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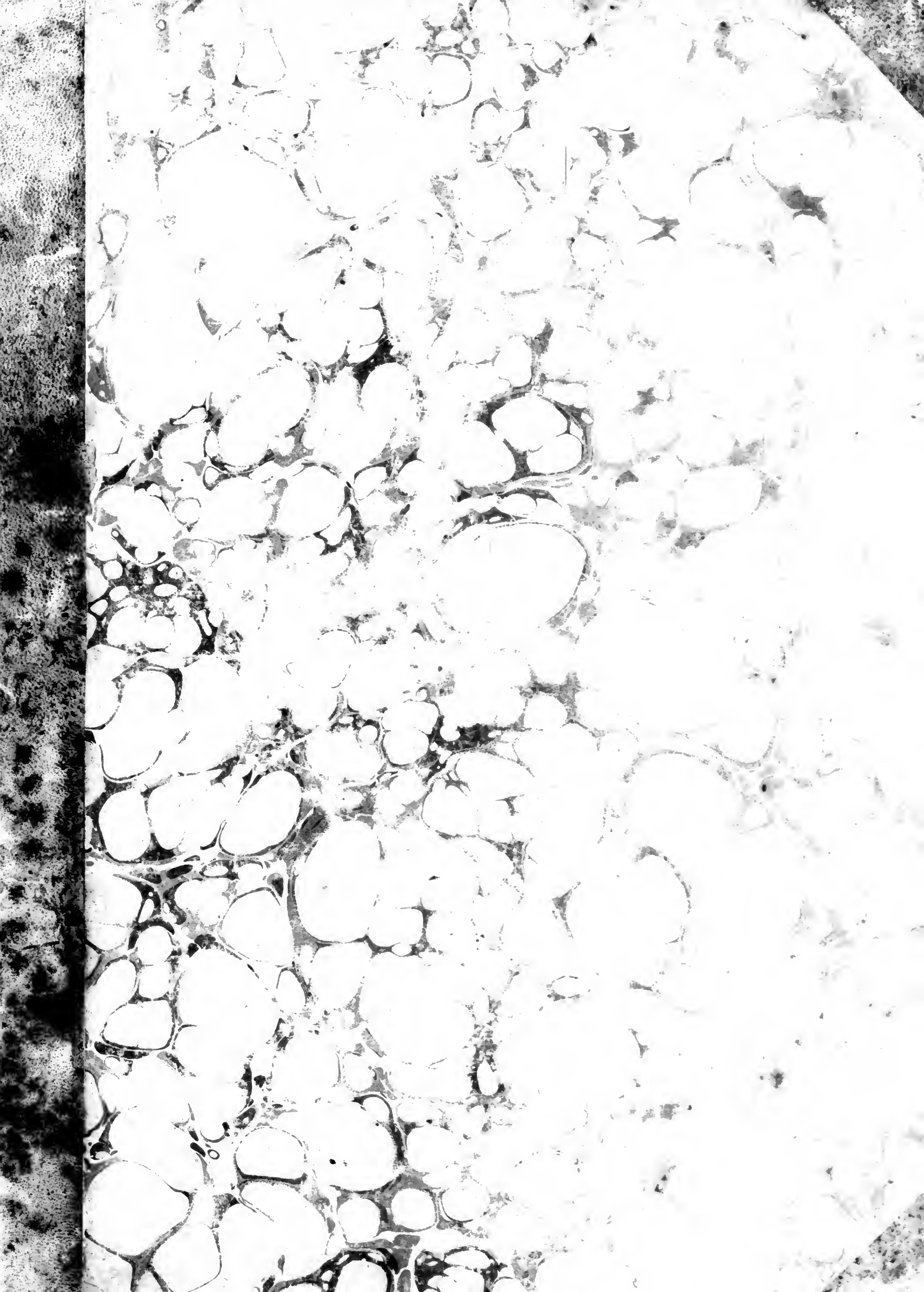

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RAILROAD JOURNAL

AND

ADVOCATE OF INTERNAL IMPROVEMENTS.

VOL. VI.----1838.7

D. K. MINOR AND GEORGE C. SCHAEFFER, EDITORS AND PROPRIETORS.

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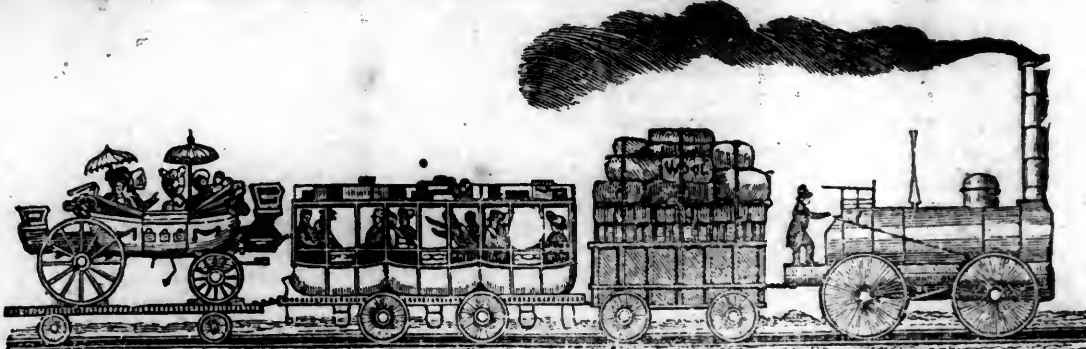

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, JANUARY 7, 1837. [VOLUME V.—No. 1

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 7, 1836.

PATENTS.—From a card attached to the last number of the Journal of the Franklin Institute, we perceive that Dr. Thomas P. Jones has turned his attention exclusively to the preparation of patents.

There is probably no one in this country, or elsewhere, who has such an extensive acquaintance with this subject, both in our own country and in Europe. Dr. J., by his situation as superintendant of the Patent Office, has had opportunities, for years, of informing himself of the details of patents—and we have ever considered his criticisms, in the monthly record of Patents, contained in the Journal of the Franklin Institute, as invaluable.

The recent destruction of the Patent Office has increased the necessity of ascertaining the originality of an invention, before taking out letters patent, while the difficulty of making such investigation has become greater than ever.

A proper preparation of the specifications is necessary to the value of the patent, and sometimes a judicious consultation with good authority on such matters, may save thousands to the inventor.

If we see any more loosely prepared papers, we shall lay the fault at the inventor's own door—no one should err in this matter, when they have the necessary information extended to them on reasonable terms.

SPRINGS, WEIGHTS, ETC. USED AS LOCOMOTIVE POWER.

We have received various communications on this subject, none of which need a reply, as they are all written by persons having little or no knowledge of the laws of matter; though possessed of considerable ingenuity in contriving and constructing. Should such persons take these laws of matter as they exist, and not as they imagine them, their inventive talent might be turned to some account.

Elementary works intended for the purpose of setting forth the laws of physics in the plainest language and without reference to technicalities, are naw to be procued in almost every village in the Union, and at an expense bearing a exceedingly small proportion to the sum wasted in useless experiment. Experience is a dear school. Quite recently we were shown by a gentleman of this city, an apparatus for perpetual motion, which cost more than thirty dollars, the necessary failure convinced him that he had been engaged in attempting to execute impossibilities.

Much has recently been said of an experiment in New-Jersey, in which a combination of springs was intended to furnish locomotive power We have never even noticed it, well knowing that failure was certain. The machinery in an attempt to put it into montion, has been partially destroyed as we undersed. This is to be regreted, as new attempts may be made, until a final test shall prove the error of the invention.

It must be distinctly understood, that no spring, weights, or fly-wheels can add power to a machine—that a man in winding up exerts as much power as the machine does during the continuance of its operation, and in some instances, where the machinery is complex a large portion of this power is lost.

Where a long contiued and uniform motion is desired without much power, clock machinery will do well enough—the moment power to any extent is desired we must resort to steam. This is as yet the only agent successfully applied to locomotion; experiments upon the use of magnetic electricity have been made upon a small scale, but the machinery is as yet too little understood in certain points of view to be able to furnish any useful hints.

We would earnestly recommend all persons who have any inclination to mechanical pursuits, to peruse before attempting to construct machinery, the work on Mechanics belonging to Lardner's Cabinet Cyclopedia—or some other popular treatise on this subject.

SCREW SETTER.—This instrument was invented and patented by Mr. George Page, of Keene, New-Hampshire, and is found by all who have used it exceedingly convenient.

The idea of the "screw setter" was suggested by observing the *delay* arising from the use of the ordinary implements for inserting screws, especially where it was necessary to counter sink the head. To do which, in hard wood, *three* different tools are generally used, whereas with the "*Page's patent screw setter*" it is all done with one tool, and in the same time that *one* of the three of the ordinary kind can be used.

The "screw setter" has a point like a *gimblet*, to correspond with the thread, a second part like a *screw augur* for the *body* and a *reamer* to counter sink for the *head* of the screw.

This little implement is of various sizes, and fitted into a *brace*, or *bit stalk*, like the common bit, and is used with the same facility. One of its greatest recommendations in our estimation, is that the screw will always fit the place it is designed to fill without being strained by a want of truth in the use of the different tools used in setting it.

Wherever they have been exhibited they have been highly approved, and although never advertised, the demand is greater than they can supply. They are manufactured by Page & Edwards, at Keene, New-Hampshire, and are sold at $3 per dozen, and of many sizes.

REPORT OF A SURVEY OF THE WATERTOWN AND CAPE VINCENT RAILROAD, BY WM. DEWEY, ESQ., CIVIL ENGINEER. TO

JERRE CARRIER,	HENRY AINSWORTH,
ROSWELL T. LEE,	SAMUEL LOCKWOOD,
EDMUND KIRBY,	GEORGE C. SHERMAN,
ISAAC H. BRONSON,	JOHN WILLIAMS,

Commissioners of the Watertown and Cape Vincent Railroad.

GENTLEMEN: A careful investigation has been made of the country between Watertown on the Black River, and Cape Vincent on the St. Lawrence, in reference to the selection of a route for the proposed Railroad, and it affords me much pleasure to state the gratifying result of my examinations.

I present a map of the country designating a ground plan of the route; also a set of profiles, showing, upon a large scale, the quantity of work requisite to reduce the surface to a practicable grade for our purposes. These papers, in connection with the notes attached, will render evident the adequacy of the estimates, upon which a calculation of the cost of constructing the Road is founded.—The surveys have been conducted with as much regard to a complete understanding of the subject, as the proposed nature of the examination would admit; and I have no hesitation in saying, that, although in the location of the Road, some variations may be made, yet, no line, judiciously established, can affect the estimate so as to increase its amount. I can pronounce emphatically, that the section of country reconnoitred in reference to this project, offers great and unusual advantages; and I confidently believe, you can invite attention to your road as one of much importance, and well entitled to the favorable consideration of the community.

A cursory examination of the country from Watertown to Cape Vincent, convinced me that the most feasible route could be found, by following down the Black River, until the hills, setting in from the North, were passed; and thence, to proceed, by the way of Limerick, to Chaumont—leaving the Bay at Chaumont, it was evident that, to avoid the steep hills crossed by the Turnpike, we should be compelled to follow a line north and north-east of the road until they should be rounded, when an easterly course could be taken to the Cape.

This general topographical view, having shown the course to be pursued in the prosecution of our design, I directed Mr. Robert F. Livingston to carry a regular line of survey from Watertown to Chaumont, while Mr. L. N. Bowlsby, with his party, examined the country from Chaumont to Cape Vincent. I shall proceed to give a condensed statement of their operations.

The line was started from Watertown, at a point on the flat, northwest of the Court House, and near the stone mill of H. H. Coffeen. Our Bench, at this place, was ascertained to be 153,073 feet above the plan of reference, or the level of Lake Ontario. My estimates are founded upon an assumption that the road will terminate at this point, and perhaps it is as near an approach to the heart of the Village, as would, under a consideration of all circumstances, be deemed advisable.

Following the flat, in a north-westerly course, the Black River is crossed in the vicinity of the County Poor-House, by a bridge 266 feet in length. Curving to the left, we advanced, in a westerly direction, towards Brownville. The route followed the bank of the River, and frequently came in very near contact with the lower road from Watertown.

Since, while locating the line of the Watertown and Rome Railroad, I had found that the entire route could be passed, without resorting to a grade exceeding 33 feet per mile, I deemed it a matter of sound policy, to use, on the line of this road, no heavier ascent. This has been accomplished; and although on some sections, particularly from Watertown to Chaumont, it has somewhat increased the expense, yet I consider its attainment well worthy of some sacrifice.

No greater rise per mile being used, when these roads are in operation, and a connection formed, engines and their trains, prepared to pass with facility from Rome to Watertown, will experience no increased difficulty, in following your route to the St. Lawrence. At Brownville our grade is 75,710 feet above the Lake, or 78,853 feet below the point of departure. Passing through the Village, we were still compelled to follow the course of the river, by hills setting quite out to its banks. An arm of the Black river, called the Basin, was crossed, and immediately after a deep ravine. Here I have estimated for 1188 feet of trestling, and 198 feet of bridging. This difficulty surmounted, more favorable ground was reached, and crossing Perch river, we passed through Limerick, and pursued a straight course, parallel to the stage road, until we reached the Village of Chaumont. With the exception of bridges at Stoney Creek, Griffin's Creek, and Saw-Mill Stream, the character of this last course is very good, and the grades quite moderate. By the profiles, it will appear that I have generally preferred obtaining a graded surface by raising embankments, rather than by making deep excavations through the ridges. The adoption of this course was induced, from the circumstance, that in most instances, the ridges cannot be cut deeper than 3 or 4 feet before metalliferous limestone, of a very compact nature, is encountered, while the embankments, whose average heights seldom exceeds 4 or 5 feet, can generally be formed by throwing up material from the sides of the road, or by availing ourselves of such knolls of loose earth as are occasionally encountered. Further investigation has shown that after leaving the Basin and Ravine, below Brownville, a route could be selected, on a course bearing more to the north than the one followed, and passing to the right of Limerick, and of the Chaumont road, which would avoid some of the unfavorable features exhibited upon the profiles; but since the course from Limerick is perfectly straight, it becomes a subject for careful consideration, to decide upon the expediency of obtaining a more level line by curving.—From Watertown to Brownville, the soil to be removed is of a light sandy character; thence to Limerick we meet with both sand and clay, and for the residue of the distance to Chaumont, the sub-soil is of a clayey nature.

I have estimated for nearly 1000 feet of trestling, and about the same amount of bridging, in approaching, crossing, and leaving the Bay at Chaumont. Limestone of a superior quality, and in convenient shapes for piers and abutments, can be readily obtained on the shores of the Bay, and within 3 or 400 feet of the bridge. It is from the shores of this bay, that these splendid blocks of limestone are procured, that are used, by the United States government, in the construction of the piers at Oswego Harbor.

The road surface of this bridge will be elevated 25 feet above the water. Considerable investigation was made, for the purpose of relieving its length and height, but a diminution of not more than from 150 to 200 feet could be effected in its line of extension, and its height cannot be materially reduced, without depressing the grades below our established maximum.

Two regular lines of survey were carried from Chaumont to the St. Lawrence. The first route proceeded on a straight course to about 60 chains above Three Mile Bay.—The crossing of Three Mile Creek is effected without any difficulty, but a short distance beyond the valley, there occurs a ravine of great length and depth, which is passed by a high trestling, and, after cutting through a clay ridge, the level of a great swale is reached. By approaching and leaving this ravine, at points different from those adopted, the amount of work can be greatly reduced; and I may here remark, that in several instances, the features of our profiles might be alleviated, by the selection of more advisable lines, but since the period assigned for field duty did not allow these changes to be effected on the gronnd, I have preferred basing my estima es upon the line, as actually surveyed, to obviate any doubts as to their sufficiency to cover the cost when more carefully located.

Having attained the surface of the swale, we followed it upon an almost level grade, for a distance of nearly two miles. Passing through the clearing called the "French Settlement," Mud or Kent's Creek was crossed near Lee's Mills, the level of another swale reached, and the line entered Cape Vincent upon a gentle grade, and with trifling excavation and embankment.

The sudden elevations and depressions that are such formidable objections to the travel upon the Turnpike Road, are entirely escaped by keeping to the right of the road, since, in that direction, the hills suddenly fall off into low swales, over whose surface an almost level line can be maintained. On the entire distance from Chaumont to the Cape, it is seldom that the vertical extent of our excavations or embankments exceed 4 feet, with the exception of the deep ravine above Three Mile Bay. Over the surface of the swales, the embankments are calculated to be formed from the deep ditches requisite here to secure a perfect drainage for the road.

The second line from Chaumont pursued a more northerly course than that followed by the first route, and for some distance proceeded parallel to the old State road, and crossed the road from Three Mile Bay at the "Soper Settlement." Here the upper extremity of the great swale, crossed by the previous line, was passed, and after rounding to the north the hills near the French Church, we proceeded to the Cape on a course not varying essentially from the first followed. The features of the second line did not differ much from that previously examined—the heavy trestling, near Three Mile Bay, is avoided, and a saving effected of a few thousand dollars, as appears by the tables of estimate.—The distance is increased 11.59 chains.

The advantages of pursuing a more inland course is possessed by this line, and consequently that of proving more generally convenient to the country. This consideration should have some weight in the determination of the line to be adopted.

While the survey was progressing from Brownville to Limerick, a line was carried with reference to a Branch road, to the new and thriving Village of Dexter, eligibly situated near the head of Black River Bay, and rapidly rising into importance. The examination showed the length of line to be 70 chains, and proved the feasibility of constructing a branch.

SUPERSTRUCTURE.—Nearly the entire distance from Chaumont to Cape Vincent, the route is located through a heavily timbered country, abounding with valuable material for the formation of the superstructure of the road.

The White Pine of this region has long maintained a superior rank in market, and offers an excellent and cheap article for our Bridge and Trestle work.

White Cedar, for cross-ties, abounds, particularly on Chaumont River, and a good quality of oak can also be obtained for that purpose. Black Ash, for the upper rails, very straight, and easily prepared, is found in immense swales. Swamps of Tamarack are also met, from which the entire road may be furnished with this timber, the superiority of which, for the longitudinal sub-sills, is generally admitted. When protected from contact with the atmosphere, no limit for its duration can be indicated, and wherever it can be obtained for railroad purposes, it is adopted.

I shall not undertake at present, to specify a mode of superstructure for this road, but shall assume the same cost per mile as that estimated for the Watertown and Rome railroad, which includes an iron rail 2¼ by ⅝ths of an inch. Suitable timber is quite as abundant upon this line, and a construction can be formed at the same cost, fully as efficient and durable. White Hemlock constitutes the principal material in the superstructure of that road, and although little of that timber is met upon this route, yet a selection can be made from the variety of other valuable timbers I have enumerated.

I subjoin tables showing the quantity of work to be performed, and the expense, to grade and construct a single track from Watertown to Cape Vincent:—

ESTIMATE.—The first section extends from a point near the Court House at Watertown, to the west side of Chaumont Bay. Distance 13 miles 35 chains.

116,147 cubic yards of Embankment,	$13,937 64
59,218 cubic yards of Excavation,	8,882 70
Bridging and Trestling,	18,652 00
Clearing,	250 00
Grubbing,	240 00
Culverts,	260 00
Road crossings,	240 00
Contingencies, 10 per cent.,	4,246 23
	$46,708 57

The first line of the second section, extends from the west side of Chaumont Bay to Cape Vincent. Distance, 11 miles 52 chains.

55,010 cubic yards of Embankment,	$6,601 20
56,219 cubic yards of Excavation,	6,746 28
Bridging and Trestling,	5,544 00
Clearing,	744 00
Grubbing,	930 00
Culverts,	500 00
Road crossings,	150 00
Contingencies, 10 per cent.,	2,121 54
	$23,337 02

The second line of the second section, extends from the west side of Chaumont Bay to Cape Vincent. Distance, 11 miles 64.59 chains.

55,612 cubic yards of Embankment,	$6,673 44
49,597 cubic yards of Excavation,	5,951 40
Bridging and Trestling,	1,848 00
Clearing,	846 00
Grubbing,	1,050 00
Culverts,	450 00
Road crossings,	200 00
Contingencies, 10 per cent.,	1,701 88
	$18,720 72

By the first line the entire distance from Watertown to Cape Vincent, will be 25 miles 8 chains.

The whole cost for grading,	$70,045 59

By the second line the entire distance will be 25 miles 19.59 chains.

The whole cost for grading,	$65,429 29
Average per mile for grading,	$2,591 76
Superstructure of the Watertown and Rome Railroad, per mile,	3,190 20
Total, per mile,	$5,781 96
25 miles 19.59 chains, at $5,781 96 per mile,	$145,965 88

In accordance with your wishes, these estimates comprehend only the grading and superstructure for a single track, with the requisite bridging and trestling, from the point at which the survey was started, at Watertown, to the place of its termination, at Cape Vincent. As respects the Locomotives, cars, station-house at Watertown, &c., it is probable, that, after the completion of the line to Rome, the intimate connection of the two roads, will cause such an arrangement as will save the expenditure, on the part of this company, of funds to procure these necessary appendages; since it would be both convenient and economical, that the same train should pass over the entire distance of the united roads from Rome to Cape Vincent.

REMARKS.—In an engineering aspect, the advantages presented by your road are:—Its cost will be much below the average per-mileage expenditure for similar works—its grades at no point exceeding a rise of 1 in 160, or 33 feet per mile, are such as can be surmounted by locomotives, with heavy loads, with much ease, and great rapidity—its departure from a straight line will not require, in the most confined locality, a less radius than 2000 feet, while in most cases, they can be projected from radii of 5 or 6000 feet—the country through which it passes abounds with valuable material, by means of which repairs can be readily and cheaply effected; and the mode of construction is that generally adopted, universally approved, and comprises an iron rail of much strength, and timber of great durability.

Since this road is mainly designed to constitute a continuation of the Watertown and Rome railroad to the river St. Lawrence, and thus afford a ready means of access, at all seasons, to the Canadas, in a consideration of the inducements it presents for the investment of capital, the principal light in which it should be examined is in reference to its forming a link in a great line of internal communication extending from the city of New-York to the far West.

Leaving the emporium of our State by the New-York and Erie Railroad, we proceed to Deposite, on the Delaware River, and thence to the city of Utica, by a route that must soon be improved. By means of the road to Watertown and Cape Vincent, the St. Lawrence is reached, and the enterprise of our Canadian neighbors will soon provide a direct communication from Kingston to Lake Huron. This line will be shorter, by many hundred miles, than any of the present means of communication with the great West, and will unquestionably form a channel much followed by the great current of travel constantly pouring into that immense region. Full seven months of the year the navigation of the Lakes is either dangerous or entirely interrupted, and during that period, this route must inevitably command a great portion of the western travel.

Indeed, if a line be drawn upon the map from the city of New-York to Kingston, it will appear that at no point, the New-York and Erie Railroad, a road from Deposite to Utica, and thence to Watertown and Cape Vincent, will depart 25 miles from the straight line—thus demonstrating that there is every reasonable prospect of the almost immediate construction of a line of communication, by the nearest possible route, from New-York to the great Lakes.—During the progress of the survey, one of my parties passed over to Grand Island, and carried across it a line of levels, demonstrating the practicability of excavating a channel, at a trifling expense, and thus avoid the necessity of unloading, or of making the circuit of the island, in passing from Cape Vincent to Kingston.

That this section of the State should have remained so long unnoticed, is truly surprising. Although possessing a soil unsurpassed in fertility, it has been until within two or three years, entirely neglected, and almost unvisited, except to carry away its Pine and Oak timber. Of late its splendid agricultural advantages have been somewhat brought to view, its true wealth has been demonstrated, and thousands of acres, but a few years ago considered almost valueless to their owner, have lately been sold, at prices that have indicated that the people are awakening to the true value of their possessions.

As a wheat and grazing country, it is destined to hold a superior rank; and its rich swales, hitherto entirely overlooked, must constitute, when properly cleared meadow land unequalled in productiveness. On every side is now beheld the cabin of the setler, and the smoke rolls up from many a clearing. Lands are increasing rapidly in value, and the construction of the Railroad will enable this portion of our State to assume a station equal, in every respect, to those whose natural location has caused their resources to be earlier developed.

Before closing, I avail myself of this opportunity to acknowledge the aid and information afforded, in the course of the survey, by the residents upon the line; and also to tender my thanks to Messrs. R. F. Livingston and L. N. Bowlsby, Assistant Engineers, and Wm. C. Moore, Assistant Draftsman, for the spirit and intelligence with which they have aided me in this, as well as other investigations made in the course of the past season.

I remain, gentlemen,

Yours, very respectfully,

William Dewey,

Civil Engineer.

Watertown, November 18th, 1836.

AUBURN AND ROCHESTER RAILROAD.

The following very satisfactory report from actual surveys by competent engineers, of the line between Auburn and Rochester, renders it in our view, certain that the railroad between Auburn and Rochester will be made, and that the stock will be very productive. We congratulate the public upon the exceedingly favorable result of this investigation, and calculate with confidence that the time is near, when our villages will reap the advantages which result from a rapid and safe transportation of passengers, produce and merchandize.

It is hoped the commissioners and committees in the several towns, will adopt immediate measures to take up the balance of the stock.

REPORT.

The undersigned, in submitting to the Commissioners of the Auburn and Rochester Railroad, the following report and accompanying estimate, does not claim to have based them on the only good route for a railroad that can be found between Auburn and Rochester. The best possible line may be yet undiscovered. The short time and limited means placed at his disposal, did not allow the examination of every pass through a country where many good lines may be had.

The surveys show a very good and direct route across the country, touching at the points designated in the charter.

The levels, distances and estimate of cost, are herewith submitted. They have been made out from lines laid down on the ground and not from conjecture. The amount of excavation and embankment is the amount which is due to the data, furnished by the minute books; so that the line on which the estimate is based is perfectly known. And although alterations may be made to lessen the cost and distance, none need to increase it.

When more minute examinations are made, it is confidently believed the cost will be lessened and the line made better.

In arranging the grades of the line, it has been found that in only two instances has it been necessary to have an elevation of more than 30 feet per mile, rising eastwardly, and only one of 40 feet rising westward.

The two and a half miles grade entering Auburn, is at the rate of 40 feet per mile. As this will be near a depot where engines will generally be waiting in working order, one can be sent to help any heavy train that may need assistance, and that without making it necessary to keep up an extra locomotive.

The other grade of 40 feet, is at Cayuga Lake, but it is very confidently believed that this can be reduced to 30 feet by lengthening the line, and this alteration is strongly recommended.

Late experiments show how small is the effective power that a locomotive has to spare on high grades beyond moving herself, and the vast advantage in point of usefulness that a grade of 30 feet per mile has over 60, 50 or even 40 feet. There are two routes from Auburn to a short distance above Seneca Falls; both are practicable, and from the selection of the northern route, to estimate upon, it is not to be inferred that the other is abandoned.

Future examinations must decide on the merits of rival routes.

The northern route passes the Owasco outlet near the south-east angle of the prison wall, and follows the general course of the stream downwards for two miles, and then passes to the valley of the Crane Creek.

There are two points of deep cutting in this distance. From Crane Brook to the Cayuga Lake, the country is traversed by ridges, running parallel north and south. We cross fifteen of these. They vary in heighth and width, but the expense of crossing them is less than would be imagined from the first glance. The grades can be so arranged as to rise and fall, and to make cutting and embankment in proper proportions, and leave the grade in useful effect equal to, if not better than 30 feet per mile, except in the cases mentioned above.

In the last mile before reaching the lake, the line bends to the north and passes ¾ of a mile, to the outlet near the junction of the Seneca and Cayuga canals. The outlet must be crossed by a bridge considerably elevated above the waters and the marsh bridge, across for a mile and a half. From the marsh the rise is to the west, and for the first mile at the rate of 40 feet per mile, and some deep cutting must be encountered, after which the ground becomes highly favorable all the way to Geneva, which is reached by a grade in no case exceeding 20 feet in a mile.

The southern route, in passing out of Auburn, will go south of the turnpike for 4½ miles, when it bends to the north and intersects the northern line at 6 miles from the starting point. It follows this line for 1 mile and then turns to cross the lake at a point half a mile below the Cayuga bridge, where the lake is a little more than a mile wide (1⅛ mile.) The bridge here will necessarily be somewhat elevated, but bridging in such still and shallow water is not expensive and the only exposure to be feared is the wind; the upper bridge will break the force of the ice. The rise on the opposite side of the lake can be overcome by some deep cutting for the first mile; after this, there is no difficulty to *Geneva*, except crossing the Seneca River at a very favorable point. Between Auburn and the lake, in several places the ridges are very narrow and high, and experienced miners will drive tunnels through these ridges in a short time, and prop them substantially, in a manner that will last ten years, and this wi'l leave the earth above the tunnel where it will be in the best possible position to be put in cars and carried on the railroad to make embankments where bridges have been erected for temporary use.

From Geneva to Canandaigua, and through to the valley of the outlet of the Canandaigua Lake the county is of a highly favorable character. From the reconnoissances made, it is confidently believed that a railroad can be constructed for the sum estimated by Judge Bates. The summit beyond Canandaigua, is easy to be reached from the valley of the outlet. From the summit near Canandaigua to the summit near Victor, the ground falls at a rate that makes it necessary to lay the lines at a grade descending west at thirty feet per mile, nearly the whole distance. The ground is generally favorable, and indeed highly so, except two miles, near Victor. It is easy either to descend the Mud Creek, or the Beaver Creek, to arrive at Victor valley; the Mud Creek will be probably found the best, all things considered. The ground after leaving Mud Creek towards Fish Creek, is broken and rolling, but easy to excavate.

From Victor summit there are two main routes to Rochester; the comparative merits of which cannot now be decided on, for want of sufficient data. One through Mendon and down Allen's Creek has been sufficiently examined to show that a favorable line may be laid there. Owing to circumstances before alluded to, no more was done than to test the practicability of one route from Mendon to Rochester.

There are three routes between these points that should be carefully examined before a decision is made as to the line to be adoped.

The estimate is based on the route from Victor summit through Pittsford to Rochester; it is very level for the first four miles to the valley of the Irondequoit, from thence for two miles, the county is very uneaven and the valley too low for the grade, causing embankment: the remaining distance to Pittsford by Carter's Basin, is fair and level for six and a quarter miles.

The route crosses the canal a short distance west of Pittsford, and keeps westerly to cross the low valley of Allen's Creek as near the canal as a due regard to direction will admit, to avoid embankment; then bearing northerly to Brighton, it passes into the city bounds of Rochester, north of Main-street, and ends at a distance of six and a half miles from Pittsford, in front of Alexander's Tavern.

The matter of damages is one in which grievous wrong is often inflicted on railroad companies. It is fortunate that the many different routes offer facilities for avoiding those persons who would be benefitted by the improvement and still demand damages. A lesson is due to such, and some may be taught it, if in choosing between two nearly equal routes, that one is fixed on where the proprietors are most ready to give up their claims for damages. Respectfully submitted to the Commissioners of the Auburn and Rochester Railroad, by their obedient servant,

W. R. Hopkins,
Civil Engineer.

Geneva, 9th December, 1836.

ESTIMATE OF SUPERSTRUCTURE.

DOUBLE TRACK.

2,640 ties *a* 40 cts.	$1,056
35,164 ft. bearing plank, *a* $15,	527
63,360 ft. Rails, *a* $20,	1,267
Laying down,	1,000
Trimming off,	1,000
*36 tons iron, 2 inches by ½ *a* $65	2,350
Total,	$7,190

SINGLE TRACK.

1,320 ties, *a* 40 cents,	528
17,582 ft. bearing plank, *a* $15,	263
31,681 ft. Rails, *a* $20,	633
Trimming road and laying down,	1,000
Iron, &c. &c.	1,170
Allow for turn outs 10 per ct.,	399
Total,	$4,293

SUMMARY OF ESTIMATES.

DOUBLE TRACK.

Auburn to Geneva,	$286,048
Geneva to Canandaigua,	178,701
Canandaigua to Rochester,	337,489
Cost of fencing,	45,545
Station Houses,	30,000
Locomotives,	50,000
Trains,	15,000
Engineering,	40,000
Damages,	30,000
Total,	$1,012,783

SINGLE TRACK.

Auburn to Geneva,	$222,433
Geneva to Canandaigua,	134,000
Canandaigua to Rochester,	253,480
Cost of fencing,	45,545
Station Houses,	30,000
Locomotives,	50,000
Trains,	15,000
Engineering,	40,000
Damages,	30,000
Total,	$820,458

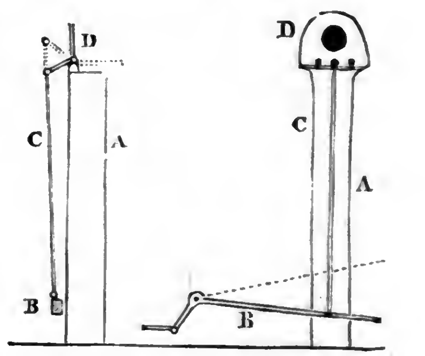
* Constracts are understood to have been made in England at six months, delivered in New-York, for $60.

From the Journal of the Franklin Institute.

ON THE MANAGEMENT OF TURN OUTS ON RAILROADS. BY A. C. JONES, Engineer.

Gentlemen,—At the present rapid rate of travelling on railroads, it is a desideratum (in point of safety,) to know that the switches of the turn outs are in the line of the road, so that the train is not necessitated to be much checked, in passing over them. The best method for insuring the right position of the switches, is that used on some short roads, by having a man stationed at them; but on long lines of road, where there are many turn outs, this is not practised, owing to the expense attending it. As a substitute, a ball is placed on the end of the lever used to shift the switches, to show their position. This, I believe, is the best plan in use; that it is defective is proved by the numerous accidents occurring on railroads by running off at the turn outs, it not being foreseen that the switches are wrong. Where the turn out is in, or at the end of a curve, it is difficult to tell by the ball how the turn out stands, until you are so near as to make it impossible to stop in time, if it is not right.

The following arrangement will have a tendency to promote safety in this particular, and the additional expense will be but trifling. Instead of the ball, I propose having a board placed on the post, its face at right angles to the road, with hinges fastened to one edge, and from its face extends a short lever, which is connected to the lever that moves the turn out, so that when the switches are changed, the dial, or board, takes either the horizontal or vertical position. This will be shown more fully by an inspection of the cuts.



On a curve or grade, this method would have the same advantages as on a straight part of the road, and it is evident, the face or edge being presented to the engineer, that he will be thereby enabled to judge how the turn out stands, at a greater distance from it, than by the method in practice, and will consequently admit of his stopping the train in time to prevent accidents.

A. The post. B. The lever. C. Connecting rod. D. Dial.

Respectfully, yours.
A. C. Jones.

Philadelphia, Sept. 1836.

This appears to be a good suggestion. A board, or disk, with a black circle in the centre, surrounded by a broad white border, would be more conspicuous, and its position, in the way proposed, more easily perceived than the ball now in use. In turn outs that are much used, it may be expedient to keep a lamp burning during the night, to show the position of the disk. It seems desirable, however, that every precaution should be taken to prevent the necessity of stopping a locomotive train in order to adjust the switches of a turn out. T. G.

Oswego and Utica Railroad.—The fall of snow last week, we understand, has caused the engineers engaged in the survey of this road, to retire from active duties in the field; but not before they had com pleted an entire line to Utica on several routes. Mr. Alton has examined the "*direct route*" by Little River, and we learn that it presents no obstacles, and that no grade will exceed 20 feet to the mile.—[Oswego Palladium.]

TERMINATION OF THE WABASH AND ERIE CANAL.—The Ohio Board of Public Works have issued an order for terminating this canal at Manhattan, a town situated at the mouth of Maumee river.

Miscellaneous.

The following letter, addressed to Professor Silliman, and taken from the last number of the American Journal of Science and Arts, is worthy of attention.

Statistical information from the various sections of our extensive territory, will not only add to our own knowledge, but be beneficial to the rest of the world.

It would be curious indeed, to observe the effects of the introduction of manufactures of various kinds, and also of the extension of internal improvement.

No other feasible mode of collecting such data can be suggested, and we hope for the sake of the artist, the student, and the manufacturer, that this letter may receive the proper attention.

ON THE ESTABLISHMENT OF STATISTICAL SOCIETIES IN THE UNITED STATES. TO PROF. SILLIMAN.—The Statistical Society in Paris have selected me as their representative in the United States, for the purpose of transmitting to them any documents which I might be enabled to procure, and for generally aiding their very useful endeavors in Paris, I respectfully desire to propose for consideration the establishment of a "General Statistical Society" in the United States, and to give general publicity to this I have selected your widely circulated Journal as the organ of communication.

The Statistical Society of France was established by Monsieur Cæsar Moreau in 1829; by the high talent of this gentleman, his extensive and varied information, joined with his activity and industry, this society has now the united assistance of almost every government in Europe. The immediate object of the Society rests upon the fact, that the knowledge of mankind increases in proportion to its tendency to observe, and that Statistical Tables, connected with general and particular information, tend greatly to facilitate this developement.

To gather and condense facts which tend to show the increase or decrease of Population, the prosperity of Arts and Manufactures, the state of public instruction, to develope the true state of Agriculture, and generally to make known the exact internal state of a great nation, its imports and exports, the state of its national funds, and those of Chartered companies, must ever claim the attention of every enlightened community. In aiding the deliberations of Government, I deem it of the highest importance, and I am enabled to state that the European Governments have already experienced great advantages from the labors of Statistical Societies, and from that of France in particular. They have tended to facilitate the views of the Statesman, by offering to him in a condensed form, the internal sources of wealth, not only of his own, but of surrounding nations; their labors render the public happiness more secure, inasmuch as the dark paths of the future may become enlightened by the experience of the past; they offer a solid basis for political and social economy, and they relieve and assist the Ministry, of a Government by condensing and bringing to a focus, not only the minutiæ, but deduced facts relative to the internal or external power of any nation, either remote or in their immediate vicinity.

In the United State of America, however, the existence of such Societies must be of incalculable benefit. The embryo gigantic powers of this Republic are now beginning to develope themselves, and it is of primary importance that the grand stream of prosperity be directed into that course which will not only secure the present prosperity, but also the future greatness of the United States, whilst it must add to the welfare and happiness of her population

The present popular system of rapid and cheap communication, has already been anticipated by the enterprising genius of the United States, and she forms a very prominent example of the immense advantages which a nation derives from the projection of such plans as shall tend to give full scope to the energies of the people, whilst at the same time it opens the paths to the developement of her internal resources, commercial, mineral or agricultural.

To mark out and prudently to direct the course of such facilities of communication, requires the aid of statistic information. The fecundity of the soil, the amount of population, the manufactured products and their separate values, each require particular consideration; and this can be obtained only by personal research. The condensation of such researches forms one of the leading features of a Statistical Society. To accumulate and condense the information given by modern authors, and more particularly that offered by persons who have occasion to visit foreign countries for scientific research, forms the object of the "Universal Statistical Society of France." To contrast the present degree of prosperity with the past, and to inquire into the causes of the increase or diminution, is its particular care; to trace the gradual development of the causes which have influenced the progress, increase, and present actual state of the wealth and power of civilized nations, forms the grand utility to society produced by their united labors; and finally, to contract into one general focus the energies of each nation, and comparing the state of their society both moral and political, their commerce, internal, and their state of Literature and the Fine Arts, with that of another Empire, demands for it the title of "Universal," and eminently merits the zealous support of every enlightened individual, whose nobility of mind prompts him to offer his mite to the general stock of knowledge.

Should this communication through your Journal be the means of having formed in your principal cities, establishments of a statistical nature, be assured that each Society will receive every aid and assistance from the "Universal Statistical Society of France," which will ever be anxious to advance their researches, and to act with them reciprocally.

I have the honor to remain,
Your very obedient serv't,
CHARLES SANDERSON.
Member of the U. S. S. of France, the Imp. Agri. Soc. of Vienna, &c. &c.
New-York, Dec. 10, 1836.

We commend the circular of M. Brongniart, to the especial notice of all interested in the plastic art.

The name of M. Brongniart, will be a guarantee for the proper use of any information that may be transmitted to him.

From Silliman's Journal.

M. ALEXANDRE BRONGNIART'S NEW WORK ON THE HISTORY OF THE ART OF POTTERY AND OF VITRIFICATION.

Museum to illustrate this subject.

In a letter to the editor, dated March 8th, 1836, M. Brongniart remarks: "I am much occupied with a work upon the history of the plastic art, or the art of pottery; and the requests which I take the liberty to annex, have for their object the enriching of a grand and instructive collection which I have formed at Sevres, of every thing relative to the art of pottery, and consequently to the perfection of the work which I have undertaken, and of which I have published the plan in an extract from the article Pottery, in the Dictionary of Technology published at Paris. It forms the half of a volume, in which I have endeavored to present the principles of the art in a manner at once practical, philosophical and elementary. I am this year about taking a journey to England and to Germany, for the purpose of collecting information and specimens for this work and for the collection at Sevres.

As this undertaking of M. Brongniart is important and interesting to science, to history, and to the highly useful and beautiful art of pottery, we publish a translation of the expose entire, and strongly recommend it to the attention of all those who, in this country, have it in their power to promote the object in view. It is quite superfluous to add, that M. Brongniart's character furnishes every security for the able and faithful performance of the duty which he has undertaken.—Ed.

SEVRES, March 8th, 1836.

ROYAL MANUFACTORY OF PORCELAIN, AND FOR PAINTING ON GLASS. U. STATES OF AMERICA.

Instructions as to the manner of co-operating towards the completion of the collection relative to the arts, connected with the manufacture of porcelain and with vitrification, founded at the Royal Manufactory at Sevres near Paris.

1. What kinds of pottery are used by the different classes of inhabitants of the country; the agriculturists, the mechanics, citizens and merchants, poor and rich?

Is the pottery of native or foreign manufacture?

If foreign, from what country does it come, and in what way?

If of native manufacture, where is it made?

II. As to the native pottery, (and under this name we include all varieties, from the most common to porcelain,) it is desired to collect and procure specimens of every sort. Common pottery, both with and without glazing. Delftware common and Delftware fine. Pottery of brown free stone; crucibles. Varieties of porcelain. Bricks, both common and those manufactured by particular processes.

Plate species.—Plates, oval dishes.

Hollow ware.—Cups, salad dishes, tea and coffee cups.

Round pots, hollow moulded.—Oval and square pieces, saucers, boxes, &c.

The largest piece of each sort that is made.

The name given in the country to each piece.

The price of each piece upon the spot.

Whether there is exportation, and to what place.

III. Fabrication.

1. *Primary materials*—for the mass or paste. Clays. Marls or plastic earths which may be substituted for them. Sands. Rocks or stones. Limestone.

For the glaze or enamel.—If stony materials—feldspar-stones.

If metalic matters—Metals, their oxides, and metalic glass.

Exact localities from which these materials are drawn.

2. *Modelling.*—Moulds of plaster, of terra cotta or other materials of whatever kind.

The lathe and other instruments for fabrication.

Sketches, with exact dimensions of these instruments, if it is supposed that they differ from those used in Europe.

3. *Baking.*—Form of the ovens sketched, with the dimensions.

*Combustibles used, indicating them in the clearest manner possible.

IV. Information peculiar to the country.

1. To designate the principal manufactures of pottery, glass and porcelain in your vicinity.

2. Whether there is in North America, ancient pottery; that is to say, pottery fabricated in remote ages, and which has not been made for a long time. This pottery is found in general in alluvial soil, in the ruins of towns, and perhaps, as in some parts of Italy, and of South America, and of the oriental countries of the ancient world, in the graves or tumuli. In Europe, these things have often been admitted into museums as monuments of antiquity but almost never as in relation to the art of pottery and its history. It is in this latter point of view that I regard them, and that I have collected a great number of the ancient pieces of pottery in the museum at Sevres.

To endeavor to collect some pieces of this antique pottery, and to indicate exactly the place and the circumstances in which they have been found, and to endeavor to decide whether it had anciently any celebrity, always however mistrusting the deception of the sellers.

3. Whether there is knowledge from traditions, inscriptions, &c, that the natives (aborigines) of North America have ever fabricated or known glass.

General instructions in relation to the purchase, packing and forwarding of the objects collected.

The expenses which may be incurred in procuring the specimens and the information, will be reimbursed by the administration of the Royal Manufactory of Porcelain, upon the statement sent to the person who shall be designated to receive the amount.

It is expected that these expenses will not rise to a great amount: it is requested, in any event, that they may not exceed, in any one year, the sum granted, i. e. 200 francs for 1836, ($40); 200 for 1837; at least without a previous understanding with the administrator of the Royal Manufactory at Sevres.

It will be necessary to pack the pieces with great care, and to consign them to a merchant in one of the ports of France, to be forwarded by way of slow transportation to the administrator of the Royal Manufacture of Porcelain; forwarding also the expenses of transportation.

It will be necessary that the correspondent at the seaport should write a letter of advice to the administrator of the Royal Manufactory at Sevres near Paris, before the forwarding—that the latter may obtain from the director general of the customs, that the box may arrive under seal, *sous plomb*, and that it may not be opened at Paris: this is very important, to the end that there may be no derangement of labels, nor any breakage. It is equally important that the tickets which may indicate the places where the pieces were made, or those from which they come, should not be separated and mixed during the unpacking. It is desired therefore that they may be fastened either with glue, or with good wafers, or with twine.

Lastly, it is very desirable that there should be attached to the case a separate box, either of lead or of tin, or that there should be sent separately, notes, previously made, of the objects collected and forwarded; taking care that a correspondence be established between the objects and the notes, by means of numbers, which shall follow each other, or by numbering the series.

Alexandre Brongniart.

From the Annals of Education.

INSTRUCTION IN AUSTRIA.

A recent work on the statistics of Austria, gives the following account of the state of instruction in this empire. There are 15,967 elementary schools, under the name of trivial (primary,) high, secondary, Normal and practical schools, and 8,964 schools of repetition. The whole number of pupils is 1,993,522. They are taught by 21,801 teachers and assistants, and 10,252 catechists or religious instructors. They are under the superintendence and inspection of 14,011 clergymen, who are at the same time local school directors.—And the whole is superintended by 845 district inspectors of schools.

In the institutions for the deaf and dumb and blind in Vienna, Prague, Milan, Gratz, Lemberg, Lintz, and Brixen, there are 300 pupils. The polytechnic school in Vienna, is under the direction of 35 teachers, and contains 747 students, of whom 265 attend the real or general practical school, 87 the commercial division, and 395 that which relates to the arts. The school of forests contains 66 pupils, under the care of a director, and 4 teachers and assistants.

GRATUITOUS SCHOOLS OF DRAWING FOR MECHANICS.

Two gratuitous schools of drawing have been established by an individual in Paris—M. Charles—for the instruction of mechanics. One was formed before the revolution, and involved its founder in suspicion as well as difficulty. For more than six years, however, he has devoted all his evenings to this species of instruction, without any compensation. His object was, to enable mechanics to pursue their employments with more rationality and success; to exercise the eye and the hand, and to elevate their taste, and thus to raise them above the temptation to low vice and degrading amusements. The municipal council of Paris has, at length, assumed the expenses of these schools, and has directed the organization of similar establishments throughout the city. At a public exhibition, more than six hundred pupils were present, and medals were presented, in the name of the king, to the most meritorious.

[Ibid.]

HAVERFORD SCHOOL.

The Friends of Pennsylvania have a flourishing school at Haverford, in Delaware county, whose object is, in their own language, "to combine sound and liberal instruction in literature and science, with a religious care over the morals and manners; thus affording to the youth of our society an opportunity of acquiring an education equal in all respects to that which can be obtained at colleges, without exposure to those associations which are apt to lead them away from the simplicity of our religious profession."

The buildings of this institution—for chambers, school-room, families of the teachers, library, infirmary, &c.—are ample and commodious; at least, comparatively; though we do not consider sleeping rooms, nine feet by five feet six inches, large enough, even when they are as well ventilated and neatly furnished as those of the Haverford school.

"The course of instruction extends to four years, and embraces the Latin and Greek languages, ancient and English lit-

*The requests for information and for specimens. apply equally to glass manufactures and their productions.

erature, mental and moral philosophy, mathematics and natural philosophy.—There is also a preparatory department.—The students are under the direction of a superintendent, four teachers, a teacher of the introductory school, and an assistant superintendent.

"With this school is connected a valuable tract of nearly 200 acres, which is in the process of arrangement and cultivation, as a farm and garden. The library has commenced with about a thousand volumnes; a philosophical apparatus is provided, and a collection of specimens in natural history and mineralogy is begun, in connection with a generel museum of curiosities."—[Ibid.]

GLASS BEADS.—Few persons, probably, are aware of the amount of trade carried on in this apparently insignificant article. We are told, that from Venice, which contains the principal manufactory, whole ship loads are annually sent to different quarters. The principal customers for them are the various savage tribes in our own continent, in New-Holland, the Pacific Islands, &c. This branch of the glass manufacture still remains to the Venitians, nearly the sole relic of their once boasted superiority in every departmant of the art. No other nation can rival her either in regard to variety and beauty of color, or cheapness of production.

The glass-houses are erected on the island of Murane, about half a league from the city. The alkalis employed are soda and potash the the sand is found in abundance on the neighboring coast. The coloring matters are obtained from the mineral kingdom, and so varied, that the beads present more than two hundred different shades. While the metal is in fusion, the workman dips into it an iron tube, five feet long, and withdraws a certain portion of the adhesive mass. A hole, corresponding to that of the tube, is then made through it. Two workmen have such a tube thus prepared, join them together by the ends, and then separate as rapidly as possible, stretching the PASTE between them. A tube is thus formed, varying in length and fineness, according to the distance which can be attained before the glass cools. In some instances the tube reaches one hundred feet in length, and becomes like the finest hair. They are divided in pieces of two feet in length and then submitted to the bead maker, who with a sort of hatchet, cuts them into fragments of a length equal to their diameter. These fall into a box of powdered charcoal and clay, which gets into the beads, and prevents their filling up when subjected a second time to the action of the fire. Thus cut and mixed with a certain quantity of this dust, they are put into an iron cylinder, sealed hermetrically, and by means of a handle are turned over the fire until the vessel acquires red heat. The beads are then sufficiently softened to lose their asperities and become smooth by friction, and when taken out, it remains only to wash and sort them which last operation is effected by a series of seives of different degrees of fineness. They are then given to women, who thread them in rows of six or seven inches long, and such is the rapidity with which this is practised, that the work can be procured at the rate of a little more than one cent for 120 rows. This quantity sells at from four to ten cents.

LAUREL HILL CEMETERY.

We have lately visited, with no common feeling of admiration the new and beautiful rural burying ground which a few liberal minded citizens have provided at Laurel Hill, on the river Schuylkill, just below the Falls, and about three and a half miles from the heart of the city. In situation and capabilities it is every thing that could be desired, realizing the wish of the poet to the very letter :—

"Mine be the breezy hill that skirts the dawn,
Where a green grassy turf is all I crave,
With here and there a violet bestrown,
Fast by a brook of fountain's murmuring wave,
And many an evening sun shine sweetly on my grave."

Here the last resting place of friends and relatives may be visited without any of those disagreeable associations connected with our city grave yards. Here the visiter will not be shocked with the mouldering coffin or sunken yawning grave; here the dead will repose amid the beauties of nature, and their memories be associated with the most soothing and most simple emblems of mortality—emblems that are at once the most eloquent advocates of religion, and morality, and the most determined foes to unnatural fear and superstition. Here will be found the tokens of a true and heightened feeling of respect towards that which is again to spring into life—which at once attests man's superiority to the rest of creation, and inculcates the salutary conviction that the spirit lives eternally.

Following out an enlarged view of what will be permanently useful, the proprietors have erected a handsome entrance, of graceful Roman Doric architecture, enclosing Porters' Lodges, &c.; a handsome Gothic Chapel, and a Superintendant's Cottage: a large receiving tomb is ready for those who may have occasion to employ it while they are erecting their own. The very large dwelling house is to be converted into one spacious room large enough for any procession to take shelter in; this and the Chapel will be warmed in winter. In addition, there are spacious coach houses, so that as far as we could judge nothing has been neglected, and the public, while they will be amply accommodated, will have cause to remember those by whom this much needed improvement has been effected.

The Cemetery is one hundred feet above the Schulykill, which washes it on the West, and is bounded on the East by the ridge road turnpike; the latter affords ready access in all seasons. East of the ridge road the company have a small farm which has been converted into a flower garden and nursery; its superintendant, Mr. John Sherwood, formerly gardner to Mr. Platt, will supply shrubbery for lot holders, and at their request keep their lots in perpetual bloom with roses, &c.

The company will no doubt receive a charter from the present Legislature, and give deeds in fee simple forever to purchasers, subject to wholesome rules satisfactory to all; the price, considering the heavy outlay, is esteemed very reasonable. A very large number of citizens have purchased, and every day adds to their number.

New-York and Baltimore, by municipal regulations have enacted that no burials shall take place within the city; it behoves all of us to anticipate such a law here, and by the removal of our deceased friends to this spot, or by preparation for our families, make arrangements for their quiet repose hereafter TOGETHER. We observed that families, brothers, sisters and cousins, &c., are selecting their lots in the vicinity of each other, that those who were united in their lives may not be separated. Husbands are removing their deceased partners, wives their husbands, children their parents, and parents their children, from the closely crowded grave yards of the city, and with pious care depositing them where they can join them when their earthly pilgrimage is over. Already is the ground studded over with a hillock or a grave stone here and there, and we learn from the Superintendant that very many removals are immediately contemplated.

Alexander Wilson, the distinguished ornithologist expressed a natural wish that he might be buried "where the birds would sing over him;" will not our citizens all unite in heart and purse to carry his wish into execution? We understand such a proposition is entertained, and that a prospectus has been issued to transfer the bodies of Wilson, Godfrey, the undoubted inventor of the Quadrant, Rittenhouse, and Say, to Laurel Hill, and erect over them a mausoleum with suitable inscriptions. Every one we should suppose would contribute to this laudable object.—[Philadelphia Com. Herald.]

BALLOONS.—The practicability of aerial navigation has been much discussed in the recent English Journals.

We have given our readers descriptions of the construction and ascent of Mr. Green's large balloon. We now lay before them several articles on the subject, from the London Mechanics' Magazine. Some information and much amusement may be derived from the perusal of them. We commend to special notice the idea of using carbonic acid gas for ballast, and of reviving the Montgolfier balloon!!

From the London Mechanics' Magazine.

IMPRACTICABILITY OF AERIAL NAVIGATION—MONTGOLFIER'S PREFERABLE TO GAS BALLOONS.

Sir,—The subject of aerostation has been more fully and better discussed in your periodical than in any other; but although your intelligent correspondents have, during the last twelve years, supplied you with numerous observations and ideas on the subject, nothing essentially new or important has been elicited. This comes from the sterile nature of the thing itself. No one, as the homely saying is, can "make a silk purse out of a sow's ear." It is quite astonishing to observe how so many men of good sense can talk of propelling and *directing* a balloon through the air, on principles derived from "the way of a ship on the sea!" A vessel either on or in a mass of water can be propelled even *against* a current of that water, because the density of the medium allows of a power being applied of a velocity within the reach of our physical organs to produce. But for a power to be applied (in an analogous way) in the car of a balloon, against the air, in which the whole machine is immersed, it must have six hundred times the *velocity* of the stroke which will produce the same effect upon the water. Some persons say, "we will take up a steam-engine," &c. But the more weight you take up, the greater must be the dimensions of your balloon!—After all—for it is loss of time to argue such a matter—it is evident that no power can draw a balloon against the slightest zephyr, but one which would *place the car and the balloon on a horizontal line together*, like a horse drawing a cart. With regard to the elongated and fish-like shapes that have been so often proposed, the fallacy is still more afflicting. When there is no power of propulsion through the fluid. how can the position of the elongated body be decided?—Even a barge going down a river *along with the stream* has not the least power of steerage by the rudder, because it does not go *through* the water, but *with* it: without *external* power applied, either of traction, oars, or wind, it goes along sideways, or any way, just as it may happen. Another fallacy in the ideas connected with an elongated fish-like balloon is also of a serious nature, setting aside the *physical impossibility* of propelling it. How is it to be kept in a horizontal position? A balloon of such a shape (like Egg's the Pall-Mall gun-smith, or of Col. Lenox's "Aerial Ship,") being filled with gas and set up without any load, would certainly be liable to rise in any way but the one desired. If to prevent its bursting by the expansion of the gas, it were only three quarters or two-thirds full, it is ten to one but that it would rise up *endways*. If a net, car, &c., were to be attached to it, with a load of passengers, it would double up into the shape of a crescent; that is, if the gas did not rush *to one end* (which is most likely,) and so defeat all the fish-like calculations of the constructors!—A stout back bone to the fish-balloon might prevent the doubling up I speak of, but it would not save the chance of going up endways, much to the inconvenience of the travellers in the car beneath. But it is absolute waste of time to dwell on such nonsense.—It is a pretty thing to see a balloon ascend when you are near it at the time, and will answer the purposes of the proprietors of public gardens, &c. The near view of any large mass in motion, such as a ship launched, a huge tree falling, &c., convey a novel and peculiar feeling to our senses.

In 1810, Madam Blanchard, the widow of Blanchard who, with an Englishman, crossed in a balloon from Dover to Calais, arrived at Naples with her balloon. An ascent was ordered by the King (Murat) to take place from the *Campo Marte*, on an occasion when there was to be a grand review of troops. In consequence of my known chemical propensities, the King ordered the talented Giovanni Dall' Armi and myself to make all preparations, and superintend the inflation and ascent of the balloon. It was settled that *I* was to have ascended with Madam Blanchard; but owing to the exhibition having been countermanded on account of the weather, after operations had began, and then reordered, the balloon was not sufficiently buoyant at the hour appointed to carry two persons, so *I*, to my great chagrin, was left behind. Madam Blanchard had in her possession a Montgolfier baloon, which she sold me for 40*l*. With that balloon I purposed making a series of experiments upon that principle alone, of which, in my opinion, balloons can ever be made to take advantage, which is, various currents of air crossing each other at differant elevations in our atmosphere.

A balloon filled with hydrogen gas, provided with sand-bags for ballast, &c., can only rise by throwing out ballast, and descend by allowing an escape of gas. It is evident that these operations cannot be repeated beyond a certain limit, because you have no means of replenishing the ascending power. A Montgolfier balloon is inflated and rendered buoyant by means of flame, just like the paper, "fire balloons" of our tea-garden entertainments. A Montgolfier balloon, made of cotton "broad cloth," forty feet diameter, will carry up four persons. A circular grate or fire-place, of three feet in diameter, is suspended concentrically in the inferior opening of the balloon; which opening is about seven feet in diameter.—Around this opening is a wicker gallery (instead of a car, as in the gas balloons.) The persons in this gallery, being provided with a store of little faggots of dry wood and a long-handled fork, keep up the fire by supplying it with fuel. When it is desirable to descend, the fire is allowed to wane; an increased fire occasions a rapid rise. Thus it is absolutely at the discretion of the aeronauts to rise or fall, as long as their fuel endures. The fire-grate is provided with a hinged cover, so that it may be extinguished at once, or the bottom of the grate may be let out, so as to vacate all the fuel. With such a balloon, even when the fuel is *all* expended, a fresh supply may be had almost any where; and thus the search after various currents of air may be far more successful than with one of hydrogen gas. I look upon the Mongolfier balloon as less liable to accident than the other, which is liable to burst, or to be ignited by an electrical discharge from the clouds, or to fall too rapidly through any over-opening of the valve.—The flame from the fire-place of a Montgolfier balloon ascends vertically into the interior without the slightest vacillation. The flame of a candle in the car of a gas balloon could not move were it blowing a gale of wind, because the balloon goes *with* the wind. But still less can the flame *in the interior* of a Montgolfier balloon waver. To protect the cotton tissue of the balloon from sparks, it is quite sufficient and effective to saturate it with a solution of alum. The circumstances through which I lost my Montgolfier balloon, before it came into my possession, are not worth detailing. It was seized at the Turin custom-house as English cotton goods. I, however, made a smaller one myself, by experimenting with which I have arrived at the above conclusions; but shortly having other things to attend to, there ended my ballooning project. But if any one would now be at the expense of constructing such a balloon, I should be very happy to furnish him with my *modicum* of knowledge and assistance on the occasion, and be the first to make a demonstration of *that which I conceive to be the best method of ascending and passing through the air by means of a balloon.*

Marshal Jourdan was commander-in-chief of the French army in Flanders when a balloon was made available to the taking of all the plans of the enemy's lines. I have conversed with him at length on the subject, and he allowed that a Montgolfier might be constructed, filled, elevated, and applied to all such purposes, when it would be impracticable to procure hydrogen gas, or a balloon sufficiently impervious to retain it. The Montgolfier requires no varnish. Gas escapes through all those hitherto applied.

Almost the only useful purpose to which I could think of applying an hydrogen gas balloon would be the establishment of a communication between a stranded ship and a lee-shore. About three years ago I addressed you a letter on that subject, but I cannot say in what number it appeared. I gave you a detailed description of the apparatus required. The Portable-gas Company compress thirty volumes of gas into one, into vessels of thin sheet-iron with ovoidal ends. Such a vessel charged with one hundred cubic feet of the best gas, might easily be fitted into the bottom of a large cask. The empty balloon being placed over it, and communicating by a tube and stop-cock. In the same cask might be arranged a long cord of the lightest and best materials. The whole apparatus, properly made and packed, would always be ready on deck like a mere water-cask. The balloon once up, by adding more rope to the thin one belonging to it, must come at last into contact with the edge of a cliff, or with the surface of any lee-shore.—The balloon might also be made to take up a small grappling, composed of three or four shark-hooks tied back to back. I fear, however, that there would be considerable risk of the balloon's being torn by the yards, &c., of the ship before it could be got clear of it.—In the case of a low coast without cliffs or high rocks, an empty water-cask, protected by sacking, &c., would take a line on shore as well as a balloon. Apropos of water-casks and provision-casks, I have suggested many years ago, that if, as these become empty, they were to be bunged up and stowed so as not to be washed away, their buoyancy would prevent the vessel from sinking even when she was full of water. All the trouble is in well bunging up the casks when they become empty.

Yours, &c.

F. MACERONI.

September 10, 1836.

From the London Mechanic's Magazine.

TRACTABILITY OF BALLOONS—COMPARATIVE SAFETY OF MONTGOLFIER AND GAS-BALLOONS, ETC.

Sir,—Your correspondent, "Umbra Montgolfieri," takes, on the whole, a fair view of the ballooning subject of my last communication; but *some* of his remarks and facts require emendation.

I do not state that no degree of motion whatever can be imparted to a balloon through the "vigorous manœuvering" of properly constructed flappers by the persons in the car. But it must be in a *perfect calm*, such as "Umbra" himself says that Messrs. Roberts were favored with in June, 1784, when they travelled 2000 yards in 35 minutes by means of their oars. This *may* be; but I should like to have *seen* the operation! I have a shrewd suspicion that the air was not *perfectly* quiescent; and that what little motion it had was in favor of the rowers. "Umbra Montgolfieri" did not *see*, either this operation or that of M. Testu; I wish he had! The flying gods and devils of our pantomimes are seen to "apply themselves most vigorously to manœuvring their wings;" but I doubt its being through their aid that they fly from one side of the stage to the other!

With regard to the comparative danger of the fire and the gas balloon, "Umbra" is not quite correct in cases which he quotes. Pilatre de Rozier lost his life by ascending with a double, or rather with two balloons—one of hydrogen gas, the other *a la Montgolfier*. In this strange conceit, I forget which of the two he placed uppermost, but the fact was, that the gas caught fire and exploded so as to destroy the whole concern. I have no encyclopedias to refer to, but I remember, thirty years ago, reading the account of this catastrophe, as given in the *Philosophical Transactions* by Mr. Cavallo, the electrician and chemist, who was an eye-witness of it. When Blanchard and an Englishman passed in a gas-balloon from Dover to Calais, they were dragged through the water more than half of the distance; although, to increase the buoyancy of the balloon, they divested themselves even of their clothes.

Madame Blanchard was killed at Paris (in 1816, I think) through the gas taking fire. It is true, the car was illuminated, and I think she had some fireworks to throw down! Mademoiselle Garnerin, whom I also knew very well, shared a similar fate, though I do not remember the particulars. Her father, Garnerin, a professed aeronaut, came to England some years ago, about a *pasteboard gun* (!) of his invention.

The most distinguished of all the early aeronauts was the rich and scientific experimenter, Count Zambeccari, of Bologna, who was a near relation of my father. The Count constructed several balloons, both *a la Montgolfier* and gas. At that time it was a serious expense to fill a balloon with gas, which was obtained by the decomposition of water by means of iron and sulphuric acid. I have above noticed the circumstance of Blanchard and his companion having been dragged through the water, on their way from Dover to Calais. I now mention the name of Zambeccari, in order to draw the attention of your intelligent readers to a circumstance which it would be well to investigate, before our aeronauts again venture in a gas-balloon to cross the sea. This distinguished experimentalist made several ascents in a Montgolfier balloon, with which he exhibited the faculty of continually rising and falling in a most satisfactory manner. With his gas balloon, however he was twice in imminent danger of perishing. A south-west wind carried him from Bologna over the Adriatic sea. No sooner had the balloon got fairly over the water about six miles from shore, and although it was at the height of 5000 feet, it suddenly began to descend. In vain did the aeronaut hasten to throw out his ballast, for notwithstanding the ejection of every particle, together with some provisions, bottles, extra clothing, and even barometer, thermometer, &c., the car soon touched the water, and Zambeccari, half drowned, was taken up by his boats. Struck by this apparent anomaly in aerostatics, and with a view of discovering some circumstance that might account for the fact which he had witnessed, Zambeccari, nothing daunted, made another ascent, with a south-west wind which speedily put him on his way to the shores of Dalmatia. He had some fast going feluccas to attend him, which, with all canvass set and nimble oars, followed him with almost the swiftness of the sea-gull's flight. The balloon was kept as full of gas as safety from expansion would possibly allow. But all would not avail—every grain of ballast had been thrown out, besides all other objects, as on the former occasion: the balloon descended on to the waters, as though overcome by an invincible attraction, and the intrepid philosopher, many miles a head of his friends in the feluccas, was dragged along with little hopes of being overtaken. I forget whether he was overtaken by one of his own boats, or rescued by some other vessel. He remained, however, so long a time in the water, or rather "between wind and water," that his hands and feet were "frost-bitten," and his health impaired for a long time after. I do not pretend to furnish any clue to the explanation of the above phenomena, which we here see repeated on three very marked occasions. *Perhaps* it is no phenomenon at all, but was merely the result of accidental causes, which escaped the notice both of Blanchard and Zambeccari. I do not see how any affinity and relationship between the hydrogen gas in the balloon, and that component of the water, could ever cause the effect described. We are not prepared to reason upon a thing before we are well assured that it, in fact, exists.

"Umbra Montgolfieri" proposes to construct the lower portion of a fire balloon of asbestos or wollen stuff. This is not necessary. The solution of alum in water renders paper, cotton, or linen, quite incombustible. The balloon (or any balloon) may be made so as of itself to answer the purpose of a parachute, by fixing a broad hoop of beechwood around its meridian. I am aware of the non-conducting qualities of silk and of hydrogen gas; but should an electric spark happen to pass through the mixture of gas and atmospheric air, which occurs on every opening of the valve, I should not like to be in the car at the time.

Should any such Aeronautic Club, as is proposed by "Umbra," ever come into existence, I shall be glad to furnish all the assistance in my power; but I really do not think that *any kind of balloons* is worth the attention of men, who wish to devote their time and labor to objects of utility and benefit to mankind.

I have the honor to be, Sir,
Your obedient servant,
F. MACERONI.

From the London Mechanics' Magazine.

IMPROVED DOUBLE BALLOON, WITH HYDROGEN AND CARBONIC ACID GASSES.*

Sir,—I take the liberty of sending you the following description of a machine which has occurred to me. Should you deem it worthy of insertion, it may at least suggest an improvement in ballooning.

I am, Sir,
Your most obedient servant,
ROBERT MUNRO.

August 24, 1836.

In the accompanying figure A is a balloon of the common form and material filled with *coal gas*. B. is another of smaller dimensions filled with *carbonic acid gas*, until its weight is nearly sufficient to prevent the rising of the machine; C. a car suspended from the upper balloon in the usual way; D, a slender steel-rod, or a rod of twined bamboo canes passing perpendicular through these and fastened to the silk at A and B; E, a sail fixed to D; close to the ends of the rod there is a valve at each extremity opening inwards, and acted upon by a cord running alongside the rod and affixed within the car.

This machine does not require much explanation here; it need only be said, that while the contents of the upper balloon are near the *lightest* of aeriform fluids, those of the lower are the *heaviest;* consequently they will each exert a power acting differently. When the machine is afloat in the atmosphere, by permitting a certain quantity of gas to escape through the upper valve, this will diminish the ascending motion, which then yields to the heavier, and by acting similarly upon the lower valve in proportionate quantity of the carbonic acid gas will fall down and the effect will be reversed; and by a nice adjustment of both the powers, may be made to balance, and the machine will become *stationary* at any elevation.

Now, as the rod is continually kept in a perpendicular position by the opposing powers, and as the whole was connected together and kept uniform by it, it is obvious that when the machine is stationary it would move horizontally before any force opposed to it, consequently a sail might be applied, though the surface of the machine itself might be sufficient to cause it to move before the wind.

The above arrangement would be very suitable for taking plans and bird's-eye views. It is in the power of the voyager in the ordinary balloon to cause it to rest at any elevation, but this only by a very inconvenient process, and one that is not always practicable; but this advantage is possessed by the present to such extent, that the mere adjustment of an index may

*The figure is omitted as the arrangment of the apparatus can easily be conceived.

cause the effect; but all independent of the *safety* of it, which would bear the most severe breeze as its becoming disarranged or tossed, would be impossible.

I mention, though well known, that carbonic acid gas is most easily procured, and at an expense far below that of coal gas or hydrogen.

From the London Mechanics' Magazine.

BALLOONING.

Sir,—It gives me great pleasure to perceive that an attempt is about to be made to turn air-balloons to some useful account; and that the conduct of the undertaking is likely to be intrusted to the active mind and enterprising spirit of Golonel Maceroni. Perhaps the whole amount of utility to be derived from air-balloons is very limited; but they are not on that account to be disregarded. We must not despise small things; the happiness of mankind, such as it is, is made up of a number of small enjoyments. It is a pity, I had almost said it is a disgrace to an intelligent nation, that this interesting art should be allowed to remain in its present worse than useless state. At all events, the mere attempt to advance it is honorable; whilst the failure can be nó disgrace.

The difficulty consists simply in this;—The resistance is greater than any power that has been hitherto applied to overcome it. To meet this difficulty, we must *increase the power* and *decrease the resistance.*

With respect to the power, I would refer Colonel Maceroni, and your readers generally, to a paper on that subject in No. 637 of the *Mechanics' Magaxine.* To decrease the resistance, the present globular form of the balloon must be rejected altogether; nothing can be done whilst this shape is retained. It appears to me that an oblate cone offers the largest capacity with the smallest resistance, or rather a cylinder with conical ends. The cylinder might be kept in a compressed form by connecting the opposite sides by means of cords in the interior of the balloon, so as to allow of its being distended by the gas in a lateral direction only. Colonel Maceroni objects, that the cone might rise endwise, or any way but the desired one. This may be easily guarded against by having the interior divided into several compartments, so as to prevent the gas from shifting.

I am convinced that the difficulties and obstacles which at present appear to stand in the way of this undertaking, may be overcome by ingenuity and perseverance—and that in *calm weather* a balloon might be conducted with safety and certainty in any direction that the æronaut might desire to steer.

I am, Sir,
Your obed't serv't,
T. S. Mackintosh.

Sept. 26, 1836.

From the London Mechanics' Magazine.

CONSTANT CURRENTS OF WIND AT HIGH ALTITUDES.

Sir,—I think that if, as has been lately stated, there are at different altitudes opposite currents of air always blowing in the same direction, aerostation may, notwithstanding all that has been said about it, prove a pleasant but sure method of travelling to the continent and back again. Now, as is well known, directly any portion of the atmosphere gets heated, it becomes rarefied, and as such it is lighter than it was before, and consequently it rises, and the cooler air rushes into the space that it before occupied, and thus forms a wind. As the sun may be considered always over the equator, the air directly under it, or that in the middle of the torrid zone must become considerably warmed, and consequently rise, and there must be a corresponding rush of cooler air below from the north and south to supply its place. That there is such, is known in the form of the trade winds, and the reason of their not being due north and south is owing to the whirling of the earth; but the heated air becoming cooled as it ascends, must in the upper regions form an opposite blast to the trade winds; and it has been clearly seen that there is such, by large masses of clouds being obsesved rapidly moving at a great height in a contrary direction to the wind, at the surface of the earth. A balloon taken to almost any part, within thirty degrees of the equator, would quickly ascertain at what height the change took place, and *ballooning* might prove of utility out there, if it never does in this country. Although the winds near the earth in the temperate zones are not, from various local circumstances, very steady, there is great probability that there may be differrnt currents at some height, and it could be easily ascertained by a few aerial trips made by an experienced person on purpose for that intent.

With respect to guiding balloons by sails, supposing that by placing them obliquely you were enabled to obtain a little side way, it would, I think, be too trifling, compared with the length you would have gone in the same time with the wind, to be of any practical advantage, and to compensate for the greater size and expense of the balloon. It is as unreasonable, in the words of Dr. Arnott, to suppose that an insect, driven along ar the rate of eight or ten miles an hour by a river torrent, should have power to stop or sail against the stream, as a man in a balloon by means of wings or sails, could resist or change a motion in the air generally exceeding fifty miles an hour.

I remain Sir,
your obe't serv't.
Vincent Brown.

Mummy Cloth.—In the mummy pits and sepulchres of Egypt, there are such immense quantities of the ancient cloths, in which mummies were enveloped, that the article has become an object of speculation in Europe, for the use of paper manufacturers. These clothes are linen, and sometimes possess great beauty and delicacy of texture. It is observed that the warp has twice or thrice, and often four times as many threads in an inch of cloth, as the wool has. Modern weavers consider the circumstance as a proof that the Ancient Egyptian weavers threw their shuttles with the hand.

A very good article appears on the French side of the *Courier de la Louisiane* yesterday, relative to steam ships across the Atlantic; and though we disagree with the writer in the inferences which he draws, we may be permitted to avail ourselves of the facts which he has industriously accumulated, in our own manner.

There are now regular lines of steam-packet ships from Falmouth in England to Corunna in Spain, to Lisbon in Portugal, to Cadiz and thence to Gibraltar, Malta, Corfu and Alexandria in the Mediteranean. There are steampackets faom London to Dublin, to Edinburgh, to Dover, to Havre, Antwerp, Hamburgh, Bordeaux and various other places. From Liverpool, there are steamboats to Dublin, Bristol, Bordeaux and other places. From Southampton also in England, there are lines to Havre and other ports of France. And from Hull, Dover and Brighton, there are similar lines across the English channel.

From Havre there are regular steamboats to the places above mentioned and to Hamburg and various ports on the continent. Also from Hamburg, Rotterdam, Ostend, Dunkirk, Boulogne, Bordeaux and Dieppe, there are similar lines. Even in Russia, there are steamboats from St. Petersburg to Riga, Stockholm, Lubwick and Hamburg.

In short there are steamboats or ships plying between the principal ports of the German, English and Irish channels, the Baltic and Mediterranean seas, and the bay of Biscay. There are also steamboats in the Red sea, the Persian gulf and Indian ocean.

In this country there are steamboats on the ocean from New-York to Boston and to Charleston; and from Boston to Portland.

But it is remarked that the voyages in every instance may be considered coastwise, or that at least no boat is longer from land than four or five days; and therefore concluded that coastwise voyages alone can be performed by steamboats or ships. It is known the ancient navigators never performed other than short voyages till the invention of the compass; it may be inferred that steam is now in its infancy as sails had then been; and that invention will again second an ocean voyage. It is admitted that a steamboat sailed in 1825 from Falmouth in England to the Cape of Good hope, there took in fuel and sailed to the mouth of the Ganges in the East Indies, making the whole voyage in 105 days; and we yesterday remarked in the Standard, that a steamboat that had sailed from London arrived at Oahu in the Pacific ocean, after a passage of 105 days. But it is supposed that because an attempt was not made afterwards to establish regular lines of steamboats between London and Calcutta *via* the Cape, therefore the first attempt was successless—although it should rather have been inferred that though the practicability of the project was fairly proved, the ordinary trade and travel between those ports could not defray the necessary expenses of such a long voyage.

A vessel of war carrying 120 guns is usually 190 feet long. The steamboat North America on the Hudson river is 222 feet long. The steamships intended for the line between Liverpool and New-York, are 194 feet long, 30 wide, and 18 deep. There will be two engines of 400 horse power.

Another objection to the use of steamships on the ocean, is the space necessarily occupied by the machinery and fuel, to the displacement of cargo. This is but in appearance; for the size of the steamships is increased beyond the ordinary tonage of merchant vessels, so as to give greater space; and the objection relative to the quantity of fuel necessary for long voyages would certainly be obviated in the establishment of lines from New-Orleans to any port in Europe or South America, as there are several intermediate places where fuel could be supplied for 10 or 12 days, were such a quantity required.

The expense of constructing and equipping steamships is another objection; but as the profits attending the superior facilities and intercourse of such ships would amply cover all outlays, the objection is not more valid against steamships compared with common packets, than with common packets compared with transient vessels.

From the Farmers' Register.

COAL DEPOSITES NEAR FARMVILLE.

FARMVILLE, OCT. 22, 1836.

At a time when the whole country is so much interested on the subject of railways, it may not be improper, to trouble you once more, in relation to the coal deposites in this neighborhood. I feel the more excusable for this, inasmuch as, in my previous communications, I have expresed so much doubt with regard to the existence of coal in large quantities. I am happy now to state, that my doubts are nearly removed, and that I think I have good reason to believe, that we have in this vicinity, a coal-field of incalculable value. Should this opinion prove correct, much importance will be added to the construction of railroads through this place; more especially, if the rumor be true, that there is considerable failure in some of the Chesterfield coal mines, as to the quantity of coal yielded.

I went on an excursion, a few days ago, with a party of gentlemen, with a view of inquiring for and examining the inditions of coal in the neigeborhood. On the Bizarre lands, belongiog to the estate of the late Vichard Randolph, we found a place in which there were several veins of dead coal on the surface, with large strata of shale intervening; and in an adjacent ravine, where there had been a little digging, we found the veins of coal much increased, and those of shale greatly diminished. Among the dead coal here, there were many lumps of good coal. The whole company supposed that at this spot, there was afforded the promise of a most valuable deposite of coal, if the veins continue to approximate as rapidly below as on the sides of the ravine. This spot is on the river cliff, and very near the river.

We also found on the lands of Mr. James Anderson two other strata, both of which, we thought, afforded undoubted prospects of great value. One of these in a ditch and longitudinly with the ditch about ten or twelve feet. The ditch was cut from east to west, and nearly all the strata in the neighborhood have their course from north-east to south-west. I mention these circumstances, because we failed in meeting the labor and implements which we expected—and, with a poor grubbing hoe and our own poorer personal labor, we were unable to ascertain the size and dip of the vein. This inebility, however, would augur favorably, as I have always been able very speedily to ascertain these matters with small veins. With regard to the size of this vein, there was some diversity of opinion. All concurred in the opinion, that it would be well worth working. My opinion is, that it must be, at least, six feet through, for I have never seen in the whole field any vein of coal not running north-east and south-west, and whose dip was not either to the north-west or south-east. The quality of the coal was also better than I have ever seen so near the surface. This place is about four miles from Farmville and a little more than one from the Appomattox.

We have recently learned that there are promising out-runnings of coal in other places, which we will, as soon as practicable, visit, and report to you, if we think them worthy of notice.

W. S. MORTON.

Agriculture, &c.

From the Farmers' Register.

ECONOMICAL METHOD OF KEEPING HORSES.

BY HENRY SULLY, M. D.

Having received innumerable letters from gentlemen who keep horses, requesting a description of my plan of feeding, I shall save much trouble both to others as well as myself, by laying my system before the public. Having pursued the plan above 17 years, I am enabled to appreciate its full value, and, being perfectly satisfied of its superior excellence, I hope to continue the same as long as I keep horses.

Most people who know me will allow, that horses in my employ enjoy no sinecure places, and few people can boast of their cattle being in better working condition or more capable of laborious undertakings than mine.

The loft above my stable contains the machinery for cutting chaff and grinding corn. From this loft each horse has a tunnel of communication with the manger below, and a tub annexed to each tunnel in the loft for mixing the ingredients composing the provender.

There should be no rack in the stable, because this may tempt the groom to fill it with hay, and thus by overloading the horses' stomach, endanger his wind, to say little of its expense and waste, for it is a well known fact, that if a horse has his rack constantly replenished with hay, he consumes and spoils upwards of 30 lbs. per day.

The manger with which the tunnel communicates should have cross-bars, of firm oak, placed at the distance of ten or twelve inches from each other, to prevent the horse from wasting his provender in search of the grain it contains, and this space between the cross-bars, allows the horse plenty of room to take his food.

The chaff cutter I make use of, is manufactured by Mr. Wilmott, a very ingenious mechanic, who resides about five miles from Taunton, on the road to Wiveliscombe. He also provides corn bruisers, of the best construction, and any person keeping three or four horses, will save the prime cost of his machinery the first year of his trial, and the horses themselves, thus fed, to use the language of horse keepers, will always be above their work.

When the provender is thoroughly mixed in the tub, previously weighing out each ingredient, the mixture should be given in small quantities at a time, many times a day; and at night, enough is thrown into the tunnel to last till morning. This process will be found of very little trouble to the groom, who will only have to go into the loft six or eight times a day. As the component parts of the provender are weighed separately for each horse, we are certain he has his just proportion; and I have hereunto annexed my scale of feeding in four classes, for it sometimes happens that some of the ingredients cannot be procured, and at other times that it may be better to substitute others; but, whatever grain is given, it should always be bruised or coarsely ground, and carefully weighed out; for by weight alone, is it possible to judge of the quantity of farinaceous substances the horse consumes; it being well known that a peck of oats varies from seven to twelve pounds; consequently if the provender were mixed by measure there would be frequently an uncertainty as to quantity.—Wheat varies from 16 to 12; Barley, from 13 to 16; Peas, from 17 to 15; Beans, from 17 to 15 per peck. And as wheat, beans, peas, barley, and oats, are equally good, and of very trifling difference in price when their specific gravity is taken into consideration, I am equally indifferent which grain I use, but I should always prefer boiled or steamed potatoes for hard working horses, to be a component ingredient, whenever they can be procured.

As I call all ground or bruised grain of whatever description, *farina*, it will be so distinguished in the following

SCALE.

	Class 1	Class 2	Class 3	Class 4
Farina, consisting of bruised or ground peas, wheat, barley, or oats,	5 lbs.	5 lbs.	10 lbs.	5 lbs.
Bran, fine or coarse pollard,	—	—	—	7 lbs.
Boiled or steamed potatoes, mashed in a tub with a wooden bruiser,	5 lbs.	5 lbs.	—	—
Fresh grain,	6 lbs.	—	—	—
Hay cut into chaff,	7 lbs.	8 lbs.	10 lbs.	8 lbs.
Straw, &c. in chaff,	7 lbs.	10 lbs.	10 lbs.	8 lbs.

Malt dust, or ground oil cake,	—	2 lbs.	—	2 lbs.
Salt,	2 oz.	2 oz.	2 oz.	2 oz.

By the above scale it will be seen, that each horse has his 30 lbs. of provender in 24 hours, which, I maintain, is full as much as he can eat. The two ounces of salt will be found to be an excellent stimulus to the horse's stomach, and should, on no account, be omitted. When a horse returns from labor, perhaps the groom will see the propriety of feeding him from his tub more largely, in order that he may be the sooner satisfied, and lie down to rest.

Whenever oat straw can be procured, it is generally preferred; and some like to have it cut into chaff without thrashing out the oats; but this is a bad plan, for in preparing a quantity of this chaff, unequal proportions of oats will be found in each lot, so that one horse will have too large a portion, whilst others have less than they ought, although the portions are accurately weighed.

The only certain method, then, is, to let the grain, of whatever description, be weighed, separately from its straw, and the keeper of cattle will soon satisfy himself that his cattle are in want of nothing in the feeding line. Many people object to potatoes, and think them unfit for working horses; but, from many years' experience, I am enabled to recommend them as a constituent part of the 30 lbs., and am convinced, that it is as wholesome and nutritious a food as can be procured for laboring horses, which are called upon sudden emergencies to perform great tasks, as has been abundantly proved by Mr. Curwen, M. P., who kept above one hundred horses on potatoes and straw, and always found that their labors were conducted better on this than any other food. See Curwen's Agricultural Hints, published 1809.

Wiveliscombe, Somerset, Sept. 12, 1836.

MEMORANDUM OF AN EXCURSION TO THE TEA HILLS, WHICH PRODUCE THE DESCRIPTION OF TEA KNOWN IN COMMERCE UNDER THE DESIGNATION OF ANKOY (NGANKE) TEA; BY G. J. GORDON, ESQ.

"Having been disappointed in my expectations of being enabled to visit the Bohea hills, I was particularly anxious to have an opportunity of personally inspecting the tea plantations in the black tea district, of the next greatest celebrity, in order to satisfy myself regarding several points relative to the cultivation, on which the information afforded by different individuals was imperfect or discordant.

"Mr. Gutzlaff accordingly took considerable pains to ascertain for me, from the persons who visited the ship, the most eligible place for landing with the view of visiting the Ankoy hills; and Hwuytow bay was at length fixed upon as the most safe and convenient, both from its being out of the way of observation of any high Chinese functionaries who might be desirous of thwarting our project, and from i.s being equally near the tea hills as any other part of the coast at which we could land."

"The wind being unfavorable, we made rather slow progress by rowing, but taking for our guidance the masts of some of the junks which we observed lying behind a point of land, we pulled to get under it, in order to avoid the strength of the ebb tide, which was now setting against us. In attempting to round the point, however, we grounded, and soon found that it was impossible to get into the river on that side, on account of sand banks which were merely covered at high water, and that it was necessary to make a considerable circuit seaward to be able to enter. This we accomplished, but not till 1 A. M. At this time a light breeze fortunately springing up, we got on very well for some time, but were again obliged to anchor at ¼ past 2, from want of water. As the tide rose, we gradually advanced towards the town of Hwuytow, til we came to one of those bridges of which there are several along the coast, that extend over wide sand flats that are formed at the mouths of the rivers. These bridges are constructed of stone piers with slabs of stone laid from pier to pier, some extending over a space of 25 feet and upwards, and others being from 15 to 20 feet span. As the length of the bridges cannot be less than three quarters of a mile, the whole is very striking as a work of great labor, if not exhibiting either much skill or beauty. We were informed by some boat people that we should not find water to carry us beyond the bridge, but observing some tall masts on the other side, we resolved on making the experiment, and pushing on as far as we could. It was almost dark when we passed under the bridge, and we had not proceeded far when we were again aground. This, however, we attributed to our unacquaintance with the channel, and as the tide floated us off, we continued advancing, notwithstanding, the warning of a friendly voice from the bridge, that entreated us to return to the town, promising us comfortable quarters, and a guide, &c. Being rather distrustful of the motives of this advice, howexer, we proceeded for some time longer but at length found it impossible to proceed farther, the ebb having at the same time commenced. We therefore spread an awning, and prepared to make ourselves as comfortable as possible for the night. The day had been the warmest we had experienced for a month past, but the night was very cold, and our boat, as may be imagined, far from commodious for so many people. At daylight, we found that there was not six inches of water in any part of the channel, and from the boat we stepped at once upon dry sand. The survey from the bank showed plainly that it was impossible to proceed any further by water. We accordingly prepared to march on foot, taking with us three lascars, who might relieve each other in carrying our cloak-bag of blankets and great coats, as well as some cold meat. We ordered the people to prepare a meal as fast as possible, intending to make a long stretch at first starting, and Mr. Nicholson was directed to remain in charge of the boat with five lascars, to move her down under the bridge on the return of the flood, and there to await our return for four or five days. Crowds of people now began to gather around the boat, moved by mere curiosity. Mr. Gutzlaff induced some of them to get ducks and fowls, for the use of the boat's crew, and strange to say, prevailed on one man to become our guide, and on two others to undertake to carry our baggage, as soon as we should be a little farther off from the town, and out of the way of observation."

"Skirting the town of Hwuytow, we proceeded in a N. N. E. direction, at a moderate pace, for an hour and a half, when we stopped at a temple, and refreshed ourselves with tea. Nothing could be more kind or more civil than the manners of the people towards us hitherto, and if we could have procured conveyances here so as to have escaped walking, in the heat of the day, loaded as we were with heavy woollen clothes, we should have had nothing further to desire: as it was, my feet already began to feel uncomfortable from swelling, and after another hours march, I was obliged to propose a halt, till the cool of the evening. Fortunately we found, however, that chairs were procurable at the place, and we accordingly engaged them at half a dollar each. They were formed in the slightest manner, and carried on bamboo poles, having a cross bar at the extremities, which rested on the back of the bearer's neck, apparently a most insecure as well as inconvenient position; but as the poles were at thesame time grasped by the hands, the danger of a false step was lessened. We had not advanced above a mile and a half before the bearers declared they must eat, and to enable them to do so, they must get more money. With this impudent demand we thought it best to comply, giving them an additional real each. After an hour's further progress, we were set down at a town near the foot of the pass which we had to cross. There the bearers clamorously insisted on an additional payment before they would carry us any further. This we resisted, and by Mr. Gutzlaff's eloquence gained the whole of the villagers, who crowded around us, to join in exclaiming against the attempted extortion. Seeing this, the rogues, submitted, and again took us up.—Mr. G., mentioned that while we were passing through another village, the people of which begged the bearers to set us down, that they might have a look at us, they demanded 100 cash as the condition of compliance. The country through which we passed swarmed with inhabitants, and exhibited the highest degree of cultivation, though it was only in a few spots that we saw any soil which would be deemed in Bengal tolerably good; rice, the sweet potato, and sugar cane, were the principal articles of culture. We had now to ascend a barren and rugged mountain, which seemed destined by nature to set the hand of man at defiance; yet even here, there was not a spot where a vegetable would take root, that was not occupied by at least a dwarf pine planted for the purpose of yielding fire wood, and a kind of turpentine; and wherever a nook presented an opportunity of gaining a few square yards of level ground by terracing, no labor seems to have been spared to redeem such spots for the purpose of cultivation. In ascending the pass, we soon came to places where it was difficult for our bearers to find a footing, and where they had consequently to pick out their steps as they advanced. To assist themselves, they gave the chair a swinging motion, with which they kept time in raising their feet. This was far from agreeable, and the first impression was that it was done merely to annoy, but we very soon saw that the object was different. The highest point of the pass I should conjecture to be about 1200 feet above the plain, and the descent on the north side to be nearly equal to the ascent from the south, say 1000 feet. At half past four we arrived at a rather romantic valley, which was to be our halting place for the day."

"Nov. 12th. Got into our chairs at a quarter past six, A. M., and proceeded along a narrow rugged dell towards Koeboe. Several nice looking hamlets were seen on the way. The people were engaged in reaping the rice, which seemed heavy, and well filled in the ear. In several places, I observed that they had taken the pains to tie clumps of rice together for mutual support. Sugar cane is bound in the same way, and for additional security, the outside canes are mutually supported by diagonal leaves, which serve at the same time to form them into a kind of fence. The leaves are not tied up round the stalks as in Bengal; the cane is slender, white, hard, and by no means juicy or rich; yet, abating the black fungous powder, which is very prevalent, the surface is healthy, and close growing in a remarkable degree.—We arrived at Koeboe at eight o'clock, and finding we could get water conveyance for part of the way on which we were proceeding, we engaged a boat for that purpose.—After a hearty breakfast, we embarked at 10 A. M. amidst crowds of people who covered the banks of the river at the ghat. On inquiry, we found that the river on which we were proceeding in a W. N. W. course, was the same which passed Nganke heen, and flowed to Tseuenchow foo. The boat was large, but light, and being flat bottomed, drew very little water. The stream was so shallow, that it was only by tracing the deepest part of the channel from side to side of its bed, that we were able to advance at all. This was done by poling; in several places the stream was deepened by throwing up little banks of sand so as to confine its course within a channel merely wide enough for the boats to pass through. I estimated the width from bank to bank at 200 yards, and should judge from the height at which sugar is cultivated above the level of the present surface, that the greatest depth in the rainy season does not exceed 10 feet. Being entirely fed by mountain torrents, its rise must be often very sudden, but I did not observe any traces of devastation in its course. Its name, Nganke, or 'peaceful stream,' is probably derived from this circumstance: the valley on each side seemed well cultivated, the banks being principally occupied by sugar cane. At every village the people poured out as usual to see us, vying with each other in marks of civility and kindness. The day, however, becoming very hot, we took shelter from the sun under the roof of the boat, to the disappointment of many who waded into the water to gratify themselves with a sight of the strangers. Coming at last to a high bank close to a populous town, they actually offered the boatman 400 cash if he would bring us to; and on his refusal, the boys began pelting the boat with clods and stones. On this, Mr. Gutzlaff went on deck to remonstrate, and Mr. Ryder to intimidate with his gun. Betwixt both the effect was instantaneous, and the seniors of the crowd apologized for the rude manner in which the boys had attempted to enforce the gratification of their curiosity. We had been in vain looking out all yesterday and today for a glimpse of tea plantations on some of the rugged and black looking hills close in view, though at almost every place where we halted, we were assured that such were to be found hard by."

"Arrived at Toa-be, we were hospitably received by the family of our guide, and soon surrounded by wondering visitors.

"Mr. Gutzlaff speedily selected one or two of the most intelligent of them, and obtained from them ready answers to a variety of questions regarding the cultivation of the tea plant. They informed him that the seed now used for propagating the plant was all produced on the spot, though the original stock of this part of the country was brought from *Woo-e-shan;* that it ripened in the 10th or 11th month, and was immediately put into the ground where it was intended to grow, several being put together into one hole, as the greater part was always abortive; that the sprouts appeared in the 3d month after the seeds were put into the ground; that the hole into which the seeds are thrown is from three to four inches deep, and as the plants grow, the earth is gathered up a little around the root; that leaves are taken from the plants when they are three years old, and that there are from most plants four pluckings in the year. No manure is used, nor is goodness of soil considered of consequence; neither are the plants *irrigated.*—Each shrub may yield about a *tael* of *dry* tea annually (about the 12th of a pound.) A *mow* of ground may contain 300 or 400 plants. The land tax is 300 cash, (720 to a dollar,) per mow. The cultivation and gathering of the leaves being performed by families without the assistance of hired laborers, no rate of wages can be specified; but as the curing of the leaf is an art that requires some skill, persons are employed for that particular purpose, who are paid at the rate of one dollar per pecul of fresh leaves, equal to five dollars per pecul of dry tea.—The fire-place used is only temporary, and all the utensils, as well as fuel, are furnished by the curer of the tea. They stated that the leaves are heated and rolled seven or eight times. The green leaf yields one fifth of its weight of dry tea. The best tea fetches on the spot \$23 per pecul, (133⅓ lbs.) and the principal part of the produce is consumed within the province, or exported in baskets to Formosa. That the prevailing winds are northwesterly. The easterly winds are the only winds injurious to the plants. Hoar frost is common during the winter months, and snow falls occasionally, but does not lie long, nor to a greater depth than three or four inches. The plant is never injured by excessive cold, and thrives from 10 to 20 years. It is sometimes destroyed by a worm that eats up the pith, and converts both stem and branches into tubes, and by a gray lichen which principally attacks very old plants. The period of growth is limited to six or seven years, when the plant has attained its greatest size. The spots where the tea is planted are scattered over great part of the country, but there are no hills appropriated entirely to its culture. No ground, in fact, is formed into a tea plantation, that is fit for any other species of cultivation, except perhaps that of the dwarf pine already alluded to, or the *Camellia oleifera.* Mr. Gutzlaff understood them to say that the plant blossoms twice a year, in the eighth moon or September, and again in winter, but that the latter flowering is abortive. In this I apprehend there was some misunderstanding as full sized seeds, though not ripe, were proffered to me in considerable quantities early in September, and none were found on the plants which we saw. I suspect that the people meant to say that the seeds take eight months to ripen, which accords with other accounts. We wished much to have spent the following day the (13th) in prosecuting our inquiries and observations at Toa-be and its neighborhood, but this was rendered impracticable by the state of our finances. We had plenty of gold, but no one could be found who would purchase it with silver at any price. We therefore resolved on making the most of our time by an early excursion in the morning, previous to setting out on our return.

"We accordingly got up at day break, and proceeded to visit the spot where the plants were cultivated. We were much struck with the variety of the appearance of the plants: some of the shrubs scarcely rose to the height of a cubit above the ground, and those were so very bushy that the hand could not be thrust between the branches. They were also very thickly covered with leaves, but these were very small, scarcely above ¾ of an inch long. In the same bed were other plants, with stems four feet high, far less branchy, and with leaves 1½ to 2 inches in length. The produce of great and small was said to be equal. The distance from centre to centre of the plants was about 4½ feet, and the plants seemed to average about two feet in diameter. Though the ground was not terraced, it was formed into beds that were partly levelled. These were perfectly well dressed, as in garden cultivation, and each little plantation was surrounded by a low stone fence, and a trench. There was no shade, but the places selected for the cultivation were generally in the hollows of hills, where there was a good deal of shelter on two sides, and the slope comparatively easy. I should reckon the sight of the highest plantations we visited to be about 700 feet above the plain, but those we saw at half that height, and even less, appeared more thriving, probably from having somewhat better soil, though the best is little more than mere sand. I have taken specimens from three or four gardens. Contrary to what we had been told the preceding night, I found that each garden had its little nursery, where the plants were growing to the height of four or five inches, as closely set as they could stand; from which I conceive that the plant requires absolutely a *free* soil, *not wet*, and *not clayey*, but of a texture that will retain moisture; and the best site is one not so low as that at which water is apt to spring from the sides of a hill, nor so high as to be exposed to the violence of stormy weather. There is no use in attempting to cultivate the plant on an easterly exposure, though it is sufficiently hardy to bear almost any degree of dry cold."—[Chinese Repository.]

From the London Gandener's Magazine.

ON THE EMPLOYMENT OF CATS IN THE PRESERVATION OF FRUIT FRON BIRDS.

"Robert Brook, Esq., of Melton Lodge, near Woodbridge, in Suffolk, has four or five cats, each with a collar, and light chain and swivel, about a yard long, with the large iron ring at the end. As soon as the gooseberries, currants, and raspberries begin to ripen, a small stake is driven into the ground, or bed, near the trees to be protected, leaving about a yard and a half of the stake above ground; the ring is slipped over the head of the stake, and the cat, thus tethered in sight of the trees, no birds will approach them. Cherry trees and wall-fruit trees are protected in the same manner as they successively ripen. Each cat, by way of a shed, has one of the largest sized flower-pots laid on its side, within reach of its chain, with a little hay or straw in bad weather, and her food and water placed near her.

"In confirmation of Mr. Kendall's statement, it may be added, that a wall of vines between 200 and 300 yards long, in the nursery of Mr. Kirke, at Brompton, the fruit of which in all previous seasons had been very much injured by birds, was last year completely protected in consequence of a cat having voluntarily posted himselı sentry upon it."

METEOROLOGICAL RECORD

For the month of July, 1836, kept at Avoylle Ferry, Red River, La., (Lat. 31° 10′ N. Long. 91° 59′ W,.) by P. G. Voorhies.

JULY.

Days.	Morn.	Noon.	Night.	Wind.	Weather.	REMARKS.
1	72	86	78	calm	clear	Red River falling
2	72	88	80	..	..	
3	73	86	78	..	cloudy	
4	74	86	78	..	clear	
5	70	72	71	SW	cloudy	heavy rain and thunder at noon
6	74	87	79	calm	clear	cloudy at noon
7	75	88	78	..	..	cloudy and thunder at noon
8	75	68	78	SE	cloudy	heavy thunder at noon
9	76	89	86	calm	clear	at noon cloudy
10	76	92	86	..	..	
11	75	90	86	..	..	
12	74	89	86	..	..	
13	76	90	85	E	..	
14	75	88	81	calm	..	River rising
15	71	84	83	N light	..	evening calm
16	71	86	84	calm	..	all day
17	74	86	84	..	..	cloudy morning clear day, thudder southwardly
18	72	87	80	..	clear	thunder showers in the ev'ng from N. E. high
19	72	80	79	..	cloudy	all day, night clear
20	73	82	78	..	..	thunder in the evening
21	74	88	64	..	clear	
22	76	93	86	..	..	Red River falling
23	86	93	88	..	..	
24	82	90	88	S light	..	light flying clouds
25	82	86	84	calm	clear	
26	84	88	84	..	cloudy	all day
27	75	86	78	..	clear	evening cloudy
28	74	90	79	..	..	thunder showers in evening 3 to 5 P. M.
29	76	90	79	..	cloudy	evening light showers
30	76	84	74	..	..	foggy morning, afternoon a heavy thunder shower
31	74	83	79	..	all day	rain in the morning, cloudy all day

Red River fell this month 3 feet 1 inch—below high water mark 6 feet 4 inches.

Po:ash from Beet Root.—Those persons in our country who have embarked in the business of making Sugar from Beet Root, will in all probability be remunerated for their enterprize in more ways then that derived from the mere profit of the sale of the Sugar. It appears that a new discovery has been made in France—a process which extracts potash in such large quantites from the residuum of beet root after making the sugar, as to threaten a rivalry with the produce of the American forests. M. Dubrunfaut is the discoverer. The molasses, after serving for the making of sugar, is distilled to obtain alcohol. The remainder then, instead of being thrown away, is manufactured into potash. The quantity of potash furnished by M. Dubrunfaut's process is equal to one-sixth of the quantity of sugar extracted from the beetroot. Thus, says the *Journal des Debats*, taking the amount of indigenous sugar manufactured each year at 40,000,000 kilogrammes, there may besides, be extracted from the beetroot which has served for that production, seven millions kilogrammes of saline matter, comparable to the best potash of commerce, and this too, without the loss of the alcohol, and the other produce, the fabrication of which may be continued simultaneously.—According to present prices, the 7,000,000 of kilogrammes represent a value of from 8,000,000 to 9,000,000 francs.–[Baltimore American.]

Ship Canal around the Falls of St. Mary.—The feasibility of this project has been shown in an article which we copied, a few days since, from the Albany Advertiser; and we have lately conversed with gentlemen, possessing accurate knowledge on the subject, who fully confirm the statements made in the Advertiser. The importance of this work to Buffalo, in a commercial point of view, can scarcely be estimated too highly. A free communication with the ocean lake, would open a new and almost boundless field for enterprise. The country bordering on Lake Superior has never been thoroughly explored, but from the imperfect examination that has been made, it is known to possess great mineral wealth. Copper, in particular, abounds in inexhaustible quantities. But in addition to the rich returns that might be expected from this branch of trade alone, immense profits might be realized from the traffic in furs. This is now monopolized by the Hudson Bay and Northwest Fur Companies, and a studied mystery has been thrown around all their operations. As the demand for fur increases and the supply diminishes, prices are enhanced, and still greater efforts are made by these Companies, to prevent any intrusion upon what they regard as their privileges. They could not, however, long maintain their monopoly, if our vessels could float on the waters of the upper lake. Trading posts could be established along its shores, and the rich freight collected at these stations, could be brought to our wharves, and thrown into market, in little more than a week. The white fisheries would also afford a profitable investment for capital. We earnestly hope some measures will be taken, this winter, to effect a free communication between the lower lakes and lake Superior; and shall ere long place before our readers some statistical information, showing the value of the trade that would thereby be secured.—[Buffalo Daily Com. Adv.]

METEOROLOGICAL RECORD.

For the month of August, 1836, kept at Avoylle Ferry, Red River, La., (Lat. 31° 10′ N. Long. 91° 59′ W,.) by P. G. Voorhies.

AUGUST.

Days.	Morn.	Noon	Night.	Wind.	Weather.	REMARKS.
1	76	75	75	calm	cloudy	showers in the morning, heavy rain in the ev'g
2	77	86	80	calm	..	rain and thunder all day
3	74	88	82	..	clear	
4	76	82	80	SE	cloudy	heavy rain in the morning and all day and night
5	84	86	84	calm	..	
6	82	84	78	..	..	thunder and rain all day
7	76	88	84	..	..	rain in the morning and all day
8	73	90	82	..	..	
9	73	89	80	..	clear	
10	75	88	84	..	..	heavy rain all night
11	73	88	82	..	..	
12	76	86	84	..	..	
13	74	86	76	..	cloudy	
14	73	87	76	..	..	
15	78	86	72	..	clear	
16	76	86	84	..	cloudy	heavy thunder and lightning and rain from S. E.
17	75	88	84	..	clear	
18	76	88	76	..	..	
19	75	89	76	..	..	
20	74	84	82	..	cloudy	
21	67	81	78	..	clear	
22	66	82	80	..	..	
23	80	86	84	..	..	
24	73	87	84	..	..	
25	74	89	75	..	..	little rain and heavy thunder from S. E.
26	75	89	78	SW	..	thunder and high wind at noon from S. E.
27	73	82	78	calm	clear	high winds at noon from west
28	71	84	74	..	..	
29	76	86	79	..	..	light showers at noon
30	72	82				
31						

Red River fell this month 7 feet 6 inches— below high water mark 13 feet 10 inches.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

RAILWAY IRON, LOCOMOTIVES, &c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2½ by	½,	15 ft in length,		weighing		$4\frac{68}{100}$	per ft.
280 "	2 "	½,	"	"	"		$3\frac{50}{100}$	"
70 "	1½ "	½,	"	"	"		2½	"
80 "	1¼ "	¼,	"	"	"		$1\frac{25}{100}$	"
90 "	1 "	¼,	"	"	"		⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28—tf Philadelphia, No. 4, South Front st.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

AN ENGINEER, regularly bred to the Profession in England, as well as to that of a Topographical Surveyor and Draughtsman, is desirous of obtaining employment in the United States. He has lately, for several years, been a salaried officer of one of the Principal Land Companies in the British Provinces, from the agents of which he can produce unexceptionable references.

On the subject of Railways he would feel particularly at home, having had much experience in their survey and formation while in England, and he confidently hopes that he would give satisfaction in all the other branches of the Profession.

Apply to the Office of this paper, 132 Nassau-st, or to Dr. Bartlett, at the office of the Albion, Cedar-street.

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hardware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTION, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio.
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicabl eextent in the United States, Maryland excepted.

MOSES LONG.

General Agent of Col. S. H Long

Rochester, May 22d, 1836. 19y-tf.

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N. Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention.

HENRY BURDEN.

Troy Iron Works, Nov. 15, 1836. 47—tf

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co. No. 119 Greenwich Street, New-York, or at the Makers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY & KNIGHT.

POUGHKEEPSIE, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANCHED and GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works he has in charge.

BENJ. WRIGHT,

Chief Engineer N. Y. & E. R. R.

NEW-YORK, April 4th, 1836.

Harvey's Flanched and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.

BOSTON, April 26th, 1836. no. 1—6t.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.

4—ytf

An Engineer is desirous of obtaining a situation, on some work, either Railroad or Canal; he would have no objections to go on to any part of the United States.

Satisfactory references given as to character and capacity. Address W. H. W. at this office—post-paid. 504t

TO CONTRACTORS STONE CUTTERS and MASONS.

JAMES RIVER and KANAWHA CANAL.—Contractors for mechanical work are hereby informed that a large amount of Masonry, consisting of Locks, Culverts, and Aqueducts, is yet to be let on the line of the James and Kanawha Canal.

Persons desirous of obtaining such work, and prepared to exhibit proper testimonials of their ability to execute it, will apply at the office of the subscriber in the city of Richmond

Stone Cutters and Masons wishing employment in the South during the winter months, may count with certainty on receiving liberal wages, by engaging with the contractors on the work.

CHAS. ELLET, Jr., Chief Eng. J. R. & K. Co.

Richmond, Nov. 29, 1836. 51—6t

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior back-strap Shovels			
150	do	do	do plain	do
150	do	do	do caststeel Shovels & Spades	
150	do	do	Gold-mining Shovels	
100	do	do	plated Spades	
50	do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.

No. 2 Liberty street, New-York.

BACKUS, AMES & CO.

No. 8 State street, Albany

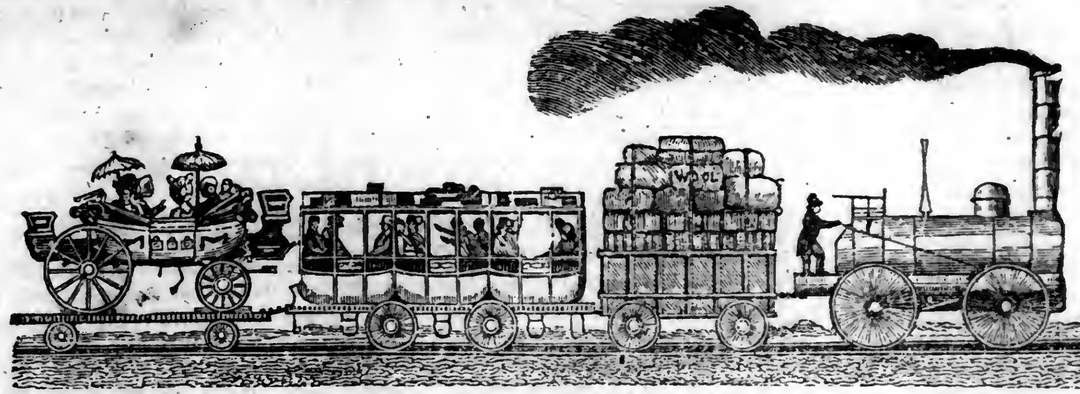
N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

NOTICE TO CONTRACTORS.

Proposals will be received at the office of the Hudson and Berkshire Railroad Company, in the city of Hudson, until the 15th of January, 1837, for One Million feet, board measure, of Southern pine, of the following dimensions:—6 inches square, and in lengths of 21, 24, 27, and 30 feet long—also, for 14,000 Chestnut or Cedar ties, 8 feet long, and 6 inches square—and also, 4,000 sills, of Hemlock, Chestnut, or White Pine, 4 by 10 inches, and in lengths of 15, 18, and 21 feet long. The whole to be delivered by the 1st day of July, 1837. GEORGE RICH.

Engineer.

Hudson, Dec. 22, 1836. 524t



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, JANUARY 14, 1837. [VOLUME VI—No. 2

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LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid since the 25th December, 1836.

L. Abbott, Woburn, Mass., Feb. 25, 1837.
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C. Sinnickson, Knoxville Tenn., Jan. 1, 1838.
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V. P. Shattuck, City, N. Y., Jan. 1, 1837.
Richard Soule, jr. Boston, Mass., Jan. 1, 1838.
Isaac Trimble, Baltimore, Md., Jan. 1, 1838.
A. Varick, City, N. Y., Jan. 1, 1838.
Wilmington & Susq. R. R. Co., Wilmington, Del., Jan. 1, 1837.

MORRIS CANAL.

We understand that a lease of this Canal has been effected by the Company, for ten years, at 6 per cent. per annum on the cost of the work.

The arrangement is considered as highly advantageous to the Company.

Louis McLane, Esq. has been unanimously elected President of the Baltimore and Ohio Railroad Company.

This gentleman, we doubt not, will prove a highly efficient officer, and his election is gratifying to all well wishers of the Company, and of Internal Improvement.

WELLAND CANAL REPORT.

To the Hon. the Commons House of Assembly:

The Select Committee to whom was referred the petition of the President, Directors, and Company of the Welland Canal, with other documents relating thereto—beg leave to report:

That after actual personal inspection of the whole line of the Canal, from Port Dalhousie to Port Colborne, and from the junction of the Grand River at Dunnville; they are more strongly impressed with the importance of this work; and are convinced of the necessity of taking immediate measures for guarding as much as possible against any interference of the use of the canal through the ensuing season—and for putting it in a state of perfect and permanent repair as speedily as the nature of the work will permit.

After much discussion and consideration, your committee are of opinion that a due regard to economy, as well as the urgent necessity of affording facility and certainty to the increasing trade upon this great channel of communication, calls for the adoption without delay, of some decisive and final measure for conducting this great work to a conclusion worthy of the Province, and such as shall ensure the accomplishment of those important results, which your committe are confident cannot fail to be obtained under prudent and energetic management.

It is only necessary to pass along the line of the Welland Canal to arrive at the conviction, that the private stockholders, who at an early period invested their capital in the work, underrated the difficulties of so stupendous an undertaking. Considering the obstacles to be surmounted, it has astonished your committee, to see how much has actually been accomplished—but there is much yet to be done—and it is in every point of view important to the Province that a sound and liberal policy should be pursued in respect to the completion, management, and care of the work.

Your committee have for many reasons determined upon recommending to your honorable House, to provide for making the Welland Canal strictly a public work, and wholly and exclusively public property—

and believing that the propriety of this course is very generally acknowledged, your Committee forbear to enlarge upon it.

They have applied themselves to the consideration of such a proposition to be made to the stockholders, as would combine the principle of ultimate indemnification to them, with a due ragard to the interest and convenience of the public; and with this view they recommend that if the stockholders will, by a certain day to be named, agree to transfer their stock to the Government, the Receiver General shall be authorized to issue to them Debentures for the amount of their stock, redeemable in twenty years, with interest half yearly, to commence in 1840, after the following rates, viz:—Three per cent. for the first year; four for the second; five for the next; and thereafter six per cent. until the debentures shall be redeemed. And that as soon as the receipts upon the Canal shall amount to £25,000, in any one year, three per cent. per annum upon the amount invested shall be paid to the present proprietors of stock or their representatives; and when the annual receipts shall amount to £50,000, six per cent. per annum upon their former stock shall be paid, until the legal rate of interest upon the capital invested by them, from the time that it shall have been actually paid in, shall be fully paid.

But your committee contemplated as part of this arrangement, the entire acquisition to the government of all the property formerly owned by the Company along the line of the Canal, with the hydraulic advantages, which they have reason to believe, can be accomplished upon the terms of paying to the purchasers the amount actually expended by them in improvements.

Your committee are of opinion, that such an arrangement would be decidedly advantageous; and so soon as it shall be ascertained whether their proposition is approved of by your nonorable house, they will apply themselves to the details of the necessary means for carrying it into effect.

All which is respectfully submitted.

Jonas Jones, *Chairman.*
John S. Cartwright,
W. Chisholm,
George Rykert,
Charles Bockus,
W. B. Robinson,
H. Norton,
T. McKay,
Charles Richardson,

Committee Room, 29th Nov. 1836.

COMMUNICATION FROM THE CANAL COMMISSIONERS, ACCOMPANIED WITH A REPORT OF B. AYCRIGG, PRINCIPAL ENGINEER APPOINTED TO EXPLORE THE COUNTRY BETWEEN THE WEST BRANCH IMPROVEMENTS AND THE TOWN OF FRANKLIN, ON THE ALLEGHENY RIVER.

Canal Commissionrs Room, December 15, 1836.

His Excellency, Joseph Ritner, Governor of Pennsylvania

Sir,—By direction of the board, I transmit to you the report of B. Aycrigg, principal engineer appointed to explore the country between the West Branch improvements and the town of Franklin, on the Alleghany river.

Very respectfully,
Moses Sullivan, President.

Harrisburg, Dec. 13, 1836.

To Moses Sullivan, Esq.
President of the Board of Canal Commissioners of Pennsylvania.

Sir,—We arrived at this place on the morning of the 11th inst., having examined the dividing ridge and completed a connected line from the mouth of Red Bank on the Allegheny to the mouth of the Sinnemahoning, on the West Branch, a distance of one hundred and twenty-eight and one-fourth miles, and taken the requisite notes for a detailed estimate accompanied by a topographical map of the country included in the examination.

No examination was made on the Allegheny since it had been already three times levelled, and the expense of different plans of improvement reported. The length of the time during which we could work being limited, that part was preferred, of which least was known, and therefore having reached the Allegheny we returned to the summit and proceeded eastward, in order if possible to connect our line with the head of the improvements on the West Branch. This, however, we found impracticable, since the river freezing, precluded the possibility of our being accompanied by our tents and camp equipage in a country without roads, where our only means of transportation was by water.

The levels and survey having been taken with the same precision as in the preliminary examinations, for a work whose construction was authorized by law, it will require several weeks to prepare an estimate, and in the mean time the following general view of the subject is respectfully submitted to the board.

Having obtained all the information that was available from the official reports of former examinations, and from individuals who were acquainted with the country to be explored; the greatest reliance was placed upon the account given to me personally, by William Wilson, Esq. having called on him for this purpose, at his residence in Williamsport.

From his examination, he had formed the opinion, that if a water communication could be at all effected, it must be by connecting the waters of Bennett's branch of the Sinnemahoning with those of Sandy Lick, and from his description of the ground, together with his notes of the levels, the conclusion was formed, that although other routes might be practicable, from resources that had been overlooked from the circumstance of their not being obvious, or not observed in a country, the greater part of which is a wilderness, this at least possesses the greatest facilities as far as ascertained However, to leave nothing uncertain, a trest line was commenced ten miles south of the Franklin turnpike, at a depression in the dividing ridge, between the waters of the Mahoning and Woodside's run, mentioned in Mr. Mitchell's report of 1827, as the "Clover patch," and thence northwardly along the ridge between the heads of the Mahoning and Sandy Lick on the west, and Curry's run, Anderson's creek and Bennett's branch of the Sinnemahoning, tributaries of the West Branch on the east.

From this examination, it was ascertained that the summit reported by Mr. Wilson, between Bennett's branch and Sandy Lick, is the lowest in this range of country, being one hundred and twenty-seven feet lower than the lowest of those between Sandy Lick and Anderson's creek, three hundred and eight lower than any between Anderson's creek and the Mahoning, three hundred and sixty-seven below the Mahoning and Curry's run, and four hundred and fifty-five below the Clover Patch.

The height of all the depressions between the Clover Patch and Boon's mountain, having been thus settled, and Mr. Wilson having previously found that the summit of Elk and West creeks, between the Driftwood and Clarion, and the lowest north of Boon's mountain, was one hundred and eighty feet above the one proposed; the examination was next made to ascertain the amount of water that could be commanded on the summit level at the height proposed by Mr. Wilson, or two hundred feet below the crest of the depression, and from this it was found that the drainage on the eastern side of the ridge would be collected from twenty square miles, and on the western side a fraction over eighty square miles. The different streams mentioned by Mr. Wilson, were not guaged separately since their minimum flow is a matter of no importance, according to the present proposed plan of improvement; but Sandy Lick below the forks of Fall's creek, and containing the water of all these runs together, was guaged during the dry weather and found to yield the insignificant amount of three hundred and seventy-five cubic feet per minute.

This has hitherto been considered an insurmountable difficulty; but when the proper view is taken, proves to be one of the most favorable circumstances connected with the subject, and requires elucidation for those who are not familiar with the western section of the State, or perhaps have never reflected upon its bearing on the subject under consideration.

The geological structure of the country west of the Allegheny mountain, and consequently on the proposed summit, differs materially from that on the eastern side. The rocks lie in horizontal strata, and are principally graywacke-slate, and clay-slate, accompanied by bituminous coal and clay, the three latter almost impervious to water; and hence we find on the summit of narrow ridges, and in dry weather, muddy roads and swampy ground The surface of the country, also presents peculiar features. Although there is at present, scarcely a piece of high level ground to be found, still the whole of this country must have been originally a rolling table land with innumerable rills, which in the course of ages have worn out deep ravines, leaving the summits of the ridges almost sharp, and the whole together forming what might almost be compared to the roofs of a large irregular city with their water tight surfaces, discharging the water immediately into the gutters below, and these into the drains, by means of which it is soon carried off, so that in a short time after a rain, hardly a vestage of it remains.

This peculiarity of the western streams, rising rapidly and as suddenly falling, may be aptly illustrated by an example.

As before observed, the flow of Sandy Lick below the mouth of Falls creek, was but 375 cubic feet per minute. On the 10th of September, when at a short distance below this place, but without any intervening stream of importance, we had a thunder storm in the afternoon and night, and found the water on the next day flowing at the rate of 21,437 cubic feet per minute; and again in two days reduced to 2,371 cubic feet per minute.

Could the water find its way into the earth as it does in the eastern section of the State, or on Boon's mountain, or if retained by land comparatively level, the streams would neither rise nor fall so rapidly, and being fed by springs from these natural reservoirs, would present a more imposing appearance in a dry season; but at the same time the total amount discharged by the streams, would be less in proportion to the water retained over an extended surface, and consequently exposed to evaporation in a much greater degree, than in a comparatively dry country. If there was no basin that could by artificial means be converted into a reservoir capable of containing the water, we should lose the benefit of nearly all the floods; but in this respect, the valley of Sandy Lick creek is remarkably favorable; since even in this elevated region, a mound of $\frac{3}{8}$ of a mile and extreme height of 40 feet, will give us a reservoir of three square miles, with a useful depth of twenty feet. This reservoir will at the depth of twenty feet, contain 1,672,704,000 cubic feet of water. A lock proposed to be fifteen by ninety feet, and lift near the summit five feet, will contain 6,750 cubic feet. Suppose it practicable to pass a boat every three minutes, and that every three boats will on an average require two locks full of water at each end of the summit, (though in a crowded trade such as we are now considering, it would approach nearly to one lock full for two boats.) This would require one lock full every two and a fourth minutes, or 156,-600 locks full in two hundred and forty days to pass 115,200 boats, requiring for lockage 1,036,800 cubic feet per annum. Allow fourteen miles to be constantly supplied from the summit at the rate of fifty cubic feet per mile per minute for wastage, and the loss would be 241,920,000 cubic feet per annum, which added to the lockage water, makes 1,278,720,000 cubic feet per annum, and leaves a surplus of 493,984,-000 cubic feet, or nearly one fourth of the whole, after allowing the boats to pass the locks more rapidly, and the lockage and wastage water to be greater than will be the case, unless the canal should be supplied with double locks.

This calculation is made from the reservoir once full. But supposing the trade to continue eight months, and the rain to fall and be drawn off regularly, the amount used might be three times the full of the reservoir, and consequently its extent would be amply sufficient.

The rain and snow that have fallen in Lebanon during the last seven years, have averaged 40.46 inches, the least being 34.49, and greatest 44.78. But nine inches on an area of eighty miles is sufficient to fill the proposed reservoir, and consequently, if we obtain twenty-six per cent. of the smallest amount that has fallen at Lebanon during the last seven years, (and the opinion appears to be general, and perhaps well founded, that there is more rain on the summit than in a lower and more level country,) we shall, with the most active trade, have a surplus of one-fourth of the whole amount. But from several years intimate knowledge of the large reservoir on the Union Canal, and the country that supplies it with water, and a comparison of the same with the district under consideration, I should anticipate the probable amount collected at two-thirds or perhaps three-fourth of all that falls.

However should this not be considered sufficient, we can command the water from twenty additional square miles on the eastern side of ridge, and being sensible of the prevailing opinion, that a water communication was impracticable, it was thought best to reduce to a certainty the whole of the available resources of the summit, and a level carried over the dividing ridge to Little Toby, from this it was found that by elevating the water one hundred and twenty feet, the whole of Little Toby could be thrown into the summit. The natural flow of this stream, would of itself be sufficient to support an active trade, and by reservoirs the supply increased to any desirable extent. But this I consider altogether unnecessary, and the examination was merely made to remove all doubts from the minds of those who have to decide the question.

The summit level, including the tunnel and reservoir, being unusual in its arrangement, it may not be improper at the present time to give a description of the plan proposed to suit the exigencies of the case.

It is proposed to construct a canal on a level with the tunnel, (which will not vary materially from $1\frac{1}{4}$ miles in length,) having all the usual arrangement for feeding from the natural flow of the streams, in the same manner as if there was to be no reservoir occupying the same ground, with the exception of having a high tow-path on the hill side, and the outer bank protected from washing by a stone covering. This being completed, a dam is thrown across the lower end of the valley, raising the water over the whole of this work, so that in high water nothing would be seen except a large artificial lake with a towpath skirting its margin and locks at each end. The water would be retained in this position by four locks, at each end. The water would be retained in this position by four locks placed near the tunnel and four of similar construction at the dam, all having their bottoms on the same level, and consequently those nearest the reservoir might be used for locks of 20 feet lift, and the others successively 15, 10 and 5 feet lift. According to this arrangement the boats passing through the tunnel will lock up into the reservoir through the 4 locks, each raising it 5 feet in the same manner, as if they were ordinary lift locks with no extra depth of water, and consequently the expense in each instance is equal to that of a 5 feet lock, (the proposed lift of the locks between the summit and the next supply of water.) As the summit is drawn down, the lift of the first lock is reduced, until at 5 feet from a full height the gates of the first lock are thrown open, in the same manner as those of a guard lock, after the flood has subsided, and the boats pass through without obstruction. The next 5 feet throws another pair of locks open, and so on successively for the third and fourth pair, when the reservoir will be shut out from all connexion with the canal, which will now receive the water from the natural flow of the runs and from lateral reservoirs should such be found necessary. In case of flood, the surplus water would pass under the canal and deposite its sediment into the body of the reservoir, and as the waters rise the locks would successively come into use, until the reservoir was full, and the surplus water pass off over a waste weir in the dam.

The distance from the dam, at the western end of the reservoir to the Allegheny, (pursuing the proposed line and cutting off by deep cuts and short tunnels 9.10 miles, from the united lengths of Sandy Lick and Red Bank,) will be sixty-five and one half miles, and descent five hundred and eighty-two feet. The distance from the same point, to the West Branch, at the mouth of the Sinnemahoning, will be sixty-two and three-fourth miles, and lockage seven hundred and three feet, effected on the West by eighty-three locks, and on the east by one hundred.

To the question, whether there may not be some other route as good or better, than the one proposed? I answer that I think not.

For the first three months, I was constantly in advance of the party, that no point might be omitted which presented the least probability of being important; and of all such, an accurate examination was made with the instruments, a detail of these would however, be of no interest except to persons in the vicinity. Accompanied by a woodsman as guide, and a security in case of accident in the wilderness, I have traversed the whole country on foot, headed the streams, examined the valleys, and believe that I have a thorough knowledge of all that is important to the present question, from the Clover Patch, on the south, as far north as the summit between the Driftwood, and the Clarion, and consider the proposed route, the one distinctly pointed out by nature, as the main channel of communication between the east and west. South of this there is nothing worthy of notice, by way of comparison. The summits are higher, and supply of water deficient; while on the north, the summit of Elk and West creeks, which alone is worthy of notice, is one hundred and eighty feet higher, the supply of water, at least doubtful, and the expense of construction far greater, as the Clarion is subject to much higher freshets than Sandy Lick, and Red Bank, and consequently requies the construction of very heavy embankments in the bed of the river; since, according to notes taken from point to point, during a reconnoisance, made for the purpose of ascertaining its character, I found about two thirds of the distance from the town of Ridgeway, to the mouth of the Clarion, or sixty-six out of one hundred miles, to be steep bluff, while Sandy Lick shows the reverse of this, or two-thirds of flats. For slack water it is less favorable, as it is larger and as before observed, subject to higher freshets, and the rapid descent of either stream, would make a continuous slack water very expensive, from the great number of dams required. The distance by the two routes, is so nearly the same that by the course of the streams the Red Bank route would be about four miles longer, but by the line, five miles shorter than the natural course of the Clarion when taken between the mouth of the Sinnemahoning, and the connexion of the two routes, at the mouth of the Clarion; twenty-two miles of the middle, or Sandy and Red Band routes being on the Allegheny, and therefore, so much toward the improvement of that river. But when considered with reference to the distance to Pittsburg, the mouth of Red Bank, is twenty-two miles nearer, than the mouth of the Clarion, and an additional thirty-six miles below the Red Bank, along the Allegheny, would complete the connexion to Pittsburg and therefore open the way not only from Pittsburg and Franklin, to the east, but likewise between these two places. From all these circumstances, I was left in no doubt as to the proper position for the line, and therefore made a minute examination of the one already discribed.

Having commenced the examination with a full determination of not taking the responsibility of recommending the construction of a canal, unless I could command on the summit, double the amount of water that a close calculation would show to be necessary, and this beyond a doubt, but in such case to report the facts and leave others to draw their own conclusions, without my expressing an opinion, it gives me great satisfaction to state, that my most sanguine anticipations have been more than realized, and that the problem which possessed double interest from the importance and supposed impracticability of the work, has been fully solved in my own mind, and that an improvement which before the examination, I considered a bare possibility, is now almost reduced to a certainty, and I confidently look forward to the period when large boats will leave the wharf at Philadelphia, and deposit their cargoes at Pittsburg, or Lake Erie. It may not be in one, two or ten years, but that every avenue to the west will be crowded, and the remarkable facilities here presented, will be one day improved, is a subject upon which I have no doubts. Although the existing prejudice against reservoirs, for the supply of water, many for a while retard the work; this will gradually wear off, the canal be constructed, support an active trade, make the West Branch canal a good investment, and be used as an example to convince others, that improvements which at first sight appear impracticable, may nevertheless be effected, and the country at large receive the benefit of a thorough water communication from the east to the west.

All of which is respectfully submitted,

B. Aycrigg.

Principal Engineer, appointed to explore the country between the head of the West Branch improvements, and the town of Franklin, on the Allegheny.

From the London Mechanics' Magazine.

FIRST REPORT OF THE DIRECTORS OF THE EASTERN COUNTIES RAILWAY.

(Read on the First General Meeting held at the London Tavern, 26th September, 1836.)

The Act for incorporation of this company received the Royal assent on the 4th of July last, and by one of its provisions, the first general meeting of the share holders is appointed to be held within *six* months after the passing of the act; but the directors, feeling persuaded that the sooner they could make officially known to the proprietary and the public the actual state and prospects of the undertaking, the sooner it would attain that high place which it is entitled to hold in public estimation, have called this meeting within less than *three* months from the date of the act; on the earliest day, in fact, which the time unavoidably occupied in organizing the establishment of the company, and in auditing the expenses incurred in its formation, could possibly allow.

Nearly three years have now elapsed since the design of the Eastern Counties Railway was first given to the public, and several preliminary surveys made; but it is not more than ten months since it can be said to have taken any considerable hold on the public mind. The month of October last was far advanced before a Provisional Committee of sufficient weight was formed for the prosecution of the undertaking, and there then remained but six weeks within which to make all the necessary preparations previous to going to Parliament in the ensuing session. Within this brief space, the whole line of a hundred and twenty-six miles, the longest that is yet in progress in any part of the kingdom, had to be surveyed, and the maps and sections, required by the forms of Parliament, prepared: the whole of the owners and occupiers too, for a breadth of half a mile, had to be canvassed for their assents, that extreme breadth being taken in order to allow ample scope for such alterations as circumstances might afterwards render expedient. Even when the requisite plans, sections, and books of reference, had by extraordinary exertions on the part of the engineers and their assistants,—exertions which the directors honestly believe to be without a parallel in the history of such undertakings—been deposited in due time, there yet remained much to be done in order to obtain for the undertaking an adequate share of public confidence. Early in November, the chairman and two other members of the Provisional Committee had made a progress through Essex, Suffolk, and Norfolk, for the purpose of personally representing to the leading gentlemen of these counties the claims which the undertaking had to their countenance and support: and also of calling public meetings of the inhabitants to investigate and decide on its merits and the demonstrations of local approbation which this deputation were the means of eliciting, were so numerous and decisive, as to leave the committee in no doubt that they had the hearty concurrence of the counties in their endeavors to carry out the plan to a successful conclusion. But though the good will the counties had certainly been conciliated, the confidence of the monied interests of the country, from whom alone could be expected the bulk of the large capital required for its execution. (the largest subscribed during the past year for any railway project,) had still to be gained. The various steps taken to this end, the directors need not stop to detail; it may suffice to state that, by the choice of active and judicious agents, and without having recourse to any adventitious aids to stimulate the spirit of adventure—by simply making known, far and wide, the sterling merits of the undertaking—the greater part of the capital was subscribed before the second reading of the bill. In point of *numbers*, the shareholders residing in, or connected with, the counties themselves, bore a fair proportion to those having no local interest in the line; but the amount of capital subscribed for by them was little more than one-twelfth of the whole. Without the powerful assistance, therefore, derived from other and distant parts—from Manchester, Bristol, Bath, Edinburg, Glasgow, Dublin, and, above all, from Liverpool, the opulent and intelligent citizens of which, ever foremost in the encouragement of great enterprizes, at once subscribed for upwards of 12,000 shares of the company's stock; it may with perfect truth be said, that the undertaking must have fallen (for the present at least) to the ground.

Notwithstanding the success which had so far crowned their exertions, the directors were still but in the midst of their difficulties. A parliamentary opposition had yet to be encountered—an opposition, as it happened, of a more than usually obstinate character. there were two rival lines in the field, both of a more recent suggestion than the Eastern Counties Railway, neither of them well suited to the wants of these counties, but both, nevertheless, very respectably supported. There was also a formidable array of dinsenting owners and occupiers, headed by gentlemen of great parliamentary influence, and to all appearance irreconcileably opposed to the undertaking.

It was under these circumstances, with no ordinary anxiety, that the directors proceeded before Parliament, and by no ordinary exertions that they were enabled to maintain their ground there, against the serious opposition with which they were met. The second reading of the bill in the House of Commons was not carried without a division; and in the committee, to which it was referred, were several of the most active members of that minority who voted for throwing it out. So strong, however, was the case proved in evidence for the bill, and in so conciliatory a spirit were the opposing parties met and arranged without of doors, that in a short time all opposition was at an end, and the committee unanimously agreed to a report to the House in favor of the measure, which concludes in the following highly recommendatory terms:—

"Your committee think it right to add that, according to the evidence adduced, the Eastern Counties Railway, between the termini, would traverse the most populous and most cultivated parts of the counties through which it is intended to be carried, and that great benefit would be given to the trade and agriculture by its adoption."

After the bill had passed the Commons, several new and powerful opponents sprung up; but the directors, by meeting the parties with the same promptness, and in the same fair spirit, which had carried them successfully through their previous negotiations, effected amicable arrangements with them also, and the bill was finally passed by the House of Lords, as one, which was now on all hands allowed to have for its object, the accomplishment of a measure of great public utility.

The directors, in giving this brief history of the undertaking, would have been disposed to dwell less on the difficulties they have had to encounter and have overcome, could they by a more reserved course have equally well justified to their constituency the price at which success has been purchased.

The shareholders will see, in the expedition with which the Parliamentary plans, sections, and books of reference were executed—in the more than usual breadth of country which was surveyed—in the great number of persons that it was requisite to employ for that purpose, at a time when hands for employment of this description were scarce, and their terms of renumeration proportionally high—in the numerous agencies which had to be put in motion in order to raise so large an amount of capital—in the many opponents who had to be negotiated and arranged with—and in the very short period within which nearly the whole of these things were transacted;—the shareholders will see in all this, reasons sufficient for anticipating a much larger amount of expenditure than would, under less extraordinary circumstances, have certainly sufficed.

As it is, however, the directors believe that, compared with other railway contests, this will not be found to have been more costly than usual; and instead of having occasion to bespeak your patience for an exhausted exchequer, they are happy to announce that, large as their expenditure has been, that they have still in hand a large and unencumbered balance.

From the balance-sheet annexed it will be seen that the the total receipts of the Company up to the present date amount to 61,845*l.* 2*s.* 9*d.* The claims brought against the company have, by careful revision of these claims, and allowances conceded for prompt payment, been reduced by 2,383*l.*; making the net amount of the expenditure, 36,561*l.* 19*s.* 2*d.*; deducting which from the monies received (61,845*l.* 2*s.* 9*d.*) the balance remaining in hand is 25,845*l.* 2*s.* 9*d.*

When the directors look to the magnitude of the object, which the sum thus expended has been the means of achieving, they think they may fairly congratulate the shareholders upon the general result. In a single session, with no more delay than the forms of Parliament rendered unavoidable, this company has obtained its act of incorporation;—that for which other proprietaries have had to struggle through several sessions, and to pay twice and thrice as much; an act of incorporation, too, which secures to them the perpetual proprietorship of one of the best lines of railway in the whole kingdom, with all the great profits legitimately derivable therefrom.

The Eastern Counties is not only the longest integral line of railway which has yet obtained the sanction of Parliament, but traverses a larger extent of cultivated and highly productive country than any other; those districts from which the immense population of the metropolis derives its chief supplies of agricultural and marine produce.

From the peninsular character, too, of this portion of England, washed as it is on three sides by the German Ocean and the Thames, it is obvious, that a main-trunk line, which follows, as this does, the ancient and long-established course of traffic, and touches at nearly all the places of greatest business, must draw *and keep to itself* the great bulk of the carrying trade of the district. Other railways may be interfered with, but this never can. As a great main line, it must always stand alone—dividing with no other railway, though receiving the tributary contributions of many.

Another novel and important feature of the Eastern Counties line is, that, notwithstanding its great length, *there will not, from beginning to end, be a single tunnel.*

If at one or two points it goes wider of considerable towns than could be wished, this has arisen from no indifference to the wants of those places, but from the necessity of consulting the general interests of the whole line, and of the majority of those who are to use it, in preference to all minor considerations.

The Eastern Counties Railway will have completely fulfilled the purpose for which it was designed, if it serve as the great trunk line of this part of the kingdom, from which branches may radiate into as many of the outlaying districts on both sides, as possess traffic enough to pay for this superior means of communication.

Already not less than six railways, branching from the Eastern Counties line, have been projected with apparently fair prospects of success; all of which, when executed, must contribute more or less to swell the profits of this Company, without involving the necessity of any addition whatever to its capital.

The Directors desire particularly to call attention to the *Thames Haven Railway*, for which an Act of Parliament was obtained in the last session of Parliament, and which is to branch off from the Eastern Counties at Romford. The capabilities of this line are undeniably great. Were it to do no more, than introduce into the heart of Essex a more abundant supply of coal, it would confer an incalculable advantage on that county, and pay the adventurers well; but should it also become, as its projectors confidently anticipate, the great channel for the conveyance of an article of such universal consumpiton as coal to the metropolis, it would be difficult to assign a limit to its value in a financial point of view. The point chosen for its seaward termination offers also such facilities as a steam-packet station, that there seems strong reason to hope for a large accession of passenger-traffic to both railways from this source.

Next in local order, follow the *Maldon Witham and Braintree*, the *Harwich*, the *Ipswick and Bury*, the *Beceles Bungay and Harleston*, and the *Norwich aud Leicester*, branches, which embrace among them nearly all the principal towns of the three counties, which were necessarily left at a distance in the setting out of the main trunk line, but will be now brought by these branches into immediate and productive connexion with it.

To these branches there is yet another to be added, which, though not projected with a view to the wants of any part of the districts immediately intersected by the Eastern Counties Railway, will in all probability prove one of its most valuable tributaries. The Directors allude to the recently projected line of railway from London to Rochester and Chatham, *through Essex*; the communication between the opposite sides of the Thames being effected by a short steam-ferry at Tilbury and Gravesend. By taking advantage of the Eastern Counties and Thames Haven lines for about seventeen miles of the entire distance, this railway will be executed for one-fifth of the cost of any line that can be executed *along the Kentish side of the river.* Although this line takes what may at first sight seem a circuitous course, it will, in fact, be little longer than a straight line between the two termini, and exceed by one mile only the distance by the present high road. The number of passengers to and from those parts of Kent, to which this railway will present the shortest possible communication with the metropolis, exceeds at presnnt one million; and assuming that one-fourth only of this immense passenger-traffic will fall to the share of this railway, this will add 25,000*l.* per annum to the revenue of the Eastern Counties Railway, from a source never thought of, or taken into account in the original calculations of its promoters.

According to the estimates, which were produced in evidence before the Committee of the House of Commons, and reported by that Committee to be verified to their satisfaction, the traffic of the Eastern Counties Railway will yield a return of 22 per cent. on the capital required for its formation.—The Directors have since tested this result in a variety of ways; but so far from seeing any reason to doubt its accuracy, they incline to think that the real facts of the case would have fully justified even a higher estimate.

No credit whatever was taken in the Eastern Counties Railway estimates for any of the passenger-traffic from *transmarine* sources, as that traffic was, at best, of a contingent character. But, unless the Directors are greatly mistaken, the traffic from these sources alone will suffice to pay the entire expense of working the line, leaving all the revenue derivable from the home traffic to count as so much clear gain.

The counties of Essex, Suffolk, and Norfolk, stand in such a geographical position as regards the northern continent of Europe, and the eastern coast of Scotland, as to offer the nearest route *by railway* from all these parts to the British metropolis. Steam vessels from any continental port north of the Texel, or from any port on the east of Scotland, by putting into Yarmouth which they can now do with the greatest facility at al times of the tide, and landing their passengers there, will enable them to reach London by the Eastern Counties Railway, from 15 to 24 hours sooner than they can now do by water, and, on occasions of contrary weather even two days sooner. To the steam-packets again, from the more southern ports of Rotterdam, Antwerp, Ostend, and Dunkirk, the port of Harwich will present an equally accessible harbor, from which the passengers may, with a proportionate saving of time, proceed to London by the Harwich branch of the Eastern Counties line. Yarmouth and Harwich were, it is well known, formerly the principal packet-stations on the Eastern coast of England, but lost that traffic through the introduction of steam-navigation. It was then found, that by despatching the Hamburgh and other north of Europe mails by steam-vessels direct from the Thames, even though these vessels should not leave the river for eight or nine hours after the mails were made up, the land journey to the outports was saved, and the mails conveyed to their destination in less time, and with more certainty than could be done by steam-vessels from any other point of the coast.—But as soon as a railway communication is established with Harwich and Yarmouth, all this advantage will be lost to the Thames.—The damage which steam has done to these ports as packet-stations the same mighty power will yet be the means of amply repairing. By sending off the mails by the railway to Harwich and Yarmouth as soon as made up, which is, not later than twelve o'clock at night, they will reach these ports by the same hour of the morning at which they now leave the Thames; one half the voyage will be saved; and an entire day, and often much more, gained in the course of transit. And thus, in the same way that the modern steam-vessels supplanted the old sailing-packets, may we surely reckon on seeing the steam-carriages of the Eastern Counties Railway restoring to its former course the passenger-traffic and commercial correspondence, between the British metropolis and the whole of the north of Europe.

The Directors beg, in conclusion, to assure the shareholders that the same spirit of determination which has enabled them to overcome the numerous difficulties which stood in the way of their obtaining the Act for the Incorporation of the Company, will continue in full vigor till every obstacle to the execution of the trust reposed in them has been overcome. Immediately on the Act being obtained, they directed all the necessary measures to be taken for enabling the engineer to commence operations with the least possible delay at both ends of the line, in order that the two portions of it likely to be the most productive,—namely, the London and Romford, and the Norwich and Yarmouth,—might be the soonest completed and opened; and negotiations for the purchase of the houses and lands required, are already in an advanced state. The expenditure on these parts of the line will be heavier than on any other; but in consequence of the considerable balance of the deposits left in hand, it has not been found necessary to make in the first instance a larger call than 1*l.* per share; and as the Directors have no doubt that this call will be responded to with cordial unanimity, the works will be in full progress before any further call is made on the shareholders.

Since the Act was passed, two vacancies have occurred in the list of gentlemen therein nominated, to constitute for a limited time the first Board of Directors; one by the lamented death of Mr. Crawford, and the other, by the resignation of Mr. Tite, who has since, with much advantage to the interests of the Company, been appointed its surveyor. The Liverpool shareholders, who now hold one-third of the entire stock of the Company, having at a late public meeting expressed a strong desire that they should be represented in the Board by two or more of their number, the Directors. considering this desire to be no more than just and reasonable, have, in virtue of the powers given them by the Act, elected two of the largest shareholders in Liverpool,—namely, Lawrence Heyworth, Esq., and Richard Hall, Esq.,—to succeed Mr. Crawford and Mr. Tite. In thus obeying the voice of the large and respectable portion of their constituency who are resident in Liverpool, the Directors are happy to state that they have at the same time added to their body, two gentlemen whose assiduous habits of business and intimate acquaintance with railway matters, are like to render their accession to the direction of the greatest advantage to the interests of the Company.

It may be proper to add, that by the Act of Parliament a certain fee is authorised to be taken on each certificate of registry and each transfer of shares; but that the Directors, considering that the levying of such a fee would impose an unnecessary tax on the shareholders—in the first stages, particularly, of the undertaking—have ordered that it shall not be enforced.

Signed, on behalf of the Directors,

Henry Bosanquet, Chairman,

R. J. Harvey, Deputy Chairman.

18 Austin Friars, Sept. 26, 1836.

From the London Mechanics' Magazine.

MANUMOTIVE-CARRIAGES.

We have often wondered that in these inventive days, no one has perfected an apparatus similar in design to the one inquired for in the following communication—Cannot our ingenuity supply this trantsatlantic want?

Sir,—By the extract in your last number from a Dublin paper, we learn that a whitesmith of Enniscorthy is emyloyed, as several other persons at this time are, in constructing a manumotive-carriage. In the present instance the vehicle "is propelled by an iron handle, which the guide moves to and fro with the right hand."

One would think it was almost impossible to hit upon any scheme for this purpose possessing much novelty, so many and so various are the plans that have been tried. When *velocipedes* were so much the rage in London a few years since, much ingenuity was exercised to produce manumotive-carriages in which the softer sex might ride; but without success, and since that time this has been the favorite hobby of many individuals. It is unfortunately a fact, that too many persons are apt to imagine, that the success of their machine depends upon the quantity and complexity of the mechanism employed, and this mistake generally proves fatal to their success.

When discussing this matter in a previous number (635,) I stated that the simplest, and therefore of necessity the best way of constructing manumotive-carriages, was to "fix a spur-wheel on the axle of the propelling-wheels, and drive them by a pinion duly proportioned to the inverse quantities of time and power. The man's labor applied tothe pinion by means of a winch-handle, would produce all the effect to be derived from such a source, and more than could possibly be obtained by any more complicated train of mechanism."

By applying the manual power to two cranks placed on the axle of the pinion, but opposite to each other, working the one with the right hand and the other with the left, the greatest possible effect would be produced. The guiding could easily be managed with the feet. By a machine so formed, favored with all the advantages of the best workmanship, a person might propel himself at a tolerable good speed; but for any great distance, I apprehend it might be walked over in about the same time with less bodily exertion, and therefore with greater ease.

There are cases, however, where persons have not the free use of their legs, while thier arms retain all their wonted vigor; to such parties a machine of this kind would be of infinite service. It is desirable, therefore, to put those persons in the right road who are wishing to construct such a machine.

In the case of Mr. Nicholson, he appears to be adopting the plan, familiar to the inhabitants of this metropolis, from its having been frequently seen in our streets; a carriage was constructed, and propelled at the rate of five or six miles an hour by six men, who each pulled a lever "*to and fro*" with a motion very similar to rowing, which acting upon cranks placed on the axle of the driving-wheels, turned them round and thereby urged the carriage forward. The conversion of rectilinear into circular motion, in this case, is attended with a great waste of power, and the plan I have pointed out would in practice be found more convenient as wellas much more efficient.

There are cases, as I have already stated, in which manumotive vehicles would prove eminently useful; in general, however, to persons in full possession of all their natural powers, the *marrowbone* stage will be the best conveyance.

Yours respectfully,

Wm. Baddeley.

London, Oct. 4, 1836.

The Military road from St. Peters, near the Falls of St. Anthony on the Upper Mississippi, and along the Western Fron-

tiers of Missouri and Arkansas to Red River, is about to be commenced, under the direction of some distinguished officers of the Engineer Corps.

From the Journal of the Franklin Institute.

SPECIFICATION OF A PATENT FOR AN IMPROVED BOILER FOR GENERATING STEAM GRANTED TO JOHN AMES, SPRINGFIELD HAMPDEN COUNTY, MASSACHUSETTS, MARCH 12TH, 1836.

To all whom it may concern, be it kown that I, John Ames, of Springfield, in the county of Hampden, and State of Massachusetts, have invented an improved boiler for the generating of steam, to be used in the drying of paper, and for other purposes, and do hereby declare that the following is a full and exact description thereof.

As this boiler is not intended to be used for steam of great elasticity, but is designed mainly, to produce it in large quantity, I intend, usually, to make it of cast-iron, although wrought iron or other metal, may be used if preferred. It may be made of various sizes, and in different shapes, but for the sake of description, I will give the dimensions of one which I have tried, and found to answer well. It consists of a box four feet square, and two feet deep, the two sides being open, but furnished with flanches for the purpose of bolting on the two plates which are to form the two sides of the stove. Tubes, forming flues, in the manner of the boilers now in general use for locomotive engines, are to pass through these side plates. In the one alluded to, the plates are cast with six rows of holes, nine in each, and about two inches in diameter. The upper row of tubes must be sufficiently below the water-line to ensure their being constantly covered; and above the water there must, of course, be sufficient space to form a steam chamber, or reservoir.

When this boiler is set, the draught from the fire place below it passes through two rows of the tubes, is returned through the next two, and finally through the upper rows. The manner of forming the flue by divisions, extending from the brick work te the sides of the boiler, between the respective pairs of rows will be readily understood by reference to the drawing which accompanies this specification.

Fig. 1.

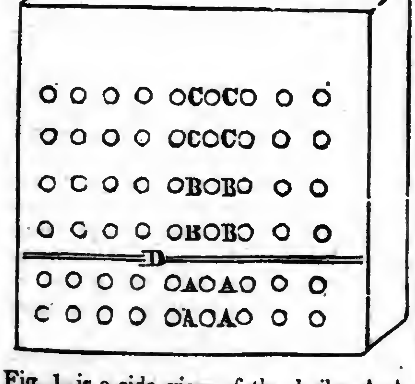


Fig. 1. is a side view of the boiler A A B B., and C C, being the open end of the tubes through which the heated air from the furnace is to pass, as will be shown more distinctly in fig. 2. D, is one of the ledges or partitions which project out from the boiler, occupying the space between it and the masonry in which the boiler is set, and causing the draught to enter the tubes A A in order to its returning through those marked B B.

2

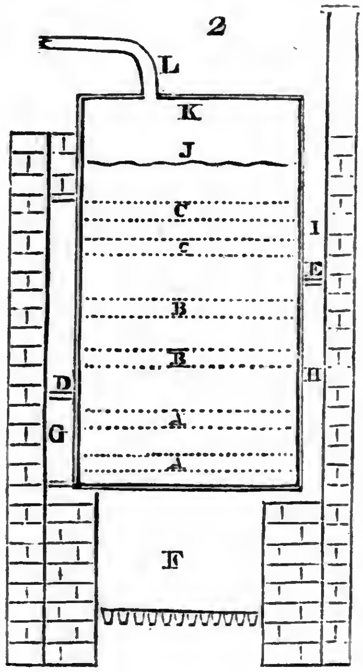


Fig. 2. is a vertical section of the boiler and furnace, cutting the boiler from front to back. A A, B B, and C C, are the double ranges of tubes, as in fig. 1, represented by dotted lines D and E, are partitions which direct the draught through the tubes in the following manner. Let F. represent the furnace, and C, a part of the flue into which the tubes A A, open, the draught being arrested by the partition D, will pass through A A, into the flue H, and being arrested by the partition E, will return through the tubes B B, then pass those marked C C, into the flue I, leading into a smoke pipe, or chimney; J, may represent the water line, K, the steam chamber, and L, the steam pipe.

Although I kave mentioned a certain number of tubes, and have said that in the boiler which I have tried, the heated air is made to pass through the water three several times, it is manifest that the same operation may be repeated as frequently as it shall be found advantageous so to do. The number of tubes also, may be varied, and they may be placed in single rows, or otherwise, without altering the principle of action.

I have not mentioned the safety valves. cock, or other general appendages to steam boilers, as in these I do not profess to have made any improvement; nor have I described any particular manner of securing the tubes, this being well known to engineers.

A boiler thus made, is recommended by its simplicity and economy, where it is desirable to generate a large quantity of steam under a moderate pressure, as for the purposes of heating and drying in various manufacturing processes. What I claim as my invention in it, is the general combination and arrangement of the parts by which the draught from the fire is made to pass repeatedly through the water, as herein set forth, whether made in the exact form represented, or any other which is substantially the same in its construction and operation.

JOHN AMES.

From the London Mechanics' Magazine.

TUNNEL UNDER THE NIAGARA.

SIR,—I perceive in some former Number of your Magazine, you have related an account of a proposed tunnel under the Ohio river at Cincinnati; your correspondent does not state that the bed of the river there, is a limestone rock, and the huge building of immense thickness, and nine or eleven stories high in the water, stands on the rock, and all the stone to build it was procured from the bed of the river at low water. However, I am not going to relate any thing of the difficulties of that affair; my busin ss is to suggest to your readers, and all others whom it may concern, that the gre test, best, and most magnificent tunnel in the world would be in Canada, under the river Niagara, at the rapids of Fort Erie, opposite Buffalo in tho United States; I say the best, and the easiest made, for the Niagara river there is narrowest, and its bottom is a flat, hard rock, which is a natural shield of itself, and below it a softer rock, which is easily cut. Captain B. Hall, in his "Travels" in America, has particularly described the strata a little lower down at the falls.

Now, if Brother Jonathan would agree to meet us half way, the thing, though of so great magnitude, would be easier performed than any thing of the kind in any other part of the world. The only attention required would be to plug up with clay any fissures in the rock which might occur, and cement them over. No great depth is required; the water seems as shallow there as at the falls on the same rock. All Lake Erie is on a complete bed of rock, and so level that an anchor slides along hundreds of yards at a time without holding. The whole is particularly suitable for such a purpose; and whenever done (if ever done,) your publication will have the honor of first pointing out to the public its true nature.

Your constant well-wisher,

A TRAVELLER.

Wilden, Sept. 30, 1836.

Miscellaneous.

From the London Mechanics' Magazine.

ANOTHER DISCOVERER OF A MODE OF PROPELLING AND DIRECTING BALLOONS.

An Italian gentleman, Signor Leonardo Andervolti, of Spilinbergo, in the Friuli, informs us that he has invented an ærial locomotive balloon, capable of propulsion and direction at pleasure, with safety and precision, either with or against the wind. He has constructed, he says, a working model of this machine, with which he has actually traversed the air in his own country. He offers, if a certain sum of money be guaranteed to him in the event of his succeeding (of which he entertains no doubts,) to fly over to England in his balloon!—Or that he will at his own expense construct a balloon here, which shall be able to keep up a regular traffic between any two points at a reasonable distance from each other, with even greater rapidity than any steamboat or coach! The Signor does not ask a farthing until he has performed the foregoing conditions; but as his mechanism is so simple, that as soon as constructed it would be copied, and he might thereby lose the fruits of his ingenuity, he requires that a certain sum should be guarateed him before doing so, either by a company or individuals, to whom he would assign his invention secured by patent. Signor Andervolti has left his address at our office.

The Signor speaks very fair; and as he asks nothing until he fulfils the conditions above stated, there could be no risk incurred were a number of individuals to subscribe for a hundred pounds or so each to secure so grand an invention. Of the thing itself we do not profess to give an opinion,—we know no more of it than what is stated above.

PENNSYLVANIA COLLEGE OF MINES.

We perceive that on Tuesday, Mr. Trego, one of our city delegation, gave notice in the House of Representatives, that he should next day ask leave to bring in a bill entitled "An Act for the Establishment of a College of Mines in the State of Pennsylvania."

It is understood that this bill will provide for the erection of an institution in which, in connexion with other useful and practical sciences, will be taught:

1. Geology, Mineralogy and Chemistry, as applicable to agriculture, architecture, the construction of canals and roads, the digging and boring for water, &c.

2. Mineralogical Chemistry, exemplifying theoretically and practically the most approved and economical methods of analyzing ores, earths, soils, mineral waters, &c.

3. The theory and practice of Mining, with reference to the geographical and geological position of the mineral beds and veins, and the discovery and discrimination of minerals in rocks and soils; also, the practice of engineering, as applied to mining.

4. Metallurgy, theoretical and practical, or the art of reducing and smelting ores, and of separating them from foreign matter as well as from one another; also, the mode of making the best combinations and alloys of metals used in the arts.

It is also intended to establish in the said college, a collection of specimens of all the important rock, formations and of all the minerals found in the State, properly and scientifically arranged, with their names and localities; and also a description of their chemical character, composition and their use in the arts. Also a similar collection of all useful or curious foreign minerals, with their names, uses, &c., together with such information relative to them as will be calculated to lead to their discovery in the State of Pennsylvania.

Instead of an endowment to this college from the State treasury, it is proposed to appropriate, in aid of its funds, the State tax on the dividends of coal and mining companies, and companies for the manufacture of iron, incorporated within this commonwealth which, with the aid of subscriptions and donations from liberal and public spirited citizens, will, it is believed, be amply sufficient for the support of the college.

It is gratifying to us thus to notice the labors of Mr. Trego. Last year he introduced, and, aided by his colleagues, carried through the House, a bill directing a geological and mineralogical survey of the State. The proposed "College of Mines" seems to be most consonant with the capabilities of our State, and if rightly conducted, cannot fail to bring out its immense mineral treasures, and make them contribute to general as well as individual prosperity.—[U. S. Gazette.]

The rotary printing machine of Mr. Rowland Hill has already excited much attention. We have had the specification of the patent with the accompaning drawings for some time in our possession, but the length of the former and the intricacy of the latter, have prevented us from publishing them. The following article giving a description of the machine is from the Repertory of Patent Inventions, and will be found to convey a very correct notion of the machine without reference to details.

THE ROTARY PRINTING MACHINE BY MR. ROWLAND HILL.

The steam-printing press was introduced at the close of the year 1814, before which time all printing was done by hand-presses, and the rate at which large sheets as newspapers were printed, scarcely ever exceeded 300 single impressions* in an hour.

The insufficiency of the hand-press to meet the growing demands of the public for newspapers was probably felt at a much earlier time, as in the year 1790, Mr. William Nicholson, editor of the journal bearing his name, obtained a patent for machines for printing upon various plans, and it is certainly the case that he then *indicated* very many of the modes of operation which, since his time, have been successfully developed by other machinists. Mr. Nicholson appears never to have carried out any of his plans to a successful termination. Whether he was unable to work out the numerous mechanical details, or wanted funds to meet the heavy and unavoidable expense of such undertakings, or could not induce those engaged in the trade to give his plans a fair trial, we have no means of ascertaining; certain it is, that whether succeeding machinists have or have not been indebted to him for their leading views, they have had still to encounter by far the most difficult part of their task, and in overcoming the various physical and mechanical difficulties which lay in their way their powers of invention and their patience and industry must have been exercised in no ordinary degree.

* Impressions on one side only of the sheet of paper.

When, however, the machine-presses were brought into action a great increase of speed was at once obtained.

During the twenty-one years which have elapsed since their introduction, various and important improvements have been effected in their construction, and by the rapid and powerful machines now used in printing the daily newspapers, the surprising number of 4000 single impressions is sometimes given off in an hour.

The inventor of the machine, which is the subject of this paper, believes that he has effected improvements by which the rate of printing just named, great as it is, may be still further increased, and that in no trifling degree.

In order to explain the means by which this advantage is proposed to be obtained, it is necessary to notice slowly the construction of the machines now commonly in use.

The type necessary to the printing of one side of the sheet, consisting (for a newspaper,) of about 100,000 separate pieces, are collected, and being arranged in proper columns, the mass is placed in an iron frame called a chase, which binds it firmly together, and the *form* (as the chase filled with type is technically called) is then transferred to the machine, where it is secured upon a strong iron plate, which plate being mounted upon truck wheels, forms a carriage; and there is a small railroad for it to run upon.

When the machine is in action this carriage, with the form upon it, of which the face* of the type constitutes the upper surface, is constantly moved backward and forward horizontally, and as it passes along, it comes in contact, first, with the inking apparatus, which consists principally of a number of cylindrical rollers covered with ink and lying horizontally, and which are set in motion by the friction of the surface of the type acting upon their lower sides as it runs under them.

Next the *form*, being now inked, passes under a large revolving iron cylinder about the form and size of an ordinary double drum; this lies horizontally, and its curved surface is covered by a closely wove blanket bound tightly upon it.

The paper as it is supplied to the machine, is made partly to encircle this cylinder, being held against it by tapes which move with the cylinder.

The surface of the type moving horizontally and the surface of the blanket-covered cylinder revolving with the paper upon it, have exactly the same speed, and as the type passes under the cylinder, that side of the cylinder which bears the paper is brought undermost and presses the paper upon the type whereby it is printed. The cylinder then rises a little, the type returns under it without contact and passes back to the inking rollers for another supply of ink, preparatory to the printing of another sheet; while the printed sheet, if the machine be constructed to hold one form only, now passes out from between the cylinder and the tapes, and is received by an attendant.

Simple and ingenious as this arrangement undoubtedly is, the experienced machinist will at once perceive that it has points in

* That part which gives the impression.

which improvement is at least highly desirable.

That which is most objectionable is the reciprocating motion of the form and its carriage, which together are of considerable weight, varying perhaps from five cwt. to a ton, and it is obviously difficult, if not impossible, to keep such a heavy mass in very rapid motion when the direction of that motion has to be reversed every instant.

Also much time is occupied by the backward motion of the *form* by which the type obtains a supply of ink, and regains the position proper for the printing of a succeeding sheet.

And the rate of reciprocating motion really obtained, though not great, requires much power to produce it.

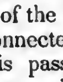
These defects appear to be unavoidable while the type forms a flat surface, as it is not practicable to make a flat surface move continuously.

Mr. Hill proposes to obviate these defects by affixing the type around a cylinder so that the surface of the type itself shall form a kind of outer cylinder, the whole resembling slightly an organ barrel with its projecting pins; and he has certainly overcome the principal difficulty as it appears, viz., the discovery of a mode of readily and securely attaching the pieces of type to the cylinder, and this without making it difficult to detach them for the purposes of correction, revisal, &c. Of the manner in which this is accomplished we shall speak presently.

The type so affixed upon a cylinder, together with the proper spaces for margin, occupy its whole circumference; the cylinder thus clothed is placed in contact with a blanket-covered cylinder of the same dimensions, and the two are connected by toothed wheels, and the paper is passed between them with moderate compression, just as a piece of metal is passed between the rolls of a flatting mill. An inking apparatus is attached by which a constant supply of ink is communicated to the type as it revolves.

As the type cylinder has affixed to it precisely the quantity of type requisite for printing a sheet on one side; and as there is no vacant space upon the cylinder except for the margins, it follows that at each revolution of the cylinder exactly one sheet will be printed; and that the instant the printing of one sheet is completed, that of another will be commenced; no loss of time therefore can occur if the supply of paper and of ink be kept up.

Again the motion being rotatory, not reciprocating, there is no difficulty in making it rapid; and the machine has been repeatedly worked with great rapidity in the presence of numbers of persons, without injuring or disturbing any of its parts, and without deteriorating the quality of the printing.

In the machine which has been exhibited, there are two type* cylinders and two blanket cylinders placed thus  : the paper in passing from left to right between the first rollers is printed upon its upper side, and in passing between the last rollers it has its lower side printed.

This arrangement, of course, requires two distinct inking apparatus, one for each type roller.

To supply the machine with paper in single sheets at the rate of two per second, at which rate the machine has hitherto been worked, would be difficult if not impracticable; the plan therefore has been to make use of a long scroll of paper as it is produced by the ordinary paper machines, the end of which being introduced between the rollers the machine then supplies itself by unwinding the scroll from a reel.

It is intended to cut the scroll up into single sheets by additional machinery, as it passes from the printing rollers.

The greatest difficulty which Mr. Hill has had to surmount in the construction of his machine, is, as we have already stated, that of fastening the small pieces of type upon the surface of a cylinder, and with firmness to ten columns upon one side of a newspaper*; each tray being filled with type has a proof taken from it by a small press, and, after correction, the type being made fast by tightening the horizontal screws with which the galley is provided, the galley itself is screwed upon the cylinder. When the ten galleys are so attached to the cylinder, they cover it completely, excepting the spaces left for margin, but any one galley can be easily removed and replaced without disturbing any other.

The galleys filled with type being firmly screwed to the cylinder, thenceforward form part of it, and are not removed until the printing is completed and the type is to be taken out for distribution, unless it should become necessary to stop the press for further revisal or the insertion of new matter.

The very rapid supply of ink which the machine demands, by reason of its great speed, appears to be fully maintained, and that with very good color, by the inking apparatus attached.

Mr. Hill employs the trough (for containing the ink,) with its ductor-blade and iron roller, having proper screws for increasing or diminishing the space between the blade and the roller, through which space a thin film of ink adhering to the surface of the roller passes from the trough as the roller revolves.

This ductor is in every respect of the usual construction; its roller turns very slowly; next to it Mr. Hill places another iron roller lying parallel with it and just touching it, but having a rapid motion equal to that of the surface of the type, and this roller by gently but swiftly rubbing against the ductor-roller, takes off its ink in a much thinner and more extended film. It ordinarily moves about eighteen times as fast as the ductor-roller, therefore it ordinarily extends the film of ink brought out by the slow-moving ductor roller over eighteen times the amount of surface it first occupied.

Means are provided by which the relative speed of the ductor can be readily increased or diminished, and thus a very nice adjustment of the quantity of ink supplied to the type can be effected.

We have spoken incidentally of the great speed of Mr. Hill's machine; being worked by two men it throws off sheets of the size of the evening newspapers, at the rate of 7000 retain their places even when they are turned upside downwards by the revolution of the cylinder, at which time their gravity combines with their centrifugal force in tending to displace them, and to effect this without throwing new difficulties in the way of correction, revisal, &c. We shall endeavor to explain how this is accomplished.

Each piece of type is slightly wedge-like in its form, so that when several are laid side by side, they form a segment or arch whose lower curve corresponds to the surface of the cylinder upon which the type is to be fixed,* and each piece, instead of the ordinary narrow notches in its side, made for the compositors convenience, has a very broad notch; when the type is placed together to form a line these broad notches in the several pieces range together, and form an arched chase capable of receiving a thin brass plate of corresponding form and dimensions, which, when applied, is wholly embedded in the chase. When a line of type with its plate, or scale-board, so embedded within its substance, is compressed between the lines, and its plate thereby completely inclosed and kept in its place, it is manifest that no single piece of type can be displaced: if any move the whole line must move. Means have been adopted, which we have not space to describe, by which these plates are made to take their places in the course of the composition, with the utmost readiness and certainty.

The lines of type are placed in a kind of tray or galley, of the length and breadth of a newspaper column; the bottom of which tray is a portion of a cylinder, the curvature being in its breadth, not in its length, somewhat as though a stave were taken from a truly cylindrical cask, and used as the bottom of a tray, the curved side being uppermost. The lines of type are secured in the tray principally by horizontal screw pressure acting against the ends of the column of type; but as a precaution against a tendency to bulge, which sometimes occurs in a column of the great length required in a newspaper, a few of the embedded plates have small projecting tenons at their ends, which lock into certain chases in the sides of the tray just described.

The upper type-cylinder of the machine exhibited has ten such trays answering to the to 8000 perfected copies per hour. What rate can be safely given to it by the application of steam power it is difficult to determine. At the speed above named, a scroll of paper of the width of a newspaper, and from three miles and a half to four miles long, might be printed on both sides in one hour.

Before the introduction of printing-machines in 1814, the printers of large newspapers, confined in their operations by the slowness of the hand press, had no resource, under the pressure of urgent demand, but to set up a portion of their matter in duplicate, at an expense of some thousands per annum. It seems not improbable that the expected abatement or removal of the stamp duty may soon cause the demand for newspapers to

* One only has been covered with moveable type, the other has stereotype plates bound round it as a temporary arrangement.

* The lower type-cylinder, which prints the other side of the paper, is temporarily covered with stereotype plates, as before named.

* Mr Nicholson proposed to use wedge-like type, and to affix them upon a cylinder, but he did not show any sufficient means of so affixing them.

overtask even the great power of the present machines.

Should such a pressure arise, and should Mr. Hill's machine prove as successful in extended practical operation, as the numerous experimental trials it has had give reason to expect, its introduction will probably bring relief in the same way as it was brought up by the introduction of the machines first used.

From the London Mechanics' Magazine.

MODE DISCOVERED OF PROPELLING BALLOONS IN ANY DIRECTION.

Sir,—It is really a matter of no small surprize, that, after all the investigations and experiments made in ærostation, since Albert first asserted, and Montgolfier afterwards demonstrated, the practicability of floating in the upper regions of the atmosphere, that balloons should remain to this day the same unwieldy and ungovernable toys as at first constructed.

After the first principle, or rather the first power of balloons—that of ascension, had been satisfactorily established, both by calculation and experiment, the next thing that became desirable was the power of propelling and guiding them at will.

Various attempts have at different times been made to accomplish this eminently desirable object; but being for the most part made without judgment, they were unattended with successful results. Sufficient has been done, however, to prove beyond all question, *that propellers will act upon a balloon*, with an effect proportionate to their size, and to the manner in which they are placed and worked. It is also equally evident, that so soon as æronauts can, by any means, cause their balloon to move with a velocity differing from that of the current of air in which they are floating, a rudder will become efficient, and the balloon will answer to the helm.

People frequently confuse themselves in their application of the simple principles of navigation in a denser medium *to ærial navigation.*

So long as a boat, barge, &c. moves with the same velocity as the stream, a rudder is wholly useless; but, if the boat or barge is made to move with a different velocity—i. e. *either faster or slower* than the stream—the rudder becomes an efficient agent in directing the movements of the vessel. With balloons, precisely the same law obtains; the moment they can be propelled, they will become capable of being guided.

In a recent Number of your Magazine, Mr. Mackintosh very justly observed, with respect to the difficulty of propulsion, that "the difficulty consists simply in this:—The resistance is greater than any power that has been hitherto applied to overcome it." He further adds, "to meet this difficulty we must *increase the power*, and *decrease the resistance.*"

Mr. Mackintosh's reasoning upon this subject is perfectly correct; and I have now to state, that following out precisely the same principle, I have succeeded in contriving a balloon of entirely new description, possessing all the requisities for efficient ærial navigation, and capable of being propelled and guided at the pleasure of the æronauts. The few scientific friends to whom I have submitted my plans, have expressed themselves perfectly convinced of their feasibility, and feel satisfied that the time has now arrived when balloons will cease to be scientific toys, and assume a new and useful character.

It would not be consistent with my own personal interest, at this time, to develope the nature of my invention, but your readers will hereafter have an opportunity of becoming acquainted with it. I should wish no person to suppose for one moment that balloons will ever be guided in the teeth of opposing currents; but I am now prepared to assert, and all who have examined my scheme will support my position—that in balloons upon my construction, the power is so much increased and the resistance so much diminished, as to enable them to be propelled and guided through the air with as much facility as boats at present are upon the surface of our river Thames.

By the same means, an upward or downward direction can be given to a balloon, without in any way varying the quantity of gas or of ballast—and the machine brought under a degree of control hardly before anticipated.

I remain, Sir, yours respectfully,

WM. BADDELEY.

Oct. 11, 1836.

From the Reperlory of Patent Inventions.

SPECIFICATION OF THE PATENT GRANTED TO FRANCIS BREWIN, OF THE OLD KENT ROAD, IN THE COUNTY OF SURREY, TANNER, FOR CERTAIN NEW AND IMPROVED PROCESSES OF TANNING.—SEALED JANUARY 11, 1836.

To all to whom these presents shall come, &c. &c. *Now know ye*, that in compliance with the said proviso, I, the said Francis Brewin, do hereby declare that the nature of my said invention, consists in the making or preparing a new liquor or liquors for tanning or manufacturing raw hides and skins into leather, and for retanning leather manufactured in the ordinary way from certain exotic substances, which have not heretofore been in use for manufacturing leather in this country, or from a combination of these substances with other materials already in common use, by means of which new liquor or liquors, leather can be manufactured of a superior quality in less time than usual, and at much less expense, and by which also leather manufactured in the ordinary way may be improved in quality. And I declare that the manner in which the said invention is to be performed, is fully shown and set forth in the following description thereof, (that is to say):

I employ in the making and preparing of the said new tanning and retanning liquor or liquors, certain substances known in English commerce by the names of gum-kino, divi-divi, and terra-japonica, all of which I find contain much larger proportions of tannen than the best English oak bark, and yield liquors, possessed respectively of the following properties:—a solution of gum-kino imparts to leather a brownish red color, but improves it considerably in point of closeness and firmness of texture; a solution of divi-divi gives a very light color to leather; a solution of terra-japonica, of the sort generally imported in small square pieces, gives a dull light color, and one of terra-japonica of the sort generally imported in large cakes, a brownish red similar to that obtained from gum-kino. A solution of divi-divi I prepare in the same way as the ordinary bark liquors are made in vats or lecks by tanners.—But gum-kino and terra-japonica require to be treated in the manner following. If the gum-kino is in large pieces, or if the terra-japonica is of the sort which is sold in large cakes, I first break these large pieces and cakes with a hammer into small pieces; I then steep the whole for about three days in cold water, or cold weak tan liquor; after which I put the whole into what I call a rubbing tub of the construction shown in the drawing in the margin hereof, for the purpose of being still further reduced; or I use hot water, or hot weak tan liquor, in which case I put the whole of the materials at once into the rubbing tub, and leave them to steep for about an hour only, which last process is that which I prefer. This tub is about five feet deep and four feet wide in every part, and has a loose cover just so much smaller to it in circumference that when not kept up by the materials in the tub, it will readily fall to the projection or stopper, fixed at about four inches from the bottom, and in this cover, on the under part thereof, about one hundred spikes of copper, wood, or any other material that will not stain the liquor, of about three inches long, are firmly inserted. A square wooden shaft, about five inches thick, with a wheel or handle at top to turn it by, is passed through an orifice of corresponding size and description in the centre of the cover, and drops into a recess in the bottom of the tub, large enough to allow the shaft to turn freely within it. The materials having stood sufficiently long for steeping, the shaft of the tub is worked round by manual or other power, which carries around with it the loose cover with the spikes underneath, till, by the stirring and rubbing action of the spikes, the pieces of the gum-kino or terra-japonica in the tub, are either successively dissolved or reduced to such small dimensions as to pass easily between the cover and the sides of the tub; and in order that the said cover may press continually downwards on the materials in the tub, and descend as the materials become dissolved or reduced to the dimensions aforesaid, a heavy weight or weights is or are placed and kept on the top thereof during the whole of the operation: and in preparing the said solutions for use I employ more or less water or weak tan liquor, according to the sort of leather which is intended to be manufactured; (that is to say,) for sole leather I use about fifty to one hundred pounds of the gum-kino, or of the divi-divi, or of the terra-japonica, with about one hundred gallons of water or weak tan liquor; and for manufacturing dressing leather, I use with every fifty to one hundred pounds of the divi-divi and light terra-japonica about three hundred gallons of water or weak tan liquor, rarely using the gum-kino or dark terra-japonica at all in the manufacture of dressing leather, or any sort of leather in respect to which color is an object; or instead of at once dissolving the said materials in the said proportional qualities of water or tan liquor, I dissolve them at first in any smaller quantities of water or weak tan liquor, and afterwards reduce the solutions to the required strength by the addition of water or weak tanning liquor; and when I have, by the processes aforesaid, obtained the requisite solutions of gum-kino, divi-divi, light terra-japonica, and dark terra-japonica, I generally mix for sole leather the different solutions together in a common tan vat in the following proportions; (that is to say,) one quarter of the solution of gum-kino, one quarter of the solution of divi-divi, one-eighth of the solution of the dark terra-japonica, and three-eighths of the solution of the light colored terra-japonica; I then put into the liquor so prepared and compounded, about one fourth more raw hides or skins than would in general be put by tanners, into an equal quantity of bark liquor, and with every hide I put on an average about one pound of oak bark in the same way as tanners now use bark in the vats with hides and skins. For manufacturing dressing leather, I mix the solutions of divi-divi and light terra-japonica, prepared as before mentioned, and put the hides or skins into them with the same proportions of bark and liquor as are hereinbefore directed to be used in the case of sole leather. When the leather is required to be of a very close and firm texture, and the color is a matter comparatively unimportant, I make use of a larger proportion of the liquor of gum-kino than is before directed and when the dark terra-japonica is low in price, and when the color to be given to the articles is immaterial, I also make use of a larger quantity of that material than of any of the others; and when it is desired to have the leather of a color lighter than that which results from the combinations of all the four liquors in the proportions before recommended, I diminish the proportional quantities of the dark coloring substances according to the particular shade of color required to be given to the article. And whereas some one or more of the said articles may occasionally be so scarce in the market, or so high in price that it may not be practicable or economical to employ it or them in the quantities before recommended with the other substances, I declare that the use of any one or more of the said substances may be dispensed with either wholly or partially, but subject to the following modifications in the effects produced; (that is to say,) if gum-kino be used alone the leather produced will be too hard and close for general purposes; if divi-divi be used alone, it will produce leather lighter in color than usual; if terra-japonica be used alone, an article will be produced possessed neither of that firmness nor that color which is generally desirable in leather, while, by the addition of divi-divi to gum-kino or terra-japonica, a better article is produced than can be obtained from either gum-kino or terra-japonica separately. And whereas also the prices of all the four articles aforesaid may, at times, rise so high that, notwithstanding their superior tanning properties, they cannot with economy be entirely substituted for oak bark, or any of the other barks or tanning materials now in common use, I declare that the same may be advantageously used in combination with the said common materials in the proportions following: (that is to say,) any given quantity of gum-kino, divi-divi, and terra-japonica, mixed in the proportions before recommended, may be combined with any quantity of oak bark; or any given quantity composed of six-twelfth parts of light terra-japonica, four-twelfth parts of divi-divi, and two-twelfth parts of gum-kino may be combined with an equal quantity of mimosa bark or kermac root; or any given quantity composed of gum-kino, divi-divi, and terra-japonica, in equal proportions, may be combined with two-eighth parts of valonia, and two-eighth parts of oak bark; or, lastly, eight parts of gum-kino, divi-divi, and terra-japonica may be combined with two-eighth parts of oak bark, and one-eighth part of shumach. When gum kino, or divi-divi, or terra-japonica, or any of them, are intended to be used along with oak or other bark, they may either be ground very small in a common bark mill, after being well dried, if not sufficiently dry for grinding in their original state, and then mixed up with the bark, or the bark and divi-divi may be steeped by themselves in the taps, and the liquor drawn off and made hot, and then put in such quantity into the rubbing tub as is necessary to dissolve the gum-kino or terra-japonica, as before described, which latter method is that which I prefer; or water or weak tan liquor alone, either hot or cold, may be used to dissolve the new materials before mixing them with the common liquors; the liquors made from these various articles I prefer using of about the same tanning strength as those made from the new materials alone; and though the proportions in which I have hereinbefore directed the gum-kino, divi-divi, and terra-japonica to be mixed with each other, or with oak bark and others of the materials already in common use, are those which I have found to answer best under ordinary circumstances, I declare that the said proportions may be varied at the discretion of the practical tanner according as the taste of customers in respect to the color of leather may vary, or according to any particular quality desired to be given to the manufactured article, or according to the comparative cost at different times of the different materials. And I declare that for retanning or improving leather made in the ordinary way, I put it into a fresh liquor, the same as is hereinbefore directed to be used for sole leather, and after it has remained therein for one day, I handle it, I then allow it to remain in the liquor for from eight to fourteen days, after which I take it out and dry it, and, if necessary, restrike it; and I declare that what I claim as my invention is the making and preparing of a tanning liquor or liquors for tanning or for manufacturing raw hides and skins into leather, and for retanning leather manufactured in the ordinary way with gum-kino, divi-divi, and terra-japonica, either employed separately or combined with each other, or with other substances already in common use, in the different proportions, and in the manner hereinbefore specified, or in any other proportions and manner which a change of circumstances may render more suitable; and such my invention being, to the best of my knowledge and belief, never heretofore used in this country, I do hereby declare this to be my specification of the same, and that I do verily believe this my said specification doth comply in all respects fully and without reserve and disguise with the proviso in the said hereinbefore in part recited letters patent oontained; whereof I hereby claim to maintain exclusive right and privilege to my said invention.—In witness whereof, &c.

Enrolled July 11, 1836.

From the London Mechanics' Magazine.

ON AEROSTATION.

Sir,—Having in my letter of the 1st ult. (see p. 307,) endeavored to show the improbability of aerial machines tending to any useful purpose, while they retain their present form, I shall now add a few remarks, suggesting the form in which balloons ought, in my opinion. to be made.

In art we generally imitate the works of nature; now, all animated bodies intended for locomotion in the air or water have a head and a tail; man has imitated this in the ship, which has a stem and stern; but in the balloon he has neglected his model, as at present made they have neither, and to this mal-confirmation alone must be attributed the repeated failures that have taken place in all attempts at guiding them. Upon this, I found the following observations:—

Balloons have two motions, a vertical and a horizontal; the former caused by the levity of the gas contained, and the latter by the prevailing current of air in which it ranges; and this latter is the movement that requires to be regulated, as the other can be varied by retaining or discharging of the gas or the ballast. Now, when it is considered how readily a vessel answers to her helm, and that water is to air, as 832 to 1, I cannot conceive that it would be found so difficult a task to guide an *oblong machine* in such a yielding element as atmospheric air. I am aware that many scientific persons think differently; I would call the attention of such to an account in the daily papers, not many months ago, of one of his Majesty's ships, after losing her rudder and a temporary one in a hard gale of wind of several days' duration, having been steered up the Channel to Spithead by only attending to the trimming of her sails; there are also other known modes of steering by the assistance of the wind alone. In short I am doubtful whether machines to float in the air should differ, except in the *materials* for their construction, from those used to float on the water.*

It is common with with aeronauts now to ascend to a most unnecessary height for any experimental purpose; if ascensions were confined to a moderate height, sufficient for all the ordinary purposes of voyaging, descents might generally be more safely and rapidly effected in cases of danger. With respect also to the proposed enlargement of balloons, I would ask, are not two or three persons sufficient for philosophical or experimental trials? First let the aeronauts show the capability of guiding them, and capaciousness may then follow. When announcements like those of the proprietor of the "Eagle" and her seventeen passengers are made, I augur unfavorably of their performances adding much to our stock of knowledge. Proofs of the points necessary to be first ascertained might be made for a tithe of the money that must be expended in making a balloon of the magnitude of that now about to ascend from Vauxhall; for the fate of which all thinking persons must feel some apprehensions, notwithstanding its being under the guidance of the most experienced aeronaut of the day.

I remain, Sir, yours, &c.

OMRI.

London, Sept. 4, 1836.

*In comparing aerial with marine navigation, the fact is generally lost sight of, (as in the present instance by "Omri,") that in the latter case the vessel floats in one medium and is propelled by the help of another, whilst in the former it floats in, and is propelled by, one and the same medium.

From the Athenæum.

MEDALLIC ENGRAVING.

The idea of employing machinery for the purpose of engraving upon metals is not of very recent origin: as was the case with steam navigation, the principle was recognized many years before it was put into successful practice. In the year 1830, Mons. A. Collas, an able mechanician at Paris, having been commissioned by an engraver at Ghent to make a ruling machine for him, constructed one for himself, upon a somewhat different principle, with which he made several attempts to execute engravings upon copper, in the style of a pattern which had been published in the *Manuel des Tourneurs* upwards of twenty-four years before. It was not till six months' labor and thought had been bestowed upon it that M. Collas brought his invention to a certain degree of perfection: he produced his first engravings in the spring of 1831. Of the attempts at a similar instrument, made in the United States, we are informed, and believe, that he had seen or heard nothing; but in the year 1833 he chanced to meet at Paris with an old mathematician from Geneva, whose father had, some sixty years before, been employed in executing engravings by machinery upon the cases of gold and silver wathes; so that the remotest traces of this art may be dated about the year 1775 to 1780.

It has been ascertained, beyond all doubt, that this invention is not of domestic growth in England. It was in the year 1817 that a die-sinker of the name of Christian Gobrecht, then living at Philadelphia, produced by a machine an engraving upon copper of a medallic head of the Emperor Alexander of Russia, several impressions of which were distributed in that city. Mr. Asa Spencer (now of the firm Draper, Underwood, and Co.) took one of Gobrecht's machines with him to London in the year 1819, which was its first introduction into London. This machine was principally designed for straight and waved lines; it was employed in London, and its uses exhibited and explained by Mr. Spencer to several artists. It attracted the particular notice of the late Mr. Turrell, an engineer, and he obtained permission to make a drawing of the machine, for the purpose of having one constructed for his own use. Ten years afterwards, in the year 1829, Mr. Joseph Saxton, an American, born at Huntingdon, in Pennsylvania, who had known Gobercht, and seen the engraving from the Russian medal, contrived a machine somewhat similar in principle to the one brought to England by Mr. Spencer; in this he first introduced a *diagonal tracer*, for the purpose of correcting some of the defects which existed in the medallic engravings executed by Gobrecht's and Spencer's machines; these had all of them an unpleasant twist upwards, and an evident distortion of the features of the head. In the following year, an idea being started of applying this new method to the engraving of designs for bank notes, Mr. Spencer again bestowed considerable pains upon the improvement of his invention, without any success. Mr. Turrell, who was acquainted both with Spencer and with Saxton, communicated his drawing and his ideas upon the subject to Mr. Bawtry, who then held the situation of engraver to the Bank of England, and it was this gentleman who originally applied to Mr. Lacy to construct a machine of this description for him. Mr. Lacy was then, as Mr. Spencer had been, connected with the establishment of Messrs. Perking, Bacon, and Petch, bank note engravers in Fleet street, and was the person employed, in the year 1832, to execute the engraving from a medal representing the bust of our present King, which appeared in the frontispiece of the "Keepsake" for 1833. The contracting parties did not come to a satisfactory agreement, and the negotiation was broken off. It was probably that at time that Mr. Bawtry entered into communication with Mr. John Bate, of the Poultry, optician and maker of mathematical instruments to the Board of Admiralty. Mr. Saxton had been introduced to Mr. Bate shortly after his arrival in England, and had, we believe, given to the latter his first notion of such a machine by exhibiting to him an engraving upon glass, executed by it. During the succeeding interval, Mr. Saxton had continued to attempt the improvement of his diagonal tracer which, though some distortions were manifestly obviated by it, was still utterly unable to give the effect of light and shade when employed to engrave medals of very bold, or, rather, *steep* relief, and inevitably left blank spots in the engravings. Here the matter rested for awhile.

In the earlier part of the year 1832, the Messrs. Bate having been informed that Mr. Saxton had effected several improvements in his machine, had an interview with him, for the purpose of exchanging their ideas upon the subject. But a natural feeling of jealousy prevented either party from exhibiting to the other his machine; the Messrs. Bate stated, indeed, that they had succeeded in removing the distortions which existed in their earlier productions; Mr. Saxton, on the other hand, referred to his own invention, and declared himself capable of executing by his machine as much as they could do by theirs; finally agreeing to satisfy them of the truth of his assertions, by putting into their hands an engraving, in which all distortions should be avoided. This engraving was a head of Franklin, with a bust of Minerva copied from a gem or cameo. Upon examining it the Messrs. Bate, however, seemed to think that some distortions, though slight ones, still remained. It was then proposed that both parties should execute an engraving from a gem representing the head of Ariadne, an impression of which, in wax, Mr. Bate, junior, undertook to send to Mr. Saxton. But here the matter ended —the wax impression was never sent, and two months afterwards Mr. Saxton was informed that Mr. Bate had taken out a patent for an improved machine, particularly specifying the introduction of the diagonal tracer, which happened to be the same as his own. Mr. Saxton, disgusted with the turn which matters had taken, turned his attention to other mechanical inventions, and subsequently sold his machine to Mr. W. Trevylian, in whose hands it now remains. From that period nothing was done in the way of engraving from medals, and no step taken, either by Mr. Bate himself, or his friends, to bring his invention before the public; the invention, as it were, remained dormant in England.

It was towards the close of the year 1832 that M. Collas sold his patent to a few gentlemen, who, with the aid, and under the direction of some of the first French painters, sculptors, and engravers, united themselves in a company, under the firm of Lachevardiere and Co. It is to the enterprising spirit of these gentlemen that we are indebted for the "Tresor Numismatique et de Glyptique" (see *Athenæum*, No. 388, p. 261), which has now reached the extent of 600 plates of medals, bas reliefs, &c., representing upwards of 5000 subjects. This work has been widely circulated in France and throughout the continent: most of its plates, for beauty of effect and artist-like execution, leave the eye nothing to desire. It is needless to remind our readers, that the French company, just mentioned, has for some months been actively bestirring itself, for the purpose of applying the invention of M. Collas to the illustration of our medallic history; and that a petition for the assistance and patronage of government to such a national work was laid before a Committee of the House of Commons during the recent session. These efforts have been met by a determined opposition on the part of certain of our native artists, who have attempted to quench the scheme, by bringing forward Mr. Bate's almost forgotten invention, in proof that the ground was pre-occupied, and by denouncing the French engravings as false, distorted, and mathematically inaccurate. In answer to the first plea, it is enough to state the fact, that nothing was done by Mr. Bate in the way of making his invention popular—no plan thought of, of applying it to a grand national undertaking—till the French company, with a superb work to point to as a specimen of *what their machine had effected*, laid their proposals and petition for Parliament. The second argument, a charge of mechanical inaccuracy brought against the French engravings, will be disposed of with equal ease, though not quite so briefly.

It will be admitted, without hesitation, that the best representation of any subject, as a work of art, is the one which shall convey the most faithful and pleasing impression of its general effect; that, as the said representation is to be judged of by a pair of eyes, and not by a pair of compasses, there are cases wherein the latter may *prove* a mathematical incorrectness, which the former will not acknowledge, and which, therefore, in no respect, impairs the merit of the copy. In examining a medal, *if it be laid flat upon a table*, all the effects of light and shade will disappear, and its bold outlines only strike the eye; whereas, *if it be taken up in the hand*, the relief becomes apparent, and the design is set off with the powerful aid of *chiaro-scuro*. The professed medallist may possibly prefer the first mode, as the best means of obtaining the exact proportions of the work before him; the general amateur and artist will assuredly give preference to the medal as seen in relief, being the more characteristic and pleasing aspect. It is to the faithful rendering of the latter effect, that the attention of the French engravers has principally been directed, at the necessary expense, in some cases, of geometrical exactness. A complaint, therefore, has been raised against their works, as unfaithful—they have been proved guilty of incorrectness, by the compasses, and the harsh word "distortion" has been liberally applied to them. But we are persuaded, that the weight of the objection is merely in the harshness of the word: the result of a careful examination of many specimens laid before us, has convinced us that there is no defect in the works executed by the French machine; there may, indeed, be occasional deficiency, inasmuch as, while the machine cannot give any thing but what is on the medal, it may not, in every instance, give *all* that is there. Granting, then, that the general effect of the medal, when held in the hand (that is, when seen in *chiaro-scuro*,) be faithfully and artistically rendered by the French machine, it is fruitless to *reason* about an imperfection, of which the compasses, and not the eye, are sensible. It should further be insisted upon, that this "incorrectness" with which the works of the French machine have been charged, is not necessary to it, but has been merely sanctioned for the sake of effect by the presiding artists, on the principle just laid down. Besides other engravings of geometrical exactness already produced, a plate is in preparation containing the Soane medal, the head of Henry the Fourth, the Ariadne, and other subjects, by which the proprietors are prepared to prove that the style of execution which they have adopted has been a matter of choice, and not enforced upon him by any defect in the machine.

The universal approbation given to the engravings of the "Tresor" by the artists and amateurs of the continent, who do not undervalue scrupulosity of outline and precision of drawing, may be quoted in support of the line of argument we have adopted: we may also, in confirmation, select a few passages from the evidence given before the Committee of the House of Commons upon the subject. Sir Francis Chantrey, when asked whether the mathematical inaccuracy objected to "produced an idea of distortion or any disagreeable effect to the eye," answered, that "it never produced any disagreeable effect to his eye, nor was he aware of it till it was pointed out to him;" and, therefore, he considered it of no very essential importance, and expressed his unqualified satisfaction in the engravings produced by the French machine. Mr. Hawkins, of the British Museum, when asked a similar question, gave a similar answer; he said that "a deviation, which is not visible to the eye, is not to be considered as a distortion;" and pronounced M. Collas's method as "giving the best idea of the medal of any method he had seen." Mr. Pistrucci, of the Mint, when examined before the Committee as to the merits of the French and English machines, gave it as his opinion, "that both are very clever, but each of them is deficient in that which makes the chief merit of the other: the French machine is beautiful and admirable for effect, and gives a correct idea of the work; but in a perspective view, or what I may call more appropriately foreshortening, it does not give the objects precisely as we see them, when we look at the centre of a real medal, but in chiaro-scuro, and with much effect. The English one gives it straight as far as I can judge: but I cannot say that it is mathematically correct with the original, not having had the original medal before me to compare it with; and it is possible that there may be a difference in the height, though not in the breadth of the objects rendered; but the engraving is flat and hard, with little or no effect."

We think that the above will suffice to convince our readers that the objections raised against the engravings produced by M. Collas's machine, are frivolous and futile. It is needless for us to repeat once again our opinions with respect to the feasibility and interest of the national work proposed; and if those who have any doubts on the subject, will examine the magnificent engravings of the portrait of Louis Phillppe, and the one from the bas-relief of the Canterbury Pilgrimage, we think they will be, like ourselves, fully satisfied that such a work could not be in better hands than those of M. Collas and his enterprising coadjutors. We have now only to describe the specimens:—

No. 1. Innocence prostrating herself before Justice, and entreating her protection; Violence is represented by a warrior holding a naked sword.—Sauvage.

2. Part of the Phygalian Frieze.

3. Cupid and Psyche; from a cameo by Louis Pikler, after a bas-relief by Thorwaldsen.

4. Vulcan forging the shafts of Cupid; from a cameo by Pikler, after a picture by Raffael Mengs.

5. Antigone and Ismena before the Temple of the Furies, urging Œdipus to return to Thebes; from a cameo in onyx by Louis Pikler.

6. The Heads of Augustus and Livia; from an ancient cameo in sardonyx.

7. Hercules stifling the Nemæan Lion; from a sculpture in bronze of the 15th century.*

* With every respect for our esteemed contemporary, we must say, that if the capabilities of M. Collas's machine are to be judged of from the specimens here referred to, its superiority is extremely questionable. The utmost that in our humble opinion, can be fairly said of them as works of art is, that they are striking and curious—considering how they have been produced—not that they are in themselves remarkable either for truth of delineation or excellence of finish. We have seen much better specimens of the art, both English and American.—Ed. M. M.

From the London Mechanics' Magazine.

So much has been said of Mr. Crosse and his experiments in electricity, that any information of his *modus operandi* will be eagerly received. The following peep into his labratory will be found highly interesting. The grandeur of the scale upon which he operates cannot fail to strike us with wonder.

MR. CROSSE'S GALVANIC AND ELECTRICAL APPARATUS.

In the *Brighton Herald* of Sept. 24, appeared, "An account of Sir Richard Phillips's visit to Andrew Crosse, Esq., of Broomfield, in the Quantock Hills, Somersetshire, in September, 1836." Passing over a great deal of Sir Richard's preliminary twaddle (who, it will be seen, claims to have anticipated Mr. Crosse), we now lay before our readers his description of the extensive and splendid galvanic and electrical apparatus fitted up by Mr. Crosse, which is exceedingly interesting:—

"On reaching the handsome mansion of Mr. Crosse, I was received with much politeness, and found that I was the first visitor from Bristol. After breakfast, Mr. Crosse conducted me into a large and lofty apartment, built for a music-room, with a capital organ in the gallery; but I could look at nothing but the seven or eight tables which filled the area of the room, covered with extensive Voltoic batteries of all forms, sizes, and extents. They resembled battalions of soldiers in exact rank and file, and seemed innumerable.

"They were in many forms. Some in porcelain troughs of the usual construction; some like the *couronnes des tasses*; others cylindrical; some in pairs of glass vessels, with double metallic cylinders; besides them, others of glass jars, with stripes of copper and zinc. Altogether, there were 500 Voltaic pairs at work in this great room; and in other rooms about 500 more. There were besides another 500 ready for new experiments. It seemed like a great magazine for Voltaic purposes.

"There are also two large workshops, with furnaces, tools, and implements of all descriptions, as much as would load two or three wagons.

"In the great room there is also a very large electrical machine, with a 20 inch cylinder, and a smaller one; and in several cases all the apparatus in perfect condition, as described in the best books on electricity. The prime-conductor stood on glass legs, 2 feet high; and there was a medical discharger on a glass leg of 5 feet. Nothing could be in finer order; and no private electrician in the world could, perhaps. show a greater variety both for experiment and amusement.

"Beneath the mahogany cover of a table on which stood the prime conductor, &c. was enclosed a magnificent battery of 50 jars, combining 73 square feet of coating. Its construction, by Cuthbertson, was in all respects most perfect. To charge it required 250 vigorous turns of the wheel; and its discharge made a report as loud as a blunderbuss. It fuses and disperses wires of various metals; and the walls of the apartment are covered with framed impressions of the radiations from the explosion, taken at sundry periods. Mr. Crosse struck one while I was present; and he has promised me one as an electrical curiosity, and a memento of my visit.

"But Mr. Crosse's greatest electrical curiosity was his apparatus for measuring, collecting, and operating with atmospheric electricity. He collects it by wires the sixteenth of an inch, extended from elevated poles, or from trees to trees, in his grounds and park. The wires are insulated by means of glass tubes, well contrived for the purpose. At present he has about one-fourth of a mile of wire spread abroad; and in general about one-third of a mile. A French gentleman had reported to the Section at Bristol, that the wires extended 20 miles, filling the entire neighborhood with thunder and lightning, to the great terror of the peasantry, who in consequence left Mr. Crosse in the free enjoyment of his game and rabbits. This exaggeration Mr. Crosse laughed at most heartily, though he acknowledged that he knew that no small terror prevailed in regard to him and his experiments.

"The wires are connected with an apparatus in a window of his organ-gallery, which may be detached at pleasure, when too violent, by simply turning an insulated lever; but in moderate strength it may be conducted to a ball suspended over the great battery, which connected is charged rapidly, and is then discharged by means of an universal discharger. He told me that sometimes the current was so great as to charge and discharge the great battery 20 times in a minute, with reports as loud as cannon; which, being continuous, were so terrible to strangers that they always fled, while every one expected the destruction of himself and premises. He was, however, he said, used to it, and knew how to manage and control it; but when it got into a passion, he coolly, turned his insulating lever, and conducted the lightning into the ground. It was a damp day, and we regretted that our courage could not be put to the test.

"Every thing about this part of Mr. Crosse's apparatus is perfect, and much of it his own contrivance, for he is clever in all mechanical arrangements, and has been unwearied in his application, almost night and day, for thirty years past. I learned, too, that in the purchase and fitting up of his apparatus he has expended nearly 3000*l*. although in most cases he is his own manipulator, carpenter, smith, coppersmith, &c.

"About 12, Professor Sedgwick arrived, and in the afternoon one or two others, besides seven or eight gentlemen of the neighborhood, who had been invited to meet us at dinner, for Mr. Crosse unites to the rank of esquire that of a county magistrate, in the duties of which he is respected alike for his humanity to the poor and for his liberal opinions in politics. Mr. Crosse himself was educated at Oxford; and his second son holds the living of Broomfield. He is master of all his father's experiments; and, in spite of the complaints of an Oxford education, I found him to be a very expert mathematician, well read, and variously accomplished. We next morning renewed our survey, previous to fresh arrivals, and I took notes of every thing connected with his aqueous Voltaic batteries, in the following order, errors excepted:—

"1. A battery of 100 pairs of 25 square inches, charged, like all the rest, with water, operating on cups containing 1oz. of carbonate of barytes and powdered sulphate of alumine; intended to form sulphate of barytes at the positive pole, and crystals of alumine at the negative.

"2. A battery of 11 cylindrical pairs, 12 inches by 4. This, by operating six months on fluat of silver, had produced large hexahedral crystals at the negative pole, and crystals of silica and chalcedony at the positive.

"3. A battery of 100 pairs, of 4 square inches, operating on slate 832, and platina 3, to produce hexagonal crystals at the positive pole.

"4. A battery of 100 pairs, 5 inches square, operating on nitrate of silver and copper, to produce malachite at the positive pole; a. the negative pole crystals already appear with decided angles and facets.

"5. A battery of 16 pairs, of 2 inches, in small glass jars, acting on a weak solution of nitrate of silver, and already producing a compact negatation of native silver.

"6. A battery (esteemed his best) of 813 pairs, 5 inches, insulated on glass plates on deal bars, coated with cement, and so slightly oxydated by water as to require cleaning but once or twice a year by pumping on them. I felt the effect of 458 pairs in careless order and imperfectly liquidated, and they gave only some tinglings of the fingers; but this power in a few weeks produces decided effects.

"7. A battery of 12 pairs, 25 inches zinc and 36 copper, charged two months before with water, and acting on a solution of nitrate of silver, poured on green-bottle glass coarsely powdered. It had already produced a negatation of silver at the positive pole.

"8. A battery of 159 galley-pots, with semi-circular plates of $1\frac{1}{4}$ inch radius, placed on glass plates, and acting five months through a small piece of Bridgewater porous brick, on a solution of silex and potash. I saw at the poles small crystals of quartz.

"9. A battery of 30 pairs, similar to No. 8, acting since 27th July on a mixture, in a mortor of sulphate of lead, of white oxide of antimony, and sulphate of copper, and green sulphate of iron (205 grains), and three times the whole of green-bottle glass (615 grains). The result has been, in five weeks, a precipitation on the negative wire of pure copper in two days, and crystallised iron pyrites in four days. It had been expected to produce sulphurets of lead, copper, and antimony, by depriving the sulphates of their oxygen. On August 10th and 28th, 25 grains and 40 grains of sulphate of iron were added.

"10. A battery of 5 jars, with plates of different metals, as 2 copper and platina, 1 lead and lead, 1 silver and iron, and 1 copper and lead. Experimental.

"11, 12, and 13. About 200 pairs, in 3 batteries, working in a dark room, of which I took no note.

"While I was an inmate with Mr. Crosse, we had various conversations about the power which he employed. I had in some degree anticipated his *debut*, by hazarding, in the last edition of my 'Million of Facts, (1835), an assertion that, inasmuch as metals are found only in a mixed or confused state of different rocks, among which a galvanic action on air or water would necessarily arise, and in long time generate the compound or matrices of metals; but I did not regard this public anticipation as any interference with his original merits, and I was deeply penetrated by the view of his labors and the expense and zeal with which he had prosecuted his experiments. Yet he had a round conductor for a minimum of power, instead of a combination of flat or parallel ones for a maximum. And he could not help talking about the fluid and some other fancies of the elder electricians, who invented their doctrines before it was suspected that air was a compound, and that such active powers as oxygen, nitrogen, hydrogen, and their definite numerical co-mixtures, conferred mechanical character on the most refined operations of nature.

"He instructed me in the fact, that his batteries performed four times the duty in those hours in the morning, from seven to eleven, when the great laboratory of nature is envolving the most oxygen—than in the same period in the evening, when we may imagine the contrary effect takes place. He considered the air as so non-electric in damp weather, that no plate of air lying between the coating of a cloud and the earth could then be disturbed; and he stated to me, as a general fact, that the earth is always positively electrified.

"On my part, I enlarged to him and his son on the universality of matter and motion in producing all material phenomena, independently of the whimsical powers invented in ages when we would have been burnt for a magician; and in this way I endeavored to return the various information which he had unrservedly imparted to me. I impressed on him, that all this creative energy of atoms was merely a display of developements by the great motions of the earth as they affect the excitable parts of different solid bodies; the results of which are necessa ily regular, and their ultimate laws of re-action and combination also regular, so as to produce that universal harmony which surprises beings, who in eternal time live and observe within only a unit of time. Hence that terrestrial galvanism, arising from the operations of the internal frictions and varied pressures called heat; hence those factitious productions of metallic matrices and crystalline galvanic effects, where different substances are proximately opposed; hence magnetism itself, tangentally displayed as a resultant of terrestrial currents of electricity; hence the fluctuations of the phenomena from obliquity of the axis of rotation, which in regard to the axis of the orbit generates two variable directions of massive pressure; hence, in fine, the wisdom displayed by Mr. Crosse in resorting to the *modus operandi* of Nature in his attempts to imitate her most curious productions.

"Observing that continual fresh arrivals rendered it ineligible for me to prolong my visit, I proceeded to Taunton, a distance of six or seven miles, the nearest place at which a stranger can meet with public accommodation."

WATER-TANKS.

At the late meeting of the Cornwall Polytechnic Society, a description was given of nine tanks, which had proved eminently useful during the late three dry summers on the Sussex property of Davies Gilbert, Esq., the President of the Society. As these tanks are cheaply and easily constructed, and not liable to decay like wooden vessels, and as rain enough falls on every house in England for the use of its inhabitants, no family would be deficient in good soft water who made a tank to *retain* it; and such tanks being paved over, take up no room.

The tanks at East Bourn vary in size: one of less than seven feet deep and wide has served two laborers' families for three years; whilst most of the springs in the neighborhood were dry.

A tank 12 feet by 7 had supplied with water a large family and six horses. This was surrounded by only 4½ inch brick-work resting solid against the sides, in consequence of being smaller at the bottom than higher up; and the dome is constructed on the Egyptian plan, by projecting horrizontally each row of materials one-third of their length beyond those below, and filling up the back with earth as it proceeded, to balance the weight of this projecting masonry.

At the East Bourn Workhouse for fourteen parishes, a tank has been made, 23 feet deep by 11 wide, of the roughest materials, being only flint stones, and though they require more mortar than if they had been regularly shaped, only 90 bushels of lime were allowed, including two coats of plaster, and the workmanship is executed like field walls at 10s. per 100 square feet; the only essential being, that *no* clay be used (which worms bore *through*,) and that the lime or Parker's cement be good.

A current of air is said to promote the purity of water in tanks, and this is easily effected by the earthenware or other pipe which conveys the rain from the roof, being six or eight inches in diameter, and an opening left for the surplus water to run away; and where the prevailing winds do not blow soot and leaves *on* the house, the water remains good, even for drinking, without clearing out the rubbish more than once a year; but in some cases filtering by ascension may be found useful, and be effected by the water being delivered by the pipe at the bottom of a cask or other vessel from which it cannot escape till it has risen through the holes in a board covered with pebbles, sand, or powdered charcoal.

Upwards of twenty laborers' gardens have been watered by the rain which formerly injured the public road, and was therefore turned into a sink well, which sink well was enlarged and surrounded by 9-inch masonry, and the water is drawn up by a *cast-iron curb*. This water was used in planting potatoes, and occasioned good crops in 1835, when setts not watered failed. And, should the profitable mode of *stall-feeding* now practised at Armagh be happily extended to England, and fatting oxen be kept *in pairs not tied up under shelter*, it will be found that preserving in tanks the water which falls on the barns and stalls will amply supply them, whilst it prevents the rain washing away the strength of the manure when straw is spread in the open yard.

Ponds have been made with equal success, dug 4½ feet only below the surface, what is excavated being added to the sides, and covered one foot thick like a road with pebbles and good lime mortar. Such ponds are become general on the dry soil of the South Downs for the use of the large flocks of sheep: and had such ponds been made in Romney Marsh, &c., during the late dry years, the sheep would not have died in such numbers as materially raised the price of meat in London.—[Bath and Cheltenham Gazette.]

EXTRACTION OF SUGAR FROM INDIAN CORN; BY M. PALLAS.—The results obtained by M. Pallas are as follows:

The stalk of the corn contains little or no sugar previous to flowering.

At the time of flowering, a small quantity of sugar may be detected.

When the grain is still soft, about 20 or 25 days after flowering, the plant contains about 1 in 100 of crystallizable sugar.

When the grain is completely ripe, the stalk furnishes two parts in 100 of sugar, and 4 in 100 of rich and good-tasting molasses.

The residue remaining after the extraction of the sugar, may be given for food to cattle, or will serve for the manufacture of wrapping paper which will bring 11 francs for 50 kilogrammes.—[L'Institut, No. 157, 1836.]

TEA IN JAVA.—We learn from the Bengal Herald, of July 10th, that the tea-plant is now cultivated quite extensively in Java, and with great success. On the 17th of May, there were more than 20,000 pounds ready for shipment; and in the course of a few years, the crop is expected to increase to a million pounds per annum.

METEOROLOGICAL RECORD

For the month of Snptember, 1836, kept at Avoylle Ferry, Red River, La., (Lat. 31° 10′ N. Long. 91° 59′ W.,) by P. G. VOORHIES.

SEPTEMBER.

Days.	Morn.	Noon.	Night	Wind.	Weather	REMARKS.
1	65	86	82	calm	clear	
2	68	84	81	..	..	
3	70	86	81	..	..	even'g cloudy, night thunder and rain
4	74	80	76	SW	cloudy	thunder, in the morning heavy storm
5	74	76	79	calm	..	rain in the morning and clear at noon
6	72	82	80	..	clear	foggy morning
7	70	84	76	..	..	rain in the morning
8	71	82	80	..	cloudy	heavy rain from the south at noon
9	72	82	74	..	..	rain at noon from the south
19	71	80	76	W	..	heavy thunder in the afternoon
11	71	86	74	calm	..	thunder in the morning and rain at noon
12	74	72	71	SW	..	heavy thunder and lightning, and rain at noon
13	72	79	82	calm	cloudy	all day
14	74	82	76	SE	..	heavy rain in the morning and clear at noon
15	72	85	75	calm	..	in the morning, rain, and clear at noon
16	73	84	74	..	clear	
17	73	82	76	..	cloudy	at noon heavy rain from S. E., and rain all night
18	74	78	80	..	..	heavy rain in the morning and clear at noon
19	75	84	80	..	..	Red River rising & showers in the morning, clear at noon
20	76	84	75	..	..	cloudy in the morning and rain all day
21	75	84	76	..	clear	
22	74	83	73	..	..	
23	72	84	74	..	..	
24	75	81	75	SW	cloudy	clear at noon, Red River falling
25	73	84	74	calm	..	
26	74	82	80	..	..	clear at noon
27	72	85	83	..	clear	.. .. rain all night
28	73	82	76	..	cloudy	clear at noon
29	66	82	76	..	clear	
30	62	76	68	W	..	

Red River fell this month 5 feet 6¼ inches—below high water mark 19 feet 4¼ inches.

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, JANUARY 21, 1837. [VOLUME VI.—No. 3

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 21, 1836.]

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid since the 25th December, 1836.

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Lepzig Dresdner Eisenbahn Co. Leipsic, Saxony,		Jan. 1,	1838.
C. A. Olmsted, Lyons, N. Y.,		"	1838.
W. Parker, Worcester, Mass.,		"	1838.
W. H. W., Phenixville, Pa.,		"	1838.

A TREATISE ON THE PRINCIPAL MATHEMATICAL INSTRUMENTS, EMPLOYED IN SURVEYING, LEVELLING, AND ASTRONOMY, explaining their construction, adjustments, and use, with tables, by T. W. SIMMS, Assistant at the Royal Observatory, Greenwich. Revised with additions by J. H. ALEXANDER, Civil Engineer—F. Lucas, Jr., Baltimore. An American edition of an English work, written by a gentleman well versed in the scientific and practical knowledge of Instruments.

The principles of the construction of the instruments are clearly explained, aided by very good cuts—and the details of their adjustment, are very well described.

The latter subjects are followed out at length as regards both Surveying and Astronomical Instruments.

The value of the work is also increased, by the Tables at the end—they are of great use to Engineers, Surveyors, and Astronomers.

The portability of the work is a great recommendation, and the information added in the American Edition, being suited to the practice of the profession in this country, it will be found one of the most useful and convenient works that an Engineer can use.

While on this subject, we must remark, that the principles of construction and adjustment of many of the most commonly used Surveying Instruments, are far from being well understood. Mistakes of the most glaring nature have come under our own observation, and in persons otherwise thoroughly understanding their instruments.

Instruments are also very liable to get out of order while in use, and that too in places where an instrument maker would be a *rara avis*. To all persons in such a predicament, a slight knowledge of the principles of construction of their instruments will be invaluable.

We know of no work more useful in all such emergencies, than this treatise of Mr. Simms.

Extract from a file of the "Journal des Debats" kept at the reading rooms of the "Young Men's Association" in the city of Albany. Nov. 5, 1836. From Correspondent.

"Monsieur Chaix a Frenchman by birth, and long a resident of the Island of France, has made a discovery of great interest to Steam Navigation. The boilers of Engines, as is generally known, are after a short use covered internally with a hard crust, principally composed of calcareous substance, which prevent the transmission of heat from the furnace, to the water contained in the boilers; increases the already heavy expense of fuel, and often causes the formation of fissures and cracks which require costly repairs. M. Chaix has discovered a means as simple as it is ingenious to prevent the formations of these incrustations. His process has been tested by order of the Navy Commissioners at Toulon on board the Government Steamboat *Phare*.—

It has been proved by a committee appointed for the purpose that not only are incrustations prevented by the process, but also that old formations are detached by it. The discovery is patented. We trust however, that our Government may be induced to repeat the trial, and if as successful as when first tested, purchase the discoverers right for the nation and the interest of Steam Navigation generally."

Scientific and Literary Journal.—This work is a continuation of the Scientific Tracts, so well known for neatness of execution and value of matter. The new and enlarged form of the work will retain the same character.

We are indebted to several gentlemen for Reports. These will appear in due course.

Also, to the Hon. Gideon Lee, for public Documents.

☞ The Brooklyn and Jamaica Railroad Company have made a dividend of $2 per share.

BALTIMORE AND SUSQUEHANNA RAILROAD.

In Wednesday's paper, we spoke of a memorial from the President and Directors of this important work, praying aid from the State, and mentioned that their application was made in reference to the construction of the Wrightsville road, which is a continuation of the Susquehanna road. We have since been furnished with the following particulars which we lay before our readers.

It will be recollected that two years ago, a similar application was made, and, in view of the importance of this work, the appropriation was immediately granted. This sum would have been amply sufficient, had it not been for the unexampled rise in the price of materials, provisions and labor. Notwithstanding this difficulty the company have presevered with a zeal worthy of all commendation.

After a careful examination of the various routes, the present line was adopted and this line strikes the Gunpowder about half a mile above Tyson's mill, continues along the right bank of this stream as far as the "Forks;' then follows the North branch as far as its junction with the Bee Tree Run, leaves this last stream at its source, and follows the Codorus to York.

As soon as the different divisions were located, they were put under contract; the 1st division is completed; the 2nd is two-thirds finished; the 3rd division is in active progres and, from present appearances, will not be far behind the others.

We see by the advertisement that the rails will be laid next spring. These rails are of a superior quality. Their great solidity will make them last much longer then the ordinary rail. The grades on this road are mostly of a gentle character. In no case will they offer a serious obsaacte to the locomotive. The curves are generally slight, being with but a few exceptions, over one thousand feet radius. On the third Diwivion there is a tunnel, about five miles this side of York; this is but 250 feet in length, and is expected to be finished before the 4th of July.

The Wrightsville road unites with the Susquehannah road at York. This road is about 11½ miles long passes through a beautiful and fertile valley, and terminates at Wrightsville, a town opposite to and connected with Columbia by a bridge 1¼ miles long. Our readers are aware that Columbia is immediately on the line of the Pennsylvania Improvements, between Pittsburgh and Philadelphia, being connected with Philadelphia by a Railroad, and with Pittsburg by Canal and Railroad. The distance between York and Baltimore is 56½ miles, from York to Columbia 13 miles, making the distance between Baltimore and Columbia 69½ miles, about 13 miles less than the distance between Philadelphia and Columbia, and consequently making Baltimore so much nearer Pittsburg than Philadelphia. Two-thirds of the Wrightsville road is in a straight line, the curves in the remainder have probably an average radius of from four to five thousand feet—the road being in a valley has very gentle grades. Five-sixths of this road is completed.

A road is about being constructed between York and Gettysburg. This work and others about to be undertaken by Pennsylvania, will render the completion of the road from Baltimore to Columbia highly advantageous to the interests of Baltimore. There are the strongest reasons to expect that this demand will meet with success. We know that the road is nearly completed, that on its completion depends much of the future prosperity of Baltimore; and when we take into consideration the giant effort of Pennsylvania and New-York to wrest from us the western trade, we cannot doubt that our Legiclature will appreciate the necessity of affording such aid as may enable us to realize the advantages expected from this great work.—[Chronicle.]

WILMINGTON AND SUSQUEHANNA RAILROAD COMPANY.

At an annual meeting of the Stockholders of the said Company, convened at their office in Wilmington, on Monday the 9th day of January, 1837.

John Andrews, Esq., of Philadelphia, was called to the Chair, and Harry Connelly was appointed Secretary.

The annual report of the Directors of the progress of the work, with the report of the Chief Engineer, was read, and

On motion of Mathew Newkirk, Esq., Resolved, That the said report be and is hereby accepted, and ordered to be published.

On motion, the Stockholders then proceeded to the election of Directors, to serve the ensuing year.

The election was conducted by John Connell, Esq., of Philadelphia, and Thomas C. Alrichs, Judges appointed by the Board of Directors from among the Stockholders. Messrs. Allan Thomson and Jonathan Bonney appointed tellers.

The votes being counted, the following persons were declared to be duly elected Directors of the Company for the ensuing year, viz:

Matthew Newkirk,
Stephen Baldwin,
John Hemphill,
John Connell,
Samuel Jaudon, } of Philadelphia.
James Canby,
Mahlon Betts,
William Chandler,
Joseph C. Gilpin,
Henry Whiteley,
James Price,
David C. Wilson,
James A. Bayard, } of Wilmington.
James Sewall, of Elkton,
J. J. Cohen, Jr., of Baltimore.

The meeting then adjourned.

J. Andrews, Chairman.

Attest, Harry Connelly, Sec'y.

The Directors assembled on the same day, and James Canby, Esq., was unanimously re-elected President of the Board.

W. P. Brobson, Secretary.

A meeting of the citizens of Rochester was held on the 30th ult., at which resolutions were passed in favor of *raising a loan* to carry on the proposed enlargement of the Erie canal, and of petitioning the Legislature to pass a law for that purpose. In pursuance of a suggestion of the citizens of Buffalo, a convention of delegates, from all the counties particularly interested in the matter, is invited to assemble at Rochester on the 18th inst.

The railroad from Mobile to Cedar Point, at the south-west entrance of Mobile Bay, is likely to progress with rapidity.—contracts being made and part materials ready.

Some work of this kind is essential for the commerce of Mobile, as the bay is gradually becoming shallower; and will shortly be little better than a pond, in consequence of the numerous and extensive bars formed by the alluvion deposits. Large ships have had consequently to anchor in the Gulf, near where its junction with the bay forms a large bar: and the trouble and expense of lighterage have consequently been very great. But as the projected railroad may have proper baggage cars for the conveyance of cargoes, a port with wharves may be formed at Cedar Point, for the trade of Mobile, but Mobile itself can never be a maritime town of note.—[N. O. Standard.]

Chicago and Galena Railroad. *James Seymour, Esq.*, Chief Engineer on this Road, has arrived in town, and is ready to commence operations as soon as the necessary action is had by the Board of Directors. Mr. Seymour has been long engaged on some of the principal public works at the East, and is every way competent to superintend the work now about to be placed under his charge. We congratulate our citizens on the present prospect of the immediate commencement and completion of this Road. [Chicago Am.]

ANNUAL REPORT OF THE COMMISSIONERS OF THE CANL FUND.

The report of the Commissioners of the Canal Fund was made to the Assembly on the 4th inst.

This report states that the surplus moneys in the hands of the Commissioners, 30th

September, 1835, at	$3,406,809 72
Received by the Commissioners for the year ending 30th September, 1836,	1,941,930 66
Total to be accounted for by the Commissioners,	$5,348,740 38

This sum is accounted for as follows, viz:	
Paid for interest on Canal Debt,	$208,391 82
Paid for Canal Stock,	685,735 60
To superintendents of repairs,	300,391 32
To Canal Commissioners,	66,259 82
To weigh masters,	4,211 20
Miscellaneous expenses,	17,397 69
	$1,282,386 45
Balance in the hands of the Commissioners, 30th September, 1836,	$4,066,353 93
Of this balance there is invested in 5 per cent. State stock,	183,933 59
Five per cent. loan to city of Albany,	150,000 00
Loaned to sundry banks at 5 per cent.,	1,897,636 22
Do. at 4½ per cent.,	1,600,325 69
Do. at 3½ per cent.,	101,504 16
Loan to Chenango Canal at 5 per cent.,	132,954 27
	$4,066,353 93

RECEIPTS AND EXPENDITURES FOR THE YEAR.

The actual amount of revenue of the Erie and Champlain Canal Fund, received from all sources, from the 30th September, 1835, to the 30th September, 1836, is as follows, viz:

Amount received for tolls, after deducting expenses of collection,	$1,513,271 85
Vendue duty,	187,194 20
Salt duty,	64,763 46
Interest on other investments,	13,645, 20
Sales of lands,	2,218 05
Rents of surplus waters	2,511 00
Miscellaneous receipts,	1,688 06
	$1,947,483 61

The amount actually expended during the year, is as follows, viz:	
For interest on Canal Debt,	$208,391 82
Repairs of the Canals by superintendents,	300,391 32
Expenditures by Canal Commissioners,	66,250 82
Salaries of weigh-masters,	4,211 20
Printing for Canals,	3,394 90
Tolls refunded,	5,728 02
Costs of suits,	134 54
Balances of Collectors' accounts,	307 72
Paid to proprietors of Albany Basin, for their proportion of tolls of 1835,	3,885 75
To John Tracy, Lieutenant Governor, for attendance as Commissioner of the Canal Fund,	253 20
To Samuel Young, for attendance as Canal Commissioner,	206 85
To appraisers of damages,	507 00
To Holmes Hutchinson, for canal maps, per chapter 58, laws of 1836,	2,545 00
To George W. Newell, second deputy comptroller, Canal Department, for salary,	1,500 00
Miscellaneous payments,	7,768 51
	$605,548 65
Leaving the nett revenue of the Erie and Champlain Canal Fund, after paying all charges upon it, at	$1,341,934 96

The Commissioners esitmate the income of the fund for the current year at	$1,595,691 67
And the expenditures at	1,188,400 00
Estimated surplus for the current year,	$407,291 67

PAYMENT OF CANAL DEBT.

The outsanding stock on the 30th of September, 1835, amounts to the sum of	$4,227,709 19
Redeemed during the fiscal year ending 30th Sept. 1836,	645,206 46
Leaving unredeemed, 30th September, 1836,	$3,582,502 73

A sum sufficient for the redemption of this stock, was collected previous to the 1st of July last; but as the receipts for tolls and salt duty for the month of June, by an arrangement with the collecting banks were not payable until the 16th of July, the amount of these receipts could not be invested for the payment of the canal debt, until the latter period.

On the 18th of July, the whole amount necessary for the extinguishment of the canal debt had been collected and invested; and on the 30th of that month a meeting of the Commissioners of the Canal Fund was held, at which the following statements, made out from the Canal Fund Books, were presented to the Board. viz:

1. A statement of the amount outstanding on the 18th July, 1836, of the several kinds of stock, issued for the construction of the Erie and Champlain Canals, the amount of interest annually payable on said stock and the time when the principal is reimbursable, viz:

		Annual interest.
5 per cts. reimbursable 1st July, 1837,	$700,648 55	$35,032 42
5 per cts. "	779,263 06	46,755 78
5 per cts. "	1,753,252 22	87,664 61
5 per cts. "	529,052 62	31,743 15
	$3,762,256 49	$201,195 96

2. A statement of the investments of the Erie and Champlain Canal Fund moneys, as the same were on the 18th of July, 1836, and of which the following is a summary, viz:

		Annual interest.
Amount in general deposite banks in Albany, at 3½ per cent.,	$69,168 47	$2,420 89
Deposites in collecting banks at 4½ per cent.,	727,609 51	32,742 42
On loan at 4½ per cent.,	952,784 38	42,875 29
On loan at 5 per cent.,	706,000 00	35,300 00
On loan til 1st July, 1837, at 5 per cent.,	1,141,636 22	57,081 81
In Stocks and Bonds, at 5 per cent.,	333,933 59	16,696 67
	$3,931,132 17	$187,117 08

It is shown by these statements, that the annual interest required to be paid on the outstanding stock, exceeds, by $14,078 88, the amount of interest receivable annually on the funds invested. After the 1st of July, 1837, interest will cease on $1,350,000 of the debt: and although the surplus fund will be diminished by the withdrawal of this amount from the capital invested, yet after the 1st of July, the interest receivable on the investment will more than equal the interest payable on the stock of 1845, if the rate of interest on the sum invested continues at 5 per cent.

The amount of capital invested, it will be seen, exceeds the amout of the principal of the canal debt by the sum of $168,875 68. There is therefore a sufficient provision made for any deficiency that may arise from a diminution of the rate of interest on the moneys invested; and in addition to this, the public creditor has a certain resource against any casulty that may impair the capital invested, in the ample revenues from the tolls of the canals, which are still pledged by the constitution for the final payment of all moneys borrowed for the construction of the Erie and Champlain canals.

The amendment to the constitution, which was ratified in 1835, provides, that whenever a sufficient amount shall have been collected and invested, to reimburse the money borowed for the construction of the Erie and Champlain Canals, the auction an salt duties shall be restored to the general fund. Since the 18th of July, therefore, the monies received into the Treasury on account of the auction and salt duties, have not been paid over to the Commissioners of the Canal Fund, but have remained in the Treasury for the use of the General Fund. The Canal Fund will hereafter be deprived of these two items of revenue, which will diminish the annual resources of the fund about $350,000. The auction and salt duties were transferred from the General Fund to the Canal Fund by the act of 1817, which provided for the commencement of our system of internal improvement; and during a period of nearly twenty years, these sources of the revenue have yielded to that fund the sum of $5,647,497 11, being $392,626 41 more than the whole sum paid for interest from 1817 to the 30th of September, 1836, on all the money borrowed for the construction of the Erie and Champlain canals.

The expenditures which have been authorised for doubling the locks and enlarging the Erie canal, and the loans which are authorised to be made to the General Fund, will prevent any future accumulation of the surplus Canal Fund moneys beyond the sum invested for the payment of the canal debt.

The Erie and Champlain canals were finished in 1825; and in 1826, arrangements were made for obtaining interest from the banks on the surplus deposites of the Canal Fund. The rapid accumulation of the deposites in the banks, and the probability that the amount might be increased to six or eignt millions of dollars before any portion of the canal debt become payable, occasioned much solicitue; and the Commissioners finally determined to apply the funds in the banks to the purchase of the stock, by paying a premium for it.

This measure was adopted in January, 1833, when the surplus money in the hands of the Commissioners amounted to more than three millions of dollars, and the outstanding debt to $7,000,135 86; of which debt, the sum of $3,489,000 was payable on the 1st of July, 1837.

The Commissioners were so strongly impressed with the importance of applying the surplus funds to the payment of the canal debt, as stated in the annual report of 1834, that they determined to redeem the stock whenever it could be obtained on such terms as would render the purchase equal to an investment at an interest of 3½ or 4 per cent. One of the reasons assigned for this measure in the same report was, that the State, in making a small apparent sacrifice to effect this object, "gets rid of the hazard incident to the management of three or four millions of dollars; and by gradually possessing itself the stock of 1837, the serious pressure upon atl the monied operations of the State will be avoided, which might result from allowing the Canal Fund moneys to accumulate in the State banks—to be diffused by them through every department of business—and then to be drawn for on the first of July, 1837, to the amount of three and a half millions of dollars for the redemption of the stock then payable.

If this course had not been adopted, the accumulations of the surplus deposited in the banks would have amounted, at the close of the year for which this report is made, to seven millions and a half of dollars, besides the investments in stocks. And if the sum of three millions six hundred and seventy-three thousand dollars, which has been drawn from the banks and applied to the payment of the canal debt, had remained in those institutions, an expansion of the credit system, beyond that which is now experienced, based upon the deposite of this money, would have been the natural consequence; and with the present indications in England relative to investments of capital in the United States, there is every reason to suppose that a large portion of the original stock of 1837, two-thirds of which is held in England, would have been returned for redemption on the first of July next, the payment of which, by drafts upon the banks, must have produced considerable embarrassment in every branch of business which is dependent upon them for money facilities.

The amount of stock redeemed during the last four years, is as follows, viz:

	Stock.	Premium.	Total paid.
1833,	$1,478.376 57	$87,933 45	$1,566,310 03
1834,	588,006 61	50 823 48	638,830 06
1835,	706.943 49	70,217 09	782,160 58
1836,	645,476 46	40,259 14	685,735 60
	$3,418,802 13	$254,233 14	$3,673,036 27

Of the stock redeemed as given above, the sum of $2,136,524 37 was reimbursable in 1837, and the sum of $1,281,278 76 was reimbursable in 1845. It was shown by the annual report of 1833, page 40, that the total amount of stock then outstanding, and reimbursable on the 1st of July, 1837, was $3,489,000 00

Deduct amount of stock redeemed since, 2,136,524 57

And it reduces the sum payable in 1837, to $1,352,475 63

It is probable that one-third of this stock will be returned for redemption, between the close of the fiscal year and the first of July, 1837. And if the whole of the residue should be presented for redemption on the first of July, the arrangements which have been made to draw the amount required ratably from a capital of nearly four millions of dollars, distributed among fifty-six banks, will enable the Commissioners to cancel the debt of 1837, without inconvenience to the business operations of the state, or the banks which have the surplus Canal Funds in deposite.

Management of the Canal Fund Moneys.

In the annual reports for 1833 and 1835, the measures adopted by the Commissioners with a view to the profitable investment of the surplus Canal Fund Moneys, are fully detailed. To those reports the legislature is respectfully referred for a history of the management of these moneys from 1826, when the surplus began to accumulate until 1835.

The amount received annually for interest on the moneys deposited in the bank for eleven years, is as follows, viz:

Received for interest on deposites in		1826	$4,515 40
do	do	1827	4,987 96
do	do	1828	7,281 20
do	do	1829	7,576 30
do	do	1830	24,000 17
do	do	1831	35,710 31
do	do	1832	84,619 15
do	do	1833	122,236 74
do	do	1834	117,092 00
do	do	1835	148,289 62
do	do	1836	162,176 32
			$718,476 17

In addition to the interest paid by the banks, as given above, there has been received for interest on investments in stocks, the sum of $124,699 85:—Thus showing that the Canal Fund has been increased by the interest on the deposite and loan of surplus, to the amount of $843,176 03. It is estimated that the receipts from interest on the surplus moneys for the ensuing year will amount to the sum of $187,000.

To enable such of the Banks in the city of New-York as held Canal Fund deposites, to avail themselves of the provisions of a law passed at the last session of the legislature, which authorised them to use loans for twelve months as capital, the Commissioners offered to all the banks an extension of their loans to the 1st of July, 1827, on condition that the rate of interest should be raised to 5 per cent. The banks generally acceded to this proposition, and several new loans were made to the banks in the city of New-York on the same terms.

On the 19th of September, the Comptroller issued a circular to the cashiers of the several banks which have the Canal Fund moneys in deposite, showing the amount of the outstanding canal stock, the time of its redemption, the condition of the moneys provided for its reimbursement, and the drafts which might be made upon the 4½ per cent. deposites during the current year, and offering to draw ratably upon all the banks, providing those holding loans and deposites at 4½ per cent., would thereafter pay interest at the rate of 5 per cent. A copy of the circular is appended to this report, and marked W. Most of the banks have acceded to the terms proposed in the circular, and have executed agreements to pay interest at the rate of 5 per cent., commencing on the 1st of October, 1836. The whole amount of the surplus on loan at 5 per cent. on that day, it is ascertained will be $3,220,000. Add to this sum invested in 5 per cent. State stock, and a 5 per cent. loan to the city of Albany, amounting together to $333,933 59, and it will show a total investment at 5 per cent., of $3,554,369 81

The total sum invested at 5 per cent., as shown by the last annual report, was 1,099,833 59

Increase of investments at 5 per cent., for the year, $2,451,736 22

The final redemption of the Erie and Champlain Canal debt being now provided for, the occasion is embraced to present a condensed view of the operation of the system of finance which was adopted in the act of 1817, "respecting navigable communications between the great western and northern lakes of the Atlantic Ocean;" and by means of which system, the necessary sums have been provided, not only for all the current disbursements connected with the canals, but also to reimburse the whole of the debt contracted for the construction of the Erie and Champlain Canals, nine years sooner than the period fixed for the payment of the second or last instalment of the canal debt. A table had been prepared and is annexed, marked U, which shows the amount of money received by the Commissioners of the Canal Fund, and the source of the revenue, for a period of 20 years, and also shows the payments for the same period, and the objects to which the moneys were applied. The table referred to presents the following results, viz:

Received by the Commissioners from 1817 to 1836.

Avails of loans exclusive of premiums,	$7,672,782 24
Premium on loans,	223,308 76
Tolls,	12,489,220 33
Vendue duty,	3,592,039 05
Salt duty,	2,055,458 06
Steamboat tax,	73,509 99
Sales of lands,	99,932 20
Interest on investment of surplus,	846,532 04
Rent of surplus water,	16,532 68
Other receipts,	28,307 90
	$27,097,683 25

Paid by the Commissioners.

To Canal Commissioners,	$9,977,944 30
For interest,	5,254,878 70
Western inland and lock navigation company,	155,718 52
Notes of Myron Holley,	17,155 91
Miscellaneous payments,	185,922 70
Superintendants of canal repairs,	3,019,146 79
Extinguishment of canal debt,	4,423,571 40
	$23,041,329 32
Balance in the hands of the Commissioners, 30th September, 1836,	$4,066,353 93

The act of 1817, which created the Board of Commissioners of the Canal Fund, and authorised money to be borrowed for the construction of the Erie and Champlain canals, expressly set apart and pledged for the payment of interest and reimbursement of the principal of the money borrowed, the auction and salt duties, a tax on steamboat passengers, and all the tolls to be derived from the canals. The sanction of the Constitution of 1821 was added to this pledge, and in it the Legislature was prohibited from selling any of the works from which the Canal Fund revenues were derived, or reducing those revenues below a fixed standard, or diverting any portion thereof from the original object for which they had been set apart.

With a system of finance thus wisely arranged and strongly guarded, nothing could prevent the prosperous result which its founders anticipated, if the plan was followed out by a judicious system for the collection, safe keeping, and faithful application of the ample revenue which had been provided. In this particular, the interest of the Canal Fund has been protected with unexampled success; and the intentions of its establishment, thus far, have been fully carried out. Since the present system for the collection of tolls was put in operation, in 1826, there has been collected and paid into the treasury, by the numerous agents on 435 miles of canal, (including the tolls of 1836, not embraced in the preceding statement,) about thirteen millions and a half of dollars, without the loss to the fund, by the defalcation or misconduct of the collecting agents, of a single dollar. During the same period there has been applied to the payment of the sum of $1,423,571 40, and the sum of $3,931,132 17 has been collected and set apart for the final extinguishment of all the outstanding debt

Oswego Canal.

Paid for repairs and interest on debt	78,172 34
Receipt for tolls and lands,	34,229 37
Deficiency drawn from the treasury,	$43,942 97

Cayuga and Seneca Canal.

Paid for repairs and interest,	38,201 78
Received for tolls,	18,539 08
Deficiency paid from the treasury,	$19,662 70

Chemung Canal,

Paid for repairs and interest on debt,	25,423 19
Received for tolls,	4,315 49
Beficiency paid from the treasury,	$21,107 70

Crooked Lake Canal.

Paid for repairs and interest on debt,	11,332 93
Received for tolls,	1,528 65
Deficiency paid from the treasury,	$9,794 28

Chenango Canal.

Balance in hands of Commissioner, 30th September, 1835,	$177,872 21
Received from loans during the year ending 30th Sept. 1836,	799,029 60
	$970,961 81
Paid in constructing canal,	911,035 10
For interest on debt,	65,637 81
Advertising for loans,	228 90
	$976,901 08

On the 16th of August the Commissioners advertisied for a loan of $470,000, being the residue of the amount which they were authorised to borrow for the completion of the Chenango canal. The 31st of August was the day designated for opening the proposals for this loan, but not a single offer was received, and the Commissioners were net able to negociate a loan for the whole or any part of the sum required, at par, on a 5 per cent. stock, reimbursable after the year 1845.

The condition of the money market in England, and the indications there of a disposition to discountenance investments in American stocks, had the effect to deter bidders from taking the loan: and this is readily explained by the fact that four-fifths of the loans for the Erie and Champlain Canal Fund are held in England.

Of the loans subsequently made, it is believed that four-fifths of the whole amount is held in England. If this state of things in regard to the money market continues, it may become necessary, in order to obtain money, to issue a 6 per cent stock. And it is respectfully submitted to the consideration of the legislature, whether discretionary authority shall be given to the Commissioners of the Canal Fund, to issue a stock bearing an interest of 6 per cent. if they are unable to borrow at 5 per cent.

After the failure of the loan of $470,000, as before stated, the Commissioners had no alternative but to make a loan to the Chenango canal from the surplus funds in their hands belonging to the Erie and Champlain Canal Fund. The contracts for the Chenango canal had all been made, and were rapidly approaching completion, and payment for these contracts could not be delayed without great injustice to the contractors, and the imputation of bad faith on the part of the State. The Commissioners therefore concluded to make a temporary loan to this canal at 5 per cent. interest, to be reimbursed as soon as money can be obtained on the stock authorised to be issued for the Chenango canal.

General Summary of the Direct Revenue from all the Canals, and the expenses of their maintenance.

The revenues derived immediately from the canals during the fiscal year, and the expenses of their maintenance are as follows, viz:

Revenue from Tolls.

Erie and Champlain canals,	$1,551,057 18
Oswego canal,	29,684 93
Cayuga and Seneca canal,	19,997 34
Chemung canal,	5,078 37
Crooked Lake canal,	1,953 90
	$1,607,771 72

Expenditure for Repairs and the collection of Tolls.

Erie and Champlain canals,	$425,539 39
Oswego canal,	49,894 98
Cayuga and Seneca canal,	28,060 04
Chemung canal,	16,661 04
Crooked Lake canal,	5,744 97
	$519,900 42
Surplus of the revenue of the canals from tolls, over and above the cost of their maintenance,	$1,087,871 30

The surplus above given exceeds the aggregate of the balance of the surplus, as shown by those statements, in precisely the amount paid for interest on the canal debts, which is not included in the foregoing.

REPORT OF THE SURVEY OF THE ROANOKE DANVILLE AND JUNCTION RAILROAD.—BY WALTER GWYNN, ENGINEER.

To the Subscribers of the Roanoke, Danville and Junction Railroad.

GENTLEMEN:—Circumstances well known to you and entirely beyond my control, delayed the commencement of the survey to a season much later than that in which field operations are usually begun. The spring, and the beginning of the summer were unavoidably permitted to pass away: and it was not until the 6th of July that the surveys were commenced. Since then two, and for a part of the time, three parties have been employed in the field, and in making the necessary calculations, and I now have the honor to lay before you the result of their labors.

For my guide and instructions in the discharge of the important duties which it was your pleasure to confide to me, I was referred by the Danville commissioners to the charter and to the proceedings of the Danville Convention. Keeping them constantly in view, mindful of the responsibility resting on me—and I may be permitted to say, with no disposition to avoid it, I have endeavored strictly to conform to the pledges of the one, and to the more formal declaration of the other. In both, it is made the duty of the Engineer to survey a route for a Railroad from "points intersecting the Petersburg and Roanoke, the Portsmouth, and Roanoke and the Greensville and Roanoke Railroads, or to such other points on either side of the Roanoke river as may best secure to the proposed route all the advantages of said roads, through Danville to some point within or near Evansham in the county of Wythe and State of Virginia.

In compliance with the requisition to connect the proposed improvement with the several railroads therein named, the following lines were traced.

The *first*:—commences at a point on the Weldon and Halifax Railroad, two miles south of Weldon—through this road a connexion can be formed with the Portsmouth, and through this last with the Petersburg and Roanoke railroads—it was then traced along on the ridge between the waters of the Roanoke and Quanky (a tributary of the Roanoke) and Tar rivers, to the Raleigh and Gaston railroad near Mrs. Little's.—This road unites with, in fact it is a continuation of the Greensville and Roanoke Railroad.

The length of this line is 21 miles, 1544 feet, and its cost as follows.

Excavation, Embankment, Stone Drains,	$221,120
Superstructure 21 miles, 1,544 ft. at $5000 pr mile,	106,462
Total,	$327,462

The *second* line:—commencing at the termination of the Portsmouth and Roanoke railroad at Weldon, proceeds up the valley of the Roanoke to Gaston, where it unites with the Raleigh and Gaston railroad, and through that with the Greensville and Roanoke railroad. It unites also with the Petersburg and Roanoke through the Portsmouth and Roanoke railroad in the same manner as the first line.

Its length is 11 miles 4700 feet, and the cost as follows:

Excavation, Embankment, Stone Drains,	$152,915 05
Superstructure, 11 miles, 4,700 feet, at 5000 pr mile,	59,450 75
Total,	$212,365 80

The *third* line—commences at the Portsmouth and Roanoke railroad, a quarter of a mile from the point where it crosses the Petersburg and Roanoke railroad, thence running about half a mile it unites with this last road, thence it pursues, in general terms the trace of the ridge dividing the waters of the Roanoke, Jack swamp, and Fontain's Cheek, until a junction is formed with the Greensville and Roanoke railroad, thus uniting with all three of the railroads named in the proceedings of the Danville Convention, and in the charter.

The length of this line is 14 miles, 1,440 feet, and its probable cost, for

Excavation, Embankment, Culverts and Drains,	$73,107 77
Superstructure, 14 miles, 1,440 feet at $5000 pr mile,	71,363 63
Total,	$144,471 40

The maps herewith presented elucidate the subject more fully, and together with the cost of the different lines, will enable the Company to whom I consider the question properly belongs, to decide which, of the plans submitted is preferable. I would here state in connexion with this subject, that should the Ridge route to Danville, prove more eligible, the route of your railroad would be identical with the Raleigh and Gaston railroad for a distance of 31 miles, 4,120 feet, should the first line be adopted, 42 miles, 4,120 feet, should the second line be preferred; and should a preference be given to the third line, the route of the Greensville railroad would be pursued 4 miles, 75 feet, to the Roanoke river, and thence the Raleigh and Gaston railroad to Chalk Level, a distance of 42 miles, 4,120 feet, all which will be rendered more plain by reference to the map.

From the railroads on the Roanoke connected as above, to Danville, two routes present themselves. One on the ridge dividing the waters of the Roanoke from those of the Tar, the Neuse, and the Cape Fear rivers—the other along the valley of the Roanoke river, both of which should be surveyed preparatory to the location. The cost, grades, and curvatures cannot be compared with the accuracy, the importance of the subject demands, without an accurate instrumental survey.

In deciding upon the route for the preliminary survey, I was influenced mainly by the importance of presenting at as early a day as possible, some data, from which the practicability of the work might be inferred. Apprehensive of the health of the party in the valley of the river, I determined upon surveying the ridge route first. The justness of my apprehensions may be inferred from the fate of the Engineers employed in the valley of the Potomac river, which we may presume is not more unhealthy than that of the Roanoke.

The president of the Baltimore and Ohio railroad company, in his report to the stockholders, says: "In the month of August last the brigade employed on the Potomac, above Harper's Ferry, was broken up by the illness of nearly every one of its members, owing to the unhealthiness of the region in which they were at work. Protracted indisposition ensued, and it is only recently that the brigade has been organized. The country on the Potomac will not be sufficiently healthy for the brigade to resume its labor there before the 1st of November.

The same results were to be apprehended in the valley of the Roanoke, which would have occasioned a delay in presenting the estimates that might have operated injuriously on your interests. I have been thus particular, in order that it may not be inferred from the fact of the ridge route being first traced, that I have on this account given it a preference in my own mind.

Without further touching the points of comparison, I would however remark, that they must greatly preponderate in favor of the ridge route, to justify its undulatory profile and greater length, it being 172 miles, 2025 feet long, and the river route, by Mr. Brigg's survey, only 132 miles. Leaving therefore, the relative merits of the two routes to be set forth at a futnre day, by the locating engineer, suffice it to say, that the practicability of the railroad, may be asserted of either.

We will now confine our remarks more particularly to the ridge route, upon which our estimates are based. This route as I have before observed, will be identical with the Raleigh and Gaston railroad, to Chalk Level, the notes of which, from the point of intersection at Mrs. Little's, were politely tendered by Messrs. Garnet and Herron, and accepted by Mr. Pendleton the assistant engineer, at the time in charge of the party.

From Chalk Level, the route pursues the ridge, dividing the waters of the Roanoke from those of the Tar, the Neuse, and the Cape Fear rivers, to the head of Country Line Creek—thence it was traced on the ridge between Moon's and Hogan's Creeks (both tributaries to the Roanoke) passing near Lennox Castle to Mr. W. H. Nunnaly's where it crosses Hogan's Creek, and thence it is continued on the ridge between Dan river and Hogan's Creek to Danville.

With the exception of a grade of 60 feet to the mile near Roxboro', and at the crossing of Hogan's Creek, where grades as steep as 65 feet per mile are encountered (but which may be lessened by crossing higher up, lengthening the road, however, a mile or two,) the route may be considered as very favorable. Its most striking feature is its exemption from bridges; Hogan's Creek being the only stream which it crosses. Excepting the above, the grades, on this portion of the road may be readily overcome by locomotives drawing a train of 50 tons, at the rate of 15 miles per hour.

Careful examinations were made with the view of leaving the ridge in the neighborhood of Roxboro', and falling into the valley of the Dan, near Milton, and thus avoid the great *detour* around the head of Country Line Creek, but no discovery of a route was made, considered at all practicable.

The cost of the railroad to Danville, by whatever plan of junction with the roads on the Lower Roanoke, may be adopted, may be safely stated as follows.

Excavation, Embankment, Bridges and Culverts,	$1351,754
Superstructure, 172 miles, 2,025 feet at $5000 pr. mile,	861,917
	$2,213,671

No deduction is made in the above, for the portion of the Raleigh and Gaston railroad, which may be used in common.

The cost of the road is based on the following plan of

CONSTRUCTION.

WIDTH OF ROAD-BED.—The graded surface of the road in excavations to be 18 feet, and the slopes 45°. The graduated surface of the embankments to present a uniform width, of 13 feet, with side slopes of $33\frac{1}{3}$ or $1\frac{1}{2}$ base to 1 perpendicular.

THE SUPERSTRUCTURE, to consist of sills of stone, white oak, locust, chestnut or pine, whichever may be most convenient, 10 by 10 inches, and 8 feet long. If practicable, the timbers, before they are used, should be well seasoned and charred.

They should be laid on foundations five inches below the graded surface of the road, well consolidated by ramming; and when there is danger of frost, on broken stone bedded below its reach, four feet apart from centre to centre. The rails should be of the best heart pine, white oak,or chestnut, 6 by 6 inches, and 16, 24 or 25 feet long, planned on the upper surface, bevilled off, both on the inner and cuter edge, leaving a smooth flat bearing for the iron rail. The object of the bevil is to cast off the water more readily from the surface of the rail, and also to throw the bearing more on the centre.

The rails to be guaged to a uniform size, and covered with a good coat of boiled tar at their bearings on the sills, to which they should be secured by a tre-nail, and by wooden knees bedded in tar, and neatly fitted to the rails on each side. When stone sills are used, iron should be substituted for the knees.

The iron plate to be $2\frac{1}{2}$ inches wide, by $\frac{1}{4}$ of an inch thick, fastened to the rail by spikes 5 inches long, and $\frac{3}{8}$ of an inch in diameter, driven through countersunk poles, 18 inches apart. The ends of the plates will be prevented from sinking into the rail by placing under them pieces of iron 6 inches long. $2\frac{1}{2}$ inches wide, and $\frac{1}{4}$ of an inch thick. The width of the track should be 4 feet $8\frac{1}{2}$ inches in the clear.

It is thought that by this mode of construction, the timbers will last much longer than in the ordinary plan of notching and keying the rail into the sill, in which case it can never be fitted so as entirely to exclude moisture, which occasions decay at the bearing both of the rail and sill,long before there is any indication of it elsewhere. By the plan here proposed, the rail rests on the *top* of the sill, is 5 inches above the graded surface of the road, and can be fitted to it through the intervention of tar, so as to be entirely impervious to moisture ; and from its high and dry situation above the ground, should any by possibility find its way between it and the sill, it receives the sun most favorably to its speedy evaporation.

And by the favorable exposure of the knees (on the top of the sill) they become heated entirely through by the sun, and thus evaporate any moistare which may get under them, and keep the timbers dry, and preserve them from decay.

THE ROUTE BETWEEN DANVILLE AND EVANSHAM.

About midway between these places, the range of the Alleghany mountains stretc. across the route of the railroad. The country embracing the approach of the railroac to the mountains from the east, is peculiarly characterised by well defined ridges between the Sandy and Banister rivers, the Blackwater and Pig rivers, the Sandy and Smith rivers, and the Smith and Dan rivers, by their favorable direction, by ihe beautiful aspect of the valleys of the streams, presenting, with but few exceptions, wide and cultivated flats, and by the remarkable depression in the mountain as the common sources of the tributaries to these water-sources, and the tributaries to the streams which flow into New River. On the west of the mouutain, hills, mountains and valleys, disposed, as it were, by accident, and alternating with each other in rapid succession, give variety and beauty to the prospect. The course of the streams although devious, approach in general the direction of the line of the railroad. The valleys are generally narrow, and occasionally bounded by abrupt hills and precipices. An elegible route, however, can be obtained along them, both as respects grades and curvatures.

Passing New River, we immediately enter the great limestone valley of Virginia, a rolling country occasionally studded with hills and presenting many embarrassments in the location of the road.

For the beauty of its aspect, richness and fecundity of its soil and salubrity of its climate, this region is not surpassed by any portion of the State. Limestone the prevailing rock of this section, is found every where abundant and convenient.

The timber growth consists principally of oak, hickory and walnut. In the mountain, the growth, in addition to the above, comprises the chestnut, locust, maple, pine and cucumber trees. Sand-stone and rocks of a flinty and slaty structure, occur throughout the whole region from Danville to New River. Timber and rock adapted to the construction of the road, may be had almost every where conveniently.

The geographical features of the country indicate three routes for the proposed railroad.

The *first* passes along the ridge between Sandy and Banister Rivers, crosses Pig River just below the mouth of Snow Creek, thence on the ridge between Blackwater and Pig Rivers, and after passing Grassy Hill near Franklin Court House, it descends to Blackwater—thence up Blackwater and Daniel's Run to the summit of the mountain thence, in general terms, down Little River to New River, and a'ong New River, Draper's valley and Reed Creek to Evansham.

The *second*, ascends along the valleys of the Dan and Smith's rivers and Rock Castle Creek, and crosses the Alleghany at Mawbrey's Cap; thence it descends Laurel Fork and Big Reed Island Creek, to New River—and thence up New River and Reed Creek, to Evansham.

The *third*, passes along the Dan River up to the mouth of Archy's Creek to a *plateau* called Cnalk Level, which it crosses and then descends Clark's Creek to the Arrarat, down the Arrarat to Loving Creek, and thence ascending along Loving Creek and passing near Mount Airy, it falls into the valley of Paul Creek, which it ascends to its source, at a depression in the mountain called the Buffalo trace, thence it descends along Little and Big Reed Island Creeks to New River, and thence to Evansham as in the preceeding route.

In deciding the question at this time of choice between these routes in a professional point of view, it is only necessary under the peculiarity of the formation of the country, to submit them to the following very obvious principle :

Which route affords the most uninterrupted and greatest aggregate descent (the grades of course being limited) in the direction of the heaviest traffic.

The application of this principle will give a result greatly in favor of the *second* route which takes its course through Mawbrey's Gap. On this there will be found no descent westward, except the descent from the mountain which appertains to each route. while on both of the other routes an undulatory profile is encountered, with considerable descents towards the mountain, and consequently ascents in the direction of the *heaviest traffic.*

The second route possesses the advantage also of being shorter than either of the others.

In deciding on the route upon which to base my estimate of cost and practicability, I was influenced by the following considerations.

That previously to the location of the road and as preliminary thereto, it would be necessary to survey each route and make an accurate comparison of their relative advantages : nothing short of this, would satisfy the public mind and enable the stockholders to decide upon the line of the road. And with the view of cutting off the angle formed between the Dan and Smith's river at their confluence, I would direct the attention of the locating Engineer, to the beautiful ridge between Sandy and Smith's rivers. Indeed it rarely happens that in a country like this under consideration, the Engineer is so fortunate as to find his observation confined to so few routes. In selecting the line of railway between Washington and Baltimore, only 40 miles in length, it was found necessary to survey in the minutest manner no less than twelve distinct routes besides tracing the water courses and making innumerable offsets to the right and left of the various lines; and for the Boston and Providence railroad the experimental surveys embrace eleven routes.

Having determined then in my own mind, that to enable those interested to decide upon the merits of these routes, an actual survey of them would be indispensable, the selection of one for the preliminary survey would seem therefore to be rendered a question of but little moment.

In relation to the *second* route, although I have expressed my opinion in favor of its greater eligibility, I did not think it prudent in the incipiency of the undertaking to select it for the basis of my calculations; because it had been reported upon by the late eminent Engineer of the State, as rather unfavorable for a turnpike. Although it is well known to many of you that the survey upon which his estimate was based was made in the most cursory manner, by one of his assistants, and that the ground was not examined by Captain Crozet—yet the report of so distinguished an Engineer, however erroneous from the incorrectness of the data furnished by his assistants, and for which he could not in the multiplicity of his duties be held responsible, might have been seized upon and handled by those in favor of other routes, and by those unfriendly to the scheme, to its serious injury. I would here take occasion to say that the estimates of Capt. Crozet as far as they have been tested, have proved to be as correct as those of any Engineer in the Country; and I would place the most implicit confidence in any estimate of his, based upon operations conducted by him in person, or of sufficient importance to command his particular attention.

For the reasons stated, my decision was narrowed down to a choice between the *first* and *third* routes. These equally circuitous, and presenting, with the exception of the Buffalo trace, which is the most favorable pass—about the same objections in the profiles. I could not hesitate in selecting for the preliminary survey, the route which would penetrate farthest into the State of Virginia.

The *first* route therefore, is the one from which I infer the cost of the railroad from Danville to Evansham. By the survey, its total length is 137 miles, 2,865 feet, which I shall divide into Eastern, Mountain, and Western Divisions.

(Continued in our next.)

The following extract from Ure's Philosophy of Manufactures, (a work but little known in this country,) will be found to contain much useful knowledge for the practical and theoretical mechanician.

From Ure's Philosophy of Manufactures.

GENERAL VIEW OF MANUFACTURING INDUSTRY.

MANUFACTURE is a word, which, in the vicissitude of language, has come to signify the reverse of its intrinsic meaning, for it now denotes every extensive product of art, which is made by machinery, with little or no aid of the human hand; so that the most perfect manufacture is that which dispenses entirely with manual labor. The philosophy of manufactures is therefore an exposition of the general principles, on which productive industry should be conducted by self-acting machines. The end of a manufacture is to modify the texture, form, or composition of natural objects by mechanical or chemical forces, acting either separately, combined, or in succession.—Hence the automatic arts subservient to general commerce may be distinguished into Mechanical and Chemical, according as they modify the external form or the internal constitution of their subject matter. An indeffinite variety of objects may be subjected to each system of action, but they may be all conveniently classified into animal, vegetable, and mineral.

A mechanical manufacture being commonly occupied with one substance, which it conducts through metamorphoses in regular succession, may be made nearly automatic; whereas a chemical manufacture depends on the play of delicate affinities between two or more substances, which it has to subject to heat and mixture under circumstances somewhat uncertain, and must therefore remain, to a corresponding extent, a manual operation. The best example of *pure* chemistry on self-acting principles which I have seen, was in a manufacture of sulphuric acid, where the sulphur being kindled and properly set in train with the nitre, atmospheric air, and water, carried on the process through a labyrinth of compartments, and supplied the requisite heat of concentration, till it brought forth a finished commercial product. The finest model of an automatic manufacture of *mixed* chemistry is the five-colored calico machine, which continuously, and spontaneously, so to speak, prints beautiful webs of cloth with admirable precision and speed. It is in a cotton mill, however, that the perfection of automatic industry is to be seen; it is there that the elemental powers have been made to animate millions of complex organs, infusing into forms of wood, iron, and brass an intelligent agency. And as the philosophy of the fine arts, poetry, painting, and music may be best studied in their individual master-pieces, so may the philosophy of manufactures in this its noblest creation.

There are four distinct classes of textile fibres, cotton, wool, flax, and silk, which constitute the subjects of four, or, more correctly speaking, five distinct classes o factories; first, the cotton factories; second, the woollen; third, the worsted; fourth, the flax, hempen, or linen; and fifth, the silk. These five factories have each peculiarities proceeding from the peculiarities of its raw material and of its fabrics; but they all possess certain family features, for they all employ torsion to convert the loose slender fibres of vegetable or animal origin into firm coherent threads, and, with the exception of silk, they all employ extension also to attenuate and equalize these threads, technically styled yarn. Even one kind of silk which occurs in entangled tufts, called floss, is spun like cotton, by the simultaneous action of stretching and twisting.

The above-named five orders of factories are, throughout this kingdom, set in motion by steam-engines or water-wheels; they all give employment to multitudes of children or adolescents; and they have therefore been subjected to certain legislative provisions, defined in the ***Factories Legulation Act***, passed by Parliament on the 29th August, 1833.

It is probable that 614,200 work-people are constantly engaged within the factories of the United Kingdom: of which number 561,900 belong to England and Wales; 46,825 to Scotland; and 5,475 to Ireland.* Fully five-tenths of them are under twenty-one years of age, and three-tenths of these young persons are females. It must be remembered, however, that besides these 614,200 inmates of factories, a vast population derives a livelihood from the manufactures of cotton, wool, flax, and silk, such as the hand-weavers, the calico-printers and dyers, the frame-work knitters, the lace-makers, lace-runners, muslin-sewers, &c. &c.

It appears from the Parliamentary Returns of 1831, that in Great Britain, out of a total population of 16,539,318 persons, there are of

Agricultural Laborers and Laboring Occupiers,	1,055,982, and of
Manufacturing Laborers,	404,317

Whence there are 1000 agricultural to 383 strictly manufacturing laborers.

Persons employed in retail trade, or in handicraft, as masters or workmen,	1,159,867
Total adult persons employed in arts and trades,	1,564,184 being

about fifty per cent. more than those engaged in agriculture.

The capitalists, bankers, professional and other educated men amout to	214,390
Laborers non-agricultural to	618,712
If we include in the agricultural department, the occupiers employing laborers, (few of whom, however, work,) we shall have to add	187,075
To the above number,	1,055,057
The total sum of Agriculturists is	1,243,057, being

only 80 per cent. of the adult males employed in manufactures, arts, and trades.

When we take into account the vastly greater proportion of young persons constantly occupied with factory labor, than of those occupied with agricultural labor, we shall then be led to conclude that at least double the amount of personal industry is engaged in the arts, manufactures, and trade, to what is engaged in agriculture. Considerably upwards of one-tenth of the population of this island is actually employed in manufactures; and probably little more than one-fifteenth in agriculture, This conclusion ought to lead our legislative landlords to treat the manufacturing interests with greater respect than they have usually been accustomed to do. If we consider, moreover, how much greater a mass of productive industry a male adult is equivalent to, in power-driven manufactures, than in agriculture, the balance in favor of the former will be greatly enhanced.

France, which has for upwards of a century and a half tried every scheme of public premium to become a great manufacturing country, has a much less propor-

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* The above numbers for Scotland and Ireland are taken from Mr. Leonard Horner's excellent Report as Factory Inspector; the number for England is computed on the recognized DATUM that it is twelve times greater for the cotton trade than that of Scotland. For the last official details see the Appendix.

tion than one employed in trade for two employed in agriculture. M. Chsrles Dupin, indeed, has been led by his researches into the comparative industry of France and of the United Kingdom, to conclude that the agricultural produce of our country amounted in value to 240 millions sterling, and that of his own to 180 millions sterling, being the ratio of three to two; and that our manufacturing power is inferior to that of France in the proportion of sixty-three to seventy-two; or as seven is eight. There can be no doubt that his agricultural estimate underrates France, as much as his manufacturing estimate underrates Great Britian.

This Island is pre-eminent among civilized nations for the prodigious development of its factory wealth, and has been therefore long viewed with a jealous admiration by foreign powers. This very pre-eminence, however, has been contemplated in a very different light by many influential members of our own community, and has been even denounced by them as the certain origin of innumerable evils to the people, and of revolutionary convulsions to the state. If the affairs of the kingdom be wisely administered, I believe such allegations and fears will prove to be groundless, and to proceed more from the envy of one ancient and powerful order of the commonwealth, towards another suddenly grown into political importance than from the nature of things.

In the recent discussions concerning our factories, no circumstance is so deserving of remark, as the gross ignorance evinced by our leading legislators and economists, gentlemen well informed in other respects, relative to the nature of those stupendous manufactures which have so long provided the rulers of the kingdom with the resources of war, and a great body of the people with comfortable subsistence; which have, in fact, made this island the arbiter of many nations, and the benefactor of the globe itself.* Till this ignorance be dispelled, no sound legislation need be expected on manufacturing subjects. To effect this purpose is a principal, but not the sole aim of the present volume, for it is intended also to convey specific information to the classes directly concerned in the manufactures, as well as general knowledge to the community at large, and particularly to young persons about to make the choice of a profession.

The blessings which physico-mechanical science has bestowed on society, and the means it has still in store for ameliorating the lot of mankind, have been too late dwelt upon; while, on the other hand, it has been accused of lending itself to the rich capitalists as an instrument for harassing the poor, and of exacting from the operative an accelerated rate of work. It has been said, for example, that the steam-engine now drives the power-looms with such velocity as to urge on their attendant weavers at the same rapid pace; but that the hand-weaver, not being subjected, to this restless agent, can throw his shuttle and move his treddles at his convenience. There is, however, this difference in the two cases, that in the factory, every member of the loom is so adjusted, that the driving force leaves the attendant nearly nothing at all to do, certainly no muscular fatigue to sustain, while it procures for him good, unfailing wages, besides a healthy workshop *gratis*: whereas the non-factory weaver, having everything to execute by muscular exertion, finds the labor irksome, makes in consequence innumerable short pauses, separately of little account, but great when added together; earns therefore proportionably low wages, while he loses his health, by poor diet and the dampness of his hovel. Dr. Carbutt of Manchester says, "With regard to Sir Robert Peel's assertion a few evenings ago, that the hand-loom weavers are mostly small farmers, nothing can be a greater mistake; they live, or rather they just keep life together, in the most miserable manner, in the cellars and garrets of the town, working sixteen or eighteen hours for the merest pittance."*

The constant aim and effect of scientific improvement in manufactures are philanthropic, as they tend to relieve the workmen either from niceties of adjustment which exhaust his mind and fatigue his eyes, or from painful repetition of effort which distort or wear out his frame. At every step of each manufacturing process described in this volume, the humanity of science will be manifest. New illustrations of this truth appear almost every day, of which a remarkable one has jnst come to my knowledge. In the woollen-cloth trade there is a process between carding and spinning the wool, called *slubbing* which converts the spongy rolls, turned off from the cards, into a continuous length of fine porous cord. Now, though carding and spinning lie within the domain of automatic science, yet slubbing is a handicraft operation, depending on the skill of the slubber, and participating therefore in all his irregularities. If he be a steady, temperate man, he will conduct his business regularly, without needing to harass his juvenile assistants, who join together the series of card rolls, and thus feed his machine; but if he be addicted to liquor, and passionate, he has it in his power to exercise a fearful despotism over the young pieceners, in violation of the proprietors benevolent regulations. This class of operatives, who, though inmates of factories, are not, properly speaking, factory workers, being independent of the moving power, have been the principal source of the obloquy so unsparingly cast on the cotton and other factories, in which no such capricious practice or cruelties exist. The wool slubber, when behind hand with his work, after a visit to the beer-shop, resumes his task with violence, and drives his machine at a speed beyond the power of the pieceners to accompany; and if he finds them deficient in the least point, he does not hesitate to lift up the long wooden rod from his slubbing-frame, called a billy-roller, and beat them unmercifully. I rejoice to find that science now promises to rescue this branch of the business from handicraft caprice, and to place it, like the rest, under the safeguard of automatic mechanism. The details of this recent invention will be given in describing the woollen manufacture.

The processes that may be employed, to give to portions of inert matter, precise movements resembling those of organized beings, are innumerable as they consist of an indefinite number and variety of cords, pulleys, toothed-wheels, nails, screws, levers, inclined-planes as well as agencies of air, water, fire, light, &c., combined in endless modes to produce a desired effect. Ingenuity has been long exercised on such combinations, chiefly for public amusement or mystification, without any object of utility. In ancient times the statue of Memnon was celebrated for emitting harmonious sounds at sun-rise, and acted probably by concealed organ-pipes. The flying pigeon of Archytas was more manifestly an automatic mechanism, as it performed all the motions of an animal; and likewise the Android of Albert the Great, which opened a door when any one knocked, and muttered certain sounds, as if speaking to the visiter. The brass heads, or conversible busts of Abbe Mical, were probably a simple acoustic experiment on the transmission of sounds through tubes, like the Invisible Girl. More recently the flute-player of Vaucanson has puzzled the world. It presented the appearance of a human figure of the ordinary size, seated on a piece of rock, supported on a pedestal four feet and a half high. By the movements of its lips, fingers, and tongue, it modified the tones of a flute, and executed twelve different airs on the instrument. Vaucanson constructed also a drummer, which played on a flute with a three holed mouth piece, no less than twenty airs. Standing upright on a pedestal, dressed like a dancing shepherd, holding its flageolet in one hand, and a rod in the other, it beat the drum at one time in single taps, and at another in a long roll, as accompaniments to the flageolet tune. This automaton seemed to be truly the animated leader of the pleasures of a ball, skilful in augmenting or diminishing the breathing sounds of its instrument, with equal precision and taste.

The duck of the same celebrated mechanician, not only imitated the different movements of this animal, drinking, gobbling, swallowing, &c., but also represented faithfully the structure of the internal viscera for the digestion of the food. The play of every part necessary to discharge these functions was imitated to the life; for the duck drank, dabbled in the water, stretched out its neck to take grain when offered to it in the hand, drew back its head again to swallow it, doubled the quickness of the masticating movements in passing the grain into the stomach, like the living duck, which always swallows its food very hastily. The grain was then ground in the gizzard, as preparatory to digestion; and finally subjected to excrementitious actions. Its wings, neck, head, and whole frame, were imitated bone by bone, and arranged in their natural form and order. When once wound up, the duck went through all its vital evolutious without needing to be touched. These machines were purchased by Professor Bayreuss, of Helmstadt.

The chess-player of M. Maelzel, now under exhibition at Paris, and formerly shown in this country, has been often described. It imitates very remarkably a living being, en-

* Even the eminent statesman lately selected by his Sovereign to wield the destinies of this commercial empire—Sir Robert Peel, who drives his family consequence from the cotton trade, seems to be but little conversant with its nature and condition.—See Dr. Carbutt's observations on the subject, next page.

* Letter of 3rd of May, 1833, to Dr. Hawkins in his Medical Report, Factory Commission, p. 232.

dowed with all the resouces of intelligence, for executing the combinations of profound study.

Raisin's automaton harpsichord was found to contain an infant performer.

Self-acting inventions like the preceding, however admirable as exercises of mechanical science, do nothing towards the supply of the physical necessities of society. Man stands in daily want of food, fuel, clothing. and shelter; and is bound to devote the powers of body and mind, of nature and art, in the first place to provide for himself and his dependents a sufficiency of these necessaries, without which there can be no comfort, nor leisure for the cultivation of the taste and intellect. To the production of food and domestic accommodation, not many automatic inventions have been applied, or seem to be extensively applicable; though, for modifying them to the purposes of luxury, many curious contrivances have been made. Machines, more or less automatic, are embodied in the coal-mines of Great Britain; but such combinations have been mainly directed, in this as well as other countries, to the materials of clothing. These chiefly consist of flexible fibres of vegetable or animal origin, twisted into smooth, tenacious threads, which are then woven into cloth by being decussated in a loom. Of the animal kingdom, silk, wool, and hair, are the principal textile products. The vegetable tribes furnish cotton, flax, hemp, besides several other fibrous substances of inferior importance.

Wool, flax, hemp, and silk, have been very generally worked up among the nations of Europe, both in ancient and modern times; but cotton attire was, till sixty years ago, confined very much to Hindostan, and some other districts of Asia. No textile filaments however are, by their facility of production as well as their structure, so well adapted as those of cotton to furnish articles of clothing, combining comfort with beauty and convenience in an eminent degree. Hence we can understand how cotton fabrics, in their endless variety of textures and styles, plain, figured, and colored, have within the short period of one human life, grown into an enormous manufacture, have become an object of the first desire to mankind all over the globe, and of zealous industry to the most civilized states. This business has received its great automatic developement in England, though it was cultivated to a considerable extent on handicraft principles in France a century ago and warmly encouraged by the government of that country, both as to the growth of the material and its conversion into cloth. The failure of the French however to establish a factory system prior to the English is a very remarkable fact, and proves clearly that mechanicnl invention, for which the former nation have long been justly celebrated, is not of itself sufficient to found a successful manufacture.

We have adverted to the mechanisms of Vaucanson. This inventive artisan directed his attention also to productive machines. He constructed one for winding silk as long ago as 1749; one for doubling and twisting it in 1751; a tapestry loom in 1758; another for winding silk in 1770; a machine for laminating stuffs in 1757, and a plan of mounting silk mills in 1776. There can be no doubt as to the value of these inventions, as they were described with merited eulogiums in the above named years by the Academy of Paris. In 1776 he published an account of the Indian mode of weaving fine muslins in the wet state, showing that his attention had been turned likewise to the cotton trade.

The term *Factory*, in technology, designates the combined operation of many orders of work-people, adult and young, in tending with assiduous skill a system of productive machines continuously impelled by a central power. This definition includes such organizations as cotton-mills, flax-mills, silk-mills, woolen-mills, and certain engineering works; but it excludes those in which the mechanisms do not form a connected series, nor are dependent on one prime mover. Of the latter class, examples occur in iron-works, dye-works, soap-works, brass-foundries, &c. Some authors, indeed have comprehended under the title *factory*, all extensive establishments wherein a number of people co-operate towards a common purpose of art; and would therefore rank breweries, distilleries as well as the workshops of carpenters, turners, coopers, &c. under the factory system. But I conceive that this title, in its strictest sense, involvs the idea of a vast automaton, composed of various mechanical and intellectual organs, acting in uninterrupted concert for the production of a common object, all of them being subordinated to a self regulated moving force. If the marshalling of human beings in systematic order for the execution of any technical enterprise were allowed to constitute a factory, this term might embrace every department of civil and military engineering; a latitude of application quite inadmissable.

In its precise acceptation, the factory system is of recent origin, and may claim England for its birth-place. The mills for throwing silk, or making organzine, which were mounted centuries ago in several of the Italian states, and furtively transferred to this country by Sir Thomas Lombe in 1718, contained indeed certain elements of a factory, and probably suggested some hints of those grander and more complex combinations of self-acting machines, which were first embodied half a century later in our cotton manufacture by Richard Arkwright, assisted by gentlemen of Derby, well acquainted with its celebrated silk establishment. But the spinning of an entangled flock of fibres into a smooth thread, which constitutes the main operation with cotton, is in silk superfluous; being already performed by the unering instinct of a worm, which leaves to human art the simple task of doubling and twisting its regular filaments. The apparatus requisite for this purpose is more elementary, and calls for a few of those gradations of machinery which are needed in the carding, drawing, roving, and spinning processes of a cotton-mill.

When the first water-frames for spinning cotton were erected at Cromford, in the romantic valley of the Derwent, about sixty years ago, mankind were little aware of the mighty revolution which the new system of labor was destined by Providence to achieve, not only in the structure of British society, but in the fortunes of the world at large. Arkwright alone had the sagacity to discern, and the boldness to predict in glowiug language, how vastly productive human industry would become, when no longer proportioned in its results to muscular effort, which is by its nature fitful and capricious, but when made to consist in the task of guiding the work of mechanical fingers and arms, regularly impelled with great velocity by some indefatigable physical power. What his judgment so clearly led him to perceive, his energy of will enabled him to realize with such rapidity and success, as would have done honor to the most influential individuals, but were truly wonderful in that obscure and indigent artisan. The main difficulty did not, to my apprehension, lie so much in the invention of a proper self-acting mechanism for drawing out and twisting cotton into a continuous thread, as in the distribution of the different members of the apparatus into one co-operatire body, in impelling each organ with its appropriate delicacy and speed, and above all, in training human beings to renounce their desultory habits of work, and to identify themselves with the unvarying regularity of the complex automaton. To devise and administer a successful code of factory discipline, suited to the necessities of factory diligence, was the Herculean enterprise, the noble achievment of Arkwright. Even at the present day, when the system is perfectly organized, and its labor lightened to the utmost, it is found nearly impossible to convert persons past the age of puberty, whether drawn from rural or from handicraft occupations, into useful factory hands. After struggling for a while to conquer their listless or restive habits, they either renounce the employment spontaneously, or are dismissed by the overlookers on account of inattention.

If the factory Briareus could have been created by mechanical genius alone, it should have come in o being thirty years sooner; for upwards of ninety years have now elapsed since John Wyatt of Birmingham, not only invented the series of fluted rollers, (the spinning fingers usually ascribed to Arkwright,) but obtained a patent for the invention, and erected "a spinning engine without hands" in his native town. The details of this remarkable circumstance, recently snatched from oblivion, will be given in our treatise on the cotton manufactures. Wyatt was a man of good education, in a respectable walk of life, much esteemed by his superiors, and therefore favorably placed, in a mechanical point of view, for maturing his admirable scheme. But he was of a gentle and passive spirit, little qualified to cope with the hardships of a new manufacturing enterprize. It required in fact, a man of Napoleon nerve and ambition, to subdue the refractory tempers of workpeople accustomed to irregular paroxysms of dilligence, and to urge on his multifarious and intricate constructions in the face of prejudice, passion, and envy. Such was Arkwright, who, suffering nothing to stay or turn aside his progress, arrived gloriously at the goal, and has forever affixed his name to a great era in the annals of mankind, an era which has laid open unbounded prospects of wealth and comfort to the industrious, however much they may have been occasionally clouded by ignorance and folly.

Prior to this period, manufactures were everywhere feeble and fluctuating in their development; shooting forth luxuriantly for a season, and again withering almost to the roots, like annual plants. Their perennial growth now began in England, and attracted capital in copious streams to irrigate the rich domains of industry. When this new career commenced, about the year 1770, the annual consumption of cotton in British manufactures was under four millions of pounds weight, and that of the whole of Christendom was probably not more than ten millions. Last year the consumption in Great Britain and Ireland was about two hundred and seventy millions of pounds, and that of Europe and the United States together four hundred and eighty millions. This prodigious increase is, without doubt, almost entirely due to the factory system founded and upreared by the intrepid native of Preston. If then this system be not merely an inevitable step in the social progression of the world, but the one which gives a commanding station and influence to the people who most resolutely take it, it does not become any man, far less a denizen of this favored land, to vilify the author of a benefaction, which, wisely administered, may become the best temporal gift of Providence to the poor, a blessing destined to mitigate, and in some measure to repeal, the primeval curse prononnced on the labor of man, "in the sweat of thy face shalt thou eat bread." Arkwright well deserves to live in honored remembrance among those ancient master-spirits, who persuaded their roaming companions to exchange the precarious toils of the chase, for the settled comforts of agriculture.

In my recent tour, continued during several months, through the manufacturing districts, I have seen tens of thousands of old, young, and middle-aged of both sexes, many of them too feeble to get their daily bread by any of the former modes of industry, earning abundant food, raiment, and domestic accommodation, without perspiring at a single pore, screened meanwhile from the summer's sun and the winter's frost, in apartments more airy and salubrious than those of the metropolis, in which our legislative and fashionable aristocracies assemble. In those spacious halls the benignant power of steam summons around him his myriads of willing menials, and assigns to each the regulated task, substituting for painful muscular effort on their part, the energies of his own gigantic arm, and demanding in return only attention and dexterity to correct such little aberrations as casually occur in his workmanship. The gentle docility of this moving force qualifies it for impelling the tiny bobbins of the lace machine with a precision and speed inimitable by the most dexterous hands, directed by the sharpest eyes. Hence, under its auspices, and in obedience to Arkwright's polity, magnificent edifices, surpassing far in number, value, usefulness, and ingenuity of construction, the boasted monuments of Asiatic, Egyptian, and Roman despotism, have, within the short period of fifty years, risen up in this kingdom, to show to what extent, capital, industry, and science may augment the resources of a state, while they meliorate the condition of its citizens. Such is the factory system, replete with prodigies in mechanics and political economy, which promises, in its future growth, to become the great minister of civilization to the terraqueous globe, enabling this country, as its heart, to diffuse along with its commerce, the life-blood of science and religion to myriads of people still lying "in the region aud shadow of death."

When Adams Smith wrote his immortal elements of economics, automatic machinery being hardly known, he was properly led to regard the division of labor as the grand principle of manufacturing improvement; and he showed, in the example of pin-making, how each handicraftsman, being thereby enabled to perfect himself by practice in one point, became a quicker and cheaper workman. In each branch of manufacture he saw that some parts were, on that principle, of easy execution, like the cutting of pin wires into uniform lengths, and some were comparatively difficult, like the formation and fixation of their heads; and therefore he concluded that to each a workman of appropriate value and cost was naturally assigned. This appropriation forms the very essence of the division of labor, and has been constantly made since the origin of society. The ploughman, with powerful hand and skilful eye, has been always hired at high wages to form the furrow, and the ploughboy at low wages, to lead the team. But what was in Dr. Smith's time a topic of useful illustration, cannot now be used without risk of misleading the public mind as to the right principle of manufacturing industry. In fact, the division, or rather adptation of labor to the different talents of men, is little thought of in factory employment. On the contrary, wherever a process requires peculiar dexterity and steadiness of hand, it is withdrawn as soon as possible from the *cunning* workman, who is prone to irregularities of many kinds, and it is placed in charge of a peculiar mechanism, so self-regulated, that a child may superintend it. Thus, to take an example from the spinning of cotton—the first operation in delicacy and importance, is that of laying the fibres truly parallel in the spongy slivers, and the next is that of drawing these out into slender spongy cords, called rovings, with the least possible twist; both being perfectly uniform throughout their total length. To execute either of these processes tolerably by a hand-wheel, would require a degree of skill not to be met with in one artizan out of a hundred. But fine yarn could not be made in factory-spinning except by taking these steps, nor was it ever made by machinery till Arkwright's sagacity contrived them. Moderately good yarn may be spun indeed on the *hand-wheel* without any drawings at all, and with even indifferent rovings, because the thread, under the two-fold action of twisting and extension, has a tendency to equalize itself.

The principle of the factory system then is, to substitute mechanical science for hand skill, and the partition of a process into its essential constituents, for the division or graduation of labor among artizans. On the handicraft plan, labor more or less skilled, was usually the most expensive element of production—*materiam superabat opus*; but on the automatic plan, skilled labor gets progressively superseded, and will, eventually, be replaced by mere overlookers of machines.

By the infirmity of human nature it happens, that the more skilful the workman, the more self-willed and intractible he is apt to become, and, of course, the less fit a component of a mechanical system, in which, by occasional irregularities, he may do great damage to the whole. The grand object therefore of the modern manufacturer is, through the union of capital and science, to reduce the task of his work-people to the exercise of vigilance and dexterity,—faculties, when concentred to one process, speedily brought to perfection in the young. In the infancy of mecanical engineering, a machine-factory displayed the division of labor in manifold gradations—the file, the drill, the lathe, having each its different workmen in the order of skill: but the dexterous hands of the filer and driller are now superseded by the planing, the key-groove cutting, and the drilling machines; and those of the iron and brass turners, by the self-acting slide-lathe. Mr. Anthony Strutt, who conducts the mechanical department of the great cotton factories of Belper and Milford, has so thoroughly departed from the old routine of the schools, that he will employ no man who has learned his craft by regular apprenticeship; but in contempt, as it were, of the division of labor principle, he sets a ploughboy to turn a shaft of perhaps several tons weight, and never has reason to repent his preference, because he infuses into the turning apparatus a precision of action, equal, if not superior, to the skill of the most experienced journeyman.

An eminent mechanician in Manchester told me, that he does not choose to make any steam-engines at present, because with his existing means, he would need to resort to the old principle of the division of labor, so fruitful of jealousies and strikes among workmen; but he intends to prosecute that branch of business whenever he has prepared suitable arrangements on the equalization of labor, or automatic plan. On the graduation system, a man must serve an apprenticeship of many years before his hand and eye become skilled enough for certain mechanical feats; but on the system of decomposing a process into its constituents, and embodying each part in an automatic machine, a person of common care and capacity may be entrusted with any of the said elementary parts after a short probation, and may be transferred from one to another, on any emergency, at the discretion of the master. Such translations are utterly at variance with the old practice of the division of labor, which fixed one man to shaping the head of a pin, and another to sharpening its point, with most irksome and spirit-wasting uniformity, for a whole life.

It was indeed a subject of regret to observe how frequently the workman's eminence, in any craft, had to be purchased by the sacrifice of his health and comfort. To one unvaried operation, which required unremitting dexterity and dilligence, his hand and eye were constantly on the strain, or if they were suffered to swerve from their task for a time, considerable loss ensued, either to the employer, or the operative, according as the work was done by the day or by the piece. But on the equalization plan of self-acting machines, the operative needs to call his faculties only into agreeable exercise; he is seldom harassed with anxiety or fatigue, and may find many leisure moments for either amusement or meditation, without detriment to his master's interest or his own. As his business consists in tending the work of a well regulated mechanism, he can learn it in a short period; and when he transfers his services from one machine to another, he varies his task, and enlarges his views, by thinking on those general combinations which result from his and his companions' labors. Thus, that cramping of the faculties, that narrowing of the mind, that stunting of the frame, which were ascribed, and not unjustly, by moral writers, to the division of labor, cannot, in common circumstances, occur under the equable distribution of industry. How superior in vigor and intelligence are the factory mechanics in Lancashire, where the latter system of labor prevails, to the handicraft artizans of London, who, to a great extent, continue slaves to the former! The one set is famillar with almost every physico-mechanical combination, while the other seldom knows anything beyond the pin-head sphere of his daily task.

It is, in fact, the constant aim and tendency of every improvement in machinery to supersede human labor altogether, or to diminish its cost, by substituting the industry of women and children for that of men; or that of ordinary laborers, for trained artizans. In most of the water-twist, or throstle cotton mills, the spinning is entirely managed by females of sixteen years and upwards. The effect of substituting the self-acting mule for the common mule, is to discharge the greater part of the men spinners, and to retain adolescents and children. The proprietor of a factory near Stockport states, in evidence to the commissioners, that by such substitution, he would save 50*l*. a week in wages, in consequence of dispensing with nearly forty male spinners, at about 25*s*. of wages each. This tendency to employ merely children with watchful eyes and nimble fingers, instead of journeymen of long experience, shows how the scholastic dogma of the division of labor into degrees of skill has been exploded by our enlightened manufacturers.

They are, in truth, much better acquainted with the general economy of the arts, and better qualified to analyse them into their real principles, than the recluse academician can possibly be, who from a few obsolete data, traces out imaginary results, or conjures up difficulties seldom encountered in practice. He may fancy, for example, that in a great establishment, where several hundred people are employed in producing fine goods, much time and expense must be incurred in verifying the quality and quantity of the work done by each individual. But this verification forms an integral step in the train of operations, and therefore constitutes no appreciable part of the cost of the manufactured article. Thus, for example, the reeling of yarn into hanks measures its length; the weighing of a few miscellaneous hanks determines the grist of the whole; and the *taker-in of work* rapidly ascertains its soundness.—For examining the quality of the very fine yarns used in lace-making, he is aided by machines which register rapidly the uniformity of its cohesive strength, and the exact volume which one hundred yards of it occupy. The lace-maker again, on his part, verifies the grist of all the thread he purchases, in the necessary act of filling the circular grooves of his tiny bobbins, preparatory to their entering into his machine.

The university man, pre-occupied with theoretical *formulæ*, of little practical bearing, is too apt to undervalue the science of the factory, though, with candor and patience, he would find it replete with useful applications of the most beautiful dynamical and statical problems. In physics, too, he would there see many theorems bearing golden fruit, which had been long barren in college ground. The phenomena of heat, in particular, are investigated in their multifarious relations to matter, solid, liquid, and aeriform. The measure of temperature on every scale is familiar to the manufacturer, as well as the distribution of caloric, and its habitudes with different bodies. The production of vapors; the relation of their elastic force to their temperature; the modes of using them as instruments of power, and sources of heat; their most effective condensation; their hygrometric agency; may all be better studied in a week's residence in Lancashire, than in a session of any university in Europe. And as to exact mechanical science, no school can compete with a modern cotton-mill.

When a certain elevation of temperature is made to give pliancy to the fibres of cotton or wool, the philosophical spinner sees the influence of caloric in imparting ductility and elasticity to bodies. The thermometer to indicate the temperature, and the hygrometer the humidity of the air, give him an insight into the constitution of nature unknown to the bulk of mankind. Of the different dilatations of different solids by increments of temperature, he has daily experience in the elongation of the immense systems of steam-pipes which heat his mill apartments, often extending three hundred feet in a straight line. On this scale, the amount of the expansion, and contraction, needs no micrometer to measure it, for it is visible to the eye, and may be determined by a carpenter's rule.

When fire-proof factories of iron and brick were first built, the columns which supported the successive floors, being hollow, were intended to admit steam, and to be the channels of communicating heat to the apartments. It was soon found, however, that the lengthening and shortening of a columnar range eighty or ninety feet high, by alternations of temperature, equal to 170° F., were so considerable, as to impair the stability of the most solid edifice, since metal changes its dimensions by heat with irresistible force. This project of frugality being therefore abandoned, horizontal, steam-pipes were suspended near the ceiling, by swinging rods of iron, which terminated at one end in a curved copper tube, for allowing the water of condensation to escape, and possessed of such pliancy as to give free play to the expansion and contraction. Ingenious expedients have been proposed for causing the lengthening of the main pipes to regulate the admission of steam into them, and to exclude it as soon as the temperature of the range had reached the proper pitch. An invention of this kind was made the subject of a patent many years ago, but it never came into general use, on account of certain irregularities in its performance. It was found very difficult so to adjust the lever mechanism of the valve, as to prevent its intercepting the flow of the steam whenever a certain portion of the long pipe was heated, long before the steam had reached the remoter end. Hence its uniform distribution was rendered precarious. Mill engineers have therefore satisfied themselves with insulating the steam-pipe ramifications from the building, leaving the circulation of the steam to be tempered by an ordinary stop-cock. The instrument, for which I have obtained a patent, under the name of the heat-governor, or thermostat, would furnish the factory proprietors with a self-acting means of regulating the temperature of their apartments, and of promoting their ventilation.

(To be Continued.)

Agriculture, &c.

From the New-York Daily Express.

A CHAPTER ON PORK.

CINCINNATI, Dec. 31, 1836.

Some of the items I gave you in my letter of the 9th inst., on the subject of Pork, and particularly on the slaughtering, I had collected sometime since. Having visited the packing and slaughtering houses within the last day or two, I found additions and improvements had been made this year, I was not before aware of. I will therefore give you another letter on *Pork*, and go somewhat into particulars. Less is doing this winter in Pork, than was anticipated during the past summer. It was known that hogs were plenty throughout the country, and it was believed that the prices would consequently be low,—or lower than last year,—but the uncommonly high prices paid last winter, induced the drovers to scour the country and purchase all the hogs they could find, and on driving them to the city, they demanded what our packers thought an exorbitant price—say for hogs weighing 200 to 250 pounds, $7,00 per hundred.,—the consequence was, that the packers generally delined purchasing, and the drovers would not sell for less, so that but few hogs were packed for the first three weeks of the season. In fact, up to this time, only about 50,000 hogs have been slaughtered, whereas two years ago, at the same time, more than 120,000 were slaughtered and packed. Some of our Pork Merchants are not packing at all, others are doing a little; and none to an extent of former years. Hogs, however, remain firm at the prices demanded by the drovers, and sales were made yesterday at $7 25 der hundred pounds, for hogs weighing 250 pounds. The pork season generally lasts about eight or ten weeks—last year it closed in less than eight weeks —in fact, but few hogs were slaughtered after the first of January. *Eighty thousand* was the number packed last winter. (In the publication of my letter of the 9th, by a typographical error, the number is set down at 60,000.) It is supposed that there will not be more packed in the city this winter than last, and about a half of the number of winter before last. Hogs are driven to this market from the interior of Ohio, Indiana and Kentucky. I will now give you the *modus operandi* of slaughtering, which is performed with such expedition at the slaughterting houses of *John W. Coleman, Esq.*, who has made a large fortune at this business. I find, on visiting these houses, which are situated on the north-east extremity of the corporation line, and bordering on a small stream called Deer Creek, or, as it would more properly be called at this season of the year, *Bloody Run*, that the number of slaughter houses now amount to *nine*, the largest of which is 160 feet long by 60 wide. The others average 100 feet long by 60 wide. Mr Coleman has also another slaughter house at Covington, on the Kentucky shore, which makes in all, *ten houses.* At *each* of these houses, he has now employed, 36 to 40 men,—making altogether, about *three hundred and eighty men*, to whom he pays $1,25 to $2,00 per day each. Near these houses are *pens* of various sizes, and covering altogether about forty acres of ground—into these pens are driven the different droves of hogs by their respective owners, as they come into the city, preparatory to the operation of slaughtering. These pens hold from 100 to 1000 each. In these slaughtering houses there are large kettles at each end, filled with water, which is kept constantly boiling, and the operation of killing, scalding, dressing. &c., goes on simultaneously at both ends of the several houses —the hogs are hung up in the centre to be dressed, before removing them to another part of the building to cool. Attached to each end of these houses is a small pen, that will hold about 50 to 60 hogs—into these pens the hogs are driven until they are so compact, that the *executioner* walks in on their backs' bearing in his hands a large sledge hammer, with with he "deals death and destruction" all around him. When they are all knocked down they are removed within the building where the knife is passed into the throat. After bleeding they are thrown into the kettle of water (one at a time) and thence, after sufficient scalding, removed to a bench, when the bristles are scraped off by iron scrapers, made expressly for the purpose, and thence hung up. when the "*gutter*," as he is called, passes his knife from one end of the hog to the other and removes the offal, and completes the dressing; and so scientific have these *surgeons* become, that any one of them can complete the inside dressing, removing all within, washing out, &c., *of three hogs within the minute*—and, as I stated in my letter of the 9th—*each set of men, at each kettle and bench, at either of these houses, will knock down, bleed, scald, remove the bristles, and complete the inside dressing of fifty hogs within the hour*—which would be *one hundred hogs at each house*, or *one thousand* at all the 10 houses, in a SINGLE HOUR. I learn they now work about eight hours per day, and were it necessary—to such perfection has Mr. Coleman brought this science of "hog-killing"—that he could at this time, at his ten houses, slaughter, and have completely dressed and hung up to cool, EIGHT THOUSAND HOGS IN ONE DAY. I will venture to say, there is no place in the world, out of Cincinnati, where this can be done, *and here it* CAN *be done.* In past years, before Mr. Coleman had arrived at such perfection in the art, he has slaughtered, dressed, and hung up, in *four houses*, and some of them not in double operation, as now—*twenty-seven hundred in a day*—say 8 or 9 hours' work. The same ratio for *ten* houses, would make 6,750. Mr. Coleman has no competition in this line of business, and I am now informed, that the gut lard, soap grease and bristles (which is the only compensation for slaughtering) is worth about 50 cents for each hog—which would amount to *fifty thousand dollars* for slaughtering a hundred thousand hogs. No mean business, this—and all accomplished within 8 or 10 weeks.

When the hogs become cool, they are conveyed on large wagons made expressly for the purpose, to the packing-houses, which are the largest and most splendid warehouses in the city—there they are cut up and packed, the lard rendered and put in kegs, and the hams cured for smoking.

In the winter and spring of 1835, we exported about sixty thousand barrels of pork! and one hundred thousand kegs of lard! Last winter and spring we exported about half that quantity, and the winter and spring of 1837, we may possibly export more than last year, although it is somewhat doubtful. The quality of the hogs this year is better than they were last, and consequently more clear pork will be packed than then. There is so far a good demand for all the new pork and lard; sales have been made, and are now making, at the following prices:—clear pork $22; mess $20; prime $18; lard 12 cents. Two weeks since, sales were made at prices *ten per cent.* lower than these. These prices are higher than this time last year, and it is thought they will be maintained.

In the article of *Hams*, our pork merchants (those who turn their attention to it) furnish better hams than can be found in any other part of the country. I will venture the assertion, that the *sugar-hams* cured by William M. Walker, and Miller & Lee, cannot be surpassed in flavor and goodness of quality, generally, in the United States. I am aware that the Virginia hams are good. I am also aware, that the hams cured in or about Boston are good—very good—and here is a reason for it. The hogs are fed wholly on corn, the meat is solid, and the hogs are generally fat; but still they cannot match the *family hams* put up by Mr. Walker, and Miller & Lee, of this city—*they know how to cure them*—and that is the great secret, and a secret known but to few. Others of our pork merchants cure most excellent hams, and perhaps equal to any. I have not had an opportunity of knowing. One thing is certain, not only the hams but the pork and lard, exported from Cincinnati, stands high in the Southern and Eastern markets.

Having strung out this letter already to too great a length, I will close this chapter on pork. I may refer to the subject again in some future communication.

From the Encyclopedia of Agriculture.

CHARACTERISTICS OF FLEMISH HUSBANDRY.

To make a farm resemble a garden as nearly as possible, was their principal idea of husbandry. Such an excellent principle, at first setting out, led them, of course to undertake the culture of small estates only, which they kept free from weeds, continually turning the ground and manuring it plentifully and judiciously. Having thus brought the soil to a just degree of cleanliness, health and sweetness, they ventured chiefly upon the culture of the more delicate grasses, as the surest means of acquiring wealth in husbandry, upon a small scale, without the expense of keeping many draught horses or servants. After a few years experience, they soon found that ten acres of the best vegetables for feeding cattle, properly cultivated, would maintain a larger stock of grazing animals, than forty acres of common farm grass: and the vegetables they chiefly cultivated for this purpose were lucerne, sainfoin, trefoils of most denominations, sweet fenu-greek, (*Trigonelle*,) buck and cow wheat, (*Melampyrum pratense*,) field turnips and spurry, (*Spergula*) by them called marian-grass.

The political secret of Flemish husbandry was, the letting farms on improvement. Add to this, they discovered eight or ten new sorts of manures. They were the first among the moderns who ploughed in living crops, for the sake of fertilizing the earth, and confined their sheep at night in large sheds built on purpose, whose floor was covered with sand, or earth &c., which the shepherd carted away every morning to the compost dung hill. Such was the chief mystery of the Flemish husbandry.

Urine cisterns are formed in the fields, to receive purchased liquid manure; but for that made in the farm yard, generally in the yard, or under the stables. In the latter case, the urine is conducted from each stall to a common grating, through which it descends into the vault; from thence it is taken up by a pump. In the best regulated farmeries there is a partition in the cistern, with a valve to admit the contents of the first space into the second, to be preserved there free, from the more recent acquisition, age adding con siderably to its efficacy. This species o mauure is relied on beyond any other, upon all the light soils throughout Flanders, and even upon the strong lands, (originally so rich as to preclude the necessity of manure) is now coming into great esteem, being considered applicable to most crops and to all the varieties of soils.

Fallows, according to Sir John Sinclair, are in a great measure abolished, even on strong land; by means of which, produce is increased, and the expense of cultivation on the crops raised in the course of a rotation, necessarily diminished; and by the great profit they derive from their flax and rape, or coleseed, they can afford to sell all their crops of grain at a lower rate. Notwithstandding this assertion of Sir John, it will be found that a fallow enters into the rotation on all of the clayey soilsFlanders.

Flax is cultivated with the utmost care The field intended for this crop, after two or three ploughings and harrowings, is again ploughed, commencing in the centre and ploughed rouud and round to the circumference, so as to leave it without any furrow. The heavy roller is drawn across the ploughing by three horses; the liquid manure is then spread equally over the entire surface, and when well harowed in, by eight or nine strokes with the harrow, the seed is sown, which is also harrowed in by a light harrow with wooden pins, of less than three inches; and the surface to conclude the operation, is again carefully rolled.

Nothing can exceed the smoothness and cultivated appearance of fields thus accurately prepared.

The manure universally used for the flax crop demands particular notice. It is termed liquid manure, and consists of the urine of cattle in which rape cake has been desolved, and in which the *vidanges* conveyed from the privies of the adjoining towns and villages, have also been blended. This manure is gradually collected in subterraneous vaults of brick work, at the verge of the farm next to the main road. Those receptacles are generally forty feet long by fourteen wide, and seven or eight feet deep; and in some cases are contrived with the crown of the arch so much below the surface of the ground, as to admit the plough to work over it. An aperture is left in the side, through which the manure is received from the cart by means of a shoot or trough, and at one end an open ing is left to bring it up again, by means of a temporary pump which delivers it either into carts or tonneaus.

The liquid is carried to the field in sheets or barrels, according to the distance. Where the cart plies, the manure is carried in a great sheet called a *voile*, closed at the corners by running strings, and secured to the four uprights of the carts; two men standing one on each side of the cart, scatter it with hollow shovels upon the rolled ground; or where the tonneaous are made use of, each is carried by two men with poles, and set down at equal intervals across the field, in the line of the rolling.

There are two sets of vessels, which enable the men who deposite the loaded ones, to bring back the others empty. One man to each vessel, with a scoop or rather a kind of bowl with a long handle, spreads the manure so as to cover a certain space; and thus by preserving the intervals correctly, they can precisely guage the quantity for a given extent of surface. For the flax crop, they are profuse, and of this liquid mixture, in this part of the country, they usually allow at the rate of 2480 gallons, beer measure, to the English acre.

With culinary vegetables the Flemish markets are abundantly supplied. Most of these are grown by the small farmers, and are of excellent quality. To every cottage in Flanders a garden of some description is attached; and according to the means, the leisure, and the skill of the possossor, is rendered more or less productive.

The general principles of management with all are, frequent digging, careful weedding, ample manuring, and immediate succession. The rotation depends on circumstances. The cheif vegetables in common use are parsnip, carrot, turnip, scorzonera, savoy, jettechou, cabbage, (Brussels sprouts) onions leeks, pease, beans, and all kinds of salading, with another vegetable called *feve haricot*, a large species of French bean, which has a place in the field or garden of almost every farmer; and being sliced down, pod and seed, is made a chief ingredient in all farm-house cookery.

The treatment of asparagus here, and generally in Flanders, differs considerably from our method: in forming their beds, they are not by any means particular as to very deep trenching, or a profusion of manure; nor, as they grow up, do they cover the beds with litter for the winter, nor fork and dress them in the spring; in the furrows they form a rich and mellow compost of earth and dung, with which before winter sets in, they dress up their beds to the height of nearly eighteen inches from the level of their crowns, and without any further operation, (except supplying the furrows again for the ensuing year,)as soon as the buds appear, they cut them 9 inches under the surface; by which means, having just reached the light, the whole of the stock is blanched and tender.

Every substance that constitutes, or is convertible to manure is sought after with avidity, which accounts for the extreme cleanliness of the Flemish towns and pavements, hourly resorted to with brooms and barrows, as a source of profit. Even the chips which accumulate in the formation of shoes worn by the peasantry, are made to constitute a part of the compost dung heap; and trees are frequently cultivated in barren lands, merely to remain till their deciduous leaves shall in the course of time, have formed an artificial surface for the purpose of cultivation. The manures in general use are—

The farm-yard dung, which is a mixture of every matter that the farm yard produces, formed into a compost, which consists of dung and litter from the stables, chaff, sweepings, straw, sludge, and rubbish, all collected into a hollow part of the yard, *so prepared as to prevent the juices from being wasted;* and the value of this, by the cart load of 1500 lbs. of Ghent, is estimated at five franks.

The dung of sheep, pigeons or poultry, by the cart load, five franks and a half.

Sweepings of the streets and roads, same quantity, three francs.

Ashes of peat and wood mixed, same quantity, eight francs.

Privy manure, and urine, same quantity, seven francs.

Lime, same quantity, twenty-four francs.

Rape cake,, per hundred cakes, fifteen francs.

Gypsum, sea mud, and the sediments of canals, have been all tried experimentally, and with fair results; but the two former have been merely tried; the latter is used successfully in the vicinity of Burges.

Bone manure was altogether unknown in Flanders, but at the suggestion of Radcliff, is now under experiment in that country.

From the Southern Agriculturist.

STRAWBERRIES.

Charleston Neck.

Mr. Editor,—In a former number of your useful journal, I read an interesting article on the cultivation of the Strawberry. Too much attention cannot be paid to this delightful fruit; and, concerning the income which an acre or two will yield, if planted in strawberries, I can, along with yourself, bear the most decided testimony.

For the last five or six years, I have been raising this fruit, upon my farm; and never fail to sell it, at from 25 cents to 50 cen s per saucer. If the beds are properly attended, bushels of the berries might be raised, and as readily sold at the above prices.

I shall not enter into an enumeration of the various species of these berries. In a former number of your journal, among the selected articles, will be found, very full information upon the subject. It will be there found, that they are as various in their kinds as any other fruit. Much praise is due to our horticulturists, for their zealous endeavours to introduce the various species of the strawberry into our State. The great success they have met with in this respect, has been more than once evinced by the brilliant and luscious display of this fruit by our Horticultural Society, within the last several years. At its last exhibition, among the other beautiful and delicate varieties exhibited, was one from the garden of Jonathan Lucas, Esq. The fruit measured several inches round, and had every indication of being as exquisite in flavor as it was agreeable in size.

For my own use, I have cuitivated the common strawberry of our climate. By care and attention in its cultivation, I am fully persueded, that it may be rendered more productive than any other, and full large enough to gratify the keenest appetite.—However, like all other fruit, the larger the strawberry is made to grow, the coarser does it become to the taste.

I have unconsciously entered into this long preface, Mr. Editor, when my object was, to offer some practical hints to your readers, upon the cultivation of this delicious fruit.

In the article from your pen, to which I have already alluded, you recommend the burning of the strawberry beds, early in March, or during the latter part of February. I prefer doing this at an earlier perior, and you shall have my method.

During the month of December, I lay pine trash, or other combustible matter, over my strawberry beds, and selecting a dry day for the purpose, I set fire to the entire mass.—As the trash burns, it will ignite along with the dry plants, the old decayed leaves of the strawberries, and consume all the old useless suckers.

Immediately after doing this, if your strawberries have grown up the previous year broad-cast, or, as I should otherwise express it, if their suckers have been suffered to take root all over the bed, you should hoe the bed just burnt, in trenches about ten or twelve inches apart, transversely on the bed. After this, well-rotted manure should be scattered in the trenches, and the whole bed should then be covered over with straw or chaff. Tanner's bark will do, if you cannot readily procure the straw or chaff.

The manure, applied as above, will warm the plants, and give them early maturity in the spring.

As soon as the plants shoot forth, the alleys between them should be well stirred, and kept free from all kinds of weeds.

A friend of mine, from the country, tells me, that he has applied cotton seed, with the greatest success, as a manure for strawberries. He applied it in the same way as I recommend the compost to be applied.

I must, however, state here, that no treatment will make strawberries produce well, without transplanting every three or four years. Bearing this in mind, it will be well if we have any plants which are as old as above stated, to transplant during this month. I confess it would have been much better to have done so during the previous month, but having neglected to do so then, it is not too late now.

The plants should be carefully selected, and set out upon a well-manured bed, about ten or twelve inches apart each way. As soon as the plants take, they should be treated as I have already directed.

I remain, Mr. Editor, your obt. servt.

P. J.

From the Farmer and Gardener.

We find the following communication marked for our eye in the *Germantown Telegraph*, and as the writer seems to question the fact which we published some weeks since, of 1510 bushels of Ruta Baga having been raised on an acre of ground, we will remark, that although we do not *vouch* for all that appears in our columns, we endeavor so far to exercise the right of censorship as to preclude that which we believe is calculated to lead our agricultural brethren into error.

That the *named quantity* of Ruta Baga, viz: 1510 bushels has, and can again be raised from an acre we have no doubt. It is known to every one acquainted with the culture of this excellent root, that in England, as well as in this country, products equally as large have been repeatedly raised. On a small scale, it appears from the statement of the *Germantown Farmer*, that he raised of the common turnip, planted in drills two feet apart, by 6 inches, at the rate of 500 bushels to the acre. These turnips would have grown equally as well if the rows had been but 12 inches apart, and consequently would have yielded just twice the quantity. And on good ground, well manured with thoroughly rotted dung, rich mou'd, or a compost of cow-dung and ashes, the plants might with advantage have been brought to stand 8 inches apart, that is, the rows eight inches apart, and the plants the same distance, which we think would have given the quantity stated, provided the turnips had been planted in due time, hand hoed, and well protected from weeds. What the precise quantity would be, we, however, leave the "*Germantown Farmer*" to calculate. And should he discover that the yield would be more than the stated quantity, we take it for granted, he would admit that, as the Ruta Baga grows larger, it necessarily must yield more than the common turnip, and especially as from its irregular form, it *measures more.* Those who advocate the drill husbandry for turnips generally recommend that the rows should be one foot apart and the plants the same distance from each other;—now this would give us 43,560 turnips on an acre; and for the information of our Germantown Farmer, we would remark, that we measured and counted a bushel of the turnips raised by us the present season on Friday last, which, owing to being sowed late, and on ground not at all manured, were but of medium size. The bushel contained 45 turnips, which if they had stood a foot apart would give to the acre 968 bushels. Our crop did not yield at this rate; for owing to drought when the seed was sown, there were as many, if not more *bald* than covered places in our patch, and from this cause our yield was not above 250 bushels to the acre: and although but *half that* of the *Germantown Farmer*, and the *third* of the yield of the grower of the Ruta Baga, we rejoice in our heart others had been more successful than ourself; felt no disposition to "question the correctness" of the statements of those who had been more fortunate than we had, and, of course, gave ourself no trouble in speculating, whether a cypher had been added or not, for although we have grown too old to believe all we read, or to give in to every fashionable dogma, or crude notion, that these eventful days are hourly brining forth, we have too much respect for the social duties of man, as well as for the the courtesies of life, to question the averments of our neighbors upon slight grounds believing as we do, that the *questioning* of the veracity of another is one of the most impertinent as well as unpardonable offence, which one man can commit against his fellow creature. *Truth* as we have said upon another occasion, we hold as the basis of every other virtue, and, therefore, hold its opposite in utter abhorrence, and while we shall entertain sufficient respect for ourself to cultivate virtue and despise vice, we shall certainly expect courtesy at the hands of others.

Near Germantown, 8th Dec., 1836.
To the Editor of the Telegraph:—

I have been pleased with the articles on farming and agriculture that you extract and select from various sources; but while we have the good manners to listen to their wonderful stories, let us not forget that we have a right to have a say in the matter too; and I am surprised that our fellow townsmen have not sounded their own trumpets on this subject: let me set them an example, and show that we can raise turnips as well as the Baltimoreans.

On the 17th of August last I dug over two rods of ground on which I had raised early peas aad onions, (manuring the part where the peas had stood, but not heavily; the onion land had been manured previous to planting the onions,) and sowed or dibbled the flat blue topped turnip seed in two rows two feet apart and six inches apart in the row. I flat hoed them twice, I believe, afterwards; thinned them out to single plants in due time, and kept them clear of weeds. They grew finely and completely covered the land thick with their tops. I took them in on the 2d of November last, and had more than six bushels of turnips on these two rods of ground. This is at the rate of 500 bushels to the acre for a ten week's crop, but not 1510 bushels certainly. I am inclined to question the correctness of this Baltimorean story; for mine stood as thick as they could well stand on the ground and were quite as large or larger than any Ruta Baga that I have seen in this country. There is a mistake in it to a certainty; for it does not give four square yards of land to each bushel of turnips; and to have them fine they should be grown in rows three feet apart, and a foot apart in the row. This would give twelve turnips in the four square yards, and these must more than fill a bushel, to have 1510 bushels on an acre of land. It looks a little incredible; perhaps a cypher has been tagged to the story; a nothing in itself; but something wonderful when used in union with 151. Soliciting proof and evidence of this astonishing turnip crop.

I am, Sir,

Yours respectfully.

A GERMANTOWN FARMER.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

RAILWAY IRON, LOCOMOT IV E c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

						lbs.	
350 tons	2¼ by ⅝,	15 ft in length,	weighing			$4\frac{68}{100}$	per ft.
280 "	2 " ½,	"	"		"	$3\frac{50}{100}$	"
70 "	1¾ " ⅜,	"	"		"	2¼	"
80 "	1½ " ¼,	"	"		"	$1\frac{25}{100}$	"
90 "	1 " ¼,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½, 3, 3¼, 3½, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28—tf Philadelphia, No. 4, South Front st.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

1st month, 7th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hard-ware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTION, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicabl eextent in the United States, Maryland excepted.

MOSES LONG.

General Agent of Col. S. H Long

Rochester, May 22d, 1836. 19y-tf.

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention.

HENRY BURDEN.

Troy Iron Works, Nov. 15, 1836. 47—tf

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co. No. 119 Greenwich Street, New-York, or at the Makers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY & KNIGHT.

POUGHKEEPSIE, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANCHED and GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works be has in charge.

BENJ. WRIGHT,
Chief Engineer N. Y. & E. R. R.

NEW-YORK, April 4th, 1836.

Harvey's Flanched and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.

BOSTON, April 26th, 1836. No. 1—6t.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

TO CONTRACTORS

STONE CUTTERS and MASONS.

JAMES RIVER and KANAWHA CANAL.—Contractors for mechanical work are hereby informed that a large amount of Masonry, consisting of Locks, Culverts, and Aqueducts, is yet to be let on the line of the James and Kanawha Canal.

Persons desirous of obtaining such work, and prepared to exhibit proper testimonials of their ability to execute it, will apply at the office of the subscriber in the city of Richmond.

Stone Cutters and Masons wishing employment in the South during the winter months, may count with certainty on receiving liberal wages, by engaging with the contractors on the work

CHAS. ELLET, Jr., Chief Eng. J. R. & K. Co.

Richmond, Nov. 29, 1836. 51—6t

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

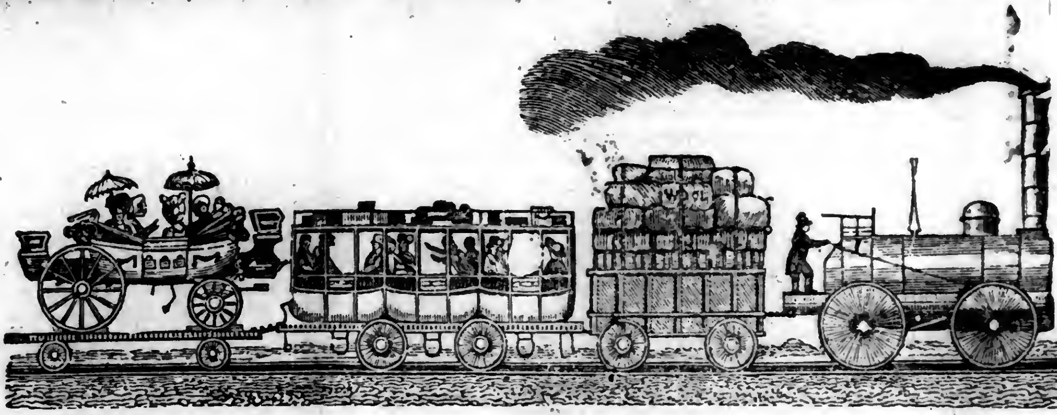
N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

NOTICE TO CONTRACTORS.

Proposals will be received at the office of the Hudson and Berkshire Railroad Company, in the city of Hudson, until the 15th of January, 1837, for One Million feet, board measure, of Southern pine, of the following dimensions:—6 inches square, and in lengths of 21, 24, 27, and 30 feet long—also, for 14,000 Chestnut or Cedar ties, 8 feet long, and 6 inches square—and also, 4,000 sills, of Hemlock, Chestnut, or White Pine, 4 by 10 inches, and in lengths of 15, 18, and 21 feet long. The whole to be delivered by the 1st day of July, 1837.

GEORGE RICH.
Engineer.

Hudson, Dec. 22, 1836. 52 4t



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, JANUARY 28, 1837. [VOLUME V.—No. 4

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 28, 1837.

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid, (continued.)

W. T. James, City, N. Y., Jan. 1, 1837.
Faber & Merle, 2 copies, " " 1838.
R. Crooks, " " 1838.
M. Foulon, " " 1838.
F. Rawdon, " " 1838.
J. Walker, " " 1838.
L. Adriance, " " 1838.
R. & H. Lawrence & Co. " " 1838.
E. T. Johnson, eng'r., " " 1838.
R. S. Jacobson, " " 1838.
Ramsdill & Brown, " Oct. 1, 1837.
E. Johnson, Rochester, N. Y., " 1838.
J. Wall, Syracuse, " Oct. 1, 1837.
S. R. Curtie, Mt. Vernon, Ohio, Jan. 1, 1838.
J. C. Nielson, Havre de Grace, Md., Jan. 1, 1838.
Jas. Murray, Havre de Grace, Md., Jan. 1, 1838.
B. H. Latrobe, Baltimore, Md. Jan. 1, 1838
P. Coudom, Marseilles, France, " 1838.
Draper & Co. Paris, " " 1838.

CENTRAL RAILROAD AND BANKING COMPANY.

The following gentlemen were on Monday elected Directors of this institution for the ensuing year:

Messrs. W. W. Gordon, Robert Habersham, J. P. Henry, J. Washburn, R. Hutchinson, N. J. Bayard, Geo. B. Cumming, F. A. Tupper, Isaac Cohen.

And, at a meeting of the Board yesterday, W. W. Gordon. Esq., was unanimously re-elected President.

On announcing the above election, we cannot refrain from indulging in a passing notice of the Railroad, now in a state of forwardness,—a Road, which, when completed, will deserve the name it in anticipation bears —*The Central Railroad of Georgia.* A few short weeks since, there was not a handful of sand cast up from the soil, where it has lain "*time whereof the memory of man runneth not to the contrary.*" *Now* twelve miles and a half of the Road are opened, more than *six* of which are graded. We learn that *ten* miles will be ready for the rails by the first of February. The Company is only awaiting the reports of the Engineers, at present engaged in the examination of different routes, to determine the course of the road, and there is every prospect of having *thirty* miles ready for use by the first of June. Upwards of one thousand laborers and mechanics are employed. Three hundred tons of iron have been shipped from Liverpool, and seven hundred more will be shipped in the course of the present month.

Our readers will remember that the Company declared a dividend in last month, on their capital reserved for banking purposes, of *five* per cent. for six months, or *ten* per cent per annum. We profess not to be gifted with the light of prophecy, but with the spirit which has distinguished the direction, and their able Engineer, we look forward to the day as not far distant, when the productions of Western Georgia will whirl through Yamacraw to the Bluff, where Oglethorpe and Tomochichi, more than a century since, exchanged the pipes of amity.

Go ahead! Mr. Randall, and let your axemen, and your spademen announce to Western Georgia, that the citizen of Old Savannah have awakened from their past lethargy, and desire to be connected with them, one and all, in a fraternal embrace. We are, ourself, impatient for a ride (by steam) through our piney forests. We expect to be gratified in June, if not in in February. We fear no disappointment.—[Sav. Geor.]

We call the attention of those editors in New-York, who are in favor of removing the duty on Foreign Coal, to the following projected Railroad.

POTTSVILLE AND NEW-YORK RAILROAD.

The period is rapidly approaching when a railroad from this region to the city of New-York will be undertaken—a work destined to be of incalculable importance to the interests of this region,—to the district of country through which it shall pass, and to the consumers of coal generally—especially to those of all our Atlantic cities. We know of no public improvement fraught with more highly beneficial consequences to the population of the interior of this State, than the proposed railroad to New-York. And we trust that no short-sighted, selfish, narrow-minded or illiberal spirit of opposition will manifest itself to this great enterprise—which must sooner or later be accomplished, in spite of every opposition, from whatever quarter it may proceed. Had such a railroad been in operation during the last season, we should not have heard any outcry about the scarcity of coal at present, and the poor man would have been furnished with this indispensable article of living, at reasonable prices. Nor would the subject of removing the duty on Foreign Coal have been agitated or prayed for by any class of our fellow citizens. The business of transportation would have continued up to the present moment, and prosecuted throughout the whole season with enery. There would then have been little or no pause or suspension in the business of mining—all hands would have been actively and incessantly employed, and monopoly and speculation in our large cities set at defiance by the consumer.

We learn from Samuel B. Fisher, Esq., a skilful Engineer, who has lately been engaged in making a reconnoissance of the route as far as Delaware river, that the same is not only practicable without inclined planes, but also that the grade required wi'l not exceed eighteen feet in the mile throughout the whole distance, with the exception of a single mile—in which it must be increased to 40 feet—a very trifling elevation. Our New-Jersey neighbors are ready and willing to give us all the assistance that may be required to connect the proposed railroad with the Somerville railroad, or any other that may be preferred, so that little or no difficulty need be apprehended in New-Jersey. This great work is therefore only awaiting the legislative sanction to carry it at once into execution. The stock will be taken with avidity beyond all question. And those who are principally instrumental in its accomplishment, will be hailed at no distant day as great public benefactors.—[Miners Journal.]

A TRIP ON THE RAILROAD.

The portion of the Wilmington and Susquehannah Railroad between this city and Elkton is now completed. Yesterday, at the invitation of the President, and Directors, the stockholders and a considerable number of other citizens of Wilmington, took a trip in the cars to Elkton, and back again. The locomotive Susquehannah, built for the company at Lowell, and better known here, by the cognomen of *The Yankee*, was placed on the road, and attached to four superb cars, from the work shop of Betts, Pusey and Harlan of this city. The Susquehannah, is the most powerful and decidedly the best locomotive, the company have yet obtained. The cars are excellent specimens of workmanship, built after the latest models, with a passage, and free communication through the entire train, and seats in each calculated for twenty-eight persons, with room for half as many more, to stand up and walk from one apartment to another. About half-past ten o'clock yesterday morning, the train was drawn up at the foot of Market street, and our citizens to the number of a hundred and thirty, or forty took their seats. This was the first trip of the cars over the road, and there was some little anxiety, and apprehension, entertained, by many of the company at the result of the experiment, and the chances of some accident or catastrophy, where as yet, the locomotive, cars, engineer and road, had not become very well acquainted with each other. In this respect, all were most agreeably disappointed. As it regards speed, pleasure and enjoyment of almost every kind, the experiment was most decidedly, successful. We left Market street, at thirty-five minutes past ten o'clock, and proceeded very rapidly four or five miles on the road, when some of the gudgeons to the cars become a little heated, from not having been worn smooth and adjusted, and it was found necessary to haul up, cool off, and apply a little more oil. We then applied the steam, and resumed our course, *puffing* and *blowing* along, to somewhere not far beyond, what is called McGrann's deep cut, when an incident occurred that frightened some, and amused others, much more than injuring any one. A strudy oak, that had not been sufficiently looked to, by the workmen and engineers, and which seemed rather to dispute a passage for *The Yankee* and his train, extended a branch some distance into the road which swept the sides and tops of the cars, breaking some twenty or thirty panes of glass, and scattering the pieces with violence enough, to draw blood from half a dozen noses, that were too prominent to escape a collision. After adjusting the difficulties from this accident, and bestowing proper attention to the wounded, by laughing them into a pleasant countenance again, we continued our course to Newark, and arrived opposite the village, at twenty minutes to twelve, where we were met, and greeted by a number of the most substantial and influential citizens intersted in the road.

As it happed here, *The Yankee* was under full headway, and went *whizzing* by, as though, he was not willing the Newarkers should get more than a glimpse of him, this trip.

We must confess, we had a strong inclination if possible to obtain a delegation from Newark, to join us, as far as Elkton, and back again, but we had no influence in matters of steam, and locomotives, besides, before we were fully aware of the presence of the Newarkers, we were out of sight, and the error, could not be retrieved. Not far beyond the Maryland line, we passed through a deep cut, where had been discovered some valuable minerals of a ferruginous character, among which was a stone called *jasper*, said to be among the hardest known to geologists.

We arrived at Elkton, a distance of over seventeen miles by the route of the road at 12 o'clock, precisely, being an hour and twenty-five minutes including all the stoppages, from the time we left Wilmington. At Elkton, we were greeted by a large number of citizens, where we tarried till half-past one, and left amidst the cheerings of hundreds of people, who literally lined both sides of the road. We reached the foot of Market street, Wilmington at half-past two, after stopping two or three times, making the time on our return, one hour.

Every one was delighted with the excursion. The route of the road, passes through the most beautiful section of this county. It was not a little amusing to see the flocks of sheep, cattle and sometimes horses as *The Yankee* came smoking along with his train, at such unwonted rapidity, take to their heels, and escape as if the de'el was to pay. Our country friends generally, who reside on the route, improved the opportunity of witnessing from their porches, the first trip of the cars over the road.

The annual election of Directors of the Railroad Company, took place yesterday afternoon, and among the first acts of the new board, will be to decide, whether they will now establish a line between Philadelphia and Baltimore, by means of stages on the part of the route not yet completed. Should they do so, it will be carried into effect in a few days. It is the expectation of many of our citizens, that such, will be their determination.—[Wilmington Gaz.]

A public meeting was held at Quebec on the 27th ultimo, to promote the Quebec and Belfast Railroad. The projectors of this line seem to be nothing daunted by the certainty of the road from St. Andrews (N. B.) to Quebec being undertaken, though the one must very materially affect the interests of the other. At the meeting it was resolved that subscription books for stock should be forthwith opened at Quebec, and other places.

Some such arrangement with the United States government, as is referred to in the annexed Resolution, would be of incalculable advantage to the Province.—[Montreal Morning Courier.]

4. *Resolved*, That an application be made to his Excellency, the Governor-in-Chief, requesting that he may be pleased to bring under the consideration of the King's Government, the great and lasting advantages which would result to the commerce of the Canadas, if an arrangement of a permanent character were entered into with the Government of the United States, so that goods, wares and merchandize might be transported by the subjects of each government through the territory of the other, under such convenient restrictions as may afford mutual security, and at the same time not materially embarrass the operations and business of the Railroad;

and praying his Excellency to recommend to his Majesty's Ministers the expediency of entering into such an arrangement.

We adverted three or four days ago to the importance of the Susquehanna Canal to the interests of Baltimore, and we hinted at the obligation which consequently rested upon our citizens of making extraordinary efforts to complete the work at the earliest possible period. Besides placing Baltimore in a most commanding position for the enjoyment of the immense trade which seeks a market through the Ohio and Pennsylvania State Canals, and enabling her to enter into advantageous competition for supplying the West with merchandize, the Canal to tide will throw open the vast Coal regions of the Susquehanna, and thus create a new trade of incalculable value to the commerce of the Chesapeake Bay, and of this its principal city. The importance of this single item is thus earnestly dwelt upon in the following editorial article, published in the Harrisburg Intelligencer of the 5th instant:—[American.]

COAL—SUSQUEHANNA CANAL.

A writer in the United States Gazette, says, that when the Canal, that is now making, from Columbia to tide, is finished, which will be in two years, the Anthracite Coal of the Wyoming valley will be carried in immense quantities to market. He states that "COMPANIES HAVE ALREADY BEEN FORMED, *composed principally of citizens of New-York, to carry coal down the canal to Port Deposit, and from thence by sloops to the Eastern cities.*" We have no doubt of this. The completion of the canal to tide, will be a new era in the coal trade. It is now confined to the Lehigh and Schuylkill, whose coal fields, great and important as they are, are small in comparison to those on the Susquehanna, stretching from Lykens valley on the South, more than one hundred miles, to the head of Wyoming valley on the North. *We predict that in less than ten years, that such an amount of coal will pass down the Susquehanna, that more sloops will be loaded at its mouth, than are now employed in the coasting trade of the whole Union.*

Fortunes will be made by the owners of coal hills. At this time coal lands can be purchased reasonably. In Lykens valley, only eighty miles from tide, and one hundred nearer market than the Wyoming, are fortunes to be made. Here is an immense coal mountain, and a railroad connecting it with the river. The coal is superior to any other, for its easy ignition and purity. The owners, especially those on the North side of the mountain, have not yet found out their great value; and yet only on a few acres in the twenty thousand, are there any mines opened. We understand that a Boston company have purchased a portion of the valuable mines of Messrs. Elder & Haldeman. There are still other chances here which we presume will not be long neglected.

BUSINESS OF THE PORT OF BUFFALO.—By the courtesy of Capt. CARYL, Collector of Canal Customs, at this port, we have been favored with the following—Account of property passing at Buffalo, on the Erie Canal, to other States, in the year 1836:—

	Merchandize.	Furniture.
Pennsylvania,	1,909,260 lbs.	165,956 lbs.
Ohio,	27,621,432 "	3,310,936 "
Michigan,	21,814,542 "	4,819,554 "
Indiana,	4,323,070 "	144,808 "
Illinois,	5,570,904 "	1,257,548 "
Kentucky,	827,780 "	20,655 "
Tennessee,	477,608 "	
Alabama,	40,987 "	
Missouri,	145,539 "	18,324 "
Upper Canada,	80,213 "	123,996 "
Total,	63,011,335	9,871,777

This shows an increase of merchandize, over last year, of 26,090,275 lbs., or about 70 per cent., also an increase of furniture over the same year, of 523,388 lbs.

The amount of merchandize left at Buffalo, coming from the east, is 23,425,762 lbs., being about 1,100,000 lbs., more than last year; the amount of furniture left at Buffalo, coming from the east, 1,596,321 lbs., being about 76,000 lbs., more than last year.

Amount of property left at Buffalo, during the year 1836, coming from the east.

Sundries,	lbs.	84,180
Domestic Spirits,	galls.	29,309
Boards and Scantling,	feet.	194,154
Timber,	do.	12,876
Staves,	lbs.	550,000
Flour,	bbls.	1,640
Wheat,	bush.	37,645
Corn,	do.	11,097
Barley,	do.	1,827
Other Grains,	do.	4,859
Peas and Beans,	do.	310
Potatoes,	do.	640
Pork,	bbls.	803
Beef,	do.	101
Salt,	do.	53,169
Cider,	do.	437
Oil,	do.	747
Dried Fruit,	lbs.	126,134
Wood,	cords.	14,027
Clover & Grass Seed,	lbs.	564
Flax Seed,	do.	174,720
Wool,	do.	17,160
Cheese,	do.	55,653
Butter and Lard,	do.	4,494
Hops,	do.	9,103
Hemp,	do.	81,812
Apples,	bbls.	5,557
Mahogany,	lbs.	9,621
Fur,	do.	3,572
Peltry,	do.	295
Gypsum,	do.	265,810
Stone,	do.	16,637,455
Brick,	do.	1,065,760
Bacon,	do.	1,316
Merchandize,	do.	23,425,762
Furniture,	do.	1,596,321
Clay,	do.	2,347,076
Mineral Coal,	do.	435,700
Tallow,	do.	10,567
Pig Iron,	do.	1,120
Iron Ware	do.	919,357

Amount of property shipped, or first cleared at Buffalo, during the year 1836, going to the east.

Sundries,	lbs.	321,524
Domestic Spirits,	galls.	35,300
Boards & Scantling,	feet.	3,443,875
Shingles,	M.	620
Timber,	feet.	510,348
Staves,	lbs.	10,345,012
Flour,	do.	139,178
Wheat,	bush.	304,090
Rye,	do.	1,500
Corn,	do.	204,355
Barley,	do.	4,876
Other Grain,	do.	28,641
Blocks,	lbs.	52,580
Beer and Cider,	bbls.	39
Bricks,		783,930
Pork,	bbls.	7,383
Beef,	do.	805
Salt,	do.	1,549
Ashes,	do.	7,789
Oil,	do.	36
Dried Fruit,	lbs.	27,380
Wood,	cords.	14,027
Clover & Grass seed,	lbs.	104,303
Flax seed,	do.	220,842
Wool,	do.	252,367
Hides and Skins,	do.	86,076
Cheese,	do.	110,347
Butter and Lard,	do.	1,272,624
Hops,	do.	19,386
Bees wax,	do.	27,037
Tobacco,	do.	3,794,905
Leather,	do.	8,201
Fur,	do.	206,604
Peltry,	do.	68,190
Deer Skins,	do.	394,937
Stone,	do.	5,114,699
Feathers,	do.	29,386
Bacon,	do.	1,010,866
Merchandize,	do.	495,082
Furniture,	do.	851,816
Clay,	do.	3,844,000
Mineral Coal,	do.	67,582
Lead,	do.	21,489
Pig Iron,	do.	769,135
Iron Ware,	do.	661,749

The amount of tolls in 1835, $106,213 58
" " 1836, $158,074 99

Being an increase over last year equal to } $51,861 41

—a trifle less than fifty per cent.

It will be perceived that the greatest increase in the business of the canal, is in merchandize forwarded to other States.—This increase is greater in proportion to the capital than that of last year, and in all probability will continue to increase in geometrical instead of arithmetical progression.—Hence we perceive the great necessity of a speedy enlargement of the whole canal, to keep pace with this immense increase of business.—[Daily Star.]

REPORT OF THE SURVEY OF THE ROANOKE DANVILLE AND JUNCTION RAILROAD.—BY WALTER GWYNN, ENGINEER.

To the Subscribers of the Roanoke, Danville and Junction Railroad.

(Concluded.)

EASTERN DIVISION.

This embraces a distance of 67 miles, 1,515 feet, and extends from Danville to the mouth of Daniel's Run.

From the crossing of the Dan river, at the Falls of Dan, an ascent, at the rate of 39 feet per mile, is effected at but little expense, through the valley of Bear Creek, to the ridge near Mr. Dix's, dividing the waters of Sandy from those of Banister river—thence the route pursues this ridge along, and close to the Franklin Court House road, to Mr. Smith's store. Soon after leaving Mr. Smith's store, we pass imperceptibly on to the ridge common to the sources of tributaries to the Pig, Sandy, and Banister rivers, and commerce descending to Pig river, which is crossed just below the junction of Snow Creek, and the route then immediately ascends to the Louisland road, and continues in the direction of the road, on the ridge between Pig and Blackwater rivers, until it reaches Grassy Hill; thence winding around the southern slope of the hill, it ascends to attain the desired point on the Carolina road, about five miles from Rocky Mount.

From the Carolina road, the route continues on the crest of the ridge, about two miles; when it descends at the rate of 58 and 80 feet per mile, passing near the Double Spring, to the valley of Blackwater river, and thence through Mr. Callaway's meadows to the mouth of Daniel's Run. It will be perceived from the foregoing, that with the exception of the grade at the crossing of Pig river, the ascent to Grassy Hill and the descent to the Blackwater, this portion of the route presents a profile within the range of locomotive power.

MOUNTAIN DIVISION.

This comprises the mountain pass and includes a distance of 8 miles—206 feet. Here as well as at the other Gaps in the mountain, which I have named, stationary power cannot be avoided.

It is not considered necessary, to distribute the ascent among the planes, suffice to say, that the summit will be attained by three inclined planes, with a total ascent of 1,313 feet. When it is considered that these planes descend in the direction of the heaviest traffic, the objections to them are in a great measure removed;—for by timing the arrival at the foot and at the head of the planes, it will rarely occur that any power in addition to the gravity of the descending train, will be required to raise the ascending train. With the proper *guards* and precautions, the transportation on inclined planes can be as uninterruptedly and very nearly as safely conducted as on a level road.

Having attained the summit of the mountain, the road continues level for about one mile and 223 rods and then descends along McDaniel's and Pipe-Stem Runs, 166 feet in a distance of 1,197 feet, to the valley of Little River, the termination of this Division.

The expense of the graduation and superstructure of this division will only be enhanced by the necessity of grading for a double track on the summit, for a portion of the way on the descent, and on the line between the planes. The excavations consist principally of earth, the rock which it will be necessary to blast, will be required in the construction of the road.

WESTERN DIVISION.

This includes the remaining distance of 62 miles 1,144 feet, to the assumed termination of the road at Evansham. The location of this division will be laborious and difficult. Little river is very circuitous, and the question constantly recurs what undulations in the plane of the railroad, and what amount of excavation and embankment is admissible and equivalent to the lengthened road, and the curvatures around the bends of the river. Except in extreme and very palpable cases, calculations founded on data derived from actual surveys, will be necessary, to enable the Engineer to decide these questions. The route under consideration has been traced with the view to test the practicability of shortening the line, by cutting off the abrupt bends of the water courses, which, on reference to the map, seem to mark out the course of the railroad.

Therefore, immediately after crossing Little River, at the termination of the Mountain Division, the route ascends, and by a deep cut passes through the high ground between the River and Booth's Branch, just above their confluence—thence up Booth's Branch nearly to its source—thence across to Beaver Dam Creek, and ascending along its valley to a favorable place, it crosses the ridge between Beaver Dam and Cole's Creek—and thence up Cole's Creek to its source in Laurel Ridge—and crossing through this ridge the bottoms of Brush Creek are entered, along which the route descends to the Walnut meadows. Thence winding around several steep and abrupt hills which bound the right bank of the Creek, the route ascends to a favorable depression in the Pilot Mountain. After crossing the Pilot Mountain, it descends along its face to a favorable point of departure—whence it stretches across a succession of hills and hollows requiring much cutting and filling. At Hall's mill, Little River is crossed a second time—thence winding around the hill on which the mill houses are situated, the route falls into a valley, which it pursues to its source, and by a single cut it enters the valley of Cecil's Creek, along which it descends to New River. Here our attention was directed to the country between.—New River and Reed Creek, and the result of our inquiries led to the continuation of the route up New River to a favorable site for a bridge, of which we availed ourselves to cross to the right bank of the River, and thence along it to Honacre's Mill.

At this point, the road leaves the River and ascends a valley which crosses the main stage road near Mr. Galbreath's, and leads to a favorable pass into Draper's valley.—Thence along this valley and through ravines draining into Reed Creek, which intersects the route twice, it reaches Evansham. This portion of the route, although rough, admits of a much more favorable location than a casual view of the country would indicate.

I have been thus particular in describing the ground in order that those interested may be able to judge of the correctness of my estimate, by comparing it with the difficulties to be overcome.

The cost of the work is based upon the amount of excavation and embankment, cut off by the grades as I have modified and adapted them to the ground.

In estimating the cost of a work, our ground, so diversified, and presenting so many intervening obstacles, an actual location, only, would furnish data for a detailed estimate. The facts elicited by the reconnoisance and survey enable me to arrive at the *maximum* cost of the work, which will be found in the following estimate:

Excavation, Embankment, Drains and Bridges,	$1,778,145
Superstructure, 137 miles, 2,865 ft., at $5000 per mile,	687,711
Total,	$2,465,856

SUMMARY

Of the Cost of the Roanoke, Danville, and Junction Railroad.

From the Petersburg and Roanoke, the Portsmouth and Roanoke, and the Greensville and Roanoke Railroads to Danville, 172 miles, 2,025 feet,	$2,213,671
From Danville to Evansham, 137 miles, 2,865 feet,	$2,465,856
Total cost of excavation, embankment, bridging, and superstructure,	$4,679,527
Cost of Inclined Planes, Superintendence, Locomotive Engines, Cars and Coaches, Shops, Ware-houses, land, water stations, and contingencies,	$575,000
Total cost of Railroad,	$5,254,527

I have estimated for a double track to alternate with the single track on some portions of the road, which, with telegraphs properly distributed, will afford all the accommodation of a continuous double railway-track, and admit of the extension of the business of the road with as little inconvenience and delay. By a line of telegraphs, the expenses of which will be much less than the interest on the first cost of a double track on the portion of the road where a single one is contemplated, the position of the train may be ascertained, its departure from any of the Depots may be readily communicated, and with almost the quickness of thought, news may be conveyed from one end of the line to the other.

Indeed, I am inclined to believe, that by means of the Telegraph, the double track may be dispensed with entirely, except at the watering stations.

The prevalent custom of making the transportation of produce subordinate to the conveyance of passengers has given rise to the fallacious opinion that produce cannot be transported so profitably as passengers, and that therefore, railroads must be confined to populous districts. To remedy this I would have two classes of engines, one for speed, at the rate of thirty or forty miles per hour,—for the conveyance of passengers, the other of greater weight and power for the transportation of produce, under low velocities from four to six miles per hour. These may travel at night with safety, and thus render a double track less necessary, and greatly reduce the cost of transportation.

The only desideratum involved is the construction of an Engine with a capacity for generating steam, travelling under the low velocities before mentioned and to admit of an increase of the load in proportion to the reduction of speed.

It is believed that by a very simple modification of the locomotives in common use the object would be attained, and that the great diminution in the wear and tear of engines and cars moving at the rate of four or five miles per hour, would at the ordinary rate charged on the Portsmouth and Roanoke Railroad, yield as much profit on the transportation of produce, as would be derived from carrying passengers at the rate of twenty or thirty miles per hour. And upon this plan, grades of 40, 50, and 60 feet are less objectionable. A load due to such grades may be attached to the heavy engines: and they will be easily overcome by the passenger engines with any train they would be likely to have.

OF THE POLICY AND PROFITS OF THE IMPROVEMENT.

Under this head I can add but little to the able and comprehensive report of the committee of the Danville Convention, to which I beg leave to refer, and will here take the liberty of transcribing an extract:

"An inspection of the map of Virginia as connected with her Southern, and South-Western boundary, offers at a glance to the eye of the examiner, an immediate and direct communication by the channel of the Roanoke, between the great South-Western valley, and our Atlantic border.

A rich and expanded area of the surface of Virginia, embracing not less than ten thousand square miles, with a population of one hundred and eighty thousand souls, a wide extent of the territories of Tennessee and Kentucky, and the richest portions of our sister State of North Carolina, embracing of her population one hundred and sixty thousand souls, seems at once connected by the ties of a common interest in this common channel of commerce, which want of energy, or want of resources in our people has hitherto left unimproved.

Is the contemplated work practicable?—We assure our fellow-citizens that it is not only practicable, but in our opinion presenting fewer obstacles to its accomplishment than any known work of the same extent, on the continent of America.

Whichever route may be ultimately selected between the Eastern and Western limits of the contemplated improvement, the distance cannot far exceed a line of 300 miles.

Allowing for every contingency, it may be safely asserted, that the round sum of 5,000,000 dollars would cover the whole expenditure on the contemplated work.

Is that a sum within our resources? Is its magnitude such as to deter us from the prosecution of an enterprise, pregnant as we believe it is with blessings inestimable to so large a portion of our people? Upon this part of the subject, no observation of ours can be necessary.

In times like these, of unexampled prosperity, when so large a portion of capital in every part of our wide-spread confederacy, is courting a profitable investment, it can only be necessary to show that ample returns must reward the investment to ensure the application of the estimated sum to any contemplated work.

By a reference to "the synopsis of the James River and Kanawha Improvements, &c.," we find the amount of tonnage on the South-Western route, embracing part only of that region which must inevitably seek our improvement as the cheapest and most expeditious, estimated at 100,000 tons. Of this by far the largest portion is now carried to Baltimore, at an enormous expenditure of time and money. The time ordinarily occupied by a wagon, in travelling from Wythe Court House to Baltimore, may be estimated at fifty days, while on the contemplated railroad, the rich productions of the valley may reach Norfolk, Petersburg or Richmond, in two days, or the Baltimore market in three. Taking then, as the basis of our calculation, the Report of the State Engineer, confirmed by the Report of the Abingdon Convention, as set forth in the synopsis above referred to, we may estimate the immediate trade meeting this improvement at Evansham, as yielding a tonnage of 100,000 tons.

To this, add the trade of the counties east of Wythe in Virginia and North Carolina, bordering on the proposed road, which on the fairest principles of calculation known to the Committee, may be estimated at	50,000 tons.
The aggregate amount of tonnage now annually seeking its destination by wagons, and other means of transportation, is	150,000 tons.

From this calculation are excluded the vast mineral resources on the intermediate line of the road. The salt, lime, gypsum, iron and lead; the three last sufficient to supply every possible demand, in fact, inexhaustible; yet according to the report of the Abingdon Convention, which valuable document we beg leave to recommend to the attention of the public, "the transmission of mineral productions of South-Western Virginia and East Tennessee, would form the largest source of profit to the stockholders of the railroad company." Add to all these the continued stream of travel which now runs through the South-Western valley, and which, as certain as cheapness, comfort and expedition invite the steps of the traveller, would mainly be diverted to the projected route, and the revenue of the road would swell to an amount which this Committee would feel reluctant to indicate. Here we reach the great thoroughfare to the South and South-West. Since January last, not less than thirteen thousand slaves alone, have passed the Western *terminus* of this improvement. But excluding from our estimate of profits all these sources of revenue,—excluding also, every prospective addition to these resources which may be derived from the awakened energies of a people now slumbering over their invaluable interests: and confining our calculations to the tonnage known to exist, and now inviting this improvement, we shall see that on a capital of $5,000,000, the return would almost exceed credibility. Suppose the 150,000 tons actually seeking its destination, to travel on an average only through half the extent of our contemplated road, and suppose the average freights on exports and imports to be reduced to six cents per ton per mile, the aggregate amount of tonnage on the road, would yield a revenue of one million three hundred add fifty thousand dolla.s annually.

Without pretending to accuracy in all our estimates and calculations, although they seem to us, based on undeniable facts; and on the public reports of accredited public agents, we may safely assume that no error can place the revenue on this investment below twenty-five per cent. It may be objected that we have not taken into consideration the cost of superintendance and repairs.—To meet this objection, we suggest, that the conveyance of passengers and the transportation of the mails must amply cover, if not largely exceed all such incidental expenses. But should our expectations from these sources prove fallacious, can a doubt be entertained that the transportation of the minerals above referred to, which as certainly as the work shall have been constructed, must in large quantities be transported on this route, will more than compensate for any deficiency in the other resources of the improvement.

To the Capitalist it holds out the strongest inducement to investments, the certainty of large dividends. To the Farmer it will be a clear saving of $20 on every hogshead of tobacco carried to market; it will afford him the means of enriching his lands, and, in many instances, will enhance their value ten fold. The great activity and impulse which it will impart to trade will enable the merchant to extend and enlarge his business, and the State will share the benefits of the general prosperity in the increased contributions to her Treasury—and in the wealth and social happiness of her citizens. And she will not fail to lend a helping hand to break down the barriers which seperated this fair portion of her territory from the benefits derived by every other portion of the State from the canals and roads which she has profusely spread.

So far our observations have been confined to the country east of Evansham, where the products of the soil, the mineral resources, the import trade and the travel fully justify the improvement and strongly recommend it to the patronage of the State of Virginia, as well as to the people and State of North Carolina. But the extension of the road to the Tennessee line forms a component part of the scheme; and if we are permitted to look to the West, to a connexion with the Charleston and Cincinnati railroad, and with the New-Orleans and Nashville railroad, we do not think we can be charged with extravagance when we say that this road must be among the most successful railroads in the country. It has been happily styled the ***Junction*** railroad. Its union with the two last named roads affords a participation in the benefit of the reciprocity of trade with the whole West and South-west portions of the country. At its Eastern *terminus* it unites with the Petersburg railroads through which the markets of Petersburg, Richmond, Fredericksburg, Alexandria, Washington, and Baltimore may be reached—with the Portsmouth railroad which leads to the oceau and the Port of Norfolk and Portsmouth one of the best seaports in the union, which by a little enterprise would command the commerce of the world; or whence, if it must be so—transportation can be readily and cheaply effected to the Northern markets.

And your railroad forms a junction with the Raleigh and Gaston railroad, and with the railroad now in progress of construction to Wilmington, N. C., thus giving the planter a choice of markets in this State also, which at no distant day when the railways which she has projected from her seaports to the interior shall be in operation, will hold out inducements for an interchange of many of the commodities of the West. Another and very far from being an unimportant consideration just at this time, when the public mind is distracted with rival schemes, is the fact of your railroad harmonising with all the existing and chartered improvements in the State. I have shown that it communicates with every market place in the State, and thus adds greatly to the profits of the railroads from the Roanoke to Fredericksburg, and from the Roanoke to Norfolk and Portsmouth. It is an auxiliary to the James and Kenawha River improvement. To prove this it is only necessary to advert to the reciprocity of your charter and that of the railroad from Lynchburg. The two companies by mutual compact have agreed to accept the hand of fellowship in the valley and go on to the Tennessee line together.

It will be conceded that it does not conflict with the Appomattox Improvemonts; and from the refusal of the Legislature to grant a charter for a railroad from Farmville to Cartersville in the grounds of the adequacy of that improvement to the wants of that portion of the State, we must infer that for the same reasons it will not sustain the scheme for a railway running parallel to it and intersecting the Roanoke at Danville and the James River at Lynchburg. There is then no improvement or any likely to be made between the James and Roanoke Rivers which would come in conflict with your railroad.—North of the James River the Louisa railroad accommodates the counties South of the valley district—through which the State in imitation of the example of Pennsylvania in stepping the Baltimore and York railroad at her boundary line, until she had completed the Susquehannah canal. the Columbia railroad, and established her line of railways and canals to Pittsburg, will certainly not permit the Baltimore railroad to extend farther than Staunton—at least until she has made further progress in her own improvements.

We will now return to the immediate line of your contemplated railway. Here, we find a conflict with the Roanoke Navigation Company.

Their improvements are totally inadequate to the present trade of the Roanoke country. It would be but just however to remunerate them for any depreciation in the value of their work by the proximity of your railroad Thus compensating this Company, I maintain that your railroad will not conflict with any existing or chartered improvement in either of the States of Virginia or North Carolina.

All of which is respectfully submitted, by Gentlemen,

Your most ob't, servant,

WALTRR GWYNN, Civil Engineer.

Wilmington, N. C., Dec. 1st. 1836.

From the Troy Budget.

DREADFUL CALAMITY—SEVERAL LIVES LOST.

Early last summer, many of our readers are aware, a large mass of clay burst from the hill on the east section of the first ward in this city, followed by a gushing stream of water, and doing no other injury than covering a large portion of ground, at the base, with the bowels of the hill. Last evening, about soven o'clock. a similar occurrence took place on the same spot, but, we regret to say, greater in extent, and exceedingly fatal in its consequences. An avalanche of clay came tumbling from an eminence of nearly 500 feet, moving down the base of the hill to level land, and thence continued, from the impulse it received, to the distance of about 800 feet, covering up acres of ground, accompanied with a cataract of water and sand which kept up a terrible roar.—The mass moved along with great rapidity, carrying with it two stables and three dwelling houses, and crushing them and their contents in thousands of pieces. The stables, and horses were moved to a distance of over 200 feet, into a hollow on the corner of Washington and Fourth-streets.

In its way, the avalanche also encountered a brick kiln, burying it partially over and crumbling it together, from which a few minutes after, the flames rushed forth and lit up the city as with a great conflagration.—This signal was the first intimation that was had of the catastrophe, to those not in the immediate vicinity.

The three dwelling houses destroyed were of light structure, and one occupied by Mr. John Grace, another by Mrs. Leavensworth, and the third by Mrs. Warner, the last of which was fortunately vacant at the time of the calamity. In Grace's house were himself and wife and little boy. *The two former were extricated from the ruins dead*, and the boy was taken, out alive, very little hurt, bare footed and bare headed, the buildings having been shattered in a thousand pieces which is one of the most singular escapes that ever came to our knowledge. There were four of Mrs. Leavenworth's family in her house, herself and three children.

Two of the children were in bed at the time and probably asleep, and were afterwards taken from the midst of the wreck dead; crushed almost to a jelly, and were undoubtedly thrown instantly from a natural sleep into a sleep of death. Mrs. Leavensworth was taken out shockingly bruised, and was barely alive when we last heard from her. Fortunately three of the family were at church at the time and escaped awful deaths.

The stables were owned by Mr. Bingham, in which were 22 horses, and all carried along with the mass together, with nine or ten dirt carts. Six horses were taken from the ruins alive—the other sixteen were killed. The dead bodies of the horses can this morning be seen mingled among the ruins. Mr. Bingham's loss must be considerable.

We learn that the body of a person was found, name unknown, who was probably employed in the brick kiln or stables—which makes in all FIVE DEAD BODIES taken from the ruins last night. There are probably others buried in the ruins, and it is likely some persons at the time were in the stables or brick kiln.

GREAT CURIOSITY, AND WONDREFUL EFFECTS OF THE EXPANSION OF WATER BY FREEZING.

The attention of many of our curious and scientific citizens was yesterday very pleasingly arrested, by an occurrence at the iron foundry of Messrs. Harkness, Voorhees & Co., in this city, exhibiting a specimen of the extraordinary power of the expansion of water by freezing.

An immensely large iron anvl, weighing between three and four tons, and measuring nearly three feet in diameter, had been left lying by the door of the furnace, exposed to the atmosphere. The anvil was perfectly solid, with the exception of a very small crack or crevice in the centre of one of the sides, about five inches long, and about four inches in depth, which from the rain had become filled with water. The quantity of water which the crevice contained could not have exceeded half a gill. In the course of the night of the 20th December, this water became frozen, and, extraordinary as it may appear, its expansion completely severed in two parts the immense mass of solid iron, and so great was its expansive power, that when the separation took place, a large log of wood which lay on the top of the anvil, was thrown to a distance of several feet.

Had the crevice been filled with powder, and the powder ignited, the effect would not have been a thousandth part as great.

We doubt not this interesting fact will be noticed with interest by the scientific curious throughout the United States.—[Cincinti Whig.]

The tremendous expansive power of freezing water has been proved, by a number of experiments, no less remarkable than the incident above described. We remember reading an account of one made at Woolwich, in England, several years ago, which gave an amazing proof of the power in question. An iron thirty-two pounder was prepared with an iron plug or tompion, twelve inches long, made to screw into the mouth of the piece with a very close and deep-cut worm, (or spiual groove); the cannon was filled with water, the plug scrwed in, and moreover fastened with strong chains and ropes to the axles; and thus charged, it was exposed to the cold of a severe winter night. In the morning the chains and ropes were found broken, the worm destroyed, and the plug driven bodily out, while a cylinder of ice occupied half the space it had previously filled.

In Norway it is a constant practice with the mill-stone quarries to avail themselves of this irresistible expansive force. They quarry out large cylinders of stone, long enough to make six or eight mill-stones of the usual thickness; then drill a number of holes, about six inches deep, in the circumference of the cylinder, so as to girdle it by rings of holes, at the proper distances. Into these holes are driven wooden plugs, perfectly saturated with water, and the frost soon splits the cylinder into as many blocks as there are circles.—[N. Y. Com.]

LARGE CORN. Mr. John Way, Sen., of Londongrove, informs us that he raised during the last season, an ear of corn, which produced 1684 grains—and four other ears each of which NEASURED $14\frac{1}{2}$ inches.

REPORT OF JOSEPH D. ALLEN,

TO THE

COMMISSIONERS OF THE NEW-YORK AND ALBANY

RAILROAD COMPANY.

GENTLEMEN.—The result of the survey and examination which at your request I have thus far made relating to a route for the proposed New-York and Albany Railroad. I respectfully submit in the following report.

A topographical map of the country explored together with a profile of the route described and taken as the basis upon which I have made an estimate of the probable cost, are also herewith presented.

That portion of the route over which I have extended my surveys, is embraced between Harlem River and a point 1¼ miles above the village of Milltown, situated on the Croton River in the county of Putnam, a distance from Harlem of 52.6 miles on the line traversed via. White Plains and New-Castle.

The topographical features of the county of Westchester and Putnam also, not only upon the region embraced in the surveys but in their general character, are quite undulating and irregular. The soil is generally good, and easy to be excavated, consisting chiefly of a sandy loam united with a gravel formation, and as an agricultural district, it presents a highly interesting appearance. The principal streams intersecting its central portion, are the Croton, the Bronx and Saw-Mill Rivers which have their course in a southerly direction. The valleys are therefore favorably ordered for the location of such means of communication with the city of New-York as the public necessities of the country may require.

The route which so far as the surveys now enable me to judge to be the most feasible for the purposes of the road, commences at the point of the ridge on the north bank of Harlem River, opposite the termination (on the Island of New-York) of the fourth Avenue; and pursuing a northerly direction soon crosses the Westchester Turnpike, and enters the valley of Mill-Creek about ¾ths of a mile north of Harlem Bridge.

The valley of Mill-Creek which is highly eligible for the object, is pursued to its source, from which at a few rods distance the line enters the valley of the Bronx. After crossing to the east bank of the latter stream its valley is pursued for 15 miles, which extends the route to the mouth of Davis Brook, a small tributary of the Bronx, joining it 2¾ miles north of the village of White Plains.

From this point several routes present themselves by which to pass on to the Croton valley, and their relative bearings will be more clearly indicated, by the features shown upon the accompanying map. The waters of the Bronx are discharged into the Sound at Westchester, while those of the Croton, originating much further north, find their way into the Hudson, near the village of Sing-Sing.

The surface of that region ranging between the head waters of the Bronx and the Croton at Milltown over which several of the eastern tributaries of the latter stream have their course, and convey the drainage of the adjacent country towards it, assumes an irregular character. Many of the dividing ridges with their intermediate valleys into which the surface is broken, here lie in a direction more opposite to our course.

Levels have been extended over the country bearing eastwardly from Robbins' Mills, situated on the outlet of the Rye Ponds, in the valley of the Bronx, passing through Bedford village, thence northward to the Croton, and upon this route several of those transverse ridges were encountered.

The chief of these and the most elevated are the Comung, the Long Pond and the Peach Pond ridges. The first is the most formidable, and to pass it would require the route to be extended nearly around its southern extremity, which lies a short distance beyond the east line of this State.

From the examinations which I have been able to make I am induced to believe that in passing from the valley of the Bronx to that of the Croton, the elevations or changes of level will be greater upon any route bearing eastwardly of the head-waters of the Bronx after leaving White Plains, than upon a course passing around westerly, with the view of sooner entering the Corton valley.

On entering the valley of the Bronx from the head of Mill-Creek the line crosses to the east side of the stream, a short distance below Williams' Bridge, upon an embankment averaging 7 feet in height for a distance of about 1300 feet, and pursues a fair course along the foot of the upland which is somewhat undulating, though upon a grade of easy ascent in general, until it reaches Tuckaho Factory where it re-crosses to the west side of the river.

From thence the line has a favorable location near the foot of the ridge which forms the western bound of the valley as far as Popham's Mill. Upon the next succeeding mile the bounding ridges upon either side lie very near the river.

The western bank is pursued as the most feasible, and will allow of a sufficient width by excavating the principal part in the slope of the hill, the remainder being obtained from the channel of the stream, by raising a protection wall upon the exterior of the road bed to guard it from the abrasions of the current. Though the ridges have here left a narrow pass, the requisite width can be obtained, and the work made safe from the floods of the River, at a moderate expense. The route from thence is continued over ground generally feasible, along the margin of the stream, passing Horton's and Purdy's Mills, and again crossing the Bronx to the east side at George Bogerts, opposite to about ¾ths of a mile west of the village of White Plains.

Some slight changes in the channel of the stream at a few points on this last portion, will be required upon the east side in order to preserve a fair direction in the line, and also sometimes avoid projecting points of upland which occasionally contract the valley.

The River at Bogerts is crossed upon a viaduct of 25 feet span, and the valley upon an embankment 13½ feet high for a distance of 1000 feet. From thence the line runs chiefly upon the table land moderately elevated to the mouth of Davis' Brook which comes to unite with the Bronx through a feasible pass-way in the western boundary of its valley from a north-western direction.

After having first pursued a line from this point along the Bronx to Robbins' Mills and thence more easterly through Bedford and North Salem villages, and on to the Croton valley, near Soddom Corners, I returned and continued the route up Davis' Brook to its source, where we met a small river called Fly Brook, which flows into Saw-Mill River, uniting therewith on our course near Unionville Church.

The summit grade between the Bronx and Saw-Mill River is 39 feet above the former, and is 250 feet above the tide.

From Unionville, (in Mount Pleasant) the line passes up Saw-Mill River to the summit ground which separate its waters from those flowing into the Kisko in an opposite direction.

The grade line upon this summit is 305 feet above the tide. In descending from thence to the Kisko it follows the border of the valley of the dead Swamp in which originates a small stream called Chopequa Brook. Crossing Kisko river about ¾ths of a mile below Kirby's Mills in the town of New-Castle, the line continues in a favorable direction up the valley of Branch Brook, another small stream which unites with the Kisko opposite the mouth of the Chopequa. The features from the Bronx to this point are quite regular though the ground along both of the Brooks last mentioned is in part of a marshy character, yet will allow of a very direct line and of a grade which will depart but slightly from a level.

At the head of Branch Brook, we reach the summit from whence the drainage of the adjacent country passes northward and falls into Cross River, a considerable Mill stream which originates in the vicinity of the village of Bedford and North Salem about 4 miles east of our course and unites with the Croton at Whitlockville.

From that summit where the grade line is 278 feet above the tide we descend by the valley of Muddy Brook to Cross River, and pass the stream upon a viaduct of 40 feet span, with the grade elevated 30 feet above the river.

The ground for two miles from the head of Muddy Brook presents a tolerably even surface, but has an inclination of 31½ feet per mile. The surface from thence onward past Cross River, to the farm of John Wilson, embracing a distance of 3 miles, is quite undulating, and as will be apparent by a refference to the accompanying profile, portions of the embankment and excavations will be more heavy than will ordinarily occur on the line.

Leaving this vicinity, the route passes over the table lands near the foot of the elevated ridge, which here becomes the main eastern boundary of the Croton valley, and enter upon its bottom grounds near the Post Office and residence of Stephen Frost, about half a mile above Golden's Bridge, in the town of Salem. The elevation of our grade here is 207 feet above tide.

The route from thence pursues the valley of the Croton River, the remainder of the distance traversed, passing Owensville, Doansville, Soddom Corners, and thence up to the point before mentioned, 1¾ miles above Crawford's Mills at the village of Milltown.

The dam at Crawford's mills is 405 feet above the tide; the grade line 4 feet above it, making the total elevation at that place 409 feet above the tide.

The Valley of the Croton between Golden's Bridge and Milltown, in general, has a width which is ample for the object, and will admit of an eligible location upon grades moderately inclined, for most of the distance. Those points at which the greatest irregularity of features occur are at Owensville, Doansville, Soddom Corners, and a portion of the distance from thence to Crawford's mills. At Owensville the upland banks approach near the Stream, and its ascent in the space of one mile, will raise the grade to 35 feet per mile, at Doansville, the valley upon a short distance is irregular in its course, and has an ascent above its average rate, at Soddam its winding direction, together with the boldness of its northern bank, renders it difficult to avoid some irregularity in the course of the line. It will doubtless be most judicious to pursue the valley, as the line is shown on the map, rather than cross the river near the village, and encounter the expense of cutting down the rocky ridge on the one side, and raising a heavy bank on the other, to obtain a more direct location. Though the course of the line is here more irregular than at any other point on the route, a radius of 1000 feet will be the shortest required, and occur at only two points, while the grade will have an easy inclination. Passing onward up the valley, its features are considerably undulating as far as Milltown, and the ascent upon a short distance rises to 35 feet per mile. On reaching that place, however, the route enters upon an extensive district, which is far more regular in its topographical features and from the personal examination which I have made, and from facts derived from former surveys, the route from thence northward for thirty miles continues to present a much more eligible character for the purpose, and it cannot be questioned that the work may be executed at a cost comparatively much below that upon the portion embraced in the present survey.

The line crosses the Croton at several of its most abrupt curvings below Milltown, and at other places a change of the channel is contemplated. The river upon this portion is not so large as to require Bridges of great expense, nor is its flow of water augmented during the flood season, to an extent demanding extra protection against injuries sometimes anticipated from causes of that nature.

It is proper to observe that the line as traversed and described, may, doubtless, be improved at various points, when upon a more full examination a definite location is made, and I trust the cost will, at several points, be thereby reduced below that now estimated. The curves are made very easy in general, upon a good length of radius, varying from 2000 to 12,000 feet. At two points only, are they necessarily reduced to a shorter length.

As before stated, I have extended lines of survey over a very considerable distance, (more than twice the length) beyond that of the line described, and presented as the basis upon which my estimate of cost is made. Branch or parallel lines, sometimes near, and again some miles distant, have been traced along the valley of the Bronx, on either side, and by a route departing therefrom, passing through Bedford Village, to the Croton Valley, near Soddom Corners, to which reference has also been made. I have not been able to find a route by the latter course so far feasible as to justify its adoption, without passing around the south end of the Comung Ridge, and thus far out of the limits of the State for a short distance, for which no chartered provision is now made.

In passing from the valley of the Bronx towards that point, before reaching Mile Square, the grade would rise at the rate of 40 feet upon a portion of the distance, and again, in passing the dividing ridge between Cross River and the Titicus, called the Long Pond Ridge, to near 50 feet per mile.

Between North Salem Village and the Croton Valley, in the direction desired towards Milltown, lies the wide and elevated Peach Pond Ridge, over which the line could not pass at a reasonable expense, bearing in the course of the latter from the former place without encountering grades, both in the ascent and descent, more than twice as highly elevated as are found at any point upon the route of the Bronx and Croton Valleys. If instead of passing thus directly over the ridge, a line is continued as was surveyed, more westerly and partially around it, to avoid a portion of the elevation, an ascent would still be encountered of nearly 60 feet per mile, and moreover, we should approach near to an intersection with the Croton line at Doansville, and thus add to its length by a more circuitous direction 3½ miles.

Many of the citizens of Bedford, North Salem and their vicinity, manifest much interest in the work, and propose an examination of other routes which they suppose may be feasible through that district. This should, no doubt, be done previous to determining upon a location.

It will be seen by an inspection of the topographical features of the country, between White Plains and Kisko River, in New-Castle, as indicated on the map, that a route continued quite up the valley of the Bronx to its source, passing through Dark Valley, so called, and down that branch of the Kisko which originates at that place, to an intersection with the present line, near its crossing on the Kisko, would be more direct than that traversed by way of Saw-Mill River.

My time has not been allowed me to extend a line of levels over this route to fully determine the question of its feasibility, but I have made a personal examination of it, and am induced to recommend its survey in the hope of favorable result.

By a reference to the accompanying profile of the line, it will be observed, that over the greatest portion of the distance, (or about 30 miles) the grade is either level or ranges below about 12 feet per mile, that it reaches in the maximum to 35 feet; and I trust this may be reduced, on revising the line. The inclination, it will be seen also, is chiefly towards the city of New-York, the direction of the greater trade.

The character of the line, in respect to its inclination, will be seen in the following tabular exhibit of the grades, as they occur in passing from Harlem River northward to Milltown.

Distance, in chains of 100 feet.	Rate per mile.		Distance, in chains of 100 feet.	Rate per mile.	
	feet ascent.	feet descent.		feet ascent.	feet descent.
18	Level.		63		31.68
105	7.04		57	Level.	
183	11.44		105		19.36
.84	19.36		54	Level.	
156	Level.		27	22.88	
78	5.28		36		26.40
105	12.32		33	2.64	
78	17.60		96		19.36
78	12.32		54	35.20	
117	14.08		48	Level.	
45	Level.		114		17.60
45	10.56		45	Level.	
93	22.00		75	31.68	
126	3.52		60	21.12	
99	19.36		42	12.32	
78	7.04		66	35.20	
51		13.20	75	3.52	
66		17.60	63		
60	Level.				

The 30 miles next succeeding, may, no doubt, be made to conform quite near to a level grade, and so regarded in such farther extension of the table.

I have based the estimate of the probable cost upon the plan of a *road-bed*, graded to a width of 24 feet, designed for a double track.

The mechanical structures, as Culverts, Bridges, &c., so far as consistent, to be given a permanent character.

For the *Superstructure* of the Road, I have contemplated the adoption of the ordinary wooden rail, most generally in use, surmounted with an iron plate or bar, and supported upon longitudinal sills and cross-ties substantially united.

In the estimate which follows, the line is presented in several separate sections, conforming to several natural divisions occurring in the route.

ESTIMATE OF PROBABLE COST.

SECTION No. 1,

Extends from Harlem River to the Valley of the Bronx, at the head of Mill Creek. The soil consists principally of a sandy loam united with gravel. Distance 5 Miles.

		Quantities.	Rate.	Amount.
Excavation of common earth,	Cub. Yds.	56,312	10c	$5,631
Rock Excavation,	"	1,900	75c	1,425
Embankment,	"	79,449	13c	10,328
Grubbing, low chopping and clearing,	"			180
7 Culverts and Drains, Masonry	"	162	$3	436
Foundations and Pits,	"			185
Road crossings,	"			90
Fencing,	Rods	2,987	$1,50	4,480
Land,	Acres	45	$1,00	4,500
			Total Amount,	$27,305

SECTION No. 2,

Continues up the valley of the Bronx River to the mouth of of Davis' Brook, in the town of White Plains—soil of the same general character. Distance 15½ miles.

		Quantities.	Rate.	Amount.
Excavation, common earth,	Cub. Yds.	258,040	11c	$28,384
Rock excavation,	"	41,208	75c	30,906
Embankment,	"	404,627	13c	52,601
Road crossings,	"			585
New road,	Rods	30	$2	60
37 Culverts & Drains, Masonry	Cub. Yds.	964	$3	2,892
Foundations and Pits,	"			1,110
2 Culverts over Bronx River, 25 ft. square	Cub. Yds.	568	$4	2,272
Foundations for same,	"			400
2 Bridges over Bronx River, Masonry	Cub. Yds.	437	$3	1,311
Foundations for the same,	"			400
Superstructures for same,	"			720
Protection Wall,	Cub. Yds.	2,542	$1,25	3,177
Grubbing, low chopping and clearing,	"			1,023
Removing Barns,	"			70
Fencing,	Rods	9,192	$1,37	12,639
Land,	Acres	139½	$75	10,462
			Total Amount,	$149,012

SECTION No. 3,

Passes from the Bronx up Davis' Brook to Saw Mill River, thence up the valley of that stream to its summit, and down Chopequa Brook to Kisko River, near New-Castle Corners. A similar soil continues. Distance 10½ miles.

		Quantities.	Rate.	Amount.
Excavation of common earth,	Cub. Yds.	184,775	11c	$20,325
Rock excavation,	"	2,160	75c	1,620
Embankment,	"	191,707	13c	24,922
Grubbing and clearing,	"			313
22 Culverts and Drains, Masonry,	"	802	$3	2,406
Foundation for same, Pit excavation, &c.	"			700
Road crossings,	"			390
New Road,	Rods	16	$2	32
Fencing,	"	6,530	$1,25	8,163
Land,	Acres	95	$70	6,650
			Total Amount,	$65,521

SECTION No. 4,

Continues upon a soil in which the excavation will be chiefly gravel and sandy loam, from the Kisko by the valleys of the Branch and Muddy Brook, passing Cross River, and thence to the valley of Croton River, near Golden's Bridge. Distance 9 miles.

		Quantities.	Rate.	Amount.
Excavation, common earth,	Cub. Yds.	229,134	11c	$25,204
Rock Excavation,	"	2,120	75c	2,340
Embankment,	"	302,003	14c	42,280
Grubbing, low chopping and clearing,	"			106
22 Culverts, small size, Masonry,	"	765	$3	2,295
Foundations for the same,	"			770
1 Culvert over Cross River, Masonry	"	680	$4	2,720
Foundations for same,	"			260
1 Bridge,	"	85	$3	255
Superstructure for same,	"			150
Foundation for same,	"			80
Road crossing,	"			360
Fencing,	Rods	5,616	$1,25	7,020
Land,	Acres	81	$70	5,670
			Total Amount,	$89,510

SECTION No. 5.

This section extends up the Croton Valley to the termination of the present survey near 1¾ miles north of Milltown.

The soil consists principally of gravel and sandy loam. Distance 12.6 miles.

		Quantities.	Rate.	Amount.
Excavation of common earth,	Cub. Yds.	203,471	11c	$22,382
Rock Excavation,	"	1,800	75c	1,350
Embankment,	"	246,516	13c	32,047
20 Culverts 2 to 3 feet chord, Masonry,	"	416	$3	1,248
Foundation, Excavation of Pits, &c., for same,	"			600
11 Bridges, Masonry,	"	2,537	$3	7,611
Superstructure for the same,	"			11,280
Protection Wall,	"	2,282	$1.25	2,853
Foundation for Bridges,	"			2,200
Road crossing,	"			450
Grubbing, low chopping and clearing,	"			114
Removing Buildings,	"			200
Fencing,	Rods	6,270	$1.25	7,838
Land,	Acres	1,13½	$70	7,945
			Total Amount,	$98,118

AGGREGATE OF THE SECTIONS.

No.	Distance—Miles.	Amount.
1	5	$27,305
2	15.5	149,012
3	10.5	65,521
4	9	89,510
5	12.6	98,118
	Total Amount,	$429,466

The distance included in the foregoing sections, is 52.6 miles, and their total estimated amount, covering the cost of completing the Road-Bed for a double track, ready for the superstructure, is $429,466, equal to $8,164.75 per mile.

I have estimated the cost of a superstructure for a single track at $4,000 per mile. To provide for the incidental expenses attending the construction of the work, as well as such as now cannot be foreseen. I have made an allowance of a further sum, equal to 12 per cent. upon the above amounts.

The estimate of the probable cost will therefore stand as follows.

Grading double track, 52.6 miles at $8,164.75,	$429,466
Superstructure for a single track at $4,000,	210,400
Contingencies, Engineering and Superintendance, 12 per cent.	76,784
Total Amount,	$716,650

Cost per mile, equal to $13,624,52.

When there is added to the portion of the route embraced in the foregoing estimate, (no doubt the most expensive part,) the next succeeding, and more eligible portion, extending through the County of Dutchess, and thence on to its junction with the *Western*, and the *Albany and West Stockbridge* Railroad, (the one uniting with it from the east, and the other from the west) and contrast it with the lines of Railroad already executed, or in the progress of construction in the various sections of the country, it is believed a result highly favorable to this enterprise, as it regards cost of construction, character of grades, and the facilities for an economical and rapid transit, will be fully apparent to all.

Respectfully submitted, by your obedient,

(Signed) JOSEPH D. ALLEN.

November 8th, 1836. CIVIL ENGINEER.

TO THE COMMISSIONERS OF THE NEW-YORK AND ALBANY RAILROAD.

GENTLEMEN,—I have with much care, and attention examined the Report, Profile and Ground Plan, of a Survey and exploration of a line run by Joseph D. Allen, for a part of the proposed road extending from Harlem River, opposite the 4th Avenue to near Mill Town, in the county of Putnam, about fifty-two miles.

Knowing Mr. Allen well, and appreciating his long experience on Public Works,—I have the most implicit confidence in his judgment and skill, in the location of a line of Roads, and upon a careful examination of the prices he has affixed to the several items of his estimate. I consider them very liberal, and such as will enable contractors to perform the work, in times like the present.

I am also acquainted with the ground over which Mr. Allen carried his line,—having some years since, examined it in relation to Water for the city; and in 1833, I examined it so far, as to pass over it with a view to a Railroad.

All these examinations, confirm me in the belief, that unlimited confidence can be placed in all that Mr. Allen has done and reported upon,—and I can vouch for the truth of the remarks made by Mr. Allen, that the line from the point where he left it, if pursued northwards, through Putnam and Dutchess, would be found to give ground, extremely favorable as to Grades, Curves, and expense, and a cheaper, and better Road may be made on that part of the Route than the part now surveyed by Mr. Allen.

I have the honor to be,

Gentlemen, Your ob't. servt.

Signed. BENJAMIN WRIGHT.

New-York, January 16, 1836.

From the Journal of the Franklin Institute.

A BILL FOR THE REGULATION OF THE BOILERS AND ENGINES OF VESSELS PROPELLED IN THE WHOLE OR IN PART BY STEAM.*

TABLE OF CONTENTS.

§ 1. Requires an enrolment, and license of navigation.

§ 2. Provides a penalty for navigating without a license.

§ 3. Requires the appointment of an inspector of boilers and machinery, and defines his duties, &c.

§ 4. Requires a certificate to the inspector from the owner or master of a steamboat, of the pressure of the steam intended to be used.

§ 5. Makes provisions intended to secure the safety of boilers.

ART. 1. Requires two safety-valves.
2. Provides for the graduation of the first.
3. Fixes the maximum pressure to be allowed upon it.
4. Provides for the regulation of the second.
5. Requires the second to be inclosed so as not to be accessible except by the captain of the boat.
6. Puts the second under the control of the captain of the boat.
7. Regulates the least rise to be given to the lock-up valve.
8. Directs the form of the lever of the valve.
9. Provides for each two small cylinder boilers, one set of safety-valves.
10. Requires a mercurial-gauge for low pressure boilers, and prescribes its arrangement.
11. Provides that it shall be open to examination by passengers.
12. Requires a fusible metal apparatus to be attached to every boiler.
13. Directs the fusible metal to be inclosed.
14. Provides for its not being tampered with.
15. Inspector to compound the fusible metal.
16. Prescribes the composition of the fusible metal.

§ 6. Requires an examination into the fulfilment of the foregoing provisions, by the inspector, previous to giving certificates.

§ 7. Penalties for interfering in any way with any part of the apparatus provided for the safety of the boiler.

§ 8. Prohibits more than two contiguous boilers to be connected by a water-pipe.

§ 9. Penalties for the bursting of a boiler caused by a deposite.

§ 10. Prohibits boilers in which the metal is exposed to heat without being in contact with water.

§ 11. A thorough examination of the boilers, &c., required of the inspecctor. Proofs directed and proof-pressure prescribed. Certificates to be given by the inspector to be posted up under the penalties prescribed. Fees of inspector.

§ 12. Proofs, &c., to be made every six moths. Circumstances under which a license may be forfeited.

§ 13. Requires the pumps for supplying the boilers with water to be kept at work, when a boat is stopped for a temporary purpose. Penalty prescribed.

§ 14. Qualifications for the office of inspector laid down.

§ 15. Penalties for explosions when the master or engineer is engaged in gambling, or is intoxicated. Also from racing, &c.

§ 16. A neglect to obtain or renew certificates as prescribed, to bar from the recovery of a claim for freight or insurance. Owners of boats to be in such cases responsible for loss, or damage by explosions.

§ 17. Penalties in case of explosion when the captain, &c. has neglected to have the required inspections made, and certificates issued.

§ 18. Provides a bounty for boats with boilers on the guards, and suitable bulwarks between them and the interior of the boat.

§ 19. Inspector to be dismissed in case of making false certificates, &c.

§ 20. Provides for the recovery of fines, &c. Proviso, that suits must be instituted within two years after the offence has occurred.

§ 1.*—*Be it enacted by the Senate and the House of Representatives of the United States of America, in Congress assembled,* That it shall be the duty of all owners of steamboats, or vessels propelled in the whole, or in part by steam, on or before the —— day of ——, one thousand eight hundred and ——; to make a new enrolment of the same under the existing laws of the United States, and to take out from the collector or surveyor of the port, as the case may be, where such steamboat or vessel is enrolled, a new license, under such conditions as are now imposed by law, and as shall be imposed by this act.

§ 2.†—*And be it further enated,* That it shall not be lawful for the owner, master, or captain, of any steamboat, or vessel propelled in the whole, or in part, by steam, to transport any goods, wares, and merchandize, or passengers, in, or upon the bays, lakes, rivers, or other navigable waters of the United States, from and after the said —— day of ——, one thousand eight hundred and ——, without having first obtained from the proper officer, a license under the existing laws, and without having complied with the conditions imposed by this act; and for each and every violation of this section, the owner or owners of said steamboat, or vessel, shall forfeit and pay to the United States the sum of ——.

§ 3.‡—*And be it further enacted,* That it shall be the duty of the President to appoint at such ports on the navigable waters, bays, lakes, and rivers, of the United States, as in his judgment will be most convenient to the owners and masters of steamboats, and vessels propelled in the whole or in part by steam, one or more persons who shall be

* The sections of this bill which are taken from that reported by the Committee on Naval Affairs, in the Senate of the United States, at the session of 1835-6, are marked by a note of reference to the sections of the latter.

* § 1. Of the bill reported in Senate U. S.

† § 2. Of bill, &c.

‡ From § 3 of the bill reported, &c.

practical mechanics, of competent skill, to make inspections of the boilers and machinery employed in such boats and vessels, whose duty it shall be to make such inspections, when called upon for that purpose, to give to the owner or master of such boat or vessel, duplicate certificates of all such inspections, and the said person, so appointed, shall, before entering upon the duties of said appointment, take an oath, before some competent authority, faithfully to discharge and perform the same.

§ 4.—*And be it further enacted,* That the owner, master, or captain of each and every boat or vessel propelled in the whole or in part by steam, shall certify, to said inspector, the greatest pressure, or total elastic force, of the steam intended to be produced in the boiler, which certificate shall regulate in the proofs, trials, and construction, hereinafter required.

§ 5.—*And be it further enacted,* That each and every boiler of a steamboat, or vessel propelled in the whole or in part by steam, shall be constructed, and arranged, so as to comply with the following provisions:

1. There shall be two safety-valves, each of which shall be competent to discharge the steam made in the ordinary working of the boiler.

2. The first of said valves shall be graduated by the maker of the engine, and have stamped upon the lever. by which it is weighted, the pressure at which it will by calculation open, when the appropriate movable weight is placed at the several marks. Said pressure to be the difference between the pressure of the steam within, and atmospheric pressure on said valve.

3. When the movable weight exerts its greatest pressure, the total pressure upon said valve shall not exceed the pressure as certified according to the provision of the fourth section of this act.

4. The second of said valves, denominated the lock-up valve, shall be immovably weighted, the total pressure upon it not to exceed said certified pressure.

5. Said lock-up valve, with its lever and other attachments, shall be inclosed in a grated box, or otherwise duly arranged so that it can be raised, but not pressed down, except as above provided, upon its seat.

6. Said inclosure, or arrangements, shall be secured with a lock, of which the captain or master of said boat shall alone have the key.

7. Said inclosure or arrangements, shall admit a rise in the valve of at least one-fourth of the diameter of its seat.

8. The lever of said valve shall be so constructed as ou the rising of the valve, to diminish the effect of the acting weight, by at least one-tenth of the ordinary pressure derived from said weight.

9. When two boilers, each of not more than forty inches diameter, are connected by a steam-pipe, each pair of said boilers may be furnished with safety-valves, as described in this section, for a single boiler.

10. When the certified pressure provided in section fourth, does not exceed two atmospheres, each and every boiler shall be furnished with a mercurial-gauge, indicating by a float or rod, upon a duly graduated and marked scele, the excess of pressure within the boiler over atmospheric pressure in inches of mercury.

11. Said gauge and scale shall be so placed as to be readily examined by any and every passenger on board of said boat.

12. Each and every boiler shall be provided with a fusible metal apparatus of suitable form and dimensions, to be applied to the boiler itself, or to its flues, at the place which may be considered that of greatest heat, or most liable to exposure froma deficient supply of water.

13. Said fusible metal shall be contained in a tube to prevent its exposure to pressure, and shall on softening, communicate an alarm by some suitable device.

14. Said apparatus shall be duly secured from being rendered ineffective, in the manner of the lock-up safety-valve heretofore provided.

15. The fusible metal hereinbefore referred to, shall be compounded by the inspector, who shall place it in the apparatus as aforesaid, and shall satisfy himself that the whole is duly arranged as heretofore prescribed; for which service he shall receive, on certifying the same, a compensation of ——.

16. The said alloys shall be compounded according to the certified pressure of steam within the boiler, by the following table of parts, by weight, of the ingredients.

TABLE OF ALLOYS FOR USE IN CLOSED TUBES, AND WITH A METALTIC STEM.

Certified pressure in atmospheres.	Tin.	Lead.	Bismuth.
1½	8	8	7.5
2	8	8	6.2
2½	8	8	5.3
3	8	8	4.6

Certified pressure in atmospheres.	Tin.	Lead.	Bismuth.
4	8	8	3.4
5	8	8	2.2
6	8	8	1.2
7	8	8	0.5

Certified pressure in atmospheres.	Tin.	Lead.
8	8	8.0
9	8	9.8
10	8	10.6
11	8	11.4

Certified pressure in atmospheres.	Tin.	Lead.
12	8	12.2
13	8	13.2

§ 6.—*And be it further enacted,* That before delivering the certificate hereinafter to be provided for, the inspector, heretofore provided, shall examine the apparatus required by section fifth, and shall ascertain that all the provisions of that article are complied with.

§ 7.—*And be it further enacted,* That any person or persons whatsoever who shall wilfully overload or otherwise render inoperative said safety-valve or valves, or render ineffective said mercurial-gauge or gauges, by plugging up or stopping off, or in any other manner prrventing their action, or shall in any manner, impair, or interfere, with the usefulness of said fusible metal apparatus, shall for every offence be subject to the penalty of —— dollars, and to an imprisonment at the discretion of the court, not to exceed ——, and in case of accident to said steam-boiler, resulting from said offence, by which life is lost, shall be deemed to have been guilty of manslaughter, and punished according to law for said offence.

§ 8.—*And be it further enacted,* That not more than two boilers of a boat, or vessel, propelled in the whole or in part by steam, and those immediately contigious, shall have connected water pipes, nor shall the license heretofore provided for, be issued until the inspector has satisfied himself, and has certified, that the provision of this section is complied with.

§ 9.—*And be it further enacted,* That for each and every bursting of the boiler of a steamboat or vessel propelled in the whole, or in part, by steam, which shall occur from a deposite of sedimentary matter [within a boiler, the master of said vessel, shall forfeit the sum of —— dollars; and that in case life shall be lost by the same, he shall be deemed to have been guilty of manslaughter, and shall be liable to prosecution acordingly.

§ 10.—*And be it further enacted,* That no boat or vessel propelled in the whole, or in part, by steam, shall be licensed until the inspector has certified on examination, that no part of the boiler of said boat is, ordinarily, directly exposed to flame, or to heated air from the draught, without the immediate contact of water.

§ 11.*—*And be it further enacted,* That it shall be the duty of the person who shall be called upon to inspect the boilers and machinery of any steamboat or vessel, in conformity to the provisions of this act, carefully, fully, and thoroughly, to inspect and examine the engine and machinery of said boat or vessel, and to state his opinion of their soundness: and he shall, moreover, provide himself with a suitable hydraulic pump, and, after examining into the state and condition of the boiler, or boilers, of said boat, or vessel, it shall be his duty to test the strength and soundness of said boiler, or boilers, by applying to the same a hydraulic pressure equal to three times the certified pressure which the boilers are to carry in steam; and if he shall be of opinion, after such examination and test, that the said machinery and boilers are sound and fit for use, he shall deliver to the owner or master of said vessel or boat, duplicate certificates to that effect, stating therein the age of said boilers, and the pressure of steam which may be carried by them, and which shall in no case exceed one-third part of the proof-pressure, one of which certificates it shall be the duty of said master or owner, to deliver to the collector or surveyor of the port, whenever he shall apply for license or for renewal of license: the other he shall, under a penalty of —— hundred dollars for every day that he shall neglect so to do while the boat is running, cause to be posted up and kept in some conspicuous part of the boat or vessel, for the information of the public; and for each and every inspection of the said machinery, and inspection and test of the said boiler or boilers, the said inspector shall be allowed and paid by the owner or

* § 5 of the bill reported in the Senate of U. S. with slight verbal changes.

master thereof, and before the delivery of said certificates, the sum of —— dollars.

§ 12.*—*And be it further enacted*, That it shall be the duty of the owners or masters of said boats or vessels, to cause the examination of the machinery, and the examination and test of the boilers, as provided in the sections of this act, to be made, at least, once in every six months; and to deliver to the collector or surveyor of the port where such boat or vessel, has been enrolled or licensed, the certificate of such inspection; and on failure thereof, he or they, shall forfeit the license granted to such boat or vessel, and be subject to the same penalty as though he had run the said boat or vessel, without having obtained such license.

§ 13.†—*And be it further enacted*, That whenever the master of any boat, or vessel, or the person, or persons, charged with the navigating said boat or vessel which is propelled in the whole or in part by steam, shall stop the motion, or headway, of said boat, or vessel; or the said boat or vessel, shall be stopped for the purpose of discharging, or taking in cargo, fuel, or passengers; he, or they, shall keep the engine of said boat, or vessel, in motion sufficient to work the pump, and give the necessary supply of water, under the penalty of —— dollars for each and every offence in neglecting or violating the requirements of this section.

§ 14.‡—*And be it further enacted*, That no other than a practical mechanic who shall be of the age of twenty-one years, or upwards, shall have served two years in a steam engine factory, or general machine making establishment, and who shall have a thorough knowledge of the working of an engine, and shall produce satisfactory testimonials of steady habits, shall be employed as an engineer on board of any boat or vessel propelled in whole or in part by steam, provided that for every violation of this section, the owners or master of said boat or vessel shall forfeit the sum of —— dollars.

§ 15.§—*And be it further enacted*, That for every explosion which shall happen from any cause whilst the captain, master, or engineer shall be engaged in gambling, or attending to any game of chance, or hazard, or shall be intoxicated, or which shall happen from racing, or from carrying higher steam than the quantity authorized by the certificate, the owner of such steamboat, or vessel, shall be subject to the penalties provided for in the sixteenth section of this act; and the captain, master, or engineer shall be respectively subject to the penalties hereafter provided in the seventeenth section of this act.

§ 16.‖—*And be it further enacted*, That any owner or master, of any steamboat, or vessel propelled in the whole or in part by steam, who shall fail to obtain, or neglect to renew, the certificates of examination hereinbefore provided for in the several sections of this act, shall be barred from the recovery of any claim for freight or insurance that may accrue when without said certificate, and should any loss or damage to property, or injury to persons, in such case occur in consequence of the breaking of any part of the machinery, or bursting of the boiler or boilers, the owner shall be responsible to the full amount of said loss, damage, or injury.

§ 17.*—*And be it further enacted*, That the captain or master of any boat or vessel propelled in the whole or in part by steam, which may not have been examined, and obtained the certificates required by the several sections of this act, shall in the event of loss or damage to property, or injury to persons, occasioned by the breaking of any part of the machinery, or the bursting of the boiler, or boilers, be subject to a fine of not less than ——, nor more than —— dollars, and an imprisonment of not less than ——, nor more than ——; and that in event of loss of life being the result of such accident, then said captain, or master, shall be adjudged guilty of manslaughter.

§ 18.—*And be it further enacted*, That any boat or vessel propelled in the whole or in part by steam, which shall have its boilers upon the guards of the boat, and shall have between them, and the interior of the boat, or vessel, a sufficient bulwark of timber, or other suitable material, so that passengers shall be protected effectually from injury in the event of explosion, shall be, on a certificate to the foregoing effect from the inspector heretofore provided, exempted from the payment of fees for the taking out of the license of navigation, and shall have remitted one half of the fees for proving and for other purposes of precaution heretofore provided. The fees remitted in such case to be assumed and paid to the respective officers by the United States.

§ 19.†—*And be it further enacted*, That for any false certificate, or one given without the thorough examination contemplated by this act, the inspector herein provided shall be dismissed from office, and fined not less than —— dollars, nor more than —— dollars, and imprisoned not less than ——, nor more than ——; and shall be incapable of ever being re-appointed to said office.

§ 20.‡—*And be it further enacted*, That all penalties, fines and forfeitures imposed by this act, may be sued for and recovered in any court of the United States of competent jurisdiction within the district, or circuit, where the same may have been incurred, in the name of the United States —one half for the use of the informer, and the other half to the use and benefit of the United States.

Provided, That all suits, actions, or indictments instituted, commenced, or found, under this act, shall be commenced or found, within two years after the offence has been committed, or the cause of action accrued.

* From § 6 of the law reported in the Senate of U. S., the period for making the inspections of the boilers, &c., is here proposed to be extended to six months.

† From § 7 of the bill reported in the Senate, &c.

‡ The Committee propose this section as a substitute for the 16th section of the bill reported in the Senate. That section requiring an examination of engineers by the inspectors.

§ From § 13th of the bill reported, &c,

‖ From § 11th of the bill, &c.

* From § 12th of the bill, &c.

† § 17th of bill reported, &c.

‡ § 18th of bill, &c, with the addition of the proviso at the close of the section.

Miscellaneous.

From Ure's Philosophy of Manufactures.

GENERAL VIEW OF MANUFACTURING INDUSTRY.

(Continued.)

In an analysis of manufacturing industry, the general functions of machines, and the effects of their improvements, ought to be well considered. Machines are of three kinds:—

1. Machines concerned in the production of power.
2. Machines concerned in the transmission and regulation of power.
3. Machines concerned in the application of power, to modify the various forms of matter into objects of commerce.

I. Machines engaged in producing power operate by counteracting gravity, inertia, or cohesion. The steam engine, by the expansive agency of vapor, raises and depresses its ponderous piston, and thereby moves its massive beams and geering.—The hydraulic wheel produces similar effects by the natural flow or fall of water from a higher to a lower level; and the windmill by the currents of the atmosphere. Blasting of rocks, in mining, exhibits elastic power overcoming cohesion.

II. The machines engaged in transmitting and regulating power are, toothed wheels, fly wheels of various kinds, valve governors, shafts, and other geering of mills.

III. The machines engaged in applying power to modify the forms of matter appear, at first sight, to be so multifarious as to set systematic arrangement at defiance. An outline of their connexions and dependencies has been attempted in the next chapter.

The philosophy of manufactures is well displayed in the economy of power. The value of steam impelled labor may be inferred from the following statement of facts, communicated to me by an eminent engineer, educated in the school of Bolton and Watt:—A manufacturer in Manchester works a 60-horse Bolton and Watt's steam-engine, at a power of 120 horses during the day, and 60 horses during the night; thus extorting from it an impelling force three times greater than he contracted or paid for. One *steam* horse-power is equivalent of 33,000 pounds avoirdupois, raised one foot high per minute; but an *animal* horse-power is equivalent to only 22,000 pounds raised one foot high per minute, or, in other terms, to drag a canal boat 220 feet per minute, with a force of 100 pounds acting on a spring: therefore a steam horse-power is equivalent in working efficiency to one living horse, and one-half the labor of another. But a horse can work at its full efficiency only eight hours out of the twenty-four, whereas a steam-engine needs no period of repose; and therefore to make the animal power equal to the physical power, a relay of 1½ fresh horses must be found three times in the twenty-four hours, which amounts to 4½ horses daily. Hence a common 60-horse steam-engine does the work of 4½ times 60 horses, or of 270 horses. But the above 60-horse steam-engine does one-half more work in twenty-four hours, or that of 405 living horses!—The keep of a horse cannot be estimated at less than 1*s.* 2*d.* per day; and therefore that of 405 horses would be about 24*l.* daily, or 7500*l.* sterling in a year of 313 days. As 80 pounds of coals, or one bushel, will produce steam equivalent to the power of one horse in a steam-engine during eight hours' work, sixty bushels, worth about 30*s.* at Manchester, will maintain a 60-horse engine in fuel during eight effective hours, and 200 bushels, worth 100*s.*, the above hard-worked engine, during twenty-four hours. Hence the expense per annum is 1565*l.* sterling, being little more than one-fifth of that of living horses. As to prime cost and superintendence, the animal power would be greatly more expensive than the steam power. There are many engines made by Bolton and Watt, forty years ago, which have continued in constant work all that time with very slight repairs. What a multitude of valuable horses would have been worn out in doing the service of these machines! and what a vast quantity of grain would they have consumed! Had British industry not been aided by Watt's invention, it must have gone on with a retarding pace, in consequence of the increasing cost of motive power, and would long ere now, have experienced, in the price of horses, and scarcity of water-falls, an insurmountable barrier to further advancement, could horses, even at the low prices to which their rival, steam, has kept them, be employed to drive a cotton mill at the present day, they would devour all the profits of the manufacturer.

Steam-engines furnish the means not only of their support but of their multiplication. They create a vast demand for fuel; and, while they lend their powerful arms to drain the pits and to raise the coals, they call into employment multitudes of miners, engineers, ship-builders, and sailors, and cause the construction of the canals and railways: and, while they enable these rich fields of industry to be cultivated to the utmost, they leave thousands of fine arable fields free for the production of food to man, which must have been otherwise allotted to the food of horses. Steam-engines moreover, by the cheapness and steadiness of their action, fabricate cheap goods, and procure in their exchange a liberal supply of the necessaries and comforts of life, produced in foreign lands.

Improvements in machinery have a three-fold bearing:—

1st. They make it possible to fabricate some articles which, but for them, could not be fabricated at all.

2d. They enable an operative to turn out a greater quantity of work than he could before—time, labor, and quality of work remaining constant.

3d. They effect a substitution of labor comparatively unskilled, for that which is more skilled.

The introduction of new machines into any manufacture, with the effect of superseding hand labor, is tempered by the system of patents, which maintains them for a certain time at a monopoly price, and thereby obstructs their rapid multiplication. Did we admit the principles on which the use of particular self-acting mechanisms is objected to by workmen, we should not be able, in any case, to define the limits of their application. Had parliament acted on such principles sixty years ago, none of our manufactures could have attained to their present state of profitable employment to either masters or men. The immediate causes of their vast augmentation may be ascribed, under the blessing of Providence, to the general spirit of industry and enterprize among a free and an enlightened people, left to the unrestrained exercise of their talents in the employment of a vast capital, pushing to the utmost the principle of the analysis of labor, summoning to their service all the resources of scientific research and mechanical ingenuity; and finally, availing themselves of all the benefits to be derived from visiting foreign countries, not only in order to form new and confirm old commercial connexions, but to obtain an intimate knowledge of the wants, the tastes, the habits, the discoveries and improvements, the productions, and fabrics of other civilized nations. Thus we bring home facts and suggestions; thus we perfect our old establishment, and add new branches to our domostic stock; opening, at the same time, new markets for the sale of our manufacturing and commercial industry, and qualifying ourselves for supplying them in the best and most economical manner. By these means alone, and, above all, by the effect of machinery in improving the quality, and cheapening the fabrication of our various articles of export, notwithstanding an immense load of taxes, and a higher price of grain, our commerce and manufactures have also increased in such a degree, as to surpass the most sanguine calculations of the ablest political economists who have speculated on the prospects of mankind. We should never cease to bear in mind, that we are surrounded by powerful nations, composed of a people equally industrious, and more sober than ourselves, who, released from the turmoil of war, are intent on cultivating the productive arts of peace, and of pushing their commerce and navigation; whose eagerness of competition is stimulated by the view of the rich prizes which we have already won.

The attempts continually made to carry our implements and machines into foreign countries, and to tempt our artisans to settle and superintend them there, evince the high value set by other nations on our mechanical substitutes for hand labor; and as they cannot be directly counteracted, they should be rendered, as far as possible, unavailing, by introducing such successive improvements at home as may always keep us foremost in the career of construction. It would be therefore no less disastrous to the operative, than to the capitalist, were any extraneous obstacles thrown in their way, since any good machine suppressed, or rejected, in this country, would infallibly be received with open arms by some of our neighbors, and most readily by our mechanical rivals in France, Belgium, Germany, and the United States.

Mill architecture is a science of recent origin, which even at this day is little understood, beyond the factory precincts. It had been ably begun by Mr. Watt, but, till it fell into the hands of Messrs. Fairbairn and Lillie, the eminent engineers of Manchester, it was too subject to the whims of the several individuals, often utterly ignorant of statics or dynamics, or the laws of equilibrium and impulse, who had capital to lay out in building a mill. Each had his own set of caprices and prejudices, which he sought to embody in his edifice, little aware how much the different orders of machines depended for the productiveness and precision of their performance, on the right magnitudes, proportions, and adjustments of the mainshafting and wheel-geering.—These are, in fact, the grand nerves and arteries which transmit vitality and volition, so to speak, with due steadiness, delicacy, and speed, to the automatic organs. Hence, if they be ill-made or ill-distributed, nothing can go well, as happens to a man laboring under aneurismal and nervous affections.

About three years ago, the above named engineers dissolved a partnership celebrated over the world; since which time each has expanded his energies, and distinguished himself in a peculiar line of work. I shall have occasion hereafter to describe several of Mr. Lillie's excellent mechanical constructions. Mr. Fairbairn has entered largely into the line of factory architect, for which his three-fold great workshops are admirably adapted. The capitalist has merely to state the extent of his resources the nature of his manufacture, its intended site, and facilities of position in reference to water or coal, when he will be furnished with designs, estimates, and offers on the most economical terms, consistent with excellence, according to a plan, combining elegance of external aspect, with solidity, convenience, and refinement in the internal structure. As engineer he becomes responsible for the masonry, carpentry, and other work of the building, for the erection of a sufficient power, whether of a steam-engine, or water-wheel, to drive every machine it is to contain, and for the mounting of all the shafts and great wheels by which the power of the first mover is distributed. The frontispiece of this volume exhibits a perspective view of a magnificent factory, lately finished by Mr. Fairbairn, and now at work under its spirited proprietor, Mr. Orrell. It is beautifully situated in the environs of Stockport, on a branch of the Mersey, the great river feeder of the cotton trade of England. In beauty of architectural design, it will yield to no analogous edifice, and, may indeed, bear a comparison in respect of grandeur, elegance, and simplicity, with many aristocratic mansions. The length of the apartments in each floor of the body of the house is three hundred feet, the breadth fifty feet, and the height of each floor twelve feet. Each window consists of two casements, extending from its top to its sill, one of which, nearly as large as a common window, may be thrown entirely open for admitting fresh air, independent of the mechanical ventilation. I have been favored, through the liberality of the architect and proprietor of this pattern structure, with an analytical section and ground plan of it, by which I shall be enabled, in the treatise on the cotton trade, to place before my readers a view of the whole anatomy of the mill, in the following order.

1. Its two-fold heart, or twin steam-engines, one of which makes its maximum effort, while the other makes its minimum, to secure perfect equability of impulsion through all the ramifications of the shafts, and to prevent arterial throbbing or tremor, formerly so common, and so injurious to the work of delicate machines.

2. The great bevel wheel-geering, which transmits the power of the engine in rectangular directions, either transversely or vertically, and with any modification of speed.

3. The horizontal and upright shafts, with their several pulleys.

4. The distribution of the strape, or belts, that convey the power from these revolving shafts and pulleys.

5. The respective positions of the various productive organs in their respective floors, such as the preparation machines, throstles, mules, power-looms, dressing machines, warping mills, &c. &c.

The recent innovations in proportioning the sizes, regulating the connections, and adjusting the movements of the system of shaft-geering, form a fine feature in the philosophy of manufactures. Thus not only an improvement has been made in the regularity of impulsion, but a considerable increase of power from the same prime-mover has been obtained; amounting in some cases, of old mills remounted by Messrs. Fairbairn and Lillie, to fully twenty per cent. The durability of shafts so exquisitely turned and polished, is another great advantage. The spinning factory of Messrs. Ashworth, at Egerton, which has been at work for several years, exhibits an elegant pattern of the engineering just described: for it has some subordinate shafts, hardly thicker than the human wrist, which convey the power of ten horses, and revolve with great speed, without the slightest noise or vibration. The prime-mover of the whole is a gigantic water-wheel of sixty feet diameter, and one hundred horses' power. I have frequently been at a loss, in walking through several of the millwright factories, to know whether the polished shafts that drive the automatic lathes and planing machines, were at rest or in motion, so truly and silently did they revolve.

The method of increased velocities in the driving arms or shafts of factories, is undoubtedly, one of the most remarkable improvements in practical dynamics. It diminishes greatly the inertia of the mass to be moved, by giving to much lighter shafts and wheels the same momentum, and it permits the pulleys or drums, which immediately impel the machines by straps, to be reduced to a size much nearer to that of the steam pulleys fixed on the main axes of these machines. About thirty years ago the velocities of the main shafts, proceeding from the moving power, whether of steam or water amounted to no more than from thirty to forty evolutions per minute, and of the smaller and remoter shafts, to only forty or fifty. At the same period the drums were heavy tubs, and from thirty, to upwards of sixty inches in diameter. The improved system is under deep obligations for its actual state of perfection to the above-named engineers, though it had commenced, as we have stated, before their time. In the mills mounted by these gentlemen it is interesting to see slender shafts, like small sinewy arms, rapidly transmitting vast power through all the ramifications of a great factory.

The following details will place this matter in the clearest light:—A mill propelled by a steam-engine of fifty horses' power was formerly geered with shafts, having an average transverse section of thirty-six square inches, or varying in size from four to eight inches square. An engine of like power at the present day will, in consequence of the increased velocities above described, work with cylindrical shafts not exceeding five and a half, and often only three inches in diameter; possessing therefore an average area of only fifteen square inches, instead of thirty-six. The horizontal shafts that run under the ceilings of the different working rooms are two inches, and seldom exceed two and a quarter in diameter. Hence the mass of geering has been reduced fully one-half. But the shafts now make from one hundred and twenty, to one hundred and fifty revolutions in a minute, and, occasionally, as where trostlers are turned, so many as two hundred in the same time. Thus we see the requisite momentum is gained with a light shaft, while the friction is proportionally diminished, and the driving drum revolves with a velocity in accordance with the accelerated pace of the modern machines. The several speeds will be given in discussing their respective subjects.

The philosophy of manufactures investigates, in the next place, the most economical and energetic modes of applying the motive force to the various working organs; the carding-engines, the drawing-heads, the roving-frames, the throstles, the mules, the power-looms, the dressing-machines, &c.

The British capitalist is vigorously seconded by the British engineer, and need not, like the Continental adventurer, leave his funds long dormant, after an opportunity of placing them profitably in factory enterprise occurs. One mill-wright establishment in Manchester turns out from three hundred to four hundred yards of shaft-geering every week, finely finished, at a very moderate price, because almost every tool is now more or less automatic, and performs its work more cheaply and with greater precision than the hand could possibly do. Where many counterparts or similar pieces enter into spinning apparatus, they are all made so perfectly identical in form and size, by the self-acting tools, such as the planing and key-groove cutting machines, that any one of them will at once fit into the position of any of its fellows, in the general frame.

For these and other admirable automatic instruments, which have so greatly facilitated the construction and repair of factory machines, and which are to be found at present in all our considerable cotton mills, this country is under the greatest obligations to Messrs. Sharp, Roberts and Co. of Manchester. By such aids, fine-cotton spinners are enabled to mount their mules and the subservient frames within their own premises, with peculiarities of construction suited to their style of work; and many of them remodel more or less the apparatus made in the machine-shops. Thus the bobbin and fly-frames of Messrs. Cocker and Higgings, so justly admired, require occasionally to be modified in certain minutiæ, essential to fine work, before being used by certain manufacturers. It is this skill in machine mounting or adjusting, combined with tact in spinning, which gives to our factories not merely their existing superiority over foreign rivalry, but the best security for its permanence. Indeed, the concentration of mechanical talent and activity in the district of Manchester and Leeds is indescribable by the pen, and must be studied confidentially behind the scenes, in order to be duly understood and appreciated.

The following anecdote will illustrate this position. A manufacturer at Stockport, whose name I shall suppress, being, not long ago, about to mount two hundred power-looms in his mill, fancied he might save a pound sterling in the price of each, by having them made by a neighbor machine-maker, instead of obtaining them from Messrs. Sharp and Roberts, in Manchester, the principal coustructors of power-looms. In order to give his fabricator every chance of success, the economist surreptitiously procured iron patterns cast from one of the looms of that company, which in its perfect state costs no more than £9. 15*s*. His two hundred looms were accordingly constructed at Stockport, supposed to be fac-similes of those regularly made in Manchester, and they were set to work. Hardly a day passed, however, without one part or another breaking down, insomuch that the crank or tappet-wheels had to be replaced three times, in almost every loom, in the course of twelve months. The fabric of the cloth was also indifferent. The proprietor perplexed beyond measure, inquired of a neighbor who worked similar power-looms, made by the Manchester mechanicians, whether *his* wheels likewise went to pieces every other day, and learned to his mortification, that not one of them had broken in the course of working, but that the four or five spare ones, originally sent from Manchester along with his two hundred and thirty-six power-looms, were unused and quite at his service. The old proverb of 'penny wise and pound foolish' never had a better illustration. His weaving factory had been most irregular and unproductive, while that of his neighbor had been uniformly prosperous. Being now heartily sick and ashamed of his fac-simile copies, he took measures in secret to have them replaced, as soon as possible, by Sharp and Roberts's substanclal machines.

BALLOON VOYAGE TO THE CONTINENT.

The public anxiety has been for some time excited by a report that it was the intention of three gentlemen to make the hazardous experiment of crossing the British Channel in a balloon, and that they resolved to ascend, not from the coast, but from the metropolis itself. The report appears to have been well founded, and, after several attempts on preceding days, which had been abandoned in consequence of the unfavorable weather; they took their departure yesterday from Vauxhall Gardens. The ascent was intended to be a private and not a public one, so far as the admission to the gardens or giving notice in the newspapers; but the secret was communicated to a few, and those persons, making in all about a dozen, eagerly embraced the opportunity of witnessing so remarkable an event. Mr. Holland, Mr. Monck Mason, and Mr. Green, have the honor and risk of departing on this voyage of discovery. They proposed, by regulating the ascent, to seek for such a stream of air as would take them, if possible, towards Paris, and if that should not be practicable, they would be guided by the current which might lead towards the Belgian capital. They do not appear to calculate on any wind prevailing but that from west-north-west or south-west, which would enable them to fulfill their design, and they boldly encounter all the hazard of being blown down Channel by an adverse breeze on the one side, or the North Sea on the other. They determined, in case they could not make the opposite coast, whether French or Belgian, to remain up in the air all night, and they took care to be provided with warm clothing and provision for such an unpleasant alternative.

The inflation commenced about seven in the morning, and by one everything was in readiness. The balloon was inflated almost to its utmost dimensions, and appeared capable of sustaining an aerial flight for many hours, or even days. In the car were upwards of a ton of ballast, several gallons of brandy and wine, a large supply of coffee, cold fowls, ham, etc., an apparatus, with unslacked lime, for heating the coffee, and, all appliances to insure comfort and prevent starvation and cold. There were also a supply of blue lights, stars, and other fireworks, to be let down at night, if the voyage were not accomplished before dark, in order to enable the æronauts to reconoitre the country from their elevation, and choose the point of their descent, and a number of parachutes, to which letters were fastened, to be dropped at intervals on the shores of the Continent, for the purpose of apprising the public of their transit, arrival, and safety—in a word, a more complete equipment cannot be conceived; and it was highly entertaining to see the preparations of the passengers, and the good humor and confidence with which they shook hands with their friends, and took their seats. They were also furnished with passports from the French and Dutch embassies, and with a letter for the King of Holland from his representative in this country. At one o'clock the inflation of the balloon being complete, the three gentlemen shook hands with their friends, and at a given signal majestically left the earth. The immense machine which held them rose splendidly from the Gardens, hung for a short time in sight of the persons who had collected to witness the daring attempt, and then, feeling the breeze which impelled it, glided away to the eastward, and was gradually lost to the straing eyes of the anxious crowd. The wind was perfectly fair for the French coast. The wind, however, by three o'clock veered more to the north, which would, of course, blow the balloon further to the southward of the French coast. Mr. Gye is already on the continent to receive the intrepid voyagers, and Mr. F. Gye, with Hughes, jun., started last night for Paris to welcome their arrival and to arrange preparations for an ascent from that metropolis. Whatever may be the result of this experiment, we regret that it was not put off till the ensuing spring or the early part of the summer, when a longer day and more favorable weather would diminish essentially the risks. It is also to be regretted that the travellers did not start soon after daybreak, instead of waiting till one in the afternoon, with only four or five hours of light before them.

FROM DOVER.—We have received the following account from a correspondent:—"*Dover five o'clock*, P. M. We were this afternoon highly gratified by witnessing the passing of Mr. Green's splendid balloon on his ærial voyage from London to the Continent, going a little to the eastward of the town, or very nearly over the Castle, the spot from which Jeffrey and Blanchard, some years since, took their departure to cross the Channel in a similar manner. A few minutes befose five he signalised his departure from England by displaying a very brilliant light, which continued burning obout ten minutes. The course of the balloon, on his crossing the Channel, was in a direction nearly E. N. E., with a gentle wind by the church vane W. S. W. Should he continue this course he will probably by morning in make the island of Walcheren, or South Beveland; or passing over these, continue his course to Holland. The altitude of the balloon was increasing as he approached Dover, and continued steady about the same as he passed from over *terra firma* to cross the Channel. The velocity of the balloon did not exceed four or five miles per hour. *Half past Six o'clock.* The balloon is not yet out of sight, its situation being distinguished by variegated lights."

Another Dover correspondent has transmitted us the copy of a note which was dropt from the balloon in a parachute near the village of Whitfield about two miles from Dover. The party appeared to be according to this informant going towards Dunkirk near the Belgic coast. The person who picked up the note was at work at Whitfield Mill, and, seeing the balloon descending, he stopped the mill to render assistance, when he saw the parachute coming down, from which he took the letter; it is as follows:—

"BOUND FOR THE CONTINENT."

"Mr. Green, Mr. Monck Mason, and Mr. Robert Holland, present their compliments to the Mayor of Dover, and beg to inform him that they left Vauxhall Gardens at half-past one o'clock, and were nearly over Canterbury at four o'clock.

"To the Mayor of Dover." [Globe.]

Dr. Vignet, first physician to the Military Hospital at Phalsburgh, has confirmed a discovery made by Dr. Viale, of the existence of insects in the Cholera. When Dr. Vignet was at the head of the hospital at Oran, he had upwards of 400 Cholera patients under his care, and ascertained to a certainty that the Indian Cholera is occasioned by myriads of insects, some visible to the naked eye and some not. He has published, at Metz, a work on this subject, and on the treatment he used in Africa in curing the disease.

AMERICAN RHENISH. At Vevay on the Ohio, the vine is extensively cultivated by Swiss emigrants, who founded a colony there as early as 1804. Some of the vineyards have twenty acres in vines, which yield nearly 4,000 gallons of wine per year—worth from one to three dollars per gallon. The quality of the wine made at some vineyards, is pronounced by competent judges equal to the best Rhenish imported into this country.

We have just learned that the Government of Prussia has placed a vast mass of the most valuable statistical information at the disposal of Mr. M'Culloch, to be used either for the improvement of his dictionary or otherwise, as he may think fit. This conduct reflects infinite credit on the intelligence and liberality of the Prussian Government. The information communicated is all official. It is in the shape of replies to queries transmitted to Berlin through his Excellency, Baron Bulow, who has taken the greatest interest in the matter. We have been assured that his Prussian Majesty, as well as his Ministers, was pleased to express his approbation of the object for which the information was sought, and his wish that it should be full and authentic. It may be questioned whether there be another Government in the world (certainly we know of none) that would, at the mere solicitation of a private individual—and that individual a foreigner—have taken so much pains to furnish him with the means of fairly appreciating and exhibiting its policy in an economical point of view.

[Chronicle.]

The following phenomenon was observed lately at Gluckstadt, on the Elbe, and at Stzehoil and Heilingenstedten on the Stoer. During the continuance of twelve hours, the tides of these rivers neither rose nor fell, the waters remained constantly at the same level, and the ships at anchor, instead of turning as usual at the flux and reflux, remained immoveable. Some persons attribute this to an earthquake in some distant country, as the same thing happened on the 1st November, 1755, the day of the great earthquake at Lisbon.

We learn from Naples, that Professor Zalm has recently discovered, at Pompeii, a table service in silver, comprising 44 plates, 1 large dish, 3 small vessels, 2 spoons, and 4 forks, of admirable workmanship. They are all in very good preservation, and were to be sent to the Royal Family at Portici.

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Address J. M. N., at the office of the Railroad Journal, post paid. 1—4t

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Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

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Of all descriptions and of the most improved Patterns, Style, and Workmanship.

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JAMES RIVER and KANAWHA CANAL.—Contractors for mechanical work are hereby informed that a large amount of Masonry, consisting of Locks, Culverts, and Aqueducts, is yet to be let on the line of the James and Kanawha Canal.

Persons desirous of obtaining such work, and prepared to exhibit proper testimonials of their ability to execute it, will apply at the office of the subscriber in the city of Richmond.

Stone Cutters and Masons wishing employment in the South during the winter months, may count with certainty on receiving liberal wages, by engaging with the contractors on the work.

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Richmond, Nov. 29, 1836. 51—6t

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N. Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention.

HENRY BURDEN.
Troy Iron Works, Nov. 15, 1836. 47—tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2½	by ½,	15 ft in length,	weighing			$4\frac{68}{100}$	per ft.
280 "	2	" ½,	"	"		"	$3\frac{50}{100}$	"
70 "	1½	" ½,	"	"		"	2½	"
80 "	1¼	" ¼,	"	"		"	$1\frac{25}{100}$	"
90 "	1	" ¼,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.
28—tf Philadelphia, No. 4, South Front st.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

NOTICE TO CONTRACTORS.

Proposals will be received at the office of the Hudson and Berkshire Railroad Company, in the city of Hudson, until the 15th of January, 1837, for One Million feet, board measure, of Southern pine, of the following dimensions.—6 inches square, and in lengths of 21, 24, 27, and 30 feet long—also, for 14,000 Chestnut or Cedar ties, 8 feet long, and 6 inches square—and also, 4,000 sills, of Hemlock, Chestnut, or White Pine, 4 by 10 inches, and in lengths of 15, 18, and 21 feet long. The whole to be delivered by the 1st day of July, 1837. GEORGE RICH
Engineer.
Hudson, Dec. 22, 1836. 52 4t

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hard-ware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTION, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co. No. 119 Greenwich Street, New-York, or at the Makers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY & KNIGHT.
POUGHKEEPSIE, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANCHED and GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works he has in charge.

BENJ. WRIGHT,
Chief Engineer N. Y. & E. R. R.
NEW-YORK, April 4th, 1836.

Harvey's Flanched and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.
BOSTON, April 26th, 1836. NO. 1—6t.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

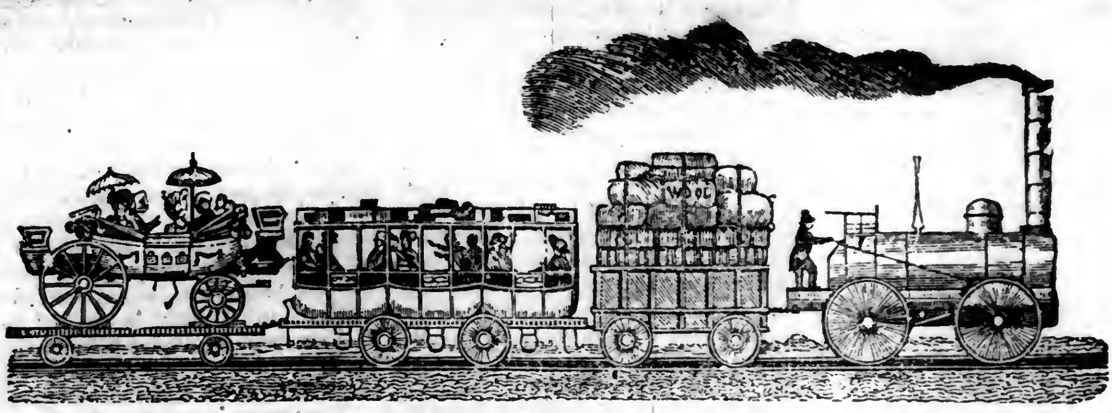
H. R. DUNHAM & CO.
4—ytf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Geering Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, FEBRUARY 4, 1837. [VOLUME V.—No. 5.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 4, 1837.

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid, (continued.)

J. B. Jervis, City, N. Y., Jan. 1, 1838.
J. L. Shoemaker, " " 1838.
J. Strunk, jr. Olean Pt. N. Y., " 1838.
I. M. Sherwood, Auburn, " Sept. 1, 1837.
Moses Long, Rochester, " " 13, 1837.
V. R. Many, Albany, " Feb. 13, 1837.
H. Bostwick, " " Jan. 1, 1837.
C. C. Dennis, " " " 1838.
J. B. Moulton, Courtland, " " 1837
C. Bishop, Homer, " " 1837.
H. Wilder, Boston, Mass., " 1838.
A. Andrews, " " " 1838
J. M. Fessenden, " " " 1838.
Jas. F. Baldwin, " " Sept. 8, 1837.
S. Nott, Lynn, " Jan. 1, 1838
W. G. Morris, Bellefontaine, Pa., " 1838.
J. F. Wright, Erie, " " 1837.
C. C. Moore, New-Castle, " Nov. 1, 1837.
W. Otis, East-Greenwich, R. I. Jan. 1, 1838.
N. Kuykindalls, Romney, Va. July, 1, 1837.
W. G. Bonner, Warrenton, Geo. March 15, 1837.

DIED, on the 16th inst. at his residence at Baldwinsville, of inflammation on the lungs, Col. STEPHEN W. BALDWIN, in the 42d year of his age. Col. Baldwin has done much to advance the interest of the place in which he lived, and was highly esteemed in all the relations of life. In his dealings he was just towards all, and the poor always found in him a friend. Those who knew him best will most justly appreciate his worth, and most deeply mourn his loss.—[Onondaga Standard.]

JOURNAL OF THE AMERICAN INSTITUTE, Jan., 1837.—This Journal again makes its appearance in the usual neatness of execution, and value of material. Several articles in it are of particular interest.

AMERICAN JOURNAL OF SCIENCE AND ARTS, Jan., 1837.—A valuable number of this work so creditable to American Science. A memoir of the Rev. Dr. Prince, of Salem, and several contributions from gentlemen of talents, will interest the general reader.

The articles of Dr. Feuchtwanger, and also those of Dr. Hare, are well worth the attention of the chemical reader, particularly the latter, on new and curious combinations in essential oils.

Several Zoological notices by Dr. Harlan are also of high merit.

HIWASSEE RAILROAD.—The corps of Engineers employed to survey the route for the Hiwassee Railroad have arrived, and will enter forthwith upon the survey and location of the road. We have conversed with Mr. Trautwine, Principal Engineer, and he gives it as his decided opinion that the part of the route he has seen, from Knoxville to this place, is equal, and some portions of it the best route for the location of a Railroad he has ever seen. The company are determined to commence the work immediately, and continue it until it is completed.

On last Monday the Stockholders elected the following named gentlemen Directors, viz:—Gen. S. D. Jacobs, Hon. C. F. Keith, Maj. Thos. Brown, Col O. G. Marrell, Jacob Pearson, John H. Crozier, James H. Fyffe, T. N. Van Dyke, and A D. Keys, Esqrs.

On the same day the Board of Directors met and elected Gen. S. D. Jacobs President, and A. M. Coffey, Esq. Secretary and Treasurer.—[Tenn. Jour.]

WATERTOWN AND CAPE VINCENT RAILROAD.—The books for subscription to this work were opened on the line of the route during the three first days of last week—and the Stock is entirely taken up with the exception of about fifteen thousand dollars; two-thirds of this sum is already engaged.

AUBURN AND ROCHESTER RAILROAD.—We see in the Seneca Falls Farmer, (in a statement derived doubtless from the Secretary of the Board who resides in that village,) that upwards of $1,035,000 have been subscribed to the stock of the A & R. Railroad Company.

Auburn and Great Sodus Bay Railroad.—The Auburn Journal of the 11th inst. says that "a petition had been for a day or two in circulation for the incorporation of a company, with a capital of $400,000, for the purpose of constructing a Railroad from that village to Sodus. Another Railroad to connect Auburn with Ithaca, is projected, and measures are on foot to carry forward both enterprises.

The Belfast and Quebec Railroad is receiving the attention of the people of Maine. They are recommending to the consideration of the Legislature, now in session.

We are indebted to the N. Y. Times for the following account of the Great Railroad Meeting, held on the 20th January last, in this city.

We exceedingly regret that other engagements prevented us from attending, as we understand the proceedings were of a nature highly gratifying to the friends of internal improvement in general, and of this enterprise in particular.

It will be seen that the Company have already been offered for the lands in their possession, and chiefly given to them, the annual payment of 6 per cent. upon such instalments as may be payed in. The Company of course have no desire to part with lands so valuable to them on the completion of this work.

There is no doubt, if we can form an opinion from the spirit manifested on the subject, but that the necessary subscriptions will immediately be made.

PUBLIC MEETING ON THE SUBJECT OF THE NEW-YORK AND ERIE RAILROAD.

Pursuant to a call signed by a large number of the merchants, mechanics and landowners of the city of New-York, a very numerous and respectable meeting assembled on the evening of the 20th of January, 1837, at Clinton Hall.

The meeting was called to order by Mr. James N. Wells, on whose motion, His Honor the Mayor, was unanimously chosen President; and James N. Wells and Nathaniel Weed, were appointed Vice Presidents; and Thomas R. Mercein and William Samuel Johnson, Secretaries.

The Mayor on taking the chair, announced the object of the meeting to be, as stated in the call, "to receive from the Board of Directors of the New-York and Erie Railroad Company, important statements respecting the progress of their undertaking, and its improved financial condition, and to adopt measures for an energetic prosecution and early completion of the work."

At the request of Mr. James G. King, the President of the Railroad Company, Mr. Johnson read a portion of the Report heretofore made to the Common Council of this city, by a joint Committee, of which Mr. J. was the Chairman; setting forth the immense importance of the work to this city, in all its branches of industry. Which being done, Mr. King proceeded to make a statement of all that the company had hitherto done, and of the circumstances—first of the desolating fire of December last, and then of the recent money pressure—(which he remarked incidentally, he thought he might congratulate his audience upon having now passed,) by reason of which they had not before called upon their fellow citizens to fill up the stock. The time, however, had not come for action, vigorous, prompt, and sustained, if we were in earnest in the purpose of opening this new avenue—available at all seasons—to the West.—That to produce such action was the object of inviting this meeting, and to the end that none might act without full knowledge.—Mr. K. proceeded to state the grounds upon which—after personal inspection by some of their body—and the most careful examinations and re-examinations by Engineers second to none in their profession—the Board of Directors were willing to stake their characters for intelligence and sound judgment, upon the practicability, and the certain and positive benefits, of the projected road—which, if reliance could be placed upon most careful estimates by cautious men—and he knew no better ground of reliance in any such undertaking—could be made for *six millions of dollars.* Of this amount there were now subscribed and paid in to the extent called for, *one million eight hundred thousand dollars,*—the State was pledged for *two millions more* on the completion of a single track for the whole route, and the city of New-York was asked to make the sum up to *five millions*—confident that before that should be expended, the benefits of the road would be so manifest, and the rise in value of property along its route so great, that no difficulty would occur in obtaining the remaining million. *One million two hundred thousand dollars* then was all that was asked from this city—so as to make up the private subscriptions to *three millions.*

Mr. K. here added that great and honorable exertions were made, to secure the passage of the law, granting the credit of State—on the floor of the *Assembly,* by General *Prosper M. Wetmore,* and his colleagues, Messrs. *Cowdrey, Sharp, Conner,* and *West,* of the city delegation; and in the *Senate,* by Messrs. *Livingston* and *Van Schaick*—to each and all of whom, the thanks of their fellow citizens were most justly due. In addition to the motives of patriotism, of pride, of self-interest, which combine to prompt New-York to accomplish this great work, Mr. K. stated, that donations had been made to the Company along the line of the road west of the Genesee river, of so great value, as to enable them to offer to those who were, and those who might become, subscribers to the stock, *six per cent. per annum*—(to be provided by the sales, as needed, of these lands,)—upon all sums called in till 1841, with the further proviso, that the residue of the lands then unsold should be rateably divided among the then holders of the three millions of stock. As an evidence even now of the worth of these lands, the Secretary, at Mr. K.'s instance, read an offer to the Company, signed by G. Hoyt, C. Hoyt, N. Devereux, and Nevins & Townsend—*of four hundred thousand dollars* for these lands, to be paid in such sums, on the 1st of July of each year until 1841, as should suffice for the interest, at 6 per cent., accruing at these periods on the instalments of stock paid up. Mr. K. added, however, that there was no intention, on the part of the Company, to accept this offer, preferring to reserve for their stockholders the rise in the value of these lands which the progress of the road could not fail to occasion, selling only from time to time what might be needful to meet the payment of dividends. Finally, whatever sums were now subscribed, would only be called in, in instalments amounting to 25 per cent. per annum, for four years; and the first payment of 12½ per cent. might be made in notes at three or four months.

As to the revenue of the road, when completed and in full operation, Mr. K. observed, that after a strict and careful examination, by his associates and himself, they could not entertain a reasonable doubt of such results, from the profits of transportation of passengers and merchandize, as to render the stock of the highest value in point of security and of dividends. Indeed, that it was impossible to come to any other conclusion, when they considered the cheapness of construction, the general facilities of the grades, the various tributary railroads and canals, the outlet upon the western lakes, the early navigation of the Alleghany river, and the enterprise of the increasing population of the thrifty towns, villages and settlements, along the whole length of the road, rendered doubly prosperous by the outlay among them of so many millions.

Mr. K. claimed particular attention to the fact, that his associates and himself had no motive, beyond what every other stockholder possessed, in the value of the stock. They had no separate pecuniary interest, to mislead their judgment—*they owned no lands or property adjoining the road—nor within the Southern counties*—and they put forward their claims to public confidence, upon the ground of their entire disinterestedness.

Mr. K. concluded by stating that he had never known inducements of a pecuniary character held out for co-operation in an enterprise promising such vast results, stronger than those which he had been able, in behalf of his colleagues and himself, to present to this meeting; but so deeply did he feel the importance of the cause, that in addition, he would invoke the patriotism, never found wanting, of the merchants, traders, professional men, mechanics and other industrious classes of this powerful city. He would appeal to their enlightened spirit of enterprise, which could discern, and aim at, distant benefits; and to that just regard to their own interests, which would not permit them to stand idle, while a rival city and State are straining every nerve to carry off, before their eyes, the precious trade of the great West—nor to suffer this mighty work, confided to his associates and himself, to languish, perhaps to perish, for the want of adequate protection.

Mr. *John A. Stevens* followed Mr. K. and said that he stood before that meeting a recent convert; that until very lately he had entertained strong doubts of the practicability and usefulness of the work— but that after a careful and minute examination, he had become fully convinced, that what on a loose and general view had seemed to him visionary, was in truth most practicable—most desirable—and would be most clearly profitable, not only to the public, but to those who might invest their funds in the work. He had no interest in the question beyond that of every one of his fellow citizens—had no lands along the route—and up to that time had not even subscribed to the stock: but his attention having recently been invited to the subject, and entertaining, as he did, a strong belief that the sagacious and experienced individuals, who were associated in the Board of Directors, must have well informed themselves as to the character of the work, and the resources on which they relied for revenue, he had spent some time in examining, as thoroughly as had been in his power, the details of the enterprise. He had carefully read the reports of the engineers, and abler or clearer statements he was sure were no where to be found—had examined the profiles and grades, and compared them with those of other roads in successful operation—had sifted the *data* as to probable expenditures and revenue, and that he had come deliberately to the conclusion, that the work was feasible—that it would furnish the means of cheap and rapid transportation—that its tolls, when completed, would afford to the stockholders a profitable revenue—that the auxiliary resources on which the Directors relied for dividends, while the work was in progress, were of great value and importance—and that it was incumbent on the citizens of New-York at once to urge it on to its completion.

Deeming it probable that there might be in that meeting many like myself, who had imbibed erroneous impressions as to the true character of the work, he thought it useful to enter into detail, and put his friends in possession of most of the *data*, which had induced the change of his own opinions on this subject.

Mr. S. proceeded accordingly to describe, with accuracy, and clearness the various acclivities and curvatures of the road—the total absence, throughout the whole line, of inclined planes—the favorable contrast, in those respects, with the Pennsylvania and the Baltimore and Ohio Railroads—and concluded by declaring his firm conviction, derived from close examination of the proofs, that locomotive engines, drawing heavy loads, as well of merchandize and agricultural products, as of passengers, could profitably traverse the whole route from the Hudson to the Lake.

In the course of his remarks on this subject, Mr. S. stated the striking and conclusive fact, that, although the route passes over, or rather winds through an uneven country in a portion of its line, yet that the greatest acclivity which it encounters at any point, *will not be steeper than the present grade of the Harlæm Railroad, in the Bowery, in this city, opposite Vauxhall*, and that the greatest portion of the whole line, has not more than one half of that degree of inclination—and he appealed to his fellow citizens, who daily witnessed the rapid passage along that street, of loaded vehicles drawn *by horses*, to point out what difficulty could exist in passing over grades of less severity wi h locomotive engines.

Mr S. proceeded to point out the importance of securing a connexion in the early spring, between the port of New-York and the populous valleys of the Ohio and Mississippi, and called the attention of the meeting to the fact, which he deemed all important, that the head of navigation of those rivers, forming the commercial key of that whole region of territory, actually lay *within the limits of this State*, in the county of Cattaraugus, and on the very line of the proposed road. He was confident, he said, judging, from his own want of acquaintance until a very recent period with that important feature in the enterprise, that his fellow citizens were not thoroughly aware of the capacity and value of that stream. He read to the meeting a very interesting letter o. the subject, from Judge Chamberlain, of Cattaraugus County, which had been printed under the direction of the Senate of this State, while the loan law was under consideration, and he showed from the facts therein set forth, that when the railroad shall be completed from the Hudson to that river, the merchandize of this city can be sent down into the valley of the Ohio, before the 10th of March, earlier even than the opening of the Pennsylvania Canal, and nearly six weeks before the opening of the Erie Canal.

Mr. S. added, that he was fully satisfied, from the general character of the country, and of the grades of the road, that it could be cheaply constructed and profitably used—that the large population which it would accommodate, and which is now rapidly increasing, would afford a lucrative revenue in the transportation both of persons and property; and that such revenue would steadily increase with the growth of the country and the development of its resources.

In conclusion, Mr. S. described the struggle which is now exhibited of four important Atlantic States:—*Virginia*, through the James River and Kanawha Canals and Railroad—*Maryland*, by the Baltimore and Ohio Railroad—*Pennsylvania*, by her Railroads and Canals; and, lastly, *New-York*, with the proposed Railroad, all striving to win the rich prize of the Western trade.—And he earnestly appealed to his fellow citizens to come forward at once, and by all the means in their power, to hasten the completion of a work in which their commercial ascendancy and permanent prosperity were so deeply involved.

He, therefore, submitted the following resolution, which was passed unanimously:

Resolved, That the early completion of the New-York and Erie Railroad is, in the opinion of this meeting, an object of the highest importance, both to the local interests of this city, and to its commerce with the interior; and that this meeting entertains the fullest confidence in the feasibility of the undertaking—in the resources relied on for annual dividends wh le the work is in progress—and in the security and value of the stock when the road shall be in operation.

Mr. *George Griswold* succeeded Mr. Stevens.

Mr. G. said, that the time had come when it was necessary for the citizens of New-York to determine whether a work, such as they had heard described, and of which the importance to our prosperity could not be overrated, should be urged on to rapid completion, or suffered to languish and die—this was the question, and on the decision of this meeting it depended, whether the enterprise should succeed or fail. He could not doubt the result of the appeal that had been made. Pride, patriotism, self-interest, all combined to induce us to proceed. Already Pennsylvania, by a railroad in progress to Erie, on the Lake, is aiming to strike the very point we are tending to; and shall we sit still and let a rival—an honorable and emulous rival indeed—take from us the prize. Nature, art, enterprise, and skill had given us the ascendancy: a harbor, to which the world presented no superior—approachable at all times—that is, added Mr. G.—when pilots are to be found—the finest ships in the world, the best sailors, as he verily believed, and vast enterprise, gave us the lead, and that lead nothing could take away from us, if we were only alive to our true interests. The work under consideration appealed to all those interests—to the merchant, to the householder, to the professional man, to the ship builder,—nay, there was not a cartman, sailor, rigger, or laborer connected with the city, who would not be more or less benefitted, either in the increase of work, the augmentation in the value of property, or the extension of business, by this new opening to the far West. And to insure these most desirable results what was asked? A subscription payable in equal parts in four years, of twelve hundred thousand dollars! not four dollars a head for our population—not one dollar a head annually for four years! Can there be a doubt that this trifle, this very trifle compared with the resources and means of the city, would be forthcoming?

Mr. G. concluded by saying, that as evidence he did not recommend to others what he was not prepared to aid in himself, he would state that, in behalf of himself and some friends with whom he had consulted, if one million were subscribed by the citizens at large *he would take the remaining two hundred thousand dollars!* He believed it would be an excellent investment.

He, therefore, submitted the following resolution, which was unanimously adopted:

Resolved, That in view of the rival enterprises of other States, this community is loudly called on to sustain the efforts necessary to a vigorous prosecution and rapid accomplishment of this undertaking, by means of which the earliest and most speedy communication will be established between this city and the vast and various markets in the valleys of the Ohio and

Mississippi, and on the borders of the western and north-western Lakes.

On motion of Mr. *Robert Chesebrough*, it was unanimously

Resolved, That the entire population of this city, from the poorest to the most prosperous—laborers, mechanics and manufacturers, as well as merchants, land owners and professional men—are alike deeply interested in the completion of this work, as a medium of constant and abundant supplies from the remote interior, of provisions, fuel, lumber and other articles of consumption, at all times, and especially during the winter months,—since by such supplies, renewed from day to day, the expenses of living will be materially diminished, and the health, comfort and prosperity of all classes of citizens essentially promoted.

It being announced to the meeting, that Mr. *Ogden* now of the State of Illinois, and lately of Delaware county, in this State, was present, and that he had actively advocated the Loan Law, as a member of Assembly from that county, in the session of 1835.

Mr. O., on the call of the meeting, made a brief exposition of the nature and extent of the products which the Southern counties would afford for transportation on the proposed road, and particularly of the valuable lumber which was now exported from that section of the State, throughout the whole valley of the Mississippi.

He proceeded further to advert to the rapid improvement now taking place throughout the whole of the west, particularly in constructing railroads destined to be tributary to the one under consideration, and to extend the line of communication into the remotest portions of those fertile and rapidly peopling regions of the interior, all of whom, said Mr. O., are looking, with eager eyes, to the New-York and Erie Railroad, and prepared to meet it at least half way, and extend to its projectors and supporters the right hand of fellowship.

General Tallmadge felt quite sure that the wants of the Company would be immediately met, for he placed the fullest reliance upon the statements which had been made, and upon the ability of this city to afford the requisite aid; and he was, moreover, well acquainted with the value of the Southern tier of counties. He would remind the meeting of events of which he himself was a witness. When the State of New-York made application to the General Government for assistance in carrying out her schemes of improvement, they appeared so vast even to the mind of President Jefferson, that he pronounced them to be *"a hundred years in advance of the times."*—That application, and the refusal, on account of its character being deemed so chimerical, did actually prostrate the credit of this State, and postpone the accomplishment of her great designs, until taking courage, and relying upon her own energies, New-York unaided, carried into vigorous execution her great system of Internal Improvement—elevating her credit to the highest point abroad and at home,—and reaping a full measure of glory and prosperity. Similar results, said Gen. T., will assuredly follow, if the New-York and Erie Railroad shall now be sustained by those to whom the appeal is made—and thus another will be added to the bright examples, of what may be accomplished by a people blessed with a healthful and fertile soil—and with their faculties developed and strengthened by general education, and by free political institutions. He would therefore move the following resolution, which was unanimously adopted.

Resolved, That it is expedient to adopt measures without delay, to increase the available subscriptions to the stock of the New-York and Erie Railroad Company to three millions of dollars,—that a committee of thirty-five citizens, with power to add to their number, be appointed by the chair, to obtain subscriptions,—and that it be recommended to the Board of Directors forthwith to open books for that purpose, at the Merchants' Exchange, and at such other places as they shall deem expedient.

The following gentlemen were then nominated by his Honor the Mayor:—

John Haggerty,	John A. Stevens,
Robert Chesebrough,	Moses H. Grinnell,
Samuel S. Howland,	James N. Wells,
Chas. N. Talbot,	Moses Taylor,
Benj. Birdsall,	Nath'l. Weed,
Frederick Sheldon,	E. S. Gould,
Stephen Allen,	Simeon Draper, Jr.
Charles Kelsey,	Abm. G. Thompson,
Thomas R. Mercein,	David Austin,
Daniel Jackson,	D. W. Wetmore,
Shepherd Knapp,	Samuel Jones,
Robert Ray,	George W. Bruen,
James B. Murray,	Thomas E. Davis,
Charles Hoyt,	J. A. Perry,
Ogden E. Edwards,	Christopher Wolfe,
Henry H. Elliott,	David Lee,
Edward G. Faile,	Charles Denison,
Alfred R. Mount,	Jacob Lorillard,
Martin E. Thompson,	Philetus H. Woodruff,

And Andrew Lockwood,

It was therefore Resolved, that the proceedings of this meeting be published, and the meeting adjourned.

C. W. LAWRENCE, President.

JAMES N. WELLS, }
NATH'L. WEED, } Vice-Presidents.

THOMAS R. MERCEIN, }
WM. SAM'L. JOHNSON, } Secretaries.

We feel proud in being able to lay before our readers this Report in relation to the affairs of a Company, that in all its arrangements financial and professional, may fearlessly challenge competition.

In New-York we feel additional interest in a work of so much importance to our city. May it go on as prosperously as it has commenced.

REPORT OF THE COMMITTEE OF THE LEGISLATURE, APPOINTED TO EXAMINE INTO THE CONDITION, AFFAIRS, REVENUE, AND FUTURE PROSPECTS, OF THE NEW-JERSEY RAILROAD AND TRANSPORTATION COMPANY.

MR. WILLIS, from the Joint Committee, made the following Report to the House of Assembly.

The Joint Committee of Council and Assembly who were charged by a resolution passed at the last sitting of the Legislature with the "duty of examining and investigating the condition and affairs of the New-Jersey Railroad and Transportation Company, the expenditures they have made on their work, the probable amount necessary for its completion, with the revenue now receiving by the Company, and all such other facts as may aid the Legislature in deciding upon the subscription to the capital stock of the Company, reserved by the charter, according to the best interests of the State," beg leave to report:

That they have during the late recess visited and examined the works and property of the Company, and made a minute and careful investigation of their books of accounts and papers necessary for the full understanding of the various matters required by the foregoing resolution, and have unanimously agreed in submitting the following highly satisfactory statement of the result of their examination, which, in order to be as plain and intelligible as possible, exhibits each subject investigated by the Committee in detail.

1. *Condition of the Work.*

The work is fully completed with a single line of rails, and an adequate number of turnouts, from the Raritan to the Passaic rivers, (a distance of 22¼ miles) upon the most approved mode of structure, with heavy upright iron rails; on the whole of this distance, a locomotive engine has been used since the middle of last July, making three trips a day.

From the Passaic to the Hudson river, (a distance of about 8 miles,) the road is but partially finished. A single line of rails, however, has been laid on the permanent route of this portion of the work, from the Passaic to near the Hackeusac river, and an double track about one mile east of the Hudson, and a temporary track on the intervening portion, viz. the Hackensac Bridge and Bergen Hill. Over the whole of this distance, cars have been used with horse-power, since September 15th, 1834, making a trip each way every hour and a half during the day, besides a night line of three trips.

Throughout the whole route, the grade of the road is no where to exceed 26 feet to the mile, as will be seen by reference to the map and profile accompanying this Report, it being understood that the entire distance between New-York and Philadelphia will admit of a railroad construction of this low graduation.

The parts which are incomplete are the Dock and place for depot at Jersey City, the deep cutting at Bergen Hill, the abutments of the Hackensac Bridge, the Bridge or Viaduct over the Raritan, and the extension of the road three miles south of Raritan to the point of its termination. The work at these several points is now in progress, with the prospect of being completed within one year. The cost of the unfinished portions, with the additional fixtures, and the right of way not yet obtained, is estimated by the chief Engineer, L. A. Sykes, at $300,416, as per paper marked A.

2. *Available Means of the Company.*

The Capital Stock subscribed and actually paid in, is $1,125,000, being ¾ of the whole capital. The remaining ¼ of the capital, amounting to $375,000 (the privilege of subscribing to which being reserved to the

State, and of course not available,) the Company, in order to proceed with the work without delay or interruption, have temporarily borrowed the sum of $158,082.14.

Surplus lands, which from motives of policy, or the necessity of the case, the Company have purchased in connexion with the right of way, and which are disposable by the Company, are estimated to be worth at least $100,000.

Debts due the Company and cash on hand, exclusive of the transportation account $18,757.88.

In addition to the above, the Company have purchased and hold, agreeably to the authority and requirements of the 10th section of the charter, stocks of other companies, as follows, viz.

Of the united Hackensack and Passaic Bridge Company,	$113,759 19
The Newark Turnpike Company,	25,780 58
New Brunswick Bridge Company,	34,920 00
Essex and Middlesex Turnpike Company,	18,192 33
	$192,652 10

Locomotive engines, cars and horses, which at a depreciation of from 8 to 25 per cent. on the cost, are estimated worth $64,542 46

Wood on hand, 3,000

3. *Total Expenditures, exclusive of the Transportation Account.*

Cost of the construction of the road, Bridges Viaducts &c	$860,335 35
Location and purchase of lands, and right of way,	222,606 42
Locomotive Engines,	25,042 46
Cars,	38,105 72
Cost of Horses,	13,189 73
" Wood,	7,185 31
Expended for Stocks in other Cost referred to above,	192,652 10
In rebuilding a bridge for the Hackensack and Passaic Co.	11,210 78
For repairs of Newark Turnpike,	2,473 79
Loans and debts now due to the Company,	3,587 64
Expended on Interest account and Dividends on acconnt of School Fund Stock,	1,407 98

4. *Revenue and Future Prospects.*

The nett receipts for transportation, from Sept. 15, 1834, when the cars commenced running, to June 1, 1835, a period of 8½ months, are $18,306 71

To which add the gross amount of receipts since June 1, 1835, viz. 169,447 55

Making total $187,754 26

From which deduct the whole amoun charged to transportation account within the same period, and which has been greatly enhanced in consequence of the temporary track over Bergen Hill, requiring the use o horse-power, viz. $81,435 04

Also the whole amount of Dividends, which have been declared on and after July 1, 1835, and which have been uniformly at the rate of 6 per cent. per annum on the capital stock paid in, viz. 47,315 00

$128,750 04

Leaving a balance in favor of the receipts on transportation account up to Dec, 1, 1836, which is applicable to the payment of Dividends and incidental expenses, of $59,004.22.

An estimate of the continual increase of revenue from transportation; and of the future prospects of the Company, may be made from the annexed statement (marked B) showing the number of passengers for each month since June 1st, 1835—and also from the close of the paper (marked C) showing the gross amount of receipts for transportation for three successive periods of six months each.

In addition to which a farther increase of revenue may be anticipated from the completion of the following tributary roads, viz: "The Morris and Essex railroad," four miles of which are finished and in use, the passengers of which are now carried between Newark and Jersey City, in the cars of the New-Jersey company, by an arrangement between the respective parties. "The Somerville railroad," which is in a course of construction, and intersects the New-Jersey railroad at Elizabethtown:—and the continuous line of railroad across the State, which will be effected when the Branch railroad from New-Brunswick to the Camden and Amboy railroad, authorised and required by a supplement to the charter of the latter company is completed; for the speedy accomplishment of which work, so beneficial to the State and to the whole community, definite arrangements have been made by the respective companies interested; each being bound to carry each other's passengers in a commodious and expeditious manner; and the receipts to be divided between them in a pro rata proportion; each party, however, preserving its distinct and separate interests, as satisfactorily appears from an examination of the contract.

It is to be recollected, that the revenue hitherto received, has been derived principally from the transportation of passengers; and that the amount must be greatly enhanced, as well as the expense greatly diminished, when the cut through Bergen Hill is completed, so as to admit of the application of steam power to the transit of merchandize.

The sum of $59,004.22, which stands on the books of the company, to the credit of the transportation account, and which is stated above to be applicable to the payment of Dividends, has been borrowed by the construction account, that is to say, the company have expended the same in carrying forward the work. It is, however, understood to be the intention of the Board of Directors to replace this sum; and it is yet an undecided question whether to refund a sufficient amount to meet the next regular semi-annual dividends, or to postpone the payment of said dividends, until the company are in funds, from the disposal of the reserved capital stock; a question, which in the opinion of your committee justly entitles them, to the prompt decision of the legislature.

5. *Miscellaneous Facts.*

A contract has been made with the "Paterson Railroad Company," which is to continue during the charters of the respective companies; by which is received a transit duty of 6 cents per passenger and 12 cents per ton of merchandize transported over the New-Jersey road from the junction near Bergen Hill to Jersey City.

The State of New-Jersey has merged the amount of its stock in the "Newark Turnpike Company," viz: $12,500 in the stock of this company, for which the State holds a guarantee of a minimum dividend of 8 per cent. per annum.

The sum of $192,652.10 invested in the stocks of the several bridges and turnpike companies referred to in the preceding part of this report, yield a revenue of between 6 and 7 per cent. per annum on the cost.—And notwithstanding a reduction of tolls of about 33⅓ per cent.; and notwithstanding the diversion of travel by the railroad and by steamboat between Newark and New-York, the amount of revenue from these sources has increased, and is continually increasing.

In conclusion it is but just to add, that all the financial operations of the company, have been based upon cash payments, and are copiously and clearly exhibited in the books of accounts and vouches. That notwithstanding the magnitude and the difficulties of the work, it has been advanced to its present state, with as little delay as could have been reasonably expected; affording just ground of confidence in the determination of the Board of Directors to bring it to its final completion in the short period of a twelve-month; and although numerous and heavy contracts have been made with different individuals, no losses have been sustained by the company, with the exception of a single instance, in which the securities held, are perhaps of a dubious character, amounting to $1,260.09.

By way of recapitulation, annexed to this report are two balance sheets (marked C and D) prepared by the Treasurer of the company, of the correctness of which your committee have satisfactory evidence, from an examination of the books and papers, which exhibit a summary view of the condition and affairs of the corporation, up to December 1st, 1836.

The committee do not at this time present any bill for the specific action of the legislature. They consider it, however, proper to state, that the Company have placed in their hands two resolutions expressive of their wishes on so much of the subject as they refer to, which resolutions are annexed to this report, and marked E. By the first of these, it will be perceived that in order to make the reserved stock of the company available for the progress of their work to its completion, they request of the legislature as speedy a decision upon the question of subscription as practicable, in order that individual subscriptions may be obtained without delay, should the State conclude to waive her right; a requeswhich your committee conceive to be reasonable, and do therefore recommend the early action of the legislature upon the subject. The other resolution offers to guarantee to the State on stock to the amount of two hundred thousand dollars, dividends at the rate of at least five per cent. per annum; or on one hundred thousand dollars, dividends at the rate of at least six per cent. per annum, and such further and larger dividends as shall be declared by the company: and they also agree to refund to the State the aforesaid sums respectively, and retake the stock if the State should subscribe either amount, whenever repayment of the monies received by New-Jersey under the Deposite Act, shall be required by the General Government.

The committee therefore, submit to the legislature the foregoing facts, as the result of their labors under the resolution by which they were created; and they deem it incumbent on themselves to say, that in their examinations, investigations, and whole intercourse with the company, the committee have been furnished with every facility for the full and faithful discharge of their trust. All which is respectfully submitted.

THOMAS ARROWSMITH, } Committee
J. C. SMALLWOOD, } of Council.

M. WILLS,
ELIAS P. SEELEY,
JOHN A. BLEECHER, } Committee of Assembly.
W. C. ALEXANDER,
WM. PIERSON, jr.

[A]

To the President and Directors of the New-Jersey Railroad and Transportation Company:

GENTLEMEN:—Agreeably to instructions, I hereby lay before you an estimate of the expense requisite for completing your rail road from the Hudson river to the Westerr termination, in the city of New-Brunswick. All the grading to be of sufficient width for two tracks, and one track to be laid complete with the requisite number of turnouts, sidings, car-houses, engine-houses, &c.

To complete filling dock at Jersey City, 105,000 cub. yds. at 28c.		$29,400
" Grading through Bergen Hill, 37,032 solid rock at $2	$74,064	
" Grading through Bergen Hill, 1,000 solid rock at 70c.	700	
" Grading through Bergen Hill, 5,600 solid earth at 15c.	840	
" Grading through Bergen Hill, 19,400 solid earth at 10c.	1,940	
" Grading through Bergen Hill, 2,000 solid wall at 50c.	1,000	
" Grading through Bergen Hill, 30,000 embankment at 25c.	7,500	86,044
" Embankment, sections 7 and 8, 18,000 cubic yds. at 33c.	5,940	
" Embankment, sections 8 to 13, 25,000 cubic yds. at 50c.	12,500	18,440
" Grading sections 14 to 67 and completing bridges, Raritan bridge excepted,		45,000
" Raritan viaduct masonry 3,227 cubic yds. at $4.87¼,	15,932	
" Raritan viaduct Superstructure. (Hassards contract),	23,600	
" Raritan viaduct Tinning and painting bridge,	10,000	
" Raritan viaduct draws and sundries,	8,000	57,532
" Superstructure of road, single track to termination,		24,000
" Car-houses, Depots, &c.		20,000
Add for right of way to termination,		20,000
		$300,416

The above I believe to be a full and sufficient estimate.

L. A. SYKES, Engineer.

Newark, November 1st, 1836.

[B]

Whole number of Passengers on the New-Jersey Railroad for the following 18 months, ending 1st December, 1836.

June,	1835,	11,809
July,	"	18,222
August,	"	13,148
September,	"	14,196
October,	"	19,231
November,	"	13,609
December,	"	12,144
January,	1836,	16,606
February,	"	9,270
March,	"	15,856
April,	"	24,694
May,	"	19,939
June,	"	21,244
July,	"	40,659
August,	"	34,332
September,	"	42,596
October,	"	34,829
November,	"	33,525
		395,918 Passengers

N. B. Of the above amount, 207,185 passengers have been transported over the road within the last six months, being ⅓ of the time embraced in the above statement.

[C]

Summary Statement, from the Balance-Sheet of the New-Jersey Railroad and Transportation Company, November 30, 1836.

Receipts.

Capital Stock, amount actually paid in,	$1,125,000 00
Nevins, Townsend & Co. Cash advanced the Co.,	158,082 14
Transportation, balance to credit of this account,	59,004 22
Brunswick Bridge Stock, amount of purchase,	33,920 00
Ground-Rent, balance to credit of this account,	674 16
Unpaid Dividends,	688 50
New-Brunswick Bridge Co. balance tolls received,	615 68
John P. Jackson, advanced for right of way,	298 25
	$1,379,282 95

Disbursements.

Construction of Road and Bridges,	860,335 35
Location, purchase of land and right of way,	222,606 42
Locomotive Engines, cost per account,	25,042 46
Cars, do.	38,105 72
Horses, do.	13,189 73
Wood, do.	7,185 31
Stocks of Hackensack and Passaic Bridge Comp.,	113,759 19
Of Brunswick Bridge Company,	34,920 00
Of Newark Turnpike Company,	25,780 58
Of Essex and Middlesex Turnpike Company,	18,192 33
	$192,652 10
Due from Hackensack and Passaic Bridge Comp.,	11,210 78
Due from Newark Turnpike Company,	2,473 79
Do. Sundry Individuals,	3,587 64
Cash, balance in hand,	1,485 67
	$18,757 88
Treasurer of School Fund Stock,	875 00
Interest Account,	532 98
	$1,379,282 95

The foregoing statement shows the gross amount of receipts and indebtedness of the Company, including capital stock, to be $1,379,282 95

From which deduct amount to credit of transportation account,	59,004 22
	$1,320,278 73
Of this sum there has been invested in the stocks of the Bridge and Turnpike Companies, which produce an income of 6 to 7 per cent. per annum, and which is not properly chargeable to expenditures on the road,	$192,652 10
The cost of Locomotives now in use is,	$25,042 46
The depreciation on which is estimated at	2,000 00
	23,042 46
The cars now in use cost,	38,105 72
And are estimated to be impaired,	6,603 72
	31,500 00

The horses on hand are estimated worth at least,	10,000 00
The wood on hand is estimated at,	3,000 00
Debts due the Company, including cash on hand,	18,757 88
Besides which, in purchasing Lands for the location of the Road, more has been bought than will be required, and it is believed that the surplus Lands, after the right of way is completed, will sell (making allowance for some further expenditures on that account,) for at least,	100,000 00
	378,952 44
	$941,325 29

It thus appears, that less than a million of dollars of the Capital has been applied to the location and constructien of the Road, a very considerable portion of which has been expended upon the excavations at Bergen Hill, the embankments on the Newark meadows, and the Viaduct over the Raritan at Brunswick, none of which have been yet used for any purpose of profit or income.

The balance to the credit of Transportation account has principally accrued from the business of the Company since the 1st of May last, and furnishes the means, even in the present unfinished state of the work, to continue the dividends on the stock of 6 per cent. per annu n; that account has been already charged with all the incidental expenses of Transportation, leaving a balance as is seen, of $59,004 22

Still, with a view to greater precision, it may be proper to deduct from this sum the estimates of the Superintendent, (which he considers large,) for the depreciations of the Locomotives now in use,	$2,000 00
Of the Cars,	7,605 72
Of Horses,	3,189 73
And for the consumption of Wood,	4,185 31
	15,980 76
Leaving a nett balance of profits from Transportation, of,	$43,023 46

The following are the amounts received for transportation of Passengers and Merchandize, from Sept. 15, 1834, (when the road was open,) to Dec. 1, 1836, from the Books of the Company.

From Sept. 15, 1834, to June 1, 1835, 8½ months, the *nett* receipts were,	$18,306 71
From June 1, 1835, to Dec. 1, 1835, 6 months, the *gross* receipts were,	38,216 43
From Dec. 1, 1835, to June 1, 1836, 6 months, the *gross* receipts were,	41,261 04
From June 1, 1836, to Dec. 1, 1836, 6 months, the *gross* receipts were,	89,970 08

J. WORTHINGTON, Treasurer.

[D]

Balance sheet from the books of the New-Jersey Railroad and Transportation Company, taken Nov. 30th, 1836.

DEBITS.

CONSTRUCTION ACCOUNT—Amount of expenditures liquidated and paid,	$727,050 16
Mason, Downing & Co., contractars on Bergen Hill, paid them,	52,342 39
Thomas Hassard, ditto on wood work of Brunswick Viaduct,	21,000 00
Bishop & Campbell, ditto mason work of do. do.,	28,955 29
Lawrence & Whitney, ditto for Cedar Ties on acc't.,	5,000 14
Engineering, salaries and expenses of engineer corps,	25,987 37
	$860,335 35
LOCATION—Amount of expenditures liquidated and paid,	199,582 11
Wards Dock, paid for this property, not required for right of way,	2,625 00
Commercial Dock, do. do. do. do. do.,	13,750 00
First Baptist Church, paid on account this property at New-Brunswick,	6,327 50
James Crane, advanced to obtain right of way at E. Town,	321 81
	222,606 42
LOCOMOTIVE ENGINES—The amount paid for 3 now in use,	21,542 46
H. R. Dunham & Co. paid on account of a new one,	3,500 00
	25,042 46
CARS—The amount paid for those in use,	26,805 72
John Stephenson, on account, additional cars	11,300 00
	38,105 72
HORSES—Amount paid for Horses,	$13,189 73
WOOD—Amount paid for wood (550 cords on hand,)	7,185 31
STOCK—Of the united Passaic and Hackensack Bridge Co., 877 shares purchased (123 remaining,)	$113,759 19
Of the Newark Turnpike Co., paid for 462 shares, (38 remaining,)	25,780 58
Essex and Middlesex do. do. 921 (79 do.,)	18,192 33
New-Brunswick Bridge Co., cost	34,920 90
	192,552 10
HACKENSACK AND PASSAIC BRIDGE Co—Balance due from them for constructing a new bridge,	9,910 78
Daniel Blasdell, paid him on account contract for covering do.,	1,300 00
	11,210 78
Newark Turnpike Co., expended for repairing road,	2,473 79
Lewis Condit, this amount due from him,	2,147 55
Thomas Salter, do. do.,	180 00
Reserved Stock, ¼ of capital reserved by charter,	375,000 00
Treasurer of School Fund, loss by agreement to guarantee 8 per cent. on stock,	873 00
Interest Account, balance of this account,	532 98
Estate of Z. Drake, balance due,	1,260 09
Balance of cash on hand,	1,485 67
	$1,754,282 95

CREDIT.

Capital Stock, whole amount of capital,	$1,500,000 00
Nevins, Townsend & Co. this amount advanced by and through them,	158,082 14
Bills Payable, sundry bonds given for New-Brunswick Bridge Co., stock,	34,920 00
Transportation, balance of this account,	59,004 22
John P. Jackson, do. due him,	298 25
Ground Rent, do. of this account,	674 16
First Dividend, unpaid	7 50
Second do. do.	96 00
Third do. do.	585 00
New-Brunswick Bridge Co. balance of this account,	$615 68
	$1,754,282 95

[E]

Office of the New-Jersey Railroad and Transportation Company,

DECEMBER 12th, 1836.

The following resolutions were passed by the Board of Directors of the New-Jersey Railroad and Transportation Company, at their meeting, December, 12th, 1836.

Resolved, That as the decision of the Legislature of New-Jersey, upon the question of subscribing to one-fourth of the capital stock of this Company, reserved to the State by the charter is desirable, in order that this reserved stock may be made available to the company either by the subscription of the State or individuals; the Legislature be respectfully requested to decide the question as soon as practicable.

Resolved, That in case the State of New-Jersey will relinquish a portion of the stock of this company reserved by the charter, that this company will guarantee on a permanent subscription to stock to the amount of two hundred thousand dollars, dividends t the rate of *at least* five per cent. per annum; or on a permanent subscription of one hundred thousand dollars, dividends at the rate of *at least* six per cent. per annum, and such further and larger dividends as shall be declared by the company. And this Company will also agree that in case repayment of the monies received by New-Jersey under the Deposite Act, shall be required by the General Government, this Company will retake from the State at par such an amount of the stock which may be subscribed as aforesaid, as will enable the State to repay to the General Government at such times as they may require repayment, a just proportion of the sum subscribed by the State for said stock.

I certify the foregoing to be a true extract from the minutes of the Board of Directors of the New-Jersey Railroad and Transportation Company.

JOHN P. JACKSON, Secretary of
N. J. R. R. & T. Co.

The following Report from the pen of one of our most promising engineers, deserves a careful perusal. The importance of the work, completing as it does, one of the grand east and west chains of improvement is a sufficient argument, if any be needed, for the earnest consideration of the subject by every friend of internal improvement.

REPORT ON THE SURVEY FOR A SHIP CANAL FROM RICHMOND TO WARWICK, BEING THE PLAN PROPOSED FOR THE CONNECTION OF THE JAMES RIVER AND KANAWHA IMPROVEMENT WITH TIDE WATER. BY Charles Ellet, Jr. C. E.

RICHMOND, November 28th, 1836.

To the President and Directors of the James River and Kanawha Company.

GENTLEMEN,—In compliance with the resolution of your board of August 23d.. "That the Chief Engineer be requested to take measures at as early a day as practicable, to have a survey and estimate made of the best possible plan of locking down from the old canal at some proper point in or near the city of Richmond, to tide water in James river, and the best plan to unite with the river and the dock, each plan being separate from the others, and report the survey, plans, &c. to the board," I herewith present my views on that subject. and the plan which I deem best adapted to the case. I have not attempted to comply with the full purport of the resolution, and furnish a separate map and estimate of each of the plans that might be adopted, since the time which could be devoted to this question is limited, and most of those plans are manifestly inadequate to the wants of the trade and the convenience of the city.

I have thefore restricted myself, for the present, to the determination of the best mode of connecting the work with tide water, and making the most suitable arrangement for the accommodation of the internal and foreign commerce of the port.

I am aware, that in offering my present plan in place of those which have been suggested at other times, as sufficient to satisfy the precise requirement of the law, I have exceeded the object contemplated by the charter, and have perhaps transgressed the limit of the powers of the company; but whatever influence that consideration may have on the action of the board, I presume it should hardly prevent the development of a project which may possess sufficient importance to lead to a modification of the charter itself.

To open a communication between the canal and the river by either of the lines which I have pointed out for the purpose, is easily accomplished. There is no difficulty in placing the produce brought by the canal in tide water, or delivering it on the wharves of the dock; and if this were all that is required by the character and purposes of the work, the duty of forming this connection would be one of great simplicity. But the improvement in which you are engaged is designed to become the medium of intercommunication between foreign countries and the interior of our own; the line of transit of the imports, which coming from abroad, are to be distributed in the west, and of the products of the west which are intended for foreign markets. And in this effort it comes in competition with two lines on the north already in full operation, and of several others of almost equal pretensions, either contemplated or in progress of construction. So that however fair may be the present prospects of the company in this field of enterprise, it becomes the friends of the improvement to enhance to the utmost the advantages which they possess, and overcome, as far as practicable, the impediments in the way of their success. Among the advantages of the line, one of the most conspicuous, is, perhaps, the possession of a valley highly favorable for the construction of the work, while among the obstacles to be mastered in the rivalry, is the comparative inconvenience of the navigation which leads to its outlet. And although this difficulty may appear to apply rather to the importer and the shipper than to the James and Kanawha Company, it is not to be doubted, that the character and standing of the work are directly interested in its removal.

Every ton of western produce, and every bale of goods which are brought to the city, are subject to a tax in the cost and risk of transportation, and in time in passing from the canal to the shipping, or from the vessels to the warehouses; and the cost of lighterage, though considerable in itself, is a small amount in comparison with the inconvenience and loss of having the business which needs the eye of the master, transacted by agents, at the distance of sixty miles from the city, and the risk of transportation, the delay of the vessel, and the inactivity of capital while the ship and cargo are detained in port. The company is affected by this loss. The risk is attended by an additional insurance, an the delay by an increase o freight; and these charges are a tax upon the trade, which, to the extent of its operation, places the work in a position unfavorable to an equal competition with it rivals.

It becomes necessary, therefore, in addition to the importance of opening a passage for the produce from the canal to the wharves, to remove as far as practicable, the expense of delivering it on shipboard; and if this can be effected by a plan which will simultaneously reduce the other charges and risks to which it is exposed, and promote the prosperity of the city, which is the termination of the work, its claims on the consideration of the company will be proportionally enhanced. But until the inconvenience of transshipment is overcome, and the delay and cost of transporting the cargo of each vessel that is consigned to this port, to Warwick, or to City Point, are obviated, these conditions cannot be satisfied. And I am persuaded that no plan that leaves a space between the termination of the James River and Kanawha improvement and the shipping can be regarded as adequate to the commerce of the city or the wants of the trade of the interior; and that no termination should be received as admissible that does not bring the shipping up to the business part of the town, and enable us to lay the canal boats along side the vessels.

The plan I propose is designed to effect this object; and without discussiug the merits of other projects, by which it is supposed such a connectien might be accomplished, further than is necessary to show their inadequacy to the purpose, I will confine myself to the reasons which have prompted me to recommend the one before you, and to the facts which establish its sufficiency, and the profitableness of the investment.

The condition of James river from Warwick to Harrison's bar is generally known. There is, I am informed, no point where the depth is less than 14 feet at common tides; and it is not unusual for ships of burthen to take in a part of their lading at Warwick and afterward drop down below Harrison's bar and make up their cargo. But owing to the difficulty of ascending the river to Warwick without the aid of steam, and the necessity of employing lighters after doing so, this is not a frequent practice; and it is more usually preferred to take in the whole cargo at City Point or Bermuda Hundred, than risk the chances of a precarious passage without gaining the advantage of relief from the inconveniences of the lower position. But if the navigation were good from Warwick to Richmond, and vessels could receive on the wharves that portion of their lading with which they can pass the bars, it is not to be questioned that the master of every vessel receiving her load at this port would be induced by such a condition of things to come up to the city. Although there is no sufficient reason to doubt the practicability of removing, or at least reducing the bars below Warwick, so that with proper arrangements above that place the whole lading might be taken on board at Richmond, it should be observed, that even in the event of those obstructions being found irremediable, but a very small portion of the whole trade of the place would have to be transported in lighters. Neglecting that part of the shipments which would continue to be made in sloops and schooners, as at present, a very considerable proportion of the foreign trade, (perhaps more than one half,) would be carried in brigs, or ships of less than four hundred tons burthen, which could pass over the bars fully loaded. Of the remaining half, perhaps four-fifths would be received on board at the city, and consequently only the remaining one-fifth of that part which would be shipped in vessels of four hundred tons or more, or one-tenth of all that is carried in vessels too large to come up to the wharves at this time, need be transported below the bars in lighters. The reduction of the bars, however important in other respects, is not therefore essential to the success of a plan requiring a heavy expenditure for removing the obstructions near Richmond.

The survey of the river, recently made by order of Congress, will doubtless exhibit the character and formation of the bars below Warwick, and will perhaps detect the causes of their deposit; and, until the result of that examination is known, it will be premature to speculate on the cost of removing them. But, as the propriety of undertaking the improvement of the navigation above, does not depend on the success of the attempt that may be made below, we may consider the plan proper to be adopted for the latter, without reference to the former.

In the plan I now present for your consideration, it is not proposed to make use of the bed of the river, by attempting to remove the obstructions between Rocketts and Warwick. Independently of the cost of carrying into execution any plan for that purpose, I deem the success of such an experiment more than dubious. The bars which are deposited at the head of tide, are formed by the materials brought down by the streams from the interior of the country; and they consist, in fact, of the waste of the whole district drained by the tributaries of the river at the mouth of which the material subsides. This matter is loosened by the action of frost and moved by the rain—the heavier particles subsiding as the transporting power of the water diminishes, while the lighter are swept on and contribute to the formation of bars at the head of tide, and of deltas at the mouths of the streams. The deposit is greatest where the diminution of the fall of the river is most abrupt, and the resistance to the motion of the water is greatest; and, consequently, on approaching tide-water, where the transporting power of the river is suddenly neutralized, much of the matter which was forced along the bottom is left by the current, and of that which was held in suspension much is precipitated.

The wearing away of the upland is unceasing, and the process of transportation is not less constant; and no plan for improving the navigation at the points where the resistance of the material which is deposited is superior to the tidal force can be perfect which does not provide for the disposal of this matter.

The objection then to the project of a dam below the shoal water, and raising the surface from that point up to Richmond a sufficient height to float the shipping that can come to Warwick, is that instead of disposing of this material, we prepare still water to destroy the force of the current, and a basin to receive the sediment that is precipitated. We have not the necessary data to determine the time that would be required to fill this basin, so as again to interfere with the navigation of the pond. But, when we observe the great quantity of sediment that is discharged by the river at every freshet, and know that the deposit would chiefly occur above this dam, and that it would continue to increase until the depth of the water would be reduced to the point where the transporting power would again become superior to the resistance, we shall appreciate the uncertainty of the expedient. The height to which the deposit would rise in the pond before the force of the current would be sufficient to carry the particles over the dam—the width of the water-way and all other things being constant—may be determined by the present condition of the bed of the river; for, the character of the deposit remaining the same, and the quantity of water being uniform, the area of the section, and consequently its depth must eventually acquire their present values.

To deepen the channel by actual excavation would be still less practicable. The rock below Rocketts might be removed; but the sand between it and Warwick presents a difficulty which could scarcely be overcome in that way. For, admitting the practicability of deepening the channel by excavating the sand to a sufficient depth over a space of three miles, it will hardly be contended that the benefit conferred on the city by such a labor, will be equivalent to the interest on the capital expended, and the additional cost of removing the annual deposit of the river.

To contract the water-way, and add to the depth of the channel by increasing the excavating power of the current, is a more rational suggestion: but, independently of the cost, there are serious objections against the adoption of the plan. The materials removed must be so distributed as to form no new obstruction to the navigation; to accomplish which, would require an extension of the works that will scarcely be justified by the object of the improvement.

Viewing then the insuperable objections against an attempt to improve the bed of the river sufficiently to subserve the purposes of the navigation, and the termination of the central improvement, I have been forced, in order to comply with the positive terms of the resolution under which I have acted, to seek other means of satisfying the conditions necessary to a proper connection of the work with tide-water.

For this purpose I propose building a dam, as represented on the accompanying plan, across the river below Mayo's bridge, and creating a pond deep enough to float ships of burthen from Shockoe creek to Haxall's mills: To construct a SHIP CANAL from this pond through the low grounds on the south side of James river to the deep water at Warwick: To make a dock, or harbor, separate from the pond, to receive the shipping and protect it from the floods, on the north side of the river, embracing about thirteen acres of ground above and below the abutment of Mayo's bridge.

Believing, confidently, that the depth of water on the bars below Warwick may be increased so that loaded ships may be brought to the termination of the canal, the plan and estimate are based on that assumption—at least they are intended to provide for that state of things. Therefore, as seventeen feet depth of water is required for a ship of 300 tons burden, of common mould, I have deemed that the least admissible depth that should be given to the canal. The width at the surface is assumed at 120 feet, and at the bottom at 52 feet, which is amply sufficient for the passage of two such vessels. The length of the canal, from the end of the towing-path bridge across the pond, to the river lock above Warwick, is $4\frac{1}{2}$ miles. The locks are 35 feet wide in the clear, and 155 feet long, between the gates.

The dam will raise the surface of the river $19\frac{1}{2}$ feet above low water, and will itself be raised on an average 26 feet above the rock on which it is to be founded. Provision will be made, in building it, for drawing off the water and discharging the deposit which will accumulate in the bottom of the pond.

The plan does not contemplate the admission of steamboats, either into the basin above the dam or into the dock appropriated to the shipping. Independently of the danger to the vessels to be apprehended from the near approach of fire, it does not appear to me advisable to mingle the light trade in which they are engaged with the heavy business that would be transacted around the dock. It seems preferable to continue the steamboat landing at Rocketts, to repair the old dock from the pier up to Shockoe creek, for the use of vessels engaged in the coasting trade, and reserve the proposed dock above the creek for the reception of the shipping that is now found at Warwick, City Point and Bermuda Hundred. But although the heavy ships would be confined to the upper dock, and the pond above the dam, it is not proposed to exclude the small craft from them, or to prevent the canal boats from descending to the lower one, or to tide water. The plan recommended is designed to offer proper facilities to every part of the trade; a lock from one dock to the other (to be built over Shockoe creek and enable us to dispose of that nuisance,) will permit the passage of canal boats and small vessels, while a mole 80 feet wide around the upper dock will give ample space for the use of drays and teams, and for ships to discharge their cargoes or to receive their lading.

A capacious basin will be formed in the river by the refluent water from the dam, which will greatly increase the extent of wharfage and the accommodations for the shipping.

The bridge should be moved further up the stream, and rebuilt in a more substantial manner and at a greater elevation.

The islands in the river should be cut down to low water mark, and their materials transferred to the dam and the embankment of the dock.

The surface of the ship canal on the south side of the river will be about five and a half feet above that of the pond created by the dam, at ordinary water, and the surface of the water in the dock will be level with that in the pond. Double gates between the dock and pond will enable us to regulate the height of the former, and protect the shipping from the effect of freshets; and a sluice opening from the upper dock to the river below the dam will permit us to draw off the water whenever circumstances require it. The canal will be supplied by means of a feeder brought from a point a little above the dam, which at present furnishes the water power to the cotton factory and flour mills in Manchester.

It would be natural, on a first glance to, suppose that great inconvenience might result from an unusual rise of water in the river, the velocity of the current tending to interfere with the navigation of the pond. But the plan which would be adopted for the purpose of towing vessels from the canal to the dock will preclude the possibility of accident, and operate more successfully during a freshet than in low water. The flood of last June would produce a velocity in the pond of but about fifteen inches per second, and a pressure upon the hull of the largest ship the work is designed to admit of about one ton. So that we have only to fasten the vessel by ropes capable of sustaining a tension of that amount to sheeves traversing guides on the superstructure of the bridge to secure the safety of the ship and obtain the assistance of the water in propelling her across the pond.

It is proper to remark, that this upper dock is not necessary to the success of the work; and that although it is included in the estimate for the purpose of showing the cost of the plan when complete, I should not think it advisable to construct the outer pier until the increase of trade shall render it expedient. Ships may lie in the eddy formed by the abutment of the dam and the shore, even during a freshet, in perfect security; and the cost of the work, exclusive of this item, is all that ought to be considered in testing the profitableness of the investment.

ESTIMATE.

EXCAVATION, EMBANKMENT, &c., FOR THE SHIP CHANNEL.

535,000 cubic yards excavation, at 18 c.		96,300
383,000 cubic yards embankment, at 24 c.		91,920
26,000 cubic yards puddling, at 10 c.		2,600
1 culvert,		6,000
3 do. at $2,000,		6,000

LOWER LOCK.

6,850 cubic yards masonry, at $8 50	58,225	
Gates and foundation,	6,600	
Excavation for foundation and bailing,	15,000	
		79,825

UPPER LOCK.

3,570 cubic yards masonry, at $8 00	28,560	
Gates and foundations,	5,690	
		34,160
Dam across James river,		66,000
		$382,805

DOCK.

135,000 cubic yards embankment, at 25 c.	33,750
45,500 cubic yards dry walling, at $2 00,	91,000
Gates and hollow quoins, &c.,	2,700
Add for rebuilding Mayo's bridge,	40,000
Total cost of connecting the canal with tide water,	$550,255

It has been observed that the cost of the outer mole should not be included in this estimate, being an expense which ought not to be incurred until the increase of business shall force its construction.

It ought also to be added, that the plan herewith submitted, and to which the estimate applies, includes within the limits of the basin that portion of the old dock between the abutment of Mayo's bridge and Shockoe creek which is now covered with a deposit of mud brought down by that stream. But this ground is the property of another company, who may wish to appropriate the space to a different purpose; and I have therefore prepared an alternative plan, which will be less costly than the other, and will enable us to avoid interfering with the interests of the proprietors of that work

The above estimate amounts to	550,255
Deducting the cost of the outer pier, &c.	58,000
Leaves,	$492,255

for the cost of the plan which would be offered in the event of objections being made by the owners of the dock against the appropriation of the ground to the purpose of the improvement.

There is still an important item in the cost of the work which has not yet been considered. The *damages to property* resulting from the destruction of water power, and the occupation of the low grounds on the south side of the river, will be considerable. And from the value of this property we are justified in drawing an argument in favor of the immediate prosecution of the enterprise. That the public will not always be content with the present mode of transacting the business connected with the commerce of the city, and that an improvement which will bring the shipping up to the wharves will eventually be forced into existence, must be admitted; and it becomes a question of importance whether the company shall go on and effect the connection of their work with tide water at an expenditure of perhaps a hundred thousand dollars, and increase, by their arrangements, the value of all the property in the neighborhood of the termination of their line, and afterward construct the work now proposed, at an additional expense due to the cost of the previous improvements and the augmented value of the property which will be injured: or, whether they shall mark out and publish their plan at once, and acquire a right to the ground which their works will occupy before the alternative improvement shall have given it a value which it does not now possess and which they will in the end have to pay for.

With regard to the property injured—it consists entirely of the low grounds between Manchester and Warwick, the island, and the lots and manufacturing establishments on the north side of the river and west of Mayo's bridge. The cotton factory and other establishments using water power on the south side of the river can be perfectly protected at a cost of fifteen thousand dollars, and will be somewhat improved by an addition of three feet head of water on their wheels.

It is not easy to estimate the damage to which Mr. Haxall and the few other proprietors around him will be entitled, since these damages will consist of the difference between the present value of their property and that which it will bear after the construction of the work—facts which cannot be obtained until the consummation of the improvement shall have furnished data for an estimate. But by observing that though the company will have to pay largely for the possession of this property, the most valuable part of it—the flour mills—is so situated as to be admirably adapted for warehouses, having the canal on one side, and a depth of water sufficient to float a loaded ship on the other—that the machinery will be valuable in new situations, and that the water power destroyed by the dam must be obtained from the canal, we will perceive that the actual loss will be greatly reduced.

I feel neither capable nor at liberty to estimate the present value of the property that will be occupied or injured by the erection of the dam; and we should probably find it still more difficult to fix, in anticipation, the price it will command after the construction of the work shall have concentrated the most important part of the trade of the city on the borders of the basin. We might perhaps form a fair estimate by referring to similar situations around the docks of other commercial cities; but as such an indication could only be received as evidence by those who have yielded their confidence to the enterprise, it could not be expected to govern altogether, the proprietors. I think it would, therefore, be more expedient for the company, after embarking in the undertaking, to obtain possession of the property, either by negotiation or assessment, and themselves risk the consequences of the work. I doubt not that there are those who would value highly such an investment.

I have estimated the cost of preserving the establishments in Manchester at	15,000
To which add the estimated cost,	550,255
And we have for the capital required for the construction of the work, without including the liquidation of the probable assessments,	$565,255

It remains to be seen how far the actual commerce of the city will justify such an expenditure; though it is well to note that a portion of this expense, which I am not prepared to estimate, would have to be incurred by a compliance with the clause of the charter requiring the company to connect their work with tide water, by whatever plan might be adopted for that purpose, and is not therefore strictly to be compensated for by the tolls on the ship canal.

It is not my intention in determining that portion of the present charges on the commerce of Richmond which might be transferred to tolls on the proposed improvement, to endeavor to sum up all the articles that are registered at the custom house, or attempt a nearer approach to accuracy than can be obtained by making a fair estimate of the heaviest articles of trade. It will be sufficient to attend to the coal and to the tobacco, flour, salt, iron and dry goods, which are now shipped to foreign ports in large vessels, and subject to a charge for wharfage and lighterage, to determine the value of the improvement. I have found some difficulty in obtaining even facts necessary for this estimate, which could be strictly relied on. But. having referred to the books of the custom house for the amount of tobacco exported, and of iron imported during the last year; to the books of the James and Kanawha company and to the colliers on the south side of the river, for the average shipments of coal; and to merchants extensively engaged in commerce, whose avocations I think preclude the possibility of serious error, for the quantities of flour, salt and dry goods, I offer my estimate on those items with full confidence.

From these sources of information, I find that there are about two millions eight hundred thousand bushels of coal annually shiped from Richmond and Manchester, for different ports along the coast; the greater part of which is transported in craft of from 70 to 130 tons burden—the largest that can be safely and conveniently loaded in the present condition of the navigation.

It is believed by the gentlemen engaged in this business whom I have the advantage of consulting, that if facilities were offered which would enable them to ship the article readily in vessels of a heavier class, they would save in freight from two to three cents a bushel on tho produce of all the coal fields in this district. So that, if the improvement now projected were in operation, and ships could be loaded with the coal from the south side in Manchester, and from the north side in the pond or harbor, the colliers could afford to pay from two to three cents per bushel for the use of the canal and its basins. It does not follow that it would be politic or just to tax the mineral that amount; but it would be proper to add for this item a sum sufficient to pay the company reasonable toll. I have not yet turned my attention to the subject of a proper tariff of charges for the use of the work; but as the cost of its construction will be at least six times as great as that of an equal distance of the James and Kanawha canal, the tolls ought, in round numbers, to be six times higher. On this principle, the company would be justified in charging one cent per bushel on all the coal passing through the canal—making an annual revenue from this source of $28,000, and relieving the coal trade of an annual tax of from thirty to fifty thousand.

If we now determine the cost of lighterage on the imports and exports of the city—including only that portion of the trade which is shipped directly abroad, or comes directly from foreign ports, and neglecting all that is sent coastwise—we shall have for the cost of transportation to City Point, on the

EXPORTS,

26,866 hhds. tobacco, (1835,)	a 92 c.	24,716 72
75,000 barrels flour, (average,)	a 8 c.	6,000 00
		$30,716 72

And on the

IMPORTS,

50,000 sacks salt, (supposed average,)	a 8 c.	4,000
1,400 tons iron, (1835,)	a 50 c.	700
3,900 bales dry goods,	a 75 c.	2,925
		$7,625

The cotton, the West India and the coasting trade are not embraced in this estimate, because the former, whatever may be its future importance, would amount at present to but a small sum, and the latter, the West India and the coasting trade, are now carried on in a class of vessels, that, with the existing facilities, can take in the greater part if not the whole of their lading at the present landing. And my estimate is intended only to show what are the charges to which the actual foreign commerce is subject, without basing conjectures of the probable revenue of the work, on possible contingencies however likely to occur. I leave it to the shipder to speculate on the probable extent of the change which will take place in the chraacter and capacity of the coasting vessels that will be used when the obstacles to the employment of a larger class are removed, as well as the value of the influence of this change on the income to be anticipated from the work we are considering.

Transfering the cost of lighterage to tolls on the ship canal and wharfage in the basin, we have for the annual

Tolls from the coal trade,	28,000
" " exports,	30,716
" " imports,	7,625
Total,	$66,341

We observe, that of these charges, supposing them to be made the basis of a tariff for the work, but about $38,000 is levied on the business of the shipper; and it will hardly be denied, that he can well afford to pay such a tribute. Throwing aside the countless inconveniences of which he will be relieved, in having the ship and cargo where he can attend to his business in person, and which none but himself can estimate, he will save an amout in time, which can be represented by an equivalent in money almost equal to that charge.

Supposing this trade to be conducted in ships of six hundred tons, there will be exports sufficient to make up forty-six cargoes annually. The delay now incident to loading a ship, over and above that which would take place if the vessel could come into the heart of the city, as is proposed to bring her, cannot be estimated at less than twelve days—time which must be compensated for, if the ship and cargo have different owners, by a charge of demurrage or in the form of freight; and in the daily expenses and deterioration of the ship, and inactivity of the capital invested in the cargo, if, as is frequently the case in the trade of this city, the ship and cargo are owned by the same persons.

To estimate the value of this delay, I will assume for the average cost of such a vessel $35,000, and for the cost of her cargo $60,000—the depreciation of the value of the ship after ten years service, at half the original cost, and the annual insurance, equal to the interest on the whole cost. These data will enable us to approximate with sufficient accuracy the value of this delay, as constant and certain losses are concerned; but it furnishes no indication of the other countless disadvantages to which the trade is subject under the present system. Reducing the above expenses to dollars, we have for the

Interest on the cost of spip per diem,	5 75
Insurance on ship per diem	5 75
Depreciation of value of ship, per diem,	4 80
Interest on value of corgo, per diem,	9 87
Daily expenses—pay of captain, mates, hands, renewal of cordage, rigging, &c.,	20 00
Total cost per diem,	$46 17
And for 12 days, or for each cargo,	554 04
And for the annual exports,	25,485 00

There might still be added, if we had the necessary data, a considerable sum for warehouses charges due to this delay, and the damage to goods, and the liability to pilferage incident to the present mode of transportation. But these are facts that can be better appreciated by the mercantile community, whose interests are more directly, though not more seriously, affected by them. It is sufficient for the object of my remarks, to know that the interest on the capital required for the construction of the work, exclusive of the probable assessments, amounts to $33,915 30; and the tolls which may be levied on the coal, added to the present charges for wharfage and lighterage, is $66, 341, or nearly twice as much.

I have nothing more to add on the subject; for I believe that it cannot be doubted that the present commerce of the city will abundantly justify the enterprise. And if the actual trade is adequate to the purpose, may we not assume that long before the present system of improvement is consummated, the increase of business will be sufficient to render this final link a most profitable addition to the works of the company? It is as unnecessary as it would be difficult to estimate the value of that increase; but with the means that are now resorted to for the developement of the resources of the State, by providing a channel for the transportation of the products of Tennessee and Ohio, and an ample power at Richmond to manufacture them, it cannot but be great.

I submit the plan respectfully for your consideration.

CHARLES ELLET, Jr.,
Chief Engineer,
James River and Kanawha Company.

From the Farmers' Register.

THE PORTSMOUTH AND ROANOKE RAILWAY THE NAVIGATION OF THE MEHERRIN, NOTTOWAY, AND BLACKWATER RIVERS.

By the Editor.

The Portsmouth and Roanoke Railway route, as far westward as the Meherrin, is remarkably level—and of course the trains are propelled with proportionable facility, and diminished expenditure of power. It is, indeed, an admirable track for its general straightness, no less than its level course. But still there were great causes of difficulty and expense in the first construction, and so will there continue to be in future repairs. The country is low, and the streams passed are bordered by swamps, or low grounds, which required long bridges elevated on sustaining posts and framed timbers. All these bridges remain uncovered, except the one across the Blackwater, and of course their decay will be rapid, and very costly repairs will soon be necessary. After passing the Meherrin, the route is quite undulating, and generally ascending to where it crosses the Petersburg railway, less than two miles from the southern termination of the latter, at Blakely on the Roanoke.

I took my seat in the train at Suffolk, for the intersection near the Roanoke, there to take the Petersburg train, as the shortest way to reach the latter town. And circuitous as is the whole route thus passed over, I travelled the 118 miles from Suffolk to Petersburg in 9 hours—including all the stoppages, except one, of half an hour, between leaving the Portsmouth train and the arrival of the one from Petersburg. If the two companies would agree in their hours of arrival and departure, so as to permit such a journey always on stated days, (as might be done without inconvenience,) and the arrangement was made known, there would be many persons who would come by the two railways from Norfolk to Petersburg, rather than wait one, and sometimes two days, for a passage by the steamboats.

Both these two great railways cross the Meherrin and Nottoway rivers below their falls, and the Portsmouth road also crosses the Blackwater river—and this last, and that only below the railway, is alone made any use of for navigation to bring country produce to be put on the railway, for market. And it is probable that no such use would have been made of the Blackwater, for boats bringing crops made in the neighneighborhood, but for their being shown the way, by this being made a regular steamboat route from Edenton, and by which much cotton is brought from North Carolina, to be sent by the railway to Norfolk. The almost total disuse of these three easily navigated rivers, is one of the most remarkable instances of the inveteracy of long established habits in our countrymen, and the slowness with which they adopt improved facilities, when offered to their acceptance. These three rivers, though small, flow over very level beds, and would require but little labor and expense to be made navigable for flat boats for distances which combined, would make at least 120 miles, without including the Chowan, formed by the junction of the Meherrin and Nottoway, which is now used for navigation. The length of the Meherrin, from the lowest falls to where it unites with the Nottoway, to form the Chowan, is more than 50 miles, as measured on the map. The Nottoway, from the lower falls above the Petersburg railway, to the point of junction just named, is more than 40 miles—and the Blackwater from the southern line of Surry county, to where that river joins the Nottoway, is 30 miles.

From above the Petersburg railway, there are no falls or rocks, in either the Meherrin or Nottoway—nor, indeed, any obstruction to downward navigation, except trees fallen by accident, or more generally by design, into the streams, and which, if sawed into pieces at low water, would all be swept away, together with the rafts and sand bars which they have served to form, by the first freshet. It is true, that these streams are very low in summer droughts: but the crops of the country (cotton and corn,) are seldom ready for market before the streams are full—and the timber which this navigation would bring into use, and make valuable for market, might wait until the water was sufficiently deep for its transportion. The Nottoway lands are among the most productive in the counties of Sussex and Southampton—and its passing through the heaviest producing region, is another reason why this river should be used for navigation.—But because these waters led to no suitable market before, and because every farmer has always been in the habit of sending his crops to market by his carts or wagon, no one thinks yet, of taking the far cheaper way of boats to either of the railways.—Meherrin and Nottoway might doubtless be profitably improved and navigated far above their falls, as routes to the upper railway: but it would be idle to urge *that*, while the advantages offered by their far better waters below the falls are overlooked, and almost totally neglected

It has been a long time since the attention of the writer of these remarks was attracted to the peculiar circumstances of these waters, and the advantages that might be derived from bringing them into use. To induce others more interested, and having more local information, to think upon that and other kindred subjects, the subjoined "Hints and Queries," were published in 1825; which may now furnish some amusement, if nothing more, by the strong contrast displayed of the condition of things, and of prospects, then and now. If the reader, at this time, should condemn the scheme then proposed for bringing these natural canals into use, as altogether absurd, and ridiculous, (as it certainly would have been, if the present state of improvement could have been anticipated,) let it be remembered, that at that time no one had thought of constructing railroads in this region—nor establishing the now prosperous cotton and other factories, which will be so increased in time, as to require as much of the water of the Appomattox, as then ran in waste down the falls. For these two great improvements, the country owes much to the enterprising spirit of Petersburg—and to the fortunate results of these bold but judicious adventures, Petersburg owes her present and fast growing prosperity, which stand in such marked contrast to the state of decline which seemed progressive as late as when this piece was published. But the writer was not more in the dark then, as to the near approaching revival of the prosperity of Petersburg, from the railway and the factories then not planned, than he was in supposing that furnishing a proper outlet to the three rivers would bring them into use. They have now better outlets than he then supposed possible to obtain—being intersected, in five different places, by railroads furnishing speedy and cheap conveyance to two different market towns: and yet these rivers are almost as little used now, as before the construction of these great works.

Miscellaneous.

From Ure's Philosophy of Manufactures.

GENERAL VIEW OF MANUFACTURING INDUSTRY.

(Continued.)

The astonishing expedition with which a great Cotton Factory, comprehending spinning and weaving, can be erected in Lancashire, arises from the vast collections of patterns of every variety, from those of gigantic steam-engines, water-wheels, iron-girders, and joists, down to the smallest member of a throstle or loom, in possession of the engineers, mill-wrights, and machine-makers. In the course of last year, Mr. Fairbairn equipped water-wheels equivalent to 700 horses' power, and steam-engines to 400 horses' power, from his engineer factory alone, independent of his mill-wright, and steam-boiler establishment. Hence, whenever capital comes forward to take advantage of an improved demand for goods, the means of fructifying it are provided with such rapidity, that it may realize its own amount in profit, ere an analogous factory could be set a-going in France, Belgium, or Germany.

The facilities resulting from the employment of self-acting tools have not only improved the accuracy, and accelerated the construction of the machinery of a mill, but have also lowered its cost and increased its mobility, in a remarkable degree. At present, a throstle frame made in the best manner may be had complete at the rate of 9*s*. 6*d*. per spindle; and a self-actor at about 8*s*. per spindle, including the patent licence for the latter The spindles in cotton factories move with so little friction that one horse power drives 500 on the fine hand-mule, 300 on the self-actor mule, and 180 on the throstle; which power includes all the subsidiary preparation machines, as carding, roving, &c. A power of three horses is adequate to drive 30 large looms with their dressing machine.

The fine bobbin and fly-roving frame, is now so greatly improved, that it can do a certain part of the work formerly done by the stretching mule; and performs as much for 9*s*. as the other did for 50*s*.

The dressing machine does at present 200 pieces of thirty yards each in a week, =6000 yards, and costs in wages to the dresers 50*s*. This branch of the trade having in consequence of the high wages been, like the mule spinning, continualy disturbed by unions and strikes, has led to the invention of a self-acting machine which will dress at least 6000 yards of warp in two days, under the superintendence of a laborer at 3*s*. a-day; that is, at a cost in wages of 6*s*. This mechanism is at the same time greatly simpler and cheaper than the former, and will soon come into general use for coarse calicoes. It affords an instructive warning to workmen to beware of strikes, by proving how surely science, at the call of capital, will defeat every unjustifiable union which the laborers may form.

It is one of the most important truths resulting from the analysis of manufacturing industry, that unions are conspiracies of workmen against the interests of their own order, and never fail to end in the suicide of the body corporate which forms them; an event the more speedy, the more coercive or the better organized the union is. The very name of union makes capital restive, and puts ingenuity on the alert to defeat its objects. When the stream of labor is suffered to glide on quietly within its banks, all goes well; when forcibly dammed up, it becomes unprofitably stagnant for a time, and then brings on a disastrous inundation. Were it not for unions, the vicissitudes of employment, and the substitution of automatic for hand work, would seldom be so abrupt as to distress the operative.*

Some may imagine that the present work, which purposes to give a minute analysis and description of the several processes of manufacture, may prove injurious to the trade of this country, by putting foreigners in possession of much useful knowledge, now hardly within their reach. To this I reply, that knowledge is available just in proportion to the capacity and means of the persons who acquire it. Every invention and improvement relative to cotton fabrics is primarily attracted to Manchester as the surest and most productive scene of its development, where it can be most profitable to the inventor, because most profitable to the trade concentred there. Lancashire is the fertile and well-labored soil in which the seed of factory knowledge will bring forth fruit one hundred fold, whereas abroad it can yield little more than a tenfold return. However well informed the mill proprietors of Great Britain may be, and they unquestionably may bear a comparison in talent as in wealth with the landed aristocracy in any part of the world, still they may profit extremely by the methodical study of the elements of their prosperity. Many of the machines at present employed by them involve the most elegant applications of both physical and mechanical science; such indeed as if duly studied would enable them to understand the operative part of their business as clearly as the commercial, and thus protect them from those hazardous innovations which crafty projectors are perpetually pressing upon their adoption. Prodigious sums are wastefully expended every year by gentlemen manufacturers in this way, which would be saved by a more thorough acquaintance with those principles of science and art which I shall endeavor to expound.

Several individuals who have embarked vast fortunes in factories are to a very great extent the victims at least, if not the dupes, of scheming managers, who are ever ready to display their perverse ingenuity by the substitution of some intricate trap, for a simpler but less showy mechanism. I have known not a few cases, where a complete system of good machines, capable of doing excellent work, has been capriciously turned out of a cotton factory and replaced by another of greater expense, but of less productive powers, and less suited to the style of work, than the old one if skilfully managed. These substitutions are continual in many establishments. They interfere most essentially, and often unnecessarily, with the going of the mill, and are referrible almost always to injudicious choice at first, and capricious alterations afterwards,—circumstances over which the proprietor, from ignorance of the structure of a good machine, cannot always venture to exercise the proper control. There are no doubt many mill-managers perfectly fitted by judgment, knowledge, and integrity to second the sound commercial views of the mill-owner, and to advance the business with a profitable career. These practical men form the soul of our factory system. But with a wrong-headed, plausible manager, the proprietor is sure to be led such a mechanical dance as will bewilder him completely, unless he has acquired a clear insight into the *arcana* of the business by deliberate study of the composition and performance of each machine in his factory. It may be supposed that this species of education can be most easily acquired in the midst of the machinery itself. But this is a mistake which experience speedily proves.

There exists in most cotton-spinning factories a beautiful piece of mechanism called the bobbin and fly frame, regulated by a principle of self-acting equations, which would do honor to the genius of Brunel. In venturing to affirm that very few mill-owners understand the structure of this machine, I do not draw the inference presumptuously from the difficulty which I myself encountered in comprehending the automatic adjustments of its parts; but from meeting with several masters of the Manchester mills who were incompetent to explain the train of its motions, however obligingly they undertook the task. In fact one scientific gentleman, a complete master of that mechanism and of every other used in the trade, who kindly acted on many occasions as Mentor in my factory researches, assured me that his father, a very talented cotton-spinner, as the country well knows, never can retain a clear comprehension of certain differential adjustments in the above machine for a week after it has been explained to him. Some of its movements being necessarily inclosed, and of a curious nature, can be best studied in an analytical drawing, where the whole concatenated motions are brought at once under the student's eye. Such complex mechanisms, indeed, like the topography of an irregular city, are most readily comprehended by inspection of a plan, in which the mutual bearings and connexions of the parts are analytically shown. The representations which I shall have the honor of presenting to the public were made by a talented draughtsman, who accompanied and lived with me in the factory districts, and they were submitted to some of the most eminent engineers and machine-makers of Manchester, from whom they received unqualified praise for accuracy as well as elegance of execution.

I shall conclude this general view by stating, that the moving power, besides performing its proper factory tasks of carding, roving, spinning, weaving, &c., does a vast deal of miscellaneous drudgery. It raises the coals from their bin in the boiler-yard by a sloping series of buckets, like those of a dredging machine for deepening rivers, and delivers them on an elevated railway platform into a waggon—through the drop-bottom of which they are duly distributed among the range of hoppers attached to Stanley's ingenious furnace-feeding machines, and are thereby strewn into the fires in proportion to the demand for steam to work or warm the mill. In this way the fire-man is entirely freed from muscular effort, so that he can tend with ease many great steam-boilers, and is not liable through ignorance or negligence to mismanage the heat, or dissipate the fuel in such black clouds as lower over a London brewery. It is no uncommon thing in Manchester to see engine-boilers equivalent to the force of from 200 to 300 horses generating their steam without any sensible smoke.

But their is another office more truly menial assigned to the engine, that of transporting any of the work-people upwards or downwards to any floor of the factory, to which their business may call them at any time, and this with equal celerity and safety. To ascend and descend rapidly through several flights of stairs is no trifling source of fatigue, as domestic servants in some fashionable houses well know. Masters of mills, with the twofold motive of benevolence and economy, have long ago taken measures to supersede this painful exertion, by the construction of moveable platforms, inclosed in upright 150 lbs. English, was completely exhausted in ascending, by steps, sixty-five feet in thirty-two seconds. The full work of a man is obtained by his going up stairs at the rate of forty-five feet in one minute.—A man weighing 160 lbs. can ascend by stairs three feet per second for a space of fifteen or twenty seconds; and if he be supposed going up stairs for a day, he actually raises 450 lbs. to the height of 3281 feet; or 1,476,450 lbs. one feet high. If the day be reckoned at ten hours, or 600 minutes, he will raise 2460 lbs. one foot high in a minute, which is only one-thirteenth of Watt's estimate of a horse's power=32000 lbs. raised one foot high per minute. With a winch a man does, according to Coulomb, only five-eights as much work as in going up stairs. If the above observations be nearly correct, they prove the expenditure of power in ascending stairs to be great. Coulomb says that this mode of action is the most advantageous for the muscular force of man, though he rates its amount at little more than one-half of Smeaton's estimate of an English laborer's force.

The mechanism of the teagle will be understood by the following description and drawing taken from one of the most improved forms made by Frost of Derby, who in concert with the late William Strutt, Esq., had the merit of inventing this very elegant automatic machine.

The teagle (tackle?) or hoist, consists of three principle parts.

* The full discussion of this topic belongs to Book III.

1. The perpendicular shaft or pit, having a horizontal section, of about five or six feet square, placed in the most convenient part of the building, and extending from the ground-floor to the top story.

2. The ascending and descending platform, suspended by ropes from pulleys, and moved up and down by machinery. It is a strong frame-work of timber, about six feet high, boxed up on three sides with deals, leaving the front side open, in correspondence with a series of doors on the several floors of the factory. The power required for hoisting is moderated by overbalancing the platform with two counter-weights, together about a hundred weight heavier than itself, which ascend and descend equably with the descent and ascent of the platform; and which, as well as the platform, are suspended by ropes from the opposite sides of the shaft to secure a steady vertical motion. Two large planks are fixed upright upon the opposite walls of the shaft, as guides to the platform, and two smaller ones as guides to the counter-weights, the latter being sunk groovewise into the building

tunnels placed in convenient parts of their many-stored buildings. This apparatus is called a hoist or a teagle, and is usually of such size and stability, as to allow half a dozen of persons, old and young, to travel at once from any one floor to any other.—The motion is perfectly smooth and agreeable, as I have often experienced; and is so entirely under control, as to cease at any desired instant opposite to any of the issue-doors in the side of the tunnel.

The muscular force expended in mounting stairs was made the subject of experiment by M. Coulomb. Amontons had previously found that an active man, weighing

3. The third part of the teagle is the machinery capable of being set in train with the moving power.

I shall give first a popular explanation of the principle on which the hoist operates.

Every observant visiter of a factory must have noticed that the endless strap or belt which descends from the drifting shaft to the steam pulley on the end of a carding, spinning, or weaving organ, sometimes has its two pieces running parallel to each other, as in that view, and sometimes has them crossed over each other.—The first arrangement, called the open strap, communicates motion in the one direction, while the other arrangement communicates motion in the opposite direction. Suppose now, that there is a fast pulley on the axis of any machine, and close to it, on either side, a similar pulley loose on the same axis; of which one is driven by an open strap, and the other by a crossed or close one. If the one strap be shifted upon the fast pulley, it will drive the machine in one direction, but if the other strap be shifted upon it, it will drive the machine in the opposite direction; that is, the machine according as it is driven by the open or close strap may be made to work upwards or downwards at pleasure, as in raising or lowering weights, &c.

When both belts are shifted upon the loose pulleys, the machine has no hold of the load, and would therefore allow it to fall by the influence of gravity, were there not some restraining power. This restraint is exercised by a *brake*, which presses strongly on the circumference of a wheel in train with the machinery, and fixes the whole by a force of friction proportional to the weight acting on the brake. Now, to move the load up or down, the brake must be removed at the same instant that the appropriate strap is shifted upon the fast pulley of the machine. The same contrivance which replaces the strap on the loose pulley, replaces the pressure of the brake on the friction-wheel.

Before describing minutely the structure of the hoist, it is proper to mention that all movements produced by straps ought to be pretty rapid, since, when slow, they are apt to permit a slipping of the bands on the surface of the driving-drums or pulleys. As, therefore, in this way, the pulley-shaft of the teagle would require too great a speed, for being connected directly with the hoisting rope, it transfers its motion, by means of a pinion and a wheel, to a second shaft, which travels at such a rate as to cause the platform to rise or fall through two feet in the second.

The drawings and description of the teagle are omitted, as being foreign to the general tenor of the article.

M. Chaix, a Frenchman who has been long a resident in the Isle of France, has discovered a simple and ingenious mode of preventing the formation of the crust which is generally found inside the boilers of steam-engines, and which, being formed principally of calcareous substances, prevents the transmission of heat from the furnace to the water. An experiment has been made on board the *Phare* steamer at Toulon, by order of the Minister of Marine, and was perfectly successful, showing that the process not only prevents new concretions, but even detaches and destroys a formed crusts.

Mme. Cheron was murdered at Maisons on the 14th of January, 1834. Two students having by some means obtained possession of her skull, fancied it indicated a remarkably avaricious disposition; and, in order to satisfy themselves whether their judgment was correct, submitted it to the examination of the celebrated phrenologist. Dr. Leroy, who fully confirmed their conclusions. A man who had managed her affairs for 20 years, and a physician who had long been intimate with her, were written to, and their answers established the scientific decision of it the Doctor by the evidence of facts showing that the deceased would acquire money *per fas et nefas*, and, though enjoying a revenue of about 6000 francs per annum, would live in the most miserable manner. Upon this, Dr. Leroy sent a detailed report to the Phrenological Society, which was read at a full meeting. The *Messager*, on the 28th August last, published the report, and mixed up the analysis of the cranium of Mme. Cheron with those of Lacenaire, Fieschi, and Avril. Upon this, the surviving relatives of Mme. Cheron brought a prosecution for defamation against Dr. Leroy and the *Messager*. The trial came on yesterday before the Tribunal of Correctional Police, when, after a long hearing, the Doctor and the Editor of the *Messager* were acquitted.

It has been impossible to form any calculation approaching to correctness of the amount of the population of Paris previous to the 15th century. Under Philip le Bel it was said to be 50,000. Under Louis XI., after the expulsion of the English, it was 150,000. In the middle of the 16th century it rose to 200,000 or 220,000. At the beginning of 1590, although reduced by the wars of religion, it was reckoned that there were 200,000. It, however, resumed its progressive increase under Henry IV. and Louis XIII. In the latter part of the reign of Louis XIV., and the first of the Regency, it amounted to very nearly 510,000. In 1762 it reached 576,000. In 1755 there were 71,114 families liable to taxes. In the reign of Louis XVI., Paris contained 600,000 inhabitants. In 1805 the number was 547,750; in 1817 it came to 713,966; in 1827 to 890,431; in 1831 to 774,338; and in 1832 to 770,286.—We are now assured that, according to a recent census, the population of this city amounts to about one million, and, consequently, has nearly doubled in the course of 31 years.—[French paper.]

Copper Smoke.—Attached to the new copper works belonging to Messrs. Vigors & Co., in Owm Avon, is a tunnel for consuming and conveying copper smoke 1100 yards in length, viz: from the smelting furnaces to the top of the high hill towards the north-west, called Mol-y-Mynyddan.—In this elevated spot the small quantity, if any, that will escape precipitation, will find its way into the air. Few persons, probably, are aware of the immense quantity of copper thus saved to the proprietor, which in former times was deposited on the neighboring lands, subjecting him to most expensive actions. In a tunnel not long made by Messrs. Williams & Co., in their works on the Swansea river, 200 tons of copper were taken out, which had been precipitated in the short space of one year—the value of this was 2000*l*., and much was still left in the tunnel. Chambers are made in the tunnel for attracting the smoke, which is further promoted by the use of steam, so that little of it is allowed to reach the place of exit till it has deposited in *transitu* all its substance. This material, therefore, which not only was formerly lost, but did serious mischief to the adjoining lands, thereby entailing lawsuits of ruinous expense, becomes now a matter of profit.

[Merthyr paper.]

In the course of September, a gold watch and other articles, given by Napoleon to the Abbe Buonavita, who was his chaplain at Saint Helena, were sold by auction at the Isle of France. The watch with its chain went for 755 piastres, a silver tea pot for 100 piastres, a sugar dish for 140, a silver goblet for 131, a pair of salt-cellars for 55, a small gold goblet for 253, a silver fork and spoon for 75, and another fork and spoon for 80, a pair of sugar-tongs for 105, a knife for 30, and the case in which the above articles were inclosed for 30 piastres, making a total of 1,756 piastres, or 9,500 francs. The purchaser of the watch, which Napoleon wore at the battle of Austerlitz, afterwards refused a very considerable sum for his bargain.

Preparation of Extracts.—The usual mode of obtaining vegetable extracts is by the aid of *heat*, but it is well known that the medicinal properties of compounds are often essentially altered by changes of temperature, and that the proximate principles of plants on which the virtue of extracts depends, may therefore be subverted at the high temperature at which they are sometimes obtained.

Mr. Guillard proposes to avoid the risk of such a deterioration, by pounding the fresh plant in a mortar, pressing out the juice in the cold, and evaporating it by a current of air from a smith's bellows. In this way he has perfectly succeeded in procuring the extract of *Aconitum Napellus*, after pounding pressing and filtering, when the temperature of the laboratory did not exceed 10° to 13° cent,

A more perfect mode, perhaps, would be to evaporate by means of a vacuum, without heat, by which the agency of the atmospheric oxygen would be very much avoided, as well as that of increased temperature.—[Idem.]

A Good Beginning.—Mr. Charles Park has sent to the Patent Office a duplicate model of his "Patent Worming and Rope Serving Machine." This is an example worthy of all imitation. In acknowledging the receipt of the model, the superintendent of the Patent Office says:

"To you belongs the merit of having been first to aid thus in the restoration of the Patent Office, and I trust that the example, which you have given to the Patentees, with so much promptitude, will be extensively followed."

A valuable mine of copper has recently been discovered in the forest of Troncay, in the Nievre, and a company is being formed for the purpose of working it.

The *Journal de Rouen* observes, that the rapid extension of the silk manufacture in England must have a serious effect upon that of France. The exportation of silk from England during the last year exceeded that of the former by the amount of 8,000,000 francs. This is said to have arisen from the employment of steam mechanical looms, of which there are 1,700 in England, and of these 306 are in use in Manchester. By means of these looms, two women are now able to produce as much manufactured silk as six men could formerly without them.—The economy of labor, adds the journal, renders the English formidable opponents to the French in the foreign markets.

We hear that the Board of Health of Paris is about to verify by experiments, on a large scale, the extraction of tallow by water, mixed with sulphuric acid, in one of the abattoirs, and particularly the quality of the tallow, resulting from this new process, which has been so successfully employed by a tallow-melter at Rouen. If this new mode should be approved, an important advantage will result in the salubrity of the melting-houses, and a greater still to the tallow trade.

At a recent meeting of the Warwickshire Society of Natural History and Archæology, Professor Buckland stated that he had discovered at Guy's Cliff the remains of an extinct species of animal, which had never before been found or mentioned by geologists, and that the Castle, Collegiate Church, and town of Warwick, were built upon a stratum utterly unknown to English geologists. Another discovery which he had made was, that the town of Leamington rested on the remains of animals which had existed in other times.—[Warwick Herald.]

New Manufactories.—It will be gratifying to all who take an interest in the welfare of Poughkeepsie, to hear that new and important branches of business, are, one after another, being established here, to contribute to the growth and prosperity of the town. Among the several new branches which have been commenced during the few last months, we are pleased to notice Mr. Hurlbert's Manufactory of Paper Hangings, which already manufactures about *one thousand pieces* of paper hangings per week.—A cursory examination of his papers, has impressed us with the belief, that for good taste in the patterns and getting up, as well as for skill in mixing the colors, and beauty and excellence in the finish, they will be found fully equal to the French papers, which have hitherto greatly excelled all others.

The Manufacture of Carpets, is another new business just commenced. One establishment is already partially in operation, another will commence operations in a few weeks. We have seen the first piece of superfine ingrain carpeting ever wove in Poughkeepsie. It is from the manufactory of Messrs. D. L. Starr & Co. The piece contains one hundred yards, and is of such an excellent quality as readily to pass for an important carpet. This establishment as well as the one getting up by Messrs. Delafield & Whinfield, is expected to be in full operation by the month of May. The two concerns will give employment to about 50 men, and manufacture more than $100,000 worth of carpeting annually.

In addition to the above, Mr. Raymond has just put in operation a concern for spinning stocking yarn, which turns out about 50 lbs. of yarn per day.—[Poughkeepsie Journal.]

New mode of preparing Kerm's Mineral and the Golden Sulphur of Antimony.—By M. Musculus. For the golden sulphur of antimony, I take—

Lime slacked with a sufficient quantity of water,	6 parts.
Sub. carbonate of potash, or dry subcarbonate of soda,	4
Finely pulverized sulphuret of antimony,	2
Flower of sulphur,	1
Sand, well washed and dried,	8

Mix them all well together, and put them in a funnel or other separating vessel, with a few small pebbles or coarse bits of glass underneath, and cover the mixture with a layer of sand. Pour on this by degrees, cold water, until the filtered liquid is no longer precipitated by hydrochloric acid.

The liquid thus obtained is to be sufficiently diluted with pure water and treated with hydrochloric acid. The precipitate, or golden sulphur of antimony, is to be carefully washed, and dried in the common way.—The product is about equal to the sulphuret of antimony employed.

To prepare Kerm's mineral, proceed in the same manner, only leaving out the flower of sulphur. The liquid obtained is to be treated with a solution of bicarbonate of soda; or by passing through it a current of carbonic acid gas.

This method of preparing these two substances, by displacement, is new, and much more simple and economical, in time, and expense, than the usual mode, and the products are as fine and abundant. The proportions may not perhaps be so rigorously exact as further experience may dictate.—It is possible that a previous maceration may be useful.

Note by M. Boullay.—We have repeated the process of M. Musculus, and find that the golden sulphuret of antimony, which it yields, is very beautiful—the kermes is heavy and the color not very good, but by substituting the dry carbonate of soda for potash, and adding to the filtered fluid an equal volume of pure water, deprived of air by heat, prior to the precipitation, we have obtained the kermes in great abundance, light, and of fine bright color.

Thus the preparation of kermes, till now so embarrassing and capricious, will be extremely easy to practice, in small quantities as well as large, and the pharmaceuist will be no longer excusable in depending on commerce, now he can extract the kermes by simple lixiviation, in the cold, instead of long and reiterated ebullition.—[Journal de Pharm.]

Preservation of Cantharides.—The rapidity with which mites attack cantharides, and the fact that they devour the soft parts of the flies, which are the most active, render any mode of effectual preservation very useful.

An experience of ten years enables me to affirm, that the process of Appert will thoroughly preserve them. The bottles containing the dried and sifted flies, being thoroughly corked, and fastened with double pack thread, are to be placed upright in a kettle of water, which is to be heated to ebullition and kept boiling, for half an hour, the bottle remaining until the water gets cold. They may then be put away in any cool place. If the insects are pulverized on being first taken from the drying stove, again left in the stove for a few hours previous to their being bottled, and afterwards treated as above, they will be still more effectually preserved. The eggs of the mites which adhere to the cantharides, though they may escape the heat of the stove, are destroyed by the boiling temperature, in well closed bottles.—[Idem.]

Advertisements.

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawaumkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.

Rochester, Jan. 13th, 1837. 4—y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
GEORGE COLEMAN,

33—tf.

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co No. 119 Greenwich Street, New-York, or at the Makers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY & KNIGHT.

POUGHKEEPSIE, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANCHED and GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works he has in charge.

BENJ. WRIGHT,
Chief Engineer N. Y. & E. R. R.

NEW-YORK, April 4th, 1836.

Harvey's Flanched and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.

BOSTON, April 26th, 1836. No. 1—6t.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior	back-strap Shovels		
150	do	do	do plain	do
150	do	do	caststeel Shovels & Spades	
150	do	do	Gold-mining Shovels	
100	do	do	plated Spades	
50	do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.

BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N. Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention

HENRY BURDEN.

Troy Iron Works, Nov. 15, 1836. 47—tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—vtf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hard-ware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTION, both as regards workmanship and quality of iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

						lbs.	
350 tons	2½ by ⅝,	15 ft in length,	weighing			$4\frac{68}{100}$	per ft.
280 "	2 " ½,	"	"		"	$3\frac{50}{100}$	"
70 "	1½ " ½,	"	"		"	2½	"
80 "	1¼ " ¼,	"	"		"	$1\frac{23}{100}$	"
90 "	1 " ¼,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28—tf Philadelphia, No. 4, South Front st.

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

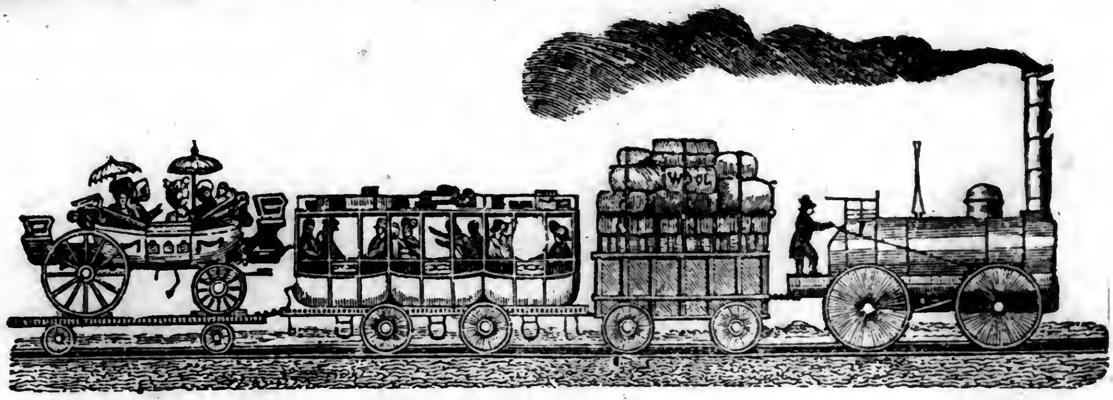
Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N. Y
51tf



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, FEBRUARY 11, 1837. [VOLUME VI.—No. 6.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 11, 1837.

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid, (continued.)

Wm. Creighton,	city N. Y.,	July 1, 1837
A. Brocklebank,	" "	Aug. 15, 1837
O. Eddy, Ithica,	"	Nov. 11, 1837
P. Hastie. Hamilton,	"	Jan. 1, 1838
S. C. Ruggles, Goshen,	" "	1838
L. Williams, Auburn,	" "	1838
Hon. Stephen White, Boston, Ms.,	"	1838
Saml. Ashburner,	" " "	1838
J. Archibald, Carbondale, Pa.,	"	1837
E. K. Wiley, Springfield, Ill.,	"	1837
G. M. Totten, Warrenton, N. C.	"	1838
C. W. Wever, Baltimore, M. D.,	"	1838
S. E. Mercer, Crawfordsville, Ga.,	"	1838
Arch Duke John, of Austria,	"	1838

Jas. Greenleaf, Washington, D. C., Aug. 15, 1837.

We understand that the Charleston and Cincinnati Railroad Company have appointed Maj. W. G. M'Neil, Chief Engineer of their Road.

We consider this appointment a guarantee for the prompt construction of this work, the greatest in the world.

AVERY'S ROTARY ENGINE.

The constant applications from all parts of the country, for information in relation to this wonderful machine, induces us to give such facts in relation to it as come within our knowledge.

The following letter signed by four gentlemen, of the highest respectability and intelligence, residing at *Ithaca*, Tompkins county, N. Y., gives the facts and impressions of a short visit to a saw-mill, erected by ABRAHAM BELL, Esq., of Jersey City, and SETH GEER, Esq., of this city, in the midst of a *Pine forest*, in Tompkins county, eleven miles from *Ithaca.*

The accompanying cut is a fair representation of the mill referred to, with the exception of the mode of driving the saws. In the mill of Messrs. Bell and Geer, the saws are driven by a drum to *each saw*, but in this cut, there is but one drum, and the saws are driven by the *walking beam*, as will be seen on referring to the description.

ITHACA, N. Y. Dec. 13, 1836.

To D. K. MINOR,

SIR,—In compliance with your request, we cheerfully give you our views and opinions of the performance of Seth Geer and Abraham Bell's saw-mill, driven by "*Avery's Rotary Engine*," situated in the town of Enfield, Tompkins county, N. Y.

The simplicity of the Engine, and consequently the ease and facility with which it can be managed by persons of ordinary intelligence, and who would be wholly incompetent to work a piston engine, first excited our attention; and upon a careful examination of the machine, elicited our united applause. It is unnecessary for us to give an elaborate description of the Engine, which is estimated at 20 horse power.

The power is applied to the saw in the most simple manner by bands; the motion being reduced by increasing the size of the drum, so as to give the saw any required velocity. The saw that we examined made 220 strokes in a minute, sawing three boards from a log 12 feet long and 2 feet in diameter, in nine minutes, or cutting at the rate of over 11,50 feet per day, if it could be kept in constant motion—but allowing one half the time to be lost in running the carriage back and adjusting the logs, it would cut from 5 to 6 thousand feet of lumber per day. The mill was arranged for 2 saws, which the workmen assured us they usually kept constantly at work; but the hand to one of the rag-wheels having been sent to the shop to be repaired, we witnessed the performance of but one saw. The workmen told us that the power was sufficient for both saws.

The plan for confining the saw without a saw-gate, was, as we were informed, invented by Mr. Mooley, and appeared to answer the purpose well.

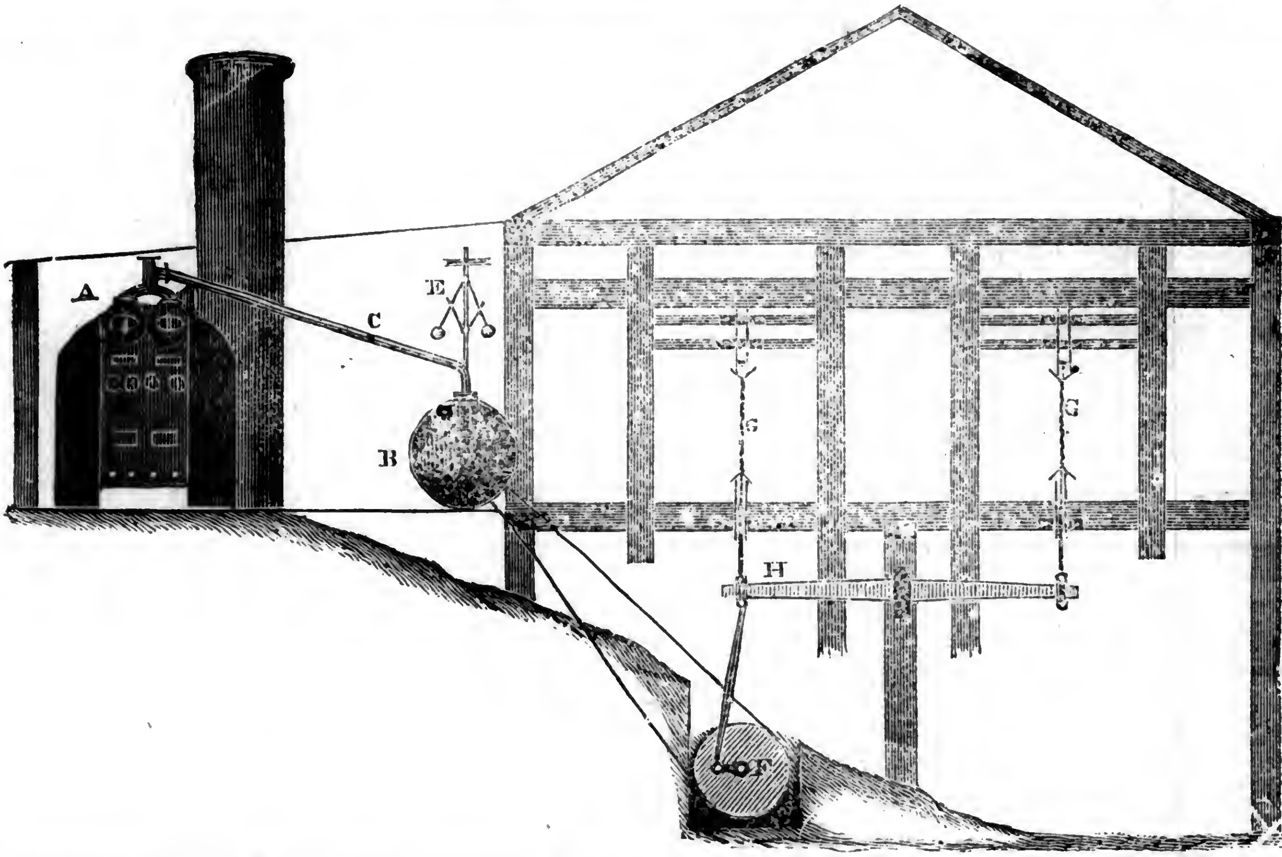
It is with pleasure that we assure you, Sir, that we were highly gratified with the whole performance, and with the utmost confidence, recommend *Avery's Rotary Engine* as a moving power for saw-mills.

Respectfully,

Your most obedient, &c.,

GEORGE McCORMICK,
J. J. SPEED, Jr.,
HENRY ACKLEY,
HENRY INGERSOLL.

The cut represents a saw-mill with two saws driven by a ROTARY ENGINE. There may be two *gangs* as well as two *saws*.—



A represents the boiler; B the engine; C the steam-pipe; D the shaft, into the *end*, or *side*, of which the steam passes from the boiler, through the pipe C; E the governor, which regulates the passage of steam; F the drum around which the driving band passes from the pully on the end of the shaft D. On the end of this drum is a crank for driving the walking-beam H, to each end of which is attached one or *more* saws, as at G, G.

This mill is represented as situated on a side hill, and the drum placed in a pit under the mill.

An *Engine* of this description, without boilers and machinery, to drive *two* saw gates can be furnished for six hundred dollars,—and the boilers, pumps, furnace irons, and fire bars; governor, and *all* the *necessary machinery* up to, and *including* the walking-beam, or drums, for *fifteen* to *seventeen* hundred dollars; or 2,100 to 2,300 dollars for the whole machinery up to the saw, and the same for *one* saw gate will be fifteen to sixteen hundred dollars, delivered at the shop of E. Lynds & Son, Syracuse, Onondaga County, or at the "*Novelty Works*," in this city, by application to Mr. Joseph Curtis, 132 Nassau-street.

The power of this engine will be ample to drive 1 saw in 1 gate, and *three* or *four* in the other—or to drive *two* saws in the single mill, or mill with one gate.

Since writing the above, we have been furnished with the following statements, from gentlemen who fully understand the subject.

The first is from Henry Seymour, Esq., late—and from the commencement of the Erie Canal—one of the acting Canal Commissioners. Mr. Seymour is himself the owner of a Saw-mill of the ordinary kind, and he fully understands what a saw-mill should do.

The other is from the owners and millers of the new Grist Mill erected in Cayuga County, N. Y., in relation to which we recently published a letter from Mr. Avery.

These certificates are from gentlemen who understand the subject, and they may be relied upon.

Syracuse Jan. 31, 1837,

To Elam Lynds, Esq.

Ddar Sir,—I saw to-day the saw-mill in Cicero, which is propelled by one of Avery's Rotary Engines. While I was present, the saw cut a hemlock log of about two feet diameter with ease and rapidity, and appeared to have power sufficient to accomplish much more. The work was well done, and I was well pleased with the power and performance of the engine in all respects.

Yours very respectfully,

Henry Seymour.

Cato, Cayuga Co. N. Y.
January 25th, 1837.

We the subscribers, owners of the Steam Grist Mill at this place, do certify, that the Rotary Engine, that drives our mill, is one of Avery's Engines, and manufactured by Messrs. Elam Lynds & Son, and is in our opinion, the best steam power for a grist mill that can be had. It gives us perfect satisfaction, and we cheerfully give this certificate.

The grinding we do is for customers, in grists of from one to ten bushels, and of all kinds of grain, so that we are unable to say how much we could grind in a given time, but this we can say, that the Engine will drive the stones to grind all the grain that any mill can grind with three run of stones, which is the number we have. We have never been able to ascertain the amount of fuel we should require if we were grinding for flouring, or indeed for our present use; but of this we are confident, that with good wood, we could grind more than 100 bushels with a cord of wood. We do not use the full power of the Engine, and it is believed by us and others, that the Engine would drive two run more if we had them, and do good business with the five running at once, without any addition to the Engine or Boiler.

B. Conger.
Henry Furman.

We the subscribers, Millers, tending the above mill, fully agree with the above certificate.

P. D. Livingston,
David Corp.

ILLINOIS INTERNAL IMPROVEMENTS.

The enterprize and liberal views of the citizens of Chicago, evinced by the proceedings of a meeting held at Russell's Saloon on the 18th ult., which we publish herewith, are worthy of imitation by the citizens of NEW-YORK. The aged matrons who claims to be the "commercial emporiums" of the UNION, may well take lessons of wisdom from the course of this infant Hercules of the West.

From the Chicago American.

INTERNAL IMPROVEMENT MEETING.

Pursuant to public notice, a large and respectable meeting of the citizens of Chicago was held at Russell's Saloon, Monday evening January 18th, to take into consideration the propriety of recommending to the Legislature, the adoption of measures for the speedy construction of the great Central Railroad, and the organization of a general system of internal improvement, in this State.

On motion, Wm. H. Brown, Esq., was called to the chair, and Wm. Stuart appointed Secretary.

On motion of Francis Peyton, Esq., who stated the objects of the meeting, a Committee of five were appointed by the Chair, consisting of F. Peyton, J. N. Balestier, John H. Kinsie, Esqrs., and Col. E. D. Taylor, and Capt. J. B. F. Russell, to report resolutions, expressive of the sense of the meeting; and thereupon, F. Peyton, Esq., from the Committee, presented the following, viz:

Whereas it is the interest of the northern parts of the State of Illinois to give a hearty support to all measures of public improvement, projected for the benefit of any part of said State, and whereas a lively interest prevails in this section of country, in favor of the immediate construction of the great Central Railroad, and a general system of improvement, therefore,

Resolved, That we approve of the law of the last session of the Legislature, adopting a Central Railroad, and feel a lively interest in the completion of said road, and that our representatives be instructed to support such measures as may be necessary to carry into effect that law.

Resolved, That we also approve of a general system of Internal Improvement, the benefits of which shall be felt in all parts of the State, and do most heartily tender our co-operation in support of the same.

Resolved, That our Senator and Representatives be instructed to use all honorable means to effect the objects contemplated by the above resolutions.

Resolved, That these proceedings be signed by the Chairman and Secretary, and published in the papers of the town, and that copies be sent to our Senator and Representatives, to be laid before the Legislature.

Which were read and in full adopted.

On motion, adjourned.

WM. H. BROWN, Chairman.
WM. STUART, Secretary.

ILLINOIS AND MICHIGAN CANAL.—We have received from *Hon. P. Pruyne* the Annual Report of the Canal Commissioners, with the accompanying documents, the publication of which, from their great length we are compelled to postpone till our next. In the meantime it may be well to present to our readers the following estimate taken from the Report:—

Summit Division,		$5,871,324 [illegible]
Middle	"	1,510,957 45
Western	"	1,272,055 08

[Chicago American.]

From the West Chester Village Record.

WEST CHESTER RAILROAD.

At an annual meeting of the stockholders of the West Chester Railroad Company, held pursuant to public notice, in the city of Philadelphia, on the 16th day of January, 1837, Dr. M. C. SHALLCROSS, was called to the Chair, and Dr. P. M. PRICE, appointed Secretary.

The President of the Company submitted the following Report, which was read, and upon motion of E. Chauncey, approved, and ordered to be printed.

SIXTH ANNUAL REPORT OF THE WEST CHESTER RAILROAD COMPANY.

This is the time fixed upon by the charter, at which the President and Directors of said Company, are directed to exhibit to the stockholders a statement of the affairs and proceedings for the last year.

The beginning of the year, and nearly three months of it, was very inauspicious for all kinds of travelling on our Railroad, and frequently it was rendered impassable by the violent and unusual snow storms, and consequently our expenses were considerably increased in proportion to the receipts—but notwithstanding these impediments, the business upon the road has been more productive for the last than the previous year.

The line of burthen cars, with their horses, belonging to the Company, were in May last, sold to Messrs. James and Darlington, who continue to run the line upon the road.

The receipts for passengers, the last year, amount to	$14,145 45
Do. for tolls, rent, freight, &c. to the sum of	5,203 35
Making altogether the sum of	$19,349 80
Expenses, including tolls to the State, interest on loans, repairs to road, &c.	16,159 47
Leaving a balance of	$3,190 33

nearly the whole of which balance has been derived from the carrying of passengers for the last six months: upwards of nine thousand eight hundred passengers have been carried in and upon our cars, to and from Philadelphia to West Chester, in the last half year.

The following statement shows the amount of transportation of Merchandize, &c., on the road during the last year:

Passed Eastward towards the City,	658 tons.
Do. Westward from do.	1026 tons.
Making	1684 tons.
Passed on and over the Branch road to West Chester, of lime, marble, lumber, &c.	1643 tons.

The final results of the operations of the Company for the past year are more particularly [illegible]

The capabilities of the road [illegible] been fairly tested upon its own basis until the last half year.

In its first trial a connection with other Western lines became necessary on account of the railroad Bridge at Schuylkill being unfinished, and common stages required to get from the inclined plane into the City.

On the first of July, 1836, the Company took the passenger business into their own hands; since then they have had a trial of what they can accomplish on their own exclusive footing; and the result has proved the absence of any extraordinary occurrence or accident, the road and business of the company may be made to yield a fair profit on the capital invested.

It is true the profits realized have not been divided among the Stockholders, but the investments made of them cannot fail to be more advantageous to them in the future returns to be realized.

A stable seemed a necessary appendage to the Hotel which had been erected on Broad street, and if neglected for a few years, the rapid increase of buildings would have deprived them of the opportunity of securing a vacant lot for its erection.

It had long been a subject of complaint that passengers were set down at a distance from the town of West Chester, and subjected to the inconvenience of walking in all kinds of weather to their houses or stopping places. It was therefore indispensible to the proper accommodation of the public, that the railroad should be extended into the built part of the town where it now terminates, under a neat and conveniently constructed Car house, with offices in front.

These may properly be paid for at a more favorable period of the money market, by a loan for the amount expended, and the profits of the company distributed as a dividend among the Stockholders.

Having accomplished these important and necessary improvements, the Company foresee no further occasion for investments of a permanent nature, until the business of the Hotel in Broad street, may make an extension of it by back buildings necessary, and a suitable return therefor certain.

Believing that they have now arrived at a period when the railroad will yield a return equal to the ordinary rate of interest, the Directors cannot but feel themselves authorized to look to the future, with the confidence that the stockholders will have a permanent basis for a similar income; besides the reasonable expectation of profit afforded by the increased accommodations to the public, the greater rapidity of travelling under the arrangement established for the last half year; and the natural increase of business, from all the new branches of trade and industry connected with it, and the extension of the population, business and prosperity of West Chester and of Chester county.

In this respect, the Directors notice with particular pleasure, not only as it concerns the profits of the Company, but the interests of the public and the character of the place, the highly prosperous condition of all the schools for learning in the Borough of West Chester; and they cannot repress the wish that these, and the scientific Lectures and associations so happily commenced, may always continue to distinguish and attract the public regard to that Borough. However humbly the railroad may subserve the surrounding prosperity, whether it be to convey the scholars to the schools, merchandize to the storekeeper, the produce of the farmer to market, or the building materials for the extension of the town, the stockholders must derive a prospective advantage in the general improvement, greatly exceeding in value the momentary compensation for the transit their railways afford

(Attest,) ZIBA PYLE, President.
WM. WILLIAMSON, Secretary.

TREASURER'S REPORT.

STATEMENT OF THE ACCOUNTS OF THE WEST CHESTER RAILROAD COMPANY, FOR THE YEAR 1836.

DR.

To Capital Stock, paid in	$109,925 00
Receipts for tolls, passengers, freight, rents, dividends on Bank Stock, &c.	19,349 80
	$129,274 80

CR.

By Cash paid for construction of road, buildings, cars, horses, &c.	109,556 46
Balance of Capital unexpended	368 53
Balance due at last statement,	392 83
Cash paid, expenses for salaries to agents, repairs, keeping horses, tolls paid to State, interest upon loans, &c.	15,766 64
Balance, being profits,	3,190 33
	129,274 80

TREASURER IN ACCOUNT WITH THE DEPOT IN THE CITY OF PHILADELPHIA.

DR.

To amount of Loan	29,000 00
Balance due Treasurer,	2,489 18
	31,489 18

CR.

By Cash paid on account of Depot,	31,489 18

All which is respectfully submitted,
WM. WILLIAMSON, Treasurer.
January 5, 1837.

On motion, Resolved, That the Chairman and Secretary act as judges of the election now to be held for Directors of the Company for the ensuing year.

Upon counting the votes, it appeared that the following named persons had each received 1146 votes, being the whole number given, viz:—Ziba Pyle, Jonathan Valentine, Algernon S. Roberts, Coleman Fisher, Eli K. Price, William H. Dillingham, and William P. Sharpless, who were thereupon declared duly elected Directors of the Company for one year.

M. C. SHALLCROSS, Chairman.
PHILIP M. PRICE, Secretary.

The following damages awarded to the seamen injured last summer on the Boston and Providence Railroad, will prove a precedent in all similar cases.

The liability of the Company in all cases of accident, arising from carelessness of their agents, is just, and it will be found beneficial to Railroad Companies, that such a decision has been made.

The property of the road will suffer much less in the hands of careful and judicious men, than when entrusted to those who know no more of the business than a quack doctor does of anatomy.

The slight increase of expense in selecting and recompensing suitable persons, will bear no comparison with the final gain, in safety and diminished wear and tear upon the road.

THE RAILROAD CASES.—The case of James Thompson, vs. the Boston and Providence Railroad Corporation, the trial of which commenced in the Supreme Judicial Court last week, has been going on from day to day, until yesterday evening, when it was brought to a close. The plaintiff was one of the United States seamen who were in the forward car of the train on the Providence Railroad, on the 29th of June last, and suffered injury from the collission between that train and the Dedham train, going from Boston towards Providence. There were five other suits brought by the other seamen who sustained injury at the same time; and since the commencement of the trial, it has been agreed by the counsel of the respective parties, that they should all be submitted to the same jury, as they all rest upon the same ground, and depended upon the same evidence, with the exception of the nature of the injury suffered by each, respecting which additional testimony was given. A great mass of testimony has been given in the trial, and as the case is novel in its character, and important to the parties, it has undergone a most thorough investigation by the learned and able counsel, both for presenting a full view of the facts, and for applying correctly the principles of the law. The case was summed up yesterday afternoon in a most lucid and satisfactory manner, by Chief Justice Shaw, and delivered to the jury. They were instructed, in case they should decide against the defendants, to award, not vindictive damages, but a reasonable remuneration, under the circumstances of the case, for the injury sustained by each of the six plaintiffs.

[Adv.]

At the opening of the Court, yesterday morning, the Jury returned a verdict for the Plaintiffs and awarded to each the sums following:—

James Thompson,	$2250 00
Joshua Howell,	3000 00
Thomas Murdock,	2250 00
Charles W. White,	1500 00
John A. Russ,	2000 00
John B. Cummins,	175 00
Benjamin Ranson,	175 00
	$11,350 00

From the St. Thomas (U. C.) Liberal.

IMPORTANT RAILROAD MEETING.

TUESDAY, Jan. 3, 1837.

A meeting of the Directors of the Niagara and Detroit Rivers Railroad Company, took place this day in the city of Toronto, at 11 o'clock, A. M., pursuant to notice from John Prince, Esq., President of the Board. In consequence of Mr. Prince's attendance being at that time required in the House of Assembly, the Board adjourned to six o'clock, P. M., at which time they met at the "Ontario House," when there were present—

Mr. Prince, President,
Mr. Hamilton,
Mr. Shaw,
Mr. Johnson,
Mr. Caldwell,
Mr. Lewis,
Mr. Haggart, and
Mr. Mercer, as proxy for
Mr. Brush, and
Mr. Cahon,

Mr. Cadwell and Mr. Haggart (not being present at the former meeting) were sworn in as Directors, in compliance with the 22d section of the Charter.

The amount of instalments paid in, being reported by the several Directors, and all being unanimous as to the expediency of commencing immediately, a survey of the route, it was moved by Mr. Shaw, seconded by Col. Hamilton, and carried—

Resolved, That Mr. Mercer, be authorized by the Board, to proceed to the United States for the purpose of employing a competent Engineer, to make the surveys for the Niagara and Detroit Rivers Railroad; and that he proceed forthwith to Judge Wright, and take his opinion as to the most competent person to be employed; and if he cannot obtain from Judge Wright the recommendation of a competent and celebrated Engineer, then, that he be authorized to employ the best one that he can get; and that the President be hereby authorized to clothe him with full authority to carry this Resolution into effect.

Resolved, That the Directors of the Niagara and Detroit Rivers Railroad Company, meet the Parliamentary Committee on a "Great Western Railroad," (as proposed,) at half-past nine in the Committee Room of the House of Assembly.

WEDNESDAY, Jan. 4.

A conference having taken place in the Committee Room of the Assembly, by appointment, with the Chairman, and several of the Select Committee of the House of Assembly, on the "Great Western Railroad," mentioned in the Lieutenant Governor's

Speech, at the opening of the present Session, and also with the President and some of the Directors of the London and Gore Railroad Company, it was

Resolved, Unanimously, (by the President and Directors of the Niagara and Detroit Rivers Railroad Company,) that it would be inexpedient and impolitic in us, under existing circumstances, to agree to form an union or junction with either of the above roads.

Resolved, That this Board do adjourn till nine o'clock A. M., to-morrow.

THURSDAY, Jan. 5.

The Directors met pursuant to adjournment in the Committee Room, when the following Resolutions were passed:

Resolved, That our President, John Prince Esq., M. P. P., be requested to present a petition to the House of Assembly in the name of the President and Directors of the Niagara and Detroit Rivers Railroad Company, praying for the loan of a sum of money (not less than one hundred thousand pounds) to aid in erecting the said road; the tolls of the road to be pledged to the repayment of the said loan, with interest.

The petition was drawn up, and signed accordingly.

Resolved, That no amendment of the Act be applied for, during the present session.

Resolved, That the President do forthwith issue Scrip to the persons who have paid up the first instalment on their respective shares.

JOHN PRINCE, President.

Resolved, That the thanks of the Board be given to our President, for his zeal and ability in advancing the interests of the Company.

JOHN TALBOT, Secretary.

DETROIT, Dec. 5, 1836.

MY DEAR SIR,—Your friends Messrs. Mercer and Gardiner, have shown me your letter to the latter, in which you advert to Gov. Head's project of a Great Western Railroad through Upper Canada.

Taking it for granted, that this is not a question of "distribution of the surplus revenue." I presume the suggestion involves considerations, affecting, not only, the geographical eligibility of the route, but such, also, as relate to the probability of inducing individual enterprize to aid in the construction of the work, to its productiveness, when finished, and to its subservience to the purposes of general *uninterrupted* intercourse. for the public by which it is to be sustained.

It is sufficiently obvious, and well enough understood, I believe, that the choice of route is confined to two. One from the head of Lake Ontario, to the foot of Lake Huron. The other from Black Rock, to Sandwich or Detroit. If the principles above suggested, are to have any application in these cases, then it becomes necessary to put you in possession of facts with which it would be unreasonable to suppose you acquainted. I desire to premise, however, that I am not writing a treatise upon Railroads. I am but presenting at the instance of mutual friends, a hasty and undigested sketch, which, if it answer the use of a statistic memorandum will accomplish all I propose. I add also that when I use round numbers, they result from the *omision,* not the *addition* of fractions; and that the sources of my information; are, the Warehouses the Custom Houses, the Stage proprietors, the Ferry Masters.

Thirty steamboats of the first and second classes, ply between this and Buffalo. Of the first class, two arrive and depart daily; and of the second class one. The former, average *two hundred passengers each, each way;* the latter 60. The former average *fifty tons freight,* each, arriving; *the latter twenty.*

One hundred and fifty vessels are employed. Of these an average of three arrive and depart daily, averaging *each, each way,* ten passengers, and *averaging one hundred tons freight each.* The exports I have omitted to ascertain. It would require more leisure than I can conveniently bestow.

An average of *two hundred wagons, one hundred and fifty pair horses, two hundred pair oxen, and eight hundred persons,* with their moveables, are crossed per month, at the Detroit Ferry, having come up through Canada. The receipts at the Ferry *have doubled* since the last year.

These averages are calculated for *the seven months of the year* during which this state of things continues.

The receipts at the Western Stages Office since the 1st of March last, have *been* $90,000. Whether those have been created by all manner of other requisitions, ranging from a big double waggon, to a little French Poney, and in default of that, the substratum of a pair of double soled cowhides it would be impossible for me to say.

Calculate these data for two hundred days, which is less than seven months, and you have

1000 persons arrival and departure, daily, or	200,000
400 tons freight import, or	80,000

This is exclusive of the transportation of property by the Ferry, and that of persons and property, by Eastern Stages and the small Steamboats in connection not enumerated in the preceding estimate.

Taking a glance now at the Map. Directly east of this, on the sea board at Boston begins a Railroad, partly in operation; partly in process of construction, and all chartered, running through the centre of Massachusetts, and New-York directly to Buffalo; of this, one hundred and forty miles are completed. Passing over the interruption of Canada the line is taken up again at Detroit, and carried to near the head of Lake Michigan,—and of this the first will be completed next July. From the head of Lake Michigan the country presents a perfectly flat surface westwardly to the valley of Rock River, emptying into the Mississippi. Into the line from Boston to Buffalo, tributaries are made or *making* from Rhode Island, Connecticut, New-Hampshire, Vermont, New-Jersey, and Pennsylvania, and a branch at Buffalo diverts to itself, the great New-York and Erie Railroad.

Compare, then, under these circumstances the relative advantages of these two routes through Canada.

Of the geographical features of the southern route it is unnecessary for me to speak. You are sufficiently familiar with them. A level ridge peculiarly adapted by its uniformity of surface, and the character of its soil, to the economical construction of such a work; it presents, in addition, in the absence of any expense for the land, and in the abundance of timber upon its borders, facilities, unsurpassed, for such an object, anywhere.

The aid it will invite may be judged of, from its position, lying as it does, between the terminating points of two extensive lines now in process of construction. The flow and ebb of population will force a channel through for itself. The natural progress of things will build it, and as a rival to anything else, it will exhibit one of those formidable oppositions, that end in becoming the administration itself. The distributive shares of Michigan, in the surplus revenue, is more than half a million of dollars, intended to be appropriated to internal improvements. Of these, none is more important to her than the Detroit and St. Joseph's Railroad—and the moment the company is relieved from this undertaking, they design to transfer their capital and enterprize to the construction of the Niagara and Detroit Rivers Railroad.—Buffalo and Detroit can never suffer such a project to sleep.

As regards its productiveness, it is sufficiently indicated by the fact I have given you. Superadd to this, that its charter is perpetual; that it is in the direct line to avoid the water, and therefore, neither liable to be cut off or interfered with, by shortening lines, nor interrupted by five months of winter; absorbing the intercourse from the sea board to the Mississippi; and you have the promise of a steadily increasing value of stock, such as is not to be found elsewhere, within my knowledge.

Shall I ask, whether it would be better for the people of Canada to become participants in, or the owners of this stocks, or whether they had better carry a line of Road from Hamilton to Fort Gratiot, having upon one side of it, half the time a frozen Lake, and on the other for the present a comparative wilderness. If New-York with its dense population and the capital of its cities, is so long in making the Hudson and Lake Erie; if Detroit a 100 years old, with its enterprize and wealth combining with the southern part of Michigan which comprises the mass of its population, finds it so laborious an undertaking to reach Lake Michigan, when, I would like to know, will that Railroad be built which is to continue the Canada Road from River St. Clair to Lake Michigan upon the 43d parallel of latitude? And when it reaches the Lake, how, for half the time will they get over it? I saw a paper the other day, published at Palmer, the County seat of St. Clair, glorifying in the idea that the Camden Road was to terminate there and remarking in a sort of parenthesis, that the extension of the Palmer and Romeo Railroad (which is not built yet) would carry it across the Peninsula. And even if that were done (I mean the first section of the Romeo Road) which is not yet begun, do you know, that the *western* extremity of the *proposed* road, which is Romeo, is east of the eastern beginning of the District Road?

But you must be tired. If you are not I am sure I am, so we shall both be gainers, if I stop this long yarn.

My friend Mr. Oliver Newberry, than whom Michigan has no more enterprizing citizen, nor any whose business relations are more extended, will corroborate the statements and views of this letter. I am, very dear sir,

Your friend,

(Signed) E. A. Brush.

I concur in the facts and views expressed in the foregoing letter.

(Signed) Oliver Newberry.

John Prince, Esq., M. P. P. Toronto.

From the St. Louis Commercial Bulletin.

Internal Improvements.—We publish to-day the Report made by Mr. W. B. Guion, Civil Engineer, of his reconnoissance for a Railroad route from Louisiana, in this State, on the Upper Mississippi River, to Columbia, a distance of about 85 miles; also, that of Mr. Erskine Stanbury, Civil Engineer, of a route from Fayette, to this city, both of which we consider of interest to the people of Missouri. We are sorry to find, that the Report of the latter developes a state of facts calculated to preclude all hope of constructing a railroad to connect the north-western portion of our State with this place, until the necessities of the country demand, and the resources of the State be, equal to, the undertaking, which does not, at present appear to exist, nor likely to do so for some time to come.

It has always appeared to us, not only more practicable, but of more importance to St. Louis, and the prosperity of the State generally, to construct a railroad from this, in a south-western course, or in the direction of the Iron Mountain, mineral and pine region, lying between the Merrimack and the heads of the St. Francis river.

A road constructed in that direction would immediately develope the great mineral wealth for which Missouri is so famed, and which could not be brought into usefulness and profit hitherto, in consequence of its remoteness from a means of transportation to a fair and profitable market, St. Louis, the State, yes, the adjoining States and Territories, need all the products of the mines and forests of that region, in order to advance its interests, and administer to the comfort of the inhabitants.

The increased demand for iron alone, has in the last two years raised the price from 50 to 100 per cent. and being an article of absolute necessity, it becomes a matter of importance to the statesman and economist to inquire into the propriety of adopting a system calculated to bring into use our own resources in the manufacture of the inexhaustible beds of ore, instead of paying tribute to other States for an article evidently inferior in quality

The same may be said in regard to lumber; we are daily paying extravagant prices for this article, brought from th. Ohio river, and of inferior quality to that produced from the pine forests of our own State.

The lead also produced from that region, to say nothing of copper, zinc and tin. would be manufactured and brought into market by means of a railroad, and render Missouri within herself, the most independent of all the States, and St. Louis the greatest workshop and emporium of manufactured articles of all the cities of the Union.

The system proposed by the committee on Internal Improvement in our Legislature we conceive to be a magnificent scheme, and if carried out, will add to the wealth and prosperity of our State, to the honor of our Governor, and those who may have assisted in devising the plan.

REPORT OF THE CIVIL ENGINEER, ON A PROJECTED RAILROAD, FROM LOUISIANA TO COLUMBIA, IN THIS STATE.

St. Louis, 1st December, 1836.

A. B. Chambers, William Cornelius, Esqrs., and others; Committee for the people of Pike and Broome Counties.

Gentlemen: In obedience to instructions from the War Department, directing me to make such an examination of the projected railroad from Louisiana to Columbia as the persons interested in it might desire, I repaired to Louisiana in the month of September last, and then reported to A. B. Chambers, Esq., the Chairman of the committee for the citizens of Pike county, by whom and I. Herrick, Esq., I was furnished all the information necessary to enable me to perform this duty. Having completed a reconnoisance and survey of the route, and knowing your anxiety to present to the Legislature of the State now in session, some of the results of these examinations, I have the honor to offer you such a report as the little time which a necessary attention to other duties in a neighboring State leaves at my disposal of this object. It is of necessity general, and the calculations it embodies only proximate; but I trust it is so nearly exact that you may be safely guided by it in your future action upon the subject

Although the country traversed by this survey is well known to you, it may not be improper to glance at its general character in illustration of the facilities and impediments to be encountered in the progress of such a work. By a glance at the map of the State it will be perceived, that the peninsula formed by the junction of the Missouri with the Mississippi, is intersected by numerous streams, the tributaries of these rivers, running across the direct line from Louisiana to Columbia. These streams are formed by the junction of a great number of small branches the vallies of which are generally deep, and often present separately, obstacles as formidable to the passage of a road across them as does the principal stream below the point of their union. The great plain drained by these water-courses which is first surmounted, in the direction of the road, at Bowling Green, at an elevation of four hundred and forty-four feet above high water mark on the Mississippi, presents generally a surface remarkably smooth, but undulating from the above stated altitude, to that of about two hundred feet. A large portion of it is prairie, of a rich and fertile character while the banks of the numerous streams intersecting it, afford a variety of woods of a quality suitable for railroads, and sufficient for all the purposes of husbandry.—Casting the eye over the map of this region we trace a broad and continuous ridge between the waters of the Missouri and Mississippi. This ridge is called the Grand Prairie, and shoots out from its principal stem, branches on either side, very nearly to the banks of those great rivers. One of these branches, or "arms of prairie," as they are familiarly termed, passing around the heads of the river Au Cuivre, reaches quite to Bowling Green—while another, in part prairie and in part wooded, leads around the head of Hinkson's Creek to Columbia. As this ridge is smooth and generally nearly level, it might be supposed to offer the best route for the proposed road; but for considerations which I shall enumerate, I preferred rather to adopt, in the preliminary survey, a route nearly coincident with the straight line to Columbia, and only deviating from it to obtain easy crossings of the streams. Were the road constructed on the ridge just indicated, there is more than a reasonable apprehension, that water to supply locomotive steam engines, at proper intervals, could not be obtained; nor would supplies of fuel be conveniently procured. But besides these objections, the road would pass through a tract of country uninhabited, and uninhabitable—being flat, wet, and without wood—whence no profitable return could be received by the proprietors for their large expenditure of money. The route surveyed is 85 miles in length, being but a few miles longer than the straight line between the extremities, and in the greater part of the way, offering a surface well adapted to the construction of a railroad, in view both of the cheapness of its construction, and the facility of transportation upon it.

From Louisiana, the line pursues the valley of Noix Creek, ascending nine miles at rates varying from fifteen to forty feet per mile—whence to the Court House in Bowling Green, there is an abrupt ascent of about two hundred and forty feet, in one mile and a half. To surmount this great height, locomotive power would be quite competent, at a diminished speed, when the rails were in a favorable condition, at which time an engine weighing eight and a half tons, of power equal to such as are in use on the Baltimore and Washington railroad, would ascend this plane at the rate of about three miles an hour, with a train of one hundred tons gross, or about seventy tons of goods. But it remains to be proved by experience, that in the worst state of the road, a locomotive engine would have sufficient tractive power to overcome ascents much above one hundred feet per mile. Again, this difficulty may be overcome by stationary power, either of steam or horses, kept in readiness to assist in drawing the trains up the plane. And lastly, future surveys may point out the means of forming a more easy and suitable grade. But the solution of this difficulty is dependent upon so many considerations, of cost, speed, and capacity for transportation, that I leave it to the future, with the mere statement of the means by which it may with certainty, be accomplished. Leaving Bowling Green, the line surveyed, passing by Major Davis' and Jeremiah Morris', crosses Indian Creek a branch of the Au Cuivre, just below the "forks," and a little above Vanney's mill; thence gently ascending to the prairie, it crosses Prairie Fork at the ford of the Indian road, continues in direct line to the west fork of the Au Cuivre, near its junction with Hickory Fork, and passing it, ascends Lost Fork to a level prairie, that is pursued about fourteen miles, on a surface graded as it were by the hand of nature, avoiding Boon Creek, and all the branches of the Loutre. Leaving this prairie the line crosses the south fork of Salt River, about three miles from its source, and ascending Beaver Dam Creek, regains the prairie about half a mile north of James Harrison's house.—This prairie is the highest ground passed over on the route, being four hundred and fifty-nine feet above the plane of reference. From Harrison's the route was continued over the Grand Prairie, around the head waters of the river Aux Vases, to Cedar Creek, which was crossed about a mile below Toneyer's mill. There are three branches of this creek crossed within two miles, but none of them are of much magnitude. From Cedar Creek, the survey was directed towards Hinkson's Creek, which must be reached by a cut of forty or fifty feet deep, through the crest of the intermediate ridge. The point selected for crossing the latter stream, viz: at the widow Redmond's, about half a mile below Crockett's mill, is believed, from personal observation and information derived from others, to be the most favorable for that object, within a distance of eight miles from Columbia. From this point may be had the longest plane by which to ascend the ridge, that bounds the valley of the creek on the west, which is every where abrupt, and here more than one hundred feet high. Having ascended this ridge along the valley of a small branch, that runs down the eastern face of it, through Mr. Mills' farm, the route was prolonged on its crest to the principal street in the town of Columbia, passing between the waters of Hinkson and Bear creeks, in a line generally direct, but a little serpentine, and over a surface slightly undulating.

In conclusion of this general sketch, I will add that of the whole length of the line surveyed, a great part is level, or so nearly so, that at small cost it may be made to conform to grades that will offer but little resistance to the burdens that may be transported upon the road; while there is but one portion, namely, that at Bowling Green, which excites the least doubt of its proper adaptation to locomotives.

Having thus briefly indicated the route adopted for the survey it will be pertinent to remark, that although you desire me, in the letter conveying your wishes on the subject, so to conduct the survey, that the line might be prolonged in the most advantageous way to Rocheport, without sacrificing the interests of Columbia, it was made without any reference to such an extension, in consequence of my ill health at the time I made a reconnoisance of the country, and the necessity of my constant attention afterwards to the party in the field, and because of the failure on the part of the citizens of Rocheport to communicate to me any information in regard to the nature of the country. But notwithstanding, I believe the line may be continued to Rocheport from the point at which it surmounts the ridge on the west of Hinkson's creek, through the vallies of Bear creek and Rocky fork, the latter of which runs into Rocher Perci nearly in direct line to Rocheport, as successfully as by any other route which can be found; for in this region the ridges are so high and the vallies of the principal streams so deep that it is in vain to seek to pass across the latter except by the ravines of the longer branches that lead into them.

MODE OF CONSTRUCTION.

The road being graded to a surface width of sixteen feet in cuttings and fourteen in embankment, the form of superstructure which I would recommend to you for adoption is one which experience has proven efficient, and which, involving the least expenditure of money, pruduce approves as the best until an improved condition of your country and an increase of traffic upon your road shall justify the substitution of more imperishable and costly materials. I propose to you, to form the superstructure of sills or transverse pieces laid at intervals of three feet from centre to centre, and notched at each end to receive the longitudinal or string pieces, the latter having a cross section of five by eight inches, and being plated on the inner edge of the upper surface with iron bars two and a quarter inches broad and five eighths of an inch thick secured to the wood by iron spikes. These dimensions of the rails as well as the nearness of the sills, and nothing less, it is believed will ensure an unyielding surface under the pressure of the efficient but heavy engines now in use, which with a less firm structure might cause by the yielding of the rails, the disruption of the iron bars, besides a great increase of resistance to the transportation upon the road.

Estimate of Cost.

For grading, entire distance	$242,000
" cleaning and grubbing do.	21,000
" bridges and culverts do.	42,000
	305,000
For a *single mile* of superstructure.	
" 42,000 feet of scantling a $15,	$630,00
" 22 tons iron bars a $80,	1760,00
" 1760 sills a 25 cts.	440,00
" laying the rails a $2 per rod,	640,00
" spikes and plates,	200,00
	3670,00
Eighty-five miles of a tract a $3570 per mile	311,950
To which must be added for the necessary turnouts, with their castings	10,000
	$626,950

To these sums must be added the cost of machinery, store-houses, work-shops, etc., but these are so entirely dependent upon the amount of business required to be done by the road, that I omit any statement of it. In conclusion I repeat that this estimate is not offered as an exact one, but rather as the ultimate limit of your expenditures, should you adopt the plan I propose.

The profiles and maps which should accompany this report, for want of time, have not been prepared, but Mr. Erskein Stanbury who with my assistant, Mr. Webster U. S. Assistant Civil Engineer, rendered me efficient aid in the survey, has undertaken to prepare them and furnish you with them in the course of the winter.

Of the benefits which your community and the State at large would derive from the successful issue of your enterprize, it is perhaps superfluous for me to speak. The mere statement of facts is proof sufficient and needs not demonstration to enforce it. Your projected road runs through a region of country rich and fertile in soil, and presenting a pleasant variety of prairie and woodland, the greatest portion of which is yet untilled, because of the difficulty of its communication with a market. That the advantages which it offers would immediately attract thousands to the Stare to swell her population—that the rich beds of bituminous coal which frequently show themselves on the surface, and that mines of metallic ore, of which there are abundant indications in the general metalliferous character of the country and the appearance of fragments on the surface, itself scarcely known—that these great sources of wealth would at once be developed to swell the commerce of the State and enrich her inhabitants so soon as an easy access to market is secured, there cannot be a reasonable doubt. But it is needless to dwell longer upon this topic. I feel assured that the zeal and intelligence of those to whom the fate of the work is intrusted, are such as to insure to it all the support which public policy and private interest demand.

I have the honor to be,
Very respectfully,
Your obedient servant,
W. Burling Guion, U. S.
Civil Engineer.

REPORT TO THE STOCKHOLDERS OF THE SCHUYLKILL NAVIGATION COMPANY.

The President and Managers, in presenting their customary annual Report, have much pleasure in stating, that no material circumstance has occurred to interrupt the regular progress of the important trade transacted upon the works under their charge, during the past year, and that the affairs or the Company exhibit a degree of prosperity highly gratifying.

The statements herewith submitted as part of this Report, marked B, C, D, show a large and steady increase of the trade, and there appears to be very reasonable probability of its further improvement and continuance.

The principal item of transportation, and from which the Company derives the largest portion of its revenue, is *Anthracite coal*, which, as a fuel, may now be considered an *article of necessity*, although but few years have elapsed since its introduction, and many prejudices to encounter;

yet, from the general preference given to it, no apprehensions are now entertained of overstocking the market. The supply of the past year, by the Schuylkill Navigation alone, has been 432,045 tons, and although this has exceeded the shipments of the proceeding year, 97,173 tons, it has met with a ready demand, and a much larger quantity could have been sold for exportation, had it been brought in season.

The whole quantity of Anthracite coal sent to market by the several canals in 1836, is as follows:

By the Schuylkill,	Tons	432,045
By the Union,	"	11,709
By the Lehigh,	"	146,502
By the Delaware and Hudson,	"	106,270
Making the whole supply,	"	696,526

Being an increase of 134,518 tons beyond the receipts of 1835.

There was likewise brought to market 5,062 tons of Bituminous coal from the Susquehann mines, via. the Union Canal

The coal is brought to the Schuylkill, by the following Railroads:

Danville and Pottsville Railroad, from the Girard mines,	Tons	13,347
Mount Carbon Railroad,	"	122,892
Schuylkill Valley Railroad,	"	55,921
Mill Creek Railroad,	"	56,583
West Branch Railroad,	"	115,992
Little Schuylkill Railroad,	"	35,159
From other sources,	"	49,890
	Tons	449,784
Of which there has been sent to market, 432,045 tons, by 9,526 boats; of these 472 discharged their cargoes between Port Carbon and Philadelphia,	Tons	21,749
There was shipped from Philadelphia, on board 2964 vessels, bound for distant ports,	"	313,838
There has been sold for home consumption (in addition to 26,000 tons of the preceeding year's supply, on hand 1st of January, 1836,)	"	61,944
Allowance for waste, five per cent.		20,514
There remains on hand at the Philadelphia landings, 1st January, 1837,	"	14,000
	Tons	432,045

The amount of toll received on Anthracite coal,	$399,472 59
Amount on all other articles,	123,160 67
Total amount of toll received in 1836,	$522,632 26
Of which there was from the ascending trade,	$76,258 29
And from the descending trade,	446,375 06

The tonnage of the ascending trade, 61,079 / The descending, 570,094	Tons 631,173

The number of boats passed through Fair Mount Locks in 1836, were as follows:

Descending boats, laden with Anthracite coal,	9054
Laden with produce, limestone, &c.,	3225
Ascending boats, laden with merchandize,	4688
Empty,	7512
Boats	24,479

Of the ascending boats, 2041 were bound for the Union Canal, on which the

toll amounted to	$37,989 70
And the ascending toll,	32,225 55
	$70,215 25
The rents received in 1836, from real estate, ground rents, and water rents, amount to,	$16,328 85
And the arrears uncollected, are	4,515 37
The estimated income for 1837, from rents, is	18,743 40

The following improvements have been made since the last Report, at points where much delay has been experienced, which will be found highly beneficial in facilitating the trade.

One new cut stone Lock at Bridsborough two new cut stone Locks below the Tunnel; in Schuylkill county there yet remains some embankment to be made at this point, which will be finished before the commencement of the spring business.

Several new substantial Tollhouses have been put up, where the old temporary buildings were scarcely tentable.

The old set of locks at Manayunk, which were much decayed, have been rebuilt, and other important improvements at this point, have also been made.

The towingpaths have been raised in many sections, and covered with hard materials. The channels have been cleared of obstructions, so that boats carrying from fifty to sixty tons pass freely.

The Mountain Dam and one at the head of the Duncan canal, have both been substantially strengthened by log cribbing, filled with stone.

The Norristown Dam, one of the oldest on the line, built upon a gravel foundation, with a sheeting of logs to prevent its being undermined, had during the heavy ice freshet of March last, sustained considerable damage by the sheeting timbers being cut off by ice, and otherwise much injured, this was temporarily repaired by a large quantity of stone thrown around the injured part; to attempt a thorough repair of this important Dam, in such manner as to give confidence in its stability, under the circumstances of its construction, was considered by the Coard of Managers as impracticable; it was therefore determined to commence building an entire new one, which was located eight feet down the stream from the old Dam. Four hundred and twenty feet of this have been finished in the most substantial manner, based upon the rock. The old Dam remained entire as a backing, the intermediate space between them, has been pile planked, filled solid to the top, made entirely tight and covered with timber. The remaining part, being about one half the distance across the river, is intended to be completed the next season, for which the timber is prepared. The expense of this work has been heavy, in consequence of the depth of excavation, necessary to obtain a permanent rock foundation; a part of which has been charged to the contingent fund, and the balance to current expenses.

A second reservoir on Tumbling run (an active stream near the head of the navigation,) which had been commenced in 1835, has been finished in the most substantial manner.

The dimensions of the two reservoirs, when full of water, are as follows:

No. 1 measures, on the surface, 28 acres, contains 23,158,152 cubic feet of water, and is 41 feet 8 inches in depth over the iron conduit pipes, at the Mound dam.

No. 2 measures, on the surface, 30 acres, contains thirty millions of cubic feet of water, and is 52 feet 10 inches in depth over the pipes. Each reservoir has two ranges of iron pipes, of twelve inches diameter, passing through the base of the dam, for the purpose of supplying the navigation, which are opened and shut with perfect facility, by iron valves, as occasion requires; the surplus waters run off through a short canal, cut out of the solid rock, on the side of the mountain, several feet below the top of the embankments, to prevent injury by heavy freshets.

The great utility of these reservoirs has been fully manifested the current year; for about two months during the period of active business, the streams near the head of the navigation were remarkably low, and afforded but a limited supply of water, for the accommodation of so extended a trade. The deficiency was fully made up by the aid obtained from these reservoirs, and we have much satisfaction in stating, that the water was so judiciously applied, as to leave at least one half the stock held in reserve.

At the canal immediately above Reading, much inconvenience has been experienced by the operations of an extensive grist mill, which required so heavy draft of water from it, as frequently to interrupt and annoy the free passage of boats through the Locks. To remedy this evil, it was found necessary to purchase the mill, for which, together with fifteen acres of land, a dwelling and other buidings connected therewith, $18,000 have been paid. The water power for the use of this mill can now be so arranged, as to obviate the difficulties.

The Company being in want of timber, for the use of the works, have purchased a tract of land near the canal, in Schuylkill county, well stocked with white oak and other materials suited to their improvements; it contains 378 acres, and cost $3,800. When the timber shall have been exhausted, the land will be sold, and it is believed that the wants of the Company will thus be supplied upon better terms than in any other way

The expediency of doubling the Locks, for the purpose of affording as far as practicable a separate ascending and descending navigation, has heretofore been carried into execution at such points as were found by experience to present the greatest delay in the passage of boats; there yet remain two or three places at which any material inconvenience occurs, and *only one* on the whole line where *combined locks* remain tobe doubled. To improve these as early as possible, orders have been given for the preparation of a large quantity of cut stone to be delivered at the several points to be improved, and in readiness to commence building additional locks, as early the next season as the weather will permit; and it is intended to progress,as fast as possible,further to improve the capacity of the works, and to afford that additional accommodation to the increasing trade, which its importance and duty to the public interest rquire.

At the last annual meeting of the stockholders, an ordinance was passed authorizing a loan of $200,000, at a rate of interest not exceeding 5 per cent. a year, for the purpose of enabling the Board of Managers further to improve and increase the capacity of the works under their charge; towards the accomplishment of this desirable object, and the payments for real estate purchased, there has been expended, during the past year, $105,583 14, for the payment of which only $44,026 94 of the loan thus authorised, have been negotiated. The unprecedented scarcity of money, and the consequent rise of the rate of interest in the money market, rendered a further sale impracticable, without increasing the rate of interest prescribed, or of selling the loan below par; the Board of Managers not feeling authorised to adopt either of these alternatives was compelled to borrow temporarily from the Toll Fund, the sum of $61,556 21, to supply the deficiency. This amount it will be necessary to return to its proper account, by a further sale of the loan, on such terms as the stockholders may authorise.

The navigation of our canals was closed by ice, much earlier this season than usual, and caused considerable disappointment, as it put an entire stop to business, at a time when in its full tide of operation.

On closing the works for the season, they were found to be in as good order as usual, or as could have been expected, after a season of active trade; but on a line of improvement extending 108 miles, with 34 dams and pools, 27 canals, and towingpaths the whole extent, with 117 locks, forming the original navigation, and overcoming a fall of 610 feet, also 45 new cut stone twin locks, built for the purpose or increasing the means of passing the boats through without detention, many repairs will necessarily be required. For the accomplishment of these repairs, preparations have already been made, that the whole may be finished and ready in time for the opening of business next spring, as early as the season will admit.

All which is respectfully submitted,

JOSHUA LIPPIMCOTT, *Pres't.*

January 4th, 1837.

STATEMENT OF THE ACCOUNTS OF THE COMPANY, JANUARY 1, 1837.

(B) DR.

Capital Stock, 33,312 shares, a $50	$1,665,600 00
Permanent Loans,	1,538,626 93
Bond payable, given for Damages,	8,000 00
Temporary Loan from the Toll Fund,	61,556 21
	$3,273,783 14
Balance of Income and Expense account,as per statement of dividend committee, February 1836,	$10,806 77
Tolls received for 1836,	522,633 26
Rents received in 1836,	16,328 85
Contingent Fund,	3,353 02
Individual Accounts,	158 36
Unclaimed Interest,	4,412 36
Unclaimed Dividends,	2,879 00
	$560,571 62

CR.

General Charges, cost of the works,	$2,994,947 23
Do. for damages paid,	105,060 91
Do. for Real Estate,	159,516 82
	$3,259,524 96
Bonds Receiveable for Lands sold,	14,258 18
	$3,273,783 14
Temporary Loan,	61,556 21
Current expenses, being cost of repairs, salary to officers, locktenders' wages, &c., for the year 1836,	102,718 06
Interest on Loans for 1836,	77,215 14
Dividend, August last,	158,105 34
Individual Accounts,	2,590 77
Loans and Stock of the Company,	29,625 81
Special Deposite inBank,of unclaimed Interest and Dividends,	7,291 36
Cash in Bank,	121,468 93
	$560,571 62

C

Tonnage of articles ascending the river, 1836.

Merchandize,	22,350
Fish,	2,793
Salt,	3,402
Plaster,	10,518
Grain,	1,128
Iron,	3,040
Blooms and Castings,	444
Limestone,	2,707
Iron Ore,	2,280
Bricks,	666
Porter & Ale,	72
Lumber,	1,845
Marble and Stone,	2,062
Coal,	3,020
Flour,	388
Sundries,	2,292
Burrs,	124
Clay,	215
Wood,	241
Staves,	280
Sand,	205
Hides,	627
Tar & Pitch,	83
Hemp,	92
Rails,	141
Wool,	134
Tons	61,079

D

Tonnage of articles descending the river, 1826.

Coal,	432,045
Flour,	9,403
Whiskey,	1,971
Lumber,	12,153
Grain,	16,267
Iron,	4,667
Blooms and Castings,	6,726
Nails,	2,056
Lime,	18,629
Limestone,	44,920
Iron Ore,	1,851
Butter,	440
Leather,	427
Bituminous Coal,	5,082
Marble,	348
Stone,	3,223
Wood,	2,039
Tobacco,	779
Bacon and Pork,	680
Sundries,	3,387
Bricks,	164
Wool,	123
Glass,	138
Rags,	103
Staves,	316
Starch,	55
Logs,	188
Lard,	81
Live Stock,	174
Shingles,	1,665
Tons	570,094

WILKINSON'S ALARM.

Sir,—Among the "Notes and Notices" in your 687th Number, I observe one describing an "*alarm-lamp*," said to be invented by a gunsmith of Easingwold, in Yorkshire. I apprehend the writer has made some slight mistake with respect to this invention, which originated with Mr. Wilkinson, the justly celebrated gunsmith of Pall Mall, London.

Having constructed a percussion-lock upon a new principle about fifteen months ago, which I considered applicable to large pieces of ordnance, and knowing Mr. Wilkinson to be the very best authority upon these matters, I obtained an introduction to him. Mr. Wilkinson received me with the utmost politeness; and having examined my new lock, he pointed out, in the kindest manner possible, the reasons why it could not answer the purpose for which I had intended it. He then exhibited and explained to me many curious and ingenious things with which I found him surrounded, and, among other things, he showed me his *new alarm* for the detection of poachers, rick-burners, &c. This alarm consisted of a percussion-lock of a very strong and durable construction, fixed upon a stout post, from which wires were led in various directions over the grounds to be protected, in the same way as the wires of spring-guns used to be. The lock is made to communicate with a rocket or a maroon, or with both. In the event of any of the wires being touched, the lock is discharged, and striking a percussion-cap, ignites the maroon, the audible report of which alarms the persons who are on the look-out; a rocket at the same instant ascends, and remains stationary for five or ten minutes over the spot, throwing down a vivid light, which indicates the situation, and exhibits the progress of the depredators.

Mr. Wilkinson's alarm has been very extensively employed by noblemen and gentlemen for the protection of their property from midnight marauders, and it is the best contrivance for the purpose I ever met with. These alarms are in every way infinitely superior to the inhuman "man-traps and spring-guns," even were they still legal; they are properly described as "being perfectly free from danger to servants or others having the care of them; but calculated when they go off to strike terror into the breast of the most audacious depredator."

I remain, Sir, yours respectfully,

WM. BADDELEY.

London, October 8, 1836.

VIEW OF PATERSON, NEW-JERSEY.

The village of Paterson, is situated on the Passaic river, in the north-eastern Section of the County of Essex, in the State of New-Jersey, and is about 16 miles by way of the Patterson Railroad in a north-west direction from the city of New-York.

This place has long been a celebrated resort for travellers and parties of pleasure, whose curiosity has been excited to view the magnificent falls on the Passaic, and the romantic scenery of the surrounding country: and within a few years it has attained a more permanent and substantial notoriety from other causes than that of an admiration of the beauties of nature. These causes are its local situation to become a large and populous city and its vast water power which will be first briefly noticed.

1st. The water power afforded by the Falls on the Passaic. This is owned by a company, which was incorporated by the Legislature of New-Jersey, in 1791, under the name of the Society for Establishing Uuseful Manufactures, and extendfrom about $\frac{1}{3}$ of a mile above the "Great Falls," to about $\frac{1}{2}$ a mile below the same, comprising a considerable width of land on both sides the river. At a short distance above the "Great Falls" a substantial dam $4\frac{1}{2}$ feet in height has been constructed across the Passaic which turns a sufficiency of water by means of a canal cut through a solid rock into a spacious basin from whence the water is conducted in such quantities as may be required into three separate canals or raceways, affording a head and fall from each, of about 22 feet. The waters of these canals flow again into the Passaic, and each is a little over $\frac{1}{3}$ of a mile in length, affording sites, in all, for about 70 mills, requring each a cubic foot of water, which is equal to about 25 horse power, and capable of carrying 2500 spindles.

2d. The descent of the Passaic from the lower termination of the Society or Company's grant to tide water, a distance of between 7 and 8 miles, is 37 feet 10 of which is within half a mile of the lower termination of the Company's grant, and by means of a canal would afford a number of valuable sites for hydraulic works of any kind.

3d. The Morris Canal runs near the southern part of the village, and the Canal Company have constructed a basin at the distance of about 100 feet from the upper basin already mentioned, and owned by the Society for Establishing Useful Manufactures. From the former basin to the latter, the descent is $61\frac{1}{2}$ feet, affording 20 mill sites: and here it may be proper to observe, that the canal at this place; has an abundance of water, furnished by means of feeders from Long Pond, situated at about 10 or 12 miles north of this place it is also worthy of notice, that the water flowing from the basin of the Morris Canal, empties into the basin owned by the Society, and can be again used in their canals or raceways.

From the foregoing statement, it will be perceived, that there is sufficient water power at Paterson, and in its vicinity for more than 100 mills, and considering its favorable location and growing importance, a short account of the origin of its growth, progress, present condition, and future prospects, is deemed worthy of notice.

ORIGIN OF ITS GROWTH AND PROGRESS.

As early as the year 1791, Gen. Alexander Hamilton foresaw the importance in a national point of view, of bringing into active operation, a portion of the resources of the country, by the establishment of domestic manufactures, and not only advocated the measure with his pen, in his celebrated report to Congress upon that subject, but exerted his personal influence among his friends and acquaintances to individually embark in so laudable and patriotic an undertaking; and through his persuasion, a number of gentlemen of wealth, were induced to form an association with a view of testing the principle. During that year (1791,) this association was incorporated by an act of the Legislature of New-Jersey, under the title of "The Society for Establishing Useful Manufactures," with a capital of $1,000,000, and the right to acquire and hold property to the amount of $4,000,000. The act of incorporation is perpetual and was penned by Gen. Hamilton, although he had no interest but that of the public good in the transaction. After making various surveys, the Company in the year 1792, made a purchase of the place already described when they commenced operations. Owing, however, to the inexperience of some, and the competition arising from the introduction of foreign fabrics, similar to those intended to be successfully manufactured here, the association did not prosper. The first factory at this place was erected in 1794, for the purpose of spinning cotton. During the same year, shawls and and other goods manufactured from cotton, were printed, and although the company made strong efforts to sustain the establishment; they were obliged, after an experiment of three four years, to entirely abandon their works, having lost over $50,000 in their operations. The cotton mill was subsequently leased to individuals, who continued, although on a limited scale, to manufacture candlewick and other coarse cotton yarns until the year 1807, when it was accidentally destoyed by fire, and has never since been rebuilt.

In 1811, 12 and 14, several mills were erected, but the business done in them did not prove to be profitable, nor was it till about the year 1824 that the manufacturing establishments of this place were brought into successful operation. Since which they have rapidly increased, as will appear by the following statement, and bid fair to progress in a much greater ratio. And as one evidence of this, may be mentioned the increased value of water privileges, which for one cubic foot,

In 1804 was rented at	$75 00	a year
For 1807 to 10 " "	100 00	" "
For 1811 to 15 " "	160 00	" "

Since which they have gradually risen to $200, 250, 300, 400, 500, and now to 600.

MANUFACTURING ESTABLISHMENTS.

Seventeen Cotton Mills, in which are over 50,000 spindles employing annually; 1,500 to 2,000 hands, and consuming from 4 to 6,000 pounds of raw cotton.

Four Machine Factories, employing 7 or 800 hands. In these factories, cotton and other machinery are manufactured on an extensive scale.

One extensive establishment for the manufactory of locomotive engines by Messrs. Rogers, Ketchum & Grosvenor.

Two extensive Paper Mills, in one of which are daily manufactured three tons of paper.

One Factory for manufacturing linen duck and bagging. employs about 200 hands, and annually consumes over 500,000 lbs. of flax.

One Sattinet Factory, with a dying establishment connected with it, has about 1,400 spindles, employs from 60 to 80 hands and consumes annually over 100,000 lbs. of wool.

Two Printing and Dying establishments, that do a large business.

Two Bleeching establishments, employing from 20 to 30 hands.

One Saw Mill, with two saw-carriages.

One Patent Fire Arms Factory, being erected, where patent fire arms will be manufactured on an extensive scale.

In the abovementioned factories are annually employed over 3,000 hands, whose wages exceed $500,000.

MEANS OF INTERCOURSE WITH THE CITY OF NEW-YORK.

The means of intercourse between this place and the city of New-York, are so great, and the travelling so expeditious, that the two places are brought as it were almost into the immediate neighborhood of each other.

1st. The Paterson Railroad extending from this place to Jersey City, a distance of 16 miles. Trips are made to and from these places 4 or 5 times a day, each occupying from an hour to an hour and a quarter.

2d. The Morris Canal, extends from opposite Easton, in the State of Pennsylvania, to Jersey City, a distance of 90 miles, and flows a little south of the compact part of the village. The canal is just completed, and will be of immense importance to this place, as respects the supply of anthracite coal from the mines in Pennsylvania, which will be afforded here in abundance at a cheap rate. Traversing the rich counties of Warren and Morris, in this State, the former of which abounds in excellent timber, and the latter in vast mineral resources, the citizens of this place, will also be supplied with abundance of materials for the purpose of building; and the day is perhaps not far distant, when the minerals found in the County of Morris will be extensively wrought here.

The distance from Patterson to New-York, by way of the Canal is 24 miles, and generally for nine months in a year, it will afford a cheap conveyance for the transportation of heavy articles.

3d. A company has been incorporated by the Legislature of this State, for the purpose of rendering the Passaic navigable from this place to tide water, a distance of between 7 and 8 miles. The stock has been subscribed for that purpose, and when the work is accomplished, trips will be made in steamboats, from this place to New-York in 4 or 5 hours.

4th. A petition is before the Legislature of the State, for the incorporation of a company to construct a Railroad from this place to the boundary line of the State of New-York, and from thence, if the right can be obtained, to intersect the Erie Railroad in the State of New-York. The distance from Paterson on the contemplated route to the New-York State line is about 14 miles, from thence to the contemplated route of the Erie Railroad is less than half a mile. Should this project go into operation the route to New-York by way of the Erie road would be considerably shortened and the principal transportation of merchandize and passengers from Lake Erie and other places in the State of New-York would pass through this village.

POPULATION AND PRESENT STATE OF THE VILLAGE.

The population of this village is estimated at about 12,000, a large portion of which is engaged in Manufactures, the remaining portion is divided into Merchants, professional men, and mechanics, such as tailors, shoemakers, house-carpenters, painters, &c., who carry on a respectable business, but on a less extensive scale than that of the large factories. There are 20 pay schools, 13 male and 7 female, an academy, and a free school supported by the town, in which are instructed from 100 to 150 children,—also, a free infant school, in which about 200 children are taught. There are also, 7 Sunday schools under the direction of different religious denominations in which are instructed over 1500 pupils—9 Churches or houses built for religious worship. Viz. 1 Presbyterian, 2 Reformed Dutch, 1 Roman Catholic, 1 Methodist, 1 Episcopalian, 1 Baptist, 1 true Dutch Reformed, and 1 Free Church, a Museum, 2 Banks. There is in Patterson a Mechanics' Society, incorporated by the Legislature for improvement in Science and the Mechanic Arts. This Society have laid the foundation for a library and philosophical apparatus.

There is also a philosophical Society composed of a number of young gentlemen who have associated for literary improvement.—They meet weekly and have collected a respectable library.—Besides these there are several benevolent associations.

The site of the village is generally level, and the streets regularly laid out. It has excellent water and there is not a more healthy location in the United States. Its markets are well supplied by the farmers from the surrounding country, and the demand for their productions has materially enhanced the value of real estate for a number of miles in different directions.

FUTURE PROSPECTS.

This is a subject not of detail, but affording matter for various opinions. In taking a retrospective view of the United States for the last thirty years in the advancement of wealth, enterprize and improvement, the mind is scarcely competent to imagine what it will be in thirty or forty years to come. Within a few years past a powerful impetus has been given to the enterprize of the country by means of internal improvements, and the establishment of domestic manufactures; and it is now conceded, pretty much, by every one, that these are the great engines which bring into requisition and active operation, the resources of the country, and must be its settled policy. No country is more favorably situated to become a manufacturing nation than that of the United States—the freedom of her institutions, which, with the general diffusion of knowledge, must necessarily bring into active operation the genius and talent of her citizens, her vast mineral resources, and the diversity of the soil and climate are all eminently calculated to favor the policy, and judging from the past, it is thought not to be extravagant, to suppose that in thirty or forty years the United States will become the greatest manufacturing nation in the world. Experience has shown that in all large trading countries it is the interest of different classes of tradesmen to congregate in large cities and such as afford the greatest facilities for the interchange of various commodities and the transaction of business generally.—The same principle will apply to manufacturing establishments, we see it verified in England, which has her Birmingham, her Manchester and her Leeds. And taking into view the local situation of Patterson—its vast water powers, and its contiguity to the great commercial emporium of the United States, is it not reasonable to suppose that this place, in a few years will be to the city of New-York, what Manchester now is to Liverpool.

Miscellaneous.

BRITISH ASSOCIATION.

From the Journal of the Franklin Institute.

TIDE OBSERVATIONS AT LIVERPOOL AND LONDON.

M. Lubbock being called upon to give an account of the recent discussion of tide observations, for which a liberal grant of money had been made by the Association, rose and stated, that through the indefatigable exertions of Mr. Dessiou, considerable progress had been made in the reduction of the observations made at Liverpool by Mr. Hutchinson.

The diurnal inequality of difference between the superior and inferior tide of the same day, which in the Thames was very inconsiderable, if not insensible, was found at Liverpool to amount to more than a foot; a matter upon which the learned gentleman laid considerable stress, as calculated to lead to important practical results. The object of these reductions was to compare the results of theory with these observations, and with those of Mr. Jones and Mr. Russell made at the port of London. The principal objects of comparison were the heights of the several tides, and the intervals between tide and tide; and these were examined in their relations to the parallax and declination of the Moon and of the Sun, and in reference to local, and what may in one sense be called accidental causes, as storms, &c. Of this latter, one of the most curious, as well as important, is the effect of the pressure of the atmospheric column. The learned gentleman stated, that M. Duassy had ascertained, that at the harbor of Brest a variation of the height of high water was found to take place, which was inversely as the rise or fall of the barometer, and that a fall of the barometer of 0.622 parts of an inch, was found to cause an increase of the height of the tide, equal to 8.78 inches in that port. To confirm this interesting and hitherto unsuspected cause of variation, had been one principal object of the researches of the learned gentleman, and at his request, Mr. Dessiou had calculated the heights and times of high water at Liverpool for the year 1784, and compared them with the heights of the barometer, as recorded by Mr. Hutchinson for the same year; and by a most careful induction, it had turned out that the height of the tide had been on an average increased by one inch for each tenth of an inch that the barometer fell, *cæteris paribus*; but the time was found not to be much, if at all affected. Mr. Lubbock then proceeded to examine the semi-menstrual declination and parallax correction, and stated that the result was a remarkable conformity between the results of Bernouilli's theory, and the results of observations continued for nineteen years at the London Docks. But to render the accordance as exact as it was found to be capable of being, it was necessary to compare the time of the tide, not with that transit of the Moon which immediately preceded it, but with that which took place about five lunar half days. To explain this popularly, the learned gentleman stated, that however paradoxical it might appear to persons not acquainted with the subject, yet true it was, that although the tide depended essentially upon the Moon, yet, any particular tide, as it reaches London, would not be in any way sensibly affected, were the Moon at that instant, or even at its last transit, to have been annihilated; for it was the Moon as it existed fifty or sixty hours before, which caused the disturbance of the ocean, which ultimately resulted in that tide reaching the port of London. The learned gentleman then exhibited several diagrams, in which the variations of the heights of the tide, as resulting from calculations founded upon the theory, were compared with the results of observations. The general forms of the two curves which represented these two results, corresponded very remarkably; but the curve corresponding to the actual observations, appeared the more angular or broken in its form, for which the learned gentleman satisfactorily accounted, by stating that the observations were neither sufficiently numerous, nor sufficiently precise, from the very manner in which they were taken and recorded, to warrant an expectation of a closer conformity, or a more regular curvature. When it is recollected that the observations are at first written on a slate, and then transferred to the written register, by men otherwise much employed, and whose rank in life was not such as would lead us to expect scrupulous care, it was not to be wondered at, if occasionally an error of transcript should occur, or even if the observation of one transit was set down as belonging to the next. When to tide these circumstances it was added, that the at London was in all probability, if not certainly, made up of two tides, one having already come round the British Islands, meeting the other as it came up the British Channel, it was altogether surprising that the coincidence should be so exact; and it was one among many other valuable results of these investigations, that it was now pretty certain that tide tables constructed for the port of London, by the theory of Bernouilli, would give the height and interval with a precision quite sufficient for all practical purposes, and which might be relied on as sufficiently exact, when due caution was used in their construction, and the necessary and known corrections applied. In conclusion, Mr. Lubbock said, the observations for the port of London had now been continued from the commencement of this century, and those for Liverpool, as we understood, about twenty-five years.

Prof. Whewell observed, that as, in the discussion of the relative level of land and sea, the tides of the ocean were an important element, he should preface the remarks upon that subject, which he intended to submit, by making a few observations upon the very valuable communication of his friend Mr. Lubbock. This communication he highly eulogized, and pointed, out to the Section the importance of many of the conclusions, should they prove hereafter to be generally applicable: but he expressed strongly his fears that this would not be the case. Observation had, in the instance of the tides, far outstripped theory, for many reasons, which it would be impossible to detail; but among the most prominent were the complexity of the problem itself involving the astronomical theories both of the Sun and Moon; the masses of these bodies; the motions of disturbed fluids, and local causes tending to alter or modify the general geographical effect of the great tide wave at any particular place. It was upon a careful review of these considerations, that he was led to fear that it would be still many years before theory would become so guarded and supported by local observations; as to afford a sufficiently correct guide to be implicitly relied on in these speculations. He instanced the tides of the British Channel, which in consequence of their excessive magnitude afforded magnified representations of the phenomena, by which the deviations become more remarkable. At the port of Bristol the tide rose to a height of fifty feet, while towards the lower part of the Channel they only rose twenty, and along other parts of the coast not quite so high. The most striking of Mr. Lubbock's conclusions was that by which it appeared that the ocean assumed the form of the spheroid of equilibrium, according to the theory of Bernoiulli, but at five transits of the Moon preceding the tide itself. By the calculations of Mr. Bent, however, it would appear, that although the observed laws of the tides at Bristol might be made to agree with Bernouilli's theory of equilibrium tides, by referring them to a certain anterior transit,—so far as the changes due to parallax were concerned, as also as far as those due to declination were concerned,—yet it turned out that this anterior period itself was not the same for parallax as for declination. The two series of changes have not therefore a common origin or a epoch; so that in fact there is no anterior period which would give theoretical tides agreeing with observed tides; and, therefore, at least the Bristol tides do not at present appear to confirm the result obtained by Mr. Lubbock from the London tides. The learned gentleman then illustrated these views by diagrams, by the aid of which he explained to the Section the luni-tidal intervals, and the curve of semi-menstrual inequality—(this latter term, and the doctrine connected with it, was introduced into the subject of the tides by the learned gentleman himself, and, as is admitted by all acquainted with the subject, with the most valuable result.)

Relative Level of Land and Sea. Prof. Whewell then proceeded to give an account of the proceedings of the committee appointed to fix the relative level of land and sea, with a view to ascertain its permanence, or the contrary. He observed, that the committee had not taken any active, practical steps for the important purpose for which they were appointed, because they had met with many unexpected difficult es requiring much consideration. It was, however, intended to appoint a committee for the same purposes, who should be furnished with instructious founded upon the views at which the former committee had by their labors and experience arrived. One method proposed was, that marks should be made along various parts of the coast, which marks should be referred to the level of the sea; but here the inquiry met us in the very outset—what is the proper and precise notion to be attached to the phrase the *level of the sea?* Was it high water-mark, or low water-mark? Was it at the level of the mean tide, which recent researches seemed to establish? In hydrographical subjects the level of the sea was taken from low water, and this, although in many respects inconvenient, could not yet be dispensed with, for many reasons, one of which he might glance at—that by its adoption, shoals which were dry at low water, were capable of being represented upon the maps as well as the land. The second method proposed appeared to the learned Professor to be the one from which the most important and conclusive results were to be expected. It consisted in accurately leveling, by land survey, lines in various directions, and by permanently fixing, in various places, numerous marks of similar levels at the time; by the aid of these marks, at future periods, it could be ascertained whether or not the levels, in particular places, had or had not changed, and thus the question would be settled whether or not the land in particular localities was rising or falling. Still further, by running on those lines, which would have some resemblance to the isothermal lines of Humboldt, as far as the sea coast, and marking their extremities along the coast, a solution would at length be obtained to that most important practical question,—what is the proper or permanent level of the sea at a given place? Until something like this were accomplished, the learned Professor expressed his strong conviction of the hopelessness of expecting any thing like accuracy in many important and even practical cases. As an example, he supposed the question to be the altitude of Dunbury Hill referred to the level of the sea. If that level of the sea were taken at Bristol, where the tide rises, as before stated, fifty feet, the level of low water would differ from the same level on the sea coast at Devonshire, where the sea rises, say eighteen feet; and supposing, as is most probable, the place of the mean tide to be true permanent level by no less a quantity than sixteen feet, which would therefore make that hill to appear sixteen feet higher, upon a hydrographical map constructed by a person taking his level from the coast of Devonshire, than it would appear upon the map of an engineer taking his level at Bristol. In the method proposed, the lines of equal level would run, suppose from Bristol to Ilfracomb in one direction, and from Bristol to Lyme Regis in the other, and by these a common standard of level would soon be obtained for the entire coast.

Professor Sir William Hamilton rose to express the sincere pleasure he felt at the masterly expositions of Mr. Lubbock and Professor Whewell. One conclusion to which Mr. Lubbock had arrived was to him peculiarly interesting, viz., that by which it appeared that the influence of the Moon upon the tides was not manifested in its effects until some time after it had been exerted, for a similar observation had recently been made by Professor Hansteen respecting the mutual disturbances of the planets. Mr. Lubbock rose to say, that the agreement between the results calculated from the theory of Bernouilli and those obtained from actual observation, were much more exact than Professor Whewell seemed to imagine; in truth, so close was the agreement, that they might be said absolutely to agree, since the difference was less than the errors that might be expected to occur in making and recording the observations themselves. Mr. Whewell explained that he wished to confine his observations to the Bristol tides, as these were the observations to which he had particularly turned his attention; and with respect to which, he should be able, at the present meeting, to exhibit diagrams to the section, which he felt confident would amply bear out his assertions respecting the tides. Mr. Lubbock stated, that so near, indeed so exact, had been the coincidence between the observations made at London and Liverpool, and the theory, that he was so strongly inclined to believe that that coincidence would be found at length to be universal. Professor Stevelly inquired from Mr. Lubbock, whether he did not think it quite possible that local causes might exist, which would be fully capable of producing the deviations from the theory of Bernouilli; as, for instance, in the case of Bristol, so ably insisted upon by Professor Whewell, where the causes of the extraordinary elevation are the land-locking of the tide-wave, as it ascends the narrowing channel, and the reflexions of other tide-waves from several places. Now, particularly in the case of reflex tides, may it not so happen, and does it not, in fact, happen in several places, that they bring the actual tide to a given port at a time very different from that at which the influence of the Moon and Sun, if unimpeded, would cause it to arrive, and thus separate, as Professor Whewell had stated, the origin or epoch of the variations due, suppose to parallax and seclension, and even cause other deviations from Bernouilli's theory?—Mr. Lubbock replied, that unquestionably it might so happen; but, in his opinion, the discussion of a few observations, like those made at Bristol, could not be expected to point out very exactly the origin or epoch of either of the variations of parallax or declination, with sufficient exactness, to furnish secure data for determining that they did not correspond to any one, common previous transit of the Moon.

JERRARD'S MATHEMATICAL RESEARCHES.

Prof. SIR WILLIAM HAMILTON read his report on Mr. George B. Jerrard's mathematical researches, connected with the general solution of algebraic equations. He wished, in the first place, to inform the Section, that no part of the grant of 80*l.* had been expended, which the Association had so liberally placed at his disposal for the purpose of procuring the assistance of persons competent to verify, by numercial computations, the method of Mr. Jerrard. The reason that he had not deemed it necessary to resort to this expense was, that he had, at a very early period after the meeting of the British Association in Dublin, satisfied his own mind that the method of Mr. Jerrard entirely failed in accomplishing the solution of equations of the fifth and sixth degree; and he trusted that he should be able to lay before the Section, with as much clearness as the abstruse nature of the subject would admit of, the principal steps of a demonstration, which, to the mind of the learned Professor himself, at least, carried a complete conviction, that the method of Mr. Jerrard was not applicable until the equation, as a minor limit, had reached the seventh degree. In order that he might carry the Section fully along with him, Professor Hamilton stated, that it would be necessary to give again a rather detailed account of the peculiarities of the very ingenious notation, devised by Mr. Jerrard, for denoting certain algebraic processes, resorted to in the application of his method. The Professor then proceeded to detail to the Section the several steps of Mr. Jerrard's method, clearly marking the steps previously known to analysts, and such as Mr. Jerrard had the merit of originating. The principal peculiarity of *formulæ* seemed to be, that in an equation, transferred in a particular manner for the purpose of eliminating the co-efficients of the original equation, the co-efficients were so ingeniously obtained as to be entirely independent of the degree of the original equation, and therefore to be of a similar form in all possible equations, the solutions of which were sought. As soon as he had prepared these formulæ, the Professor proceeded to demonstrate to the Section, that from the very nature of their connexion with the original equation, they must fail in giving its solution, where it only rose to the fourth dimension, because he showed that this would involve the solution of an equation of the sixth degree, as a preliminary step. Equations, however, of this degree had been long solved, and it was only, therefore, in connexion with the generality of Mr. Jerrard's method, that its failure, as regarded them, was of any consequence. He then proceeded to give a similar demonstration of its failure, as regarded equations of the fifth and of the sixth degree; and during his discussion of this step of his demonstration he took occasion to show that Mr. Jerrard's method had succeeded in reducing equations of the fifth degree to tables of double entry—a discovery, upon the value of which he enlarged considerably, and highly eulogized and complimented the author; insomuch, that he stated that if the method had accomplished nothing but this alone, Mr. Jerrard would have received the congratulations of the scientific world. He then proceeded to show, that unless the index of the equation reached as a minor limit the number seven at least, a certain intermediate equation, concerned in the elimation, would be met with, along with a multiple of it, which, therefore, would not give a number of distinct results sufficient to complete eliminations; but, beyond that degree, he stated that he had satisfied himself that Mr. Jerrard's method would afford solutions of equations, which, even if they should, from their complexity, or other causes, be useless to the practical or merely arithmetical algebraist, yet to those engaged in prosecuting inquiries involving purely symbolic algebra, he felt confident they would afford facilities and general methods of investigation, hitherto almost unlooked for and unexpected.

Mr. Babbage complimented Sir W. Hamilton upon the very lucid exposition which he had given of a subject which he characterized as bordering upon the very extremest limits of human knowledge, and congratulated Mr. Jerrard upon the success with which he had contrived so effectually to distinguish between the symbols of operation and those of quantity, in expressing the results of elimination. Engaged, as it was well known he was, in a branch of practical numerical science, he could not suffer himself to be supposed to look with indifference upon a discovery which, if it should even fail in affording any practically important assistance to his particular branch, must yet be admitted to afford the strongest promise of advantage to the more purely abstract branch of algebraic investigation. Professor Peacock observed, that during the progress of the discussion of this question he had not failed to remark the many advantages which must result to algebra from Mr. Jerrard's method, from the collateral improvements to which the prosecution of his principal object had led, partly in suggesting new, and hitherto unexplored, methods of elimination, and partly by leading to a notation, which so clearly distinguished between the marks of quantity and the observations and changes which were to be resorted to in reference to them; but as to the result itself, he need characterize it no higher, when he added, that it was an advance in the science, which it did not appear that the celebrated La Grange had ever contemplated, and which was not approached by the result of Stchernhausen.

EXPERIMENTS WITH A VIEW TO DETERMINE THE INTERIOR TEMPERATURE OF THE EARTH.

Prof. PHILLIPS stated that this subject had for a long period engaged the anxious attention of scientific men, both at home and upon the continent; that the most accurate, as well as numerous, experiments indicated a decided elevation of temperature as a more depressed station below the earth's surface was attained; even when the depths descended to were small, this elevation of temperature became large enough to arrest attention; in fact, the temperature of the air, of the water, of the rocks, and of the soil, was found to augment as we descended. But in order to ascertain, if possible, what portion of this heat arose from, or was connected with, an elevated temperature of the internal parts of the globe, as well as to ascertain whether the causes of those were local or universal, and, if possible, to arrive at the law of its distribution, it was deemed a matter of much importance to get rid altogether of the effect of the air's temperature upon the thermometer, as also the action of water, because the sources of the water in mines, &c. must be in most cases entirely beyond the reach of observation. All these circumstances induced the committee appointed by the Association to conduct experiments upon this subject, to take the temperatures of the rocks themselves alone, as the fundamental experiments. With this view, they had no less than thirty-six thermometers made and carefully compared, and, although they well knew that these thermometers, after all the care which had been bestowed upon their construction, were by no means perfect or exact, yet, as their errors had been carefully noted, by a comparison with the standard thermometers of the Royal Societies of London and Edinburgh, and each thermometer numbered, the errors admitted of an easy correction. Many of these thermometers had been already placed under the care of persons adequately instructed to conduct the requisite experiments, and some of them were still in the possession of the committee, who would gladly place them in the charge of any person giving adequate security that they should be applied to the purpose for which they had been procured. The method of using them was this: a hole large enough to receive one of the thermometers, was first drilled into the solid rock, at the bottom of the mine, pit, or other proper place of observation, to the depth of two or three feet at least; into this the thermometer was then introduced and suffered there to remain for a number of days sufficient to ensure the attainment of the temperature of the rock itself. The temperature of the air at the mouth of the pit, and, if possible, the mean temperature of the place, must be observed or obtained. Professor Phillips then stated, that observations had been made in this manner, and with some of these instruments. under the directions of Professor Forbes, at mines in the Lead Hills, in Scotland, and that Professor Forbes would take some early opportunity of bringing these observations more immediately under the notice of the Section; at Newcastle, under the direction of Mr. Briddle; at Wearmouth, under the care of Mr. Anderson; near Manchester, and at Northampton, under the direction of Mr. Hodgkinson; and within a few days, Professor Phillips had been enabled, through the kindness of a friend, to place a thermometer in a deep coal mine at Bedminster, in this immediate vicinity (Bristol.) The results of these observations, so far as they had as yet proceeded, amply confirmed the fact of the increase of temperature in the parts under the earth's surface. As one example, the Professor stated, that in a mine, the perpendicular depth of which, below the surface, was 525 yards, the thermometer in the rock stood at 78°, while the temperature in the open air at the mouth of the mine, varied from 30° to 80°, the mean temperature of the place being 47½°.

Prof. Forbes then gave, from memory, an account of the experiments which he had been the means of instituting in the Lead Hills. Before he did so, however, he wished to state that he had been informed that an artesian well had lately been met with in granite, and he then gave a general description of artesian wells. It was to this effect: that heretofore, in making borings in certain districts through certain alternation of clays, and at length through certain rocks, a supply of water was reached, which rapidly rose through the boring to the surface, and continued to overflow at the top sometimes, as the term fountain indicated, in considerable quantity, and with considerable force. He instanced the artesian wells, or fountains, of the London clay districts; and added, that the temperature of these waters was found universally to increase with the depth of their source beneath the surface of the earth. Heretofore, no such well had been obtained by boring through the granite; and if the account, which he had received, were correct, and of its correctness he entertained little doubt, this would be a matter of considerable interest as well to the geologist as to those who were engaged in scientific pursuits similar to those now under consideration. The observations made under his direction in the Lead Hills, alluded to by Professor Phillips, were almost entirely conducted by Mr. Irvine. These obervations were particularly interesting, from the fact, that the mines, in consequence of a strike among the workmen, had not been worked for many months, and at the same time it most fortunately happened that they were self-drained, that is, by machinery worked by external power, without the aid of either animals or steam. This most fortunate concurrence of favorable circumstances, which could be expected to be met with in so very few instances, at once embarrassed the observations from many sources of error, which, but for this, would have still left considerable doubts of the results being, partially, at least. affected by the heat generated by animals residing and work in the mines, as well as of artificial fires kept up for the purposes of ventilation or of originating power. It was upon these grounds that he perceived the importance of them, but had it not been for the valuable astistance afforded him by Mr. Irvine, who descended into the mine, and placed the thermometer and made the observations, he could scarcely have been as successful as the results already obtained warranted him in hoping he should be. These results, which, of course, had not as yet reached the degree of accuracy which he still looked for, lead to the conclusion that the temperature in that mine increased about 50 of Fahrenheit for a descent of ninety-five fathoms. Professor Stevelly stated, that as practical utility was one of the principal objects of the British Association, he might be permitted to add, that the waters of these wells, in consequence of their temperature being in genereal elevated above the mean temperature of the place at which they delivered their waters, had been applied to the very important practical purpose of freeing machinery of ice in winter, insomuch, that by their instrumentality, machinery, such as water wheels, &c., which had always previously been clogged by ice for a considerable part of the winter, to the great loss of the owner's manufactory, were, by the aid of the waters of these fountains, kept constantly free; while the same water has been, in some instances, conducted through the factory itself, with a view to keep up a uniform and elevated temperature within its walls, thus affording a second and a very valuable practical application.

Improvement in the Manufacture of Charcoal.—It is well known that there is a very great loss of the carbonaceous portion of the wood in the usual careless way in which charcoal is made; and yet the greater density which the coal acquires by this process, than by that of close distillation, renders its quality very superior for the purpose of reducing ores. This is probably owing to the slower carbonisation which the wood undergoes, by which its molecules are dilated with less rapidity and force

It has been ascertained by experiment, that when the interstices of the wood stacks for charcoal are filled with saw dust and the stack itself covered with it prior to the application of fire, the product of coal is from seven to nine per cent. greater than in the ordinary way. It requires rather more care in the beginning, to get the fire under way, and prevent its going out.

By covering, or mixing the charcoal with tar, before it is put into the furnace with ore, so great a degree of activity is given to the fire, it may be worth the experiment to ascertain whether it would not be good economy to employ the tar of certain districts in this way.—[Journal Conn. Usuelles, Mai. 1836.]

Process for determining the existence of Sulphurous Acid in Common Hydrochloric Acid. By M. Girardin, Prof at Rouen.—Put into a glass about half an ounce of the hydrochloric acid to be tried, and add to it 120 to 180 grains of the protochloride of tin (common muriate of tin) very white and not altered by the air, stir it with a rod, and add to it two or three times as much distilled water, and agitate the mixture. If no sulphurous acid be present, nothing appears; the salt dissolves, and the fluid only becomes a little disturbed by the action of the air on the salt; but if the smaller portion of sulphurous acid be present, a cloud is immediately perceived, the acid becomes yellow, and when the distilled water is added, the odor of sulphuretted hydrogen is manifest, a brown appearance ensues, and a powder is deposited. These phenomena are so obvious, that there need not be a moment's hesitation with respect to the sulphurous acid.

Sometimes the brown color does not appear till after some minutes have elapsed.—The more sulphur, the deeper it is. The sulphuretted hydrogen is evident only when the water is added. The yellowish brown powder which subsides is a mixture of sulphuret and peroxide of tin.

This process will detect a hundredth part of sulphurous acid in the hydrochloric.—The method is now practised in the workshops of Rouen.—[Annales de Chim. Mars. 1836.]

From the Journal of the Franklin Institute.

DESCRIPTION OF A MACHINE FOR MILLING COIN, INVENTED AND INTRODUCED INTO THE MINT OF THE UNITED STATES; BY FRANKLIN PEALE.

For the purpose of reducing manual labor, and expediting the processes of the Mint, I was induced, during the latter part of the last year, to make designs for the construction of a Milling machine, to be propelled by the steam power ordinarily employed in the Mint, a model of which I had the honor to exhibit at one of the late conversation meetings of the Institute.—From these designs and model, the machines to which this communication relates, have been most satisfactorily executed in the workshops of the Mint, and are now in full operation in the coining department.

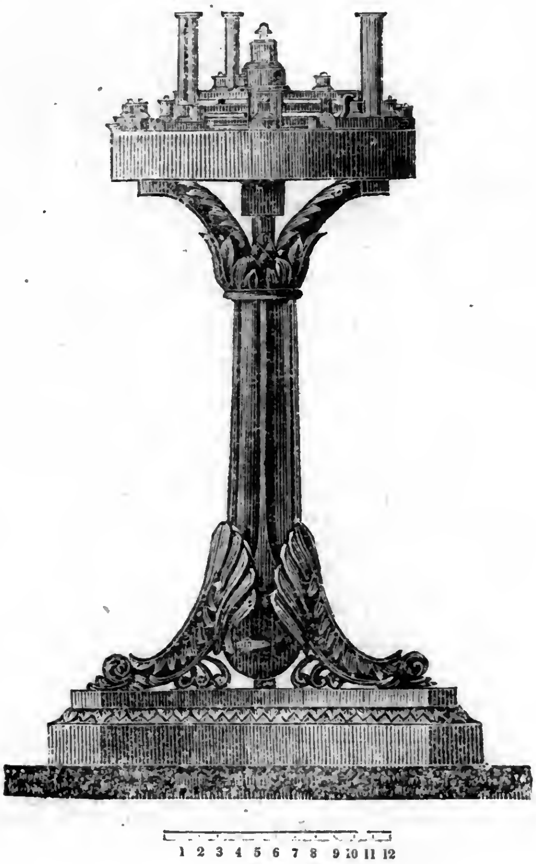
To those who are unacquainted with Mint operations, it will be well to explain, that the operation of milling has for its object, to throw up a thickened edge upon the *blanks* or *planchets*, previous to their being struck, by which means a better border can be given to the coin, with less labor or injury to the dies, it is also, sometimes employed to impress letters or ornaments upon the edge of the coins.

A classical tripod, of cast-iron, supports the table on which are placed the feeding tubes and dies; through the centre of the stand a vertical shaft rises from the room beneath, on the lower end of which is a pulley and its band, furnished with a clutch box, by means of which, movement is given, or arrested, as occasion requires. A winch handle may be applied to the hexagonal top of the axis, for the purpose of adjustment, or to propel the machine, if required, by manual force.

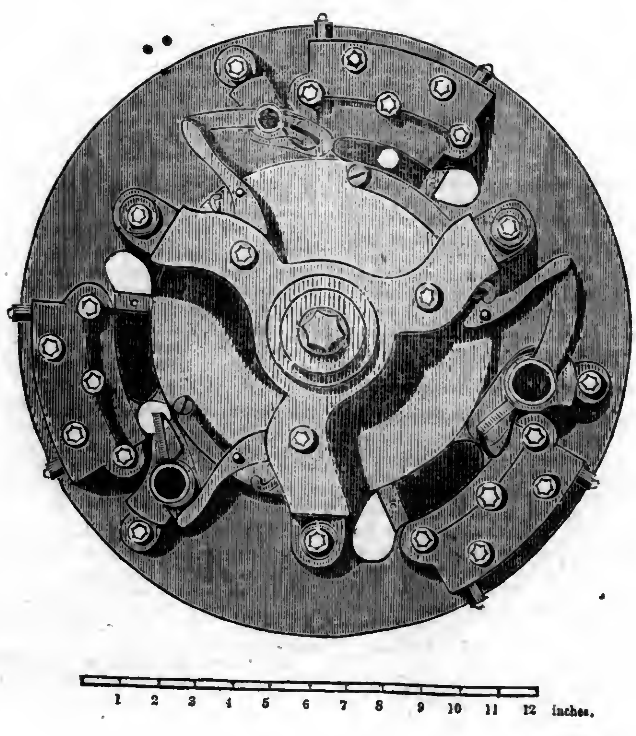
Upon the central axis is a wheel, furnished with two steel dies upon it periphery, the length of each of which corresponds to the circumference of the coin to be milled; and on the trilateral spaces of the table, are firmly screwed blocks for the outside dies, furnished with the necessary adjusting screws, by means of which the proper degree of pressure is given. Upon the axis immediately above the central wheel, an oval *cam*, or *eccentric*, is placed, for the movement of the feeders; this cam is set in *time* to place the blanks between the dies, when the extremities of the latter are opposite to each other. The feeders are *levers*, moving on centres, placed on each of the three arms of the gallows which supports the upper ends of the axis; which *levers* are kept against the cam by spiral springs, contained within a cavity at the centre of motion. A circular blade, or *pitcher*, as it is technically called, takes the lowest blank from the pile contained in the feeding tubes, and pushes it forward, at the required moment, and a light curved spring prevents its being thrown in advance of the movement. Nearly all of the parts are exhibited in the annexed views.

This machine is triplicate, and all its feeders may be put in motion at the same time, or any one of them, as occasion may require. Each division is capable of milling 200 pieces, or more, per minute, equal to 12,000 per hour, with the attendance of a boy only; and during this rapid operation, separates any defective pieces that may pass into the tubes. This machine has been in operation since February of the present year, and has given unqualified satisfaction in every respect.

ELEVATION.



HORIZONTAL VIEW



The Director of the Museum at Kertch, a town in the Crimea, on the Black Sea, lately discovered an ancient tomb of oblong shape, formed of very large hewn stones without any cement, containing a species of coffin in cyprus-wood, inclosing a bronze urn, with the cover firmly soldered on, in which were the remains of burnt bones.—Near the urn were two broken vases of alabaster, which, probably, contained odoriferous essences as used by the Greeks at their funerals. The shape of the urn, which has three handles, and is in very fine preservation, makes it of high interest and value. It is not perhaps possible to fix its precise date, but there is every reason to believe, from the form and construction of the tomb, that it goes as far back as the first colonization of this country by the Greeks, that is, 150 years before Christ.

A highly curious and valuable antique has recently been discovered at Weston, near Bath. It is of pure silver, hexagonal, of a tapering form, and about 14 inches in length. The top is cornet-shaped, ornamented with acanthus leaves, and was attached probably to the handle. It has been conjectured that this article was employed to hold a torch to light a funeral pile, and to be Roman.—[Bath Herald.]

Advertisements.

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.

Rochester, Jan. 13th, 1837. 4—y

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co No. 119 Greenwich Street, New-York, or at the Makers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY & KNIGHT.

POUGHKEEPSIE, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANCHED and GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works he has in charge.

BENJ. WRIGHT,
Chief Engineer N. Y. & E. R. R.

NEW-YORK, April 4th, 1836.

Harvey's Flanched and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.

BOSTON, April 26th, 1836. NO. 1—6t.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings o every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

TO CIVIL ENGINEERS, &c.

E. & G. W. BLUNT, 154 Water-st., corner of Maiden Lane, have recently received an assortment of LEVELS, from different manufacturers, among others from Troughton & Surins, which they warrant of the first quality. Circumferentors, Levelling Staves, Prismatic Compasses, Mathematical instruments, Books for Engineers, etc., constantly on hand.

One of the above firm is now in England superintending the manufacture of Theodolites, Transit Instruments, etc.—and any orders for Instruments, not now on hand, will be forwarded him, and executed promptly. 5—tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad none of which have failed—Castings of all kinds Wheels, Axles, and Boxes, furnished at shortest notice

H. R. DUNHAM & CO.

4—ytf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B —Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention

HENRY BURDEN.

Troy Iron Works, Nov. 15, 1836. 47—tf

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hardware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTION, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

								lbs.	
350 tons	2½	by	⅝,	15 ft in length,			weighing	$4\frac{68}{100}$	per ft.
280	"	2	"	½,	"	"	"	$3\frac{50}{100}$	"
70	"	1½	"	⅜,	"	"	"	2½	"
80	"	1¼	"	⅜,	"	"	"	$1\frac{25}{100}$	"
90	"	1	"	½,	"	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and ston block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28 tf Philadelphia, No. 4, South Front st.

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

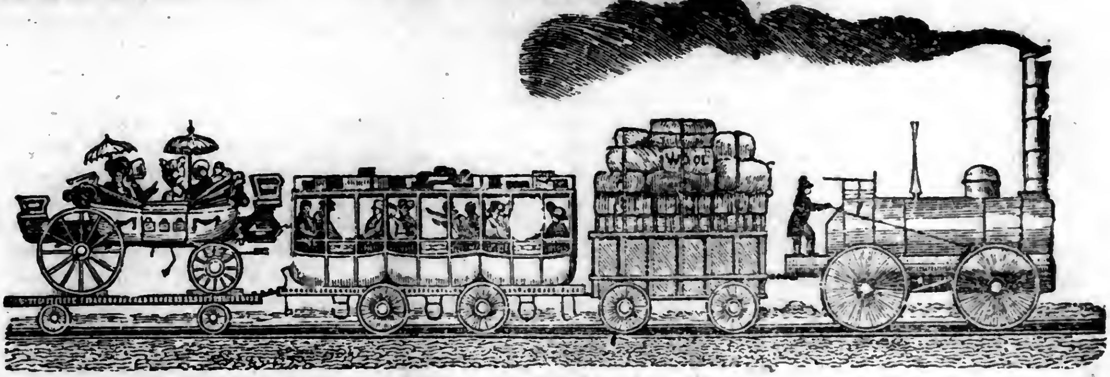
Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N. Y
51tf



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, FEBRUARY 18, 1837. [VOLUME VI—No. 7.

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GREAT WESTERN RAILROAD IN UPPER CANADA AND MICHIGAN, AND CONCENTRATION OF IMPROVEMENTS AT THE TOWN OF HURON, FOOT OF LAKE HURON, MICHIGAN.

Our readers will remember, that in the Journal of last week we inserted, as taken from the "St. Thomas (U. C.) Liberal," an account of a meeting of the Directors of the "Detroit and Niagara River Railroad Company," held at Toronto; and also a Letter from E. A. Brush, Esq., of Detroit, advocating the contemplated improvement; since then we have received additional information of movements making for the accomplishment of the same object—*a Great Western Railroad*—but by a different and much shorter route, which we now lay before them for their consideration.

To the Editors of the Railroad Journal.

GENTLEMEN,—I find in the last number of the Railroad Journal, an account of the proceedings of a meeting of the Directors of the "Niagara River and Detroit Railroad Company," held at Toronto, on the 3rd of January last; accompanied by a letter from E. A. Brush, Esq., comparing the relative advantages of the two routes through Canada, viz.: from Black Rock to Detroit, and thence across the peninsula to St. Josephs, with that from Hamilton, at the head of Lake Ontario, to Fort Gratiot, at the foot of Lake Huron, and from thence in a direct course to Grand River, on Lake Michigan.

When the geography of the North and West is considered, one thing appears beyond a doubt: that to complete the line of *direct* commercial communication between the Atlantic and the Mississippi, a section of the route must pass over the southwestern corner of Upper Canada. The Company, the proceedings of whose Directors you published last week, has been formed for the construction of such a road from Black Rock to Sandwich or Detroit; and the meeting was held for the purpose of raising funds, and taking measures for the employment of an Engineer. But there is a question whether this would be the most eligible route. There surely are serious objections to it. It would be a Railroad running nearly parallel with the shore of Lake Erie, a distance almost equal to its whole length; and terminating at the two points indicated, it would be connected with neither of the great Lakes; not even with Lake Erie; but the Internal Commerce of those great waters, which must some day be of such immense importance, would be subject to all the delay of River navigation, before its commodities could reach the main thorough are to the Ocean The route proposed, different from this, and which the subjoined report so strongly advocates, is to connect the head of Lake Ontario, almost in a direct line, with the foot of Lake Huron. This route *shortens the distance at least one half, if not more.*—A single glance at the map shows the natural directness of this route. Every facility is afforded in the contiguous and almost inexhaustible timber lands of the vicinity, for nearly any amount or kind of wood material, while the surface of country is peculiarly level and favorable. When I consider this fitness of the country intermediate to the two Lakes for any public work, in connexion with the short distance and near abundance of material, I almost wonder how, among all the enterprising schemes which characterize the age, this should so long have escaped notice.

From late intelligence, however, it would appear that the opening prospect of this road, although late, has yet met with a degree of favor proportioned to its lateness. It will be seen from the report following, that the Special Committee of the Commons of Canada, most strongly urge upon the attention of Parliament, the advantages of this route, as emphatically the route of the "Great Western Railroad." The loan of $800,000, which they advise to be made to the Company, already chartered for the construction of a road the greater part of the distance, shows clearly their opinion of the importance of the measure, as well as the enterprising spirit with which they hasten its completion.

I will remark too, while upon the subject, that this example of Canada, has not been without its influence upon Michigan. Indeed, the interest of the two is so intimately connected with this concentration of improvement at the foot of Lake Huron, that it would have been truly singular if she had not stepped forward to give another signal proof of the characteristic public spirit of her citizens. By late intelligence, I learn that the Committee on Internal Improvements of the Legislature, now in session at Detroit, in their general report, recommend the construction, by the State, of two grand Railroads across the Peninsula, viz: one from Detroit to St. Josephs, and the other *from Fort Gratiot, or Huron, to Grand River*. They urge the House to consider these as government works, and upon a fund of $5,000,000, to be loaned expressly for the purpose, to assume the direction and provide for the immediate construction of them. Notice is also given in the Detroit papers, of an application to the present session for a charter to construct a road from Detroit to Huron, at the foot of the lake. This will complete the chain, and thus, taken in connexion with routes of communication West of Lake Michigan, between Chicago and the Mississsippi, we have the great Northwestern thoroughfare from the Valley of the West to the Eastern ocean completely defined and adjusted. I will soon furnish your readers with the substance of the Michigan, report in a succeeding number.

EXTRACT FROM THE REPORT.—TO THE HONORABLE THE COMMONS HOUSE OF ASSEMBLY.

The Committee to whom was referred that part of His Excellency the Lieutenant Governor's speech at the opening of the present session which relates to the subject of a great western railway, and also the petition of the President and Directors of the London and Gore Railroad Company, beg leave to transmit the following as their first report:

That having given the important matter referred to them, that of "a great Western Railroad, as being of infinite benefit to the Province, as well as promoting our friendly intercourse with the neighboring States," in connection with the before mentioned petition, their best consideration, your committee are of opinion that the route taken up by the London and Gore Railroad Company, from the head of Lake Ontario to the town of London, is the proper one for accomplishing the object recommended by His Excellency, and to give so laudable a purpose full effect, your committee recommend that the charter of the London and Gore Railroad Company should be amended, if they do not at present possess sufficient authority, so as to enable them to continue their line of route from the town of London to Point Edward, at the foot of Lake Huron, and that your Honorable House should address His Excellency the Lieutenant Governor, praying that His Excellency will be pleased to set apart the proceeds to be derived from the sales of the Crown Reserves in the several townships in the London and Western Districts which have been surveyed since the granting of the Canada Company's charter, as well as the proceeds of such other lands of the Crown in that portion of the Province as may be yet subject to the disposition of His Majesty's government, to be applied in the construction of the said Railroad. On this subject your committee have agreed to an address, which they take leave to report herewith, and recommend to the adoption of your Honorable House.

Your Committee are deeply impressed with the belief, that the facilities which will be created by the completion of "a great Western Railroad," for all kinds of travelling and goods passing in transitu, and the transportation of the surplus products of the portion of country through whose vicinity it will pass, to their proper markets, besides increasing to an incalculable degree our powers of production, will add greatly to the value of the waste lands of the Crown in the western portion of the Province particularly in the rear of the north western coast of Lake Huron, the exploring of which has hitherto been neglected. And your Committee will add, that the completion of the work will afford the most ample facilities to our neighbors of the American States, who will find it to their advantage to pass through the Province on their way to the great western interior of their country, by which means the tolls and profits of the work, and the necessary resources for keeping it in repair will be increased in a degree commensurate with the business which the improvement will create.

Your Committee are aware that the London and Gore Railroad Company have already made their survey to the town of Chatham, and determined to prosecute the work to that point as soon as they have sufficient means, and when this work is completed, all travellers, with their commodities, can avail themselves of a daily water communication by steamers from Chatham to Sandwich or Detroit, so that those who may be desirous of passing from Detroit on the railroad from that place to the town of St. Joseph, near the head of Lake Michigan, can be accommodated.

Your committee beg leave to suggest that if the town lots held by government in the several towns of London, Brantford, and Chatham, and in all other town plots which may hereafter be laid out in the vicinity of the said route under the authority of Government, will be readily sold after the public confidence is well established in the work, and that the proceeds thereof would go very far towards the completion of the same—that the commencement and vigorous prosecution of the work will excite a spirit of emulation, enterprise and activity throughout the western country hitherto lying dormant. That a considerable portion of the people of this Province, occupying some of the best lands in the country through which it is intended said railroad shall pass, are completely shut out from market for want of a proper internal communication. That the completion of this would have the effect of securing to this Province the principal part of the travel now crossing Lake Erie in American bottoms, and diverting the same to Lake Ontario, and by that means through the St. Lawrence Canal—thereby rendering the work truly a great national undertaking.

That your committee would recommend that the stock of the said Company be increased to the sum of £500,000, and that a loan of £200,000 be granted to the said Company on the following terms and conditions, and that the same be secured out of the Public revenue.

Your committee have agreed to the subjoined resolution, which they earnstly recommend to the adoption of your Honorable house.

All which, is respectfully submitted.

ALLEN NAPIER MACNAB.
Chairman.

Resolved, That there be granted to His Majesty, the sum of £200,000 to be advanced by way of loan, to the London and Gore Railroad Company as circumstances may require, on the credit of the Public revenue. That the same be secured to the Province by the said railroad, and all its works, and that the style and the title of the said Company be henceforward changed to that of "the Great Western Railroad Company."

ADDRESS TO HIS EXCELLENAY THE LIEUTENANT GOVERNOR, REPORTED BY THE COMMITTEE.

MAY IT PLEASE YOUR EXCELLENCY,—

WE, His Majesty's most dutiful and loyal subjects, the Commons House of Assembly of Upper Canada, in Provincial Parliament assembled, humbly beg leave to inform Your Excellency, that we have taken into our most serious consideration that part of Your Excellency's Speech from the Throne at the opening of the present Session, which recommends the construction of a "Great Western Railroad as being of infinite benefit to this Province, as well as promoting our friendly intercourse with the neighboring States."

We entirely concur in the sentiments expressed by your Excellency, and are of opinion that the important object can be best attained by extending the charter of the London and Gore Railroad Company, and determining the Western part of its route to be from the town of London to Point Edward, at the foot of lake Huron, or head of the river St. Clair. The "great Western Railroad" will then be from the head of lake Ontario to the foot of lake Huron, a distance of 132 miles.

And for the furtherance of this most desirable object, we humbly pray that your Excellency will be pleased to set apart the proceeds to be derived from the sales of the Crown Reserves in the several townships in the London and Western districts, which had been surveyed since the granting of the Canada Company's charter, as well as the proceeds of such other lands of the Crown in that portion of the Province as may be yet subject to the disposition of his Majesty's government, to be applied in constructing the said great Western Railroad.

At a Meeting of the President and Directors of the Baltimore and Ohio Railroad Company held yesterday, the following preamble and resolutions were adopted—copies of which have been furnished to us—and which we take great pleasure in publishing, confident as we are, that the appeal, thus made to the citizens of Baltimore, deeply interested as they most undoubtedly are, will be promptly responded to—

"*Whereas* it has been represented to the Board of Directors of the Baltimore and Ohio Railroad Company, that unless the sum required to be subscribed to the Staunton and Potomac Railroad Company, before that Company can go into operation, to wit, the sum of five hundred thousand dollars shall be subscribed before the first day of March next, that the charter of the said company will expire by limitation and become wholly void—and whereas, should the said charter be thus permitted to expire, it is altogether uncertain whether the same privilege would ever again be granted by the Legislature of Virginia, although, while the charter is in existence, there is every reason to believe that the latter State, true to her general policy, will contribute two-fifths of the amount necessary to complete the work—And whereas it is represented that the citizens of the Valley of Virginia have subscribed two hundred and fifty thousand dollars, which is all that can be anticipated in that direction and that the city of Baltimore is the source from which alone can be procured the amount necessary to secure the charter and to secure also the subscription of the State of Virginia. And, whereas, the importance of the Staunton and Potomac Railroad whether as a new channel of communication between Baltimore and the rich and productive region that it traverses, or as a tributary to the Baltimore and Ohio Railroad, enhancing the value of the latter work, cannot be too highly appreciated by the people of Baltimore—Therefore, *be it Resolved*, That in the opinion of this Board the completion of the Staunton and Potomac Railroad is a matter of the highest consequence to the city of Baltimore, as the certain means of securing an immense trade and travel from the South-West, that will otherwise seek the Atlantic seaboard by other channels.

Resolved, That in the opinion of this Board it especialy concerns all those who are interested in the prosperity and increase of Baltimore, to lend their aid by subscribing to the stock of the Staunton and Potomac Railroad Company, with a view to the preservation of its charter and the completion of the work that it is authorized to make.

Resolved, That a copy of these resolutions be addressed to the Board of trade, representing, as that body does, the interests of the commercial community; and that their aid in obtaining the requisite subscription be most respectfully solicited.

Resolved, That Messrs. Cohen, Patterson, Swan, Donaldson and McKim be a committee to take such measures as may be useful in their judgment to procure the subscription herein referred to, and to the necessary extent.

Resolved, That a copy of these resolutions be published in the newspapers of this city."—[Balt. Gaz. Feb. 8th.]

From the Indiana Farmer.

Almost every day furnishes some new attempt to extend or to modify the internal improvement system of last winter; but it appears all are destined to the same fate. On Tuesday last an attempt of this sort was made, the ultimate object of which was, to change the rout of the railroad from this place to Layfayette, so as not to make Crawfordsville a point, but to run on a direct line to Lafayette.

The friends of the measure contended for it on the score of economy; its opponents used the same argument, urging that if the proposed measure should carry, that then the Albany and Crawfordsville road must be extended to Lafayette to connect with the canal; while upon the present plan the distance was only lengthened some 7 miles, and the one road from Crawfordsville would serve to connect both works with the canal. Several gentlemen took part in the debate; but especially Mr. Longly of Boon, in favor, and Messrs. Curry and Lee, of Montgomery, against the measure. And as above intimated, it failed.

Daniel Yandes has been appointed by and with the advice and consent of the Senate, as a member of the Board or Internal Improvements, *Vice* David Burr, resigned.—[Indiana Farmer.]

Michigan Road.—On Wednesday, in the House, a bill providing for an appropriation of $30,000 to the Michigan road,—$10,000 north, and 10,000 dollars south of Indianapolis—was considered, spiritedly debated, and finally passed; but on Thursday morning, after a long and animated debate the vote of the preceding day, passing the bill, was reconsidered, and the bill, after some discussion, was re-committed with instructions, from the tenor of which we inferred that no direct appropriation would be made for the improvement of this great thoroughfare of travel at present.—[Indiana Farmer.]

Dunkirk Harbor.—The last Van Buren Times feels somewhat piqued at what we published two weeks ago, about Dunkirk Harbor. Now, we know that facts are stubborn things, and did not expect at the time that the Times could withstand what was contained in Lt. Smith's Report, without at least one struggle, if not more. If the Times does not like the language of the report, it must call on Mr. Smith—he is answerable to an enlightened public, for the language he there makes use of.

The slang of the Times with regard to Dunkirk Harbor, is not worthy of notice. The public it would seem, knows the merits of the two places, better than the editor of the Times; and we are willing to abide by their decision, though the Times is not.—[Dunkirk Beacon.]

From the Harrisburg Intelligencer.

THE GREAT RAILROAD.

The project of extending the railroad from Harrisburg to Sunbury, and from Sunbury to Erie, is one of the noblest, most useful, and practicable of any of the day. *One third of the whole distance is nearly completed.* The whole length from Philadelphia, by the State railroad to Lancaster, the Middletown railroad to Harrisburg, and a railroad by the way of Sunbury and Williamsport to Lake Erie, will not exceed 400 miles. The whole of this distance can be made *without a single inclined plane* where stationary engines must be used, and following the waters of the Susquehanna, the Sinnemahoning, the Tionesta, the Alleghany and the Brokenstraw, three fourths of the whole distance there will not be a plane of any kind of an inclination of 50 feet to the mile. The State railroad from Lancaster to Philadelphia, will have the highest grades upon the whole route. This alone will give the Pennsylvania railroad the advantage over every other railroad from the Atlantic to the Lakes, that has ever, or can be projected. Its length, too, is one fifth less. Besides, it will run through one of the richest mineral regions in the world.—The products and trade of the great Lakes, will not only seek an outlet to the Ocean by this route, but the great iron, as well as the bituminous coal region of the West Branch, and the anthracite mountains and rich agricultural vallies of the Susquehanna will swell the vast stream of wealth, that will pour into the lap of our commercial metropolis, when this great work shall have been completed.

We have lately read the report of the engineer that surveyed, the New-York Railroad, through the Southern counties of that State, from Dunkirk, on Lake Erie, to Tappan, 24 miles from the city of New

York, on the Hudson river. The following is it length:

Western Part,	260 miles.
Eas ern Part,	222 do.
From the Eastern termination, to the city of New-York,	24 do.
Whole length,	506 miles.

☞ Thus, it will be seen, that the route through Philadelphia, and then across New Jersey, will be nearer to New-York itself, from her own termination, Dunkirk, than on her own railroad, when it is finished.—But this is not all the advantage we have in distance. Dunkirk is about 40 miles further down the Lake, than the town of Erie. and this distance, added to the New-York road, will show, that no passengers from the western States will take the New-York road, when our road is finished,—when Philadelphia can be reached through Pennsylvania, by a route 150 miles shorter, and New-York itself is 50 miles nearer, than on her own contemplated railroad. But even this great saving of distance is not our greatest advantage. The New-York railroad has a number of inclined planes. By the report now lying before us we perceive, that there are eleven planes, with an inclination of 50 feet to the mile. Six p anes with inclinations varying from 50 to 60 feet per mile, and five having inclinations from 50 to 70 feet per mile. Twelve miles have a grade of 70 feet inclination to the mile. Four miles and nearly one half ascending at the rate of 72 feet per mile. Three fourths of a mile, at 100 feet per mile; and more than one mile and a half at 316 feet per mile. The following are only a few of the planes, with their grades, length and distance from Tappan on Hudson river, 24 miles from New-York:

Distance from Hudson river.	Length of the planes.		Inclination per mile.
Miles.	*Miles.*	*Chains.*	*Feet.*
76		278	100
188	5		60
193	5		70
194	1		61
203	7		70
207	3		65
348	4	40	72
349	1	25	67
473	1	60	316

From the Petersburgh Intelligencer.

At a meeting of the Stockholders of the Roanoke, Danville and Junction Railroad Company, convened at Powell's Hotel, in the Town of Petersburgh, on Monday, the 23d day of January, 1837, pursuant to public notice, given by the Commissioners, named for the Town of Danville, in conformity to the provisions of the 4th section of the General Assembly of Virginia, entitled "an Act to incorporate the Roanoke. Danville and Junction Railroad Company," passed the day of 1836.

It appearing to the meeting that 4859 Shares of the Capital Stock have been subscibed—and a majority of said shares being represented by Subscribers present, and by proxy: On motion of Mr. Spooner, Andrew S. Fulton, Esq., was called to the chair, and John D. Townes, appointed Secretary.

A report of the proceeding of the Commissioners, for the Town of Danville, was presented by George Townes, Esq., read, and ordered to be printed.

On motion of Mr. Woodis, the meeting proceeded to the election of a President and five Directors; when Vincent Witcher, Esq., was unanimously elected President, and George Townes, Benjamin W. S. Cabell, and william Linn, of Danville; John Foster, of Evansham, and Wright Southgate, of Norfolk, were duly elected Directors of the Company for 12 months.

On motion, it was resolved, that the President of the Company be allowed the sum of Fifteen hundred Dollars, as a salary for 12 months.

On motion of Mr. Spooner, it was

Resolved, That a committee be appointed to prepare a memorial to be presented to the Legislature of Virginia, asking a subscription by the State to the Stock of the Roanoke, Danville and Junction Railroad Company—and to prepare and report to a future meeting of the Company, such Bye-Laws and Regulations as may be deemed necessary for the government of the Company and its officers. Messrs. Spooner, Branch, G Townes, Garland and Martin, were appointed a committee pursuant to the foregoing resolution.

On motion, it was

Resolved, That the annual meeting of the Company be held in the Town of Danville, on the last Monday in July next.

On motion of Mr. Townes, the meeting adjourned until to-morrow morning, 10 o'clock.

—

TUESDAY, January 24, 1837.

The meeting convened pursuant to adjournment.

The Secretary not being present, Mr. Garland was appointed Secretary, *pro tem.*

On motion of Mr. Woodis, it was

Resolved, That the President and Directors be and they are hereby authorised and required to refund to the respective contributors, the several sums advanced by them to defray the expenses attending the experimental survey.

The Committee appointed on yesterday, to prepare a memorial to be submitted to the Legislature, made a report, which was concurred in, and it is ordered that the President of the Company, cause the same to be presented to the Legislature without delay.

On motion of George Townes, Esq., it was

Resolved, That the President and Directors be requested to proceed with all possible despatch to the execution of the work, and all other business necessary to the expedition and successful completion thereof.

Resolved, That these proceedings be signed by the Chairman and Secretary and that the respective Editors of News papers published in Norfolk, Petersburg Richmond, Danville, Evansham, and Abingdon be, and they are hereby requested to publish the same.

On motion of Mr. Martin, the meetin adjourned.

A. S FULTON, Chairman.
J. D. TOWNES, Secretary.

From the Dunkirk Beacon.

DUNKIRK HARBOR, ETC.—The report of Lieut. SMITH, Superintendent of the public works on Lake Erie, will be found in part, below. We give such extracts as relate to Dunkirk, and such other harbors as are in this vicinity. By this report, it appears that Dunkirk is the point fixed upon by the general government, to expend the sum of *one hundred and ninety-four thousand dollars*, for erecting a permanent stone wall nine feet high on the breakwater in front of the harbor. This report gives a broad and comprehensive view of what has long been needed at this harbor; it recommends, second, the construction of a permanent stone wall nine feet high, on the pier at the western entrance into the bay, from the contemplated beacon light, 480 yards running in toward the shore. Third, the construction of a pier 320 yards long, to be sunk in eight feet water, and carried up to two feet above the surface of the water; to be erected on the south side of the eastern channel. Fourth, to add 480 yards crib work to the east end of the breakwater or pier in front of the bay.

There is one feature in the report which we take pleasure in mentioning—it knows no harbor between Buffalo and Erie, except *Dunkirk*. We mention this for the exclusive benefit of our Van Buren neighbors, who we understand, deny the correctness of extracts which have been made from the report, in eastern papers.

OFFICE OF SUP. PUBLIC WORKS,
BUFFALO, N. Y. September 20, 1836.

Brig. Gen. GRATIOT, U. S. Army,
Chief Engineer, Washington, D. C.

SIR:—I have the honor to report, that I assumed the duties of general superintendent of such of the works on the south shore of Lake Erie as are confined to the Engineer Department, by your direction, from the 1st to the 9th August last; my predecessor having, on the last named day, ceased to disburse.

With the remark, applicable alike to every work on this lake, that the appropriations were not received for this year until late in the month of August, and that the season from that time has been such a one as has never before been known, of continued and violent storms, generally from some northwardly direction, with the water of the lake, on an average, at two feet eight inches greater height during the whole season, than it has been in any season for twelve years past, I offer the following report of the progress of the works.

Dunkirk Harbor, New-York.—The progress of this work during the season has consisted in: 1st. The building up to 5 feet in height above the surface of the water, and finishing off 156 feet of the west pier, and 166 feet to the height of 4 feet above the water, making 322 feet. Of the foregoing 20 feet left unfinished last fall was carried away by storms and ice to $3\frac{1}{2}$ feet below the water, and is now rebuilt. This portion of the work is constructed in a depth of ten feet of water, and is 22 feet in width. The west pier is entirely complete on the present plan. 2d. Building up 200 feet of the west end of the outer pier to the height of 4 feet above the surface of the water. To repair this effectually, it was necessary to cut down and remove, 1 foot below the surface, 140 feet of this work during the season. This is also, now, complete and in good condition. 3d. Filling up with stone, planking, and capping 280 feet of the outer pier left unfinished last fall, the stone having been carried out by the storms and ice during the gales last fall and winter to the depth of 4 feet; this is now finished and in good order. Of this pier, 1,120 feet still remain to be repaired this season. The repairs will consist of filling it up anew with stone heretofore carried away at different heights, covering the whole anew with plank; a repair rendered necessary by the decayed state of the present plank, and the danger of still further injury to the work from the storms. The harbor of Dunkirk has recently been rendered of vastly more importance than heretofore, by the decision of the Hudson and Erie Railroad Company to terminate that great work at this place. It has been found a valuable harbor in the severe and sudden storms to which Lake Erie is liable, and it appears to be of infinite consequence that it should be made permanent. It is, therefore, respectfully recommended, that the necessary steps should be taken the coming year to construct the piers of stone, laid in hydraulic cement above the water, in a manner somewhat similar to the construction of the mole of Buffalo Harbor, and with this view the estimate marked C is respectfully submitted.

Recapitulation of the different sums required for theservice of the works at Dunkirk harbor, New-York, as per estimate.

1. An estimate for fuuds for a stone wall on the breakwater,	$98,981 72
2. An estimate for a stone wall on the western pier,	48,020 50
3. An estimate for the construction of a new pier on the south side of east channel,	14,829 80
4. An estimate for extending the breakwater 480 yards eastward,	22,974 29
5. An estimate for large stone for backing up works,	10,000 00
Total amount required to complete works,	$194,806 31
Amount required for the service of 1837,	$47,784 09
1838,	50,000 00
1839,	50,000 00
1840,	47,022 22
	$194,806 13

DUNKIRK, October 10, 1836.
Respectfully submitted,
By your obedient servant,
THOMAS FORSTER, Superintendent.
Brig. Gen. C. GRATIOT,
Chief Engineer, Washington.

From the Buffalo Daily Commercial Advertiser.

THE CANAL CONVENTION.

This Convention, which assembled at the Court House yesterday, was creditable both in numbers and character to Western New-York, and an evidence of the deep interest generally prevalent for the speedy completion of the great work it was designed to promote. The doings of an assembly of a character so imposing, cannot but arrest the attention of the Legislature, and exert a salutary influence in prosecuting to completion, the great work of enlarging the Erie Canal at a much earlier day than was contemplated at the adoption of the project.

The Convention, at 11 o'clock, A. M. was called to order by the Hon. Jonathan Childs, and on motion James Seymour, of this city, was appointed temporarily to the Chair, and Washington Hunt, Esq. of Lockport, and John L. Kimberly, of Buffalo, were appointed temporary Secretaries. At this point of the proceedings Mr. O'Reily rose and stated in behalf of the citizens of this city, that the Convention was not called to subserve any other project than that indicated in the call for the Convention. This was warmly responded to, by a gentleman from Buffalo, on behalf of that delegation, and by Jesse Hawley, on the part of the Niagara delegation.

The counties was then called when it appeared that delegates were in attendance from Erie, Niagara, Orleans, Monroe, Wayne, Livingston, Alleghany, Seneca, and Cayuga counties. On motion, it was resolved, that the delegates from the several counties designate three from each delegation to nominate officers for the convention.

After a short retirement, the committee returned and reported the Hon. NATHAN DAYTON, of Niagara, as President. and Josiah Trowbridge, of Erie, James Seymour, of Monroe, Jesse Clark, of Seneca, and Allen Ayrault, of Livingston, as Vice Presidents. The committee also made choice of S. G. Andrews, of Monroe, James L. Barton, of Buffalo, Theron S. Strong, of Palmyra, and A. H. McKinstry, of Albion, as Secretaries.

On motion it was then resolved, that a committee of six be appointed to report resolutions for the consideration of the convention. Whereupon Henry O'Reilly of Rochester, C. Turner of Niagara, R. W. Haskins, of Erie, A. H. Bennett, of Livingston, Geo. W. Cuyler, of Wayne, and Theodore Rapple, of Cayuga, were appointed such committee. The convention then adjourned till 3 o'clock, P. M.

The convention met pursuant to adjournment when it was ascertained that J. Clark, one of the persons designated as Vice President, was not present, and a motion made that Jesse Hawley, Esq. of Niagara, be chosen in his stead, which was unanimously agreed to.

The committee having returned, Orasmus Turner of Lockport read the preamble adopted by the committee. It set forth in an eloquent and happy manner the great importance of the speedy completion of the enlarged canal—important as a means of facilitating our own business, but doubly so as offering the only alternative for the retention of the already great and rapidly augmenting commerce of the illimitable West.

Mr. Hart, of Wayne, who had previously submitted a resolution connecting the enlargement of the Genessee Valley Canal with that of the Erie Canal, and which, with the various motions growing out of it, had been laid on the table, seemed unwilling to let it rest there, as it was connected with a speech, of which he seemed in pain to be delivered. The convention, therefore, unanimously assented to his proceeding. He commenced by adverting to the eve of internal improvement in the state of New-York—the completion of the main trunk, the Erie Canal, and the various lateral branches to which that has given birth—vindicated the policy of their construction, although a yearly tax on the main channel. Having thus cleared the way, he came to his favorite project, which was none other than giving the Erie canal and that of the Genesee Valley a like capacity.

He denominated the proposed canal an important leg in the triangle—proceeded to show that without such capacity the canal would never become a source of revenue, but with it,and extended by an improvement of the Allegany river, it would open to Rochester the extensive trade of the Ohio valley, and become the favorite channel for the transit of a great trade. In connection with the subject he adverted to the accumulation of ice in Buffalo harbor, as opposing an impediment to early navigation, alledging that the Genesee Valley canal would obviate this difficulty. After insisting on the propriety of the resolution which had been the occasion of his remarks, and adding the hope that it would yet find favor with the convention, he resumed his seat.

After the reading of the preamble was concluded, Mr. O'Reily, chairman of the committee, reported six resolutions, happily embodying the necessity of the work and the arguments in favor of its speedy prosecution. The preamble and resolutions having been thus presented to the meeting, it was moved and carried that the the report of the committee be accepted.

If the numerous assemblage of people early in the day gave satisfactory evidence that the importance of the convention was appreciated, the spirit evinced on the question of the adoption of the resolutions as they were severally proposed, would have rendered assurance doubly sure. The first and second wery adopted without discussion, but on the third being proposed, E. Darwin Smith, Esq. of this city, rose and made some stirring remarks on the subjects embraced in the resolution. He was followed by Messrs. Hawley and Ketchum, of Buffalo, in a strain of stirring eloquence. Also, by Judge Hunt, of Niagara. Judge Cantine, of Orleans, and General Brooks and Mr. Bryan, of Livingston, all of whom spoke with that feeling and efficiency which a warm zeal and a just cause always inspire. The speakers were severally cheered by a crowded assembly of eager listeners. Several other gentlemen, whose names were not known to us, addressed the meeting with effect.

The discussion was arrested by a motion to adjourn till 9 o'clock the following day, but was subsequently amended to seven o'clock in the evening, to which time the convention adjourned in the greatest harmony.

SEVEN O'CLOCK.—The convention met according to adjournment, and proceeded to adopt the remaining resolutions. Their propriety was enforced by pertinent remarks from J. H. Beach, H. L. Stevens, Esq., E. Darwin Smith, Jesse Hawley, Esq., Judge Hunt and O. Hastings, Esq., as also by other gentlemen whose names were not distinctly heard. The resolutions were adopted by acclamation.

☞ Some caustic reflections were made on the apathy evinced by the cities of New-York, Albany and Troy in relation to the proceedings had here preliminary to the present convention, and the fact stated ☜ that of all the journals in New-York none save the Journal of Commerce deigned them a passing allusion. Yet with all these discouragements to encounter, Western New-York is determined to press this matter on the attention of the Legislature with all the moral weight possessed by her enterprising and indefatigable population. The remarks on the resolutions having been concluded, the convention adjourned till to-day at 9 o clock A. M.

THURSDAY, Jan. 19.

The convention re-assembled this morning pursuant to an adjournment and was called to order by the chair.

Jesse Hawley, Esq. of Lockport, presented a resolution complaining of the apathy evinced by the city of New-York, in relation to the enlargement of the Erie canal, which, having been read, was, at the instance of the mover, laid on the table.

Judge Hunt of Lockport, submitted a resolution designated the appointing of a committee for the purpose of laying the proceedings of the convention before the Chamber of Commerce for the city of New-York, which was also laid on the table.

The unfinished business of the previous evening being called for, a resolution was read by Mr. O'Reilly setting forth the advantages which the speedy completion of this work offered.

Mr. Hastings, of Rochester, objected to the resolution as too minute and diffusive in character, and more appropriate for embodiment in a memorial.

Mr. Gay concurred in the same views.

Mr. Hart thought the resolution too conjectural—the simple facts were all that were necessary to ensure the subject a profound consideration from the public.

Mr. Hawley said the object of a resolution was to embody sentiments, not facts. On motion, the resolution was read, when its structure was objected to by Mr. Ketchum, who thought it more fitting a memorial. After considerable informal discussion the resolution was laid on the table.

Mr. O'Reilly called the attention of the convention on the subject which convened it, and proceeded to deprecate the introduction of any extraneous matter, when he was called to order and sat down, but on motion of Judge Hunt, of Lockport, was allowed to proceed, which he did by a recapitulation of the reasons why no other subject should come before the convention than that indicated in the call.

* * * *

The reading of the preamble being called for, the question was on its adoption, when Mr. Hastings objected to it as a preamble, but was willing to adopt it as an address.

Mr. Hawley, of Buffalo, objected to changing the name, and after having concluded his remarks the preamble was adopted, as also the resolution in connection.

A gentleman from Buffalo rose, and by permission of the convention proceeded to reply in a playful manner to the "*ice*" argument of the gentleman from Wayne. He stated that Buffalo had indeed much ice, but, bountifully as she was supplied with that article, it so happened that they contrived to "*use it up*" by the time the canal was ready for navigation in the spring. But should icebergs so accumulate at the harbor as to deny egress therefrom, the people would uncomplainingly submit to the fetters that enchained them, and settle down to the occupation of "*seal catching!*" He further stated that Buffalo felt no hostility to the Genesee Valley Canal, and that the repugnance of the Buffalo delegation to connecting it with the Erie canal, arose solely from their want of authority to act on it.

The convention proceeded to the business more immediately connected with the objects of it, and after an extended discussion, the Chair was anthorised to appoint a central executive committee to carry into effect the proceedings of the convention. and to transact such other business in relation thereto as may be deemed advisable.

A memorial was reported and accepted and placed in the hands of the committee.

The Chair announced the following gentlemen residents of this city as the central executive committee :

Henry O'Reilly, E. Darwin Smith, G. Andrews, Thos. H. Rochester. Jonathan Child, James Seymour and Horace Gay.

The following county committees were announced by the respective delegations.

Erie County—W. A Mosely, R. W. Haskins, Seth C. Hawley, J. M. Kimberly and Jas. L. Barton.

Niagara County—G. H. Boughton, W. H. Hunt, E. Ransom, C. Turner and Jesse Hawley.

Livingston County—A. Ayrault, A. A. Bennet, C. H. Bryan, Micah Brooks, and Charles Colt.

Genesee County—H. J. Redfield, D. E. Evans, T. Cary, G. W. Lay and James Brisbane.

Orleans County—Hugh McKurdy, A. B. Mills, Alexas Ward, A. H. Cole and A. Nickoson.

Wayne County—Richard Wood, E. Blackman, J. Andrews, J. Hemmingway, and A. Purdy.

The central executive committee was charged with the duties of a county committee so far as Monroe county was concerned. The business of the convention having been thus disposed of, Dr. Brown of this city moved a resolution tendering the thanks of of the convention to the President for the manner in which he had discharged the duties of the station assigned him.

The resolution was unanimously adopted, whereupon the President, in a neat, brief and pertinet address signified his appreciation of the honor done him by the convention.

A resolution of a similar character was presented in behalf of the other officers of the convention and adopted by a like unanimity.

Mr. O'Reilly then presented the thaks of the citizens of Monroe to the several counties represented, and to the delegates therefrom, for the promptness with which the call for a convention had been responded to, and expressed the hope that the citizens of Western New-York would be always found ready to co-operate with the like unanimity in the promotion.

The convention then adjourned *sine die.*

OFFICIAL.

ADJUTANT GENERAL'S OFFICE,
Washington, Feb. 3, 1837.

GENERAL ORDER, NO. 2.

I.—The Secretary of War, *ad interim*, has received the following resolution from the Senate of the United States :

Resolved, That the Secretary of War be requested to cause an examination to be made by a board of officers, into the improvements in fire-arms made by Hall, Cochran, Colt, and the Baron Hackett ; and that the general results be presented to the Senate in tabular statements, showing the advantages of each in all important military points of view, and especially as to—

1. The celerity of fire.
2. The extent of the recoil.
3. The efficiency of the fire.
4. The inconvenience from heated barrel in rapid firing.
5. The capacity of being used as a rifle.
6. The simplicity and cheapness of construction.
7. Durability.
8. Saving of ammunition and appendages.
9. The number of charges which may be carried by an infantry soldier.
10. The advantages when used against a charge of cavalry.
11. The advantages when used by cavalry.

II.—In conformity with the provisions of the foregoing resolution, the Secretary directs that a board, to be composed of the following officers, to wit :

Brev. Rrig. Gen. J. R. Fenwick, Colonel of the 4th Artillery ;
Brev. Brig. Gen. N. Towson, Paymaster General ;
Col. G. Croghan, Inspector General ;
Brev. Lt. Col. Worth, Ordnance ;
Lt. Col. Wainewright, Marine Corps ;
Lt. Col. Talcott, Ordnance ;
Capt. B. Huger, Ordnance ;

be assembled at the Washington Arsenal on Monday, the 20th of February instant, at 11 o'clock, for the purpose of making a thorough examination of the improvements in fire-arms made by Hall, Colt, Cochran, and the Baron Hackett, in the manner and mode specified in the resolution.

III. The board will report the general results, for the information of the Secretary of War, in tabular form, showing the utility of each fire-arm in all important military points of view, as required by the resolution ; and will also report such further information on this subject as they may be able to communicate, with their opinion on the relative advantages of the several improvements submitted to their examination.

First Lieut. J. N. Macomb, of the Artillery, and Aid-de-camp, will record the proceedings of the board.

By order,

ROGER JONES,
Adjutant Gen. of the Army.

Miscellaneous.

About a year since an article was published in this Journal on the subject of the employment of zinc for roofs, by Dr. L. D. Gale, and in this article it may be remembered that several serious objections were urged against the employment of that material. The following article from the American Journal of Science and Arts—January 1837, will be found to give an entirely different view of the subject.

It is highly important that the merits of the case should be well ascertained before opinion is made up. Believing that the experiment detailed by Dr. Gale could not give erroneous results, we had decided in our own minds. It appears however, that further experiment is necessary.

ON ZINC, AS A COVERING FOR BUILDINGS; IN A LETTER FROM PROF. A. CASWELL, TO MESSRS. CROCKER, BROTHERS & CO.

You sometime ago requested me to examine an article on *Zinc, as a roofing material*, published by Dr. Gale of New-York, in a late number of the Mechanics' Magazine. I regret that it has not been in my power to give your request earlier attention.

The remarks of Dr. G., which were copied by several papers at the time, were fitted, in your opinion, to prejudice the public mind unjustly upon a subject of great importance. He discourages the use of zinc as a roofing material, upon several distinct accounts, the principal of which, are the following.

1. The difficulty of making the roof tight.
2. The deterioration of the water which falls from it.
3. The comparatively small resistance which it offers to the progress of fire.

1. As to the first of these objections, the brittleness of the metal and its great expansion from heat are adduced, to show that a roof cannot be made sufficiently tight.—Zinc in the *unwrought* state is well known to be very brittle, and there may be in the market *rolled* or *sheet* zinc of a bad quality. But no one need be deceived on this point, since nothing is easier than to test its flexibility. Sheet zinc which will bear to be doubled and hammered down without any appearance of fracture in the bend, may be used as a covering for buildings, without the least fear of leakaga. Such is ths fact with regard to sheet zinc which I have examined from your manufactory; and such, I am assured, is the fact with regard to foreign zinc from the best manufactories. But any detailed examination of the brittleness and expansion of zinc, so far as this question is concerned, is entirely obviated by the well ascertained fact, that there is no practical difficulty in making a zinc roof *perfectly tight*. The numerous certificates which you have submitted to my examination, from most respectable gentlemen, who have made the experiment, place the subject beyond all reasonable doubt. A zinc roof may as easily be made tight as any other whatever.

2. The second objection respects the deterioration of the water which falls from the roof. This consideration is particularly important to all those who are in the habit of using cistern water for culinary and other domestic purposes.

It is alleged that a *poisonous* suboxide of zinc is dissolved in the water, which renders it unfit for *cooking*, and impairs its proprieties for *washing*. On this point I have consulted the ablest modern writers on chemistry, Brande, Turner, Thomson, Berzelius, and others. The oxides of zinc seem not to have been much studied. The principal one known, and perhaps the only one certainly known, is the white oxide, (sometimes called the flowers of zinc,) which is quite *insoluble* in water, and hence could not vitiate its proprieties. Berzelius thinks there are two others, the suboxide and the superoxide.

The *suboxide* is the gray coating formed on the surface of zinc by exposure to the weather, and this is the substance which, it is said, is dissolved and mixed with the water, which falls from a zinc roof, thereby impregnating it with deleterious properties. This opinion, so far as I can learn, is unsupported by any writer on chemistry. Turner says, "zinc undergoes little change by the action of air and moisture." Aikin's Chemical Dictionary, a work of merit and authority, says, "the action of the air upon zinc, at the common temperature, is very slight; it acquires a very thin superficial coating of gray oxide, which adheres to the metal and *prevents any further change*." The statement of Thomson is, that zinc, when exposed to the air, soon loses its lustre, but "*scarcely undergoes any other change*."—The account given by Berzelius, the ablest chemist of the age, is very explicit and much to the point. He says, "this oxide is formed on the surface of zinc which remains a long time exposed to the contact of the air. It has a dark gray color when moistened, but by drying becomes of a light gray. Ordinarily it forms a thin crust on the surface, which neither *increases* nor *experiences any change in the air*; but acquires great hardness, and resists, better than the metal itself, the mechanical and chemical action of other bodies. A piece of zinc sufficiently suboxidized at the surface, dissolves with *extreme slowness in the acids, and only at the boiling temperature.*

Such are the opinions of chemists, and particularly of Berzelius, whose unrivalled skill and accuracy in chemical analysis have been the admiration of all cotemporary chemists.

The opinion of Dr. G., is considerably at variance with those now adduced. I think he has not stated very fully, and certainly not very satisfactorily, the reasons on which it is founded. He mentions, however, as a proof that this suboxide is dissolved in water from zinc roofs, that if it is suffered to stand for some time exposed to the air, the suboxide gradually takes oxygen from the atmosphere, and is thus converted into the *insoluble* white oxide before mentioned, and is then precipitated in the form of a white powder. To test its purity by this method, I have kept water from a zinc roof exposed in clean glass vessels for several days, without any, the slightest appearance of a precipitate, or even a pellicle upon the surface. And what is still better as a test, I have kept it for several days in closed bottles with oxygen gas, and subjected it to frequent agitation, without the least appearance of a precipitate, or any diminution of transparency. I must think, therefore, that if such water contains the suboxide of zinc, its presence is not to be detected in this way.

That the quantity of zinc dissolved in water *must be exceedingly small*, is obvious from the following consideration. A sheet not more than the fortieth of an inch in thickness, would probably last at least half a century, on the roof of a building. Indeed, for any thing we know as to the *rate* of its oxidation, it might last for centuries. The concurrent opinion of chemists, and this confirmed by observation and experiment, so far as these have extended, is, that after the gray oxide is once formed, any further change takes place *scarcely at all*, or with *extreme slowness*. But on the supposition that it would last only fifty years, the whole quantity of rain which falls in the course of a year, or about three feet on the level, would dissolve the *two thousandth part* of an inch in thichness of zinc. This, to produce any appreciable effect, must be one of the most virulent of poisons, equal at least to prussic acid. But so far from being an active poison, it remains to be shown that it is poisonous at all, even if a minute portion of it did mingle with the water. The white oxide of zinc is not poisonous, and the inference seems to be gratuitous that this is so.

It is due no less to the public than yourselves, that the truth upon this subject should be known and promulgated. I am quite satisfied, for one, that we are not in the least danger of being poisoned by the use of water from zinc roofs. The portions of this water which I have examined, could not be distinguished from pure river water by any test that I have been able to apply to it. I feel myself warranted, therefore, in the conclusion, that *it has suffered no deterioration whatever from the zinc.*

3. A third objection is that zinc affords inadequate protection against fire.

This objection is based upon the fact that zinc melts at a low temperature; and in case of fusion, leaves the wood work of the building unprotected. This objection is rather specious than real. Zinc melts at the temperature of about 700° Fahr. or a little below red heat. Whenever, therefore, the heat from adjacent buildings is any thing less than that of redness, zinc would afford as complete protection as copper or iron.—When the heat has reached the melting point of zinc, which it seldom would do except in the most compact parts of cities, very little confidence could be placed in the protection of iron or copper. The dry wood work of the roof, under a covering of red hot iron, with air enough for combustion circulating through openings and crevices, would soon be in flames; and when once in flames it would be extremely difficult to extinguish it by the application of water. It would be applied with great disadvantage to the under side of the roof, and almost to no purpose at all upon the top. If therefore the heat, in any case, should become so intense as to melt zinc the probability of protection from iron or copper will be but small.

Complete protection against fire is perhaps unattainable; at least we can never be sure we have attained it. In the progress of the arts, great improvements no doubt will be made in the mode of defence against the attacks of this destroyer. I am not aware that the following construction for a roof has ever been tried. For cheapness, tightness, durability and resistance to fire, it seems to be well deserving the attention of builders. Let the rough boards of the roof, (and the rougher the better,) be covered with a thick coating of common lime mortar, then lay down the *ribs*, if I may so call them, for the zinc plates,—then cover the whole with zinc, according to the most approved method of applying it. Such a roof would be in no danger of leakage, unless the water accumulated upon it so as to stand above the ribs, in which case no roof would be tight unless it were corked or soldered throughout. This covering, if I am rightly informed, would be nearly as cheap as slate—quite as cheap as tin, cheaper than iron, and more than three times cheaper than copper; and would at the same time resist fire much better than either of them. A heat that would melt down the copper and iron, would of course, melt the zinc, but would leave the mortar uninjured. The peculiar advantage of the mortar is, that it is infusible except at a very high temperature, while the closeness with which it adheres to the wood work is such as to exclude the air and thus prevent combustion. If the mortar should be kept at a red heat for some length of time, the wood beneath it would be *charred*, but could hardly be *burnt*. In case of fusion the zinc might be replaced without injury to the mortar. I know of no construction for a roof that would be more completely fire proof than this.

Such are my views on the subject to which you called my attention. If they shall serve in any measure, to remove prejudice, and allay unfounded apprehensions on a subject of great and growing importance to the public, it will afford me much pleasure.

Brown University, October 1, 1836.

From the Journal of the American Institute.

COAL.

Messrs. Editors,—This community, and, in fact, a large part of the country, are alive to the high price of coal. Winter is gathering upon them with increasing sternness; and although thus far not as frightful as the last, the dread that the worst is still to come, agitates and alarms. This condition of the public mind is calculated to bring forth advisers in scores; because it is a time when they will be listened to. Some favorite panacea becomes popular. The people, like suffering patients, are sure that they feel distress, and, like them, they cannot be satisfied until they have swallowed the popular remedy, or been bled or steamed, as the fashion at the time may dictate.

The sovereign specific—the grand catholicon—which will make plenty, and, of course cheapness, is free trade;—take off all duties, and open your ports to the whole world and all will be well. Petitions to Congress for this purpose have been circulated, and thousands have signed in the full belief that they were contributing thereby to mitigate the rigors of our severe winters, and bring our shivering inhabitants into a milder zone. I have been repeatedly accosted by those engaged in carrying around these petitions, to lend my name—to inform Congress that the weather is cold, and that fuel is high, and humbly pray them to pass laws to make us warm:—not exactly to legislate us into a milder climate, but to legislate down the price of coal, by taking off the duty, about $2 per chaldron, which is required to be paid on imported coal. Not having a particle of confidence in this prescription, I have sought for reasons from those who take such interest as to go from house to house and store to store, to beg signatures.

I have desired them to name an instance, when the means of a home supply existed, where a reduction of duties effected a reduction of prices. I desired them to examine the history of our tariff, and see for themselves whether reduced prices had not been the invariable effect of high protecting duties. I instanced to them cottons, leather, cabinet wares, hats, &c., which were among the earliest articles protected by high duties, and which duties have been regularly continued down to this; all these are now so abundant and cheap, that we are deriving a good profit while we undersell them in foreign markets to those very foreigners from whom formerly, before high duties were imposed, we purchased our supplies. Not a free trade coal advocate has been found to deny these facts.

I have not, however, been so fortunate as to shake the faith of a single man. It is opposed to their theory; they are suffering, and, like the afflicted patients, unwilling to submit to a gradual, but certain cure, they yield to the persuasions of the empiric, and shut their eyes against facts and experience. Some have said that coal is an exception; that all that is wanted is to break down the coal monopolizers, extortioners and grinders; that coal is necessary for the poor. I ask, is not bread, too, a necessary? Do not flour dealers monopolize? It has been stated, that there is a confederacy of monopolists extending from New-York to Buffalo; and it is probably truly stated, that a more universal scarcity in bread stuffs exist from the short crops of the last season, than has prevailed at any time within the last fifteen years.

The duty on foreign wheat is twenty-five cents per bushel. Are there not stronger reasons for the repeal of this duty, than even the duty on coal? Are the flour monopolists less obdurate? Is their combination more limited, or less effective? Is the future supply less certain? Let those who doubt explore the coal regions of the west, and they will find a supply, not thousands of feet below the surface, as in England, but forming the very surface itself, and of sufficient depth for the supply of not only America, but all Europe, for centuries to come. That the supply is inexhaustible, no one will deny. From the best calculations, it may under ordinary circumstances, be afforded in our city at less than half its present price.

The supply of wheat cannot be relied on with the same certainty. Bad crops may occur, and reduce production particular years greatly below the common average, as they did the last year. No deficiency can happen in our coal beds. Why then these exorbitant prices? Coal has suddenly superseded other fuel, not only in our populous cities, but in the country—for manufactures, for steamboats, as well as to warm our houses. Just as our forests had disappeared, our coal beds—those exhaustless magazines of fuel—began to be known.

It is but a short period since a few samples were brought here for exhibition. The last year there was brought to market, from three mines in a single State, 556,935 tons; and for the coming year, preparation for its supply are making upon a larger scale than ever. The ratio of increase from these mines alone, is such as must soon fully equal the demand, and new mines are constantly opening; and the competition, so highly stimulated by ready sales and high prices, must inevitably and speedily reduce the article to its minimum price, unless that competition is checked by indiscreet legislation. All that is required, is for more capital to be turned into the coal trade at home.

If the facilities for the importation of foreign coal are increased by the repeal of the duty, the inducement for our capitalists to make extensive arrangements for supplying our market the next year is clearly lessened—probably to a tenfold greater amount than the increased foreign importation. The foreign importation is also calculated to derange prices. This consideration, in all probability, would influence the capitalist to withhold the employment of his money beyond what it ought to be invested.

The foreign supply, under any circumstances, will be but a drop in the bucket, when compared with our consumption. The foreign importations of last year were only 14,453 tons. If that amount were imported for forty years in succession, it would but a trifle exceed the amount procured the last year from the three mines I have already referred to. If the repeal of the duty were to be doubled, the foreign supply would amount only to a fraction, compared with the probable home supply of the coming year.

I defy those who desire the repeal of the duty on coal, to name a reason which does not, in full force, apply to wheat, and flour, and potatoes. The present prices of these latter articles, beyond the average of former prices, is quite equal to those of coal. The duty, in proportion to present prices, is as great; and the possibility of a real scarcity, from short crops, may happen to wheat, flour and potatoes, but never can to coal.

The quantity of coal brought to market for several years past, has doubled every three years. Our population requires about twenty years to double. The article is, therefore, increasing more than six times as fast as the consumers. Under these circumstances, we have nothing to do but to give competition full play, and monopoly soon will get its quietus.

Suppose we admit, because coal is a necessary, and the price is high, that the duty ought to be repealed. The same reason will apply to every other necessary. We must carry the principle through, or stand charged with partiality; and in years of plenty, our markets would be glutted with the agricultural products of Europe, and our farmers made the sufferers. Motions and petitions would be offered in Congress to repeal the duties on other articles, and our whole social system would be disturbed and deranged. Pennsylvania would not be peaceable if, without a good reason, her great staple should be made an exception. Our whole protective policy must be demolished. To me it is folly to *endeavor* by a repeal of duties, to tempt our citizens to send their money three thousand miles, and employ foreigners to dig coal from the deep bowels of old England, instead of using it at home in rewarding our own industry, and by its circulation enriching our own people. It would be much sounder political economy to give bounties to encourage its exportation, and by these means break down the monopoly so loudly complained of. CLINTON.

That the price of coal will be regulated by supply and demand, will not be denied. The question then arises, will the supply be increased or diminished, by the repeal of the duty on foreign coal? We believe it will be diminished. With the coal dealers, who fully understand the subject, it will have no effect; but some sensitive capitalists will, no doubt, be influenced to withold their money, which they might otherwise employ in the coal business themselves, or loan to others disposed to carry it on. The whole quantity that, under any circumstances, will, be imported, must be so small, that comparatively a very little effect on our coal operations will more than overbalance the increase from importation, arising from a repeal of the duty. The consequence will be, that coal will bear a higher price than if the duty is continued. And we are told, that some of the most intelligent coal dealers are perfectly willing for the repeal, and laugh at those who think by such means to affect their trade. In 1820, only 365 tons were brought to market from all the Pennsylvania mines. In 1835, 556,935 tons. Fifteen years, therefore, had increased the quantity fifteen hundred and twenty-five times. No monopoly, if the business is let alone, can long withstand the accumulating supply.

Our correspondent has overlooked a very important consideration which has helped to sustain coal the present season. The severity of the last winter caused an extra consumption, which has been computed at fifty per cent. Great numbers, to guard against extortionate prices, obtained their winter's supply the last fall, contrary to their practice in former years. There is not, therefore, exhibited in the coal yards the quantity which, it would seem, might be required. Instead of being there as formerly, and in greater abundance, it is in the vaults of individuals. We believe at this moment the aggregate of coal in the yards and private vaults, will exceed the winter's consumption—especially if the winter continues as favorable as it has commenced.

Some have been alarmed because the coal mines have been alleged to be in a few hands who have it in their power to perpetuate a monopoly. A very little knowledge of our country would satisfy them that a company might as well monopolize the land as the coal. As our correspondent says, new mines are constantly making their appearance; and the positive indications of others are abundantly sufficient to quiet all apprehensions from monopoly. In no one thing has Providence been more bountiful to the United States, than in the article of coal. We may as well alarm ourselves at combinations to monopolize water or air. If our members of Congress, who are so distressed about the poor, will substitute for their repeal bill a bill for the appropriation of a sum equal to what the debate will cost, if it is entered upon—for the purpose of getting coal, to be sold to the poor at a fair price, they will manifest more sense, without diminishing at all the claims for our confidence in their sincerity.

The idea of those who would repeal the coal duty, to help relieve us from the admitted evils of our surplus revenue, will pardon us if we find their proposed remedy bordering on the ludicrous, inasmuch as the revenue from that source has not, in years past. averaged forty thousand dollars per annum!

If a proposition should be made to empty one of our lakes with ladels, it would not be more ridiculous. The time expended by Congress in hearing a dozen long-winded speeches, calculating the ordinary per diem cost, will operate much more effectually in this reduction, and would indeed afford the only argument we have ever heard in favor of the everlasting speeches, fashionable in the national school of rhetoric at Washington.

We will sum up what we have to say. Let the consumers of coal, eschew all petitions, keep up their courage, and be of good cheer, exercise rigid economy in the use of coal this winter, and we have no doubt but that the coming spring, the monopolists of coal will be sufficiently punished by a surplus that must remain a burthen to them until another season. The report on the Morris Canal, published in a former number, a document made up with great care, affords us the cheering information that by means of their canal, anthracite coal may be afforded for $3 66 per ton, and bituminous coal at $4 56—delivered in the city of New-York. As sure as cause and effect follow each other, the price must be soon reduced so as to afford to those engaged in it no more than a bare reasonable profit.

From the Journal of the American Institute we take the following article on an interesting subject.

The following extracts from a correspondence between Mr. Durant, of Jersey City, and a well known friend of domestic industry, has been obligingly furnished us for publication. We think it will particularly interest our silk-growing readers.

NEW-YORK, Nov. 28, 1836.

SIR,—You will recollect suggesting to me last summer, that you was engaged in experiments to produce two or more crops of silk worms in one season. If this could be effected, it is evident the quantity of silk might be greatly augmented in our country. It is not necessary to dwell on the importance of experiments for this purpose, when we know that fifteen or twenty millions of dollars of our hard earnings are every year drained off into foreign countries, for silks which we consume. Fifty thousand bushels of wheat, say one hundred thousand dollars value, is sufficient to put our "*let alone*," or "*free trade*" advocates almost into convulsions, while their nerves are as calm as "a summer's sea" under a full knowledge that more than one hundred and fifty thousand times that amount in silk was imported last year.—But not to dwell on the absurdities of this misnomer, free trade, (which I trust our farmers, who are intended to be entrapped, will perfectly understand,) I will proceed directly to my object, which is to ask from you a detailed statement of your experiments the last season, in producing two or more crops of the silk worm.

Experiments for a similar purpose are making in France. The eggs have been kept from hatching in ice houses, until the time when the hatching process is to be commenced. Experiments made by keeping the eggs in a cellar, where the variation of temperature was from six to nine and a half degrees, were unsuccessful, being, as expressed, too great to keep the living principle dormant.

I am one who fully believe that we are, in a few years, to go ahead of all other countries in producing this commodity—a commodity which must be invaluable, in helping to a favorable balance in trade, as, like specie, it will exchange in any market in the world. Let the ingenuity and tact of our country be brought to bear on its production, and there can be no mistake. But our silk culturists should have early and accurate details of all important experiments made by each other.

Yours, respectfully.

MR. CHARLES F. DURANT.

JERSEY CITY, Nov. 30, 1836.

SIR,—Your letter, soliciting a detailed statement of my experiments the past season to produce two or more crops of the silk worm, is before me.

I agree with you in the opinion therein expressed, that "the silk culturists should have early and accurate informatian of all important experiments made by each other," though I doubt whether much benefit is derived from a publication of the crude essays and mere approximation to some desirable result in physical science. Such is the state of the experiments to which you allude; with the object only partially accomplished, I have sanguine hopes of ultimate success: and yet I fear it would tire your own and readers' patience, to hear a recital of all the reasons that support these hopes, or the causes which have operated to prevent the success of the entire series of experiments

The desired object, as I remarked to you, was a succession of worms, from the first opening of the leaf in spring until it can no longer afford that nourishing matter so essential to the life and production of the worm. This, in the latitude of 40°, would embrace a period of about five months, say from May to October, and would permit nearly four successive crops to occupy the same shelves, allowing forty two days for the feeding or first state of existence, which, I think, will be the average duration, with the temperature of this latitude.

Seven successive crops, in this period of time, may occupy the same shelves, if for the first twenty days in the existence of each, they could be fed on a shelf specially appropriated for that purpose. This, I think, should always be done; for, at this age, they do not occupy one hundredth part of the space which they require when winding, and consequently, there must result by this mode, a great saving of room and labor to feed them.

By this method, I fed two crops on one frame the present season. They were both from eggs of 1835. The eggs of the first crop were kept uncovered the entire season, where they were deposited by the moth, at my residence in this place, exposed to York Bay and the sea air—the sash of one window lowered three inches, to admit at all times the temperature of the season; and, notwithstanding the extreme cold of last winter, every fecundated egg was hatched from the 7th to the 9th of May, before trees in the open ground had put forth leaves.

I had anticipated this result, and in autumn covered with sea-weed and bass matting a nursery of young trees in the garden. On these the leaves began to appear as early as the 17th of April, and by the 9th of May furnished abundant food for the crop, until they could be supplied from trees in the open grounds. They completed the first state of existence from the 17th to the 23d of June. The cocoons were large, and, with a few exceptions, perfectly formed. With a mere theoretical knowledge of the process, I reeled them without difficulty; and some sewing silk, which I made from the same stock, was judged by connoisseurs equal to the best imported from Italy. You saw specimens of the whole at the last Fair of the Institute, and I think you will agree with me, that the result of the experiment will warrant the assertion, that *silk worm eggs can be preserved uninjured through our coldest winters, and silk of a good quality produced without artificial heat.*

The second crop was from eggs of the same year as the first, and produced by *retarding* the process of nature. With this view, the whole experiment was planned and commenced as far back as the second state of existence, by enclosing the cocoons in a box, to shut out the light. They were then removed to the cellar, where the temperature was lower than the room in which they passed the first state. This kept the chrysalis back seven days longer than those in the feeding room. As soon as they attained the winged or perfect state, I separated the moths, to prevent copulation, till the end of six days, which is a further gain of four days. Most of the eggs were fecundated, as very few were deposited previous to copulation. The box was kept closed, and removed to the room previously described, which exposed the eggs to the same temperature and treatment as those for the first, except the exclusion of light, and removed to the cellar again in March, to prevent the temperature rising above 55 Fahrenheit. From the 15th of May, I opened the box a few minutes each day, to observe with a microscope the progress of the embryo worms, which had advanced so far on the 21st May, that I feared injury from the humid atmosphere of the cellar, and removed them to the feeding room. On the morning of the 30th, a few worms had escaped from the eggs; and, judging it imprudent to keep them longer in embryo, I placed them on a sheet of paper, exposed to the direct solar rays through the window. Every fecundated egg passed to the first state by the evening of the same day. They were in number about four thousand, apparently healthy and vigorous.

The first crop was now twenty-two days old, and occupying the frame on which they continued to be fed, until the winding of the cocoons, which was accomplished by the 21st of June, when they were removed, to give place to the second crop, which were now twenty-two days old, and so small, that up to this time, the four thousand were fed on two sheets of paper. On the 15th of July, most of the second crop had finished winding. The cocoons were generally small and imperfect, though a few among them were nearly equal in size and perfection to the first.

The probable cause of this deficiency in size and quality of the cocoons, can be traced to so many parts of the experiment, that a description of all would require more time than I can at present devote. The dampness of the cellar probably contributed largely, as *water*, in all its forms, whether in bulk, dew, or vapor, is a *bane* to the silk worm. In some instances, protracted rains obliged me to pick leaves in a wet state, and, though I dried them between cloths, probably particles of water still adhered to them. During the latter part of their feeding, the hydrometer indicated a humid atmosphere, and it was at times so cold, that Fahrenheit fell below 60°—an injurious effect, which I could not counteract, as I had resolved to dispense with artificial heat. That these were the most immediate causes, I infer from the fact, that a few of the cocoons were large and perfectly formed.

You remark, that "experiments made in France, by keeping the eggs in a cellar where the variation of temperature was from six to nine and a half degrees, were unsuccessful, being, as expressed, 'too high to keep the living principle dormant.'" In the degrees of temperature, I suppose you allude to the centigrade scale, as modern French chemists have wisely adopted the Celsius thermometer, by which pure water, under a barometrical pressure of thirty inches, will freeze at zero and boil at 100°. By this scale 9.5 plus corresponds to 49.2 of Fahrenheit, an average temperature *below* that of my cellar, which proves that the French experiments did not fail from the causes stated by them, but rather by commencing *too late.* To produce a second crop by this process, we must commence as far back as the moth of a previous year.

My experiments for a third, and succeeding crops, were to *hasten the process of nature*, by producing an artificial winter.—For this purpose, I placed the eggs of the first crop, as soon as deposited by the moth, in an ice-house, and, at the end of sixteen days, submitted them to the action of solar heat, without the desired effect.

Some eggs, after remaining six days where deposited by the moth, I submitted to a winter of plus 3° Fanrenheit, by mixing sulphate of soda five parts, and diluted sulphuric acid four parts; others to a temperature of plus 10°, by muriate of ammonia five, nitrate of potash five, and water sixteen parts, and then exposed them to the solar heat. Though these attempts proved abortive, I still think that nature may be supplied with an *artificial winter*, and eggs hatched the same month in which they are deposited by the moth.

When such a desirable result is accomplished, who will fix limits to the immense wealth which the silk worm will create in this country? Silk, from remote times, has been a source of immense wealth to Asia. Its cultivation has kept pace with the intelligence and riches of Europe.—Our country has all the essential advantages of climate for its production, with a numerous and intelligent population, who cannot fail to see the advantages of appropriating to their use the valuable labor and productions of a worm, which can create a greater revolution in political economy, with such simple means as nature ever employs to work good results, than did Gaul's great emperor make in political existence with the sword, fire, and concomitant horrors of a continental war.

Yours, &c.,
C. F. Durant.

M. Thenard has resigned the Professorship of Chemistry at the Ecole Polytechnique, and it is expected that he will be succeeded by M. Dumas.

Agriculture, &c.

From the New-York Farmer.

Life in Illinoise; Agriculture, &c.—The following communication of E. R. W., contains information not only interesting, but highly important, to thousands of our citizens who are struggling with adversity and want. It points out a path by which the man of small means and entire dependance may become, in a good degree, *independant*, with a farm, house, and fields of grain of his own.

It would be no less surprising to us, than it is to our correspondent, that so few of our citizens of small means avail themselves of the advantages of the fertile West, if we were not aware of the lack of correct information possessed by them, of the best mode of getting there, and then of living until they can *prepare* to live. There is, in truth, very little known here, of the *detail* of the process of becoming *farmers* in a new country—and it is of course viewed as a herculean task. This difficulty, however, might be easily obviated, if some intelligent western farmer, who has formerly been a resident of this city, and therefore familiar with our mode of living, would publish a small work, showing the condition, prospects, and advantages of the country, together with judicious directions how to remove a family in the most comfortable and economical manner; advising what necessaries of life ought to be carried, and what can be obtained there to advantage,—and pointing out the best manner of commencing operations when there.

Such a work, by a judicious hand, could not fail to be highly useful; and we doubt not our correspondent, E. R. W., is a suitable person to prepare it. If he will do so, we will give it all the publicity in our power.

We shall at least hold him to his *intimation* at the close of his communication; hope soon to hear from him again.

For the New-York Farmer.

SPRINGFIELD, Sangamon Co., Ill.

MESSRS. EDITORS,—Having had some opportunity, from travel and residence in this country for a year or two past, to become a little acquainted with the state of things in these Western regions, I thought I would add to my business concern a few observations for your paper. They may be of some service to those, whom high prices and hard time at the East have induced to think of other countries, where labor is more abundant and better compensated.

It has often struck me as somewhat a matter of astonishment, that among the multitudes who earn a scanty and precarious living by their labor in the eastern cities, so few of them can make up their minds to remove to these countries, where, with no greater exertions, they could soon acquire every necessary comfort and convenience of life. Does the mere facts of our having been born and brought up in the city of New-York, and formed local attachments there, opperate so powerfully that we would rather remain there in poverty and want, than to live in another State in plenty and comfort? Let me take the case of a very numerous class in the eastern cities, those females who sew for their living. There are some few of this class who receive an adequate compensation for their labor, but the number of such is small. The great majority of them do not receive more than half enough to support them comfortably. The case of widows with small children is particularly hard. Out of the miserable pittance they receive for their labor, the best they can do is to protract a joyless existence, half fed, and half clothed; —their children stunted in body for want of proper and sufficient food, and degraded in mind through want of that mental and moral training which it is impossible for the parent to provide. How is it possible for those who receive from 12½ to 25 cents for making a shirt, vest, or pants., even of the commonest kind, to maintain themselves decently, much less support and educate two or three children. Even if they received 50 cents for making such articles, (which, however, is more than hundreds of them do receive,) it would be totally inadequate for their wants, under the present prices of things. In this country, things are very different. There is, throughout the whole country, a want of laborers, in almost every branch of business. And, of course, wages are high. Those seamstresses, for instance, who cannot procure enough work at 50 cents at the east, would here have the same kind of work *urged* on them, at most seasons of the year, for 75 cents to $1 00.

There is another branch of business in which many females might find profitable employment in this country, that is, as domestics in private families. The domestic here is not exactly the same as at the east. She is not a *servant* girl—she is the *help* of the housekeeper. It is not by any means a disreputable employment. Such persons readily command from $1 50 cts. to $2 a week; in public houses something more. Most kinds of journeymen's work are done by the piece in this country, and the prices are high enough to enable a good active hand, in almost *any* business, to earn from 10 to $18 a week. Perhaps the general rate is about $12. Common laborers are worth $1 a day—good farm hands, 15 to $18 a month, and scarcely to be had at those rates. In regard to the expenses of living in this town, an idea may be gathered from the following statement of prices. Beef and pork are 3 to 5 cents a pound. Vegetables of all kinds very abundant and cheap in their season, but usually scarce and high during winter. Potatoes 25 cents a bushel. Corn meal 50 cents. Flour $11 a barrel. Butter (in summer) 12½ cents per lb., this winter it commands from 20 to 25 cents. Flour is usually worth from 3½ to 5 dollars a barrel, but the wheat crop has partially failed for 2 or 3 years past, and consequently the article is high.—Fowls are worth from 8 to 12½ cents.—Families who are provident, and lay up their stores at the right season of the year, can live here moderately. A cow can be kept during summer without any expense, as they get their living on the praries, and thrive on the abundant pasture they afford. To winter a cow would cost about 5 or 6 dollars, and for this small yearly expense, a family may have an abundant supply of milk.

One great advantage an enterprising family enjoys here, is the facility of getting a dwelling house of their own. A lot may be had for 50 or 100 dollars, and a house, small, but sufficient for a contented family, may be put up for two or three hundred.—To do this is but the work of a year or two, and the man becomes a landholder,—his dignity is considerably heigntened thereby. He feels an interest at stake in the prosperity of the town, and is far more likely to apply himself diligently to business, than while he had no such inducements to influence him.

It may be asked, will these advantages continue long? I think a short consideration of the causes which give rise to them, will show that they are like to continue for many years. The farming interest is the principle one in this State, and is eminently prosperous. The land is fertile, the climate propitious, and such a thing as a general failure of crops, I believe, is unknown. From the ease with which new farms can made frobem the prarie, and from the immense extent of prarie land now lying uncultivated, the prosperity of the farmer must long continue as great as at present. For he will have no inducement to settle in any neighborhood where he will not be well paid for his labor, when by going a little further, he can buy his land cheaper and sell his produce for more. As long as there is vacant land in different parts of this State and in adjoining States, the farming business will continue prosperous. It is the farmers who chiefly support the store keepers and mechanics of the towns, and of course the prosperity of the one will insure that of the other classes. For the same reasons, merchants or mechanics will have no cause for crowding into any place in such numbers as to overrun the business, when there are new towns continually springing up, where their commodities and labor will be in greater demand. Many persons feel an unwillingness to emigrate to the West, under the apprehension that a sort of semi barbarous state of society exists there—that the people are rough and uncouth in their manners, and without education and refinement. On this subject, I would remark, that most of the inhabitants of this State, are emigrants from the older States of the east and south, who brought with them all the education and refinement they possessed there. Enterprise and energy eminently characterise them as a body.—It was those traits of character that led them to seek this new country. In this town, you may go into a church on Sunday, and see an assembly as genteel in appearance, and as attentive and orderly in their deportment, as a New-York congregation. And you may also hear as good a sermon. There is a much larger proportion of children in Sunday schools in this town, than in the city of New-York; and most of the benevolent enterprises of the day are patronized with a good degree of liberality.—The people in their manners are usually sociable and pleasing. Strangers are welcomed with cordiality, and far less suspicion and distrust manifested than in the older countries. Upon the whole, it is only necessary to become acquainted with the character of the people here to admire it.

At some future time, I shall probably enlarge on some of these topics, and also communicate some information respecting farming in this country.

E. R. W.

From the New-York Farmer.

No. I.

GENERAL SKETCHES.—NEW-ENGLAND AGRICULTURE.

By H. C.

I propose to sketch some very general views of the Agriculture of the Northern and Western parts of the country, which I have had recently the gratification of visiting. With much of New-England, I have been long acquainted; and this season has afforded me the opportunity of seeing some of the Western parts of New-York, the North-Western and central parts of Pennsylvania, and parts of Michigan, and Ohio, not under all the advantages, which I could have desired ; but with as many as usually fall to the lot of travellers in their transit over the country, by the usual public conveyances.

There is a strong impression prevailing, and not without plausible reasons, that the Agriculture of New-England is on the decline ; I do not mean in respect to the character, but the extent of the cultivation. Much less land in proportion to the population is under cultivation than was under cultivation twenty years ago ; though in respect to the modes of cultivation, and the utensils employed, especially the plough, great improvements have been made. The amount of crops, from the same extent of land, has been greatly increased, and they are more carefully husbanded than formally. Yet it is a discreditable fact, that New-England is dependant upon other parts of the country for the common necessaries of life ; and has little to export, excepting perhaps a small amount of beef; and the amount of this article, which New-England exports, does not exceed that, which is brought here alive from other parts of the country.

Maine, with an admirable wheat soil in many parts, grows comparatively little ; and wheat flouer with the Rochester, N. Y. brand upon it, is to be found far in the interior, a hundred miles, it may be, from the sea coast. Little Indian corn is produced, and small quantities of rye. Oats are raised in considerable amount ; but not more than is demanded for home consumption. Excellent patatoes are produced ; and of these as well as of hay some are sent to the capital of New-England, and there is an occasional shipment to the Southern cities. A good many cattle are driven from Maine to Brighton and likewise into the British provinces ; and, as grass fed cattle, they are of a good description ; but agriculture in Maine, though the State, notwithstanding its climate, possesses in this respect great advantages, cannot be set down as a primary interest of the State. The fisheries, and especially the lumber business, are the great objects of pursuit.

New-Hampshire is even in this matter, behind Maine, and this from the natural condition of the soil. To a stranger unacquainted with the hardihood and spirit of the people, it is matter of difficult solution how the inhabitants of this State are sustained. There are it is true, some sunny spots. Some extremely well managed and beautiful farms are to be met with in Greenland near Portsmouth. There is some good cultivation near Exeter and in Salisbury on the Merrimack. There is excellent, I may justly call it, pattern farming among the Shakers at Canterbury and Endfield, where all that persevering industry and untiring labor, applied with skill and judgment can accomplish, seems to have been done. There is excellent farming in that part of New-Hampshire, which lies upon Connecticut river; at Walpole, Charlestown, Claremont, Lebanon, Haverhill, and Lancaster. But a considerable portion of this State is doomed to perpetual unfruitfulness ; is covered with mountains of granite, which defy all cultivation and subject to late vegetation in the Spring and early Autumnal frosts, discouraging to the enterprize and often fatal to the labors of the husbandman. Indian Corn is in most parts of the State a precarious crop. Wheat, in those parts of the State where it is at all cultivated, has for three or four years, been much cut off by the grain worm. Rye is in no part of New-England a large crop, and this too, has suffered severely from the same pest. Some small amount of cattle are raised, but the severity and length of the winters make this an expensive process.—On some of the Connecticut river lands the crops of oats have been abundant, in some instances rising to ninety bushels to the acre ; but nothing like this is to be generally calculated upon and hardly an approach to the necessary supply of bread stuff is at any time produced in the State. There are some valuable intervale lands near the head waters of the Saco, which present favorable examples of good cultivation ; but they are quite limited. Considerable portions of the State are well adapted to the growth of wool ; and at present New-Hampshire may boast of some as well managed flocks ; and the production of some as fine wool as any part of the world can furnish.

Vermont is, undoubtedly, the best as it is the most exclusively Agricultural State in New-England. The Indian corn crop in Vermont, is, however, a very precarious crop on account of the climate ; and it produces at present, comparatively little wheat. Wheat was formerly cultivated in Vermont with much success, but for various reasons the cultivation for a few years past has fallen off. Wool is now the great object of attention, and the sheep husbandry is pursued with eminent skill and advantage. Vermont likewise may boast of some of the finest dairies in the country ; and a large amount of butter and cheese are sent out of the State. The town of Barnet, on the banks of the Connecticut, has been long and deservedly celebrated for its careful cultivation and excellent dairy produce. The Agriculture of the towns on the Western side of the mountains, and on the lake shore is very superior.

The Agriculture of Massachusetts, is, with few exceptions, in a comparatively humble state. Of bread stuff, it produces but a small part of its necessary supply. Of wheat, a very small amount is raised. Of rye, much more than of wheat, but the amount is not large. Indian corn is more largely cultivated, but the farmers, who produce more than five hundred bushels per year, are a small number. Barley is cultivated to some extent in some parts of the State ; in others the cultivation has been abandoned on account of the grain worm, believed to be the same by which the wheat has been cut off, but this fact is not as yet ascertained. Oats are a small crop, and great quantities of horse feed, oats, corn, and hay are imported into the sea ports and their vicinity, a considerable amount of broom corn is raised ; and the brush is manufactured and sent into different parts of the Union ; and the hops grown in this State Vermont, and New-Hampshire, form in some years a notable article for exportation. Considerable beef is fattened in Massachusets ; and Worcester and Berkshire counties especially, are extensively engaged in the business of dairying. A large amount of wool, and some of the finest qualities are grown in this State. The culture of the mulberry and the feeding of silkworms are begining to be objects of attention. Some hemp and tobacco are raised, but the cultivation is quite limited. Massachusetts however, though highly spirited, enterprising, and liberal in her agricultural improvements by means of well managed societies, liberal donations from the State, and the disinterested efforts of many eminent individuals, has comparatively little agricultural wealth ; the farms are generally small, and in many cases cultivated as an appendage to a trade, profession, or some commercial pursuit.

Rhode Island is essentially a manufacturing and commercial community. With the exception of a few favored spots, the soil is sterile and hard of cultivation. The Island itself, from which the State derives its name is singularly beautiful in its position and aspect, in most cases, of a strong and productive soil, and having singular advantages for obtaing manure on account of its proximity to the sea. Much sea grass, rock weed, and kelp are obtained, and in some places fish, the munhaden, which are taken in great abundance, are freely and successfully used. With the exception however, of the product of potatoes, and especially of onions, which it grows to a large extent, the State has no agricultural produce to export ; and is almost wholly dependant on other places for its supply of bread.

Connecticut likewise is a manufacturing State ; and agriculture scarcely exists as an exclusive profession. Some parts of Connecticut have been long remarked for the extensive cultivation of Onions, and a considerable amount of wool and tobacco is raised in the State, but its agricultural products are by no means equal to its wants. Connecticut has some large, and is full of small, manufacturing establishments ; and no part of the United States has a greater appearance of neatness, comfort, and good economy. Its manufactured articles are found in all parts of the Union.

It is sometimes asked how, with a soil and climate not very propitious, the Yankees live, and live in comfort ; and if they do not acquire large and overgrown fortunes, yet present more than a fair proportion of examples of humble competence, and as much independence as usually falls to the human condition ? The answer may be comprehended in three words, industry, enterprise, and frugality. Climate and soil may be against them, but the condition in which Providence has thrown them, contributes to nourish a spirit of self-dependance, and to form a hardihood of character which is the foundation of their success. Their enterprise carries them into all parts of the country, and the world ; and if the usual traits of the Yankee character go with them, their enterprise seldom disappoint their calculations.

I trust it was not mere prejudice, for of that I should feel quite ashamed ; that in travelling through the new parts of the country, I persuaded myself that I could, in most cases, point out a Yankee settlement or homestead, without inquiry. In several instances, where I attempted the experiment, the inquiry confirmed my conjectures. There was a certain air of carefulness about the house and out-buildings, which distinguished them from most others. I am far from thinking their ways are always best; and as it respects agriculture, they are far behind the Pennsylvania Farmers; but in the capacity of "getting along" on small means, and with honor, comfort, and independence, no people surpass them.

The Yankee too has an officiousness in other men's matters, which if it has its evils, as it is sometimes complained of, it is not without its advantages. He no sooner plants himself in any situation, than he has a "notion" that the community would be better for good roads, secure bridges, a school house, an academy, and a meeting house; and these matters, in general standing in pretty close connection, usually, though silently, announce, who presides over the municipality. The Yankees have a propensity too to have their houses painted, their yards neatly secured, their gates on the hinges and shut, and the pigs kept out of the hall and the front parlour.

This appearance of neatness, care, frugality, and thrift, indicates generally the residence of a Yankee settler; and leads us back to the circumstances under which such a character is usually formed.

With a hard and unpropitious soil, a severe climate, and a population which, if confined to its own resources, would press sorely upon its means of subsistence, he is compelled to labor and exertion, that he may live; obliged to gather up the fragments that remain, so that nothing shall be lost, he is trained in habits of extreme frugality; and his invention is continually toned and stimulated by the great spur of necessity, and a spirit of enterprise aroused and cherished, that he may increase his resources. When the Yankee emigrant carries these habits with him to his new place of residence among the fertile lands of the West, success and wealth are certain; but it too often happens, that when he finds himself in a situation where such constant and strenuous exertions are not required, and he discovers that even moderate exertion is most amply rewarded, far beyond his experience and even his imagination, the love of ease, almost an essential element in the human constitution, prevail over his early habits of industry; abundance begets extravagance and waste; he sinks into the negligent habits of those around him; and stops short in the very midst of improvement.

H. C.

January, 1837.

From the Farmers' Register.

OBSERVATIONS MADE DURING AN EXCURSION TO THE DISMAL SWAMP.

BY THE EDITOR.

The following article from the Farmers' Register, will be found highly interesting.

Whoever has heard any description, however slight and imperfect, of the great morass known by the name of the Dismal Swamp, must have been interested and impressed by the peculiar features and remarkable circumstances mentioned. Yet few persons have made any personal observation of, or paid much attention to these things, except those whose near residence, and early and long continued business and habits of life, have made them so familiar with the swamp, that they have lost, or perhaps never enjoyed, the freshness of feeling which novelty would have excited. Persons thus long acquainted with the ground, do not seem to think its circumstances very remarkable, and therefore do not offer their information to strangers. On the other hand strangers, who at least might learn the facts thus acquired by residents, do not even direct inquiries so as to draw them forth, because totally ignorant of their interest, and even existence. Few strangers would ever have been induced by curiosity to attempt the great labors necessary for even a slight examination; nor would any have probably seen more than some points on the outer margin, but for the great highways now opened through the swamp—the great canal, the road on its bank, from Norfolk to North Carolina, and the railway which dips into the northern extremity of the swamp. These passages have given to thousands a rapid passing glance at certain portions of the scenery: but in every other respect, these numerous passengers have added nothing to the scant information previously possessed by the public. No visiter has made the investigation of the peculiarities of this unknown land a main object—and still less has any person paid attention to the geological and agricultural aspects in which this region well deserves consideration. I am but little qualified, either by scientific acquirements, or by opportunity for personal investigation, to supply these deficiences. Still, in the absence of better digested and more accurate information, I will now offer such facts as were learned or observed, during a recent hurried visit to the Dismal Swamp, together with the speculations that these facts and observations suggested to my mind. Under circumstances so unfavorable for careful or full investigation, it is not probable that mistakes can be avoided. But I am willing to hazard being found in error, in the hope that the needed corrections may be furnished, and more full as well as correct information be given, by others better acquainted with the localities.

The part of the Dismal Swamp lying in Virginia, is about 25 miles from east to west, and about 20 from north to south—that is from near Suffolk to the Carolina line. The swamp stretches perhaps 20 miles more southward within North Carolina, but with much contracted width, and limits not well defined on maps, or by report. With such minor variations as will be mentioned hereafter, the whole of this extensive region is one great morass, or quagmire, except for the partial firmness caused by its cover of vegetables, and their matted roots. It would be naturally supposed that the swamp was much lower than all the surrounding lands, and the general receptacle of the numerous streams flowing from them. But, on the contrary, the swamp is higher than nearly all the firm and dry lands that encompass it and the interior of the swamp is generally higher than the outer parts. The only exception to both these statements is found on the western side, where for some distance say 12 or 15 miles, the streams flow from higher land into the swamp, and supply all its abundant and overflowing water. But towards the north, east and south, the waters flow from the swamp to different rivers, and give abundant evidence, by their courses and their rate of descent, of the swamp being higher than the surrounding drier and firm ground. I do not mean that, at the junction of the two, the swampy ground is highest. On the contrary, it is generally bordered by a flat ridge of land perceptibly, though very little higher: but this ridge slopes downward on all sides except the west, and soon descends to a level greatly below the general surface of the swamp. The accurately levelled profile of the railway from Portsmouth to Suffolk, and of the Dismal Swamp Canal, and the Land Company's Canal, all furnish still stronger and more accurate evidences of the general fact stated. The railway passes through about 4 miles of the northern extremity of the swamp—and is there higher than when on the firm land some miles away on either side; and is 6 to 7 feet higher than on firm and dry ground near to Suffolk and to Portsmouth. The central part of the swamp is 5 or 6 feet above the middle section of the Dismal Swamp Canal, which section is some 13 feet above the rivers into which it empties at both ends—and these rivers are not more than 5 or 6 feet below much of the dry but low-lying land of this generally flat country. If it could be supposed that the streams, which flow into the western part of the present swamp, had for ages been bringing, not water, but mire almost as fluid as water, the spreading of that mire over the basin of firm subsoil, which now underlies the swamp, would have caused nearly such slopes, and form of the surface, as now exist—descending from the issuing streams on the west to the centre of the area, and thence descending towards every other part of the circumference. The surrounding slightly elevated rim, and various small and narrow ridges of poor and firm land, which rise like low islands in various places above the surface of the swamp, and the gradually descending slopes from such summits under the adjacent swamp soil, all give countenance to the supposition that the swamp is a comparatively recent formation or deposite on the lower foundation.

But whence came this enormous deposite of 25 miles in width, and in many parts 10 to 15 feet in thickness? The flood of liquid mire, which was supposed above for the purpose of illustration, of course was impossible. Neither could the deposite have been made by the alluvium of the streams—because they bring down very little, and because the soil of the swamp is not such as would be formed by such a cause. It is not principally *earthy*—as are all alluvial deposites, of every grade of fertility and consistence—but *vegetable*—and this peculiar and regular constitution may point out the origin, and explain the growth, of this vast body of high morass.

Before seeing the Dismal Swamp, and making some examination of its different soils, I had always considered that no true peat soil existed in Virginia—and that it could not form, nor remain long, if already formed, owing to the warmth and length of our summers, and the consequent ease with which vegetable matters runs into fermentation and putrefaction. I have several times incidentally expressed th: opinion in different publications, and t: last time, but a few days before visiting th region. (Far. Reg. p. 504 vol. IV.) still hold this opinion,as to all common lan: and localities, and in circumstances simil: to those in which most peat mosses exi in Europe. But the Dismal Swamp i certainly a peat soil, or soil formed almo exclusively of vegetable matter, though th kinds of plants, and the manner of the fo mation, may differ much from European peat. In Scotland, the climate is so damp, and the summers are so short and cool, that in many situations, the natural vegetation of one year, if left undisturbed, will not rot during the next; and it remains, either wholly or principally, adding to the height of the surface soil, without giving it any increase of fertility. If water flows into such land, it is absorbed by the vegetable matter, and acts to give greater vigor to growing mosses, and other aquatic plants, and still more to retard their putrefaction when dead. Thus, in the situations most favorable to the formation, that is the coldest and most moist, (witkout being overflowed by water,) the peat grows to many feet in depth—and even on pasture lands, or arable left untilled, the surface becomes peaty or moory, having an excess of vegetable matter, but in that undecomposed state which makes a soil less, instead of more productive under tillage. Hence, the peats of Britian, whether of 6 inches or 6 yards deep, are barren, or at least tending to make a soil unproductive: and when brought under tillage, besides drainage, these soils require operations to decompose their excess of vegetable matter, to fit them for producing grain crops. For this purpose, the dry and shallow peats are pared and burnt—and the deep peats are limed, dug up and stirred, and even manured with dung, to quicken fermentation. Now no such formation of soil can take place in such a climate as ours, because the summer's heat and continuance are more than sufficient, under ordinary circumstances, to ferment all the vegetable matter that the preceding year had produced. Paring and burning the soil, which is a common and excellent part of preparatory tillage in England, on any common highland soils that have been left in pasture, could not be effected in Virginia—and if it could, would be injurious, by destroying the vegetable matter, which, if not burnt, would be decomposed soon enough.

It is true that we have soils as entirely of vegetable formation as many of the peats of Britain. Such are all the fresh water tide marshes, parts of many swamps and the whole of the great Dismal Swamp But the difference I take to be this. Th vegetable soils, being kept constantly eithe covered by, or saturated with water, ar kept from entirely rotting, and are increased in thickness by annual accessions o vegetables. But though not enough rotte to lose much of the bulk, they are enoug so to form manure: and these lands nee only perfect draining to be at once highl fertile. Then indeed the soil begins to ro too rapidly; and if kept dry, will continue to rot as long as a great excess of vegeta-le matter remains. Hence the opinion hich I have long maintained by reasoning, and to my very great loss have seen roved in practice, that our fresh water de marshes, if diked and drained, will ro way, as deep as they are made dry enough or tillage.

The soils of the Dismal Swamp ar much nearer to the peat of Europe than ny other that I have observed: indeed the pper layers of the juniper lands, to the lepth of some inches, may be formed of the same mosses. But below the living roots, though still it is all of vegetable formation, the plants are so rotted they are simply a soft black mud. The general cover of all this kind of ground, under the shelter of the large trees, shrubs, or reeds, is a thick carpet of tender mossy plants, which rise to 4 or 5 inches high, and which are taken up by the hand so easily, that they seem to have scarcely any hold of the ground. Where these grow, the surface is as wet as water can make it, if not covered an inch or two. This, the least solid of the whole, is the soil most favorable to the juniper trees—which stand, barely supported by the long tap root, in these quaking bogs of "surf" or "sponge," as this earth is called by the laborers.

The peat of Europe, or at least certain qualities of it, is good fuel: and I have but lately learned from a very intelligent gentlemen who resided in Boston during the late war with England, that the peat of Massachusetts was then used for fuel, in consequence of the scarcity and high price of coal. In an article in a New England paper which has since reached me, I see the use of the same fuel recommended at this time. The vegetable soil of the Dismal Swamp, (like that of our tide marshed,) when dry, is highly combustible—and being principally of vegetable origin, would leave but little ashes, or earthly residue. But on account of being so well rotted, it would probably make but poor fuel.

The immense and continually growing fields of peat, which are spread over the earth in cold countries, are probably the materials for future beds of coal, after being buried deep in the earth by some of the convulsions of Nature which have so often changed the face of the globe. When compressed by the weight of mountains to the density of stone, the peat of the most open texture, or the most rotted and worthless, may become a coal valuable for fuel I do not believe that geologists admit this theory of the formation of coal: but i seems to me a more plusible origin than from other than peaty matter.

It is not difficult to conceive how the soi of the Dismal Swamp should have been growing in thickness, and spreading over more extent of surface; and that it shal continue to do both, if the existing causes are suffered to operate. The stream which flow from the western highland ar sucked up by the earth, which from the nature of its composition, absorbs and hold water like a sponge: and it is thus fill or very slightly overflowed by water, a yet no part covered deeply, because th superfluous water finds or forms channels to escape into rivers, which head at various adjacent and much lower points. This continual wetness, and the extreme richness of the soil, combine to produce a prodigious growth of aquatic plants, of various kinds, and of all sizes, from the diminutive moss to the gigantic cypress. The wet soil causes more evaporation than would take place from water alone—and evaporation causes cold—and the heat of the sun is in great measure excluded by the thick cover of trees. Hence, a coldness of the earth, suitable to a far more northern climate is produced, and maintained. The leaves and moss, and other vegetable matters that fall, are but partially decomposed, and thus add annually to the thickness of the soil.

As might be inferred from the operation of the causes named, but little of the surface of tho swamp is many inches either above or below the water, though the level of the swamp is in some places five feet lower than in others, and perhaps much more. Standing, but shallow water tends to raise the earth to its surface: and if, by drainage, drought, or any other circumstance, a part of the land should be so much higher than the water as to become quite dry, the first accidental fire would reduce it to a lower level.

It may well be supposed, from the foregoing general description, that the swamp furnishes very difficult ground to travel upon. But I had no adequate conception of the magnitude of the difficulties before personally making the trial. In addition to the general wetness of the earth—the most dry being a mire, from sinking in which the traveller is guarded only by the mat of living roots—the undergrowth of evergreen shrubs, and vines or reeds, cause still greater impediments to his progress.

It is difficult to imagine a sufficient motive to have induced any man to penetrate a mile into the swamp, before paths were cut and made solid enough, for the purpose of getting the timber. And these obstacles long prevented any person from going far from the borders. It was as late as some twenty years before the revolutionary war, that the lake, which is the most beautiful and magnificent feature of the region, was first discovered by a hunter, named Drummond, who had lost his way, and therefore wandered miles through this "Slough of Despond." He could not have reached the lake in the shortest line from the main land in less than three miles—and probably it was many more. What must have been he sensations of a man, so lost in such a gloomy labyrinth, when he came suddenly upon the border of this splendid sheet of wide water! Lake Drummond is nearly oval—seven miles long, and more than five wide. It has no beach, the thick and tall forest being at and in its margin. The water is generally even with, and often gently overflowing its banks—and the banks (if such they may be called) sink perpendicularly, so that whether the waters of the lake are higher or lower than is usual, it makes no difference in the breadth of the water, and but little difference in the general appearance of the shores. There may be a difference between the highest and lowest water, from the opposite effects of the wettest and dryest seasons, of three or four feet—and there would not be as much, perhaps, but for the artificial reducing of the water, in the dryest seasons, to supply the great canal for the purposes of navigation.

This beautiful lake—and which no doubt seems the more beautiful on account of the gloomy scenery passed to reach its borders; is so much like belonging to fairy land, that it is not strange that it should have been connected with sundry popular delusions.—Some persons at first had affirmed, and others believed, that the lake had no bottom, or that it communicated with the neighboring ocean by a subterraneous passage.—There was but slender ground for this delusion, as the lake is quite shallow, and the level of the bottom very regular. Mr. Mills Riddick sen. of Suffolk, told me that he assisted Commodore Barron in sounding across the lake. The depth about the middle, where greatest, was 15 feet. The bottom is of mud like the swamp, but sometimes a pure white sand colors the mud a foot, or perhaps more, in depth.

About the time that the lake was discovered, another event took place which produced ultimately the present proprietary state, and peculiar business and management of the swamp. This was the "taking up" by Gen. Washington, and a few other gentlemen acting upon his suggestion, of all the then unappropriated lands of the Dismal Swamp in Virginia. Before that time no persons had taken possession (by course of law,) of any lands, but those at and near the margin of the high land, because the interior lands were not deemed worth paying the lowest taxes on. Gen. Washington whose business as a land surveyor gave him many opportunities of acquiring possession of valuable public lands, and who obtained much of his wealth in that manner—saw a rich farm on the border, which had been rendered productive by being drained. Thinking that the whole swamp was equally available for cultivation, he formed the association above named, bought the farm in question, and took up all the remaining State lands, estimated then at 40,000 acres, but which are now supposed to be much more. They excluded the lake from their patent, though it was completely surrounded by their land, considering it not worth paying a tax for.—By this ill judged economy the company has since suffered. When the Dismal Swamp Canal Company was afterwards chartered, they were granted by the commonwealth the exclusive use of the water of Lake Drummond to feed their canal—and this grant serves to shackle the efforts of the Land Company, (since also incorporated,) and would prevent the adoption of any general plan for draining. As is usually the case with corporations that come in contact, they seem more fond of squabbling with and opposing each other, than of uniting in any general procedure for the good of both.

The only object of the Land Company at first were agricultural—and they commence, and for years carried on tillage on their farm and drainage to extend it. For the latter purpose, they dug a canal of some miles in length from the high land to the lake, which is still large enough for the passage of boats. This is now known as the "Washington Ditch." But whether their plans were judicious, or had the defects inherent in such joint stock companies, their labor and capital yielded little profit. The war soon followed, and before its end half their slaves went off to the enemy, as was generally the case in places so near their encampment.—After peace was made, the work still went on badly, until the Company undertook the getting of juniper shingles. This business, which was not at first counted on, has since become their sole pursuit, and immensely profitable, and must continue profitable until the timber is mostly consumed, which indeed is rapidly approaching completion. The shares into which the stock was originally divided, have increased in price from $3000 each to more than $15,000; and the dividends made are large even for the highest price. But unlike most other stocks, this is diminishing in real value, with every year's waste of timber—and unless the land itself is made of value by drainage, the stock of this rich company will, at some future time, lose its market value, as rapidly and to many owners as unexpedly, as it was formerly acquired.

What I have stated of the Land Company, was learned from gentlemen who have been long and well acquainted with the general affairs of the company; but as their knowledge was not official, and rested on memory, facts may have been incorrectly stated as to dates, amounts, or other minor circumstances.

It had long been my intention to visit these scenes—but it was only very lately that a first and hasty visit was made, which has enabled me to judge of and to describe them, as far as will here appear.

On Nov. 17th, I reached Suffolk by way of the railway, from Portsmouth, which passes through a few miles of the swamp at its northern extremity, and thus permitted a first slight glance. It seems unfortunate that the first approach to the swamp, of almost every person hereafter, will be on the rapidly moving railway train. The savage gloom of the face of nature is altogether unsuited to the highly artificial facilities by means of which the traveller is flying past—and the discordance serves to lessen the high gratification which either the conveyance or the scene alone would cause, when new to the observer.

It was too late on that day to commence a voyage to the lake—nor could it be made on the next: for though every thing else necessary had been carefully provided, there were no good boatmen out of the swamp—and without those accustomed to the peculiar mode of navigating the canal, there was no getting on. The leisure afforded by these disappointments permitted me to visit some of the most interesting lands in the neighborhood—and to see some improvements on swamp lands, to which my remarks will now be confined. Having mounted on horseback, we returned by a different route, to the swamp where it is crossed by the railway. This great public improvement had effected much of the first and heaviest labor necessary for draining the adjacent swamp lands, and had clearly indicated the proper mode to pursue—and the proprietor on one side, Mr. David Jordan, was making proper use of the opportunities thus offered. The swamp land here is 6 to 7 feet higher than the part of Suffolk which the railway passes over; and the ditches dug on each side, to drain and to raise the track of the road, furnish deep and wide discharging outlets, to receive the waters from all smaller ones draining from the swamp. This land had been filled or covered with water before the railway was begun: the ditches dug by Mr. Jordan, are at right angles to the road, and emptying as above stated, have laid the land dry, and kept the water as much below the surface as the depth of his ditches, which is from 2 to 2½ feet. Still this is not enough for so spongy a soil, which will draw much moisture upward, and from considerable depths. I advised giving 10 or 12 inches more of depth to the smaller ditches, and still more to the large railroad ditch, which can be easily done. The water comes from the general overflowing or saturation of the swamp, and therefore a good large ditch ought to surround the whole piece designed to be reclaimed.

This tract of land was bought by Mr. Jordan and Mr. Benton, after the railway was made, at $7.50 the acre. Immediately adjoining, and also on the road, another body of land of 2000 acres had been bought before the road was commenced, for only $900, a most striking evidence of value thus increased. All the wood is now made marketable, and is cut to a great profit, and sent by the train to Portsmouth. It is cut (by the job) into 4 feet lengths, at 50 cents the cord; carted and corded along side the road for 25 cents more—(and this expense might be lessened one-half, by making branch wooden railways—) and the wood is sold at $1.25 in that situation, and now commands $4 if delivered in Portsmouth. As but little superintendence is required, the profit from an acre must be very considerable.

The swamp soil next the railway was from 1½ to 2 feet thick, resting on a good dark colored clay. The soil did not appear to vary materially in texture, as seen in the new ditches several hundred yards towards the interior. It is of the more firm and earthly kind, known as "gum swamp," but which seems to be composed in great measure of vegetable matter. It appears precisely like the soil of the gum and ash tide swamps on James River. Farther from the railroad, the ditch reached land which formerly had been burnt over, so as to destroy its trees, and it was now covered by the closest possible growth of reeds, among which were scattered many young pines. The soil did not seem to change, otherwise than by becoming deeper. The sub-soil here is a stiff yellowish clay.

(To be Continued.)

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FRAME BRIDGES.

THE undersigned, General Agent of Co S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfull inform Railroad and Bridge Corporations, that he prepared to make contracts to build, and furnish a materials for superstructures of the kind, in any pa of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the fo lowing localities, viz. On the main road leading fro Baltimore to Washington, two miles from the form place. Across the Metawamkeag river on the Mili tary road, in Maine. On the national road in Illino at sundry points. On the Baltimore and Susqueha na Rrailroad at three points. On the Hudson an Patterson Railroad, in two places. On the Boston an Worcester Railroad, at several points. On the Bos ton and Providence Railroad, at sundry points. Acros the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Con necticut river, at Haverhill, N. H. Across the Con toocook river, at Hancock, N. H. Across the An droscoggin river, at Turner Centre, Maine. Acros the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squaki-hill, Mount Morris New-York. Across the White River, at Hartfor Vt. Across the Connecticut River, at Lebanon, N H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroa Bridge at Upper Still Water, Orono, Maine. Thi Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.

Rochester, Jan. 13th, 1837. 4—y

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co. No. 119 Greenwich Street, New-York, or at the Makers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY & KNIGHT.

POUGHKEEPSIE, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANCHED and GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works he has in charge.

BENJ. WRIGHT,
Chief Engineer N. Y. & E. R. R.

NEW-YORK, April 4th, 1836.

Harvey's Flanched and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.

BOSTON, April 26th, 1836. NO. 4—6t.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

TO CIVIL ENGINEERS, &c.

E. & G. W. BLUNT, 154 Water st., corner of Malden Lane, have recently received an assortment of LEVELS, from different manufacturers, among others from Troughton & Surins, which they warrant of the first quality. Circumferentors, Levelling Staves, Prismatic Compasses, Mathematical instruments, Books for Engineers, etc., constantly on hand.

One of the above firm is now in England superintending the manufacture of Theodolites, Transit Instruments, etc.—and any orders for Instruments, not now on hand, will be forwarded him, and executed promptly. 5—tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad none of which have failed—Castings of all kinds Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.

4—ytf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior back-strap Shovels		
150 do	do	do plain	do
150 do	do	do caststeel Shovels & Spades	
150 do	do	Gold-mining Shovels	
100 do	do	plated Spades	
50 do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.

BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron. v4—tf

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N. Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention

HENRY BURDEN.

Troy Iron Works, Nov. 15, 1836. 47—tf

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hard-ware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTION, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

									lbs.	
350	tons	$2\frac{1}{2}$	by	$\frac{5}{8}$,	15 ft in length,			weighing	$4\frac{80}{100}$	per ft.
280	"	2	"	$\frac{5}{8}$,	"		"	"	$3\frac{50}{100}$	"
70	"	$1\frac{3}{4}$	"	$\frac{1}{2}$,	"		"	"	$2\frac{1}{2}$	"
80	"	$1\frac{1}{2}$	"	$\frac{3}{8}$,	"		"	"	$1\frac{25}{100}$	"
90	"	1	"	$\frac{3}{8}$,	"		"	"	$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, and $3\frac{3}{4}$ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28 tf Philadelphia, No. 4, South Front st.

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

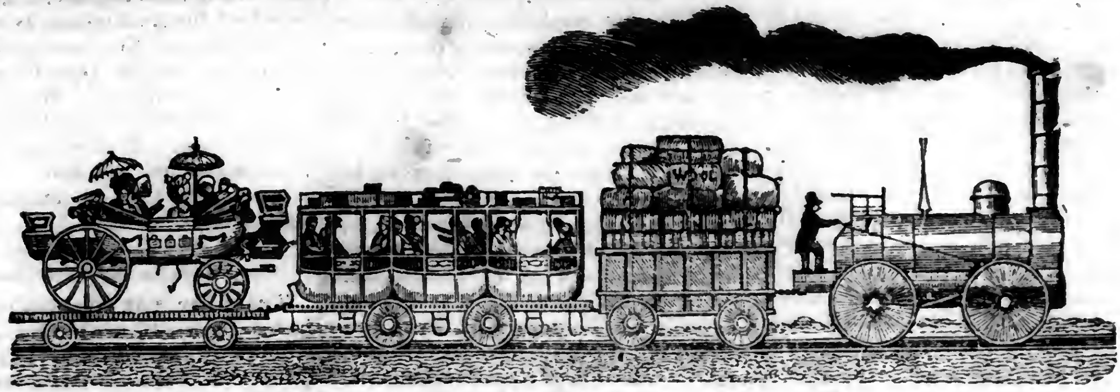
Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N. Y
51tf



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, FEBRUARY 25, 1837. [VOLUME VI.—No 8.

CONTENTS:

NEW-YORK, FEBRUARY 25, 1837.

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid, (continued.)

H. Mc Farlan, City, N. Y.,	Jan. 1, 1838
Mr. Stoddard, Brooklyn, L. I.,	" "
Messrs. Bancroft & Co., "	" "
M. S. Brackett, Syracuse, N. Y. "	"
J. D. Allen, Oswego, N. Y.,	" "
G. Pearsall Smithsboro, N. Y.,	May 1, 1836
R. C. Hewett, Lexington, Ky.,	Jan. 1, 1837
S. Fitch, "	" "
G. W. Shields, "	" "
R. Downing, Bergen, N. J.,	Feb. 15, 1837
A. Paris, Boston, Mass.,	Jan. 1, 1838
Post Master, Rushville, Ill.,	" "
Geo. Sullivan, London, Eng.,	" 1837

BENNET'S STEAM BOILER.—Very few inventions of recent date have excited so much notice as that of Mr. Bennet. We have had the pleasure of examining his models and of hearing his explanations.—The novelty and originality of the idea of forcing the flame and entire volume of air from the furnace through the water, are striking, and to some, startling features in a boiler to a steam engine. Nevertheless, Mr. B., who has entered very thoroughly into the investigation of the operation of the machine, demonstrates very satisfactorily the entire safety and certainty of this mode of applying steam.

The very elegant machinery for the Atlantic Steam Navigation Company's Boat is constructed upon this principle, and will afford a very excellent trial of the system.

Mr. B. may be found at the rooms of the American Institute, where he will afford every explanation of his models.

The subject is worthy of attention, as several curious points of chemical relations are involved. It is of course intended by such an application of heat, to economise the consumption of fuel, and if the boiler operates at all, this will be the inevitable result.

ALDRICH'S INCLINED PLANE FOR RAILROADS.—A description and cut of the inclined plane will be found on p. 764 of the last volume of the Railroad Journal. The intention of the inventor is by a simple and substantial arrangement, with rack work to enable engines to ascend plains of various degrees of inclination without disturbing their horizontal position, a great desideratum in Railroad economy.

The inventor founds the claim of usefulness upon the extreme simplicity of his machines, a basis upon which every improvement in Railroads or Locomotives must be placed before it can be deemed worthy of considerative engineers.

Mr A., is also to be found at the rooms of the American Institute.

RAILROAD AND CANAL STOCKS, in New-York and Philadelphia.	Price of shares	Offered	Asked.
PHILADELPHIA STOCK MARKET.			
RAILROAD STOCKS			
New-Castle and Frenchtown	25	32	32¼
Do loan, 5¼ per cent	100	99	101
Wilmington and Susquehanna	50	38	42
Camden and Amboy, shares;	100	136	136¼
Do loan, 6's 1836	100	110	120
Danville and P shares	50	25	35
Norristown, do	50	34¼	35
Do 6 per cent loan	100	85	100
Valley Railroad	7¼	1	3
Westchester do	50	20	28
Minehill do	50	55	60
N. L. and Penn. Tp. do	40	34¼	35
Philadelphia and Trenton do	100	125	127
West Philadelphia Railroad	50	20	30
Harrisburg and Lancaster	50	46	48
Cumberland	25	15	20
Beaver and Meadow	50	57	58
MISCELLANEOUS STOCKS			
North American Coal Company	25	12	14
Steam Bt. Sts. Columbian	100	18	22
Exchange Stock	100	70	80
Arcade	100	55	75
Theatres—Chestnut street	600	625	675
————Walnut street	280	175	120
————Arch street	500	325	375
Gas Company	100	100	102
CANAL STOCKS.			
Schuylkill Navigation, shares	50	164¼	165
Do loans, 5 1845	100	98	100
Do do 1855	100	100	101
Do do 5¼ 1837	100	98	100
Lehigh Coal and Navigation	50	82¼	83¼
Do loan, 6 1838	100	86¼	97¼
Do do 6 1839	100	97	98
Do do 6 1844	100	99	100
Do do 5 1840	100	96	97¼
Union Canal, shares	200	180	190
Do loan, 1836	100	83	86
Do do 1840	100	85	90
Chesap'k & Delaware Canal, shares	200	20	40
Do loan, 1837	100	60	67
Do do 1840	100	60	67
Delaware and Hudson,	100	90¼	91
Do loan	100	95	100
Louisville and Portland	100	112¼	117
Convertible 6 per cent. loans,	100	110	120
Sandy and Bever	45	10	40
Morris Canal	100	96	96¼

From the Van Buren Times.

EXTENSION OF THE ERIE CANAL.—A single moment's reflection, cannot fail of convincing the most scrupulous that it is for the best interests of the State, that the Erie Canal be extended, immediately, to some point farther up the lake, so as to avoid the existing obstacle to the most profitable portion of our trade with the western States. All must be aware of the fact that the Erie Canal is in ordinary seasons open in the spring several days before the Lake at its lower extremity, is navigable, a circumstance which seems very likely to operate materially to our disadvantage.—Pennsylvania has caught from us the spirit of enterprise, and seems determined through the medium of a projected chain of internal communication from her eastern border to Lake Erie, to secure to herself no small portion of the lucrative business of the west, which is at present enjoyed by the State of New-York, and unless prompt measures are taken by the latter, the desired object of the former will, we fear, be successfully effected. The bare tact of the difference in the time of the opening of lake navigation between Buffalo and the ports further west, might not, when abstractly considered, be thought of very great moment, but when we look at its indirect bearing, and ultimate consequences, the importance of conquering this obstacle is at once apparent.

The Western Merchants will, of course, make their purchases as near home as the nature of things admit; if they can by purchasing at Philadelphia, receive their goods one week or two weeks earlier than they could from New-York, they would undoubtedly do so, and having once become diverted from the latter place, they would close up and discontinue all communication.

Under such circumstances it behooves the State of New-York, in order to subserve her interests as well as sustain the character she has already acquired on the score of improvement and enterprise, to avert such a state of things; and how? the only possible way for her to do it will be to extend the Erie Canal from Buffalo to some point far enough west to remedy the evil complained of; and as soon as this work is vigorously set about, the idea of constructing a channel through Pennsylvania, to the Atlantic coast, will be regarded as wild and chimerical. The project of extending the Erie Canal was, we believe, contemplated by the late Gov. Clinton, and subsequently submitted to the consideration of the Legislature, by our present worthy chief magistrate, (vide. Governor's message, 1836,) and it is vitally important that it be fully carried out; public policy requires it—the interest of the western and northern counties imperatively demands it—the city of New-York is anxious for its consummation, and relying upon the wisdom and liberality of the Legislature, we are confident that the subject will be thoroughly canvassed. It will be perceived by the following, that Pennsylvania is moving with a fixed determination to undermine us, and she will succeed too, unless we check her in the bud.

HARRISBURG, Jan. 17, 1837.

The following resolution was offered by Mr. Taylor, of Indiana, and it relates to a highly important public measure, and one which will one day become the glory of Pennsylvania, I will copy it entire. It was read the second time and adopted:

"*Resolved*, That the committee on Inland Navigation be instructed to inquire into the expediency of reporting a bill, extending the West Branch division of the Pennsylvania Canal, on the Susquehanna River, to the Alleghany River, by the route proposed by the Engineer, Mr. Aycrigg, in his report of the 13th December last to the Canal Commissioners: and to authorize, at least, one half of the distance, reported to be put under contract the ensuing summer, appropriating the sum or sums of money necessary to defray the expenses which may be incurred thereby during the current year."

The whole distance of the route from the Susquehanna to the Alleghany, is 128 miles. This being made, and a short distance down the Alleghany to the mouth of the Kiskeminetas, and up the Alleghany to Franklin—and Philadelphia will be connected with the Ohio and Lake Erie, by a continuous water communication. Then let the Union Canal be purchased by the State, or the company assisted, and that important work widened and deepened, and the trade of the Lakes and the Ohio both is securred to us forever! Secured, did I say? There will still be wanting another work; and that work will be constructed. I mean the great railroad from Philadelphia, by the way of the West Branch to Erie. This great railroad can be made without a single inclined plane at which stationary engines must be used; and the distance will not exceed 400 miles. New-York has a project to unite Dunkirk, on Lake Erie, thirty or forty miles down the Lake from Erie, with the city of New-York. I now have the report of the engineers on that route, and am satisfied that it will be nearer to New-York itself, through Pennsylvania and Philadelphia, from Erie, than on the New-York road. The New-York road is five hundred and six miles long. There are eleven planes of the grade of 50 feet to the mile, and fourteen having a grade of more than 50 feet to the mile; there are ten planes of 60 feet and upwards to a mile, whose aggregate length is more than 30 miles; there are two planes of 78 feet to the mile; one five miles long, and another seven; there is one of more than three-fourths of a mile in length, with 100 feet inclination to a mile; one plane of nearly four miles and one-half, with an inclination of 72 feet; and of more than one mile and a half, with an inclination of 316 feet to the mile. You can readily see, that if the Pennsylvania road is commenced, the New-York road will hardly be found a profitable investment for money.

Our Pittsburg friends without reason, I think are opposing the road to Erie. They want a railroad from Pittsburg to the foot of the Laurel Hill, and then, a MacAdamized road of 60 or 70 miles in length, over the mountains, to Chambersburg. Now, let us have both of these improvements. Nothing can check the great prosperity of Pittsburg. By building up Erie, and creating a trade between her and the Ohio River, Pittsburg will be also benefitted. We must have the Lake trade and the Lake business through Pennsylvania. It must not go down the Lake to Buffalo, and then to New-York, in consequence of an illiberal policy towards Erie.

From the Van Buren Times.

TRADE OF THE WEST—TUNNAGE OF LAKE ERIE—HARBORS, &c.—But a few years have elapsed since Lake Erie was literally a "desert waste of waters;" nought was seen on her expansive bosom save the curcling wimple here and there, caused by the sport of the water fowl, or the light canoe of the red man as it shot from some of the numerous coves indenting its then forest-fringed borders. The hardy adventurer, with his guide, might traverse the vast extent of territory adjacent, without finding a single trace of civilization, relying on his "dog and gun" for sabsistence, and reposing at night by his solitary watch fire, now startled by the shrill scream of the panther, or lulled into slumber by the music of the waves as they chased each other upon the sand. Anon, an occasional opening was discovered in the wood, and a rude shantee, told the weary hunter that he was nearing the habitation of a "pioneer of the new country." Time rolled on, and with it the tide of emigration rolled westward. The Genius of enterprise waved her wand, and towns, villages, and cities sprang up as by enchantment—churches and institutions of learning were reared where once stood the wigwam, and the Indian, like his favorite game, betook himself to the yet unexplored regions of the *far* west. The waving harvest showed that agriculture had been busy, and the din of machinery of all kinds denoted that manufacture had not been idle; Commerce, the natural concomitant of industry and civilization spreads her white canvass, and the hitherto "desert" Lake is converted into a national highway.

The trade of the west has within the past five years outstripped the most wide calculation, and our commercial facilities have increased in a proportionate ratio. From a statement recently published in the Buffalo Com. Adv., it appears that there are now afloat on Lake Erie, 58 sloops, 148 schooners, 7 brigs, 1 barque, 2 ships, and 47 steamboats. Total number of vessels, 263. The tonnage owned at the different ports is as follows:

Buffalo,	8541 09
Detroit,	6703 73
Cleveland,	4518 33
Sandusky,	1792 75
Presque Isle, (Erie,)	1562 29
Miami,	927 57
Total,	24,045 76

The steamboats and vessels now building will swell the number stated, to at least three hundred; of those now on the stocks and to be completed the ensuing season, *fifteen* are steamboats of the first class.—

The Black Rock Advocate says that "the tonnage on the Lake increases in a ratio of nearly fifty per cent. per annum. For some years past it has been much greater, and from the accelerated growth of the great region west of us, we may anticipate a growth of the trading and shipping interest on the Lake hitherto unparalleled.—But ten years ago, and only *five* moderate sized steamboats floated on our waters, and these five did hardly a living business; now, all those in service are in full employ during the navigating season, and at no former period have their profits been so great as during the past year. But ten years since, fifty or sixty small sail vessels plied on the Lakes, and engrossed all the carrying trade. Within the next ten years, we predict, *one thousand steamboats and sail boats*, of an average tonnage equal to those now employed, will whiten Lake Erie and crowd our ports, adding millions to our commercial wealth, and thousands on thousands to our population;" "our warehouses choked with merchandise, receiving and discharging their storage; our steamboats and shipping groaning under their enormous cargoes, and literally alive with travellers and emigrants, arriving and departing; and our mills taking in their millions of wheat from the far off west, and lading into canal boats their rich products of flour for the Atlantic ports."

We said that our commercial facilities were increasing in a proportionate ratio to the trade, we refer expressly to craft for transportation. In harbors, for the convenience and safety of this craft we are wofully deficient. The reader will readily perceive that this great western traffic is principally with eastern cities, for which purpose channels of communication are constructed to the lower extremity of the Lake, at which point most of the harbors have been neglected, and consequently are unimproved, and unless the general government does something to render their condition more tolerable, our hitherto flourishing commercial operations must be crippled, and our onward march greatly impeded. As we have before remarked, the harbors in their present state are inadequate to the number of vessels already on the Lake, and the many disasters which have resulted in consequence, call loudly for the improvement of such as can be made secure and convenient.

From the St. Louis Com. Bulitin

IN THE BOARD OF ALDERMEN, City of ST. LOUIS, *Jan.* 24, 1837.

The Register laid before the Board a letter from J. B. Brant, dated this day, enclosing the report of Erskine Stansbury, Esq. of a reonnoisance made by him of the railroad route from this city to the valley of Belleview, Missouri, which was severally read, and, on motion of Mr. Clark, the report was ordered to be published in all the newspapers of the city, and that the other papers throughout the State be requested to publish the same also. And further, that the claims of said Stansbury for making said reconnoisance be allowed, as authorized by a resolution of the 16th December, 1836.

St. Louis, Jan. 3, 1837.

SIR: Having performed the duty assigned to me in your letter of the 20th December last, I have now the honor to lay before you the following report of a reconnoisance of a route for a railroad from this city to the valley of Belleview, commonly called the St. Louis and Iron Mountain railroad; and it affords me much gratification that the nature of the country is such as to permit the report to be a favorable one.

In order that the reasons by which I was governed in the selections of the route I have chosen, may be better understood, a short description of the country to be traversed, may not be unnecessary.

The valley of Belleview, the point to which I was directed to extend my examinations, is situated between several of the head branches of the Big river, and is bounded on either side by a lofty range of mountains; it is from thirteen to fifteen miles long, and varies from five to ten in width; possesses a rich and fertile soil, a large proportion of which is under cultivation, and is thickly settled. By a glance at the map it will be perceived that Big river (among whose head waters this valley is situated,) takes its rise near the head waters of the river St. Francis, and runs in its whole length nearly parrellel to the Mississippi river, although in exactly opposite direction, and at length, discharges its waters into the Maramec river about 30 miles above its mouth. This latter stream, together with the Gravois creek and the river Des Pere, run across the country in a direction transverse to the route, and consequently will have to be crossed by the road. From this short sketch, the facilities presented by the route as well as the difficulties to be overcome, can readily be understood.

Having by personal examination, ascertained that a crossing of the Maramec river, (the largest stream on the route,) might be effected at Fenton, my examinations, commencing at this city, were directed towards that point. Leaving St. Louis, and passing along the south side of Choteau's Pond, the route may follow the valley of the branch emptying into it, until it reaches its source, which is near the house of Mr Payne, and about four and a half miles from the city. A drain, which takes its rise on the opposite side of the ridge and runs past Mr. Wilson P. Hunt's old place, into the Des Pere, whose valley is very smooth, and nearly straight, affords a slope sufficiently gentle by which to approach that stream. Upon the opposite side, a branch commonly called Lick Branch, empties its waters into the river a short distance above, and its valley may be followed to its head, which is near the farm of Wm. Rich Wells, whence a cut of considerable depth through the top of the ridge dividing the waters of the Des Pere from those of Gravois creek, leads into the valley of another drain, which passing the house of Mr. Wells, empties its waters into the latter stream at the farm of Mr. Wells, senior. A branch, which takes its rise in this ridge dividing the waters of the Maramec from those of Gravois creek, empties into the latter nearly opposite to the house of old Mr. Wells. The valley of this branch affords a slope by which to approach the ridge. It may be followed to its source when a cut to the depth of fifty feet or upwards, through the cone of the ridge, a distance of half a mile, becomes necessary, in order to reach the valley of a branch which takes its rise on the opposite side of the ridge, and discharges its waters in the Maramec. The advantage to be gained by this deep cut in the diminution of the grades upon both sides of this ridge and the consequent increase of the speed of travel, upon the road more than counterbalances the cost of making it. The bottom upon the east side of the Maramec is upwards of a mile in width, and a part of it is subject to be overflown by the high floods. A high embankment for the greater part of this distance will be necessary, the earth for a part of which may be taken from the deep cut above mentioned. The Maramec being navigable for steamboats above this point, the bridge across it must be sufficiently high above the water to permit boats to pass under it at the highest stage. Stone, of a good quality, for the piers and abutments, may be had in the immediate vicinity, and it is supposed that a firm foundation may be found by going down a few feet below the surface, as a ledge of limestone rock shows itself near the surface of the water, a short distance below.

The valley of a branch discharging its waters into the Maramec at Fenton, may be followed to within a short distance of its source, when for some distance it runs parallel to the valley of Saline Creek, which also empties into the Maramec some four or five miles below. I propose to cut through the narrow ridge dividing these two streams, and to follow the valley of Saline creek, which runs more in the desired direction than the other, to within a short distance of its source, whence a rather abrupt turn brings us on to the ridge dividing the waters of Big river from those going into the Mississippi.

Upon arriving at this ridge, three routes present themselves: one by following the ridge upon the west side of Big river, another by the valley of the river itself, and a third by the ridge upon the east side of the river. By following the ridge upon the west side of the river, the distance would be considerably increased, and the necessity of descending by a high grade from the ridge to the river, together with a consequent ascent upon the other side to about the same level, deterred me from adopting that route. The route by the valley of the river itself is also objectionable. Big river is subject to very high floods, which frequently overflow its banks, which would consequently occasion much expense in embankments. Besides this, the sinuosity of the river would require that it should frequently be crossed, by which the expense of bridging would be incurred, and in addition, the valley itself is so crooked, that by following it, the opinion is entertained, that the distance would be nearly, if not quite, doubled. For these reasons, this route was rejected, and that upon the east side of the river was preferred. Either of the other routes, however, are of sufficient importance to demand a careful and accurate examination before the final location of the route is determined upon. The present examination was only preliminary, and was directed more to the practibility of constructing a road at all, than to the selection of the route. Before this can be done, a careful and accurate survey of several routes should be executed, and upon a comparative estimate of the cost &c., that route selected which should be found best adapted to the purposes of the road, and of most advantage to the company, and to the country at large.

The ridge upon the east side of the river partakes very much of the character of many others in the State. It is narrow, very crooked, is indented with innumerable drains, many of which are wide and nearly all of them deep; and though it is generally level, numerous depressions with corresponding elevations, are of frequent occurrence. Its general level is very high, being, as I suppose, from 150 to 300 feet above the level of Big river, and of course considerably more than that above the Mississippi. Its general course is nearly direct, and by occasional excavations and high embankments, across the vallies of drains, the line may be made considerably more straight than by following the top of the ridge.

Upon arriving at the head of Stong's Branch, it will be advisable to cross Big river in order to avoid the increase of distance which would be incurred by following round a bend, which it here makes, to the eastward. For this purpose the valley of that branch may be followed to the river, a distance of about three miles, crossing which, the valley of Madden's branch, which empties into the river a short distance above, affords a slope by which to ascend to the ridge upon the west side of the river. This ridge continues from the head of this branch to the head of Flat creek, which stream runs a south course, and empties its waters into Big river at the crossing of the road leading from Potosi to Caledonia. By following the ridge the route would traverse a rich mineral region, passing in its course in the immediate vicinity of Bellefontain mines, Old mines, New and Old Shibboleth, Massons Diggings, Potosi, in that part of the country familiarly called Mine a Burton besides numerous other diggings not of sufficent importance to be mentioned. The ridge, like that upon the east side of the river, is narrow and generally level, but ha, frequent elevations and depressions in it which, however, are not of sufficient magnitude to present any serious obstruction. The course would probably be as direct, by following it, as by any other route, which might be found in a country, so rough and broken as this. Following down the valley of Flat creek which is smooth and nearly straight, the route passes Springfield furnace, and reaches Big river, (here running east) a short distance above Hunter's mill. Crossing the river by a bridge, it may follow a drain, coming in from the south, to the immediate vicinity of Caledonia.

The Iron Mountain lies in a direction nearly south-east from Caledonia, distant about 10 miles. The only obstruction in the route is the crossing of Cedar creek, a stream of considerable magnitude, which runs in a north-easterly course into Big river several miles below Hunter's mill. A bridge with a single arch, at a high level above it, may be thrown across it, whence a deep cut for about a hundred yards in length, and a high embankment for about ⅜ of a mile, the valley of Saline creek, a branch of Cedar, is reached, and may be pursued to its source. This stream, a branch of Big river, rises in a highly level plane, from which, within the circumferance of two miles, the head branches of the St. Francis and Black river also take their rise, and each runs off upon its several courses towards the Mississippi, into which at length they all empty hundreds of miles apart. From the head of Saline creek the Iron Mountain bears a few degrees north of east, about four miles distant. A direct line to it from the crossing of Cedar could not be obtained on account of the lofty range of mountains bounding the eastern side of the valley. The line may, therefore, be continued from this level plane through a rich and level country presenting no obstructions.

Having thus briefly given a description of the route, the mode of construction and probable cost are next to be considered. With regard to the first I would recommend the same plan as that suggested in the report of Mr. Guion, U. S. Civil Engineer, in his report upon the Louisiana and Columbia railroad. Experience has proved that with the exception of the edge rail, this plan is better than any other that has been tried It is that the superstructure be built "of sills or transverse pieces laid at intervals of three feet from centre to centre, and notched at each end to receive the longitudinal or string pieces, the latter having a cross section of five by eight inches, and being plated on the inner edge of the upper surface with iron bars two and a quarter inches broad by five eights of an inch thick, secured to the wood by iron spikes." The estimate cost of a mile of superstructure upon this plan as made by that gentleman, is $3670 00, which might probably be considerably reduced, in consequence of the abundance of timber for the sills every where found upon the route and the vicinity of the Pine region to the lower part of it The iron, of which 22 tons are used per mile, is estimated at eighty dollars a ton, but it is supposed that as soon as the Iron Company, chartered during the present session of the Legislature, goes into operation, iron for railroad purposes can be sold for a much less sum.

There is no *data* from which to estimate the cost of gradation, but the opinion is entertained that this part of its cost will not be very great. Several deep cuts occur, and one or two high embankments, but in all these cases the cuts will be for short distances. A considerable part of the route is level and very smooth, and will require little more grading then the necessary levelling of the road bed preparatory to laying down the superstructure. The whole distance is estimated at 85 miles, and I am of opinion that it may be constructed for a sum not greater than that estimated for any other road in the State of equal length.

The benefits that would accrue to the State at large, and to this part of it in particular, are of so great importance as to demand to be noticed. The country traversed by the road, partakes of a mixed character: that part of it between St. Louis and the head of Saline creek, together with all that portion from the first crossing of Big river, to its termination, is interspersed with narrow but beautiful vallies, possessing a rich and fertile soil, many of which are now under a good state of cultivation, and return to the farmer an ample reward for his toils. That part of it which follows the dividing ridge is rough and barren, but at short distances on either side, the vallies of the numerous branches which indent its sides, afford good localities for small farms, and are very generally inhabited and cultivated. The great source of interest in this country, however, is the almost inexhaustible mineral wealth which it contains. The sulphuret of lead, commonly called lead mineral, which yields to the smelter from 60 to 80 per cent. of pure lead, may be said to exist in almost every hill and almost every valley. Vast quantities of it, even in the present very imperfect manner of mining, are annually discovered and smelted, and when mining is conducted upon more scientific principles, no doubt is entertained that the quantity obtained will be greatly increased. Copper has been discovered and worked to advantage, and indications of its existence are found in several places through the country. Tin is supposed to exist, and indications of several other metals, among which is silver, are said to have been discovered. Since my return to this city, anthracite coal, which heretofore was supposed to be confined east of the Alleghany chain, has been discovered, but in what quantities I have been unable to ascertain. About three miles from Potosi the route passes through a belt of fine timber, the main body of which is said to be twelve miles in breadth, and thirty miles in length, the lumber from which would be a large item of transportation, and would always command a fair price and ready sale in this city. But the object of by far the greatest interest in this part of the country, and which would afford one of the chief articles of transportation, are the two Iron mountains, now owned by Messrs. Van Doren and Pease. These two hills, one of which is upwards of six hundred feet in height, and the other about three, cover an area of about nine hundred acres, and consist of an iron ore of the purest quality ever discovered, in quantities to specify which, would exceed belief. It is supposed, however, that it would be within the bounds to assert, that iron, in quantity sufficint to supply the wants of that article in the United States for a thousand years, might be obtained.

Owing to the want of easy communication with a market, the greater part of this wealth is now locked up. The construction of this road would afford this desired facility, and bring, as it were, into existence the immense mineral resources of this country, and place the State of Missouri in that rank which, from the fertility of her soil, her great mineral wealth, and the hardy and enterprizing disposition of her people, she is entitled to assume.

Permit me to add, in conclusion, that in this examination much valuable information and assistance has been afforded me by many gentleman on the route, for whose kindness and attention I am much indebted.

I am, sir, with great respect,
your obedient servant,
ERSKINE STANSBURY.
Civil Engineer.

Maj. J. B. BRANT, *Chairman of Com. on Surveying, of Inter. Imp. Con.*

On motion of Mr. Grimsley,

Resolved, That the report of Erskine Stansbury, Esq. on the subject of the contemplated railroad from this city to the valley of Belleview, be forwarded by the Register to the Governor, together with a copy of this resolution, with a request that he lay the same before the General Assembly of Missouri.

Attest, J. A WHERRY, *Register*.

From the Farmers' Register.

REPORT OF THE ENGINEER OF THE EASTERN SHORE RAILROAD.

WASHINGTON CITY, Nov. 10, 1836.

TO THE COMMISSIONERS APPOINTED TO SURVEY THE ROUTE OF THE EASTERN SHORE RAILROAD:

GENTLEMEN,—Of the various surveys which have been made under your direction for the purpose of ascertaining the best route for a railroad on the Eastern Shore of Maryland, conformably to the several acts and resolutions of December session, 1835, the one which I have selected as the basis of the preliminary estimates, begins at the Wilmington and Susquehanna Railroad, near the town of Elkton, and continuing throughout its whole course within the State, crosses the Chesapeake and Delaware Canal a few hundred yards west of the pivot bridge, and after passing a little to the west of the head of Bohemia and Sassafras Rivers, thence by the head of Chester or Millington, and the head of Choptank or Greensborough, and by the North-West Branch, eastward of the Bloomery, to the Nanticoke River, which it crosses between Sharptown and the Delaware line. From the Nanticoke, it follows a very direct course to Princess Anne, whence it diverges south-westwardly to the mouth of Little Annemesic River, on Tangier Sound, its terminus. Its total length is $118\frac{1}{4}$ miles.

The purpose of this communication limits me very cursorily to remark, in relation to the character of the line, that for lowness of grade and directness of communication, I know of no road of its length by any means comparable to it. The grades rarely reach, and never exceed twenty-one feet to the mile, and this only, on very few miles of its length in Cecil County, and at the crossing of the principal water courses. On much the greater part of the route, the grades do not attain one half that rate per mile.

Between the points of passage of the rivers above named, the lines were intended to be traced perfectly straight, and so far as this was practicable in an experimental survey, it has been done. They are very oblique to each other, and the curves by which they are to be connected, need in no case be of less radius than one mile, and for nearly one hundred miles of the route, very probably of not less than five miles radius.

The annexed estimate is founded, on the facts collected during the experimental survey, and although it was not supposed that this would follow the best ground, the stations were nevertheless taken at 300 feet apart, where the surface of the country was nearly level, and at 200 feet or less, where it became undulating or broken—this is mentioned to show that the quantities stated in the estimate, are not assumed without careful inquiry. The other elements of the estimate are as follows, viz., the road-bed to be formed for a single track, except at the embankments, where it is to receive a breadth of 20 feet at the crossing of the principal creeks and rivers. The viaducts to be of the best timber, and to have a breadth of 20 feet of flooring. The rails to be of $2\frac{1}{4}$ by $\frac{5}{8}$ inch iron, resting on wooden string pieces, 6 by 6 inches, and 10 by 12 inches sleepers, all of the very best quality. The cost of materials and workmanship generally are assumed at the highest current prices, and wherever in framing the estimate of road-bed and bridges there was a doubt as to quantity or value, the sum taken was a maximum, and the price of the iron is that for which it is offered by a most respectable house. I am warranted, therefore, I think, in assuring the Commissioners, that the amount of the estimate need not be exceeded in the construction of the road.

Ample provision it is believed is also made for the transportation upon the road, and for connecting it with the great stream of southern travel, which seeking its way to the north will find this in connection with the ports of Norfolk and Portsmouth, and with the rivers of the south-western part of the Chesapeake Bay, a safe and convenient as well as a very *expeditious*, and at all times too, an *uninterrupted* channel of communication.

In the present state of our statistical information, we are unable to present other than general views of the business which may be expected to come upon the road. It is, however, mainly to the transportation of passengers, that this, as well as all other railways, not directly in connection with great mineral regions, are to look for profitable returns upon the capital invested, and it is to this source the friends of the road may with the most undoubting confidence turn themselves.

From the southern seaboard, the country bordering on the Gulf of Mexico, the lower Mississippi and its tributaries, and from all the country which lies south and south-west of the States of Virginia and Kentucky, the number of travellers who annually seek the north in pursuit of business, of health, or of recreation, and who again return back upon the south, is absolutely incalculable; along the navigable water courses, they are seen to crowd the numerous steam boats, and on the seaboard, the packet vessels are fully occupied. During the boating season, the travelling from the south and south-west is almost altogether by steam boats, notwithstanding the acknowledged danger and delays incident to this mode of journeying, west of the mountains. When this season is past, the traveller has no other course, whether he proceeds to the north or returns southwardly, than to take the ports of the Gulf, or to cross the mountains, and journey by the valley of the Tennessee, and thence home. The latter course is often preferred, and the number of travellers, and the quantity of goods also by that route, often greatly exceed the means of conveyance. Nearer the seaboard, the condition of the traveller upon the road is not more enviable, and the voyage by the coast is beset with some danger, and much discomfort. Conscious of this condition of things, the intelligent men of the south and west are using every effort to awaken and direct enterprise. From the Gulf of Mexico, roads are in contemplation, or are already undertaken, the prolongation of which, must be through the principal towns of the interior of the States of Georgia and the Carolinas towards the western termination of the Portsmouth and Roanoke Railroad. With these projects are and will be connected, others to lead to the commercial capitals of those States, and from the Mississippi, others will proceed by the way of Georgia, by the valley of the Tennessee, or more directly by Knoxville, and all them uniting with the great line of communication which I have just mentioned, all of them directing themselves towards the Roanoke. By the valley of the Roanoke also, and of one of its tributaries, a railroad which has recently been surveyed, will be conveyed to the same point, the agricultural and mineral wealth of an extensive region, and will return to it the merchandise which it will consume.

It is ascertained that the travel last year between Charleston and Savannah, and the northern cities alone, amounted to between 50 and 60,000 passengers. The contemplation of this great number is alone sufficient to convey to us some idea of the multitudes who throng to the north, from the vast regions of the south and west, the greater part of whom, undoubtedly, would prefer to travel by railroads, and who, as I have shown, would be conducted by them directly towards your road. Whether, on arriving at the Roanoke River, the choice being before them of the route by Richmond and Potomac Creek, by Norfolk and the Chesapeake Bay, to the Frenchtown Railroad, or of your road by the bay and peninsula, is a question, which the friends of the Eastern Shore Railroad will willingly leave to the decision of the traveller.—That the general preference would be given to the conveyance by railroads over that by sea, or by the Mississippi and Ohio Rivers during the boating season, or to the mountain roads at any season, cannot admit of doubt.

I have not yet arranged the data by which may be shown the great advantage which the road offers for the rapid transmission of intelligence, and its consequent connection with the transportation of the mail.—

What I have already said, while speaking of the experimental survey and of the grades, is, however, sufficient to enable the Commissioners to perceive the necessary connection which it must have with this source of revenue.

Situated as the south-western terminus of the line is, in a climate comparatively mild, the navigation of the waters near it, are rarely closed, and never certainly so much obstructed by ice as to present serious difficulty in keeping it free to vessels arriving on our coast, especially from the south, and destined for a port inaccessible by reason of the inclemency of the season, Tangier sound and the neighboring waters, always easy of access and safe, offer sufficient harbors and anchorages in near connection with the road, and capable of being brought in direct contact with it. The advantage, therefore, which it presents of an occasional winter-harbor for merchant vessels, and the facilities which the road presents for the conveyance of their cargoes to their proper destination, are, I conceive, of no inconsiderable importance, viewed either in relation to the interests of the Eastern Shore, or to those of the commercial cities of Baltimore, Philadelphia and Wilmington.

I have already, gentlemen, exceeded the limits which I had assigned to this letter, and must, very reluctantly, pass over a branch of the subject not less interesting, nor less fruitful of mutual advantages than those I have already spoken of; I mean the benefit which this improvement is likely to receive from, and to confer upon the country through which it is proposed to carry it—its connection with the agricultural improvement, and the general amelioration of the condition of the peninsula.—These and other topics must be reserved as subjects to be considered in a general report hereafter to be furnished.

The plans and profiles of the ground, and of the several parts of the work, and the details of the estimates, are already prepared in the rough form, and will be in readiness to accompany my report, on which also some considerable progress has been made, should it be in my power, as it has been certainly my desire to complete it. Of this, however, I have no expectation, as I am under orders which separate me from this duty, the moment my health is sufficiently re-established to permit me to travel. The general report which may be somewhat voluminous, and will embrace much detail, will necessarily occupy some time in its preparation; but it can be ready quite soon enough for any purpose for which the Commissioners may have occasion to use it.

It has been my intention also to give plans and estimates for the eastern line as far as it has been surveyed, and of the route which, on separating from the one on which the annexed abstract of estimate is founded, at or near the right bank of Sassafras River, would cross Back Creek at Chesapeake City, and pursue thence the most favorable ground, would cross Big Elk River, at or immediately west of Elkton.

The survey of the ground over which the Branch Road, south of Princess Anne, leading to the Virginia line, with the intention of uniting hereafter with the Virginia Road to Cherry Stone, has been completed so far as the compass work applied to it. We are, therefore, enabled to assume the length of the branch, and this, together with the striking resemblance which much of it bears to the ground over which the levelling was carried for the location of the main stem near Princess Anne, enables me to give an approximate estimate for this branch, and which will be sent to the commissioners whenever they may desire it.

The lateral roads contemplated to be surveyed under the resolution of your Legislature, No. 108, it has as yet been impracticable to survey, but their location, I presume, will be made at as early a period as possible,

I have the honor to be,
Very respectfully,
Gentlemen, your obedient servant,
JAMES KEARNEY.

Abstract of an estimate of the cost of the main stem of the Eastern Shore Railroad, of 118¼ miles long, and of the cost of a steam boat line from its south-western termination, near Tangier Sound, 85 miles to Portsmouth, in Virginia.

For the road,	Dolls. Cts.
For 1,129,076 cubic yards, excavation and embankment,	263,892 27
For clearing and grubbing,	11,397 00
For bridges and culverts,	120,928 00
For sleepers, string pieces, wedges, and iron for superstructure, and for crossings and sidings,	302,034 50
For depots, water stations, wharves and fencing,	70,000 00
For purchase and condemnation of land,	21,500 00
	$945,773 77
Contingencies at 12 per cent.	109,754 85
Total cost of the road and its appurtenances,	1,024,378 62
For locomotive engines, and for passengers' and burden cars,	81,000 00
For two steam boats,	150,000 00
Total estimate, November 10, 1836.	1,255,378 62

The subject of Steam carriages on common roads, has excited little or no attention with us. In England the case is different; experiments have been made, and continued for years, and the subject is growing to be such an important one, that the question of tolls upon such vehicles has called forth a vast deal of excitement among those interested. The following minutes of evidence on that subject, are taken from the London Mechanics' Magazine, as we find them. We hope the length of the article will not deter any one from reading it, containing as it does, the best information of the practical operation and every-day work of their machine. Many useful hints may be found, and the amusing style of question and answer, take much from the dullness of the detail.

From the London Mechanics' Magazine.

MINUTES OF EVIDENCE BEFORE A SELECT COMMITTEE OF THE HOUSE OF LORDS ON THE TOLLS ON STEAM CARRIAGES' BILL. SESSION 1836.

MR. GOLDWORTHY GURNEY

Has had no engine on the road since 1831; before this period they ran a good deal in the neighborhood of London. Went to Bath and came back in 1829. Carriages in 1830 were established between Gloucester and Cheltenham, and ran there uninterruptedly for four months three times a day. They carried upwards of 4,000 persons over 5,000 and 6,000 miles of ground without any hurt or accident. And not running on that road now, because they were stopped by turnpike acts, which laid a toll of 11s. each time of passing at both gates, a distance of eight miles, making 22s for each journey.

His carriage can be made to run round a circle of twenty feet diameter, at a speed of six or seven miles an hour.

Cannot say exactly how many miles his carriages have run along public roads; but should think 15,000 miles.

Has not built an engine, nor had any one on the road since 1831.

Thinks that if his carriages had gone on and been persevered in they would have prevented some of the railroads now in operation. Is quite satisfied of that. By a little experience and management, steam carriages will go nearly as fast and fully as safe on a common road as on a railroad. After a twelvemonth or two years observation the public would be satisfied with them, and a rapid rate would be permitted. It is rather a singular fact that when you are travelling at the rate of eighteen miles an hour in a steam carriage on a common road you are not sensible of the rapidity.

Have you ever travelled eighteen miles an hour in a carriage on a common road?—Yes, I have gone eighteen miles within an hour.

From what place?—From Finchley to Regent's Park and back again twice, up the Highgate Tunnel. We travelled the first twenty-four miles in two hours in our journey to Bath.

Have all the boilers tried on common roads been attended with loss of life, if constructed above a given size?—I would not say that all have, but all I am acquainted with.

What is the extreme size you would recommend?—The extreme size for public safety I am of opinion ought not to exceed eight or nine inches diameter. I think it essential to keep within that size; they may be reduced still lower. I am sure all engineers of experience would bear me out in stating that this size is sufficient for all purposes on common roads.

The Committee are to understand that your carriage, though less in weight, has *more power* than the locomotive engines employed on railroads?—Yes, compared to weight; on a railway they are very heavy.

Have you heard of an instance which occurred some two years ago of the gates on the Liverpool and Manchester railroad being carried off in the middle of the night?—I recollect hearing of the circumstance.

Would such a thing occur with *your* carriage, if it were to come against a turnpike gate?—It might possibly, by charging a turnpike gate with full steam, and carry it away; but a man must be mad to do it.

Do you conceive your power is sufficient to do that under ordinary circumstances?—I think not.

Have you heard of an instance of Mr. Hancock's engine striking the corner of a house?—I was in the country at the time I heard of the circumstances, but I do not know whose carriage it was; I do not think it was Mr. Hancock's.* I simply heard of a wall being driven in at Paddington. A great number of caricatures of steam carriages have certainly taken place; a great many undigested experiments have been made on the public roads, which have tended much to prejudice the public mind against the subject.

What means do you propose for preventing the establishment of other caricatures, as you call them, of your project?—I think the toll being placed on the weight of the carriage will limit them in size. The clause in the bill subjecting them to double pressure will be also another means; I think the clause limiting the size of the boiler will be the principal. Possibly, if the prohibitory tolls be taken off, and the subject be allowed to go on fairly, fair and legitimate carriages will alone be soon on the road.

In what manner do you propose to guard against the introduction of other carriages further than as the weight would prevent their running with success?—The weight of the carriage would be only one guard, the proof to which the boiler is submitted would be a second, and the limited size of the boiler would be a third. Those are as much as I can point out capable of legislation.

You were understood to state that there is no difficulty, however small the boiler, to raise the power of the engine?—However small the vessels composing the boiler, you may with vessels not exceeding an inch in diameter obtain forty-horse power, or even one hundred-horse power.

Do you suppose it would not answer for an individual to undertake to draw a train weighing twenty or thirty tons to pay a toll upon them?—In the first place, I think it would not be practicable to do it; secondly, the expense would be very considerably more than horses: for when we exceed a given relative weight the expense of steam becomes greater than that of horses.

Can you state what the limit is?—If I speak in engineer's terms, a horse power boiler should not exceed three hundred weight; if it exceeds this weight it becomes far more expensive than horses.

If you could have, without increasing the size of the boiler, a forty-horse power engine, it is perfectly evident you could carry three times forty hundred weight?—I think I am misundersrood. In regard to pressure. I have been speaking of the separate vessels composing the boiler; if one vessel will generate steam enough for a horse power, then it will require two for a two-horse power. If you require a forty-horse power, you must have forty vessels, each vessel or series representing a horse power. The boiler for producing steam sufficient for a horse power must be practically under three hundred weight.

In your engine for every horse power you would have a distinct boiler?—For every horse power there is a given number of those tubes, increasing in direct ratio as the horse power is increased; so the number of those must always be increased in that ratio.

You were understood to say you could increase the pressure on your boiler to any given extent?—Certainly. The tubes when formed together compose the boiler as a whole, every tube will bear the same pressure.

You were understood to have stated that a boiler could bear pressure to a hundred atmospheres?—I said it was capable of almost unlimited resistance.

How would you restrain any individual from making a pressure on a given tube of above one-horse power?—I hardly understand the question. If he was to double the pressure upon a tube, the power of the engine would be increased. This is a question more of force or intensity than a question of power. Series of tubes would work the engine under the power of one hundred to an inch, or at fifty; the rate would determine the power. What is gained in power may be lost in time. The actual power is represented by the quantity of steam, not by the pressure.

Your steam carriages are totally inapplicable for merchandise?—Quite so; only for passengers and quick travelling.

With how many carriages in their train?—Not more than one.

You can go, you say, at the rate of eighteen miles an hour?—Certainly it can be done, but the best practical rate is from twelve to fourteen.

How soon after the new tolls were imposed did you give up running between Gloucester and Cheltenham?—Not till they were imposed.

How soon after?—Directly.

Did you find it a profitable speculation?—The speculation belonged to Sir Charles Dance; he was the proprietor of the carriage; and the speculation was his. It appears from the accounts of expenditure and return that there must have been a considerable profit.

You considered it a profitable undertaking?—Yes. I have a letter of Sir Charles Dance's, in which he states it himself.

Can you say why Sir Charles Dance did not try running in the neighborhood of London, where there were no such tolls?—After he returned from Gloucester he became acquainted with Messrs. Maudslay and Field, the great practical engineers; they made alterations in the carriage, with a view of improving it. Experiments were made after that by Sir Charles Dance and Mr. Field, to determine the vale of these alterations; but they never ran, nor did Sir Charles intend to run till we could get the question of tolls settled; it was not the particular road on which the tolls were laid then that stopped us, but the fact that wherever we attempted to run, or contracts were made, we were met by an Act of Parliament.

Was there any instance of an act being passed except where some great improvement took place on the road, or the existing act had expired?—I cannot answer that question as to the cause directly which occasioned acts to pass; but this I can state, that on the great line of road between London and Liverpool, Liverpool and Edinburgh, which were contracted for, the turnpike tolls were laid; also between Glasgow and Edinburgh.

Are you correctly informed on that?—Yes, as to the amount of tolls, but not as to the motives.

Was it on all?—On particular trusts.

Are you informed under what circumstances those acts were obtained?—I am not informed under what circumstances.—I firmly believe they were misinformed as to the subject. There was no intention on the part of the trustees to put on tolls in the way of prohibition, but as a fancied just protection. In my petition in 1831 I stated this. I prayed that inquiries might be made, in order that just and equitable tolls might be placed on steam-carriages.

Then it appears it was only on certain roads that those tolls were laid?—On certain roads which occurred along the great roads, here and there, but so sufficient that if we take the roads from Liverpool to Edinburgh, taking all, "they would amount to 1s. for every mile run over, taking the whole distance;" this was stated in evidence by the contractor. If the tolls were laid on at the rest of the gates on the line in the same proportion, they would have amounted to 1*l.*

Are you not aware that you might have run during the periods, if the acts were still to exist; you might have run without any fear of an increase of toll?—Yes; but to what purpose? My object was not to run for profit as a coach proprietor; its public introduction was the work of great capitalists. I had not capital enough to introduce a subject of such importance; and the capitalists who were disposed to establish it, and had licences, were not disposed to go on with it when that spirit was shown on the part of the Legislature.

You had got the patent. Your object was not to run the carriages, but to sell the right of running carriages to other persons. You were not the person who gave it up, but they gave it up?—Yes.

You found no person who would undertake to run with your patent, and in that way you were injured?—Capitalists undertook to run to a certain extent; contracts were made with great capitalists, but those did not withdraw from their contracts until the bill for their repeal was lost in the Lords. If this bill passes I could to-morrow find capitalists.

How is it that no capitalist have been found to run on the road near London, where no such toll is imposed, and where two or three carriages are running?—I conceive if carriages are now running it is on the faith of tolls being taken off, or they may be experimental carriages; but the reason why capitalists will not run car-

* The carriage which performed this exploit, was Messrs. Macerone and Squire's.

riages in the neighborhood of town, is the fear of the spirit in which those acts have been passed.

It appears capitalists have been found to run other carriages. Hancock runs his own coaches?—I do not think any capitalist would be disposed to run short stages; the great advantage is in long distances; the stopping on short stages would increase the expense very much in the consumption of coke, and other expenses,

Do you apprehend Hancock's is an unprofitable speculation?—I have not a conception whether it is or not.

The question is, how do you conceive it arises that no person has bought of you the right to start a coach near London, when other coaches have been running and plying for hire near London?—In 1831, when acts passed, I shut up my establishment, and I retired from the subject, at that time feeling injury had been done to me, and thinking I was unfairly treated; when the repeal did not pass I sold all my materials for manufacturing, and gave up my manufactory. Capitalists would not apply to me after that, and I have not applied to them. I have been engaged in other pursuits lately, waiting in the full expectation that the question would be soon settled so as to enable me again to apply myself to the subject. I may be allowed to remark that the instant this bill passed the Commons, and it was expected it would pass the Lords, large capitalists have applied to a considerable extent, to whom I have granted licences.

MR. WALTER HANCOCK.

Has now three steam carriages running between Paddington and the Bank. The engines to each carriage are of two four-horse power; perform about twelve miles an hour, and consume from a bushel and a half to two bushels of coke an hour.

Have you ever been in the back part of your coach when it was travelling?—Frequently.

Have you seen whether any sparks came out of the bottom?—In the former part of my experience I found that a great objection, and I in consequence formed the fire-place so as to prevent any coming out, and now you may travel hundreds of miles in my carriage, and not see a spark come out of it. It was a matter of difficulty to get over the objection, but I surmounted it by excluding the possibility of any spark being seen.

You have stated that no sparks came out at the bottom; does any smoke come out at the top?—No. We have destroyed both the steam and smoke. Occasionally when the gas is not so clear as it generally is there has been a little smoke seen.

Do you use coke of any particular sort?—The common gas coke.

How do you let off your surplus steam?—I have two safety-valves. It is not heard; there is no noise of steam escaping.

How do you avoid that?—There is an apparatus in the carriage that prevents it, so as to deaden the sound.

The noise is there, but deadened?—The force is there, but deadened before it flows out in the common atmosphere; but this is not allowed; it is gradully spent.

Is that by taking it into a larger chamber?—I think there are about twenty or thirty of those chambers the steam passes through.

Do any sparks fly out at the top of the chimney?—I never discovered any; there have been great improvements of late.

What are your great improvements?—They throw the steam in a particular direction so as to come into contact with the fire, after it has passed the chamber; the steam not passing out, as in common locomotive engines, has not the power of drawing up the ashes as in the common engines.

Have you had any accident with your carriage?—I never had any accident myself; there was one accident occured, but there was no personal injury by it; I never had an accident occur with my carriages upon the road from the boiler.

Did any accident occur with any carriage?—Yes.

When was that?—I think three or four years ago.

None has occurred since that?—No.

Was that when the carriage was in motion?—It was on the first trial of a new carriage called the "Enterprise," a carriage now running for hire on the City-road. The man who was attending the machinery did not thoroughly understand the nature of the machinery, and he got one of his safety-valves at wotk. He had one valve tied down. We had what we call a blowing-machine to produce a greater heat; he had immense heat. I have no doubt he had the boiler filled full of water. The engines going veiy fast increased the pressure to as nearly as possible 1,400 lbs. upon the inch before it rent itself. The engineer, on his coming up the yard, says, "For God's sake release that valve." In the act of his turning about the rent took place; he was so paralysed he never could be restored.

How did it produce this effect; was he wounded?—No; not touched in the least.

Where was this?—Down at Stratford, at the manufactory.

You mean that the valve was confined?—Yes.

Was any one hurt upon that occasion?—No.

What became of the man?—The doctor could not bleed him, and he died in consequence of fright.

Have your boilers ever burst?—I have had rents in the boilers I suppose a hundred times.

Have any bad consequences ensued to the passengers?—No; quite the contrary. On the road we had been running very successfully all the day. We were taking in water. One of the chambers had given way, and when we were about to start again there was not half the pressure. We examined into the cause, and found that the bottom part of one of our chambers had rent about an inch and a half. We had just steam enough to get the carriage to the yard; it produced no noise whatever.

There were no inconvenient consequences resulted?—No; only the delay.

How long have you been at work on steam-carriages for the road?—I think the last nine years.

Do you know how many miles your carriages have travelled?—I should be quite within compass if I said 30,000 to 40,000 miles.

How soon can you stop?—I have been abliged to stop the machine within two to four feet. A boy fell down before the carriage, and it was not three feet when I stopped it.

Can you stop at that distance?—I can stop within two feet going up hill.

What is your usual pace of travelling?—I generally go eight miles an hour. In going to Birmingham we averaged sixteen and seventeen miles an hour at times for hours.

In how short a space can you stop on a good hard road?—That will depend upon the speed we are going.

If you were travelling eight miles an hour?—Within ten feet; the man puts his hand upon a lever to turn the steam off, and gives a signal to put on the break.

What is your charge per mile?—It is sixpence from Paddington to the Bank, which is about five miles; rather more than one penny a mile.

What is the charge of the omnibuses?—The same.

What is the weight of your machine and carriage altogether?—I should think about three tons and a half to four tons.

What tolls do you pay?—On the Paddington-road 4d., that is, on the City-road.

What is the rate on other carriages?—An omnibus pays 2d. for carrying the same number of passengers.

The danger of a boiler bursting is in proportion to its size, is it not—on the same principle that a cannon requires to be made stronger than a smaller gun?—That will depend upon the size and thickness. In my boiler all the braces would require to be stronger, and the outer plates stronger.—These boilers, I have no doubt, would bear a pressure of five to six hundred pounds the inch.

You stated that you make the same charge that the omnibuses do; could you afford it rather cheaper?—The money I have lost in experiments has been from 10,000*l.* to 12,000*l.*, and I have sacrificed nine to ten years full of my time. I ought to get as much as I can by the fare, but not to make it unreasonable.

Do you find your carriage fills?—Very well indeed.

Does it fill with persons who go in it onca from curiosity, or persons who regularly go by it?—We have regular customers.

Do you perform the space in less time?—Yes; we aveage from the city to Paddington and back froman hour and a quarter to an hour and twenty minutes.

What is the distance?—Nearly ten miles.

What do the omnibuses take?—Before I came upon the road they were two hours and twenty minutes; but now they do it in nearly the same time that I do, being driven to it by the competition through steam. It has produced a public good in that respect against the will of the drivers.

Do the omnibuses contrive to go as you do by an increase of their positive speed, or by abstaining from stopping?—Both.

What is the average pace you go?—About nine or ten miles an hour; the omnibuses go from eight to nine miles an hour.

How many horse power have you on your engine?—I think it is between eight and ten on the "Enterprize;" the "Era," I think, is about eight.

You reckon that, as equivalent to having how many horses attached to your carriage?—We reckon both of those to carry passengers equal to an omnibus with two horses, but I take into consideration the weight of the carriage and the weight of the horses. There is a mistake in the Bill. I think now that we shall pay double the tolls that other carriages do. We are not allowed the weight of the horses and the weight of the carriage. We suppose a horse draws one ton, and that is measured for a steam-coach; then there is no consideration of the weight of the horses and the vehicle drawn by the horses.

You think that even if this Bill passes in its present form, steam-carriages will be at a disadvantage compared with other carriages?—Yes. We ought to have two tons and a half instead of a ton allowed to one-horse power, to include horse and cart and load, the weight of which will amount to two tons and a half.

You calculate a horse power in a steam-carriage to be equivalent to three hundred weight?—Yes.

You call the draught by a locomotive engine of one-horse power equivalent to three hundred weight: consequently, before you could draw a ton, you must have three-horse power to do the same thing?—The "Era" carriage drew the "Infant." The "Infant" and the "Era" are about the same weight, about three tons and a half in weight. The average speed of the "Era" is about ten miles an hour, and with an engine behind it went about the rate of seven or seven and a half an hour. I consumed no more coke in the distance in those seven miles. According to that our carriages will draw about the same weight with the same steam and water, but we lose about two miles and a half per hour in speed. A horse power we consider equal to lifting 250 lbs. over a pulley, and that is very different from drawing; a horse power is considered as equal in drawing a ton. If we were to run one of those carriages the day through it would do as much as thirty horses.

Your carriage does work equal to thirty horses?—Yes; if they were to keep on the whole day. The work I am doing now is about equal to ten horses. Ten horses would be employed to do the same work. Five journeys from Paddington to London would take ten horses. This is about the same.

Do you go at the rate of ten miles an hour through the narrow streets?—No, certainly not; we pass through the streets very gently. I have been through the streets in the city hundreds of times, and persons would hardly know we were passing.

Do you concur in the opinion that there is much danger arising from a large boiler?—So much depends upon the principle on which it is made. I have no objection to a boiler of 100-horse power on my principle; there is no difficulty in making a boiler of the size of this room upon that principle; it can be extended or increased by increasing the number of chambers.

That is a number of small boilers joined together?—Yes. I can increase the size of the boiler by increasing the number.

The question refers to one large boiler in its own capacity?—Under any circumstances I rather feel timid in a steam-vessel with a large capacity. When we come to increase the size of the surface if has a greater effect to burst if metal is weak.

What is the largest boiler which you think could with safety be used on the public high roads?—A cylinder of twenty inches diameter, if the materials are well selected, and with the proper proportion of thickness, produces as great a safety in proportion as any other vessel. The cylindrical form is strong, but it is no stronger than any thing that is square, if the parts of the vessel are supported with sufficient materials. It all depends upon the thickness. The strain of a cylinder is the same as if it were of a given length, and was pulled at each end. If the thickness of the metal is not sufficient to sustain the pressure inside it will be sure to rent, and a cylinder of twelve inches may be made equally dangerous, if it is nat strong, as one of twenty.

Would the danger from blowing up a cylinder of ten inches be equal to that of blowing up a larger cylinder?—Certainly. A cylinder of ten inches, if it communicated to any other part of the boiler so as to make a continuous explosion, it would be nothing more than a discharge from the engine with greater report. If one of the bolts in my boiler was to break I should have twenty-five safety valves; there will be fifty apertures for the steam to escape, and there will be nothing like a report. All the seams or joints will be open, and the steam will escape, and lose its force.

It is in evidence that for public safety the extreme size of a boiler ought not to exceed eight or nine inches in circumference, and that it is essential to keep within that size. Do you concur in that opinion?—I think that a vessel of three times the size of it is capable of bearing the power. There is no necessity for limiting the size if the vessels are sufficiently strong.

The object of that observation was, that if it was not sufficiently strong, and did explode, no damage would arise; that is your opinion?—If it were twenty-four inches, and were to burst, I do not think that there would be any danger if no longer than three feet. I am making a carriage where the cylinder will be sixteen inches in diameter, and vessels containing a much larger portion of steam than a cylinder for a ten inch boiler.

What is the object of that carriage?—For passengers.

Do you conceive that this method of travelling upon the high roads can ever be adapted to the conveyance of heavy goods?—Yes; I think passengers may be taken in the steam carriage itself, and goods behind.

The question respects heavy goods?—Yes. Not the heaviest goods; perhaps they would not be so profitable; but light Birmingham goods, and things of that description.

It would not be likely to supersede the heavy waggons?—I think it is very probable it might; in fact I consider it a medium superior to horse conveyance, and inferior to the railroad in regard to speed, but likely to prove much more profitable.

Are you acquainted with Mr. Gurney's plan?—Yes. We differ entirely.

You imagine yours to be preferable?—I think the fair answer to that would be the great expenditure Mr. Gurney has made to bring it to bear; and that mine have been brought into use at a much less expenditure, say one-fourth, and all at my own expense. Mr. Gurney had the capital of a number of persons.

You consider the advantage of yours to be principally in economy?—I consider that my boiler stands the work much better than his. I had some difficulty in getting the proportions of strength of iron-work to the machinery.

Your other machinery is pretty nearly the same?—The arrangement is different. The whole is on springs in mine, and upright; and his horizontal, and a crank axletree; mine is straight.

You have both adopted a mode of getting rid of the draught through the chimney?—I have a blowing machine, so that I can increase the draught at pleasure.

Do you not use the steam for that purpose?—No; it makes too much noise; it would frighten the horses.

Does Mr. Gerney's carriage make any noise?—It made a hissing noise when I saw it, just before it went down to Cheltenham and Gloucester, from the escape of the steam into the chimney. There was a very good draught, but it would make too much noise for us. It is the same as is adopted on the railroad. If I adopt that plan I should frighten the horses off a common road.

You thing that his carriage would frighten a horse off the road?—I am quite confident that the letting off the steam without its being quieted would frighten horses. If we could use the steam in the chimney without producing any nuisance we should save a considerable expense.

You would not be afraid of any competition from Mr. Gurney running against you?—I should not be afraid of competition.

Do you think any other carriages which have been running can be put into competition with yours?—The thing stands entirely upon its own merits, and the best will be appreciated.

MR. JOSHUA FIELD CALLED IN AND EXAMINED.

Have you turned your attention to the construction of locomotive-carriages to run on public highways?—I have been employed in making experiments on this subject by some gentlemen as a matter of business.

Is there an engine goes by the name of Field and Maudslay's?—The machine in question was made for some gentlemen; it was not our property.

Will you state what was its weight, and how many persons it was constructed to carry?—It weighed, with water and coals, six tons; it was merely a drag to draw another carriage.

How many carriages would it draw; one or more?—It was generally applied to draw one ordinary omnibus; but it has drawn two and three.

Along what sort of road; a good hard road?—The roads about London.

Gravel roads?—Yes, or Macadamised.

Is it at work now?—No.

Was it meant to work?—It was built as an experiment.

To try what?—To try what might be done on the roads.

Did it succeed?—Yes.

What was the object you wanted to attain?—The object of the party was to give the subject a fair trial.

Did it ever run any length of time?—It performed many journeys last summer.

On the roads immediately about London?—Yes; it went various times to Reading.

Drawing carriages after it?—On those occasions it drew one carriage.

What rate did it travel at?*—From twelve, fourteen, fifteen, sixteen and even at the rate of eighteen miles an hour.

What was the pressure; how many horse power?—It is difficult to estimate the power of such a machine by horse-power without the resistance being known.

What other means of estimating the power of a steam-engine have you?—Fixed steam-engines are easily estimated by horse power, but the power of a locomotive engine varies with every rate at which it runs.

In proportion as you increase the rate you would lose the power; what you gained in velocity you would lose in power?—Not exactly so; it would take more power to drive a carriage sixteen miles an hour than it would twelve; at the highest velocity it would exert the greatest power.

Have the goodness to give the Committee some way of estimating the power of an engine in any way you think you can explain it most satisfactorily?—The ordinary mode of estimating the power of a steam-engine is to ascertain the effective pressure of the steam on the piston; the area of the piston, and the rate at which it travels, reducing this to pounds weight, moving one foot per minute, gives the power of the engine moving at this rate; then dividing this sum by 33,000lbs., which is supposed to be the weight one horse can raise one foot in a minute, gives the number of horses' power.

Apply that to your engine, if that is your mode of estimating the force of an engine; apply that, and tell us what the power of your engine was in that carriage?—That would be extremely difficult to do in this case, some of the data not being known; but I think the object of the inquiry would be answered by stating that the cylinders were ten inches in diameter, the steam from 50 to 100lbs. on the square inch, and sixteen inches stroke; such an engine may be estimated at about twenty horses-power.

You had a number of cylinders?—Two.

What length of time did you complete your journey to Reading?—Three hours and ten minutes average both ways.

How often do you go there?—It went five or six times down that road, some journeys to Slough, and once to Marlborough.

Did you go with it?—Once only to Slough, and once to Marlborough.

Did you observe that your carriage frightened the horses on the roads?—Occasionally horses would shy.

Have you seen any serious accidents?—No.

Did the horses shy more or less than at meeting a stage-coach?—More so, from the novelty of the thing.

Would a noise accompany your carriage?—A little.

From the carriage or the steam?—More from the hissing of the steam.

Were there any sparks; none were visible by day-light?—No.

Have you ever travelled by night?—On one occasion.

Were there any sparks?—A considerable number.

Have you taken any precautions or tried any thing to prevent the emission of sparks?—We had at one time a wire-gauze over the top.

Did it answer?—As it rather impaired the draft it was taken off, and was not on when we travelled by night.

Have you seen that wire-gauze applied to other locomotive-engines on railroads?—Yes.

Travelling at the same speed?—Yes; at all speeds on the railroads they have gauze.

Have you seen them travelling at the same speed, fourteen miles an hour, or whatever it is, with the wire-gauze on the top of the chimney?—Yes; and at much higher velocities.

But at that velocity did not sparks fly out, and would they not at a more great velocity than at a moderate one?—I never observed any.

When they travelled at that velocity have you observed the sparks fly out, notwithstanding the gauze?—I have only travelled by day-time.

Did you use coal or coke?—Coal, and that accounts for the great number of sparks.

Is yours a large chamber—the boiler?—It was divided into a great number of small tubes.

Of what size?—The largest was two inches in diameter.

Were they cylindrical?—Yes.

And so small as that?—The largest part exposed to the pressure of the steam was only two inches in diameter.

How much coal did you consume in an hour, do you know?—I cannot speak very accurately to this, as those experiments were made more to ascertain the effect than the quantities of coal consumed.

Did you observe what effect it had on the road; did it make ruts?—Not at all.

What was the width of the tire of your wheels?—Three inches and a half.

They did not sink into the road?—No, not at all.

Were the roads wet or dry?—These experiments were chiefly made in the summer, but the carriage has run when the roads were soft and muddy.

Then it was very dry weather?—Yes, for the most part.

Have you ever travelled by any of the steam-carriages that go by the name of Hancock's?—Once.

When was that; lately?—It was about eighteen months ago.

Do you know his constructions?—Yes, generally.

Do you consider it safe?—I think it is.

Where was it you travelled; on the New-road?—Yes.

Did you observe that the horses were frightened at it?—No.

There was no starting?—No.

Did the horses pay more attention to it than they did to the Paddington omnibuses or the Paddington stages?—I did not observe that they did.

You conceive the mechanism is such as to secure safety to the individuals who travelled by it?—Yes.

Did it seem to move and turn very readily?—Very easily.

You had no accident with it while you were upon it?—No.

Have you ever seen Mr. Gurney's steam-carriage?—I never saw one of Gurney's under way, except an old one belonging to Sir Charles Dance, quite altered as it regards the boiler.

But not Gurney's most improved and last-made carriage; his best carriage?—No.

Do you know the nature of the construction of his carriage?—Yes, as it was five years ago.

Do you consider his safe?—I did not consider the large flat-sided chamber safe.

But not latterly; it has a round cylindrical tube?—I do not know.

Do you know Colonel Macerone's?—No.

You do not know any thing about it?—No.

Are there any others you know, whose mechanism you are acquainted with?—I have seen Mr. Ogle's, but not at work.

Do you know the nature of his plan?—Yes.

Do you consider that safe?—Yes; I think the boiler safe.

Safe with respect to explosion?—Yes.

You have never seen it under way, therefore you do not know its effect?—No.

The only one you have seen tried is the one you built, and Hancock's?—The only steam-carriages I have seen moving are that we built ourselves, and an old one of Sir Charles Dance's partly composed of one of Gurney's original carriages, Mr. Hancock's, and one made by one of my partners, which was a railroad-engine, put on the road with plain wheels for experiment.

Have you seen that under way?—Yes.

Do you consider the mechanism of that such as to be safe for passengers?—Yes; as safe as the ordinary railroad-engine.

Did you find the horses start at that?—A little; not much.

More than at Hancock's?—I think so, as the noise is greater from the escape-steam.

Did Hancock's make a noise?—Not much.

Is it the rattling of the carriage, or the whizzing of the steam?—I think about half each.

They do not neutralize each other?—No.

You have never seen Gurney's?—No.

Did horses start at Sir Charles Dance's?—A little occasionally.

More than at Hancock's?—I cannot say, but should think them much the same in that respect.

Do you know the mechanism of that of Dance's?—Yes.

Concluded in next Number

[From the Mechanic's Magazine.

INTRODUCTORY LECTURE,

To a course delivered before the General Society of Mechanics' and Tradesmen, by James Renwick, L. L. D., Professor of Natural Experimental Philosophy and Chemistry, in Columbia College, New-York.

In opening the first course of public Lectures which has been prepared for this Institution, I cannot but feel that my task is attended with some difficulty. Unable to forsee the wants and wishes of an audience now for the first time assembled, I have been in doubt whether it would be best to adopt a strictly scientific, or a merely popular plan, or whether a middle course might not be preferable, in which the dry discussions of pure science should be relieved by illustrations of a more familiar character.

There has also, been a question whether the few lectures ought not to be devoted solely to such subjects as might possess the charm of novelty, and thus illustrate no more than the recent additions which have been made to philosophic knowledge, or whether they should embrace matters more familiarly known.

It has, after due deliberation, been inferred that this audience has not been collected merely for the purpose of learning what has recently been done in science, but would prefer to receive a connected view of the subjects which may be treated of; in which way, while mere novelties will not be wholly excluded, they will occupy no more space than their real importance entitles them to demand. It often happens that a new discovery attracts for a season an undue portion of attention, and different subjects have thus, in rotation, filled up a measure of the time devoted to the study of science, far beyond that which is due to their intrinsic merits, or their value in practical application. Thus, common electricity for several years demanded nearly half the time which was devoted to the physical sciences; it was then superceded by galvanic electricity; while at the present moment electro-magnetism and the polarity of light, are the fashion. Without pretending to undervalue either of these branches of knowledge, it is sufficient to say that they have not been considered of sufficient practical value to be introduced in the opening course of such an Institution as that at whose request, I have the honor to address you.

In determining, then, to have reference rather to the real importance of the subjects to be treated of, than any temporary interest they may have assumed from novelty or fashion, two distinct modes of proceeding have presented themselves. It might, in the first place, have been attempted to compress, within the prescribed limits of the lectures, a brief and general view of the whole extent of physical science. Such brief and general view might not be without its interest, but it would necessarily have been condensed within a space so confined as to render it extremely difficult to give to such of my hearers, as may not have had the benefit of a previous acquaintance, with at least, a part of the subject, any clear and satisfactory idea of the whole. This plan would also have labored under the disadvantage of excluding in a great measure, all experimental illustration.

In the second place, it is easy to select from the variety of matter included under the general head of physical science, a few subjects of important practical value. Each of these would then admit of being fully investigated, and full space would be allowed for rendering them interesting by experiment and apparatus.

The latter has, for such reasons, been considered the preferable plan, and this view of the subject has received the sanction of the very intelligent committee of the Institution.

In respect to the style, which it would be most expedient to adopt, I have, upon my own responsibility determined on framing the lectures in a plain and didactic form, rather than attempt to dress them in literary ornaments. For the subsequent evenings of the course, the reading of written lectures will be avoided as far as will be consistent with a clear and perspicuous exhibition of principles. Conceiving that it is probable, that, at least a part of the audience, has had no opportunity heretofore of instruction in physical science, and is therefore assembled for the purpose of acquiring elementary knowledge, the mode which experience has shown to be best adapted to that particular object will be pursued. To those of my auditors who have already made proficiency in such studies, this must serve as an apology, for bringing before them matters to which they are familiar. Still, even to them, it may not be uninteresting, to review what they have long since acquired; and to fortify their recollections by witnessing again facts and illustrations, which, however often repeated, cannot wholly cease to be worthy of attention.

If such impressions be not erroneous; to define the limits of the sciences which fall within the scope of my studies, and to point out what parts of them have been selected as the subjects of the present course, will form no unfitting introduction.

The physical sciences present a wide and extensive field. More than two centuries have elapsed since the proper mode of studying them was revived, and the few sound principles with which the ancients were acquainted, restored to their proper rank in the scale of human knowledge. From the time of this revival up to the present hour, no year, and indeed hardly a month, a week, or even a day, has elapsed, which has not added to the present stock of facts. From these facts, general principles and laws have been continually deduced, until the science of natural philosophy, which was at first of so little extent as to permit of its being successfully cultivated in connection with others, has been necessarily divided into many distinct branches, each of which may well occupy the whole attention, even of the most powerful intellect.

Physical Science, or, in other words, Natural Philosophy, has for its object, the laws which govern the phenomena and appearances of the material world. Every thing, therefore, which is capable of perception by our senses, falls within its province, as well as all the agents which are efficient in influencing them, whether these agents be themselves objects of sensation, or known, only by the effects they produce on the bodies which are.

The world with which we become acquainted by the evidence of our senses, and to which the name of material has been given, is made up of many substances extremely diverse in their specific characters, and yet agreeing in a few general properties, which enable us to class them all under one general term. This term is Matter.

In what the essence of matter may consist, we know not; nor is it probable that we shall ever learn, in this limited state of existence, the final causes by which it is separated, on the one hand from mere space, and on the other from spiritual existence. Metaphysicians have indeed with subtle ingenuity speculated upon these causes, until they have resolved matter into collections of mere occult qualities: while others have refined until they have denied its existence altogether. Such refinement of ingenuity appears almost ludicrous to the uninstructed mind, and it is not less repugnant to those who study physical science in the true spirit of philosophic inquiry. To those imbued with this spirit, or such as enter upon the study unbiassed, it is unnecessary to refute such sophistry. The error lies at the root of the inquiry; and it may be safely asserted, that, wherever metaphysical arguments are admitted into the discussions of natural philosophy, the chance of discovering truth will be in a great measure lost. It is from our senses, either unassisted, or aided by the instruments which the advance of science has both called for and supplied, that the whole basis of natural knowledge is to be derived, and it is to our senses that we must finally appeal to determine whether the inferences built upon that basis are correct or not.

In making the testimony of our senses the basis of all our knowledge of physical science, we proceed in one of two ways, namely: by observation, or experiment.

We are said to observe, when we watch for the phenomena as they occur in the regular course of events, and merely note the appearances which these phenomena present. We are said to experiment, when by means of apparatus or preparations, we cause actions to begin, which would not have occurred in the spontaneous order of nature; in this method of proceeding, we may not only induce an action, which might not have taken place without our intervention, but we may modify, and in some cases, cause it to cease; but we can do no more. The phenomenon itself is due to natural causes which are beyond our control, and escape our scrutiny. Hence experiment, after all, is no more than a case of the more general method of observation, the proper time for which, we may choose for ourselves, but whose result is independent of us.

These two methods cannot be adopted indiscriminately, nor is each applicable in every different instance. Thus, if we wish to examine the phenomona of the heavenly bodies, no other method is practicable but that of observation; their motions proceed in a space far beyond the limit of any of our senses except that of sight, and the several appearances which they present, occur at regular periods, but in a way which is beyond any control or modification on our part. Astronomy is therefore emphatically the science of observation. But when we wish to examine the internal constitution of bodies, we find the elements of which they are composed, united by forces which require the application of a more intense force of the same description, or of some powerful physical agent to overcome them. Such forces we can call to our aid, and such physical agents we can control and employ. Chemistry is therefore as emphatically the Science of Experiment. Other departments of Natural Philosophy may be investigated by mixed methods, in which observation and experiment, each fulfil their proper office.

It may perhaps be urged that the evidence of our senses is far from being infallible, and there is probably no person persent who may not, at some time or other, have been led into error, by relying upon this evidence alone. We have however the means of comparing and combining a number of different appearances, and of reasoning upon the basis of other phenomena, in relation to which no doubt can possibly exist, and we may in this way correct what would at first give rise to erroneous impressions, and actually deduce and demonstrate the true state of things, from the very perceptions which at first appear to contradict it. Thus, a savage or a child, who for the first time contemplates his own image in a mirror, may think this image the actual body of another person. By bringing the sense of feeling to the aid of that of sight, he will speedily learn the existence of the mirror, in what at first appeared an empty space, and careful observation will prove that the position of the image is dependent upon that of his own body, and follows his own motions; but if the appearance were to occur for the first time to one acquainted with the general laws of the reflection of light, he would be at once enabled to include the phenomenon of the image among the cases of that general problem. So also, our senses appear to inform us that the sun rises daily in the East, and performs his appointed course until he sets in the West, over the firm and apparently immoveable earth. So soon as his light has faded, innumerable stars show themselves which seem to be affected by a similar motion. But he who has made progress in physical science, can, by the very comparison of these apparent motions with each other, prove that they are all owing to the rotation of the planet of which we are ourselves inhabitants; which, so far from being of the importance that a comparison with our own pigmy stature leads us to beleive it, is a mere point in the vast system of the universe, and instead of being at rest is in a state of continual and rapid motion. The sun himself can be shown to be a million times and more, as large as our puny earth, and many of thestars, which to us seem mere luminous specks, to be even greater than that splendid luminary. Yet the whole of this knowledge rests for its basis upon the very facts, which to our first impressions, seem to demonstrate the reverse of the truths which are finally attained.

In order to understand how truth may be reached, even from contradictory appearances, it is expedient that we should treat in a brief manner of the mode of proceeding in physical science. This method is founded in nature, and is not only that by which philosophers proceed, when they pursue a proper mode of inquiry, but is that, by which children and the rudest individuals of our race, learn whatever is absolutely necessary to their safety and sustenance. As we advance in age, and in mental cultivation we are often tempted so deviate from the path which nature has pointed out, in the pursuit of more easy roads to truth; prompted partly by indolence, which induces us to endeavor to avoid the slow and laborious method, by which alone, true knowledge can be acquired, and partly by the influence of bad example. It therefore becomes necessary that rules for conducting the process should be laid down, and that we shall never be satisfied that our inferences are correct unless these rules have been rigidly adhered to.

Concluded in next Number.

Agriculture, &c.

From the Farmers' Register.

OBSERVATIONS MADE DURING AN EXCURSION TO THE DISMAL SWAMP.

Early on the morning of Nov. 19, our party assembled at the northern end of the Land Company's Canal, about a mile from Suffolk. To this point all their shingles are brought by boats—and passed over to the tide creek close by, and which is about 20 feet lower in level, where they are received by vessels which carry them to the northern cities. Our party was mostly composed of gentlemen of Suffolk, who most kindly aided all my views and wishes. The boat was flat bottomed, long and spacious, belonging to the Land Company, and designed solely for conveying passengers in trips to the lake, for pleasure or business. It was well suited for the purpose, and was well manned and provided for this occasion.—The mode of propelling the boat is the same as is always used for the shingle boats. A strong pole is fastened across the square head, and another in like manner at the stern, at right angles to the boat, the other ends extending across the tow-path on the margin of the canal. By these poles the men push the boat along in a rapid walk, and at the same time lean on them so as very much to lighten their labor. Four experienced hands accompanied our boat, who relieved each other from time to time. It seemed strange to me that horse power had not been substituted for that of man for this business; for though it would be costly to provide enough solid earth to make a tow-path for horses, when once done, one horse would pull as many boats as perhaps 15 or 20 men could shove.

This canal was dug 12 feet wide, 4 feet deep, and is 10 miles in length, and very nearly straight. Its water is almost a level —a gentle current flowing from the middle part towards each end. The firm land soon was passed through—(in which the banks are from 1 to 2, and for a short space 3 to 4 feet high—) and we then entered the swamp. The tow-path still continued to be a firm but low bank for a short space more —and then for the remaining 7 or 8 miles was scarcely above the surface of the adjoining swamp, and merely afforded better footing by being trodden, and thereby consolidated, and by the poles and other wood placed along where water covered the ground for the boatsmen's steps. The earth thrown out in digging the canal must have made on each side a wide and high bank. But so little elevation now remains, that it furnishes alone sufficient proof of the correctness of my previous opinion, that such land, if kept dry, will rot away, leaving nothing but the very small portion of earthy matter in the soil. A permanent horse towpath could therefore only be made by earth boated from the firm land, or by wood. Wooden roads for mules are made throughout the swamp, to convey the shingles to the borders of the canal, or lake—and these roads are so rough, and bad, that it seems as if as much power must be lost on them, as by using hand labor to propel the loaded boats. Some of these roads are 5 or 6 miles in length—and their united length must be very great. They are constructed as follows. Double lines of poles are laid in the direction of the road, about the distance apart of the cart wheels. Across these are laid split pieces, merely long enough for a single track of a cart, of 4 to 6 inches in diameter, and as angular and irregular as may be supposed, from mauling. These lie close to each other across the sleepers, and present a very rough and unstable surface for the wheels, and still worse for the feet of the mules. Still, I was told that on such roads, a mule will draw as heavy a load as on ordinary roads, on land. If so, it would seem that they would draw ten times as much on smooth longitudinal tracks, or such wooden rail, or tram-roads, as are described in Vol. I. of the Farmers' Register.

The escape of the water in numerous places over the margin of the canal, served to explain how there could be a regular current always setting towards the *closed* end of a level canal.

We soon reached juniper trees, (or white cedars) and the softest swamp soil, in which situation only, these trees grow. I had never before seen a juniper—and should not now have distinguished them from the red or true cedars, but for their situation, greater height, and the beautiful straightness of their long naked trunks. The length of the branches, and the spreading and bulk of the whole top, bear but small proportion to the diameter and length of the trunks of the juniper. The trees are beautiful, and especially when they stand thick, forming a high roof of their evergreen tops, supported by numerous columns formed by their long and straight stems. They are not often large, or are too valuable as timber to be permitted to reach much size. Most of our whole course was through the "burnt woods," a large track of which nearly all the growing trees had been formerly killed and consumed by great fires in former times.

Though the form of the juniper is well adapted to stand on its soft and yielding foundation of mire, still when large it is easily overthrown by winds—and perhaps as many such were lying beneath the surface of the peat, as were standing erect. When thrown down, they are soon covered by water, and keeping wet, they never rot, except the sap wood, which is less than an inch thick. Much of the timber now got, is from trees long covered a foot or two deep under the surface soil, and which are found by the workmen by sounding, and then dug to and sawn off into shingle cuts, though half covered by water. Some of the great fires, in certain places, have brought to view and into use, more good timber than they injured, by burning the soil down to where numerous trees had lain perhaps for a century concealed, and their existence unsuspected. By the way—in digging down into the swamp, charcoal, the plain evidence of the former fires, and of the height at which the surface had then stood, is often found at several feet below the present surface—thus giving practical proof of the growth of the soil in thickness by the operation of the natural causes before reasoned from. But I get on slowly upon the canal.

The canal, when perfectly straight for a long course, with the trees on each side almost joining their branches across, presents a beautiful vista and perspective view—and with our singular boat and its equipage would have furnished a fine subject for a painter. Still more striking were the same scenes when we returned at night, with the bright light of our fire partially displacing the general darkness. The landscape painter would find many new subjects in this region, where every thing is strange and new—and so might the student of botany and other branches of natural history. A writer like Irving might here find enough interesting matter for description and narrative, to fill a volume. The land and the water—the vegetables and the wild animals—the inhabitants in their habits and occupations—are all as different from the surrounding country, as if the traveller had suddenly passed into a far remote region.

I landed several times in the course of the day, at places of different appearance and growth, and of different levels, and walked far enough to see the swamp in all its various conditions. The parts most easy to walk through (and these are scarcely passable) are where the original gigantic forest growth has not been destroyed or hurt by fire, or where the reeds, forming a thick growth, have all died, and thus permited one, with some effort, to break his way through such a brittle though close barricade. The getting of timber being confined to the juniper trees, and these being of comparetively small size, the original grandeur of the forest is but little impaired by the labors of man. The cypress is here the king of the forest—and this, with the gums, and all other trees except juniper, are left untouched. The cypress grows on the same kind of land with the black gum—which, as before stated, is much firmer than the juniper lands. The farmers here, who have given any consideration to the subject, suppose that though the juniper land, if drained, would sink and soon fail, that the gum and cypress lands would be permanent. No doubt they would be *more* durable§—but the vegetable matter that will *burn*, will also *rot*, if placed in circumstances favorable to fermentation: and soon or late, all the *excess* of vegetable matter in the soil, not combined with, and fixed by the earths, and especially by calcareous earth, must rot away, and disappear.

We passed through sundry such changes of land, and of its vegetable cover, as have been described—but still a general uniformity of appearance prevailed, owing to the deep gloom and miry surface of the surrounding swamp, the sluggish and dark water of the canal, and its scarcely varying course. The only sign of life was seen at intervals in a "camp" of a pair of shingle-getters. Their houses, or shanties, are barely wide enough for five or six men to lie in, closely packed side by side—their heads to the back wall, and their feet stretched to the open front, close by a fire kept up through the night. The roof is sloping, to shed the rain, and where highest, not above four feet from the floor. Of the shavings made in smoothing the shingles, the thinnest make a bed for the laborers, and the balance form the only dry and solid foundation for their house, and their homestead, or working yard. Yet they live plentifully, and are pleased with their employment—and the main objection to it with their masters, (they being generally slaves,) and the community, is that the laborers have too much leisure time, and of course spend it improperly. Their heavy labors for the week are generally finished in five, and often in four days—and then the remainder of the week is spent out of the swamp, and given to idleness, and by many to drunkenness. All the work is done by tasks: and the employers have nothing to do but pay for the labor executed. About 500 men are thus employed in the whole swamp, by the Land Company, and by numerous individual land owners. With all their exposure, the laborers are remarkably healthy, and almost entirely free from the autumnal fevers that so severely scourge all the surrounding country. It is said that no case has yet occured of a shigle-getter dying of disease in the swamp—nor did my informants know that any one had been so sick as to require to be brought out. A young white woman lately died, whose father and his family have lived ten years in the swamp—but she had just returned from a visit of some length to the open country outside. It is well known that the borders of extensive peats in Britain are healthy, and in that respect are very different from the marshes of the same regions.

At length we came to another straight canal, (the old "Washington Ditch,") by entering which a slight deviation was made from our previous straight course. This turn obstructs the view, and thereby adds to the pleasure of the surprise that immediately follows. But a few yards more are traversed, when the boat passes, almost without warning of a change, from its narrow and shaded channel upon the wide-spread surface of the lake. The boatmen, having exchanged their poles for oars, rowed nearly two miles toward the centre of the lake. It is encompassed to its margin every where by a thick growth of tall trees, in which the cypresses, by their greater height and singularly formed summits, show most conspicuously. The general level horizon presented to the eye by the surrounding forest, is made lower and irregular in two large places on opposite sides of the lake, plainly indicating the wide and desolating passage of the last great fire, which left nothing alive in its track, nor any thing standing, except some of the largest trunkss of trees, many of which still remain, though naked and scathed by fire to their summits. But so rapid is the growth on this swamp, that the burnt land is generally and closely covered by a young forest of considerable height, and among which are junipers of twelve inches through, which are already used for shingle timber.

It was a bright and clear day, and not a breath of wind was felt before emerging from the canal. But though there imperceptible, there was enough wind to ruffle the surface of the lake. The observer would at first suppose that the lake was in a great measure secured from the effect of wind, by its inland situation, and its close surrounding forest barrier. But high as is this barrier, it is low in comparison to the elevation of high lands in general—and the low level of all the adjacent country, and the vicinity of the Atlantic, permit to the winds such a sweep, that Lake Drummond is remarkably subject to their effects; and the violence of storms, is here about as commonly exhibited as on the sea.

The water, though clear and transparent, is so deeply colored by the extract of vegetable matter, as to seem black when seen in the lake and canals. When taken up in a glass, it is found that this deepness of color is delusive—and that it is about the color of pale rum or wine. It is every where through the swamp the same in quality, though not always as deeply tinged. It is, by some, considered medicinal, and is preferred for drinking by all the laborers, an others most accustomed to its peculiar and at first, disagreeable flavor, to any other water whatever. Some twenty-five years ago, invalids, and especially those suffering under pulmonary affections, were in the habit of visiting the swamp in the summer, to drink the swamp water for improvement of health; and they often remained for weeks together at a tavern on the Dismal Swamp Canal, beyond the opposite side of the lake.

The water in the lake, is now about 18 inches below the usual level, and of course we found the swamp so much the drier, and more accessible, near the borders of the lake. But notwithstanding this cause for the unusual dryness of the surface, and notwithstanding also, the thick carpet of recently fallen leaves and other vegetable matter on the surface, sustaining the footsteps, I was continually reminded, by the yielding of the miry earth below, of the unsoundness of the support. Through the greater part of the year, the basin of the lake is full to the brim, and overowing at many places into the surrounding swamp. The water in the Land Company's canal through which we passed, however, was then kept at its ordinary height, by means of a wooden stop-gate placed across the mouth of the canal.

The fish of the lake are of species similar to those of the ponds and fresh water streams of the neighboring country—but of some, the sizes are much greater. The gar is sometimes seen above five feet long. Some kinds of the fish are highly valued, and dining on them is not the least enjoyment of the pleasure parties that often make excursions in summer to the lake.

Reeds, at remote intervals, bear seeds which have a considerable resemblance to wheat, and which will make tolerably good bread. These seeds are so seldom borne and are usually so few, that most persons do not know of their existence. Whenever a reed brings seed, it dies the same autumn. A few years ago was a general and great "reed mast," as a full bearing of seed is here called—and all the reeds consequently died at once. The present growth is in many places as thick and as beautiful as ever—varying however in height in different places, as if of different years' sowing, from 18 feet to 9 or less. But it seems as if nature demands a change of crops in this as in many other cases. I infer this from walking into large pieces of ground covered by a former growth of reeds, of which all had died in the last great mast season, and not a single living reed had followed, or was seen on such places. It is a vulgar error that the reeds bring seed once only in seven years. There are few more beautiful single plants than a reed of large size—and their general appearance is as pleasing when in smaller size they stand so thick as to form an almost impenetrable undergrowth.

It is not known to most persons that bears still inhabit the Dismal Swamp, though long ago driven from every other part of lower and middle Virginia. But proably most have thought, as I did before this visit, that they were so rarely met with, that the killing of a single one would be a matter for great exultation, and cause of some notoriety to the huntsman who was so lucky. But I now learned that they were so numerous, that there were but few men who resided near the margin of the swamp who had not killed one or more. A youg gentleman of our party, had shot several dozens of these beasts. He told me that the largest weighed, after being skinned and gutted, more than 500 pounds. They do not usually weigh half as much. It is difficult to raise many cattle or hogs on the adjacent farms, though the swamp furnishes such abundant food for both, owing to the slaughter committed on them by the bears. A bear will with ease kill a full grown cow, and has strength to drag away the carcass to a suitable hiding place. No dogs will hunt these animals to much purpose, and therefore it is not often attempted. The most numerous pack will seldom ever bring them to bay, and will never attempt to seize on them. The bears are traced and found by the hunters, by listening for the noise of their nightly drepredations in corn-fields, or among live stock, or when breaking the limbs of the trees they climb in search of acorns or gum berries: or they are baited and killed by traps, or havily loaded set muskets, the latter being a common and successful mode of destroying them. I heard related by the gentlemen of our party, and by the boatmen, sundry accounts of such adventures—and enough could easily be had to fill a second volume of Davy Crockett. Indeed, the story of one remarkable adventure which has been bestowed in print on Crockett, I believe, or if not, on some other western bear hunter, I found had been pilfered from the honors of an old borderer of the Dismal Swamp: for whether the story be true or false, (and it is fully believed here,) it had been told by the hero of it for forty years before his death.

Some more formal testimony of the great number of bears in the swamp was presented at the recent meeting of the Land Company, in a written proposal submitted to them by an individual for getting up their oak timber. This paper stated as a reason for their taking such measures, that the oaks were suffering, and many dying under the effects of the depredations of the bears. This statement which would otherwise have been to me impossible to conceive a meaning for, was explained by the account received of the habits of these annimals. Heavy and apparently clumsy as they are, they are expert climbers, and in that manner seek the gum berries and acorns, which, in their season, form a favorite part of their food. To reach the acorns on the extremities, they draw to them and break off the limbs, even when of large size—and into these broken places worms of a particular kind enter, or eggs are laid, as in the case of the pine bug, and in time the trees are killed by their borings.

A still more ferocions animal found here is the larger of two species of what are called *wild cats*. This name is certainly misapplied—but my acquanitance with this branch of natural history is not sufficient to enable me to fix the kind of either animal, from the descriptions given. The larger is brown, with a short tail, and is about as large as a middle sized or rather stout dog. The smaller kind is mole-colored, and has a long tail. Pole cats are also sometimes found in the borders of the swamp.

The most singular recent fact with respect to beasts of prey, is the appearance here of a solitary wolf a few years ago. As no wolf has been heard of east of the mountains for many years, the kind of this destructive animal was not suspected until long after he had been committing his ravages on the sheep about Suffolk—and more than a year passed before he was at last killed. His howling had often been heard by the inhabitants of that town, so near did he forage—but as his shelter in the swamp was perfectly secure from intrusion, and he moved out only by night, and as no dog would pursue him, it seemed long impossible to destroy him. He at last, like many warlike or predatory heroes, from Sampson down to Macheath, fell a prey to female attractions. Tired of celibacy, he was seeking a mate, though of a different race—a bitch at a farm house: and her other suitors made so great an outcry over the foreign intruder, that his presence was discovered, and he was shot.

Upon inquiring for some one who had witnessed and was able to describe the great fire of 1806, the boatmen referred me to old Toby Fisher, who was then, as he still is, and has continued to be, a shingle-getter in the swamp. Accordingly, we visited Toby's camp—and his account was readily obtained. The first indication of the extent of the fire was the uncommon prevalence of smoke, and its long continued increase. But a shift of wind would remove it from the neighborhood of the laborers, and for as much as a week together they were free from it. At last, the fire approached so near that the falling of the great trees was heard in rapid and continued succession, like the reports of guns heard at a distance—and when still nearer, bears and other "varmunts" were seen fleeing from destruction, and some times singed and lamed from having been forced through the fire. At last the laborers nearest the approaching flames were driven in, and in such alarm, that all hastily embarked on the lake, and left the swamp. From 30,000 to 50,000 shingles, ready for market, which were the property of a single individual (the father of one of our party,) had been previously thrown into the old canal—but without obtaining much of the expected effect in saving them from the flames. The upper layers, above the water, having taken fire and been consumed, and their weight removed, the next layer would rise to the same height—and though wet, were soon dried enough, by so powerful a heat, to take fire also. Thus the shingles, which had been completely submerged, continued to rise and to burn, until but a small part was left. The fire continued about a month, and passed over the greatest part of the swamp. From other authority, I learned that the soil was in many of the dryest places burnt down as deep as two feet, producing such effects as have been already mentioned.

To such a fire, in former times, acting on a still dryer state of the swamp, it seems probable that the lake owes its existence, by the soil being burnt so low as to allow water to be retained, and of depth too great for plants to grow therein, which otherwise, would have recommenced a growth of peat and by it ultimately have filled again the void. That this vast basin was thus hollowed out by fire seems to be proved by stumps at the bottom being found charred on their surface—by the perpendicularity of the banks—and the operation is rendered probable, strange and great as the effect may be, by the reasonableness of its taking place, when the supposed existing circumstances are considered. I do not suppose that the basin was burnt to its present depth—and merely because it is not likely that the earth could have been dry to the depth of fifteen feet, or even half that depth. But if burnt to three feet only, and then filled with water, the continued growth in thickness of the margin of the swamp generally, in the course of ages would raise the surface to fifteen feet above the present bottom of the lake.

But if the swamp soil is growing in thickness, and (as I suppose) the lake in depth, it is also believed and with much appearance of truth, that the lake is likewise continually growing in superficial extent. That this is taking place along a large part of its margin, is evident to present observers, and still more to those who remember the state of things many years ago, and have witnessed the gradual encroachments of the water. Some however doubt whether other parts of the shore may not be growing, by filling up. I do not see why the water may not be spreading on all sides. The violence of the waves, in high winds, must undermine and wash away the banks—and of the earth thus removed, the lightest parts are dashed over upon the swamp, where they dry and rot, or otherwise add to the depth of the soil—and the more earthy and heavy, serve to raise the bottom of the lake, and the more so where nearest to the banks—and in this manner to cause the regular deepening towards the centre that is found to exist. Until the parts thus filled up shall rise near enough to the surface to support plants, and thus gradually grow to be high peat again, the lake must be widening on every side to which the waves are driven by violent winds.

The following results, showing the proportions of vegetable matter contained, were obtained by subjecting to trial different soils of the Dismal Swamp. The method used was to measure the bulk of each specimen, by pressing it moderately and equally into a measuring glass, marked at equal portions of an ounce of water each. The measured portions of earth were then separately exposed, in an iron vessel, to a strong heat, for one or two hours, until each seemed as much reduced by combustion as could be by such means. Coal'y matter still remained with all the ashes, showing that the burning was not completely finished. All these soils have been before described, either particularly, or generally. The amounts lost may be supposed to show the comparative proportions contained, of vegetable matter.

1. Of the soil of the reed covered swamp land (Mr. Daniel Jordan's) described page 517, taken about $1\frac{1}{2}$ or 2 feet from the surface, 3 parts (oz. measures,) lost in bulk, by burning, $2\frac{1}{4}$ parts, or 75 per cent.

2. Of the gum swamp soil, also Mr. Jordan's described page 517. taken from 1 to 2 feet below the surface, (but quite free from any mixture of the clay sub-soil)— 3 parts lost, by exposure to heat equal to any used, only half a part—or 16 per cent. This became black by burning, but could not be made to take fire, as the other specimens did. So small a loss was unlooked for.

3. Of the gum and cypress swamp soil near the north-western side of the lake. This was presumed to be some of the highest and firmest land, as it had been ditched and cultivated by old Draper in turnips, the best of which were as large as musket bullets, and had leaves 6 inches long. The specimen was free from unrotted vegetable matter. Five parts lost by burning $4\frac{1}{2}$ parts, or 90 per cent.

4. Of juniper soil, taken from 6 to 10 inches below the surface, and below all living roots or unrotted vegetable matter. The specimen was a black slimy mud, which gave no indication to the eye of having an excessive proportion of vegetable matter. Eight parts (half a pint) of the soil after burning, left one third of a part—showing the vegetable matter destroyed by fire to be 96 per cent. This specimen and the next, only, burnt with flame for a short time.

5. Soil of gum and cypress, under its original growth—about 200 yards from the north-western side of the lake. The specimen taken from six to ten inches below the surface, and free from living roots, or unrotted vegetable matter. Eight parts (half a pint) was reduced by burning to one third of a part, or lost about 96 per cent. This specimen was burnt at a different time, and with more powerful heat than the others.

Before closing these remarks, some speculations will be submitted as to the feasibility and policy of draining this immense body of swamp, supposing it permitted by the laws, and not opposed by any existing rights or interests.

In comparison with the magnitude of the object, it would seem to be both a cheap and certain operation to drain this whole body of land. All the water, except the rain that falls directly on its surface, it may be supposed flows from the streams coming in within the extent of some 10 or 15 miles of margin, from the highland on the western side. If a canal was dug through the western side of the swamp, its northern end emptying into the Shingle Yard Creek, near Suffolk, and the southern end emptying into the head of Perquimans river, which rises in the swamp and flows southward into Albemarle Sound, this canal would divert from the swamp all the waters which now run in and continually flood it, and the level of the water would be sunk just as deep as the bottom of the canal might be made. Lake Drummond would be deprived of its supplying source, and would become dry, except the deepest central part. Nearly the same extent of land might be drained, and the same objects effected, by deepening the Land Company's canal, and giving it a northern outlet to tide water, and by opening another cut from the Perquimans into the lake, and both parts so deep as to lower the water 7 or 8 feet. Either of these modes however would destroy the navigation of the Dismal Swamd Canal, for which such a vast amount has been spent. But probably the water might be enough reduced to lay the land dry, without hurting the navigation or materially diminishing the present extent of the surface of the lake. If lowering the water of the lake 5 feet only, would make the land dry enough, that reduction of level need not deprive the great canal of any of its present supply of water, because its feeder from the lake now has 5 feet of descent, and of course might be as much deepened at the highest end. But if the middle section of the canal, between its highest locks, could be deepened so much as to dispense with those locks, every difficulty would be removed, and the navigation would be greatly improved and facilitated in future use, and the general drainage be made far more perfect.

But there is a prior question of some importance. If a general plan of drainage is ever so cheap in execution, and certain in immediate results, would it be advantageous to so change the state of the swamp? The policy is at least doubtful, though the balance of advantages seem to be in favor of the drainage. An immense body of most fertile land would be brought into cultivation: but it would rapidly rot away, and while rotting, would probably be as unhealthy, as it now is remarkable for healthiness.

But every thing on the subject of draining large swamps, held by many different proprietors, in Virginia, is mere matter for theoretical reasoning and of useless speculation. Nothing can be done in practice, no matter how great the promised advantages, or the existing evils. The laws, indirectly, yet completely, forbid the making of any such improvements on a large scale: and still greater obstacles are presented in this case, where, in addition to the existence of separate rights of hundreds of individual proprietors, there would be the chartered and landed rights, and conflicting claims, of two great joint stock companies. Under these various circumstances, it may be safely predicted that the possible good or ill effects of a general plan of draining the Dismal Swamp will never be practically known—at least, not during the continuance of the present legal policy of Virginia.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2¼ by	⅝,	15 ft in length,			weighing	$4\frac{68}{100}$	per ft.
280 "	2 "	½,	"	"		"	$3\frac{50}{100}$	"
70 "	1½ "	½,	"	"		"	2½	"
80 "	1½ "	¼,	"	"		"	$1\frac{25}{100}$	"
90 "	1 "	¼,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28 tf Philadelphia, No. 4, South Front st.

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR

Patterson, New-Jersey, or 60 Wall street, N. Y

51tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice

H. R. DUNHAM & CO.

4—ytf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.

No. 2 Liberty street, New-York.

BACKUS, AMES & CO.

No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron. v4—tf

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N. Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention.

HENRY BURDEN.

Troy Iron Works, Nov. 15, 1836. 47—tf

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hard-ware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACOTIN, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.

Rochester, Jan. 13th, 1837. 4—y

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co. No. 119 Greenwich Street, New-York, or at the Makers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY & KNIGHT.

POUGHKEEPSIE, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANCHED and GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works he has in charge.

BENJ. WRIGHT,
Chief Engineer N. Y. & E. R. R.

NEW-YORK, April 4th, 1836.

Harvey's Flanched and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.

BOSTON, April 26th, 1836. NO. 1—6t.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

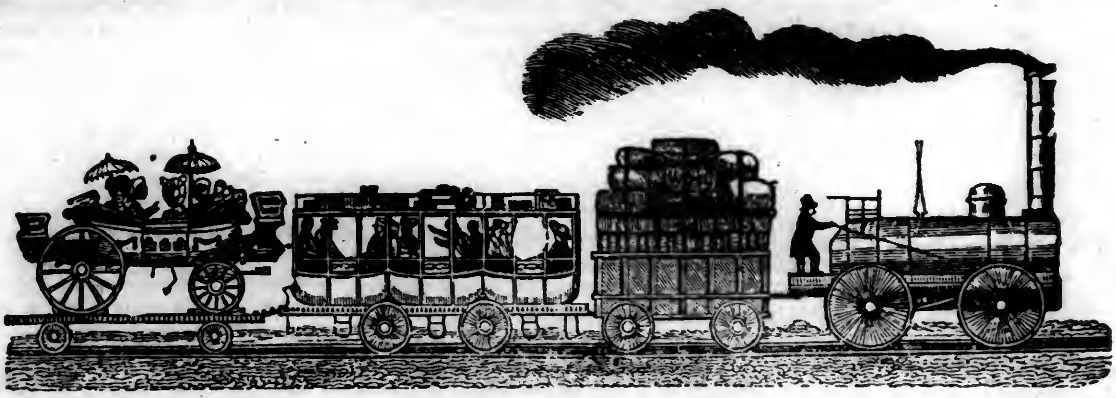
ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

TO CIVIL ENGINEERS, &c.

E. & G. W. BLUNT, 154 Water-st., corner of Maiden Lane, have recently received an assortment of LEVELS, from different manufacturers, among others from Troughton & Surins, which they warrant of the first quality. Circumferentors, Levelling Staves, Prismatic Compasses, Mathematical instruments, Books for Engineers, etc., constantly on hand.

One of the above firm is now in England superintending the manufacture of Theodolites, Transit Instruments, etc.—and any orders for Instruments, not now on hand, will be forwarded him, and executed promptly. 5—tf



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.]

SATURDAY, MARCH 4, 1837.

[VOLUME VI—No. 9.

CONTENTS :

NEW-YORK, MARCH 4, 1837.

TO MANUFACTURERS OF HYDRAULIC CEMENT.

PROPOSALS will be received by the subscriber, on the part of the James River and Kanawka Companies, for the delivery on the wharf, at the city of Richmond, Va., of Fifty Thousand Bushels of Hydraulic Cement. The amount called for must be furnished in quantities of about six thousand bushels per month, commencing on the first of April, and ending on the first of November next.

To avoid future litigation, it is to be understood, on making the proposals, that the bushel shall weigh seventy pounds NETT, and that the Cement shall be delivered in good ordder, and packed in tight casks or barrels.

Proposals will also be received for furnishing fifty thousand bushels, at any convenient point on the navigable waters of James River, or the north branch of James River, where the materials for its manufacture has been discovered.

Persons familiar with the preparation of the Cement, would do well to examine the Counties of Rockbridge and Botetourt, with a view to the establishment of works for the supply of the western end of the line; and a contract for the above quantities will be made with them before they commence operations.

As there will be required on the line of the James River and Kanawka Improvement, in the course of the present and next year, not less than half a million of bushels of this Cement, and some hundred thousand bushels more in the progress of the work towards the west, contractors will find it to their interest to furnish the article on terms that lead to future engagements.

Proposals to be directed to the subscriber at Richmond, Va.

CHARLES ELLET, Jr,
Chief Engineer of the J. R. and Ka Co.

February 20th, 1837. 9 6t

TO ENGINEERS.

WE are gratified to be able to announce to those desiring INSTRUMENTS, that Messrs. E. & G. W. BLUNT of this city, are now prepared to furnish at short notice, LEVELS, from different manufacturers, among others from Troughton & Sims, which they warrant of the first quality. Circumferentors, Levelling Staves, Prismatic Compasses, Mathematical Instruments, Books for Engineers, etc constantly on hand.

One of the above firm is now in England supe intending the manufacture of Theodolites, Transit Instruments, etc.—and any orders for Instruments, not now on hand, will be forwarded him, and executed promptly.

*** Orders will be received and promptly attended to by the Editors of this Journal. 9 4t

RAILROAD AND CANAL STOCKS, in New-York and Philadelphia.

SALES OF STOCK IN NEW-YORK
February 27th.

		Price of shares	Offered	Asked
Mohawk Railroad	t w			83½
Paterson Railroad				70½
Boston and Providence	b 50 ds.			108½
New-Jersey Trans.	60 ds.			103
Stonington	b 60 ds.			82
Long Island Railroad	n w			81½
Paterson Railroad	b 90 ds.			75
Stonington Railroad	cash			77
Harlaem Railroad				78½
Utica and Schenectady				121½
Delaware and Hudson Canal				94½

PHILADELPHIA STOCK MARKET.
February 24th.
RAILROAD STOCKS

	Price of shares	Offered	Asked
New-Castle and Frenchtown	25	31½	32
Do loan, 5½ per cent	100	99	101
Wilmington and Susquehanna	50	38	42
Camden and Amboy, shares,	100	136	136½
Do loan, 6's 1836	100	110	120
Danville and P shares	50	25	35
Norristown, do	50	34	34½
Do 6 per cent loan	100	85	100
Valley Railroad	7½	1	3
Westchester do	50	20	28
Minehill do	50	55	60
N. L. and Penn. Tp. do	40	34½	35
Philadelphia and Trenton do	100	125	127
West Philadelphia Railroad	50	20	30
Harrisburg and Lancaster	50	46	48
Cumberland	25	15	20
Beaver and Meadow	50	57	58

MISCELLANEOUS STOCKS

	Price of shares	Offered	Asked
North American Coal Company	25	12	14
Steam Bt. Sts Columbian	100	18	22
Exchange Stock	100	70	80
Arcade	100	55	75
Theatres—Chestnut street	600	625	675
———Walnut street	280	175	220
———Arch street	500	325	375
Gas Company	100	100	102

CANAL STOCKS.

	Price of shares	Offered	Asked
Schuylkill Navigation, shares	50	164	164½
Do loans, 5 1845	100	98	100
Do do 1855	100	100	101
Do do 5½ 1837	100	93	100
Lehigh Coal and Navigation	50	85	88
Do loan, 6 1833	100	96½	97½
Do do 6 1839	100	97	98
Do do 6 1844	100	99	100
Do do 5 1840	100	96	97½
Union Canal, shares	200	180	190
Do loan, 1836	100	83	86
Do do 1840	100	85	90
Chesap'k & Delaware Canal, shares	200	20	40
Do loan, 1837	100	60	67
Do do 1840	100	60	67
Delaware and Hudson,	100	92½	93
Do loan	100	95	100
Louisville and Portland	100	112½	117½
Convertible 6 per cent. loans,	100	110	120
Sandy and Bever	100	60	80
Morris Canal	100	99	100

LIST OF SUBSCRIBERS to the **Railroad Journal.** that have paid, (continued.)

J. Gibson, Goshen, Pa., Jan. 1, 1837
Wm. Norris, " " "
D. Ruggles, Newburgh, N. Y. " 1838
A. C. Morton, Goshen, N. Y. " "
S. B. Cushing, Providence, Rhode Island, January 1, 1838
D. Embree, Nashville, Tenn. Jan. 1, 1837
Philadelphia and Reading Railroad Company, January 1, 1837
Wm Mathews, Covington, Pa. Jan. 1, 1838
Mr. Hoffman, Athens, Tenn. " "
Mr. Hayes, " " " "
E. McGehee, Woodville, Miss. " "
Major J. Johnson, " " " "
Judge Ogden, Baton Rouge, Louisiana, Jan. 1, 1838

We learn from a correspondent, that 60 miles of the Montgomery Railroad, Alabama, are under contract.

Railroads in Virginia.—"The *Potomac and Staunton* Railroad, now completed to the centre of Virginia;" and "the *Staunton and Lynchburg* Railroad," referred to in the following extract from the "Harrisburgh Intelligencer," have heretofore escaped our notice. We were aware that there was a Railroad from Harper's Ferry to Winchester, but not that it had been completed to Staunton, in Augusta County. That such would soon be the case, no one could doubt, who had ever passed up that beautiful Valley—not only to Staunton, but also to Lexington, Firecastle, and Abingdon, and thence to *Tennessee*—but a Railroad from *Staunton* to *Lynchburg* would, we should imagine, be no easy matter, unless it were to continue up the Valley to Lexington, and then follow the north branch of James River through the Blue Ridge. Will some of our readers put us right in this matter? We seek information in relation to this road.

[From the Harrisburg Intelligencer.

A Line of Railroads from Philadelphia to New-Orleans.—It is not generally known, that companies have been incorporated for the construction of a continuous line of Railroads from Philadelphia to New-Orleans, through the great Cumberland valley. But such is the fact, and a part of the chain is already completed.—The Philadelphia and Columbia Railroad, and the Cumberland Valley Railroad from Harrisburg to Chambersburg, are now finished or under contract. The Franklin Railroad to connect Chambersburg with Harper's Ferry, will connect the foregoing Pennsylvania works with the Potomac and Staunton Railroad, now completed to the centre of Virginia: the Staunton and Lynchburg Railroad: the Lynchburg and Tennessee Railroad—to connect the Virginia works with the Nashville and New-Orleans Railroad—will complete the chain, and form a direct communication between Philadelphia and New-Orleans, by Railroads, without inclined planes, on which locomotives can be used the whole distance. What a splendid improvement!—We are pleased to see that a committee of the Virginia Legislature has recommended that the State appropriate out of the Surplus Revenue, 600,000 dollars to the Potomac and Staunton Railroad—450,000 dollars to the Staunton and Lynchburg Railroad—and 1,255,000 dollars to the Lynchburg and Tennessee Railroad. Should the Old Dominion follow the recommendation of this committee, we shall have a continuous Railroad to New-Orleans within five years.

We copy the annexed article from the Goshen Democrat, and most cheerfully unite with the Editor of that paper, in the expression of the opinion that the Hudson and Delaware Railroad Company, will find it for their interest to unite with the citizens of Goshen, in the construction of a Railroad, which shall lay open to Orange county, the coal region of Pennsylvania—*concentrate*, not divide, the various interests—will be found the best policy.

Our own Village.—We have but seldom referred to the subject of the contemplated public improvements through this section of the country, and whilst our brethren of the press, in other villages, have been exaggerating their own prosperity and peculiar advantages, we have contented ourselves with looking upon the excitements thus sought to be produced without participating in them or following their example thus set, so far as it regards us, and we have even abstained from repelling insinuations and statements hostile to our village and its interests, contained in such publications. Whatever may have been our anxieties or doubts heretofore, we have now the pleasure to state, from information derived from authentic sources, that little or no doubt remains upon the location of the New-York and Erie Railroad, through our village, although long persuaded from a careful examination of the subject that such was the preferable route, so far as the interests of the company and the public were to be regarded. We regret the efforts which have been made to divert it from us, but we congratulate the citizens of our village, upon the probable success of their exertions in the resistance of those efforts. We hope to be able soon to assure our readers as to the final decision of the company on the above subject. But for the present, we only call the attention of the public to the advantage of our location, by adverting to the projected additional improvements which must doubtless intersect the New-York and Erie Railroad in this village.

The importance of the Goshen and Jersey Railroad which is designed to connect with the New-York and Erie Railroad at this place is not generally understood. The engineers have completed the survey to the Jersey line, and report that the route is not only a feasible one but of the best in this section of country, the greater part of it being nearly a perfect level, and the highest grade not exceeding 20 feet in a mile. The engineers are continuing the survey to Columbia, N. J., and we learn that so far as they have gone the route is highly favorable. This road is intended to connect with others leading to the coal regions of Pennsylvania, and the western part of that State. Beside this, it is confidently believed that the road for which a charter has been obtained, from Kingston to the Erie road, will be constructed through the valley of the Walkill, and terminate at this place. This would form a continuous line of railroad from Buffalo, by the route of the canal, to Canojoharie, thence by way of the Canojoharie and Catskill road to Catskill, thence by way of Kingston and this village, where it would intersect the New-York and Erie road, to the city of New-York. For the whole of this route charters have been obtained, (some portions being already completed and others under contract) excepting about 24 miles between Catskill and Kingston, and for this section an application for a charter is already pending before the legislature.

We are of opinion that the Hudson and Delaware Co., will find it to their interest, as well as the interest of the public to unite with the Goshen and Jersey road, at this place. If they should think proper to do so, and should prosecute their work with the same vigor with which they have commenced, with a corresponding zeal on the part of the Goshen and Jersey Company, we think there can be no doubt that the roads could be in order for the transportation of passengers and freight in less than two years when coal from Pennsylvania mines could be delivered in this village for four dollars per ton., and in Newburgh for less than five dollars per ton.

We might fill columns with the important advantages which would result from these contemplated improvements, but we have neither time nor space at present; we shall resume the subject hereafter.

From the Petersburgh Intelligencer.

RALEIGH AND GASTON RAILROAD.

It gives us much satisfaction to learn that this work is in rapid progress, and bids fair to be completed with as much despatch as any that has preceded it.

One half of the whole line of the Road, from Gaston to Chalk level, a distance of about 45 miles had been located and put under contract. Between 600 and 700 hands are at work, and although only five weeks have elapsed since a commencement was made, the extent of excavation and embankment is already considerable.

Exclusive of several contractors who have heretofore been regularly engaged in this occupation, some of the most wealthy and respectable planters residing in that part of the country have taken contracts, and are making excavations and embankments instead of Tobacco and Cotton—looking forward to the benefit which they will derive in the transportation of future crops to market, when the Railroad shall be completed, which will no doubt precede the maturity of their next years crop. The owners of Land, on and near the line of the Road, find a new resource in the market which it affords for their timber, heretofore of little or no value—for provisions of all sorts, and for any superfluous labor from the business of farming. Most of the foundations of the piers and abutments for the Bridge across Roanoke are above high water mark, and that great work will be speedily executed.

The Road has been located as far as Tar River, and will soon be completed to Raleigh. Persons are in readiness to take contracts on this half of the Road, and there is no doubt that the entire line will be let, very soon after the requisite preparations are made by the Engineers.

A spirit of activity, we understand, prevails along the whole extent of the country through which the road is to pass, and all look forward with confidence to the benefits which it will confer.

The Legislature of North Carolina has granted a Charter for a Railroad from Raleigh to the South Carolina line, in the direction to Columbia; and books for subscription to the Stock will be opened in the course of a few weeks.

From the Newark Daily Advertiser.

BELVIDERE DELAWARE RAILROAD.

Our readers are already informed that the Legislature granted banking privileges to this Company on the 7th instant. We give below a summary of the Supplement to the Charter, which confers the privilege. The Directors, we learn, have determined to locate the bank within two miles of the Delaware bridge at Easton—as near that place as is practicable. I. M. Sherrerd, Esq., who resides at Belvidere, has resigned the office of Secretary in favor of Charles Sitgreaves, Esq., and accepted that of Counsellor of the Company.

Messrs. Col. Porter, Dr. Green, and Duckworth have been charged with the duty of Commissioners for the disposal of the stock, receiving proposals for a banking house, depots, &c. A survey and estimate of the road will be made at the earliest possible period by the Company's Engineer, Mr. Edwin A. Douglass. The whole enterprise, it is believed, will be completed within two years.

The Supplements provides—

1st. The Company is authorised to increase its stock to any amount not exceeding $500,000—the original privilege being limited to a million.

2nd. To employ any part of the whole stock, not exceeding $500,000 in Banking purposes; the bank being located in Greenwich, Warren County, N. J., and its operations not to commence until the road is located and under contract; 20 per cent. of the Capital paid in, and $100,000 expended on the road, and then whenever another equal sum shall be so expended, the like amount is authorized to the added to the banking capital, until the aggregate shall amount to $500,000. The bank privilege ceases if the whole stock is not paid in within 10 years.

3rd. The banking capital is made liable to the present or any future tax, and the railroad, and all other property of the corporation, is liable for the bank, besides the Directors being personally responsible.—The cashier and a majority of the directors to be residents of New-Jersey, and the President to be a citizen of this State or of Northampton, Pa.

4th. The usual powers and restrictions put into bank charters are contained, and the duration of the charter is limited to 21 years from the time allowed by the original act for completing the road, which expires on the 4th of July, 1846, so that the charter continues until the 4th of July, 1867, or upwards of thirty years. The Railroad charter is perpetual.

The intelligence of the passage of this bill, we learn by the Belvidere Apollo, produced universal satisfaction, which was manifested by the reports of cannon, loud cheers, and uncorking of champaigne bottles. The Apollo significantly adds—"For our own part we can rejoice over a bumper of pure water as cheerfully as over champaigne."

Railroad Meeting for a Railroad between Newport and Boston, via Taunton.—A meeting of citizens was held at Newport, the 18th instant, to take into consideration the expediency of making a *Railroad* from that place to Taunton; there to connect with the Railroad running thence to Boston.

At said meeting, committees were appointed for the following purposes, viz:

1. To ascertain and report upon, the practicability of constructing the contemplated road, reference being had to the several modes of construction now in use, with the estimate of the cost of each, &c.

2. To report upon the sources whence the proposed road may derive an income sufficient to pay a fair and certain profit to its stockholders: on the presumable advantages to be derived by the various interests of Agriculture, Commerce, Manufactures, and general intercourse, &c.

3. To report upon the importance and validity of the road, in a national and military point of view, and in reference to the establishment of a Naval Depot, Arsenal, and Foundry by Government.

4. To correspond with the Merchants, Manufacturers, Steamboat Companies, Capitalists, and others interested, in New-York, Providence, Boston, and elsewhere, to invite delegates from these places to attend a general Convention at Newport, and to collect and publish such facts relative to this important enterprise, from time to time, as they may deem advisable, and report their doings to the General Convention.

5. To report upon the necessary measures for procuring a charter, and for uniting with the present incorporated companies.

New Harbor at Cleaveland.—A writer in the Cleaveland Daily Herald, is endeavoring to demonstrate the practicability of forming a new harbor in front of that city, by the construction of a pier or breakwater of 7000 feet in length, at a distance of about 1000 feet from the shore at low water. He proposes to wharf out for 450 feet of this distance, at which point there is 10 feet water—the location of the pier to be in 15 feet water. He estimates the expense of the improvement at $175,000, and contends that the enhanced value of real estate to be benefitted by it, will amply defray the entire cost, both of the pier, and of the wharfing which would be required. The positions of the writer are however contradicted by another correspondent, who asserts that the undertaking will be enormously expensive, and is entirely impracticable.

One idea put forth by the writer who urges the improvement, may perhaps be deemed a little fanciful. He says:

"The contemplated Ship Canal around the Falls of Niagara, which will result in a line of uninterrupted ship navigation between this city and the Atlantic ocean, presents a strong argument in favor of the new harbor. Before the present generation shall have passed away, ships from Liverpool, and other foreign ports, will be seen to navigate these Lakes, and unlade their rich cargoes upon our wharves!"

The Middlesex and Monmouth Railroad was organized at Freehold on the 12th inst. by the election of the following directors, viz: Daniel B. Ryall, William L. Dayton, Geo. C. Herron, Isaac K. Lippincott, Simon Arrowsmith, John H. Smock, William Little, Joseph F. Randolph, and Peter Vredenburgh.

At a subsequent meeting of the Directors, Daniel B. Ryall was elected President, William L. Dayton, Treasurer, and P. Vredenburgh, Secretary.

The Princeton Whig says, "The whole of the stock is now subscribed for, and active preparations are making to proceed with this highly useful and important work. One gentleman from the South, we learn, has offered to make the whole road, so certain is he that it will be a profitable investment. But the directors prefer keeping it according to the original intention, in the hands of the farmers in its vicinity, for their more immediate benefit."

A Compromise.—A Gettysburg paper says: "We are gratified in being able to state, that the Wrightsville and Gettysburg Railroad Company, and the Wrightsville and York Company have compromised, and that there will be but one road and joint stock between this place and Wrightsville. A bill for the consolidation of the companies is now before the Legislature, and will no doubt pass."

Geological Survey of Michigan.—This bill has become a law. It is entitled to rank among the most important that have engaged the attention of the Legislature of Michigan. The expense of the survey is too trifling to be compared with its benefits. The whole is less than that of the Toledo campaigns, and it is distributed over four years—$3000 are appropriated for 1837, $6000 for 1838, $9000 for 1839, and $12000 for 1840.

Wrightsville and York Railroad. At an election for Directors of the Wrightsville and York Railroad Company, held at York on Monday last, James Howard, Luke Tiernan, John H. Hodges, and James Harwood, of Baltimore, Thomas McGrath, and Edward Chapin, of York, and James E. Mifflin, of Wrightsville, were elected Directors, to serve for the ensuing year.—[Baltimore Gazette.]

Silver Creek and Dunkirk Harbors.—The Hon. Mr. Sutherland, Chairman of the Committee on Commerce, has presented to Congress the Annual Report of the Committee. By the Report it appears, that the sum of *four thousand five hundred dollars* is reported for the erection of a beacon light at Silver Creek harbor; and that Dunkirk harbor has a report of *two thousand seven hundred dollars* for a like purpose. The Delaware Breakwater, or general harbor appropriation bill has not yet been presented.—[Dunkirk Beacon.]

A memorial has been presented to the Legislature of Pennsylvania, from WILLIAM NORRIS, Engineer and Machinist, of Philadelphia, in which he proposes to take charge of the motive power on the Columbia and Philadelphia Railroad, for the term of three years. He engages to keep the stationary and locomotive engines, now on the road, in perfect repair, and to conduct the transportation of passengers and freight, at all seasons of the year, without delay, and to receive as compensation for these services, the tolls which shall be collected from the motive power.

We give the following "Notes on Indiana," believing that they will be found highly interesting to many of our readers.

From the Springfield Ohio Pioneer.

NOTES ON INDIANA.

MR. EDITOR,—Having recently returned from a visit through the Northern part of Indiana, and thinking that a few hurried remarks upon that country might not prove uninteresting to some of your readers, I submit the following particulars.

After having made a voyage across the ocean of swamps, extending in width from St. Mary's, Ohio, to Fort Wayne, a distance of sixty miles, we reached the latter place, the country seat of Allen county, Indiana, situated on the east bank of the Maumee river, where the river is formed by the junction of the Little St. Joseph's and St. Mary's rivers, and immediately on the ground where Wayne's fortification against the Indians stood, from whence it derived its name. The population is about 1000: half of which are French and Canadians. The public buildings are a court-house, jail, and three churches: it has a bank and a library. The land office is kept here. The river is navigable for barges and keel boats; and lately a small steamboat ascended as high up as this place; and from this may be dated a new era of its prosperity. The Wabash and Erie canal passes through this place: twenty-five miles of it is furnished from here to Huntington, and affords an extensive water power at this place. In short, Fort Wayne is situated in the midst of a rich and fertile country, which, together with its other local advantages, must make it in a few years become a thriving and populous city.

After crossing the rich and fertile counties of Noble and Elkhart, with their many advantages, in a North Western direction, we came into the county of St. Joseph.—South Bend, the county seat, is beautifully situated on the south bank of the Great St. Joseph's river, upon a sandy plain elevated about 25 or 30 feet above high water mark; and contains a population of about 1000; and perhaps is not excelled by any town in the North for beauty of situation. It has attained its present importance and beauty by its superior local advantages. Its growth though rapid, has been steady, and corresponding with the improvement of the surrounding country. The town plat was laid off into lots, and brought into market between five and six years ago: a more eligible site could not have been found in all Northern Indiana. Travellers are charmed with its beauty, and upon learning its superior local advantages are at once struck with the conviction, that it must and will, in a very short period of years, become a town of some five or ten thousand inhabitants. The St. Joseph's river, opposite the town, is about two hundred yards in width: it is a deep and majestic stream, and is navigable for steamboats as far up as South Bend, and even further, except when locked up by the frosts of winter. Its course is generally North-West, and a more beautiful and imposing stream was never gazed upon by man. Just opposite the town there is a fine fall in the river, which when properly improved will afford a most tremendous water power. A company of enterprising men are now improving it by cutting a race with a lock for boats to pass through, and furnishing materials for damming the river. It is calculated that a power will be brought under control sufficient to propel from fifty to a hundred run of mill stones. This vast power will be immediately thrown into market: it will immediately arrest the attention of enterprising capitalists, and will, without doubt, all be employed in propelling various kinds of machinery in a very few years. Besides this vast power, there is a race discharging the waters of the Kankakee river into the St Joseph's on the town plat, affording a volume of water sufficient to propel from ten to twenty run of mill stones. There may be some estimate of the power afforded by this improvement when it is made known that the proprietors have been offered the sum of thirty thousand dollars: the whole improvement perhaps not costing more than three thousand dollars. And here are the waters of the South united with the North—the Lankakee river emptying into the Illinois river, and the St. Joseph discharging its waters into the Michigan lake. Thus water, that was intended by nature to flow into the Gulf of Mexico is, by a little labor, made to flow into the Gulf of the St. Lawrence.

A canal is located through South Bend from Michigan city on Lake Michigan, to intersect the Wabash and Erie canal at Fort Wayne; and it will in all probability be put under contract the ensuing summer. The Michigan road—a graded road—extending from Madison, on the Ohio river, to Michigan city, passes through South Bend. This, it will be readily seen, is an important road; it being the greatest thoroughfare through the centre of the State, from South to North; and towns through which it passes in the interior may boast of it as being a matter of no minor importance. At no distant day, a railroad perhaps from some point on Lake Erie, directly through South Bend, to Michigan city, and thence, in course of time, west to the Mississippi river will be constructed. The project is under way, and the combined enterprise and capital east and west will be enlisted for its prosecution. By reference to maps it will be seen that this railroad must pass directly through South Bend.

The Kankakee river may, with trifling expense, be rendered navigable for steamboats within twelve miles of South Bend. A canal across these twelve miles, will open to South Bend a water communication with the great Mississippi river, and its vast and extensive commerce.

The town is remarkably healthy, and the land of the country around it, is like most of the land in the northern part of the State—open oak and some heavily timbered land, prairies, and low lands.

The soil is of a sandy nature, but mixed with a sufficient quantity of marl and iron, which renders it productive, and is a guaranty of its durability.

The county of St. Josephs, though but six years ago an untamed wilderness, the undisputed wild and uncultivated home of the savage, now contains a population of from five to six thousand enlightened and industrious farmers, and abounds with numerous well tilled, extensive, and productive farms. Possessing such advantages, it is not a matter of wonder that South Bend should have assumed her place among the populous and flourishing towns of the North. It contains two churches, a printing press, from which issues weekly the "South Bend Free Press," a public library, fifteen dry goods stores, and two drug stores; three taverns and four groceries; four lawyers, three physicians, and mechanics of almost all the branches of the mechanic arts; there are, also several week day schools, two sabbath schools, a temperance society, and a lyceum, &c. &c.

About four miles from South Bend up the river, on the same side, is a village by the name of Mishawaka, containing a population of about three hundred souls. It possesses many advantages, and among others, inexhaustible beds of iron ore near it, which is going to be worked by a company of enterprising capitalists, during the ensuing spring. They are making hasty arrangements for a furnace, rolling mill, &c., and they have already in operation an extensive iron foundry, a flouring mill, and many other kinds of machinery. There are several large dry goods stores in this little village.

The next places that arrest the eye of the traveller, are Laporte and Michigan city, both of which are situated in Laporte county. The town of Laporte, the county seat, is situated near the centre of the county, on the south bank of a beautiful clear lake, of about a mile square; it is bounded on the east, south, and west, by extensive and beautiful dry prairies, and natural meadows, which are mostly all fenced and under cultivation, and dotted over with farm houses. On the south-west, the scenery is beautiful in the extreme, there being no forest or in exceptance of the view, till the horizon and the earth seem to close. Nothing can be more charming than a view of this in autumn, when the sun is declining in the west with all the splendor of an autumn afternoon. Laporte has a population of from five to seven hundred. Its public buildings are a court house, a jail, and two or three churches; it has also, a library and a printing press, from which is issued weekly the Laporte Herald. The land office for the Laporte district is kept at this place.

Michigan city is twelve miles from Laporte, and situated on the shore of Lake

Michigan, from whence it derived its name. The ground upon which it stands, is very sandy, and uneven, consisting of hills of loose, yellow sand, which was at one day all occupied or covered by the lake water, but the waves have through time thrown up these sandy barriers and caused the Lake to recede for several hundred yards. The population is perhaps about a thousand, who are mostly emigrants from the State of New-York. Its advantages consist entirely in its being a landing place for vessels of merchandise for the interior part of the State. There is no harbor as yet at this place, but the citizens are making arrangements for constructing one the ensuing summer. The country immediately around is mostly broken, and of a poor sandy soil, covered mostly with white pine timber, which affords excellent building timber. It is not more than three or four years since this place was laid out. Its growth has been very rapid, and bids fair to become one of the foremost of the towns on the lake.

Much more might be said of the rapid growth and prosperity of Indiana; but having already lengthened this longer than I first intended for a newspaper arricle, it is sufficient to say that in a very few years Indiana will assume a place in the formost rank of her sister States. H.

From the London Mechanics' Magazine.

MINUTES OF EVIDENCE BEFORE A SELECT COMMITTEE OF THE HOUSE OF LORDS ON THE TOLLS ON STEAM CARRIAGES' BILL. SESSION 1836.

Do you consider that safe?—It is just the same as one we made as it regards the boiler, and the mechanism very similar.

You consider yours safe of course?—It is quite safe from explosion.

But is it safe in other respects; is it safe to travel along the road with?—Yes.

Not only for the persons travelling, but for the persons it meets?—All carriages going at great velocities make more noise, and are consequently more likely to frighten horses.

Do you think they are as safe to meet as a mail-coach?—Until horses are more accustomed to them.

You think there might be considerable anger at times from horses taking fright?

Could you make a gauze sufficiently close to keep a draught, and prevent the smallest sparks escaping?—That object can be attained only by increasing the gauze head to such extent that the sum of all the openings in the wire shall be equal to the area necessary for the draft.

But do you think that object has been attained?—I do not know that it has.

Part of Hancock's plan is the one adopted on railroads also; to turn the steam into the chimney to create a draught?—I rather think he turns the steam into the ash-pit, and so lets it pass with the air through the fire.

And then it goes up the chimney?—I am not fully acquainted with the construction of it.

You say you think danger would attend the use of steam carriages till the horses were accustomed to it; at the same time you say, when you travelled by Hancock's along the New-road, there was no appearance of the horses being frightened?—No, there was not; and I think the noise and the smoke might be very much abated if it became a general thing. In the experiments I have been mostly engaged in, that has not been so much an object as to produce the effect.

What legislative provisions would you—Yes; from this as well as from any other cause.

How would the effect of them be at night, as far as you can judge?—At night the flame and the sparks are an objection; improvements may obviate this.

They are visible?—Yes, at night, when coal is used; less if coke is used, as is the case with Hancock's and some others.

You never saw it?—No; but from the manner in which Hancock's flame is divided and the heat absorbed, I should think it likely that less flame would be visible.

Do you think his plan, as far as you can judge of it, would secure you from sparks falling in the road?—I think it might be lessened in every construction by a gauze at the top.

Are you of opinion that gauze at the top is an effectual remedy against the emission of sparks from locomotive engines?—Not the smallest sparks perhaps, but the largest, certainly.

That would apply in the same way to Mr. Hancock's?—Yes, just the same.

suggest to enforce a due attention to that object?—I am not prepared to suggest any.

What would be the mode of doing it that would occur to you to induce engineers to turn their attention to that point?—Any thing that would induce or oblige them to lessen the noise, flame, and sparks.

With regard to the smell, is there not a great effluvia arising from Hancock's carriage?—I have understood there is: I did not perceive it.

When you were travelling along by it you did not perceive it?—No.

What is it from?—It is from the steam passing through the fire, and the products of the coke.

Have you any opinion of the size that it would be desirable that the boilers to run along high roads should be allowed?—I think it difficult to prescribe a rule of that kind.

Do you think it possible in any case danger could arise from a boiler that is cylindrical, of which the diameter was not more than ten inches, supposing it were to burst?—If it exploded, even that diameter would produce mischief to those who were near it.

The notion is to divide the boilers into chambers, and the chambers should not exceed ten inches in diameter; do you think danger would arise from the bursting of that?—I should be afraid to stand near one when it exploded.

Can you state that size of the chamber which, if it was to explode, would not be dangerous?—I should think any chamber exploding beyond three inches in diameter would be dangerous.

Below that you think no serious harm could arise?—No; it would rend, and let the steam out.

Do you find it very difficult to get men capable of managing locomotive engines on roads or on railroads?—There has been so little experience hitherto that we have always trusted the carriage to one steersman, who is very expert, and have never had any accident. He is a man formerly in the employ of Sir Charles Dance, and who came to us from him. I have travelled some hundred miles with carriages which he has steered, and he has in no instance met with an accident.

What carriages were those?—It was the old carriage of Sir Charles Dance's and that made by us.

You have been many hundred miles on that?—Yes; and that we made last summer.

As you probably employ a great number of men of that class, do you think there are many men capable of conducting a steam carriage?—I think every coachman would be able to steer well with practice.

You mean a good coachman could conduct a steam carriage?—Yes.

And your engineers, you must have an engineer with your carriage besides?—Yes.

Is that a class of men you can easily find?—Yes.

And capable of doing it?—Yes, very easily.

Is there any such nicety in the work that if they were to get drunk, or take too much, they would be liable to accident?—Not more so than on a railway, or a locomotive engine, or a steamboat.

But on a railway the locomotive-engine could not have the opportunity of stopping at different public-houses?—Certainly not.

Therefore there would not be the same probability of a man getting drunk?—The steersman may be considered exactly the same as a stage-coachman in that respect, all depends upon his care.

You think there would be no more risk from a drunken engineer than from a drunken coachman?—They are much the same.

There would be no more danger arising from the misconduct in that way of an engineer than from that of a coachman?—No; I think not.

And that the engine is not a more dangerous vehicle to be conducted?—No.

Within what space could you stop your engine that you went to Reading in, going at the rate of twelve or thirteen miles an hour?—In about the space a coach would stop.

Three or four yards?—Yes.

It was in Sir Charles Dance's you travelled so far, and is that as easily stopped?—I spoke of that, and the carriage we made.

And would it turn as easily?—Yes.

Would it turn as easily as a stage-coach to get out of the way?—Quite so.

Could yours?—Quite so.

And does Hancock's?—It is quite as manageable as a stage-coach.

Do you think it desirable on high roads to have drags for other carriages, or to carry the passengers on the engine itself?—I should think passengers would be more comfortable in a separate carriage.

Which would be the safest for the public?—A separate carriage.

Do you not think that the length of the carriage on the road would be a serious inconvenience, and be attended with consider able danger?—It is not longer than a coach and four horses altogether, with the drag.

Would you think it dangerous that a carriage of the length of one of the great timber-waggons that you see should travel on the high-road at a great speed?—Extending the length beyond certain limits would increase the danger.

You think it would be desirable that that length should not be extended?—The shorter it is the better.

Do you think it would be desirable to have any mode of testing the boiler of steam carriages?—I think they should be tested.

You, of course, use some mode of testing them before you send them out of your factory?—Yes.

Would there be any means of enforcing such a test to prevent neglect on the part of engineers, to prevent mere adventurers?—I think it might be done.

How could it be done entirely?—By forcing them with water. It would require some officer to examine and to see them tested.

Is there any difficulty in the use of the instrument you use to test them to require a scientific person to apply it?—Not at all.

Any individual might do so?—Every carriage has a hand-pump, which is an instrument by which the boiler might any time be proved. The pump which fills the boiler before starting, or in case of the water being short, that pump is the most appropriate instrument for proving the boiler; so that if the safety valve was weighted to double the extent at which it was determined the boiler should work, it might be proved at any time.

Might it be proved, suppose the Legislature required that the boilers should be tested before a magistrate, would he be capable of seeing the test was correctly applied, or does it require a scientific person to do it?—It requires a scientific person, or it might be evaded.

Is there any means to be adopted by which such a test should not be evaded?—I can suggest no other than that of a qualified person to superintend it.

What do you think might be the test of a boiler; how many times the pressure that is intended?—I should say double.

You think that sufficient?—Yes.

What test do you generally adopt in your boilers?—Our boiler was so strong that it would have borne five times the pressure we worked it at, so that we were free from any apprehension of explosion.

But with boilers generally you know to what pressure it is intended to subject them, and you subject them to a test?—Boilers having to sustain great pressure are tested double.

When you make high pressure engines you must test them?—Yes; to double the pressure intended to be used.

You think double the pressure required would be sufficient?—Yes, I think it would.

If there were a provision that it should not be lawful to use any vessel to propel a carriage any part of the transverse section of which should not exceed ten inches circular or cylindrical—you think that is too large an allowance—do you think that would not secure safety to the passengers?—It would certainly be dangerous to passengers if it should explode.

But if it is properly tested there is a security against explosion?—It would be safe if it were made sufficiently strong and tested.

If it were not made sufficiently strong it would not stand the test?—No.

If it does stand the test, you think there would be no danger in that?—No; making allowance for decay.

You say you knew the principle of Gurney's mechanism, and you thought it safe? Yes.

Was not that the principle of his chambers—of his boilers?—The cylindrical vessels were considered safe, but the square flat vessels which he used at one time I did not consider safe.

But the cylindrical were his patent?—I do not know what his patent is.

Though a vessel may have been tested and pronounced to be safe, yet is it not possible that it may be used for too great a time, and that danger may arise from that circumstance?—Certainly it is.

Can there be any limit fairly put as to time without doing injustice?—I think no limit could be set as to time, for a boiler may be as much injured in one day, and its strength impaired by accident, as in ordinary wear it would be in twelve months.

The test is only a guarantee of safety at the time it is applied?—Exactly so.

These chambers may be perfectly safe at one moment, without any appearance of danger, and may burst the next?—It is quite possible.

I do not know if you are of opinion that a small chamber, though it should burst, would not produce any disastrous consequences?—I am perfectly aware of that. Indeed the boiler used in the experiment in which I have been engaged is one of which Sir Charles Dance, in conjunction with myself, has a patent, the principal feature of which is, that no part of the boiler exposed to the pressure of the steam should exceed three inches in diameter, and therefore may be considered perfectly free from danger from explosion under any circumstances with any degree of wear, so as to remove entirely the apprehension of any danger to the passengers from the explosion of the boilers.

MR. BENJAMIN W. HORNE, COACH PROPRIETOR.

There is a great hostility among coach proprietors to steam-carriages, is there not?—Not at all. If we should prefer either, we should prefer those on the high road to those on the railroad, for the competition is greater. I speak with a degree of honesty.

What weight do you require a horse should draw in a stage-coach, a coach fairly loaded?—They so much vary; from two to three tons.

In your own establishment what do you calculate the weight of the fast coaches when loaded?—About two tons; not exceeding.

You have some coaches faster than others? The difference of about three miles an hour.

The fastest go about ten miles an hour?—Eleven.

What is the full weight of a loaded coach going at the rate of eleven miles an hour?—Not exceeding two tons.

What is the full weight of a loaded coach that does not go more than eight miles an hour?—They are short coaches that go merely to Dorking, Sandridge, and Egham; they do not go at the rapid speed, as others do.

Have you any that go eight miles?—All distances.

Have you any eight mile an hour coaches?—Yes, a Dorking coach that goes eight or nine miles an hour.

What is the weight of that loaded coach more than the others?—It is the same as one that travels from 70 to 100 miles; it is the day and night.

The day coach does not exceed two tons; About that.

What is the weight of a night coach?—It might be perhaps occasionally according to the season of the year; if it is a mercantile town it varies; it is occasionally half a ton more; two tons and a half.

What rate would that coach go?—Nearly ten miles an hour.

Do you horse any vans?—No.

Do you run to Norwich?—Yes.

Does that come up loaded with turkeys at Christmas time?—Yes.

What is the weight of it?—When we have turkeys there is hardly any passengers; scarcely any difference; it might weigh three tons; hardly that.

You require about five hundred weight as the load of each horse?—About that.

How many miles do you reckon that a horse ought to go at the rate of eleven miles an hour, drawing five hundred weight, per diem.—About eight miles.

Does the same horse do eight miles seven days in the week?—If it exceeds ten there is another horse kept, which brings it down fifty-six, and he will go fifty-six miles a weeks. We calculate a horse a mile; that brings eight miles to eight horses, or fifty-six miles a week. Very few coaches will average more.

You think you should be able to compete with steam-carriages; do you think you should beat them?—I fancy so. I only hope that steam-carriages will be on the high road instead of being on railroads; there is every probability of our coaches doing very well if they draw about half the weight.—With a tramroad we could maintain about twelve miles an hour very easily; on a tramroad in narrow streets. where waggons or gigs are going, you will find the gig will over-run the horse.

Is there any difference in the tolls, on the roads with which you are acquainted, between steam-carriages and stage-coaches on any of the roads?—As far as the practical part of steam-carriages go, they do not have to encounter much with turnpikes; there are very few about London; the Metropolitan Act has done away with them.

There is great variation in your tolls, is there not?—Wonderful.

What are the highest tolls on the road you go?—The highest, taking the average per mile, will differ from 9s. to 17s. 6d. on different roads.

Per mile?—Yes; per mile per month; the difference will be on the whole of the month.

Where is the highest?—On the Birmingham line of road.

Are you connected with any coaches running between Glasgow?—We do not extend beyond Leeds or Manchester.

You run as far as Holyhead?—As far as Shrewsbury.

You pay a post-horse duty besides the tolls?—We pay a stage-coach duty.

Is it on the horses or the coach?—The coach.

Is there any duty on the steam-coach?—I am very sorry to say there is but little paid there; I think the competition is unequal.

What is the amount of duty on the coach?—It is according to the number of passengers we take out licence for; most are rated at two-pence halfpenny per single mile, which is five-pence per day; the number of passengers we are allowed to carry in each mile are four inside and eight out, in winter time; if four insides and eleven outsides in summer time, we pay six-pence. Steam vessels do not pay, nor do steam-carriages pay any thing to speak of. The steam-carriages do on the railroad pay a trifling duty to government, according to the numbers carried; if the machine is empty they do not pay; we pay, passengers or no passengers. We have a petition before the Treasury for reducing the price of freight between Dover and Calais and Boulogne, by the packets, as coaches going to Dover and Margate are obliged to pay a duty, which we cannot afford in consequence of the low price by steam, which does not pay duty.

You run the coaches?—It is difficult to reduce the number of coaches; the loading is extremely uncertain; we are obliged to keep the same number of coaches; we cannot reduce the number of coaches in consequence.

MR. GEORGE STEPHENSON, C. E.

Have you turned your attention at all to locomotive carriages on public roads?—Of course I have thought a great deal about them, having been concerned in them twenty years.

What is your opinion of them?—I think they will never be made to do any good on a common road; I do not see the slightest possibility of it.

From what cause?—The friction is so much greater on a common road than on a railroad, and we find we cannot with engines beat horses used on railways so very much at slow speed, as to economy. One reason why an engine competes at a much less advantage on a common road with horse power, than on a railway, may be thus stated? a horse consumes no more power in maintaining his own motion in drawing a load on a common road than on a railway; whereas from the great weight of an enigne, and the resistance being increased tenfold, the whole of its power is consumed in upholding its own motion.

The friction on a common road is, taking an average number, ten times what it is on a railway?—Yes; a horse will on a railway take ten times as much as on a common road. That being the case, the locomotive engine that is to go at this power, is travelling on a smooth surface on the railway, but the same engine using the common road is on a very different surface. The friction is increased so very much, that it has enough to do to propel its own weight, without any thing else; therefore the great advantage in getting the power generated is so much less on the railway than it is on the common road, that this alone makes a great differance.

You think, taking a given weight, say two tons, it would require ten times the power to propel it along a common road than on a railroad?—Yes, it would.

If you had to move two tons on a railway by a locomotive engine, what power should you find it necessary to apply to make it go at the speed of fourteen miles an hour; how many horse power?—It requires time to go into that. I will prepare that table. A horse will take ten tons, besides the weight of the carriages, at three miles an hour on a railway, and I think one ton at the same velocity on a common road. I could not tell off hand as to the exact proportions. It will require one horse power on a railway, and ten horse power on a common road.

You are well acquainted with the construction of these locomotive carriages?—I think I am; I think I have a right to say I am. I do not think there is a possibility of keeping the engine in order for any length of time from the jolting of the engine. I do not care what springs they put on.

Have you seen Mr. Hancock's carriage running?—No; I have been at Mr. Hancock's place, and saw his arrangements. I thought there was a great deal of ingenuity about it, but I told him in my opinion there was not the slightest probability of making them pay. There is no doubt of their making them go on a road, but not to make them pay, for I do not think any experienced engineer would be concerned in them. Many ingenious gentlemen have turned their attention to it, but if they had had much experience in keeping steam engines in order they would not have gone into it at all. The last engine made of Mr. Hancock's construction was made by Maudslay & Co., and they are most excellent engine builders; it must be well done if they did it. I do not care how well they are done; I do not see the slightest probability of their being made to answer.

Do you suppose that Mr. Hancock's engine, if it had been running twelve months would have been running at a loss?—Yes. If I saw his books I engage to say he must have been running at a loss.

You think there is not much danger to be feared if they can be run with advantage—if they prevailed?—As to danger that may be prevented.

There is no danger of their becoming common?—No; I do not think there is any probability; there will if full power is given to every one to use them.

If all the tolls that were laid on to stop them were taken off, you still think they would not run at an advantage?—I do.

You have said that there was a probability of obviating the dangers; state what you concieve the dangers to be?—Why, I think the most likely part of the machine to become dangerous is the boiler—the bursting of the boiler; they always endeaver to make them as light as they possibly can, and to carry as little weight as possible; they construct the boiler to carry very little water; and even if the boiler is made very strong, on account of the small quantity of water being carried, when the steam is generated that soon gets dry, if there is little water it must boil away, and there are accidents that will happen to cause them to stop. If the water gets boiled down to allow the pipes to become red-hot, hydrogen gas is generated, and explosion takes place. Explosions have taken place witht hese boilers; no satisfactory reason has been given how it occurred, but it has done so. I imagine that there must be a decomposition of the steam; that when the iron becomes red-hot, the oxygen of the steam will seize the iron, and of course the hydrogen is set at liberty, it is separated from the oxygen; then, if the plate is heated to a certain degree, it will take fire and explode. In the locomotive engines on the common railroad we carry as much water as will take us thirty miles.

On the railway?—Yes; my former observation is as to a common road; I am stating the difference between that and the railway. Our boilers are very large comparatively, and hold a great deal of water; the engine may stand an hour or two, and will not boil down the water; therefore there is not the same risk on a railway. More than that, we have a tank with a great deal of water to supply them in case it is wanted.

That you carry with you?—Yes. There was an explosion in Scotland from one of those, which was said to be by the breaking of a wheel. I do not see how that would make the boiler explode. I believe the boiler burst, and broke the wheel, and they merely made that excuse.

That was a large boiler?—One of the pipes, one of Gurney's construction; I think I saw it in Scotland; I saw it repairing; I understood it to be the same engine, but Mr. Russell took it up.

You saw an engine which was stated to be on Mr. Gurney's principle that had burst?—No, before this engine burst; I understood it was the same engine, if that which has been shown me was it.

Do you conceive a boiler can be constructed so small as to do the work required of it on a public road, and at the same time not to be dangerous if it bursts?—No; I think if the boiler is made very small it will not do sufficient work to work the engine forward at a desirable velocity.

Have you seen these boilers of Mr. Hancock's engine?—Yes, I have; they are merely a number of flat tubes.

The number of flat chambers is very small; if one were to burst would any evil arise?—No, I do not think there would be much evil from one of these chambers bursting; there is not that quantity of explosive matter to make the same injury; it might injure the individuals near it, but it would not do much damage.

You conceive, for security to the public, boilers must be limited in size?—Of course. I do not know that there will be any means of guarding against danger by testing the boiler, which would be perfectly safe if it was always certain that the water was always kept at acertain height, but if not there is no safety in testing; they might test before they went off, and before many miles the boiler gets too low, and the material becomes in a very different state? therefore testing ceases then to be of use.

That testing does not meet the objection you mentioned before of the hydrogen gas being generated?—Certainly not.

The only security to the public would be, that the chambers should be so small that if it did burst no injury would arise?—Certainly; each of them should be so small that it would not do much injury if it did burst.

What should be the limit of the size of these chambers?—I could not go into that without consideration.

You know the nature of Mr. Hancock's mechanism?—Yes.

Do you think there is any danger attending it?—I think there is not much danger.

Do you know Mr. Gurney's patent?—Yes.

Do you think there is danger attending that?—There is not so much danger in the tubes if they are kept small, but then you cannot generate sufficient steam.

You think there is no danger?—Yes; I think there is more danger in Mr. Gurney's than in others, for there is a greater quantity of steam held in the pipes than what is held in the chambers of Mr. Hancock's.

What is the danger, explosion?—Yes.

Do you think pipes of that size, if they exploded, would injure the passengers?—If there is a long continuation of pipes connected with it, I think that will so far hold good in Mr. Hancock's; if they are so connected that the connexion will give a free outlet from the other chambers, it is still objectionable.

Are they so?—No; there must be a connexion to get the steam generated; I do not know the size of the apertures. I know if one or more tubes gives way in locomotive engines of an inch and a half or two inches in diameter, it does not do much injury; they stop the two ends up, and go on again. I do not think they can do that with Mr. Gurney's or Mr. Hancock's.

Have you ever travelled by Mr. Hancock's or any one of the steam carriages?—No; I saw one down here, and I stopped to see it go off.

Did it make much noise?—No, I think it did not.

As much as one of your locomotive engines?—No; ours gets the steam off into the chimney; by that we get power to send us along; if they get power in the same way they would go faster on the roads. It is that jet that occasions a noise like the barking of a dog. They do make use of something in the road engines, but it is muzzled, so that the noise does not escape; they must always make use of the outlet through the cylinder to force the current of atmospheric air through the fire, but they muzzle it so that the noise is not heard. Our engines are from twenty-five to thirty horse-power, and those on the roads are not more than three or four horse-power. I am not quite aware, though the power may be great to begin with, it may be soon got rid of so as not to be power at all. It is not fair to calculate power by the size of cylinders. The question is, can they keep it up; if they could keep it up at the rate it set off, it would be a fair calculation to measure from the cylinder; whereas they frequently stop to allow the steam to increase the strength, then the boiler is not sufficient to supply the steam.

Do you understand that to be the case?—Yes; that one that came to Liverpool was a long time on the road, but it stopped very often.

And was assisted sometimes?—Yes.

What is the size of the chambers you make use of on the Manchester and Liverpool railway?—They vary from one inch to an inch and a half, and others have two inches.

In diameter?—Yes.

Not larger than that?—No; the first we put up was three inches; that was the Rockte, the first swift engine; we found that we could make more steam by diminishing the diameter, and getting more (and we got more) surface, and we had them of less diameter since.

Was there much smoke from these engines?—No, I did not see much.

As much or less than the engines on the Liverpool and Manchester?—It must be the same, for they both burn coke; if they burn coke they must have the same proportions.

You do not think there is any means of diminishing the smoke?—I know of nothing better than coke; there are still fumes; a quantity of sulphur comes off.

That offends the nose, not the eye?—It has an effect on the eye also.

It surely makes a very considerable degree of smoke?—If well coked there is no smoke.

But on the Manchester and Liverpool?—Some parts of the coke is not well coked; but if it is properly done there can be no smoke from it, but fumes; there is a decomposition of the air passing through; what comes out must be different from what goes in.

Is it visible to the eye?—No; even the steam is not visible at a temperature of eighty or ninety degrees.

That is on a very hot day?—Yes.

You have turned your attention a good deal with locomotives engines, to prevent the flying off of sparks from the ash-pit?—Yes, I have tried that, but have not succeeded in it yet.

You could not say if Mr. Hancock's is less?—If his blast is less it will not make so many sparks. I think the ash-pit may be managed; I think that may be so boxed in; it will be injurious to the making of steam, but still it will affect the engine. The freer the air gets to the fire, the more steam will be made at a less expense.

You have not done it on the Liverpool and Manchester Railroad?—They have had boxes, but they are obliged to open at one end, and when the cinders drop out they fly out of the box, and then if they come in contact with the wheels, the wheels moving at such great velocity sometimes throw it a considerable distance.

The sides of the railroad are frequently burnt?—Yes.

You have had one or two serious accidents with fire?—That is since I left the Liverpool and Manchester.

You had one in the north, on a railroad you were concerned with, had you not?—There was a little farmhouse and building set fire to and burnt down.

Are you aware of the particular circumstances of the case?—I am perfectly sure of that being the case.

Do you know at what time the engine passed, and what speed the engine was going?—No, I do not know.

The danger of course is great with a thing of that kind in proportion to the speed at which the engine is going?—More sparks get out at a higher velocity than at a lower velocity; the draught is increased as the velocity is increased; but it is not increased by passing through the air, but by the greater quantity of steam being jetted into the chimney, which forms a vacuum. In the chimney a pipe stands up like the jet-pipe of an extinguishing engine, and all the steam that is required to supply the power of the engine has to pass out of that jet-pipe. It moves at such a velocity, it drives all the atmospheric air out, and leaves a vacuum below. There is no opening to fill up the vacuum, only through the fire, and of course we get the weight of the atmospheric to pass through the fire. In looking through the hole in the door I have seen the fire as if it was dancing on the bars, the current so strong as almsst to lift the cinders, and many of them were brought out through the pipe and up the chimney.

Is there more effect of that kind in windy weather than on a still calm day?—Of course, if the wind is blowing laterally to the train of the carriages it will.

Does it make the draught more rapid?—No, it has no effect on the draught.

You have not tried to make gauze or wire covers at the top of the chimney?—Covers we have; and we have tried various sizes, so as to keep the sparks in and let the vapor out; but it has been all useless. I have tried it at various sizes till I have been obliged to take it off, the engine was so diminished in power; it was injurious to keep it on.

You saw Mr. Hancock's engine; had he any precautions of that kind?—That I do not know; I have not seen that part of his engine.

What is the usual weight you carry in one of your trains; your passenger train?—Forty or fifty tons; no, not more than thirty to forty tons, carriages and passengers together. We have engines now made that if they were travelling on a level road we could take 400 tons; they will take a large ship-load of goods at once, at fifteen miles an hour; we can make them take 400 tons on a level. I would engage to make one of 100 horse-power to move on a railway; we have made them at 50 horse-power, and have sent some of the same power to Belgium, and, I think, some to America.

You think that you are not yet arrived at that point that you can do any good with a locomotive-engine, effectually guarding against any sparks dropping out or flying out from the chimney?—No we have not, certainly; from al I have done and seen it has not yet got to that state.

You were understood to say according to the velocity you go those sparks were carried to a considerable distance if they met with the wheel?—That is from the ash-pit; the sparks from the chimney are guided by the wind; if the wind is blowing longitudinally with the road the sparks do not leave the line of railway so much, but if the wind blows at right angles the sparks are carried to a considerable distance. The sparks from the chimney of a locomotive-engine are not like the sparks from a common chimney that is on fire. You frequently see a chimney on fire, and sparks come out; these have not the same tendency to ignite; they are so light that when they fall to the ground they are almost extinguished, and combustion ceases. But those that come out of a locomotive chimney have more weight in them, —they are cinders, and there is a quantity of heat remaining in them.

If there were a cap in the form of an umbrella, and they were thrown back into the chimney across, would bad consequences arise from that?—It would diminish the power of the engine; that has been tried; it was one of the schemes resorted to on the Liverpool Railroad by putting a kind of umbrella so that the sparks should be thrown downwards; and it diminished the power of the engine.

Suppose you had a lateral outside chimney, made of very fine wire, so as to carry the sparks down that, and let them fall on the ground?—I think such a covering might be made, only it would be very large and cumbersome, yet it might be made so as to prevent sparks getting out, except of very small dimensions; but it must be very large and expensive to keep up, and it would be destroyed; the free outlet of the chimney would be obstructed, and the power of the engine so much diminished, it could not travel with velocity. The sole power of the engine depends on the exhaustion of the steam into the chimney; if it was only the height of chimney, the draught, without the blast-pipe, would be so much diminished as to reduce a 50-horse power engine to not more than 2 or 3-horse power.

With regard to the power of stopping the engine on the road, in what space do you conceive you could stop an engine going at full speed on a common road at fourteen miles an hour?—I should think from fifty to 100 yards; it depends on the weight and the momentum. The only means made use of in stopping them suddenly is preventing the wheel revolving by the application of the break, and reversing the power of the engine, so that the wheel becomes a sledge, and brings the revolving motion into a sledge motion. It is this sledge motion that takes up the momentum. It requries some calculation to know how soon. The weight of the engine must be given, and the velocity and the friction taken, to state at what distance it can be taken up; it depends also on the state of the road. If it is very wet weather it will not be taken up in the same time as if it were dry. When it is icy the sliding motion would allow the carriages to move forward with as little friction as the revolving motion, which is well known in those countries where dogs are used for drawing sledges through the snow, so that it amounts to a railway; in such cases a sliding wheel would not stop them so soon.

Do you think a weight of three tons could be stopped as easily as a four-horse coach, and in as short a space of time?—I do not think a four-horse coach could be stopped at much less than fifty yards, going at fourteen miles an hour. I think the engine would be as powerful in stopping the carriage as the horses, but I cannot conceive a four-horse coach travelling fifteen miles an hour would stop in much less distance than fifty yards. I think the horses would have a little advantage in throwing their weight against the momentum of the carriage.

How soon could you bring up an engine, travelling ten or eleven miles an hour, on a common road in summer-time?—I should think about forty yards, going at ten miles an hour. I judge from what I have seen frequently done, when a coach is called to stop it does not stop immediately.

You find great difficulty on the railroad in turning, do you not, in taking a short turn?—We do.

That is one of the points in which the system is chiefly deficient?—Yes, the power is very much diminished indeed if the curve amounts to above a certain ratio; a mile radius is the standing point we have got to; we endeavor to keep as near to that as we can. The wheels of the carriage are made conical, so that when we do come to a curve, the larger part of the wheel goes to the exterior rail, and makes up for the extra distance, so that in some degree we manage it in that way; still there is the momentum to be retarded in its progress. All matter put into certain velocity requires a certain power to change its position.

You have on the railroads things that turn to chenge the direction of the engine?—We have; but that engine must be in a standing position.

You never venture to turn an engine except in that way?—No.

Do you conceive that in these steam-carriages it would be possible to turn round the corner without stopping the engine?—Yes, they certainly can turn better than we can do, they have a swivel motion in the under part of the frame that they can turn it like a gentleman's carriage. It would be dangerous to have railway engines so constructed. In our engines if the wheels are left to get out of square, that is, if an obstacle is on one rail when moving at a great velocity, if the wheels are left to swing round as the wheels of gentlemen's carriages, the wheel that struck the obstacle would be retarded in its progress, and the engine would turn round and go off the road.

The difficulty depends on having the rail to run on; but it would not exist on the common road?—No; they can be made to turn on a common road something like a gentleman's carriage; but that cannot be made use of on a railroad at high velocities, from the circumstances I have stated; that is, from the construction of the engines. Neither can loose wheels be made use of; the wheels in our engines are always made to revolve with the axle-tree, so that when the wheels are made to work in a square frame they cannot change their position. If an obstacle happens to be on the road, and one of these wheels comes in contact with it, the other wheel assists in getting over it, for they all are confined in the direction of the rails. There is a contrivance I saw the other day for passing round curves, but it is by having a centre to move on, so as to change the direction of the wheels to suit the curve like a gentleman's carriage. I thought it would not do.

That would not be safe?—No; nor could machinery be attached so properly to it; we frequently, with powerful engines, connect all the four wheels together; you cannot do that if they move on a centre.

The result of your evidence seems to be that you think testing no use?—I do not think it is; it might be of some use; but it would not be so useful as to prevent danger from what I have stated.

And you are of opinion that there would be danger of a boiler bursting if the chamber were above a certain size?—If they are connected together; it depends on their connexion. Our pipes are not connected together; therefore it is only that one aperture which gives way, and allows the steam to escape.

In your engines you use a pipe of what diameter?—Varying from an inch to two inches diameter.

Should you think a pipe of any larger diameter dangerous?—As it increases in diameter the danger must increase with it.

Whereabout does the danger commence?—I think at three inches diameter; I think if it gets above that it will become dangerous; dangerous at three, but still more as it increases in diameter.

You do not think any mode has been yet devised that will prevent the escape of sparks from the chimney?—I think not, not without diminishing the power of the engine.

In engines of large power?—Of course engines with smaller power will have chambers of smaller dimensions, and the same covering put in small engines will affect it in proportion as it will in the large one.

Is there any mode devised at present of entirely preventing the fall of ashes into the ash-pit?—Nothing more than what I have stated.

Without injury to the power of the engine?—I think not; not that I am aware of.

MR. ALEXANDER GORDON, C. E.

Thinks that he is quite an impartial person as regards the merits of the different carriages. Believes that several steam-carriage inventors say that he is partial, but as almost the whole of them say that, considers it as a proof that he is not.

Have you travelled by all those carriages that have been going?—I have travelled by Gurney's, by Macerone's, Hancock's, Field's, Ogle's, and Russell's, and others.

What speed do you think those steam-carriages can travel upon the road?—I have travelled at a speed varying from two miles to fourteen, fifteen, and sixteen, and I have gone a mile at the rate of twenty.

The average rate, taking a good road without any peculiar feature belonging to it, would be how much?—Varying from ten to fourteen would be the rates at which they could travel with most profit.

And without danger to the public?—Yes; they are perfectly under command.

In what possible space can you stop one of those carriages?—Certainly in a less space than a two horse coach.

What do you conceive is the greatest capacity which is consistent with safety?—I should not like to give a hasty opinion upon that. It is a difficult subject to touch upon. I should prefer not to use a chamber larger than that now before your Lordships, and used by Mr. Hancock; nor if I were to use one of Mr. Gurney's should I use one larger than that he has at present; nor would I travel with such a carriage as Russell's boiler, which was attended with the accident near Glasgow; it had a large chamber.

You cannot state what should, in your opinion be the extreme size of the chamber of a boiler? – If the chamber of the boiler be cylindrical, I think eight inches or ten inches at most; but I understood the question to refer to a clause in the bill now before your Lordships. In that bill there is a prohibition, I understand, of certain rectangular figures.

What is the proper shape for the chambers or compartments of boilers for these carriages, and of what size may they be made consistently with the safety of the public?—To transmit heat from the fire to the water in the boiler, so as to generate steam of the requisite intensity, a certain surface of the boiler, on which the fire and heated gases play, is necessary; this surface must bear some proportion to the quantity of water to be evaporated. The requisite quantity of surface was in the early steam-engines obtained on the outside of the lower portion of the boiler, which therefore required to be of large size; subsequently the boiler was diminished, and the requisite quantity of surface preserved by directing the flue through the water in a large pipe. Steam-boat boilers required to have still more of these flues from the furnace to the chimney, so that these boilers might expose the smallest weight of water to the largest heating surface. Railroad engines required a still greater proportional reduction of water to obtain lightness, and a still greater proportional heating surface; this was obtained by multiplying the number of flues through the water from the fire-place to the chimney; the flues were reduced in their size, and more of them (sometimes 150 small tubes) were caused to pass, carrying the heated gases and flame through one large chamber in which the water is contained. Such is the general description of railway boilers now in use: they have each one large water and steam-chamber surrounding the fire-place and flues; they are erroneously called by some, tubular boilers, whereas they are large chambered boilers with tubular flues. The material difference between the boiler just named and the small chambered boilers of Gurney, of Dance and Field, of Hancock, and of Maceroni, and of a few others, is that the fire-place and flues in these latter form the large chamber, and the water in small chambers, in films or streams, is presented to the heat in the large oven or furnace. These numerous small chambers of water and steam are safer than the large chamber of water and steam, because the fracture of one of the small chambers does not involve the danger of an explosion of the whole. The ingenuity of the inventors is seen in the arrangements of the tubes or chambers, so as to allow the contained water to receive its heat from the fire, and to part with its steam unmixed with liquid (i. e. dry steam) to the engines. Hancock's boiler may be considered a number of small rectangular boilers, ranged beside each other,—as books in a library,—and connected together, in each of which circulation and separation are required to go on: Gurney's boiler is a number of small tubes in the fire; water sweeps along them, becomes heated, and rising into a chamber or chambers out of the fire the steam is separated from the water, and ready for the engines, whilst the water (with or without an addition to replace evaporation) returns by another channel to sweep again through the small heated pipes. The boiler of Sir Charles Dance and Mr. Field is very similar to that of Mr. Gurney. Of the boilers which have been used on turnpike roads some are circular in the cross section of their parts, others are nearly rectangular in the cross section. The circular is known to be, according to both theory and practice, stronger than any other figure. Were it necessary I could give your Lordships numerous instances which occurred to me during many years' practice, with some thousands of my father's portable gass reservoirs, at a pressure of 450 lbs. on each square inch. The repellant and fluent particles of steam force outwards in radical lines, and their force is best resisted by hooping them in, all round; the forces are then equal, and they are resisted by the absolute strength of the metal or the resisting force of cohesion. If, however, we confine steam in a square box, or other straight-sided figure, we expose the metal on the straight side of the box to another kind of strain,—the greatest strain to which metal can be exposed,—the power of the steam tending to break the metal transversely; the box is forced by the internal pressure to alter its shape, and bulges out; the metal is crippled, and fracture takes place, generally near the angle, the portions of metal on the same plane performing in some degree the functions of levers. Of the two shapes there can be no doubt the circular is incomparably the stronger.—With regard to the size of chambers of such boilers as are to be allowed on the turnpike road, I think that until some means of preventing explosion, not yet known, are introduced, no cylinder of greater diameter than eight inches should be allowed in such boiler or steam-generator for the turnpike road, and no ractangular or other shaped figure of such boiler or generator shall be of more than forty-nine square inches of transverse sectional area, and no vessel or compartment of such boiler should be made in part or wholly of cast-iron. I have in this answer specified the area of the rectangular figure, which is equal to the area of the circle, eight inches diameter, not because the rectangular figure in any measure equals the circle in strength, but because if an explosion does take place the same amount of steam and water may be presumed to escape. I believe, however, the area of the fracture would in case of accident always be the largest in the rectangular figure.

Inform the committee of the weights of stage coaches, vans, waggons, and steam coaches, with the view to levying a toll on the latter; and also of the probability of steam conveyance being more general on the turnpike road or on the railroad?—Of these conveyances the most destructive to the road are the light stage coach and mail coach. In them there is a greater proportional weight resting on a square inch of the tire than there is in any of the other conveyances above stated. The difference in the rates of travelling is of less consequence; of the proportional damage done to the road surface by horses feet at a quick or at a low rate, I do not know that any experiments have been made; and in my opinion the damage done by a steam-carriage and load to the road is certainly not one-third part of the damage done to the road by the mail or stage-coach and its horses, the weights moved being in both cases the same, and, after long and careful examination and experiment, I should say, that were I the proprietor of a road I should prefer the steam-carriage, even of six tons weight, as the least destructive; and having special regard to the interests of the road-trusts of the country I say the same.

	Rate in Miles per hour.	Average Weight in Tons, Coach and Load. without Horses.	Observations.
Mail or stage-coach	8 to 11	2½	Average weight of each Horse in any of these Conveyances may be stated as Ten Hundred Weight.
Van	6½	4½	
Six-horse waggon	3 to 3½	4½	
Eight-horse waggon	3 to 3½	6 to 7	
Steam-carriages	7 to 14	2 Tons.—Some are much heavier. I have seen one Six Tons weight. The best amongst many that I have seen and travelled by was not Three Tons.	

MR. THOMAS HARRIS.

Was the engineer who superintended Mr. Gurney's steam carriage while running for Sir Charles Dance between Gloucester and Cheltenham.

While you were running between Gloucester and Cheltenham, do you imagine that was a profitable speculation to Mr. Gurney?—I do not know; there was a great expense in establishing coach-houses and buildings, and the time was not long enough, I should think, to refund. I think we could have done very well.

Do you think the traffic on the road paid the expense of carrying it on?—Yes; it cleared it well.

Would it pay the expense of carrying it on in London?—I have not a doubt it would.

Then it is not from the extent of tolls you were prevented from doing it near London?—I believe not.

Do you know for what reason Mr. Gurney did not continue?—It was a matter of choice on the part of Sir Charles Dance.

REV. MR. WILLIAMS.

You can give evidence as to steam-carriages?—Yes; I have rode on them more than any person in England. I am a great advocate for them.

You are an amateur traveller in them?—Yes; and I understand something of the mechanism as well. I know something of the construction of all that were built in London.

Have you ever travelled by Gurney's carriage?—Yes.

Do you know the nature of his machine? —Yes, it is a tubular boiler.

Can it be used on roads with safety to the passengers?—The fact is, his boiler is safe, perfectly safe, but he has got an appendage to this boiler which is called a separator, or, as I call it, a danger-chamber, in order to separate the water from the steam. Within the tubes the steam forms, as it were, a corkscrew or coil, and brings out the water with the steam before it passes to the cylinder where the piston is. In order that the steam should be efficacious he has got the separators, and these are of large capacity; the consequence is, it does not signify whether the boiler is tubular, spherical, or of any other construction. If you bottle up that steam, they are all dangerous, which is the case with Gurney's; it is a dangerous boiler as long as there is a place of capacity for the steam, for if that steam is not passed off to the piston that works in the cylinder up and down, or horizontally, if you do not pass it off immediately it will burst any thing, whether it is a sphere or whatever other shape.

That separator is peculiar to Gurney's? —Yes, I think so.

You think that it is productive of danger? —Yes.

Have you been by Gurney's carriage? —Yes; several miles.

Have you met with any accidents?—No.

You trusted your life in it, notwithstanding your knowledge of the danger?—Yes; knowing that the engineer, Mr. Stone, made his valve only to a safe pressure; but suppose you come to a depth of gravel on the Cheltenham-road, eight or nine inches thick; the depth of the gravel was rather more than is usually laid by trustees on roads; it was not enough to impede a mail-coach, but it impeded his carriage, and the consequence was that they used a very great pressure there to get over, but with it the axletree broke.

Were you in the carriage at the time?—No.

You were not one of those who were blown up?—No.

Therefore danger did not occur?—No.

Have you known a case where it did occur from the boiler bursting?—Yes, at Glasgow; it was Gurney's carriage, sold to a person of the name of Ward; their carriage was in a coal-wharf at Glasgow; the person who had the management of it put on the steam, and was going to show it off to great advantage; the steam was so powerful, that either the separator or the boiler burst, and a boy or man was much injured.

Was there a separator?—Yes.

Did you see that?—Yes.

Was not that a carriage with a large chamber?—Not much larger than the usual chamber.

Was it not with a large square chamber hung under the carriage?—No; I think a cylindrical one.

But the one that burst?—Yes; I have rode on them likewise; the Scotch carriages; I have rode on it 300 miles.

But keep to Mr. Gurney's carriage; was that it? (*Pointing to a drawing.*)—No, that is Russel's; here is the boiler, which is of large capacity, and would not bear a pressure of above 35 to the square inch. I rode in this from Hammersmith to London scores and scores of times, knowing they never worked at a pressure of 20 or 25, therefore it is safe, though it is a boiler of large capacity; the safety depends on the engineers; they may blow up any of them if they load the valves to more than they can bear; but it can be prevented by a lock-up valve.

You think all steam is dangerous?—Yes; it depends on the engineer employed if he has the sole control of the valves.

You venture on board steam-packets?—Frequently; and I consider them more dangerous than steam-carriages, having boilers of great capacity, containing thousands of gallons.

Then you are an enemy to steam in general?—No; it depends on the engineer entirely; if he is fool-hardy enough to use higher pressure than a boiler can bear, no carriage is safe.

Did you ever travel by Mr. Horne's stage-coach?—Yes.

There your safety depends on the coachman?—Yes, and on the management of the horses entirely, and the coach-builder; if the axletree breaks, or a spoke or spokes break, you must come down, and most likely dislocate a limb, or lose your life. I should rather a steam-coach for travelling on, if one safety-valve is locked up from the engineer, than the best-conducted horse-coach that I know of. I do not consider boilers without the steam-chamber at all dangerous; but if they have got such steam-reservoirs, they are dangerous.

Go back to this carriage of Mr. Gurney's that burst at Glasgow; when was that?—I cannot recollect dates.

Who was the proprietor of it?—A person of the name of Ward, a man who lost a great deal of money speculating in Gurney projects, like many other gentlemen that advanced money in his concerns, to the amount, I have been told, of 40,000*l.*—This is Russel's carriage (*producing a drawing*); an advocate in Edinburgh, a Mr. Dauney, a friend of mine, lost 10,000*l.* by embarking in it.

Do you know Mr. Hancock's carriage? —Yes; I have rode in them upwards of 4,000 miles; the reason why I did so was, he was continually working on all roads, winter and summer; the prohibitory tolls had nothing to do with his carriages; *he could go distances on roads where the Acts had not been renewed, the same as Mr Gurney might have done if he had been in a situation to run.* In the metropolitan districts the Acts were renewed, and applied to steam or any other power; but the expenses attached to that are not prohibitory; it is 4*d.* on his carriage instead of 2*d.*, being double tolls in proportion to omnibuses.

Do you think the tolls were prohibitory in the other places?—Yes; but Mr. Hancock did run thrice from London to Brighton, and paid no tolls at all.

Do you think his carriage is dangerous? —No; he has no steam-chambers. An accident happened in his factory; a part proprietor in one of his carriages tied down the safety-valve with a coil of wire, so that it was impossible any thing could bear the pressure; a rend seven inches long took place; he was not hurt, but paralysed from fright, the surgeon said. There has been no serious accident from any steam-carriage of Mr. Hancock that I am aware of.

Not any whatever?—No, not on the roads, never an accident while going.

Did you ever hear of the Birmingham carriage?—Yes, but on turnpike-roads. I rode in that carriage, (*pointing to Squire's and Maceroni's,*) which is a very excellent carriage; I have rode from London to Uxbridge and back, to London twice, and also in Ogle's several times.

The result of your opinion seems to be, that they are all dangerous, but that no accident happens?—If the engineer is a fool-hardy fellow, it is dangerous. I have rode 200 miles in one, and I have rode in Mr. Ogle's carriage 100 miles; now his carriage is as fast as any of the carriages, and as safe; I do not think he has a steam-chamber; the boiler in his carriage is composed of a tube within a tube, and caloric impinges on the water inside and out; he generates steam as fast as the engines require it, which is the case with Mr. Hancock's. I do not think any of them are dangerous, provided the engineer is not intrusted with the key of one of the safety-valves.

MR. WILLIAM CUBITT, C. E.

You were one of the party of engineers who subscribed towards the building of a locomotive carriage by Messrs. Maudslay and Field?—I was. It originated in a sort of challenge which I gave the parties to prove the possibility of doing the thing.

What was the result of the acceptance of that challenge?—The result of it was that a carriage was built, and remarkably well built; it travelled exceedingly well, and was very manageable; *it proved that the thing was perfectly practicable*, but was not economical or expedient to be applied to the purposes of traffic.

Can you state to what extent it was not economical?—It was not economical in this respect, inasmuch as the expense of the machine and the expense of keeping it in order was too great to be put in competition with railway travelling or even with common roads. Such, at any rate, was the result, in my judgment, from the experiments we were enabled to make.

In what respect did the inexpediency of it consist; was it in travelling?—It was on account of the great cost of it.

Did you not draw a distinction between the two; expediency and economy?—I intended to say it was not expedient because it was not economical.

Has it no other disadvantage?—No; the thing is perfectly practicable; there is no difficulty whatever in making a good carriage which will travel remarkably well.

We have gone up steep hills with the one we had in Dulwich and the neighborhood, but the great cost is against it.

Is it not dangerous to the passengers?—Not under proper management any more than any other machine.

Do you mean than any other coach?—Yes.

Is it not dangerous to the people on the road by frightening the horses?—Not at all; I have been frequently through crowded roads in the neighborhood of London and I have never seen the horses frightened.

What was the weight of it?—Between five and six tons.

Was that as light as could be made?—It might have been made a little lighter.

Did it do much damage to the roads?—Not the least. I think if it were made properly it would rather mend the roads than otherwise, inasmuch as the wheels must be broad wheels, and cylindrical, and therefore they roll the roads.

Have you ever seen Mr. Gurney's steam-carriage?—Never.

You do not know any thing about the contrivance of that?—No. The contrivances are all on one principle; the great object is to contrive a boiler which will combine lightness and a capability of giving a great quantity of steam.

In your opinion they are not so economical as stage-coaches?—They are not so generally useful or economical as stage-coaches, because there must be an immense establishment to set them going; to run from here to Bath would require a great many locomotive carriages, and a vast establishment of workshops and stations? in fact under such management as railway carriages, which would be attended with much more expense.

What was the cost of yours?—One thousand guineas, by agreement.

What was the size of the boiler?—Our boiler was a boiler of peculiar construction; it was an assemblage of tubes, and I believe it was on the principle of what is called Gurney's boiler; at least I think so.

Who directed the form of the engine?—Mr. Field himself, subject to the approval of myself and one or two other engineers.

And you all came to the conclusion you have stated: it was an unanimons opinion was it?—I do not know that it was unanimous; we never met to express an opinion upon the subject, nor do I know what the opinion's of the other parties are; I do not even know what Mr. Field's opinion is, whose judgment I should most rely upon. I made six or seven journeys, and the result of my experience was that it was practicable but not expedient, because it was not economical.

From the experiments you have made are you satisfied that more economy could not be introduced in the management of steam-carriages,—that they could not be conducted sufficiently economically; have you made sufficient experiments to satisfy yourself upon that point?—I can only speak from the experience I have had; I doubt they could be conducted economically except upon such an immense scale as it would be impossible to establish; for instance, it would be impossible to establish a steam-carriage—to have one or two steam-carriages running from London to Bath, it would cost more than it would be worth, and they could not take passengers in competition with well-managed coaching; they could not do that but by the investment of immense capital, having an immense establishment, and doing every thing upon a very great scale. It would be necessary perhaps to have a hundred steam-carriages to keep a concern continually going.

Is not the formation of a large capital perfectly possible?—It is.

Are not railways conducted by companies?—Yes, they aro; but there is not the difficulty attending the construction of a railway and the managemenr of carriages on railroads that there is with steam-coaches; we require a totally different class of persons. In a railway a man of comparatively common talent will do for what they call the engineer, that is to manage a locomotive engine; but in managing a steam-coach it is quite different, there is the greatest presence of mind required, he should be a person of great sharpness and firmness to manage a steam-carriage on a common road; we were fortunate in having a very able man at the time we made the experiment; he was a man of the greatest nerve and spirit, and he was also a person of great mechanical skill; it made us all nervous sometimes to see him steer through a string of carriages in the way he did.

Have you ever made any calculation as to the difference of speed between what could be accomplished on a common road and what could be accomplished on a railroad?—No; but I should say I scarcely know a limit to the speed that could be obtained upon a level and good railway; I should say there is no limit till the power is balanced by the atmosphere, which would be upwards of sixty miles an hour certainly.

MR. JOHN BRAITHWAITE, C. E.

Have you directed your attention to the distinction between locomotive-engines and carriages that run on the highway?—I have; not that I consider much difference between them.

Are you acquainted with the construction of any of those carriages?—My attention has been called to them, but not with regard to any particular plan; Mr. Hancock's and others, Mr. Gurney's and Colonel Macerone's all of them have been experimentalizing for a considerable time, but it does not appear that the result has been what we should call practically successful.

As an engineer well acquainted with these things, do you imagine that the science is sufficiently advanced to enable you to build such an engine as would be both safe and sufficiently economical for general purposes?—Certainly not.

Do you think there is any danger in them?—I do not think there is any danger.

Then the objection is decidedly upon the ground of the expense being greater than the profit would justify?—I should say so most decidedly.

For what railways do you construct locomotive engines?—At this present moment we are constructing a great many for Cuba, and we have also been applied to by the Birmingham and London Railway Company. The great difficulty is to get parties who will construct them with sufficient care and attention. Some time since I was competing with Mr. Stephenson upon the Liverpool and Manchester Railway with an engine, which was called the Novelty. It was then given as the opinion of many persons that if locomotive-engines cost as much as I asked of the Liverpool and Manchester Directors, namely, 1000*l.*, that that of itself would be a decided prohibition to the introduction of steam-carriages on railways; and yet, notwithstanding that, we are now receiving not only 1000*l.*, but in many instances 1200*l.*, 1300*l.*, 1400*l.*, and 1500*l.*, for locomotive-engines.

How is it that their price is not a prohibition?—From the circumstance of the great duty which the engines now do, which was never anticipated. At one time it was thought we never should do more than something like twelve miles an hour; but the result was, that we did at the rate of forty-five miles an hour.

Do any of your engines run upon that road?—No; I do not choose to build engines after a model which I know to be objectionable, unless desired as a manufacturer; and as they saddle us with the responsibility of proving these engines, which would necessarily take me a distance of 200 miles from my place of abode, it is rather too far to undertake the management of them.

Have you any carriages running on any existing railway?—Not at present; we are making several; but of course, having a very extensive manufactory, we are obliged to make for the market. We are making them upon the model laid down by the Liverpool and Manchester Railway Company,—Mr. Stephenson's improved by Mr. Berry.

Have you turned your attention to the means of preventing sparks from flying out?—Yes, I have.

Have you, in your opinion, succeeded in effectually preventing it?—No, I have not.

Have you succeeded in effectually preventing any loss of cinders from the ash-pit?—Yes; we have a tray constructed at the bottom part of the grating to receive any thing that falls.

Do they not fall out?—Occasionally they may do so, when they have been stoking very furiously for the purpose of effecting particular objects, such as getting up the inclines; then they require abundance of steam, and stoke furiously; and now and then cinders fall out in spite of the greatest care.

From the Mechanic's Magazine.

INTRODUCTORY LECTURE,

The basis of all physical knowledge has been stated to lie in experiment, and the careful observation of facts. The truths thus obtained, so long as they are considered individually, are of value to direct our practice, only when the circumstances under which they were originally noted, recur without variation. It is not only necessary to record them, therefore, but to classify them; in order that phenomena, which are probably connected, either in their supposed cause, or in their appearances, may be considered together. Up to this time we use no scientific process, the record and classification of the facts, is purely historical, and has been said to constitute a department of that division of human knowledge, under the name of Natural History. This name, it may be incidentally stated, is now usually given to the description of the external characters of the bodies which we rank by their obvious qualities in the three great kingdoms of nature, the Mineral, the Vegetable, and the Animal. This department of knowledge has, however, been elevated, by the introduction of Philosophic reasoning, to the rank of a science, and we should, in speaking of it, give it its true value, by including its several branches under the denomination of "The Natural," as distinguished from the Physical Sciences.—When certain facts, obtained by observation or experiment have been classified, we are generally able to find among the phenomena which they present, one or more which are applicable to them all. A general proposition expressive of this agreement may then be deduced and applied to them without exception. Several such general propositions may be found to agree in some one or more points, and this agreement may be, therefore, expressed in a proposition of still more extensive application. Proceeding in this manner, from individual instances to general, and from general propositions to those still more general, we may finally, sometimes, reach propositions which include in their expression all substances on which experiment can be made, or which observation can reach. Such a proposition, unlimited in its application, is called a law of nature.

At other times we find the proposition to be limited in its application, to one or more classes or orders of natural bodies.

We are said, in thus obtaining general propositions from individual facts, to employ the process of induction.

It is, however, impossible to collect every individual instance, and thus obtain complete proof of the general laws by induction alone. But we are warranted in concluding the truth of the proposition to be absolute, if we find it to apply to every case in which it is possible to make experiment or perform observation. We are now said to reason from analogy.

As an instance of the inductive process; of reasoning by analogy; and of the limit of some inductive propositions: I shall cite a very familiar case, drawn from Natural History, and partly connected with our most early impressions.

A child observes, that in his parents and play-fellows, the sensation of vision is operated by two concurring organs, and is not slow to become aware that he himself is similarly constituted. He finds the same provision existing in all the individuals of his race which he meets. He therefore infers, partly by induction, and partly by analogy, that "All men have two eyes." This is the first step in generalization, for until he had reached it, it would have been necessary for him to name the individuals in whom he observed the common fact.—He will probably have ascertained the truth of the same proposition, in respect to a variety of species of animals, but he cannot make the second step in generalization, until he have studied the elements of Natural History. He will then find that man, and all the animals in whom he has observed this peculiarity, belong to a grand division of the animal kingdom, which naturalists call the vertebrated, and will by two successive steps in the analysis—steps, we need not repeat here,—reach the most general proposition of all, namely: "*All vertebrated animals have two eyes.*" He cannot proceed farther, for he will find in other grand divisions of the animal kingdom, provisions totally distinct, or the faculty and organ wholly wanting; for, some animated beings have eyes innumerable, and others none. In reaching this most general proposition, he must have proceeded partly by analogy, and he can now apply the analogy to obtain even more extensive knowledge; for if he find, buried thousands of feet beneath the present surface of the earth, a fossil bone, although belonging to one of a family which has long since become extinct, he infers at once, that it, when living, had the same provision for receiving the impressions of light as existing vertebrated animals.

When a general proposition has once been obtained from individual instances by induction, we may, therefore, by analogy, make use of it to explain new facts, or to predict natural occurrences; we may also apply mathematical reasoning and calculation, and in either way may obtain propositions as certainly true as the result of the original induction itself.

We are now said to make use of theory; and although the term theoretic has been opposed to practical, as an epithet almost of reproach; it would were the individual to whom it is applied, worthy of it, be the highest possible praise; for it implies that he is acquainted with all known facts, as well as capable of applying them to discover new combinations, and to explain what has not before been observed.

What is styled hypothesis, is however, totally distinct from theory, and is liable to this reproach, for it is either founded on a partial view of facts, or has no other foundation, except that it is capable of explaining the phenomena which we observe.

In the course which I am now commencing, I shall find occasion to illustrate these modes of reasoning, and explain these processes further.

Physical Science is, then, built upon the foundation of innumerable experiments and observations, and is made up of propositions of different degrees of generalization. In the study of this science, it is by no means necessary to pursue in detail the methods by which it was originally formed. To enter into all the experiments, would occupy, not the duration of a single life, but of several; and some of the observations may be of phenomena so rare as to be repeated at intervals too distant to be seen oftener than once in the course of several generations. It is only necessary that we should have reliance on the veracity of the observer in the latter case, or have concurrent testimony in the former. Thus when Hally observed a comet in 1759, his observations were received to be true; others of a subsequent generation revised his calculations and predicted its return for 1835. Living astronomers therefore looked for it with complete faith. This faith was fully warranted by the exact coincidence of the re-appearance with the prediction. So also, to draw an instance from another source, when many nautical men have informed us that they have met, in the ocean, with an animal as large as a ship, we see no reason to doubt their joint evidence, and receive the existence of the whale for a truth as well established, as if it were derived from the evidence of our own eyes.

If, then, it be unnecessary for us to repeat the experiments and observations of others, provided the truth of their results be established by sufficient evidence: Of what use, may it be asked, is experiment in a course of lectures on the physical sciences? The answer to this question is important in the present instance, as it will elucidate the plan which it is proposed to pursue. Experiments, then, are of importance, and in some cases absolutely necessary, in a well conducted course of philosophical instruction: First, because they bring our analogical reasonings and mathematical investigations to the test of the phenomena themselves, and thus enable us to perceive whether we have included all the circumstances of the case: Secondly, because they enable us to illustrate general principles, by means of particular facts; and to describe the individual instances, whence the general laws are deduced; and, thirdly, because they impress upon the mind more firmly, the recollection of the principles which they are applied to illustrate. It is also to be stated, that they afford an agreeable variety, and thus render a study attractive, by giving pleasure to the senses, which, in their absence, might be dry and laborious.

Such, then, are the views with which experiment will be introduced into the present course. The manner in which the general principles that will be developed were originally discovered, will be described in the way of history, and reference will be had to the distinguished philosophers, who have been authors of the several discoveries. To these we shall appeal as authorities, not however to follow with blind obedience, but with due regard to the evidence of the authenticity of their statements, and to corroborating facts. This authenticity we shall test in individual cases by experiment, and thus show the truth of the induction, by the exhibition of a few of the facts whence it was originally obtained; at other times, we shall have recourse to experiment, solely as an illustration of the principles laid down, or for the purpose of serving as an artificial memory.

For such experiments, liberal appropriation has been made, and it is hoped, that by proper exertions, the course may be rendered not only instructive, but interesting.

Having thus explained the method by

which the principles of physical science are originally obtained, defined the value and use of experiment in a course of public lectures, let us return to the consideration of the class of existences, the examination of whose phenomena is the object of Natural Philosophy.

We have already seen the impossibility of lifting the veil which hides from us the agency of the Maker of "this universe and all created things," and of penetrating to the final causes which operate in the constitution of the substances and actions, which become known to us through the intervention of our senses. Failing in this, we adopt the method of defining the object of which physical science more especially treats, by its properties. Choosing for this purpose those, which by the method of induction, can be shown to be universal, and omitting every property which is not common to every part of the visible world.

The existences, then, which we include under the general name of matter, are marked by certain obvious properties which are common to them all. These essential properties are but two in number, and are known by the names of extension and impenetrability. By saying that matter possesses the property of extension, we merely mean, that it must occupy a portion of space in all the three dimensions of length, breadth and thickness. By impenetrability we express, that it is capable of occupying this portion of space, to the exclusion of all other material substances, or in other words, that no two portions of matter can exist in the same space, at the same instant of time.

From the fact that matter is extended, it follows that it is capable of being divided; and discussions have been entered into, for the purpose of examining how far this divisibility may be carried. It is sufficient for our purpose to state, that it is believed at present, upon a variety of concurring facts, that matter is by division finally resolvable into portions which are incapable of further division. This proposition is not however, susceptible of absolute proof, for the actual division, by mechanical, physical, or chemical means can be carried to such an extent. that the sight, even when aided by powerful instruments, can no longer follow the operation.

The ultimate portions into which it is believed that matter is finally resolved by division, are called atoms, or, in more familiar language, particles of matter. If it be true, that no two particles of matter can exist in the same space at the same time, it follows, that before any particle can enter and occupy the place possessed by another, the latter must be moved from that place. Mobility or the capability of being set in motion is therefore, although sometimes reckoned among the essential properties of matter, no more than a necessary consequence of its impenetrabity.

Attraction also, which is often classed among the properties of matter, is not essentially so, for we can conceive matter to exist without it, which is not the case with the other two properties which we have named.

When we cease to consider matter in the abstract, and view it as it presents itself to our senses, we find it existing under certain determinate forms, or in peculiar and well marked states of existence. To these determinate forms and peculiar states, we give the name of bodies.

Bodies, as we find them on the surface of the earth, are undergoing continual changes, although with different degrees of rapidity. Thus some small animals are born, enjoy the functions of life, and die, within a few hours; and no sooner has their life departed than a decomposition begins, which resolves them back again into inorganic matter. Other animals, and some productions of the vegetable kingdom, resist for centuries the attacks of death, but are finally made subject to the same general law. Even the most solid rocks yield gradually to the principle of change, and generations of them succeed each other in geological chronology, as those of men do in civil history.

In some cases, the disintegration is always attended by the destruction of the body, which the particles originally composed. Such is the case with all inorganic beings. But in the animal and vegetable kingdoms, although a waste of their particles is continually going on, this waste is supplied by the food which they consume, so long as the vital energy remains. In the youth of animals this supply exceeds the waste, and the body increases in bulk. In more advanced age, the waste and supply balance each other. Such is the extent of the change, which we are thus und[illegible]o[illegible]ng, that it has been proved by phys[illegible]ologists that at the end of seven years, no one particle which at the beginning of that period composed a pa[illegible]t, even of our hardest bones, is left in the human body.

In all these changes, experiment and observation conducted with the nicest care, and strictest attention to weight and measure, have shown that not the smallest particle of matter is ever lost. It may be traced, forming in succession a portion of many different bodies, but in the innumerable changes of form, which proteus-like it undergoes, it still continues to exist, and to occupy its due extent of space, to the exclusion of all other material substances. The actions which we call natural, because they are due to causes inscrutable to us, operate with powerful, and in some cases, irresistible energy to produce changes in the constitution of bodies. We can ourselves, bring to operate on bodies mechanic forces, by which they may be rapidly disintegrated; and the actions of flame, of chemical affinity, and of other physical powers are still more efficaceous in changing the determinate forms in which matter exists at any given moment. But all these agents, natural, mechanical, physical or chemical, are wholly incapable of adding to, or diminishing in the least degree, the quantity of matter, which exists in the universe. Matter therefore, so far as any cause, which we can reach by our finite intelligence, is capable of acting upon it, is incapable of increase or diminution. It has therefore been inferred by some that it is eternal.

Persons of good intentions, but ignorant of physical science, have stigmatized the proposition of the indestructability of matter as Atheistic. So far, however, from being so, this very fact, is among the most powerful of the proofs of the existence of a deity, which natural theology brings to the aid of revealed religion. We cannot conceive of the existence of any thing without an adequate cause, and this truth is admitted under the name of the sufficient reason, both by infidels and believers. If then no finite cause be sufficient to generate material existence, it necessrily follows, that all which we see or discover by our other causes, in the universe, must be the work of an omnipotent cause,—the creation of an agent of infinite power. If his workmanship be eternal, so must he also be; and of his wisdom all nature furnishes abundant proof. If on the other hand the present state of things is ever to be brought to a close, it can only be so, by the same Almighty power, to which its original creation was owing.

The motion which bodies acquire, in consequence of the impenetrability of the matter of which they are composed, is subject to certain definite laws. The study of these, and the application of them to predict and explain natural phenomena, and to direct the works of human art, is the province of an extensive division of Physical Science, to which, from the intimate relation it bears to the practice of all the arts, the name of Mechanics' has been applied.

Mechanics' differs from the other divisions of natural philosophy, in approaching more closely to the rank of an exact science. The laws which govern the action of the forces by which motion is produced are few; and are reached by the most simple induction. Upon these laws a science of vast extent and almost unlimited application, can be built by the aid of mathematical reasoning alone. So completely is the mode of proceeding identified with that employed in pure mathematics, that the original induction is often passed by unnoticed by such as content themselves with the mere theory. When, however, this theory is to be applied to practical purposes, innumerable experiments become necessary, upon friction, the strength of materials, the resistance of fluid media, and other interfering causes. Such however has been the extent of the researches into these subjects, and the accuracy of the mathematical laws which have been deduced from them, that it is hardly possible for a new case to occur in practice. We can calculate the power, and forsee the action of a machine, determine the proper dimensions of the parts of a proposed structure, or predict the quantity of water which will be delivered by a pipe, although miles from the source may intervene, with almost as much precision as we can estimate the number of square feet in the floor of a room.

Situated, as we are, upon the surface of a body which we call the earth, our position causes us to draw a wide distinction between the bodies which we find in our own immediate vicinity, and those which our sight teaches us, to exist in distant parts of space. The appearnces of the latter bodies, to which we have given the name of heavenly, are pursued by a species of observations which we style Astronomic. To the astronomy of observation it is necessary to call in the aid of mathematical calculation; and we obtain by their union the science of Theoritu and practical astronomy, the most elevated of those included under the general name of Physical.

The laws which govern the motion of the heavenly bodies, are shown by this science to be identical with those which are involved in the motion of terrestial bodies. The motion of the ship upon the ocean, of the carriage upon the railroad, and of the manufacturing machine, are all subject to exactly the same rules as those which guide the planets through the regions of immeasurable space. When we apply these laws to the heavenly bodies, we create a science to which the name of celestial mechanics' has been given. This also goes in our language, although with little propriety, under the name of Physical Astronomy.

In the motions of bodies, in the changes which they undergo, and in some of their mutual actions upon each other, we perceive the influence of agents which cannot themselves be embodied or confined; and which therefore, although acting powerfully on matter, we cannot prove to be material. Among such agents are, heat, light, electricity, and magnetism. The investigations of the effects produced by them, and of the manner in which they act upon bodies, gives birth to a department of Natural Philosophy, to which the name of Physics is usually restricted.

The bodies which we meet with in nature are rarely simple in their constitution. Each of them is generally capable of being resolved into two or more other bodies of greater simplicity; and by means, whose manner of action we shall have occasion to study, bodies are finally reached, which it is impossible for us, in the present state of our knowledge, to simplify further. These simple bodies may again be re-united, and thus caused to regenerate the body whence they were originally obtained, provided it had not been organised. In the combinations which these elements thus enter into, they are found to be subject to a few determinate and definite laws. The study of these laws, and of the natures and characters of the substances themselves, is the province of another department of Natural Philosophy, which is known under the name of Chemistry.

Such then is the basis of the division of the general subject of Natural Philosophy, into distinct sciences. And it may not be amiss to repeat their names, along with a more brief definition, in order to impress them more fully upon the minds of such portion of the audience as has not yet entered upon the study of these subjects. The divisions of Physical Science, then, are:

1. Mechanics, which treats of motion in general, as well as of the construction of machines, and other artificial structures.

2. Astronomy, which observes the motions of the heavenly bodies, and by the application of mathematical calculation to the records of the observations, enables us to predict the occurrence of the several phenomena.

3. Celestial Mechanics, or Physical Astronomy, which applies the laws discovered in the motion of terrestrial matter, to the explanation of the phenomena of the heavenly bodies, and to the detection of minute variations, growing out of their mutual action, which can hardly be reached by observation alone.

4. Experimental Physics, which is generally restricted to the examination of the actions, and effects, of light, heat, electricity, and magnetism.

5. Chemistry which investigates the compositions of bodies and inquires into the nature and character of their elements, and of the several compounds which these elements make up. However different these subjects may be from each other, there is, notwithstanding, an intimate connection between them all, and it is indeed hardly possible to make progress in any one of them, without at least a partial acquaintance with each of the others. Nor is it practicable in almost any case, to produce a natural effect, in which actions which are included under at least three of the different heads, are not intimately connected. The three species of action which are thus closely allied, are the mechanical, the chemical and the physical. The agent, too, by which the motions of the heavenly bodies are controlled, is of the same general character as those we call physical; and were it not that we rather study it in its great mechanical effects, than in its mere laws, might be classed with electricity and magnetism.

A simple instance will serve to exhibit the connection, as well as to illustrate the difference, between these several kinds of action.

A smith places a piece of iron in his forge fire and heats it red hot; applying for the purpose the *physical* agency of heat. He next lays it upon his anvil and beats it into some proposed form, the action thus applied is strictly *mechanical*, not only in common, but also in scientific language. But while he beats the red hot metal, sparks fly off in all directions, which are the result of the combination of the iron with one of the component parts of the atmosphere, a combination which is therefore governed by *chemical* laws. We might go farther, and show how the combustion of fuel, urged by the action of a bellows, whence the heat is originally derived is due to another combination of mechanical, physical and chemical action, but what has been already said will suffice for our purpose.

It has already been stated that it is my intention to select from the wide field of which an outline has now been given, a few subjects susceptible of familiar explanation, and popular illustration. I have been farther guided in the choice of these subjects by the desire to exhibit those particular points in which Mechanics, Physics and Chemistry are more closely connected with each other. The course will commence with a general view of the classes into which bodies are divided, by means of their mechanical characters. Among these we shall find that the class to which the atmosphere which surrounds our earth belongs is the most curious and interesting. We shall therefore enter fully into the investigation of its nature, and mechanical properties. At every step we shall find that these properties are materially influenced, if not wholly due, to the physical agency of heat. The consideration of the effects of heat, and the laws by which it is governed, will therefore naturally follow.

Returning again to the atmosphere: its chemical character will be examined, and the manner in which it can be separated into a number of constituents, described. The most important properties of these constituents, and of the elements analogous to them in character will then be illustrated by experiment. In the course of these experiments, we shall be led to the consideration of the more important principles of physical science, and finally to the discovery of the laws of chemical affinity, with the consideration of which, the course will conclude.

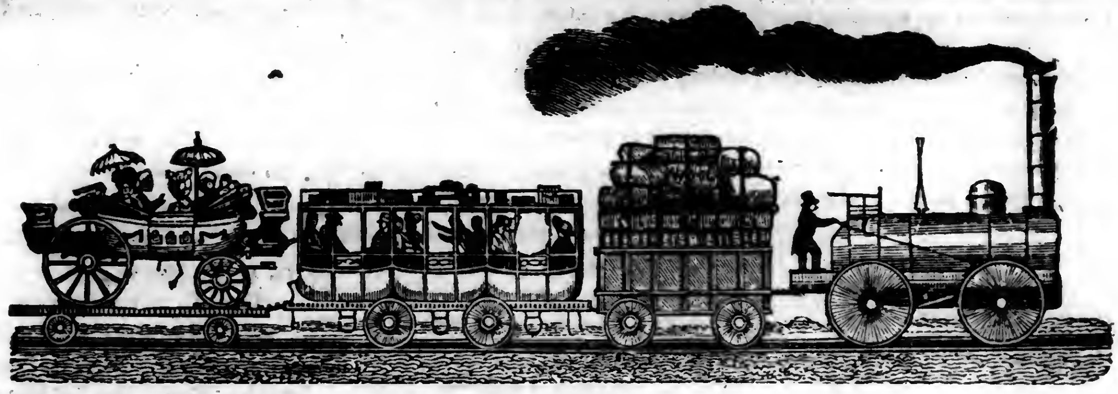
It is hardly necessary that I should point out to this intelligent audience, the advantages to be reaped from the study of the physical sciences. Derived, as they are, from the careful observations of the action of nature, continued for several generations; and composed of laws and principles deduced by laborious study from innumerable facts, these sciences possess the merit of conveying to him, who wishes to enter into the practice of any of the useful arts, the accumulated experience of centuries. If therefore, it be not only possible, but a fact of daily occurrence, that a person, by practice alone may become eminent, in the manipulations of manufactures and the mechanic arts, he may save himself much labor, both of body and mind, by acquiring the principles of physical science, before he enters upon the manual part of his calling. These principles will enable him to foresee contingencies in the exercise of his art, which he might otherwise only learn by long and laborious experience. The difference in the progress of him who rests upon physical principles as the guide of his practice, and him who is unable to employ them, will be in some measure the same, as that which exists between the persons by whose researches the fabric of Natural Philosophy was erected, and those who study it in its present state. The investigations of the former have continued undisturbed, and in regular succession for more than two conturies, yet to a youth of intelligence and duly grounded in elementary knowledge, a couple of years may well suffice for the attainment of a complete outline of the sciences. The knowledge, too, which is acquired in the study of science, is capable of universal application, while that which is derived from practice alone, is of little value, except in the epecific case in which the experience was obtained. It is true indeed, that theoretic knowledge can never be a substitute for practical skill, but a far higher degree of that skill can be acquired, by him who is previously imbued with a knowledge of the physical science, than by him who is devoid of it. The cultivator of science and the practical man, ought therefore, in order to a complete success in their respective callings, to start from the same point. Both should be equally versed in the elements of natural philosophy. Their paths will then diverge from each other; the one will devote his whole time and attention to the increase of the facts of the science he studies or to the extension of its theoretic parts The other will apply the knowledge he has obtained to practical purposes.

Concluded in next Number.

WIDTH OF THE DELAWARE RIVER OPPOSITE PHILADELPHIA.—On the 17th of January, 1837, the river Delaware was carefully measured with a four pole chain, on the ice, from the end of the wharf at English's (late Daniel Cooper's) ferry, in

Camden, to the end of the wharf at Burr's (Blight's) ferry, south side of Market-st, in Philadelpuia, by Richard W. Howell, and Josiah Harrison, Esqrs., of Camden, and was ascertained to be 54 chains and 50 links, being 22½ rods short of three quarters of a mile.

M. Thenard has resigned the Professorship of Chemistry at the Ecole Polytechnique. and it is expected that he will be succeeded by M. Dumas.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.]

SATURDAY, MARCH 11, 1837. VOLUME VI—No. 10.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MARCH 11, 1837.

FOR SALE AT THIS OFFICE,

A Practical Treatise on Locomotive Engines, with Engravings, by the CHEVALIER DE PAMBOUR—150 pages large octavo—done up in paper covers so as to be sent by mail—Price $1 50. Postage for any distance *under* 100 miles, 40 cents, and 60 cents for any distance exceeding 100 miles.

ALSO—*Van de Graaff on Railroad Curves*, done up as above, to be sent by mail—Price $1. Postage, 20 cents, or 30 cents, as above.

ALSO—Introduction to a view of the works of the *Thames Tunnel*—Price *fifty cents*. Postage, as above, 8 cents, or 12 cents.

*** On the receipt of $3, a copy of each of the above works will be formarded by mail to any part of the United States.

10 10t

AVERY'S ROTARY STEAM ENGINES.—AGENCY.—The subscriber offers his services to gentlemen desirous of procuring Steam Engines for driving SAW-MILLS, GRAIN-MILLS, and OTHER MANUFACTORIES of any kind.

Engines only will be furnished, or accompanied with *Boilers* and the necessary *Machinery* for putting them in operation, and an Engineer always sent to put them up.

Information will be given at all times to those who desire it, either by letter or by exhibiting the Engines in operation in this city.

Inquiries by letter should be very explicit and the answers shall be equally so.

D. K. MINOR,
132 Nassau-st., New York.

With unfeigned pleasure we announce the speedy commencement of the Croton Aqueduct, a work interesting to all concerned in Internal Improvement, but of vital importance to the inhabitants of the city of New-York.

The attention of Contractors is invited to the following announcement of the Water Commissioners.

From the nature of the work, and the substantial source from which the funds are drawn, we anticipate a large number of applications on favorable terms.

CROTON AQUEDUCT.

NOTICE.—Sealed Proposals will be received by the Water Commissioners of the city of New-York, until the 22d day of April next, at 3 o'clock, P. M., at their office in the city of New-York, and until the 24th day of April, at 9 o'clock, P. M., at the office of their Engineer in the village of Sing Sing, for constructing a Dam across the Croton River, for the Excavation, Embankment, Back Filling, Foundation and Protection Walls; for an Aqueduct Bridge at Sing Sing, three Tunnels, several large and small culverts, and an Aqueduct of stone and brick masonry, with other incidental work, for that portion of the Croton Aqueduct which extends from the Dam on the Croton to Sing Sing, being between eight and nine miles in length

The prices for the work must include the expense of materials necessary for the completion of the same, according to the plans and specifications that will be presented for examination, as hereinafter mentioned.

The Work to be completed by the first day of October, 1839.

Security will be required for the performance of contracts—and propositions should be accompanied by the names of responsible persons, signifying their assent to become sureties. If the character and responsibilities of those proposing, and the sureties they shall offer, are not known to the Commissioners or Engineers, a certificate of good character, and the extent of their responsibility, signed by the first judge or clerk of the county in which they severally reside, will be required

No transfer of contracts will be recognised.

Plan of the several structures and specifications of the kind of materials and manner of construction, may be examined at the office of the Commissioners, in the city of New-York, from the 10th to the 14th, inclusive, of April next. The line of Aqueduct will be located, and the map and profile of the same, together with the plans and specifications above mentioned, will be ready for examination at the office of the Engineer, at the village of Sing Sing, on the 15th day of April next, and the Chief or Resident Engineer will be in attendance to explain the plans, &c., and to furnish blank propositions.

Persons proposing for more work than they wish to contract for, must specify the quantity they desire to take

The full names of all persons that are parties to any proposition, must be written out in the signature for the same.

The parties to the propositions which may be accepted, will be required to enter into contracts immediately after the acceptance of the same.

The undersigned reserve to themselves the right to accept or reject proposals that may be offered for the whole or any part of the above described work, as they may consider the public interest to require.

STEPHEN ALLEN,
CHARLES DUSENBURY, } Water
SAUL ALLEY, } Commissioners.
WILLIAM W. FOX,

JOHN B. JERVIS,
Chief Engineer, New-York Water Works.

New-York, February 28, 1837. 10 5t

TO ENGINEERS.

WE are gratified to be able to announce to those desiring INSTRUMENTS, that Messers E. & G. W. BLUNT of this city, are now prepared to furnish at short notice, LEVELS, from different manufacturers, among others from Troughton & Sims, which they warrant of the first quality. Circumferentors, Levelling Staves, Prismatic Compasses, Mathematical Instruments, Books for Engineers, etc. constantly on hand.

One of the above firm is now in England superintending the manufacture of Theodolites, Transit Instruments, etc.—and any orders for Instruments, not now on hand, will be forwarded him, and executed promptly.

*** Orders will be received and promptly attended to by the Editors of this Journal. 9 4t

PRESERVE YOUR RECEIPTS, *especially* for newspapers, and periodicals, as such accounts are more numerous than in most other kinds of business and therefore errors are more like to occur. To avoid errors in our accounts, and to give the parties interested an early opportunity to correct them should they occur, we have adopted the plan of publishing in each number, the name, residence, and *date paid to*, of those who have paid during the week—and we request early information should error be detected by subscribers.

PAYMENTS IN ADVANCE.—Our friends who have so promptly paid in advance, for the current year of the Journal, will please accept our thanks. Those who have been to *busy* to think of such a *trifle*, will have the goodness to receive "*in advance*," our thanks, and then we shall have no occasion to respeat the expression on receiving their favors.

To those who have been so constantly engaged in *business* as to *omit* to pay for *previous* years, we will merely say—it will afford us much pleasure to receive the amount and record their names as paid to *January* 1838.

RAILROAD AND CANAL STOCKS, in New-York and Philadelphia.

SALES OF STOCK IN NEW-YORK
February 27th.

	Price of shares	Offered	Asked
Mohawk Railroad	s w		88½
Paterson Railroad			70½
Boston and Providence	b 50 ds.		108½
New-Jersey Trans.	60 ds.		108
Stonington	b 60 ds.		82
Long Island Railroad	n w		81½
Paterson Railroad	b 90 ds.		75
Stonington Railroad	cash		77
Harlaem Railroad			78½
Utica and Schenectady			121½
Delaware and Hudson Canal			94½

PHILADELPHIA STOCK MARKET.
February 24th.

RAILROAD STOCKS

	Price of shares	Offered	Asked
New-Castle and Frenchtown	25	31½	32
Do loan, 5½ per cent	100	99	101
Wilmington and Susquehanna	50	38	42
Camden and Amboy, shares,	100	136	136½
Do loan, 6's 1836	100	110	120
Danville and P shares	50	25	35
Norristown, do	50	34	34½
Do 6 per cent loan	100	85	100
Valley Railroad	7½	1	3
Westchester do	50	20	28
Minehill do	50	55	60
N. L. and Penn. Tp. do	40	34½	35
Philadelphia and Trenton do	100	125	127
West Philadelphia Railroad	50	20	30
Harrisburg and Lancaster	50	46	48
Cumberland	25	15	20
Beaver and Meadow	50	57	58

MISCELLANEOUS STOCKS

	Price of shares	Offered	Asked
North American Coal Company	25	12	14
Steam Bt. Sts. Columbian	100	18	22
Exchange Stock	100	70	80
Arcade	100	55	75
Theatres—Chestnut street	600	625	675
———Walnut street	280	175	2[illegible]0
———Arch street	500	325	375
Gas Company	100	100	102

CANAL STOCKS.

	Price of shares	Offered	Asked
Schuylkill Navigation, shares	50	164	164½
Do loans, 5 1845	100	98	100
Do do 1855	100	100	101
Do do 5½ 1837	100	98	100
Lehigh Coal and Navigation	50	85	88
Do loan, 6 1838	100	96½	97½
Do do 6 1839	100	97	9[illegible]
Do do 6 1844	100	99	100
Do do 5 1840	100	96	97½
Union Canal, shares	200	180	190
Do loan, 1836	100	83	86
Do do 1840	100	85	90
Chesap'k & Delaware Canal, shares	200	20	40
Do loan, 1837	100	60	67
Do do 1840	100	60	67
Delaware and Hudson,	100	92½	93
Do loan	100	95	100
Louisville and Portland	100	112½	117
Convertible 6 per cent. loans,	100	110	120
Sandy and Bever	100	60	80
Morris Canal	100	99	100

STEAM MILL.—We understand that the stock for the purpose of erecting a steam mill in this village, with three or four run of stone has been nearly all taken up, and that the work will be speedily commenced.—[Goshen, Orange Co. Democrat.]

The above paragraph indicates a determination to make Goshen a place of business—and of the success of the measure we have not a doubt, as we understand the company propose to put up one of *Avery's Rotary Engines*—which is probably the most suitable machinery in use for *mills*, either for sawing or grinding.

The manufacturers of those engines, will guarantee the engine to grind *one hundred bushels of wheat* with a cord of maple wood, OR HALF A TON OF LEHIGH PEA COAL and one man will superintend the engine and make the *fire* for ten or twelve hours in the twenty-four.

RAILROADS AND LOCOMOTIVES.

In laying the following communication before our readers, we feel compelled to reiterate the remarks made in publishing other articles on the same subject. As far as we are concerned, and as far as we understand the notions of those who have taken up the performances of Mr. Norris' and other powerful engines, as arguments against the use of stationary power and excessive excavation and embankment in ordinary cases, it is not intended to recommend the adoption of 360 nor ever of 100 feet to the mile as a suitable grade for railroads. No one can be so foolish as to propose these or any other grades as uniformly proper upon railroads, yet many of the remarks in the following communication as well as in others, on the same subject, are predicated upon such a supposition.

We understand these performances only as proofs of the great superiority of our American Locomotives, on any and every grade. There is no doubt but that the experiments on the Columbia Railroad give a greater adhesion than those of any former trials, but of the fact there can be no doubt. We were of a party of 53 persons, in two passenger cars, drawn with the tender up the inclined plane, rising 360 feet in a mile, at the rate mentioned in a previous No., and this without any start, the engine being stationary at the foot of the plane.

We leave the discussion of this subject, as far as the theory is concerned, to those who have time to examine into the matter.

As for Mr. Norris, he goes upon the principle that "facts are stubborn things," and we understand that in a week or two he will be able to make another and more conclusive trial of the power of his engines.

As to the remark in the communication on the blowing off of steam, we consider with the writer that this is no argument at all of superabundant power.

We are always obliged to our friends for communications on this subject; much discussion has already taken place in our paper, and we are convinced with a happy result.

Any remarks, facts or calculations on a theme so prolific and so intimately connected with the science of civil engineering, can never come amiss.

For the Railroad Journal.

FREDONIA, Feb. 7th, 1837.

To D. K. MINOR, and
GEO. C. SCHAEFFER,

GENTLEMEN,—I have read in your paper of the 24th December, a Circular, by William Norris, Esq., of Philadelphia, containing an account of some very wonderful feats said to have been performed by his Locomotive Engines, on the Columbia Railroad. Some of these were published last summer, but have not as yet, I believe, been noticed by scientific men, from the fact, I suppose, that the errors in them were so enormous and so apparent, that they supposed they would be detected by all, and were not therefore worth exposing.—But the mass of those who read these accounts, now again put forth as facts, and who are interested in Railroad Improvements, are not scientific men, and it is to prevent such from daily quoting and swallowing absurdity with such grave astonishment, that I send you the following exposition. I have not the least desire to prejudice community against Mr. Norris' engines, which I have no doubt are really very superior ones, but I do not wish capitalists to mistake *steep* roads for *cheap* ones, or to suppose they are going to draw loads which are really impossible for Mr. Norris' engines or any others.

I shall confine myself to the first and last articles of this Circular, merely premising that the others are records of deeds done in equally flagrant and open violation of the laws of gravitation. In the first article in this Circular, taken from the Railroad Journal, of July 16th, 1836, it is stated that the engine "George Washington" started at the foot of a plane, having an inclination of $\frac{1}{14.0}$, without previously acquired velocity, and went up said plane at the rate of 15½ miles per hour, drawing a load of 19,200 pounds, with a pressure under 60 pounds per square inch in her boiler.—Now the resistance to motion which an engine must overcome when ascending an inclined plane, is composed of the following items, viz.:

1st. The friction of the load=8 pounds per ton of said load.

2nd. The gravity of the whole mass= the whole weight multiplied by the size of the inclination.

3rd. The additional friction caused in

the engine by the load it draws=1 pound per ton of said load, including gravity; and

4th. The friction of the engine without load, which varies with different engines, but is never far from 15 pounds per ton weight of the engine.

In the case before us, the friction of the load $= \frac{8\times 19200}{2240}$

=68.56 pounds, 68.56

The gravity of the mass $=34130 \times \frac{7}{100} = 2389.10$ pounds, $g=2389.10$

This being divided by 8, gives 298.63, to which adding 8.57 (the weight of the engine in tons), gives a total load=307.20 tons on a level, 307.20

which causes therefore an additional friction of 307.20 pounds, 100.00

$R=2864.86$

The friction of the engine without load $= \frac{15\times 14930}{2240} = 100.00$ pounds, making in all, a resistance $R=2864.86$, to which the power applied to the engine must at least be equal, in order that it should advance.

The dimensions of the "George Washington" are thus given:

D=diameter of driving wheels =48 inches, $D=48$

d=diameter of cylinders =10.25 inches, $d=10.25$

l=twice the length of the stroke=35.25 inches, $l=35.25$

W=weight of engine=14.930 pounds, $W=14.930$

w=adhering weight=8700 $w=8700$

$\pi=3.1416$

The area of both pistons will be $\frac{1}{2}\pi d=$ 165 sq. in., which being multiplied by 60, the pressure per square inch, *below* which it is stated the engine worked, and we have 9900 pounds power applied to the pistons; but as the power applied to two different points in the same machine is in the inverse ratio of the velocity of those points, and as the velocity of the piston is to that of the engine, as twice the length of the stroke to the circumference of the driving wheels, the 9900 pounds power applied to the piston, must be multiplied by the ratio $\frac{l}{\pi D} = \frac{1}{4.278}$ to transfer it to the engine. This gives the power of the engine $\rho=2314.16$ pounds, which it will be seen by refering to the table of resistances above, *was insufficient to overcome the force of gravity*. Therefore supposing the "George Washington" to be one of those Utopian Motors, which move themselves and their loads without a pound of friction, yet the feat is impossible, without we can also "suspend the rule," with reference to the immutable law of gravitation. In the case of no friction, the engine placed upon the plane, with the forces applied exactly as stated to have been, instead of going *up* the grade, would go *down*, impelled by a constantly accelerating force, equal to $(g-\rho)=75$ pounds. *Actually*, the engine would have remained in equilibrium on the plane, the surplus of gravity over the power of the engine being insufficient to overcome the friction which retards the *downward*, as well as the upward motion.

The statement thus demonstrated so vitally wrong, ones confidence in the whole experiment is greatly impaired. For instance, I am inclined to believe, that the load actually drawn up the plane, was not so great as stated, since this gives for the adhesion a value of about $\frac{1}{5}$ the adhering weight, which is more than twice as great as any yet observed elsewhere. But supposing the load to have been exactly as stated, then the pressure in the boiler and cylinders must have been enormously greater. It is easy to calculate *how much* greater it must *necessarily* have been.—The analytical expression for the effective pressure in the boiler of an engine, in order that it may draw a given maximum load, is thus given by Pambour, $\rho-\delta = \frac{D\,(9\,M+F)}{\frac{1}{2}\,l\,d^2}$ in which ρ represents the elastic force of the steam, δ=the atmospheric pressure per same square unit, and F, the friction of the engine without load. In this formula, putting for the Algebraic quantities their values, we have the effective pressure $\rho-\delta = \frac{48\times(2763+100)}{(\frac{41}{4})^2\times(\frac{141}{8})} = 74.2$, so that the engine must have worked at the pressure of 74.2 pounds per square inch.

The Editor of the "National Gazette" concludes his comments on this performance with the following: "It is remarkable that the engine was blowing off, on her arrival at the top, having acquired *speed!* and power during the ascent." It is indeed "remarkable" that this sapient editor did not know, that the blowing, instead of indicating a gain of speed, was occasioned by the loss of it. If an engine goes a certain speed, and if by some obstacle her speed is reduced to one half, the fire being animated the same as before, about the same amount of steam is generated in the boiler in the same time, while only half the number of cylinders of steam is used—the consequence is, that the pressure rises in the boiler which lifts the valve, and causes the blowing which was so edifying to the Editor of the Gazette.

I now come to the last article in the Circular, wherein Mr. Norris states that the engine, "Washington County Farmer," drew $141\frac{3}{4}$ tons, over a rise of 47 feet per mile, at the velocity of 22 miles per hour. In this case, the whole resistance R=4759 pounds. The dimensions of this engine are not given, but supposing the ratio $\frac{l}{\pi D}$ the same as in the "George Washington," and the diameter of the pistons=11 inches, such an enormous pressure is required as to throw an air of incredulity over the performance. Please give if you can, the dimensions of this engine, and the pressure employed on this occasion.

Your obedient servant,

A. G. STEERE,
New-York and Erie Railroad.

From the Philadelphia Commercial Herald.

RAILROADS, &c.

The fair prospect of having shortly in actual existence, a concatinating rout, for such velocity of transition as is afforded on railroads, and by steamboats on navigable rivers, between Portland in Maine, at the North-eastern extremity of the Union, and New-Orleans in Louisiana at its opposite extreme a distance of 1745 miles; is a matter of lively gratulation; and what, ten years ago could not have been anticipated by the most sanguine; nor could hopes, now reasonable, have then been cherished of the rapidity with which it seems this country is destined to arrive at greatness unparalleled by any other nation whilst in a state of adolesence. But it is now an unquestioned fact, that the vast project is not only in great progress, but likely soon to attain its consummation.

PORTLAND, prior to the year 1832, was the seat of government for Maine; and in 1830 contained a population of 12.601 persons. For commerce it is conveniently located, one of the finest harbors on the continet, easy of access and seldom frozen over. From this place to DOVER in New-Hampshire a Rai road has been incorporated. The distance is 52 miles. Dover is a flourishing town at the head of the tide on the Cocheco 12 miles north-west of Portsmouth, on the Piscataqua, a river into which the Cocheco empties.

PORTSMOUTH is the largest town in New-Hampshire, and in 1830 its population was 8,082. The harbor is excellent, easy of access, and owing to the AGITATION OF THE WATER from the rapidity of the tide, NEVER FROZEN. In 1836, a railroad was incorporated, and it was commenced in July of the same year—to extend between this town and BOSTON, in Massachusetts, and is now in progress. Its location is by NEWBURYPORT, a distance of 25 miles; thence by SALEM 20 miles, which is 14 miles from Boston. Salem is the second town in New-England for commerce, wealth and population, which, in 1830, was 13,886. The population of Newburyport, the third commercial town in the State, was at the same period 6,388.

From Boston there are several routes to NEW-YORK. That by the Boston and Providence Railroad, 41 miles in length, has been in use since June 1835; where two trains of cars for passengers pass through each way daily, Sundays excepted; and another, called the steamboat train, connected with the New-York and Providence steamboat line, conveys passengers to and from Providence every day the steamboat arrives there and departs thence.

That by Providence, and extending thence to Stonington, Conn., 47 miles, is in progress and expected soon to be completed, and will be connected by a ferry, 25 miles across, from Stonington to Greenport, Long-Island, with the Long-Island Railroad, 98 miles long; together 211 miles from Boston to New-York.

The other route is by the Boston and Worcester Railroad, 44 miles in length to Worcester, on which, trains of cars for passengers pass through each way two or three times daily, Sundays excepted. The Western Railroad, extending from Worcester to the Connecticut river at Springfield, 48 miles, and thence to the boundary line of the State of New York, where it will unite with railroads in progress to Albany, to Hudson and to Troy, was commenced in 1836. In the same year a railroad from Springfield to Hartford, Connecticut, 28 miles, was incorporated, which will meet one in progress from Hartford to New-Haven, 34 miles; thence to New-York, the distance is 76 miles. In all, by this route between Boston and New-York, 230 miles. Between New-York and Philadelphia two routes exist. The one by steamboat from New-York to South Amboy, in New-Jersey; thence by the Camden and Amboy railroad, which was completed in 1832 to Bordentown, passing Spottswood and Hightstown, 35 miles; and thence through Burlington to Camden on the river Delaware, opposite Philadelphia, 26 miles; total 61 miles from Amboy. The whole distance probably 85 miles through, during the greatest portion of the year, whilst no danger of obstruction by ice is apprehended. Steamboats are the vehicles of conveyance between Bordentown and Philadelphia on this route. The time occupied in the passage from New-York to Philadelphia, this way is 7 or 8 hours.

The other communication between those two cities is by the New-Jersey Railroad, extending from Jersey city on the river Hudson opposite New-York, through Newark, Elizabethtown, and Rahway, to New-Brunswick 31 miles in two hours. This road is in progress of continuation to the Delaware Bridge at Trenton 27 miles to meet there, the Philadelphia and Trenton Railroad, 26½; total 85 miles.

Between Philadelphia and Baltimore there are 2 routes—one, by Steamboats on the river Delaware, 33 miles to New-Castle, in the State of Delaware, thence by the New-Castle and Frenchtown Railroad. 16 miles completed in 1832, and thence on the Susquehanna river, Chesapeake Bay and the Patapsco river by Steamboats to Baltimore. The whole distance upwards of one hundred miles. The other route, not yet completed, is the Philadelphia and Baltimore Railroad from Philadelphia to Wilmington, in Delaware, there to be united with the Wilmington and Susquehanna Railroad, which forms a junction with the Baltimore and Port Deposit Railroad at Havre de Grace. Distance from Philadelphia to Baltimore 93 miles.

From Baltimore to the city of Washington, 40 miles by the Baltimore and Ohio railroad, thence by the Baltimore and Washington railroad 31 miles; completed in 1835; the whole distance, 40 miles. From Washington, the metropolis, by steamboat on the Potomac, passing, on the right bank Alexandria, to the termination of the Richmond, Fredericksburg, and Potomac railroad 50 miles.

Alexandria is a city of extensive business, containing a museum, in which are deposited, among other rareties, an elegant satin robe, scarlet on one side and white on the other, worn by General Washington when he was baptized; a penknife with a pearl handle, presented to him by his mother in his twelfth year; a pearl button from the coat he had on at his first inauguration as President of the United States; a black glove which he wore when in mourning for his mother; a part of the last stick of sealing wax he used; the original of his last letter, written by him, apologizing in behalf of Mrs. Washington and himself, for declining an invitation to a ball at Alexandria; a beautiful Masonic apron, with the belt of scarlet satin, and the white kid gloves worn by him the last time he participated in the social ceremonies of that institution.

From this termination, the said road, which will soon be completed, is located over the river Rappahanock, through Fredericksburg, a place of considerable commerce, to Richmond, the seat of Government for Virginia, and in a beautiful and picturesque site, at the head of the tide, and at the falls of James river, and the largest town in the State, favorably situated for trade and manufactures, with an extensive commerce; 58 miles.

From Richmond to Petersburg, a railroad was incorporated last year. Petersburg is on the river Appomatox, at the head of the tide, the third commercial town in Virginia, and its trade in flour, tobacco and cotton, is considerable.

From Petersburg to Blakely, on the river Roanoke, 59 miles, a railroad is in operation; from thence, a railroad has been incorporated to Raleigh, and is now in progress. Raleigh, 148 miles from Richmond, is pleasantly situated near the centre of North Carolina, and the seat of the State Government.

From Raleigh to Fayettville, regularly laid out near the West bank of Cape Fear river, at the head of navigation, and one of the most flourishing towns in North Carolina, a railroad has been projected—and another, thence to Charleston, South Carolina, in order to complete the line from the Potomac by Fredericksburg, Richmond, Petersburg, and Raleigh to Charleston. Between the two last named cities, the distance is about 274 miles.

From Charleston to Cincinnati, Ohio, a railroad is projected, and charters have been obtained from the legislatures of all the States through which it is to pass, and the distance computed at 607 miles. Thence it is designed to be continued to Louisville, Kentucky, 93 miles. From whence the communication is on the rivers Ohio and Mississippi, to New-Orleans.

From Charleston, South Carolina, the South Carolina railroad extends to Hamburg, on the river Savannah opposite to Augusta, 136 miles, and was completed in 1833.

From Augusta, Ga., a railroad is in progress to Athens, a distance of about 100 miles. And from the same city of Augusta, a railroad is projected to Columbus, on the Chattahooche, 210 miles; thence to Pensacola in Florida, about 110 miles, passing by Monticello and Montezuma.

From Baltimore to Wheeling, on the river Ohio, a railroad has been in progress since 1828. The distance is about 360 miles.

From Philadelphia to Pittsburg, situate at the head of the river Ohio, an eligible route has been ascertained for a railroad, which, no doubt, will be constructed before a lapse of many years; when a passage may be made over land from Portland, in Me., to Pittsburg, at a moderate calculation in the space of three days, whence steamboats ply on navigable rivers, to New-Orleans.

This sketch, it will be perceived, delineates the most prominent routes from the extreme north-eastern State in the Union, on the Atlantic, to the extreme south-eastern Territory, with three lateral divergences to New-Orleans. And should the progress of improvement that has taken place within the last ten years, continue undisturbed, before the expiration of ten years more, the journey between Portland and New-Orleans, will be effected in six days. X.

ILLINOIS INTERNAL IMPROVEMENTS.

The folowing extract from the ***report of a "Committee on Internal Improvement,"*** to the Legislature of Illinois, evinces a disposition to keep pace with the other States of the Union—*Illinois* could not be expected to do less—more could hardly be expected from the oldest and most powerful States in the Union.

The works which your committee have concluded to recommend to the consideration of the house, are given in the annexed schedule, together with the estimated costs and amount appropriated to each, viz:

1st. Improvement of Great Wabash River	$100,000
2d. Improvement of the Illinois River	100,000
3d. Improvement of Rock River	100,000
4th. Improvement of Kaskaskia River	50,000
5th. Improvement of Little Wabash River	50,000
6th. Improvement of Great Western mail route	100,000
7th. Central Railroad from the mouth of Ohio to Galena	3,500,000
8th. Southern Cross Railroads	1,600,000

9th. Northern Cross Railroads	1,850,000
Amounting to	$7,450 000

The said several works and the routes of the said railroads, are particularly described in a bill for "An Act to establish and maintain a general system of Internal Improvement," accompanying this report.

The estimated average costs of the respective railroads per mile. your committee have put a fraction less than eight thousand dollars, and have judged of the respective length of each, from the maps of the State, executed from that derived from the public surveys. From a topographical knowledge of the country, derived from the personal obsereation of different members of the committee, it is believed, that the sum of four thousand dollars per mile, on an average throughout the State, will be a liberal estimate for the graduation and bridging of a road bed adapted to a double track railway; and your committee have supposed, that four thousand dollars per mile, will be sufficient to lay down a substantial single track railway, adapted to locomotive power, and to the transportation of the bulky staples of the State, at the cheapest rates of tolls and chargrges. A single track railway, with necessary turn outs in suitable parts, to admit the passage of the trains moving in opposite directions, will alone be necessary, and prudent to construct in the first instance; and the facilities afforded by the track in laying down an additional one which may be deemed necessary by the Legislature, and materially reduce the cost of constructing the second track.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

It is seldom that we are enabled to give our readers so great a treat, as they will have in the perusal of the papers from this valuable work.

It is well known, that the most eminent engineers in England have formed an Institution for the advancement and improvement of Civil Engineering as a profession. The papers read before the society, some by the most distinguished members of the profession, have been collected in the elegant and costly work now before us, but few copies of which are in the United States.

We hasten to lay before our readers the various papers, as rapidly as the cuts can be prepared.

The expense of the work and its scarcity, will prevent the members of the profession (with but few exceptions) from obtaining even a sight of the Vol., we have therefore, without hesitation, determined to give as great a circulation to its usefulness as possible, though the expense incurred is not trifling, while our readers are enabled to have before them the cream of a work, costing double our yearly subscription, and not to be had for that, as it is only furnished to the few subscribers in this country.

We have already endeavored to give whatever may be new and useful to the profession, and our exertions shall not be intermitted,—the present No. is given as a guarantee of our promise.

We give in this No. the following papers:

On procuring supplies of Water for Cities and Towns, by boring. John Seaward, Esq., M. Inst., C. E.

Some account of several sections through the Plastic Clay formation, in the vicinity of London. William Gravatt, Esq., F. R. S., M. Inst., C. E.

Some account of Boring for Water in London and its vicinity. John Donkin, Esq., M. Inst., C. E.

ON PROCURING SUPPLISES OF WATER FOR CITIES AND TOWNS, BY BORING. COMMUNICATED BY MR. JOHN SEAWARD, M. INST C.E.

A French gentleman of our anquaintance having recently addressed upon a project of supplying the different towns of France with water, by means of boring in the earth, according to the method which has come lately a good deal into fashion in different parts of England, and thus having brought the subject under our mature deliberation; we offer the following remarks, which we were led to give in reply, with the hope that they may be found not altogether uninteresting to the Institution.

In the first place, as respects the project of furnishing water to the different towns of France by means of simply boring in the earth; if by this is intended that the various towns are to be supplied with water economically, for all domestic and manufacturing purposes, in the same abundant manner that it is furnished to the inhabitants of London and other towns of England, we must at once declare without any hesitation that, as a general principle, the scheme will be abortive, and if attempted will infallibly end in loss and disappointment.

In stating thus explicitly our opinion, we do not wish to be understood as being anywise unfavorable to boring in general; on the contrary, as an art when employed under suitable circumstances, we know that it can be made, on various occasions, highly subservient to the wants of man, but we also know that with many persons, a very erroneous opinion prevails as to the economy, and other merits and advantages of the art.

The method of "simple boring," as it is called, is not adapted for all situations and places; it requires a combination of circumstances not generally met with; London and the surrounding district, wherein this art has been most successfully practised, is highly favored in this particular; the stratum of soil is a bed of clay, varying from 100 to 200 feet thick, and is therefore very easily bored through. It is remarkable that the springs under the bed of clay produce the finest and most salubrious water, while those above the bed of clay produce water so impure as to be unfit even for the most ordinary purposes. It is therefore easy to conceive, that this method would here meet with the most favorable encouragement, but in districts where the same circumstances do not exist, there would not be the same inducement to follow it.

"Simple boring," is suitable only when the quantity of water required is comparatively small: thus if the object be to furnish a very superior water for a nobleman's mansion, for a small village or neighborhood, or even for a single manufactory, then this method is admirable, provided the circumstances are in any proportion as favorable as in the district which surrounds London; but if the question be to provide an abundant supply of water for a large town or populous city, then certainly in every case, the method of boring should, on the score of economy, be the last that ought to be resorted to for the purpose.

That the bowels of the earth contain springs of water in abundance, there can be no doubt; miners and colliers are aware of this fact to their cost and sorrow: but we know full well that those same springs, if they have sufficient natural force, must find their way to the surface of the earth somewhere, without any boring, and then form rivers and flowing brooks. Why then delve a great depth at an infinite expense, to procure that which we can generally obtain so readily and economically on the surface of the earth?

There is scarcely a city or town of any magnitude but what has some fine river or copious brooks in its immediate neighborhood, these are the natural sources whence we should obtain our supply of water; but if the streams in the vicinity are so impregnated with deleterious matter, as to render the water unfit for domestic or manufacturing purposes, and if no ready method can be adopted for cleansing it, recourse should then be had to the water that falls from the heavens; tanks and reservoirs, (similar to those employed in feeding navigable canals,) should be formed in convenient situations, to receive the rain-water which falls on the adjacent hills: either of these means would furnish an abundant supply of this necessary element constantly and economically.

It is perfectly true, that a populous town may be so situated as to be at an inconvenient distance from any salubrious river or brook, whence to obtain water, and local circumstances may be such as to render it impossible or inexpedient to form in the vicinity tanks or reservoirs to collect the rainwater from the hills; in this case, there appears to be no alternative but that of obtaining a supply from the bowels of the earth: in such case, it will be necessary to sink very capacious wells or shafts to a great depth, with suitable pumps and steam-engines, to bring the water to the surface; and even then the supply may be so scanty as to render it necessary to drive (in various directions) horizontal levels or galleries from the bottom of the wells or shafts, in order to break in upon the springs which may exist at a distance; similar to the method practised in the salt-works of England, to obtain a copious supply of the brine; but in such case to expect that by simply boring down into the earth, a plentiful supply of water can be obtained for the domestic and manufacturing purposes of a populous town, is to expect what rarely or never can be accomplished.

The modern plan of boring to obtain water has been, without any rational grounds cried up as a new and wonderful discovery, but the truth is, that boring is an operation of great antiquity; the miner and collier make use of it in a variety of ways, and it has from time immemorial been a useful auxiliary to the well-digger; he employs this process to discover where springs of water exist. By this means he can at a comparatively small expense determine whether the situation is favorable or not for forming a well; at the same time he can ascertain the quality of the water when obtained, and the probable ultimate expense which must be incurred in order to secure a regular supply.

In some instances it has happened that in boring, from the cause just stated, the water has of its own natural force risen up through the hole, and flowed over the surface in considerable quantity, and thus, without much further trouble or expense, a tolerably copious supply has been obtained. This circumstance it is that has brought into favor the idea of depending on simple boring alone as a regular systematic method of obtaining a supply of water; and it is but right to say, that the method, in many instances, has been remarkably successful; but it should be borne in mind, that the supply, copious as it is called, has scarcely in any one instance exceeded what would be required for a moderately extensive manufactory, or for the domestic use of a very small village; moreover although considerable success has attended many of the experiments made to obtain water in this way, yet it is most certain that, as regards the obtaining of an abundant supply by the simple process of boring alone, in a majority of cases, the method has *completely failed*; and, after a very heavy and useless expense and loss of time has been incurred in these failures, recourse has at length been had, either *partially or wholly*, to sinking a well.

The most rational plan for obtaining a good supply of water from under-ground is in the first place to sink a well to about half the depth at which it is supposed the spring of water exists: thus, if the spring is judged to be 100 yards below the surface, then the well may be made 50 yards deep; this being properly built up and secured, the engine erected, and suitable pumps fixed, the remainder of the depth to the spring may be pierced through by the process of boring, and in this way a copious supply of water is frequently obtained. and as may be readily judged, the quantity of water obtained will vary according to the greater or less depth to which the well is formed; but at the same time it should be observed, that the deeper the well, the greater will be the expense of raising the water to the surface.

If necessary we could here enumerate a long list of losses, failures, and consequent disappointments, which have attended the process of boring, within our own observation; for the present, however, we shall confine ourselves to two instances.

About four years ago we erected, almost in the heart of the metropolis, a 14-horse condensing engine for a manufacturing purpose. As a good supply of water was wanted for that and other objects, the proprietor of the establishment thought he could obtain this necessary element on his own premises, and make himself independent of the water-companies. We recommended him to sink a well at once; but contrary to our advice, he determined to try the process of simple boring, the situation of his premises being judged very favorable for that purpose. A hole was consequently bored to about 100 yards deep, and after some labor and expense water was obtained, but the supply was so scanty as not to be half sufficient for the 14-horse engine; several attempts were made to remedy this but without effect; the hole was at length abandoned, and a well was then formed, though not so deep as it should have been; boring was then resumed to the depth of what was considered the main spring; pumps were put down the well, and water was again obtained; but even after all, the supply was barely sufficient for the engine. The result of this business was, that the proprietor after having his premises in confusion for nearly two years, in the end expended double as much money as would at once have formed a good productive well, and the interest of the money expended is considerably more than he would have had to pay to any water-company for all the water he required for his engine and manufactory, besides losing a considerable portion of the power of his engine, which is expended in drawing the water to the surface.

Within a quarter of a mile of the above-described well was situated a brewery furnished with a similarly-constructed well, from which a considerable supply of water had been obtained; it is, however worthy of remark, that no sooner did our engine commence drawing water from the new-formed well, than the brewers immediately lost a great part of the supply they had previously been accustomed to derive from theirs; the consequence was, they were under the necessity of sinking it deeper, and of putting up more powerful pumps, in order to obtain their former supply.

We mention the above fact to show that, although there is no question but it is possible to find a spring of water in almost any situation, yet the springs do not furnish that inexhaustible supply of water which some persons imagine; indeed a bare consideration of what is accomplished in mines and collieries must convince us of the truth of this fact; were the springs of that inexhaustible nature some pretend, not a single mine or colliery in the universe could be worked to any moderate extent whatever.

The second instance of failure in boring, which has happened in our own practice, we shall now proceed to relate. About twenty years ago a canal was cut in the neighborhood of London which passes over a very hilly tract of land, and in the summer months there is great difficulty in obtaining a sufficient supply of water for the upper level. It is true the canal passes very near some copious brooks and streams, which with little expense or trouble might have been made available to supply every deficiency twenty times over; but from some circumstances the proprietors of the canal were not permitted to take advantage of these facilities, and as the rain-water they were enabled to collect from the hills was inadequate, they were under the necessity of resorting to the bowels of the earth to supply the deficiency. For this purpose, a large hole was bored down at the side of the canal, to a depth of two or three hundred feet, to what was understood to be the main spring; the water speedily rose and flowed over the surface; however, it was soon discovered, that the quantity obtained by this means was so very small as to be of no practical utility: a well of large dimensions was then sunk down about 80 feet, the boring still continuing to the original depth; pumps were fixed, and machinery worked by horses; the supply of water by this means was increased teufold, but still was inadequate for the purpose required. We were then employed to erect a steam-engine with suitable pumps, &c., and the well was sunk to double the original depth; a much more copious supply was now obtained, and the navigation thereby greatly assisted; but after all, the expenses attending these works, and the pumping up the water from such a depth, and that too still inadequate in quantity, are evils of such a serious magnitude, that these joined to other circumstances attending this property, will probably before long cause the whole of the concern to be abandoned.

We could add many other instances of the total failure of what is called the simple boring system; of works begun and never finished to any useful purpose; of others pertinaciously carried on for four or five years, until the patience and the funds of the parties were alike exhausted; but we think enough has been stated above to prove to your satisfaction, how very uncertain has been this method of obtaining water. We think it right, however, to guard against the impression that boring for water is a bad system; on the contrary, allow us to repeat that we think most highly of it; but then only under proper management, and as a useful auxiliary to the sinking of capacious wells.

With respect to the project generally, of forming a regular establishment for the purpose of supplying water to the various towns of France, we have to remark, that there can exist no physical impediment to the accomplishment of the plan; there is no question but every town in France might be made to enjoy the same inestimable advantages possessed by the inhabitants of London and other towns of England; that is to say, a constant, abundant, and an economical supply of good water, for all purposes of domestic and manufacturing use; but of the three modes by which this can be accomplished, the one by boring or well-sinking is decidedly the most expensive, and the most uncertain in the final results.

SOME ACCOUNT OF SEVERAL SECTIONS THROUGH THE PLASTIC CLAY FORMATION IN THE VICINITY OF LONDON. BY WILLIAM GRAVATT. F.R.S., M.INST.C.E.

TRING HILL, HERTS.

A boring for water for the Grand Junction Canal commenced at 25 feet below the summit level of the hill near Marsheroft Bridge.

Chalk	20 feet.	
Hard blue clay	30	
Blue stone	4,	At 54 feet the water rose to the top, and ran over 1300 cubic feet in 24 hours.

Hard blue clay 47

101 feet—no more water than at 54 feet.

The boring discontinued in Nov. 1827.

A second boring in the same hill commenced 20 feet from the summit level.

Chalk 30 feet.
Hard blue clay 34
Blue stone 4. Water rose up. The stone required punching before using the auger.
Blue clay 82 } Strata of indurated clay at about every 4 feet, so hard as to require punching from 2 to 10 inches.
Black grit 10 }
Blue clay 108 very hard.

268 feet. Boring discontinued—no more water than at first. These two borings cost £145 and were 3 months in hand.

NORWOOD, NEAR STANDWELL.

A well 4 feet diameter sunk and bricked 280 feet through blue clay, into sand; the instant the sand was reached, the water rushed up to the top so fast as to endanger the workmen; it now stands within 8 feet of the surface of the canal, which is 86 feet above Trinity high water-mark.

BORING AT BRENTFORD, SIX MILES FROM LONDON.

Brick earth 9 feet.
Sandy gravel 7
Loam 5 varies from 1 to 9 feet.
Sand and gravel 4 varies from 2 to 8. Contains water.
Blue clay 200

225 feet. Boring discontinued—still in clay.

WOOLWICH SANDPITS.

Alluvium of various depths.

Rolled flints with sand 12 feet.
Clay, striped brown and red, a few shells 6 water, merely drops.
Blue and brown clay, many shells 9
Iron shot sand, with ocherous lumps 9
Greenish sand, *clean* 8
Greenish sand with flint pebbles 1
Light ash-colored sand, perfectly clean 35
Green sand, with green chalk 1
Chalk unknown.

PLUMSTEAD COMMON.

Shafts for Chalk.

No. I. Alluvial gravel, and pure ash-colored sand 120 feet.
Chalk penetrated to 24

No water at 144

No. II. Alluvial Gravel 36
Stopped by the water.

No. III. At a small distance from this, stopped again by water at the same depth.

N. B. These three shafts were in the same field.

BOSTON HEATH, NEAR WOOLWICH.

A well sunk for water.

Gravel	65 feet.
Sandy beds	65
Chalk	70
	200

The water stands only five feet deep in this well; a trifling supply of water was found in the gravel.

LEWISHAM LOAM PIT HILL.

Alluvium various.

Striped sand, yellow, fine, and iron shot	10 feet.
Striped loam, and plastic clay, with thin seams of coaly matter	10
Yellow sand	3
Lead-colored clay, with casts of leaves	2
Brownish clay with cytherea	6
Three thin beds of clay, the upper and lower with cytherea, and the middle with oysters.	3
Loam and sand	4
Iron shot sand, with flint pebbles	12
Coarse green sand	5
Clean ash colored sand	35
Green sand	1
	91

Chalk with nodules of flint unknown.

REDRIFF DRIFT SHAFT.

	Ft.	In.
Vegetable mould	6	9
Brown clay	0	9
Gravel with water	26	8
Blue clay	3	0
Loam	5	1
Blue clay, with bivalve shells	3	9
Gravel and calcareous rock	7	6
Light blue soil with pyrites	4	6
Green sand	1	9
Leafy clay	8	4
	68	1

A pipe sunk by Mr. Turner 95 feet deep, near Bermondsey new church;—when they reached 80 feet, the rod sunk down 15 feet at once; after pumping out several tons of green mud, the water rose to within 25 feet of the top; it rises and falls about three feet with the tide; the water is quite clear and tasteless. At a place not 500 yards from this, they sunk a pipe 190 feet with very little success, the water being out of reach of a pump, and appearing bad.

SOME ACCOUNTS OF BORINGS FOR WATER IN LONDON AND ITS VICINITY. BY MR. JOHN DONKIN, M.INST.C.E.

PARTICULARS OF A WELL SUNK AT THE EXCISE OFFICE, IN BROAD-STREET LONDON.

In the first place, after excavating the upper stratum of gravel and loose soil, four cast-iron curbs were sunk, each 6 feet long; the lowest of these entered the clay about 3 feet; the digging was then continued through the clay to the depth of 140 feet, and a curb of brickwork within the iron curb was sunk the whole depth in the ordinary way, the iron curb serving merely to support the upper stratum, and to prevent the land water getting into the well. Boring was then resorted to, to the depth of about 20 feet, when the water appeared, and rose to within 60 feet of the top of the well; a copper pipe was then driven through the last-mentioned 20 feet, to keep the passage open for the supply.

WELLS SUNK AT MESSRS. BRANDRAM'S VITRIOL AND WHITE LEAD WORKS, LOWER ROAD, DEPTFORD.

The wood and brick curbing was sunk barely 30 feet; the bricks were laid in Roman cement to keep out the water from the land springs; the well was then bored to the depth of about 180 feet into a bed of chalk, from which the soft water rises and flows to within 9 feet of the top of the well, through wrought iron tubes riveted together. The strata are chiefly composed of yellow and green sand and gravel, like those found at the tunnel under the Thames.

ACCOUNT OF BORINGS MADE NEAR LONDON, WHERE THE WATERS RISES ABOVE THE SURFACE OF THE LAND.

In Mr. Wilmot's garden at Isleworth, a boring was executed to the depth of 327 feet. The blue clay was found to exist from about 24 feet below the ground level, with little variation of color, to the depth of 240 feet: it is then of a lightish red, and afterwards of a darker color very much variegated. At the depth of 308 feet it is blackish, and at 310 feet very black; at 311 feet it becomes yellow for some depth; then light green, followed by dark green, out of which the water rises, being a stratum of about 10 feet thick.

All the specimens, with the exception of the yellow, appeared to be clay; the yellow had a sandy appearance. The cast-iron pipe is sunk 327 feet, and is 2½ inches diameter. The water rises about 10 feet above the ground, and the well supplies eight gallons per minute. The land water here stands about 16 feet below the ground.

Lord Cassilis* has also had a boring executed in his grounds at Isleworth, to the depth of 290 feet; the quantity it supplies is about 30 gallons per minute, and its water rises about 30 feet above the level of the surface.

* Now Marquess of Ailsa.

From the Chicago American.

RUINS OF THE ANCIENT CITY AZTALAN.

We have received from N. F. HYER, Esq., of Milwaukee, a correct diagram of these ruins, prepared from actual survey, and we confidently furnish it to our readers as a statement to be relied on.

It will be seen that it differs in some respects from the account sometime since published by us, but that account was as correct as could be obtained from the then imperfect and slightly investigated state of the discovery. These ruins form a new and prominent attraction among the many the west affords, and illustrate and confirm some of the theories and opinions of scholars in relation to the early character of the western territory. Much credit is due to the enterprise and taste of those to whom the public is indebted, for the knowledge and particulars of this discovery; and affording, as it does, a fine field for the research of the antiquarian, illustrates the importance of those scientific institutions that are forming in this new and comparatively unexplored section of our country, for the developement of its mysteries and the record of its discoveries. We are gratified to have our former account and opinion of these ruins thus materially confirmed, and hope that the enterprise and intelligence of our western citizens, operating upon a spacious theatre, rich in wonders, will cause this to be among the first only in a train of discoveries for future record and admiration.

THE CITADEL.

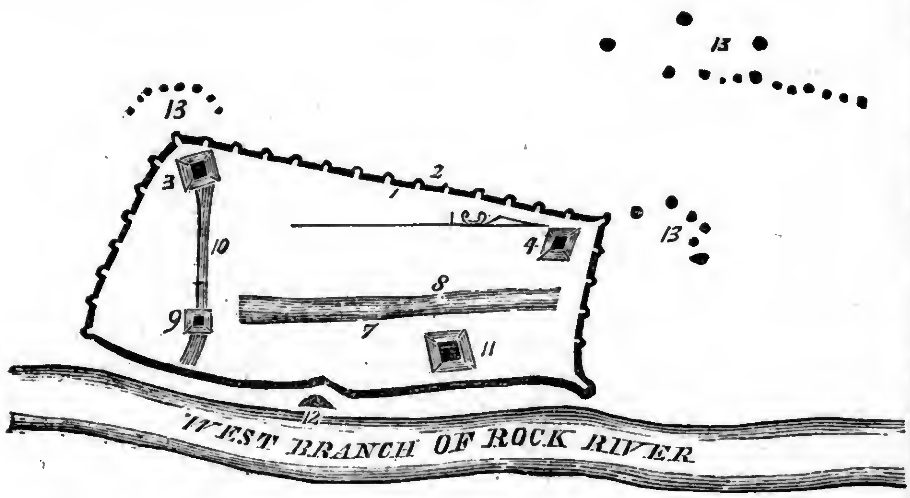


Figure 1 represents the brick Wall, which at the base is 23 feet wide, 4 or 5 feet high, and 84 rods in extent.

2. Buttresses, 23 feet wide, and extending beyond the Wall 17 feet.

3. A square Mound or Plain, 15 feet high, and 53 feet square on top.

4. Mound, or elevated Plain, similar to No. 3, except on the top.

(5 refers to a Cellar 3 or 4 feet deep, and 6 to a Stairway, in figure 4, which our engraver found difficult to accurately delineate, and therefore have been left out.)

7 and 8 are parallel ridges of 2 feet in height, including a smooth Plain, or Road, and extending through the interior of the Fort.

9. Square Mound, with high ground leading to the river.

10. Ridge connecting Mounds, or what might have been Towers.

11. Plain, with slight elevation.

12. The termination of a Sewer, about 3 feet below the surface, and arched with stone.

13. Mounds, varying in size from 3 to 25 feet in height, and from $1\frac{1}{2}$ to 15 rods in circumference.

Besides the mounds which appear on the plat, there are many others, of various sizes, to the northwest.

The enclosed diagram is intended to represent the ruins of the citadel as they now appear, together with some of the surrounding mounds, or tumuli; all which is taken from actual survey and measurement.

These ruins are situated in the town of Jefferson, directly west from Milwaukee, on the West side of the West branch of Rock River, township seven North, range fourteen East.

The weather was very tedious when I surveyed these ruins, and the ground being frozen, the examination was not extended so far as I could wish; but I intend to make a more thorough examination in the spring. The walls were not originally of the width here described, as they would naturally spread out as they crumbled down; and in measuring the width, I have taken an average as it now appears.

There is much here to indicate that this has once been the location of an ancient walled-city, of some miles in extent; but as I have not examined it sufficiently to give a definite opinion, I will leave the subject to the examination of the antiquarian and the curious; and to them I would say, that there has recently been a settlement commenced in the vicinity, where they can pursue their researches without the necessity of "camping out."

To the Editor of the Chicago American:

Sir: I see by the papers that you have published a description of the "Ruins of the Ancient City of Aztalan." I have not seen your publication, but suspect that it is not quite correct, for at that time no accurate survey had ever been taken; and I am not aware that any description was ever given but that furnished by me; and that being taken from observation merely, was found on actual survey to be somewhat incorrect, but the description above given can be relied upon.

Respectfully yours, &c.
N. F. Hyer.

Milwaukee, Feb. 4, 1837.

Builder's Manual.—The importance to the community, of a correct knowledge of building, induces us to re publish in the Magazine "the *Builders Pocket Manual*, containing the elements of Building Surveying, and Architecture, with practical rules and instructions connected with the subject, by A. C. Smeaton, civil Engineer."

This work will be found highly useful especially to young builders, as it describes and illustrates by engravings, the various modes of building. There are over 75 engravings. By the following "contents" our readers will perceive the character of the work. It will be completed in the six ensuing numbers.

CONTENTS.

INTRODUCTION.

So intimately is the art of building connected with a provision for the comforts and conveniences of life,that it has engaged the attention of men from that period when they first formed themselves into societies. In the early ages of the world, little more could have been required than a temporary shelter from occasional atmospheric changes, and houses or huts were probably constructed in a very rude and imperfect manner; but as even communities were not then accustomed to confine themselves to any locality, such residences were sufficient for their purposes. But when large societies determined to occupy a place as a constant residence, they surrounded themselves with all those permanent comforts which might be within their reach. The art of building necessarily attracted much of their attention, and nations vied with each other in an attempt to blend stability of structure and elegance of appearance. These are the objects of builders in the present day, but at the same time, the altered state of society requires that they should be equally careful to secure economy in the use of the materials, that no unnecessary expense may be incurred by their waste or misapplication, or by the addition of unnecessary labor.

The importance of the subject has induced men to acquaint themselves with the general principles of construction, and the application of ornament; and to give their attention to individual branches of the science and art of building, so as to obtain by the combined labors of many some knowledge of the whole. Many expensive and useful books have been published, by both architects and builders, upon different subjects connected with the art and science of building; but many of these books are not only too costly for the means of some persons desirous of knowledge, but would be almost useless if they could be obtained. A preliminary knowledge is required before the student can either perceive the importance of the information they contain, or the means by which it may be applied. There are it is true, many introductory books, but they chiefly treat of Architecture and Designing, and are of little assistance to the workman or the student.

In preparing this manual the author has endeavored to supply the reader with such important elementary knowledge as shall enable him to understand the general principles of building, and fit him for the perusal of those works which have been written on several subjects connected with the art. There are three classes of men engaged in the completion of a building, the architect, the builder, and the surveyor; and each should be perfectly acquainted with the business of the others. Some persons have professed the three arts, a practice which cannot be too strongly condemned, since it is impossible that any man can give sufficient attention to all to do either correctly or well. But at the same time an acquaintance with all is desirable, for they are so closely connected, that one cannot be properly practised without the assistance of the others.

The business of the Architect is to design buildings, to make such drawings, and to so describe them as shall enable the builder to execute that which he has planned. The surveyor masures the work when finished, and affixes appropriate prices according to his judgment of the manner in which the workman has performed his task, and the difficulties which have attended the execution. An elementary work on Building should describe the manner in which these persons severally perform their tasks, and we have therefore divided our book into three parts or sections, which we have designated the Builder, the Surveyor, and the Architect.

THE

BUILDER'S MANUAL.

THE BUILDER.

WRITERS on Architecture have frequently divided the art into three parts, because in the erection of a building three things are required, ***strength***, ***convenience*** and ***beauty***.

In order to obtain strength, good materials must be employed, and they must be well applied. There must be a proper arrangement of the several portions of edifices, so that instead of weighing down or oppressing each other, they may mutually strengthen each other; and should faults be suspected to exist, in either the quality or dimensions of the materials used, they must be employed where they would be sufficient for the purpose, should the suspicion be realized. The builder must also be careful that any stress may be met by a suitable arrangement of parts, and that the strength may be in a reciprocal proportion to the stress which is to be overcome.

To provide convenience, the building must be suited to the purpose for which it is intended. The rooms, for instance, should be of a size proportionate to the use for which they are to be employed, or the business that is to be done in them; a small house should not be encumbered and lessened with a large staircase, nor a large mansion be rendered uncomfortable by one that is cramped in its dimensions. "The hall," as Fuller says, "ought to lie open, and so ought galleries and stairs, provided the whole house be not spent in paths. Chambers and closets ought to be private and retired." Every part should be suited to the purpose for which it is to be used.

The beauty of a building does not altogether depend upon its architectural decorations and ornaments; but there must be a just proportion of all its parts, the width, length, and height, being everywhere so adjusted as to produce that harmony calculated to give pleasure to the observer. Many persons err in overloading an edifice with ornament, while others impair the general appearance by neglecting altogether its enrichment. There should never be introduced an ornament that has the appearance of supporting a weight where there is evidently no weight to support; and when mouldings are employed, they should have an agreement with the dimensions of the walls on which they are to be fixed, being neither heavy in small apartments, nor diminutive in large ones.

The first thing to be done when a building is to be erected, is to survey the ground on which it is to be placed, with a view to determine the nature of the soil, whether it be rocky, swampy, or composed of clay, gravel, or sand. When this has been determined the foundations may be arranged for, and the operations required must be regulated accordingly.

The dimensions must then be set out, as shown upon the plan of the basement. This is best done by first marking out the line of the principal front, and then placing stumps, or pins, at those parts where the side and internal walls meet it. When the several angles have been determined, and the line of walls marked out, the excavator may proceed to form the trenches which are to receive the footings, or foundations; and the work is then regularly proceeded with, according to the drawings which are placed in the workman's hands. And here it may be necessary to remark, that architects generally form their drawings from a scale of one eighth of an inch to a foot; but this is not adopted in every case; and, therefore, to prevent mistake, the plans and elevations are generally figured. The scale of one inch to a foot is the most convenient for workmen, for they have then only to apply their rule to the several parts of the drawing, and, calculating every inch as a foot, it is scarcely possible for them to make a mistake. But it is not always practicable to draw a plan to this scale, as it would in some instances extend the drawing to an inconvenient size.

These general remarks may be of some service to the beginner, as illustrating the objects to be obtained in building, and the manner in which the workman is to commence his operations. We may now proceed to make some more particular remarks upon the several departments of building, the nature and composition of the materials employed in each, and the methods by which they are worked. As this little volume is intended for the use of the student in all departments, we shall not consider any fact, however self evident it may appear, too simple to be mentioned; but we shall endeavor to lead him on, by easy steps, from the simple to the more complex principles of the art, giving so much of the science as may appear necessary to afford a reason for the process that may be adopted.

THE BRICKLAYER.

As the art of bricklaying is generally supposed to be so simple as to require little or no attention, it will be necessary to remove this false impression by a somewhat particular detail of the facts which relate to it. There are many persons, and even some workmen, who suppose that nothing more is required than that the bricks should be properly bedded, and the work level and perpendicular. But the workman who would attain perfection in his business, should acquaint himself with the different arrangements made use of in placing the bricks, so that one part of the work shall strengthen another, and thus prevent one portion from a greater liability to give way than another. It is also necessary that the workman should be acquainted with the several sorts of bricks, their qualities, and the uses for which they are particularly adapted.

It appears from history that bricks have been employed for building from a very early period. We are informed by the sacred records, that very shortly after the occurrence of that universal catastrophe, which swept from the earth nearly the whole human race, and remodelled its surface, the sons of Noah fixed their abode in a plain in the land of Shina or Chaldea, "and they said one to another, go to, let us make brick, and burn them thoroughly. And they had brick for stone, and lime had they for mortar." By the same authority we are informed that the Jews during their servitude to the Egyptians, were employed not only in making bricks, but also in building with them. "And they (the Egyptians) made their life bitter with hard bondage, in mortar, and in brick."—"And they built for Pharoah treasure cities, Pithom and Raamses." Nearly all the Egyptian buildings spared by the devastating hand of time, are constructed of stone, but there are some brick buildings still in existence, and Pocock mentions a pyramid constructed of unburnt brick.

From all the evidence we can collect on the subject, except that to which we have referred, it does not appear that the Egyptians, or any other of the early inhabitants of the earth, were acquainted with the art of burning bricks; but both the Greeks and Romans used them. Vitruvius has given a description of the kind of bricks used in his own day, and has offered some suggestions as to the choice of the material from which they ought to be formed. The passage is interesting, as and the works of this author may not be in the possession of all our readers, we may be permitted to quote it from Mr. Guilt's translation. "They should be made of earth of a red or white chalky, or a strong sandy, nature. These sorts of earth are ductile and cohesive, and not being heavy, bricks made of them are more easily handled in carrying up the work. The proper season for brick-making are the spring and autumn, because they then dry more equally. Those made in the summer soltice are defective, because the heat of the sun soon imparts to their external surfaces an appearance of sufficient dryness, whilst the internal parts of them are in a very different state; hence when thoroughly dry, they shrink and break those parts which were dry in the first instance; and thus broken, their strength is gone. When plastering is laid and set hard on bricks which are not perfectly dry, the bricks which will naturally shrink, and consequently occupy a less space than the plastering, will thus leave the latter to stand of itself. It is not therefore, without reason that the inhabitants of Utica allow no bricks to be used in their buildings, which are not at least five years old, and also approved by a magistrate.

"There are three sorts of bricks, the first is that which the Greeks call Didoron, being the sort we use, that is, one foot long, and half a foot wide. The two other sorts are used in Grecian buildings; one is called Pentadoron, the other Tetradoron. By the word Doron, the Greeks mean a palm. That sort which is five palms each way is called Pentradon; that of four palms, Tetradoron. The former of these two sorts is used in public buildings, the latter in private. Each sort has half bricks made to suit it, so that when a wall is executed, the course on one of the faces of the wall shows sides of whole bricks, the other face of half bricks, and being worked to the line on each face, bricks on each bed bend alternately over the course below."

There has been some dispute among antiquaries as to the time when bricks were first introduced into England. Dr. Lyttleton states in Archæologia, that there were no brick buildings earlier than the fourteenth century. Bagford says they were introduced in the reign of Henry the Seventh, but it must have been earlier than this, for Ewelme palace in Oxfordshire, erected by William de la Pole, and Herstmonceaux castle in Sussex, were both erected in the reign of Henry the Sixth. But we leave the antiquaries to determine this disputed question, and proceed to make a few remarks of a more practical character.

Bricks.

Brick is an artificial stone, formed of clay moulded in rectangular prisms of constant dimensions, and hardened by burning, or exposure to the sun. All bricks made in England must be, according to act of parliament, nine inches long, four and half inches broad, and two and a half thick.

There are several kinds of bricks; the most important to be mentioned are marls, stocks, and place bricks. All these are formed in moulds of the same size, and differ only in quality, which depends upon the character of the clay, the care taken in tempering it, and the manner in which it is burnt. The best marls are called firsts, and are used for the heads of doors and windows; the seconds are used for facing, that is, for the front of a building; and for this purpose they are admirably adapted, not only on account of their color, which is a yellowish white, but also for their compactness, and capability of resisting the action of the atmosphere. Grey stocks are sometimes used instead of marls, but they are of inferior quality. Place bricks are the refuse of a burning, and are in fact these which have not been perfectly burnt. Clinkers are overburnt bricks.

For paving, Dutch clinkers, so called because imported from Holland, are frequently used; they are very hard, and have a light yellow color. These bricks are six inches long, three inches broad, and are laid herring-bone way.

Tiles.

There are several sorts of tiles. Paving-tites, used for kitchens and dairies in farmhouses, are about nine inches long, four and a half broad, and one and a half thick. Roofing-tiles are formed in different ways, and are known as pan-tiles, plain-tiles, hip-tiles, and ridge-tiles.

Pan, or Flemish-tiles, are fourteen inches and a half long, and ten and a half broad. It is seldom that these tiles are used, even in country towns, for any other purpose than that of covering sheds and out-houses; and, as they have no pin-holes, they are altogether unfit for a high-pitched roof.

The size of plain-tiles is regulated by law, and they should be ten inches and a half long, six and a quarter broad, and five eighths of an inch thick. They are hung on the laths by oak pins, there being two holes in each tile.

Ridge and hip-tiles are of a semi-cylindrical form, and are thirteen inches long, and sixteen inches girt on the exterior surface.

Brick-making.

Brick should be made of an earthy loam; but the manufacturer is not generally very careful as to the earth he uses, so that it be only possible to make an article which he can sell, or employ himself. Hence it is that some bricks are very brittle, because there is too large a quantity of sand; and others are shaky, because they contain too little, and crack in the drying. It is absolutely necessary for the manufacture of a good brick, that the earth of which it is to be formed, should be exposed to the air, and especially to the frosts of winter, at least during one year, that it may be pulverized, as this will aid the tempering; and the more it is turned over, during the time of its exposure, the better will be the brick.

An experiment, made by M. Gallon, fully proves the necessity of well tempering the earth to be employed in brick-making, "He took a certain quantity of the earth prepared for the making of bricks, he let it remain for seven hours, then caused it to be moistened and beaten during the space of thirty minutes; the next morning the same operation was repeated, and the earth was beaten for thirty minutes; in the afternoon it was beaten f r fifteen minutes." After moulding a brick, made of this earth, he found that it weighed five pounds eleven ounces, but one made of the same earth without the same preparation, weighed five pounds seven ounces. When the bricks were dried and burnt, he tested their strength, and found that under the same circumstances, the brick made of well-tempered clay broke with a weight of one hundred and thirty pounds, while the other broke with a weight of seventy pounds. This result clearly proves the necessity of well-tempering the brick earth, which is usually done by a mill, put into motion by horses.

When the clay is prepared, it is pressed into a mould ten inches in length, and five in breadth; but the brick itself, when burnt, is not more than nine inches long, and five and a half broad, on account of the contraction it suffers by exposure to heat, driving off the water which is in combination with the clay. When the bricks are turned from the mould, which is readily done, the mould being strewed with sand to prevent the adhesion of the clay, they are placed in hacks in a diagonal position, so as to admit the air. Each hack is two bricks wide, and eight bricks, on edge, high. To prevent the access of rain, long sheds are sometimes erected, and the hacks are formed under them; but at other times they are covered with wheat or rye straw. The time required to dry the bricks must depend upon the weather; if favorable, it may be done in six or eight days.

Bricks are burnt either in clamps or kilns; the former are generally used, but the latter are preferable.

Clamps are made with the bricks to be burnt. The foundation is made with place bricks, and of an oblong form. The flue is first formed, passing through the clamp, and about a brick wide. Between each course of brick, a layer of cinders or breeze is placed, the bricks being placed diagonally about an inch apart on each side of the flue. When the clamp is about six feet high, a second flue is made similar to the other, that is to say, if the bricks are immediately required, if not, the flues may be placed about nine feet apart; each flue being filled with coal, breeze, and wood, closely pressed. A layer of breeze is always laid at the top of the whole. The fireplaces are usually placed on the western side of the clamp. The bricks may, if required, be burnt in twenty or thirty days, the time varying according to external circumstances. The outside of the clamp is sometimes plastered with clay when the weather is precarious.

Kilns are frequently used for burning bricks, but more commonly in the country than in the neighborhood of London.—They are to be preferred to clamps, as they require less fuel, and less time is required in the process. The walls of a kiln incline inwards, and are usually a brick and a half thick. A kiln is about thirteen feet long, ten feet wide, and twelve feet high, and will burn about twenty thousand bricks at the same time. The bricks are laid upon an open floor, and after they have been thoroughly dried by a gentle fire, a pile of brick, closed with wet earth, is placed before the fireplace, space being left to add faggots as may be required. When the arches have a white heat, and fire appears at the top the heat is slackened, and then increased, until the bricks are thoroughly burnt, which is generally in about two days. The workman can always determine whether the bricks are dried or not, by the color of the smoke, which turns from a darkish to a transparent color, as soon as this has been accomplished; the burning is then commenced.

The advantages which result from a division of labor are well known, and they are not more evident in any mechanical employment, than in the manufacture of bricks. In a long day, that is to say, between five in the morning, and eight at night, a good moulder, will produce five thousand bricks.

There is a very judicious remark in Mr. Partington's Builder's Complete Guide, but we are at a loss to say whether we are indebted to him, or to Mr. Malcolm for it; we have quoted it as it stands in the work we have named. "The color of London bricks is not red, as is the case with the common bricks and tiles, but of a light brownish yellow. This color is more pleasing to the eye, than that of the common red brick, and on this account the London bricks are preferred for building houses. The brick-masters assign a curious reason for this color. According to them, their bricks are kept as much as possible from the contact of the air during the burning. The consequence of thus is, that the iron contained in them is not oxidized to so great a degree as in common bricks; but this mode of reasoning is far from exact. If air were entirely excluded, the bricks would not be burnt at all; because the fire would be extinguished. But if enough air be admitted to burn the coal, mixed with the clay, (which must be the case,) that air must also act upon the iron, and reduce it to the state of a peroxide; indeed there can be no doubt, but, that the iron in the London yellow bricks is in the state of a peroxide, as well as in the red bricks; for the peroxide of iron gives various colors to bodies according to circumstances. With it, we find bodies tinged, red, yellow, and brown, according to the substances with which the oxide is combined. We ascribe the color of the London bricks to the ashes of the coals, which, by uniting with the peroxides of iron, form a kind of yellow ochre."

A patent was sometime since taken out by Mr. Shaw for the manufacture of bricks. This gentleman proposed a very ingenious arrangement, by which the clay could not only be pressed into the mould, without manual labor, but be also removed by machinery. The machinery may be moved by any mechanical power, whether it be manual, steam, or horse.

CEMENTS.

Having explained the manner in which bricks are made, and the means of distinguishing their qualities, it will be necessary to state the composition of the several kinds of cement, that are used in order to bind or connect the several parts together; and it may here be necessary to mention, that we shall not confine our remarks to those cements which may be used by the bricklayer, but shall also refer to those which may be commonly employed by the mason; for as we must speak of the origin of the cementitious principle, it seems desirable to explain all the several kinds of substances, in the composition of which this principle is called into action. But before we speak of the cements themselves, it will be necessary to refer to the nature of that substance, lime, which is their principal ingredient.

Lime.

Lime is easily distinguished from other substances by its properties. It is an earth having a white color, and produces a caustic sensation upon the tongue; is incapable of fusion by ordinary temperatures, being one of the most infusible substances in nature, and is but little soluble in water, though it is more soluble in cold than in hot water. Lime is seldom, if ever, found pure in nature, but is generally in com-nation with an acid; most frequently with carbonic acid, as in the formation of chalk, limestone, and marble. Lime is a very abundant ingredient in the composition of the earth's crust, and generally makes its appearance as a carbonate, but both sulphates and carbonates of lime are found to occur as constituent parts of mineral substances. To obtain pure lime, that is, lime separated from an acid, with which it is uniformly combined in nature, the mineral must be submitted to a red heat, which drives off the acid, and leaves the lime in a state of purity; it is then called caustic or quicklime. Chalk, limestone, marble, oyster-shells, and other substances, are carbonates of lime; and either of these will, when burnt, furnish the material required in building; but the two former are chiefly used for this purpose.

Builders are well aware of the fact, that all limestones or mineral substances containing lime, as an ingredient, do not possess the same cementitious properties.—One stone may yield, when burnt, a lime very superior to another, and this difference depends upon the quantity and character of the advantitious substances, which are combined with the lime. Many of these may be detected by the appearance of the mineral, or by very simple experiments.—When the limestone has a deep brown or red color, it generally contains iron, and when burnt has a yellowish hue; when it does not freely effervesce with the application of an acid, and is sufficiently hard to scratch glass, it contains silex; when it effervesces slowly, and gives a milky appearance to the acid, it contains magnesia. The effects of these and other substances upon cements, have not been accurately determined.

The cementing quality of lime seems to arise from its chemical combination with the substances with which it is mixed.—First of all it unites with a certain proportion of water, forming a hydrate of lime, which appears to have a chemieal attraction for silica, that is to say, the sand with which it is mixed. After exposure to the atmosphere for a short time, it abstracts and applies a portion of carbonic acid, which greatly increases its hardness, and on this account all old mortars are remarkable for their cohesion and strength, frequently becoming stronger than the stones they unite. Sir Humphrey Davy, speaking of cement, says, "The cements which act by combining with carbonic acid, or the common mortars, are made by mixing together slaked lime and sand. These mortars at first solidify as hydrates, and are slowly converted into carbonate of lime, by the action of the carbonic acid of tho air. Mr. Tennant found that a mortar of this kind in three years and a quarter, had regained 63 per cent. of the quantity of carbonic acid which constitutes the definite proportion in carbonate of lime." But there are two kinds of cement used in building: that in which lime forms a prominent combination with water, and this is called a water cement; and that which combines with carbonic acid, which is called a mortar: this distinction is a very important one; one kind has the property of setting under water, the other has not.

Sand.

Sand is a very important ingredient in cements, and too much pains cannot be taken to obtain it pure. River sand should be always preferred to pit sand, for it is less likely to be mixed with clayey or other substances, which greatly injure the indurating property of the cement. But wherever the sand may be obtained, it should be well washed, and this is especially nenessary if taken from the sea; for the salt with which it is combined, having strong hygrometric properties, would prevent the cement from drying. This effect we remember to have frequently observed in a little seaport town, where beach-sand had been used by the builders, without sufficient washing.

Mortar.

Mortar is made of lime and sand, thoroughly mixed together, and brought into the consistency of a paste, by the addition of water. Different proportions of these substances are used by builders, and this must necessarily be the case, for a larger or smaller quantity of sand must be added in proportion to the quality of the lime. A good lime will take more sand than a bad one, and the value of the cement may, in a great measure, be judged of by the quantity of sand it contains. Builders are accustomed, for instance, to use more sand with stone-lime than with chalk-lime; not that there is in general much difference between the two, when first burnt, but because the quality of the chalk-lime is speedily injured by a very rapid absorption of carbonic acid. With one hundred and fifty pecks, that is, thirty-seven and a half striked bushels of chalk-lime, the workman mixes two loads of sand, each load consisting of thirty striked bushels; but twenty bushels of stone-lime will frequently bear two loads and a half of sand. It is estimated that the mortar produced by either of these proportions, will do a rod of brickwork, that is, two hundred and seventy two and a quarter square feet, superficial measure, a brick and a half thick, that is, about fourteen inches. According to the experiments of Dr. Higgins, a proportion of one peck of lime to seven of sand, makes the best mortar.

When mortar is to be used in a situation where it will dry quickly, it should be made with as little water as possible, but it is better that the mortar should dry gradually and slowly, as it then becomes more indurated. It is stated by some writers that mortar is injured by keeping, and under one condition, exposure to the air, it is; but, if excluded from the air, it is rather benefited than injured. Pliny states, that the Roman builders were prohibited by law from using a mortar that was less than three years old; and attributes the stability of all their large buildings to this circumstance. But when old mortar is used, it should be well beaten up before it is employed. The reader must not, however, suppose that these remarks justify the exposure of mortar to the air for a considerable time before it is used, a practice very common, but highly improper. This practice probably arose from the difficulty which workmen sometimes find in slaking the lime, in consequence of its being insufficiently burnt, or containing a large portion of argilaceous matter. But of all other things, it is important to use good lime, and to soak the bricks which are to be bedded, before they are laid; for, if the bricks are dry, they imbibe the moisture of the cement, and destroy its quality. There are two things which cause mortar and cements generally to crack, too small a quantity of sand and a too rapid exhalation of the water. There must always be a contraction, but it is least in those mortars which contain the greatest proportion of sand; for it is the moistened lime which contracts during the process of drying. All mortars may, for a time, be affected by atmospheric changes, and especially by alternate wetting and freezing; but this is the most remarkable in those which are liable to crack. A mortar which sets without cracking will always stand afterwards.

Dr. Higgins, to whom we are much indebted for his experiments upon cements, invented one which he speaks of as admirably adapted for both internal and external work; and becomes as hard as Portland stone when dry. "Take," he says, "fifty-six pounds of coarse sand, and forty-two pounds of fine sand; mix them on a large plank of hard wood, placed horizontally; then spread the sand so that it may stand at the height of six inches, with a flat surface, on the plank; wet it with the cementing liquor; to the wetted sand add fourteen pounds of the purified lime, in several successive portions, mixing and beating them together; then add fourteen pounds of bone-ash in successive portions, mixing and beating all together." Whatever may be the quality of this cement, it is not likely ever to come into general use, as it would be more expensive, and give more trouble in preparation, than many others which are now found to answer the builder's purpose. This, however, was proposed as a water-cement. Mortar is evidently unfit to be used in any situation where the force of water is to be resisted; for although it is said that mortar composed of lime and sand, in the proportion of one and seven, will not suffer from water, yet, as this composition is seldom, if ever, obtained, it would be folly to risk the security of a building by its use.

The insufficiency of mortar for all those works, the whole or part of which are under the water, induced the scientific builder and chemists to seek a substitute. Many compositions have been recommended, and several of them have been found to answer the purpose. There is one substance, however, Roman cement, which, above all others, is extremely useful for a number of purposes, and will require our attention; and if our remarks should occupy a space which may appear to have no proportion to the length of the other parts of the volume, the importance of the subject will be a sufficient excuse.

Roman Cement.

Roman cement was accidentally discovered in the year 1796, by Mr. Parker, whose attention was attracted, when walking beneath the cliffs of blue clay, on the shores of the island of Sheppy, by the uniform appearance of the masses of stone which were strewed here and there upon the beach, and were seen projecting from the cliffs. As a mere matter of curiosity, he collected two or three fragments, and happened afterwards to throw one of these pieces in the fire. After it had been exposed for some time to the fire, it fell upon the hearth, and was there found by Mr. Parker, who was induced to make some experiments upon its cohesive properties, which led him to the discovery of its value, as a strong and durable cement. He then immediately applied to the Government of the day, for a patent, which was granted to him for fourteen years; and having secured to himself the right of manufacture, realized an ample fortune.

So great has been the recent demand for cement stone, that its quantity has been much diminished, and other substances have been substituted to so great an extent, that the cement now used is much inferior to that originally manufactured by Mr. Parker.—So small is the quantity obtained on the Sheppy coast, that the manufacturer is scarcely repaid for the cost of a search. The natural physical causes which are constantly active, have a tendency to increase the quantity upon the beach which surrounds this interesting island; but all natural agents act in a slow and progressive manner, so as to afford a very inadequate supply for the demand which is now made for this material. The masses once abundantly strewed over the shores of the island of Sheppy have been long since removed by the cement manufacturers, and the supply which is now obtained from this spot depends upon the quantity of the cliff that may be thrown down by the undermining influence of land-springs, or by other cause. At the base of the cliffs which surrounds this island may be seen, here and there, extensive land springs, which weaken the foundation of the clay, and frequently cause masses of large extent to fall upon the beach. This cause is aided by the storms which, during the winter season, frequently blow upon its shore, and, either by the force of the waves or by the subsequent drying of the saturated mass of clay, weakens its cohesion, and produces the same effect. The falling of the cliffs produced by these and other means, furnishes a small quantity of cement stone, but a quantity altogether inadequate for the supply of the demand. But as far as observation extends, it appears that these nodular stones are found in all the deposits of London or blue clay. This stratum is found in Harwich, and other places, as well as at Sheppy; and the attention of the manufacturer was consequently directed to them, for a supply of the material. But it has been stated, and experiment seems to justify the assertion, that the Sheppy stone yields a much better cement than that which is obtained from other places: the cause cannot be readily determined; but so great a value is placed upon the former, that some persons have actually excavated for the purpose of obtaining it. But the principal part of that now used by manufacturers is obtained from Harwich; and not less than from thirty to forty tons weight are annually collected in this place. The engineer and architect still prefer the Sheppy cement, which has a much lighter color than that made from the Harwich stone, but is far more expensive. The manufacturer, however, now so frequently intermixes other ingredients with the Harwich cement, to give it the same appearance as the Sheppy, that it is almost impossible to determine the quality by the color. Limestones, found in other places, have been substituted for the Sheppy nodules; all of which, excepting that which is found in small quantities in the marshes of Essex, near Steeple, are much inferior to it.

The manufacture of cement is extremely simple, although some experience is necessary, as the character of the cement will depend as much upon the manner in which it is made, as upon the property of the stone. After the stone has been broken into small pieces it is thrown into a kiln, with a proportion of small coal, to be burnt. A strong red heat must now be supported throughout, and considerable skill, or rather experience, is required to accomplish this purpose, for the relative degrees of hardness in the several pieces, and other causes, tend to give them an unequal temperature and to prevent perfect calcination. After the stone has remained from thirty to forty hours in the kiln, in which time it is usually perfectly burnt, it is taken to the mill, and being immediately ground to powder is packed in casks and sent into market. Promptness in all the processes which follow burning is absolutely necessary, for the contact of the air impairs the adhesive power of the cement. Hence it is that builders who study the character of their materials invariably prefer the cement which is made in large manufactories; a ready sale generally securing, them from the use of an old cement. Good cement perfectly burnt has a light-brown color, and has very little weight; but if imperfectly burnt it is heavy and has a dark color: when the stone is burnt overmuch, small black carbonized particles may be observed. It may be necessary to state that the cement should always be reduced to as fine a powder as possible; and to accomplish this an attempt was made some time since to sift it, but its exposure to the air was found to injure its properties as cement. As a test to the value of a cement the experimenter may mix with it a quantity equal to two-thirds of clean, well washed, and dried sand, and should it then have a strong cohesive power he may depend upon its qualities; but as soon as the two ingredients are mixed and moistened, the cement should be used, or it will either fail to set or to possess an adequate adhesive power. These suggestions, if carried out, will be found of great importance in the art of building, and particularly in those instances where great stability is required. The builder frequently attributes to the cement that which depends upon its own injudicious use or exposure of the material; and even bad cement may be made tolerably effective for ordinary purposes, if it be little exposed to the atmosphere, and be used immediately after its mixture.

Roman cement should never be used in any situation where there is the slighest chance of warping or spring, for as it does not possess any elastic force it is sure to break way. For covering walls when used as a stucco it is well suited, but the bricks should be damped previous to its application, or they will absorb its moisture and give it a porous structure. But stucco will not bind upon a bed of stucco, and it is therefore necessary that it should be applied in one coat; for, as good cement will set in about twenty minutes, a second bed cannot be applied at any subsequent period without endangering the stability of the work, for one coat is almost sure to separate from the other.

To ascertain the relative value of any number of cements, mix them with certain proportions of sand, and that which is the hardest with the largest proportion is the best. As a collateral proof the specimens may be kept for a few days, and it will be found that a quantity of bloom formed upon their surfaces will have some relation to their qualities. Good cement, will always be raised to a great temperature when mixed, and those which are not may be considered worthless. There are some cements that harden very quickly, and yet are of very bad quality, and will in the course of a few hours become quite soft. These facts are well worthy the attention of the workman or the builder, for they will not only enable him to ascertain which is a good and which a bad material, but also to use the material he may choose, in the most advantageous manner.

Chemists and others who have investigated the properties of hydraulic limes are not by any means agreed as to the cause of the cementitious quality. Saussure was of opinion that their peculiar properties were derived, from the presence of silex and alumina in certain proportions; Descotils attributes them to the presence of a large proportion of silex, and Bergman and Guyton to a small proportion of manganese.

The Roman is the most valuable of all water-cements, as well for the ease with which it may be used, as its hardness and durability. As it sets in about fifteen minutes, the workman cannot mix more than a small quantity at once. Experience will soon teach how much can be worked in a certain time: an appropriate quantity must be taken upon a clean board and something more than an equal quantity of very clean and dry river sand. When the lime and sand are thoroughly mixed, as much clean water as is necessary to form them into a paste should be added. The workman should then immediately use it, and after it has been once applied, it should not be in any way disturbed. Forty bushels of cement, with its appropriate quantity of sand, will do a rod of brick-work. Good cement will take two parts of sand, and that cannot be called good which will not take one and a half.

When cement is used for coating or lining walls it must have as much sand as possible, so as not be too stiff to work. It must also be always worked in one coat, and the surface to which it is applied should be clean and well wetted. Cement when thus used is called stucco, and should be laid on three-quarters of an inch in thickness. A bushel of cement with its proper proportion of sand will cover a surface of two square yards.

Cement is also used for casting ornaments, for which purpose it answers exceedingly well. Gothic work is sometimes finished in this way, but, although it may be desirable in some instances, it is generally better to use stone where very ornamented work is to be introduced.

There are several other kinds of cement which are occasionally employed by the bricklayer, but they are not of sufficient importance to be treated of in a work which can only give some of the most prominent facts in the art of building. But it may be asked, what was used before Parker's cement was discovered? This question leads us to make a few remarks upon two cements which were once extensively used in this country, Puzzolana and Tarras, but are now scarcely ever employed.

Puzzolana.

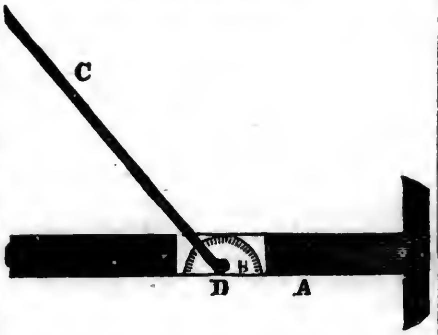
Puzzolana is a volcanic substance, consisting, according to Bergman's analysis, of from fifty-five to sixty per cent. of silica, from nineteen to twenty of alumina, five of lime, and twenty of iron. The Romans were accustomed to mix this substance with lime in the manufacture of water-cements, and the same method was a long time adopted in England. The hardening of the mortar is supposed to arise from the union of the oxygen of the water with the iron.

Tarras.

Tarras or Tras is a substance found at Andernach, in the department of the Rhine, and, according to Bergman, differs but little from Puzzolana in composition. Tarras mortar is well suited for all those situations in which it is constantly exposed to wate , but it cannot resist the action of alternate wet and dry, and indeed is never so firm when it sets in exposure to air as under the water. The principal objection to the use of this mortar was its expense, and consequently the Dutch attempted to supply its place by the union of substances found in their own country, and succeeded so well that a large quantity was imported into this country, and extensively used. There are two proportions which have been adopted as the best for Tarras mortar: in one kind a measure of quick lime is mixed with a measure of Tarras, and being thoroughly mixed are brought into the consistence of paste by the addition of water, as little water being used as possible; in the other, one measure of Tarras is mixed with two measures of slaked lime and three of sand,—this is almost as good a cement and much cheaper than the former.

From the Mechanics' Magazine.

Sir,—I send you an improvement of Dr. Farishes Isometrical drafting square, as published in Brantons Mechanics', page 209; should you think it worthy your attention you will please give it place in your valuable Magazine, that it may benefit some who are making use of his perspective.



In the first place take a common drafting square A, with the blade something wider than usual, and (instead of his notched ruler so made as to form an angle of 60°, which he says is the most common angle,) put a piece of Brass B, so fitted as to slide from end to end. On that strike a semi-circle, graduate it into 180°, numbered from the base upwards to 90°; then by another small ruler C, turning on the point D, in the centre of the circle and one side running directly to it; it will readily be seen that we may draw a line to any angle by taking the degrees on the circle instead of being confined to one, as in his plan. I made one, only temporary, but am satisfied that it may be made so as to be a great improvement in Isometrical Perspective. H. B.

Agriculture, &c.

From the New-England Farmer.

Providence, Feb. 11, 1837.

Mr. T. G. Fessenden,

Sir,—I perceive that you seem to recommend the use of Potatoes in making Bread. It is I presume, for economy, for no person would use them for any other purpose, in preference to flour. It should not be forgotten that 10 oz. of flour will, with a little yeast, and a due quantity of water, make 15 oz of bread, and that water is cheaper than even potatoes. If the bread be so made as that the moisture of the potatoes supplies the place of water, in the production of dough, you will lose all the bread, which would have been produced by the use of water. I have known potato bread made with a total loss of the potatoes, and yet heard a great boasting of the economy of the proceeding.

Will the black corn produce as much as the blue or white, if planted, both of them as they should be, three feet by 15 foot? Its earlier maturity is in its favor, but not so much as the loss of one-fourth of the crop; for in New-England the corn is not injured by frost one year in four, or perhaps eight.

Mr. Bateman, of Newport, in this State, has raised, as I am told, 1600 bushels of Mangel Wurtzel on an acre; he uses them in fattening cattle. This crop requires the whole season, while the Ruta Baga may be raised to, perhaps, three-fourths of that amount after a crop of grass, or any kind of grain. The difference in the nutritive qualities of roots should be considered, and the purposes for which they are fed.

With high respect, I am
Your obedient servant,
Tristram Burgess.

By the Editor.—We are ever happy to receive articles like the above, from gentlemen, whose character, mental powers, and standing in the community are calculated to turn the attention of the reading and thinking part of mankind to the pursuits of economy. With regard to converting water into nutritious matter, and making it food for animals as well as plants, we have heretofore made some remarks in a note to the Boston edition of Mowbray's Treatise on Poultry and in the New-England Farmer, vol. x, p. 389. We will now take the liberty to repeat some of those observations, as they are pertinent to one of the topics of our able correspondent's communication, and will perhaps be new and useful to some of our readers:

"It is a fact, which will be acknowledged as soon as stated, that a pound of Indian meal, or rice, or any other farinaceous substance, when boiled, contains more nourishment than several pounds in a raw state. Count Rumford has stated, "from the results of actual experiment, it appears that for *each pound* of Indian meal employed in making a pudding, we may reckon *three lbs. nine ounces* of the pudding.* And again, three pounds of Indian meal, three quarters of a pound of molasses, and one ounce of salt, (in all 3 pounds 13 ounces of solid food,) having been mixed with five pints of boiling water, and boiled six hours, produced a pudding, which weighed *ten lbs. one ounce.*† Thus we gain from the raw material more than 300 per cent. in weight, and, no doubt, the gain as respects the quantity of nutriment contained in the pudding, over and above the component parts as they existed before boiling was still greater. The gain of weight in rice, in consequence of boiling, is more considerable than that of Indian meal, and every one knows that a small quantity of oat-meal will produce a very great relative proportion of gruel."

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* Count Rumford's Essays, vol. 1. p. 258.—Boston edition.

† According to Sir Humphrey Davy's Table of the Quantities of Soluble or Nutritive Matters afforded by different vegetable substances, 1000 parts of wheat afford 995, whole quantity of soluble or nutritive matter, 765 of mucilage or starch, 190 of gluten or albumen. Potatoes afford by analysis, the same materials, but in a smaller proportion and the addition of saccharine matter, viz: from 1000 parts, from 260 to 200, whole quantity of soluble matter, from 200 to 155 mucilage, or starch,

from 20 to 15 saccharine matter, from 40 to 30 gluten. As wheat and potatoes both contain mostly the same constituent parts, one would suppose there could be no loss by their mixture in bread; but there are properties belonging to the potato part of the mixture, which do not belong to that which is composed of the flour. The potatoes are cooked and boiled before they are mixed with the flour or dough, while the flour is a raw material, and potatoes, we believe, are not increased in bulk or substance, by any process in cooking, like flour, Indian meal, or rice, &c. This subject, however, deserves further investigation, and our able correspondent, by resuming it, would oblige us, and probably benefit the public.

From the Practical Farmer.

MORUS MULTICAULIS.

SIR,—Having seen many statements and suggestions in public prints, that the Chinese mulberry, (morus multicaulis,) was not as hardy as the White mulberry, and that it would not bear the extreme cold of our winters, &c., I deem it proper to state my own observation on the subject. I was the first person south of New-York, who had the Morus Multicaulis; it was sent to me by my old friends, Wm. Prince and Sons, in 1828, in a collection of seven other varieties of mulberry. It was not then known by the present name, but it was called the Phillipine Island mulberry, and I believe was received by the Messrs Prince direct from those Islands. About a year after I received it, accounts were received from France of the receipt there of the Morus Multicaulis, and of its great value for feeding worms. On examining my trees, I at once found that my Phillipine Island Mulberry was the Multicaulis, and immediately commenced feeding my Silk worms with it; and from experiment, ascertained the truth of all the French had said about it. From that time to this, I have continued to urge upon all, the propriety of cultivating this, in preference to the white mulberry. Its advantages are, it is full as hardy as the white; one pound of its leaves contain as much nutritive matter as a pound and a half of the white; the silk made from it is of a finer texture and more lustrous; its leaves are so large that a pound can be gathered at half the expense and trouble that a pound of White Mulberry leaves require; it can be cultivated with infinitely more despatch than any other kind. These are all great advantages, and I am so well convinced of the correctness of this statement, that I do not hesitate to say, that within ten years, no other mulberry will be cultivated for feeding silk worms; simply because those who feed the worms upon the mulberry leaves wil not be enabled to compete with those who feed on Morus Multicaulis, and they will be either compelled to abandon the silk business or adopt the multicaulis for feeding. In relation to the hardiness of the Morus Multicaulis, I have cultivated it for seven years, never protected it in any manner whatever and never lost a tree by the cold of winter, or any other way. I had fifty young trees in my garden last winter, and not even a bud on the extremity of the branches was injured. It is true that about fifty yards west from where the young trees stood, there is a grove of oak trees, and on the north, fifty yards distant, my dwelling-house stood; and my garden has an exposure to the south, with a gentle declination. But my residence in the winter of 1831–2, was very different. It was on a farm, four miles in the country, in a northeast direction: the situation at an elevation of 3 to 400 feet above the tide water. There my Morus Multicaulis had an open exposure to the north-west wind; yet none were injured. During the whole time, I have had the white mulberry of various varieties, and have observed that they were all equally hardy—none more so, than the multicaulis. I have seen the young *unripened wood* of all varieties destroyed by the winter, and was very early led to adopt measures to guard against it, and now I never lose a bud.

None but the young trees are ever injured by winter, and all we have to do is to give them such a start as to enable them to ripen their wood previous to the approach of very cold weather. I raise all my trees from cuttings in a hot bed. About the first of March, I make an ordinary hot bed, like those used for cabbage plants; then I take the young wood of last year's growth, and cut it into pieces about two inches long, merely leaving a single bud on each; these I stick in the hot bed, three inches apart, in a slanting direction, the upper end inclining to the north, and burying it so that the bud is scarcely seen at the surface of the earth; sprinkle the bed with a watering pot, and put on the glasses; keep the bed properly moistened by watering every day, and throw matting over the glass at night, and in the middle of the day, to protect both from frost and the hot sun. By the middle of May, the plants will be four, six or eight inches high, and may then be transplanted to the place they are to grow, like cabbage-plants, watering them once a day for eight or ten days, if the weather is dry; they will be found to be well rooted, and will grow from four to six feet the same season, and will ripen their wood so that the ensuing winter will not injure them. After the first year, I have never seen any of them lost by the winter, except in some extra cases, and in these the white mulberry has suffered, and even the native mulberry, fully as much as the multicaulis. Last winter, a white mulberry tree, seven or eight years old, in the western part of the city of Baltimore, was killed to the ground; while my Morus Multicaulis not a quarter of a mile from it, and north of it too, and in a higher situation, was not injured. GIDEON B. SMITH.

From the Genesee Farmer.

BEET SUGAR.

BY W. G.

There seems to be some little conflicting difference of opinion on the possibility of manufacturing beet sugar profitably by individuals or families, among those whose attention has been drawn to the subject, and who profess to speak from experiment. For instance, Mr. Sleigh of Philadelphia, in a late communication to the U. S. Gazette of that city, says: "An establishment will not clear its expense, unless it be calculated to manufacture at least from two to five hundred pounds of sugar a day; so that the idea of individuals in this country manufacturing profitably for private consumption is preposterous; their sugar would stand them, including labor, a dollar a pound." This opinion Mr. Sleigh says he has come to "after numerous experiments."

On the other hand, Mr. Le Ray de Chaumont, Mr. Isnard, and others intimately acquainted with the manufacture in France, assert that there can be no doubt of the practicability and profitableness of domestic or family manufacture, and that there are large quantities actually so manufactured in France. In addition to these statements, in "Journal des Debats," of April 15, 1836, appears an article on on this subject, in which it is stated, that four residents in the village of Wallers, department of the North, formed an association for making sagar, subscribing 50 francs each as capital. One was a blacksmith, the others farmers. These men were able to make from 40 to 50 lbs. a day, of sugar of a medium quality, a result surprising, considering their simple mode of conducting the process. They used curry combs to rasp the beet roots, used linen bags for expressing the juice, and the syrup thus obtained, was boiled in pots on the blacksmith's fires. Several others are mentioned as having introduced the business on a small scale successfully, and the French editor intimates as his opinion, that the time is not distant, when every family in that country, will make their own sugar, as they now do their preserves.

That some experience in the manufacture of beet sugar by companies and capitalists in this country must be acquired, before it can be introduced into families, can be readily conceived, but as the processes become simplified, and our farmers become familiarized with them, and with the culture of the beet, we can see no reason why it cannot be as well made in families here as in France; and there is no reason for doubt but that it will. If with cooking pots and a blacksmith's fire, six or seven dollars worth of sugar were produced; there can surely be no obstacles that American perseverance, and an improved apparatus will find insuperable.

☞ We have received a highly valued favor from the Hon. Abbott Lawrence, dated 15th inst, House of Representatives, Washington, relating to a parcel of *Seed Corn*, which has four or five ears on a stalk, &c. The package has not yet arrived, and we received the notices of the donation and the statements with which it was accompanied, too late for this paper. We have now only room to express our thanks to Mr. Lawrence for this repetition of his kindness and attention to the Agricultural interests of New-England. His letter and the documents with which it was accompanied, shall be published in our next.

[New-England Farmer.]

☞ A Premium of One Hundred Dollars, is offered for the best experiment made in the year 1837, in fattening various animals on apples—the premium to be awarded by a Committee of three Farmers, to be named hereafter in this Journal.

[Amer. Temp. Union.]

LIST OF SUBSCRIBERS to the **Railroad Journal,** that have paid, (continued.)

Thos. Hassard, City, N. Y., Jan. 1, 1838
N. Bliss, " " " 1838
A. B. Taylor, " " " 1837
G. M. Wilkins, " " " 1838
W. H. Russell, " " " 1838
D. C. Colden, " " " 1838
S. Swartwout, " " " 1838
New-York, Boston and Providence Railroad Co., City, Jan. 1, 1838
A. Hovey, Binghampton, N. Y., " 1838
Railroad Office, Painted Post, " " 1838
New-Haven Atheneum, New-Haven, Con., Jan. 1, 1838
H. M. Walker, Philadelphia, Pa., Jan. 1, 1838
Lt. Bliss, York, Pa., " 1838
A. Pardee, Hazleton, Pa., " 1838
W. Kinney, Louisville, Ky., " 1838
R. H. Chinn, Jacksonville, Ill., " 1838
A. R. Johnson, Fort Levenworth, Mo. Jan. 1, 1838
Ross. Winans, Baltimore, Md., Jan. 1, 1837

Error in last No., Wm. Norris, Philadelphia, Pa., to Jan. 1, 1838, instead of Jan. 1, 1837.

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AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, MARCH 18, 1837. [VOLUME VI.—No 11.

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NEW-YORK, MARCH 18, 1837.

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J. Matthiew,	"	Jan. 1, 1838
Astor House,	"	July 1, 1837
G. W. Bruen,	"	Ju y 1, 1837
W. Taylor,	"	in full
J. Ely,	"	Jan. 1, 1838

J. W. Crane, Binghampton, N. Y. Jan. 1, 1838
New Castle Manufacturing Co., New Castle, Del., Jan. 1, 1838
A. McGrew, Cincinnatti, Ohio, Jan. 1, 1837
S. Williams, Florence, Ala., Jan. 1, 1838
Richard Ellis, Richmond, Va., Oct. 1, 1837

TO ENGINEERS.

WE are gratified to be able to announce to those desiring INSTRUMENTS, that Messrs. E. & G. W. BLUNT of this city, are now prepared to furnish at short notice, LEVELS, from different manufacturers, among others from Troughton & Sims, which they warrant of the first quality. Circumferentors, Levelling Staves, Prismatic Compasses, Mathematical Instruments, Books for Engineers, etc constantly on hand.

One of the above firm is now in England superintending the manufacture of Theodolites, Transit Instruments, etc.—and any orders for Instruments, nonow on hand, will be forwarded him, and executed promptly.

⁂ Orders will be received and promptly attended to by the Editors of this Journal. 9. 4t

☞ It will not do, these hard times for money, to be too modest. The *Paper Maker* must be paid, the *Engraver*, the *Ink Maker*, and the *Printer* must be paid,—then why not Pay the Publishers and the Editors the *current year* and all *arrearages* for the Journal? *It must be done.*—PLEASE REMIT BY MAIL.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its engravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

☞ MISSING NUMBERS WANTED.—If any of our subscribers have numbers 4, 5, 6 and 7, of Volume or *five last* year, which they do not desire to preserve, they will confer a special favor by sending them to us, that we may complete a few copies of the volume.

⁂ If any of our subscribers are in want of *any other* number of the same volume to complete their volume they will please give early notice and they shall be sent.

The Title page and Index for last year, or volume five, will be forwarded to subscribers with our next number.

RAILROAD AND CANAL STOCKS, in New-York and Philadelphia.

SALES OF STOCK IN NEW-YORK

March, 14th.

Mohawk Railroad	cash	79
Paterson Railroad	"	65
Boston and Providence	"	102¼
New-Jersey Trans	"	100
Stonington	"	69
Worcester Railroad	"	91
Long Island Railroad	"	74
Paterson Railroad	"	65
Stonington Railroad	"	69
Harlaem Railroad		66
Utica and Schenectady	cash	118¼
Delaware and Hudson Canal	"	90
Morris Canal	"	95
New Orleans Canal	"	95

PHILADELPHIA STOCK MARKET.

March 10th.

RAILROAD STOCKS	Price of shares	Offered	Asked
New-Castle and Frenchtown	25	31¼	32
Do loan, 5¼ per cent	100	99	101
Wilmington and Susquehanna	50	38	42
Camden and Amboy, shares,	100	135¼	136¼
Do loan, 6's 1836	100	110	120
Danville and P shares	50	25	35
Norristown, do	50	34	34¼
Do 6 per cent loan	100	85	100
Valley Railroad	7¼	1	3
Westchester do	50	20	28
Minehill do	50	59	57
N. L. and Penn. Tp. do	40	34¼	35
Philadelphia and Trenton do	100	125	127
West Philadelphia Railroad	50	20	30
Harrisburg and Lancaster	50	46	48
Cumberland	25	15	20
Beaver and Meadow	50	57	57¼
MISCELLANEOUS STOCKS			
North American Coal Company	25	12	14
Steam Bt. Sts. Columbian	100	18	22
Exchange Stock	100	70	80
Arcade	100	55	75
Theatres—Chestnut street	600	625	675
———Walnut street	280	175	220
———Arch street	500	325	375
Gas Company	100	100	102
CANAL STOCKS.			
Schuylkill Navigation, shares	50	163¼	164¼
Do loans, 5 1845	100	98	100
Do do 1855	100	100	101
Do do 5¼ 1837	100	98	100
Lehigh Coal and Navigation	50	86	87
Do loan, 6 1838	100	97	98
Do do 6 1839	100	97	98
Do do 6 1844	100	99	100
Do do 5 1840	100	96	97¼

Union Canal, shares		200	180	190
Do loan,	1836	100	83	86
Do do	1840	100	85	90
Chesap'k & Delaware Canal, shares		200	201	40
Do loan,	1837	100	60	67
Do do	1840	100	60	67
Delaware and Hudson,		100	92¼	92¼
Do loan		100	95	100
Louisville and Portland		100	112¼	117
Convertible 6 per cent. loans,		100	110	120
Sandy and Bever		100	60	80
Morris Canal		100	97	98

The following correspondence, which we copy from the Courier and Enquirer of 25th February, merits the attention of those who have the superintendance, or are in any way connected with public works.

We adopt the remarks of the Courier and Enquirer as expressing our own sentiments in relation to the character, and course of the gentleman, and the subject which called forth this correspondence.

☞ In giving place to the following correspondence between Major McNeil and the contractors who under him constructed the Boston and Providence Railroad—a work which probably has no rival in all that pertains to its durability—we deem it unnecessary to say ought in regard to the merits of Major McNeil as an engineer. His reputation is too well established in the estimation of the public to require any such testimony from us; but we deem it a duty alike to him and to contractors generally, to call public attention to the fact elicited by this correspondence, that the engineer considered himself not only the representative and agent of the Company, but so far the guardian of the interests of the contractors, as to feel it is his duty to make them a liberal allowance for obstructions in excavations which no ordinary foresight and prudence on their part, could enable them to anticipate. Thus, where contracts are taken in good faith, and it was subsequently discovered that unanticipated obstructions occurred which would render their contracts exceedingly onerous, the Engineer allowed them, under the sanction of a very liberal board of direction, such additional compensation as justice and liberality dictated, without reference to the mere letter of their contracts.

Such conduct merited a proper expression of feeling on the part of the Contractors, while the constant aim of the Chief Engineer to add character to the business, entitles him to their respect and esteem.—We hope the lesson inculcated by this correspondence, will not be lost upon other Engineers, and the board of Directors under whom they act.—[Ed. Cour. & Enqr.]

To Major Wm. Gibbs McNeill—

Sir,—At a meeting, holden at the Astor House, in the city of New-York, on Wednesday, Sept. 28th, 1836, Thomas Hassard, Esq., being called to the Chair, and Jonathan Crane appointed Secretary, it was voted unanimously, that

Whereas, the undersigned, having been Contractors and Agents on the Boston and Providence Railroad, of which you, sir, were the Chief Engineer and Agent, feel it a duty to make an expression of their high consideration and respect, not merely for the judgment and skill you have displayed in the location and construction of said road, but more especially for your liberal policy, your kind and affable treatment to those who have executed contracts under your agency:

Therefore, Resolved unanimously, That Thos. Hassard, E. Turner, and D. Carmichael, be a committee to present you, sir, a pair of silver pitchers and a vase, which we respectfully request you to accept, as a small memento of our mutual regard.

Most respectfully, yours,

Thos. Hassard,	Thos. Bell,
Jonathan Crane,	Levi Walton,
W. J. Duval,	Wm. McDermitt,
John Borland,	Joseph Sturgess,
William Otis,	E. Turner,
Stephen Otis,	E. D. Turner,
Aaron Carso,	A. C. Vedder,
R. G. Fairbanks,	J. P. Vedder,
Daniel Carmichael,	Michael Onil,
Wm. S. Otis,	Joseph Mankin,
James Muranus,	Janus Mankin,
Daniel B. Carson,	John Moss,
Wm. A. Bird,	Alex'r. Birnie,
John T. Clarke,	John L. Bevens,
Ira Doder,	K. Beckwith,
Jacob Stearn,	N. D. Williams,

——— Riley.

To Major Wm. Gibbs McNeill—

Sir,—The Contractors who have been engaged on the Boston and Providence Railroad, lately finished, under your superintendence, desirous of attesting their appreciation of your character and conduct, have appointed Messrs. E. Turner, D. Carmichael, and myself, a committee to procure and present to you, the accompanying pieces of plate.

In the unavoidable absence of my colleagues, the performance of this pleasing duty devolves upon me. Having been for a longer period than any of my associates connected with works of which you were the Chief Engineer, it gives me peculiar pleasure that I am selected to present you this evidence, that the kindness, courtesy and candor which has always marked your conduct towards us, has been duly appreciated.

In behalf of my associates, as such evidence, I ask your acceptance of a Silver Vase and a pair of Pitchers, herewith presented.

With great respect,
Your obedient servant,
Thos. Hassard.

New-York, January 1, 1837.

To Mr. Thomas Hassard—

Sir,—I beg to return to the Contractors of the Boston and Providence Railroad, represented by the Committee of which you are the Chairman, my most sincere thanks, not only for the splended plate which they have done me the honor to present to me, but for the warm expessions of their personal regards which, in their names, you have so kindly tendered me.

Such an evidence of their good feeling towards me is indeed amongst the most gratifying rewards, which have attended my efforts as an Engineer; and I reciprocate, with all the cordiality of my heart, the friendship and affection which you assure me I have won at the hands of those represented by yourself. From an intimate intercourse for years past, I respect and esteem them personally, as I trust, it has been uniformly apparent, I do their *calling*. I look upon them as identified with the Boston and Providence Railroad; and if, in its conception, general plan and location, there be any thing to merit the approval of the public—in its substantial and permanent construction, *indeed in the faithful execution of their trust*, there is, in my opinion, infinitely more to command the gratitude alike of the stockholders and the engineer.

That intelligent, upright and experienced Contractors should be preferred, and while they maintain, (as those of the Boston and Providence Railroad have done, without, I believe, one single exception,) the deserved character of being such, should be sustained and encouraged by the Engineer, is too obviously proper to admit of question.—For I regard them as fellow laborers in a common cause, and agents, in fact, with him, of the Corporation; and when their best energies shall, to his knowledge, have been given to the promotion of the interests of their employers, surely a just appreciation of the labors of the contractor—a consideration of circumstances, concealed from the eye of man, and unanticipated, till disclosed by those labors, but which nevertheless, if overlooked, would deprive him of an adequate return, if not involve him and those dependent on him *in ruin*—surely, I say, such a course, on the part of the engineer, cannot be at variance with the true interests committed to him. That it has been my honest purpose, throughout, vigilantly to guard those interests, I am conscious is accorded. That I have done so, and that, at the same time, I know—while in the satisfactory fulfilment of your contracts, there is abundant evidence of that ability on your part, to be useful, which must ensure you ample employment hereafter—you have lost neither in fame, nor fortune under me, is a satisfaction even greater than the approving voice, which so flatteringly has reached me, from those with whom I have now for years been associated, on the Boston and Providence Railroad.

To the steadfast support which I have received throughout the progress of that work, however, in the liberal and enlightened policy of its Direction, you will agree with me, that *our united thanks are due*.

In conclusion, allow me to bear my public testimony not only to the skill and industry with which you and your associates have, one and all, executed your contracts, but also to the cheerfulness and perseverance which have distinguished your efforts; and with my best wishes for your future welfare and happiness, believe me

Your friend, and obedient servant,
Wm. Gibbs McNeill.

INTERNAL IMPROVEMENT IN PENNSYLVANIA.

The whole length of canal by the Com-

monwealth of Pennsylvania, in operation at this time is	100 miles
Railroad in operation belonging to the State	120
Canal extension commenced	209½
Railway extension commenced	41½
Canal by incorporated companies in operation	286½
Railroad by incorporated companies in operation	186
Canal by companies being constructed	386½
Whole length of canal in operation in the State	886½
Whole length of Railway in operation	306
Aggregate of Canal and Railway in operation	1192½
Whole length of Canal being constructed in the State	305½
Whole length of Railway being constructed	400½
Aggregate of Canal and Railway being constructed	715½
Aggregate length of Canal in the State when completed	1191½
Aggregate length of Road when completed	715¾
	1,907¼

From the Harrisburg Reporter.

THE IMPROVEMENT BILL

Was reported in the House of Representatives yesterday, by Mr. J. M'Ilvaine, chairman of the Committee on Internal Improvement. We have neither time nor room, at present, to do more than give the following brief abstract of its details:

To the Erie extension,	$600,000
To the North Branch extension,	600,000
To an extension from the mouth of Tangascootack to the Sinnemahoning,	100,000
From a navigable feeder from Alleghany to the Kiskeminetas, near Kittanning,	100,000
To complete the railroad to avoid the inclined plane at Columbia,	87,500
To complete the Tangascootack line on the West Branch,	38,943
To the Gettysburg railroad,	150,000
For reservoirs in the neighborhood of Johnstown and Hollidaysburg,	25,000
For a survey to ascertain the practicability of a continued water communication between the West Branch and the Allegnany river,	10,000
For surveys to ascertain the practicability of a railroad from Chambersburg to Laughlinstown,	12,000
For the survey of a railroad line from Nanticoke Pool, by way of Tunkhannock, to Binghampton,	15,000
For the survey of a railroad from Franklin to the harbor of Erie,	2,000
For surveys to ascertain the practicability of conneeting the canals on the Juniata and Conemaugh, by a railroad without inclined planes, (no sum specified,)	
For making a navigable communication between Sheaver's creek, in Huntingdon county, and the Pennsylvania canal,	5,000
To construct a towing path along the pool of the Nanticoke dam on the east side of the North Branch, to the mouth of Salmon's creek,	5,000
To extend the Pennsylvania railroad to Marietta, so as to avoid the inclined plane at Columbia,	40,000

In addition to the foregoing, the bill provides for the following subscriptions of stock on behalf of the Commonwealth:

To the Danville and Pottsville railroad,	$300,000
To the Bald Eagle and Spring creek navigation,	95,000
To the Lancaster, Mount Joy, Portsmouth and Harrisburg railroad,	150,000
To the Cumberland Valley railroad,	200,000
To the Union Canal company,	3000 shares
To the Monongahela navigation company,	100,000
To the Franklin railroad,	50,000
To the Freeport and New-Castle railroad,	100,000
To the Pittsburg and Laughlinstown railroad,	200,000
To the Somerset and Johnstown turnpike company,	8,000
To the Williamsport and Washington turnpike,	5,000
To the Monongahela Bridge at Williamsport,	5,000
To the Warren and Franklin turnpike company,	5,000
To the Washington and Pittsburg turnpike company,	10,000
To the Peter's Mountain turnpike company,	35,000
To the Mercer and Meadville turnpike company,	500
To the Downingtown, Ephrata, and Harrisburg turnpike,	6,000
To the Susquehanna and Waterford turnpike,	1,000
To the Bald Eagle and Brush Valley turnpike company.	1,000

BOARD OF ASSISTANT ALDERMEN, JANUARY 9TH. 1837.

COMMUNICATION FROM THE WATER COMMISSIONERS, SETTING FORTH THE PROGRESS OF THE WORKS FOR SUPPLYING THE CITY WITH PURE AND WHOLESOME WATER. LAID ON THE TABLE AND ORDERED TO BE PRINTED.

JOHN NEWHOUSE, Clerk.

To the Honorable the Common Council of the City of New-York.

The Water Commissioners had the honor of presenting a communication to the Common Council on the 1st day of August last, stating briefly the progress and situation of the works for supplying this city with pure and wholesome water, up to and including that date; and they now beg leave to lay before your honorable body the material facts in the progress of the work from that date to the first day of January, 1837.

It was stated in the communication referred to, that Commissioners of appraisement had been appointed by the Vice-Chancellor to take certain lands for the Croton Aqueduct, belonging to John Grffin, James Palmer, Zophar Palmer, and Joshua Purdy. One of the persons appointed, however, was absent from this State at the time, and the vacancy was not filled by the Vice-Chancellor until the 26th of July, 1836.

The names of the gentlemen then, and now, acting as Commissioners of Appraisement, are as follows, viz: William Jay, of Bedford, Abraham Miller, of Northcastle, and William Nelson, of Peekskill, all in the county of Westchester. They were notified to meet on the second of August, 1836, at the village of Sing Sing, for the purpose of appraising the amount of compensation to be paid the persons above named, as owners of the property, required by the Water Commissioners.

The appraisers accordingly met at the house of S. M. Tompkins, in the village of Sing Sing, at 12 o'clock, M. on the 2d day of August, aforesaid, and completed their estimate and appraisal on the 3d of August, which was handed to Daniel B. Tallmadge, Esq., the Solicitor of the Water Commissioners, to be reported forthwith to the Chancellor for confirmation.

This appraisal was duly confirmed by the Chancellor on the 8th of August and was as follows:

For Land of

James Palmer,	$5\frac{858}{1000}$ of acres,			$700 00
Zophar Palmer,	$\frac{768}{1000}$	"		45 00
Joshua Purdy,	$4\frac{951}{1000}$	"		500 00
John Griffin's West lot,	$11\frac{770}{1000}$	"	$425	
John Griffin's East lot,	$14\frac{184}{1000}$	"	1425	1850 00
Total of acres,	$37\frac{531}{1000}$	"	Total,	$3095 00

The reasons why so small a portion of the land required for the Aqueduct, was placed under Commissioners of Appraisement in the first instance, was, because the map of these lots were among the first furnished us by the Engineers, and the owners of the land were the first who positively refused to sell or negociate with us for its purchase.

It may be proper to state in this place, the difficulties the Commissioners have to encounter in obtaining the land required for the works. In a former paper we alluded to the opposition attempted by a portion of the inhabitants of Westchester; their unreasonable demands, as indicated by resolutions passed at public meetings, and their remonstrances to the Legislature. The prejudices produced in the minds of many by these proceedings, tends very much to embarass the operations of the Commissioners in their endeavors to obtain possession of the necessary land on fair and equitable terms, and without possession, either by purchase or through the appraisers, we are not authorised to use or disturb its soil in the prosecution of the work.

We are bound by the statute, first, to agree with the owner of any property which may be required for the purpose, as to the amount of compensation to be paid such owner; and it is only in the event of disagreement between the Commissioners and the owner, except in the case of infants, married women, insane persons and absentees, that we are authorised to apply to the Chancellor for the appointment of Commissioners to examine the property and estimate the value thereof. The Chancellor before appointing Commissioners, requires an affidavit from the Water Commissioners, that an attempt has been made to agree with the owner of the property, and that they were unable to agree. There are on the line of Aqueduct and Croton reservoir about 200 owners. First, it is necessary to ascertain the name and residence of these respective owners, and that done, each resident must be seen in person. Some of them are not at home when called on; others are a mile or two away from their residence; and many who are seen, want time to make up their minds as to the amount of compensation they ought to receive; and another, and in some instances, two or three calls must be made before the matter can be closed. This, to be effected on a line of thirty odd miles, is not very easily accomplished.

Having failed to purchase by agreement, and application having been made to the Chancellor for Commissioners of Appraisement, the application will not be granted which every owner is notified, in due form, of the fact, in order that he may appear in person, or by Counsel, and oppose the application if he deems proper. The Chancellor having appointed the Commissioners, each owner of land to be taken, must again be served with a notice of the time and place of meeting, in order that they may appear and produce evidence of the value of their property, and the damage they will sustain by its occupation for the Water Works. This having been got through with, and the report of the Commissioners duly laid before the Chancellor, some distant day is appointed for hearing objections why the report should not be confirmed. After confirmation, searches are to be made, in order to ascertain the validity of title to each piece of land, be it more or less; and the objections or others, not coming forward before the expiration of sixty days to claim the amount awarded them, it becomes necessary that a tender of money should be made them personally, and on refusal to receive it, to pay it into Court. There is an additional embarassment which has grown up since the line of the Aqueduct was marked out. Whether it has emanated from the mania for speculating in lots, or from a disposition to enhance the value of the land, the Commissioners have no positive means of deciding; but, the fact is, that since the period alluded to, we find the line of the Aqueduct crossing village lots in several places, where we formerly only met with fields appropriated to the plough or for pasture. Instead of one owner, therefore, as we have originally supposed, we find several;—the map of the line of Aqueduct must be made to conform to this new arrangement, and when the subject is brought before the Appraisers, there is no lack of evidence to prove, that as much has been offered for one of these new village lots, and that it is worth as much, or more, than would have been given for several acres of the ground a short time previous. These embarassments, thus thrown in the way of our proceedings, may account, in a measure at least, for the delays which have occurred in the progress of this portion of the work.

None of the persons included in the first appraisement, called for the amount awarded them by the Commissioners before the expiration of the sixty days from confirmation, and we accordingly dispatched P. S. Cooke, Esq., with the amount in specie, to make the tender; two of them refused the tender, and the amount of their awards was paid into the Court of Chancery.

At the meeting of the Board of Water Commissioners on the 13th of August 1836, a resolution was passed, directing D. B. Tallmadge, Esq, as solicitor of the Commissioners to apply to the Vice Chancellor for the appointment of Commissioners of Appraisement on such portions of the land, not already purchased, as is designated on the map of the Aqueduct from number 5 to 38, inclusive. This range extends from the land of Henry Lounsberry, designated on Map number 4, which has been purchased by the Commissioners, to the State farm at Sing Sing.

An act was passed by the Legislature on the 11th of May, 1836, authorising the Water Commissioners, with the consent of the Governor, to construct the Aqueduct through the State farm appurtenent to the State prison at Sing Sing, and the consent of the Governor was officially obtained, for the purpose, on the 23d of September, 1836.

It was the middle of October before the Chancellor decided on the appointment of Appraisers, in the case referred to the Solitor by the Commissioners on the 13th of August last. He then appointed the same gentlemen who have served on the first case submitted, viz: Messrs. Jay, Nelson, and Miller. They were regularly notified to meet at Sing Sing on the 28th of October, and a Committee from the Commissioners repaired to that place for the purpose of furnishing such information on the subject before the Appraisers, as might be deemed necessary and proper. Two of the gentlemen appointed appraisers attended at the place and time designated by their notice; the third did not attend, his notice having taken a wrong direction. They adjourned to meet on the 3d of November, and measures were adopted to inform the absentee of the fact.

The Appraisers met accordingly on the 3d of November, the whole Board being present. They spent three days in hearing evidence brought forward by the owners of the land to be taken, and on the evening of the last day, completed their report. There were twenty-eight owners of the land comprised in the report of the Appraisers; the quantity taken was 57 acres 465 thousandths and the aggregate award amounted to $27,140 12 cents. This report was handed to our Solicitor on the 7th of November, 1836, to be presented to the Chancellor for confirmation. On the 28th of November, the question of confirming the report came up before the Chancellor for consideration, and Counsel was heard in opposition, and in favor of eight of the awards, when further proceedings was adjourned to the 7th of December for a rehearsing. At the day appointed, the subject again came up, and judgment was given by the Chancellor, confirming the whole report, except six cases, which were referred back to the same Appraisers for re-examination.

The following persons have since received the amount awarded them, viz:

John Sing, for 286 thousandths of an acre,	$3,500 00
Willet Holmes, 51 thousandths of an acre,	450 00
Russell Barnam, for one thousandth of an acre,	350 00
John Hogg, for one acre 392 thousandths,	300 00
John Hoag, for one acre 392 thousandths,	300 00
Michael Lent, for 16 thousandths of an acre,	250 00
Robert Acker, for 57 thousandths of an acre,	125 00
Estate of Henry Waller, for 294 thousandth,	2500 00
Ldward Auser, 2 acres, and 213 thousandths,	2200 00
Total,	$9675 00

Nearly the whole of this land forms parts of village lots.

At a meeting of the Water Commissioners on the 18th of October last, it was resolved, to apply to the Chancellor for the appointment of Appraisers on all the land required for the Aqueduct, between the Croton and Harlæm river, which had not already been purchased or taken by appraisement. As yet, however, the Appraisers have not been appointed, neither have they met on the cases referred back to them for re-consideration.

In addition to these perplexing delays, (whether chargeable to the form of proceedings by the Court, or the neglect of applicants, the Commissioners are not competent judges,) they have had to contend with what they have considered much lack of energy in the operations of their Engineer department. We took occasion to state in our communication of the 1st of August, already alluded to, that on the 23d of July, 1836, certain information was requested of the Chief Engineer, which he had promised to furnish as soon as practicable; and that, on the production of which, we were still in hopes of being enable to place some part of the work under contract before the close of that year. These hopes, however, have not been realized, and the Commissioners having felt much dissatisfaction for this disappointment, and for other cause, they finally determined to make a change in the office of Chief Engineer, and he was accordingly notified of the fact. After proper inquiry on the subject, they fixed upon John B. Jarvis, Esq., as Civil Engineer, who had been engaged on most of the great works constructed by this State, and who was extensively known as an energetic and practical conductor of the public works. The negotiations with Mr. Jarvis have resulted favorably, he was appointed Chief Engineer of the works for supplying this city with water, on the 11th of October, 1836, at an annual salary of five thousand dollars; and an official letter was transmitted to him by the Chairman, announcing the fact of his appointment. He arrived here on the 19th, and on the 20th two of the Commissions accompanied him to Sing Sing and Yonkers, where parties of the Engineer corps were engaged, and placed him in the direction of the Engineer department of the works. Mr. Jarvis has since inspected the whole line of the Aqueduct, from the Croton to the Harlæm river. His opinion of the route, so far as he was able to judge from viewing it, without instrumental examination, appears favorable, and the location of the dam at Garritson's Mills, he thinks the best, under the circumstances of the case, that could be obtained.

It was found that most of the stakes on the line had been removed; whether intentionally by persons inimical to the work, or by accident while ploughing the field, or reaping the crop, the Commissioners have not been able to ascertain. A party was accordingly formed for re-setting the stakes in a more permanent manner than heretofore.

The Commissioners feeling a strong desire to have some part of the work under contract at the opening of the next working season, requested the Chief Engineer to have shafts sunk at the site for the dam, and on the line of the Aqueduct from that place to Sing Sing, about 8 miles in length, in order to exhibit the soil and nature of the ground to be excavated, both for the information of the contractors as well as ourselves. These operations were nearly completed, when the cold became so intense as to prevent further progress until a change of weather.

Examinations have also been made of the ledges of rock on the line of Aqueduct, and near the site of the dam, to ascertain whether suitable stone, by quarrying, can be obtained in convenient situations for the works. The result has been as favorable as could be expected under the circumstances in which the examination was made, it having been prosecuted without assistants to open the ledges of rock examined, and during the inclement month of December last. There can scarcely be a doubt, however, that abundance of stone, which will compose a majority of the materials wanted for the work will be found on the line. Specimens of the stone discovered are deposited in the office of the Water Commissioners.

When Mr. Jarvis entered on the duty of conducting the engineering of the works, there were nineteen persons attached to the corps. He immediately set about diminishing their number, and there are now only five retained for service during the winter. Two of these are at the office at Sing Sing, engaged in preparing a map and profile of the several roads that intersect, or pass in the vcinity of the line of Aqueduct, in order that it may be seen at what place it will be necessary to obtain the privilege to pass over private property, in transporting to the work, the materials for constructing it; and three of the party are employed in the office of the Water Commissioners in this city, preparing the map and drawings, necessary to form the basis of the specifications of the aqueduct, culverts, bridges, &c.

In accordance with the 25th section of the act of the 2d of May, 1834, the Commissioners have regularly reported to the Comptroller, every six months, a detailed account of their receipts and disbursements, since their first operations under the ordinance of the Common Council, passed the 7th May, 1835, which directed them to proceed with the work.

The amounts disbursed for all matters connected with the works of supplying this city with water, are as follows:

From July 1835, to January 1836,	31,828 02
From January 1836, to July 1836,	12,070 84
From July 1836, to January 1837,	28,099 59
Total,	$71,998 45

For particulars, see our accounts rendered the Comptroller.

The following statement will show the whole quantity of land required for the Croton reservoir and the aqueduct, the quantity paid for, the quantity under agreement, and appraised but not paid for, and the quantity still to be acquired, either by purchase or through the intervention of appraisers.

	Acres	Thous's.
The whole quantity of land required for the Croton Reservoir and Aquepuct, from the Croton to Harlaem river,	813	$\frac{147}{1000}$
The quantity of land purchased and paid for around the Croton Reservoir,	241	$\frac{443}{1000}$
The quantity taken by appraisement and paid for,	23	$\frac{300}{1000}$
The quantity purchased and paid for on the line of the Aqueduct, is	17	$\frac{915}{1000}$
The quantity taken by appraisement and paid for on the line of the Aqueduct, is	15	$\frac{901}{1000}$
The total quantity paid for, is	298	$\frac{559}{100}$
The quantity under agreement but not paid for, is	4	$\frac{815}{1000}$
The quantity appraised but not paid for, is	53	$\frac{147}{1000}$
The quantity of the State farm, the use of which was authorised by the Governor,	2	$\frac{417}{1000}$
The quantity still to be obtained either by purchase or Appraisement is	454	$\frac{209}{1000}$
It thus appears, the quantity of land paid for, the title of which is vested in the Corporation of this city, is	298	$\frac{559}{1000}$
The quantity under contract but not paid for, is	57	$\frac{262}{1000}$
The quantity still to be acquired to Harlaem R., is	454	$\frac{209}{1000}$
And the quantity of the State farm, is	2	$\frac{417}{1000}$
Making the total as above	813	$\frac{147}{1000}$

The solicitude manifested by the members of your Honorable body, and by our fellow citizens generally, for the progress of this great work, cannot be greater than that experienced by the Commissioners. It is this which has led to the change in the Engineer department, and they have reason to think, the result will be favorable to a more energetic prosecution of the business, and that it now may be calculated with some degree of certainty, that at least a portion of the work will be placed under contract in the spring of the present year.

Before closing this communication, the Commissioners beg leave respectfully to remind your Honorable body, that there are two subjects, presented by them for consideration which are yet undecided on, if the Commissioners are correctly informed, both of which require Legislative aid, and are considered important. One, on the subject of certain highways and turnpike roads, that will be covered with water by the damming of the Croton river; and the other, respecting the sites for the necessary reservoirs on the Island of New-York. Until the first is disposed of, we are prevented from building the Croton dam, as the roads alluded to, must be constructed before the reservoir is formed; and all operations on the Island of New-York must be suspended, until the Legislature shall authorise an alteration of the city map, in order that the reservoirs may be permanently located.

There is another subject, which the Commissioners refer to with great reluctance. It has appeared by the proceedings of one of your Honorable boards, as published in the newspapers some time since, that censure has been cast upon the Commissioners for some unknown cause, and that in debate, it had been stated, they were under no accountability, either to the public or to the Common Council, and that a resolution had been proposed to apply to the Legislature for an act compelling them to make quarterly reports to the Common Council. There seems to be some mistake in this matter however, as the fact is, the Commissioners consider themselves accountable both to the public as well as to the Common Council. To the public they are accountable for an honest and upright discharge of their duty, and to the Commn Council they are accountable for a vigilant superintendance over those employed under them, and for the strictest economy in the expenditure of the funds placed in their hands In order that your Honorable body might see that these funds were properly disbursed, the Commissioners have uniforly, as has before been observed, reported to the Comptroller a detailed account of their receipts and expenditures. at the end of every six months, since the commencement of their operations. These reports are made in conformity with the 25th section of the act of the 2d of May, 1834, to enable the Comptroller and finance Committee of the Board of Aldermen, to examine whether any improper expenditure had been incurred. The Commissioners have, in addition, always left their books open to the inspection of any member of the Common Council who might choose to examine them, and they have uniformly expressed to the

Comptroller, a readiness to appear before the finance, or any other Committee of your Honorable body, and produce their vouchers for the expenditures incurred. Neither ar they sensible of having at any time refused information to the Common Council, or any of its members or Committees, or neglected to report on any subject referred to them; and why your Honorable body should be led to doubt, that an ordinance or resolution directing the Commissioners to report quarterly to the Common Council, instead of half-yearly to the Comptroller, would not be complied with, and therfore, that it was necessary to ask an act of the Legislature for that purpose, is beyond their comprehension. The Commissioners will dismiss this subject however, with the hope, that nothing may occur, in the transactions of this important concern, to mar the good understanding which ought, and which they still believe does exist, between them and your Honorable body.

All which is respectfully submitted.

STEPHEN ALLEN,
CHARLES DUSENBURY,
WILLIAM W. FOX,
SAUL ALLEY,
BENJAMIN M. BROWN,
} *Water Commissioners.*

Office of the Water Commissioner's, New-York, January 9th, 1837.

THE RIVER THAMES.—The removal of the old London Bridge has caused a considerable change in the river above, and also, though in a less degree, below the bridge. Owing to the contracted arches through which the water had to make its way at the old bridge, there was a fall of from 4 feet 9 inches to 5 feet at low water; this fall is now reduced to about 2 inches; so that the low water line above the bridge is nearly 5 feet lower at spring tides than formerly. In consequence, a greater increased body of tidal water now flows up and down the river. The effect of this is to scour and deepen the channel of the river; its influence in this respect being sensibly felt as far up as Putnam Bridge, 7½ miles above London Bridge. The shores above the latter, that were formerly foul and muddy, are now becoming clean shingle and gravel, and near low water the beach is quite hard and firm. The shoals are also decreasing below the bridge; and there can be little doubt that the change will, at no distant period, be felt from the Nore up to Teddington. The descent down the river has been equally facilitated; the mean velocities of the flood and ebb between London and Westwinster-bridge are, flood three miles an hour, extreme three-and-a-half; ebb three ⅙; extreme three ½.—[Herald.]

From the Gettysburgh Star and Banner.

THE FRANKLIN RAILROAD.

☞ We have seen the report of THOMAS CHAMBERS, President of the Franklin Railroad Company. It is an extraordinary document, written in a spirit, not only of low rivalry, but altogether destitute of truth. It ill becomes *gentlemen*, striving for the improvement of the State, to travel out of their way to assail *any* work which they may suppose likely to be their competitor. We certainly feel no hostility to the Franklin and Cumberland Valley Railroads.—Let them be made, and if *that* is the *shortest* and best *route*, (by shortest we mean soonest travelled,) *it* will take the business, and has nothing to fear from our route. If ours is the best, let it be made, and have the advantages which Nature gave it.

But to return to Mr. Chambers' illiberal Report. He makes the difference in distance from Philadelphia to the junction of the two roads, with the Baltimore and Ohio Railroad at or near Hagerstown but 5 miles, when, in truth, it is 29 miles, and so he must have known. Lancaster is the point from which both routes diverge, and unite again at Hagerstown, or its immediate vicinity; for all our purposes, Hagerstown may be taken as the common termination. Take the present road on both routes:—

From Lancaster to York, it is	22 miles.
From York to Gettysburgh,	28 "
From Gettysburgh to Hagerstown,	32 "
	82 miles.

By the Cumberland Valley Route—

From Lancaster to Harrisburgh,	40 miles.
From Harrisburgh to Chambersburgh,	51 "
From Chambersburgh to Hagerstown,	20 "
	111 miles.
	82 "
Difference in favor of the York route,	29 miles.

Admitting this route to curve more than the Chambersburgh route, say at most, 4 miles, still this will be 25 miles shorter than the Franklin Railroad. Chambers has hunted up and quoted an old silly and false report made by a boy employed by the State authorities some ten years since, to make a false report about the Southern Route to punish our anti-improvement spirit!

We regret the insiduous report of Mr. Chambers, who might have sustained the interests of his own route without slandering and misrepresenting ours. It is the index of a narrow mind.

Items.

From the 1st of May to the 31st of December, 1836, 730,000 passengers were conveyed on the railroad from Antwerp to Brussels; the receipts amounted to 734,-236f.

Pig iron has been reduced by the iron works in the neighborhood of Bradford, £1 a ton. A similar reduction has taken place in Wales.—[Times.]

The *German Courrier* gives the following of the 12th inst., from Vienna:—"Some new iron mines of considerable extent have been discovered at Eisenertz, in Styria, which place has long been celebrated for its rich mines of that metal; upwards of three hundred thousand quintals are annually drawn from the mines of Erzberg, and it is thought that those just discovered will be equally productive. It has been declared by persons acquainted with the article that the Styrian steel is harder and more flexible than that of England, with which it can also compete in cheapness of manufacture.—English steel costs here from 120 to 160 florins the quintal; whereas the price of the quintal of Styrian steel will not exceed 60 florins. Austria may therefore dispense with English steel, while that of Styria will become an important branch of commerce, not only in Europe, but in other parts of the world. The Prince Lobkowitz encourages with all his efforts this new undertaking, which yields abundant profit."

M. Degousse has succeeded in piercing a fourth Artesian Well, at Meaux. The depths of the bores of these wells are from 164 to 295 feet English, and the water rises to from 3¼ feet to 16 feet 4 inches English. The quantity obtained at the Fulling Mills is 66 English gallons a minute, and that at the Seminary 37 gallons. The water is very soft, and has been proved by an analysis to be fit for every purpose.

At Saint Denis de Thibcult, near Rouen, a discovery has lately been made of a large spherical Roman vase, of Terra Cotta, 5½ feet in circumference, inclosing a square vitrified vase, about a foot high, filled with burnt bones and ashes. These relicts are in perfect preservation, and M. Quesnel, on whose estate they were found, about four feet below the surface, has deposited them in the museum of antiquities at Rouen.

M. Aime Grimaud has within these three days made an experiment on the Seine of a new invention, by means of which vessels may be impelled across the seas in every direction without the use of fuel. Additional force will be given to windmills, and artificial falls of water may be formed so that such provinces as are now deficient in this necessary of life may be supplied. The new machine is composed of several wings forming together a wheel which is supported by a vertical mast that gives a motion to a transversal beam, at each extremity of which is a paddle wheel. This machine is so constructed that it acts in every direction of the wind, and has all the force of a steam-engine. M. Grimaud has succeeded in making his way up the river against the current, which was strengthened by the late floods, and in traversing in it all directions, even in the teeth of the wind.

We have it from undoubted authority that a propelling power has been discovered for vehicles on common roads, which can be applied to mail-coaches, etc., at the cost of 6d. per mile for a four horse power.—The inventor has obtained a patent in England, and is obtaining a similar instrument in the principal countries of Europe, and in the United States.—[Cumberland Packet.]

A mechanician of Cherbourg has just invented a press for the extraction of oil, which possesses very decided advantages over every other press hitherto in use, as a greater power can be given to it, and it will extract twice the quantity of oil in the same time as the other presses hitherto in use.—The force of a single man applied to this machine will produce a pressure equal to 400,000 pounds weight. The new press also occupies but little room, as it will stand in the space of four square feet.

The National Intelligencer gives the following biographical sketch of the late John Loudon McAdam:

Mr. McAdam was of the proscribed clan of the McGregors, being, in his own person, the head of one of the branches of that family, of which the territorial appellation was Waterhead. His father took the name of McAdam, when that of McGregor was forbidden. In early youth, Mr. McAdam came to this country, as the adopted son and heir of an uncle of the same name, whose widow died within the last ten years in New-York. After residing here seventeen years, during which period he married, Mr. McAdam returned to England and established himself near Bristol. At this place he commenced, about the year 1810, those experiments which have since converted the roads of England into the best in the world. By this improvement he has made himself one of the great benefactors of that nation, and indeed, of our own, though his system has been but lamely imitated here. He was conscious of the extent of his services, which have never received the reward they deserved. He was twice offered knighthood, and once a baronetcy by the British government, both of which titles he declined, preferring his confiscated but hereditary claims to "Waterhead," with true Scottish fidelity, to the possession of those more common distinctions. His second son has, however, recently accepted the former rank, and is the present Sir James McAdam. As this gentleman occupies the situation of superintendent of the metropolitan roads, he is commonly mistaken for his father.

Mr. McAdam was twice married, and both times to ladies of well known New-York families. His first wife was Gloriana, the daughter of William Nicoll, Esq., of Islip, the collateral descendant and heir of Col. Nicoll, the first English governor of the colony, and the proprietor of one of its largest manors; and his second wife was Anne Charlotte De Lancey, the eldest daughter of John Peter De Lancey, Esq., of Mamaroneck, Westchester, whose father died at the head of the government of the same colony in 1760. By his first wife, he left several children.

THE

BUILDER'S MANUAL.

(Continued from page 158.)

THE METHODS OF LAYING BRICKS.

The strength of walls and piers of brickwork depends as much on the manner in which the courses are placed, as on the quality of the materials employed in construction; for, however good the bricks may be, if they are not so placed as to strengthen one another, and mutually confine each other to their several situations, the work cannot have the requisite stability. If the perpendicular joints in the several courses are too nearly over each other, the work is liable to crack in a vertical direction, and if the bricks, forming the outer and inward face of the wall do not bind together, the work will bulge, and the wall must at last fall to pieces by its own weight. It is therefore important for us to determine the best method of laying bricks, and we shall endeavor to describe the means adopted by builders to prevent the separation of the work, and give a solid bearing to every part.

Those bricks which are so placed that their length is in the direction of the wall, are called stretchers; and those which are placed with their length across the wall, are called headers.

The two principal methods of bricklaying are severally called English and Flemish bond. English bond is generally preferred by builders as being decidedly the strongest, though it has not so neat and regular an appearance as Flemish. English bond consists of alternate courses of headers and stretchers; thus, one course is formed with headers, that is, with bricks crossing the wall; the next with stretchers, that is, with bricks having their length in the same direction as that of the wall: the headers serve to bind the wall together in a longitudinal direction, and the stretchers prevent the wall from separating crossways.

Flemish bond consists in placing a header and a stretcher alternately throughout every course. This method of bricklaying is very much adopted, on account of the regular appearance it gives to the face of the work, but in order to have this result, a header must always be placed over the middle of the stretcher below it. The Flemish bond, though inferior in many respects to the English, is very generally used, and an inferior brick is placed in the interior of the wall, and those which form the face, are picked or chosen, that the work may have a uniform color. The greatest fault in this method of bricklaying is, that by making a putty joint on the face, the interior bricks do not range level with the exterior ones, and this prevents the builder from connecting his work by headers extending through the whole thickness of the wall.

THE CARPENTER.

A Carpenter is a workman who executes that combination of timbers which may be considered, in connexion with the bricklayer's work, as the frame or skeleton of a building. There is, however, this difference between the objects of the one and of the other; the bricklayer has only to consider the downward pressure or force of gravity, and the forces which may be exerted, tending to destroy the perpendicular; the carpenter must also study the relative disposition of parts, so as to alleviate as much as possible the strains which may be exerted upon the building.

Carpenter's work is distinguished from that of the joiner's; for while the one has regard to the substantial parts of an edifice, those which give solidity and strength, such as the construction of roofs, floors, and partitions, the other consists in providing for the ornamental and convenient. A carpenter should be well acquainted with the strength and character of the materials he uses, and especially as he employs them in great masses. He should also be careful not to overload a building, or to employ larger timbers than are absolutely necessary; for, if there were no danger in so doing, economy would dictate the necessity of this care. It is then important that the carpenter should be able to ascertain the dimensions required for the several parts of a building, so as to produce a maximum of strength, without overloading the walls or his own work. and at the same time, to avoid the danger which must result from a scantiness of material. There are then two things to be considered, the strength of the materials, and the stress to which they are subject in certain situations. A timber, or framing, may be strained in various ways, but of these we shall speak presently; our first object is to describe the materials themselves, referring particularly to those woods which are most commonly used.

Oak.

There are many species of oak, but that known among botanists, as the "Quercus robur," is most esteemed. It may, however, be necessary to remark in relation to this, as well as all other kinds of timber trees, that the character of the wood must greatly depend upon the soil in which it grew, and the degree of attention it received from the cultivator. The oak of Sussex is most esteemed by builders, but, whether the preference is dictated by experience or prejudice, we are unable to state: but we are not acquainted with any series of experiments that warrants the choice, and it is not fit that practice should be regulated by unproved statements.

A Norway oak, called clapboad, is frequently brought to London; and also one that is grown in Germany, called Dutch wainscot, being imported from Holland, to which country it is brought in floats down the Rhine. Both these woods have been extensively used in this country, and it is probable that the wainscot will be still employed for many purposes, for, though it is softer and the grain more open than the English oak, it is also less liable to warp.

Oak is the most durable of all woods, and surpasses them in strength and stability. Vitruvius says, that it has an eternal duration, and when we see the beautiful specimens which have remained untouched by time, in our oldest buildings, though all other materials are crumbling around them, we feel an inclination to assent to his opinion. It is, however, only the close grained varieties that deserve this character; and it is no small addition to the professional skill of the architects of past ages, that by the choice of the best materials, they gave a perpetuity to their works, which few, if any, of the present day can rationally expect.

Oak may be used in all those places where strength is required, and its flexibility does not present an objection. For sleepers, wall-plates, ties, king-posts, and other such purposes, it should be used more frequently than it is. But its chief application is for ship-timber, and some thousand loads are annually used in our Dock-yards. This remark suggests the propriety of using it in all those places which are much exposed to the variation of weather.

Fir.

There are many species of fir, all of which are more or less used in building; but there are three sorts in particular that require our attention, being more used than any others: these are the Pinus Sylvestris, or yellow fir; the Pinus Abies, or spruce fir; and the Pinus Resinosus, or pitch pine.

The red or yellow fir is a native of Scotland, and the Northern counties of Europe. This tree is more abundant than all others in the boundless forests of Norway and Sweden. It grows to an immense height, very straight, and with few branches. The fir timber of Norway is brought into this country under the name of masts and spars; those which are eighteen inches or more in diameter are called masts, and are frequently eighty feet in length; others are called spars. In several parts of Scotland the yellow fir is grown, and attains a great height.

The yellow fir or deal is much used in building, and is a very durable wood; according to some authors, as much so as oak. But whether this be the case or not, it has many qualities which render it exceedingly useful to both the carpenter and joiner. It is light and easily worked, yet stiff, and capable of bearing great weights. It is commonly employed for framing, girders, joists, and rafters; for joiner's work also it is almost universally used.

White fir is also a native of the north of Europe; and is especially abundant in Norway and Denmark, and is sometimes called the Norway spruce. The larger quantity of that which is brought into this country, is imported from Christiana in deals and planks. Deals are formed by cutting the fir tree into thicknesses of generally about three inches, the width being about nine. As fir is exceedingly liable to shrink, it is very necessary that it should be well seasoned, and this is especially the case with white fir, which should never be used in those places which are exposed to atmospheric changes. We are informed by travellers, that the tree is first cut into three lengths of about twelve feet long, each of which are divided into three deals.

The pitch pine, which is a native of Canada, is sometimes employed by the carpenter, but not so frequently as those kinds we have already mentioned. This wood is much heavier than either of those we have already described, but it is less durable. Its name has been derived from the circumstance of its containing a large quantity of resin, which makes it very unfit for building purposes, and very difficult to work.

Larch.

There are three species of Larch; one is a native of Germany and the neighboring countries, the other two are Americans. The European species (Pinus larix,) sometimes grows to a great height, and contains a large quantity of timber; one which was cut at Blair Athall in 1817, is said to have contained 252 cubic feet of timber; this, however, was a tree of remarkable size.

Mr. Tredgold, in his most interesting and useful work on Carpentry, has made some appropriate remarks upon the character of this wood. "It is extremely durable in all situations, failing only where any other kind would fail: for this valuable property it has been celebrated from the time of Vitruvius, who regrets that it could not be easily transported to Rome, where such a wood would have been so valuable. It appears, however, that this was sometimes done, for we are told that Tiberius caused the Naumachiarian bridge, constructed by Augustus, and afterwards burnt, to be rebuilt of larch planks, procured from Rhœtia. Among these was a trunk 120 feet in length, which excited the admiration of all Rome. The celebrated Scamozzi also extols the larch for every purpose of building, and it has not been found less valuable when grown in proper soils and situations in Britain. In posts and other situations, where it is exposed to damp and the weather, it is found to be very durable. In countries where larch abounds, it is often used to cover buildings, which, when first done, are the natural color of the wood, but in two or three years they become covered with resin, and as black as charcoal; the resin forms a kind of impenetrable varnish, which effectually resists the weather. Larch is not attacked by common worms, and does not inflame readily.

The larch is useful for every purpose of building, whether external or internal; it makes excellent ship-timber, masts, boats, posts, rails, and furniture. It is peculiarly adapted for flooring-boards in situations where there is much wear, and for staircases; in the latter, its fine color, when rubbed with oil, is much preferable to that of the black oaken staircases to be seen in some old mansions. That we may not give an erroneous estimate of the value of the larch as applicable to building purposes, it is necessary to state that it is worked with more difficulty than fir, and is even more liable to warp, unless it be perfectly seasoned.

Beech.

The beech (Fagus sylvatica,) is not much used in building, on account of the very rapid decay it undergoes whenever it is affected by dampness. It grows in our own, as well as in most European countries; but it prefers a dry soil, and, in England, flourishes most in chalk districts.—There are two kinds of beech-wood; one is called the brown or black beech, the other the white; it is, however, generally supposed that the difference is due to the character of the soil, and not to any specific distinction. Beech is a hard, fine-grained wood, and has been much used for the commoner kinds of household furniture.—It may appear singular that it should be well adapted for piles, provided it is constantly immersed in water; but damp destroys it very readily. Nor is this the only objection to its being used in building; for even the best, which is the white, is soon injured by worms, whether in a dry or damp situation.

Ash.

There are several species of ash, but the one which is most common in Europe, called by botanists the Fraxinus excelsior, is the most valuable. The tree sometimes grows to an immense size; but its mean diameter is said not to exceed twenty-three inches. The texture of the wood is alternately compact and porous, and presents a veined appearance, the veins being darker than those of the oak. On account of its great flexibility, and want of durability, it is not ever applied for framing or for timbers. From the experiments which have been made, it appears that it is tougher and stronger than oak, and, were it not for its great flexibility, might be, in many instances, advantageously employed by the carpenter. It is not, however, without a use in the arts, being exceedingly well adapted for many parts of machines and carriages.

Elm.

Five species of elm are found in this country; but the wych elm (Ulmus campestris,) and the smooth-barked elm (Ulmus glabra,) are most valuable. Elm decays rapidly when exposed to variations of weather; but is durable when kept constantly dry, or constantly under water. The piles upon which Old London Bridge was erected, were elm, and their soundness, after an exposure to water for some centuries, proves the truth of one of these statements. It is a porous and generally coarse cross-grained wood; and, on this account, should never be used in any piece of framing where a strain is to be supported. But, in addition to this, it is liable to shrink both in breadth and length, though it is not readily split. It is by no means an important wood to the builder; but a large quantity is used in this country. For many hydraulic works it is very useful; some parts of ships are constructed of it; and it is generally employed for coffins, piles, and wet planks. The wood of the wych elm is preferred to all others.

Chesnut.

The chesnut (Fagus castanea,) is one of the most long-lived of all European trees. It is a native of many parts of Europe, and was at one time very common in England, yielding the principal timber at the time. The roof of King's College, Cambridge, is made of chesnut, which is one instance of its durability in a dry state. It is also well adapted for water-pipes, casks, and other vessels intended to hold fluids. When thoroughly seasoned it will neither shrink nor swell, and may be applied for all those purposes for which oak is used, and in some instances is more useful. The wood is hard, and, when young, tough and flexible. It is not always easy to distinguish between oak and chesnut, for they much resemble each other in color and in grain; but they may be known, says Sir Humphrey Davy, "by this circumstance, that the pores in the albumum of the oak are much larger and more thickly set, and are easily distinguished; while the pores in the chesnut require glasses, to be seen distinctly." The wood of old trees is generally brittle, and should never be used in those situations where it will be subject to a considerable strain. It has also been stated, that when chesnut is shut out from the access of air, it quickly decays. It is much to be regretted that the culture of this tree, at once ornamental and useful, should be so much neglected in England. In some instances it has been known to live from eight hundred to a thousand years; and its full and beautiful foliage might induce the land proprietor to propagate it, even if he should be uninfluenced by its usefulness in the art of building.

Walnut.

The common walnut (Inglans regia,) is a native of Persia; but was once cultivated in this country as much for its wood as its fruit. It is a greyish-brown wood, with a fine grain; but, if it were not scarce, and could be obtained by the builder for the same money as the woods now employed by him, it would be very unfit, on account of its flexibility and aptness to split, for all those situations where a weight is to be sustained; though it was sometimes used for this purpose in former times. It is now chiefly used for gun-stocks, handles to steel instruments, and for furniture. It is less liable to be attacked by worms than perhaps any other wood, excepting cedar.—For some building purposes, particularly for some joiner's work, it might be advantageously employed, could the supply be sufficient.

Mahogany.

This wood is the produce of a tree called the Swietenia mahogoni. It is much used by cabinet-makers, and frequently by joiners for doors, hand-rails, tops of counters, and other ornamental work. The tree is a native of the West India Isles, and of the Bay of Honduras in America. On account of its costliness, it cannot be extensively used in this country by the carpenter, though its qualities are such as would make it otherwise desirable. The Spanish mahogany, or that which grows in the West Indies, is most esteemed, and is imported in lengths of about ten feet, and from twenty to twenty-six feet square.

Teak Wood.

Teak wood, or Indian oak, is obtained from the Coromandel coast. It is a light and durable wood, easily worked, and equal if not superior to oak in strength and stiffness. It is chiefly used for ship-building; a purpose for which it is well adapted, being of an oily nature, and yielding good tar.

Poplar.

Several kinds of Poplar grow in England, but none of them are frequently employed by builders. The wood has a beautifully clean grain; it is light, though not very strong; is easily worked; and may be sometimes used for flooring in those situations where there cannot be much wear.

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The woods we have described are the most important of those used by the carpenter and joiner. To distinguish the one from the other, the reader must accustom himself to examine specimens carefully; for it is impossible, by any description, to give him a capability of doing so. Our object has been to relate the characters and properties of the several kinds of timber, as deduced from the experiments which have been made by practical and scientific men. There is one thing, we think, that will particularly strike the reader's attention, and should be constantly borne in mind: the same wood is not equally useful in different circumstances; and when we discover that it possesses durability in one situation, it by no means follows that it will have the same property in another. A wood may be admirably suited for floors, but it may be altogether unsuited for timbers, and all situations where great weights are to be sustained.

DECAY OF WOOD.

Allusion has been frequently made in the preceding remarks to the fact, that wood is, under some circumstances, susceptible of decay. Some woods decay much more rapidly than others; but they will all, in some situations, lose their fibrous texture, and, with it, their properties. But all circumstances are not equally favorable to decay; for it will be evident that there must be some arrangement of causes to produce this effect To ascertain the causes which act upon woods, and effect their destruction, is an important object both to the builder and to the public; for, untill this has been done, we cannot ever expect to ascertain any general principle that may guide us in our endeavor to avoid those circumstances which have a tendency to encourage the destruction, or to propose a remedy for the evil. The ravages which are constantly made upon all our works of art, give a character of insecurity to our labors; for the things which men accomplish with great perseverance and difficulty, in a length of time, are, in a few years, destroyed by invisible agents. In studying the decay of wood, there are three things that demand our attention, the causes, the circumstances under which those causes are most active, and the means by which they may be destroyed, or their effects in some degree neutralized.

CAUSE OF THE DECAY OF TIMBER.

All vegetable as well as animal substances when deprived of life are subject to decay. From a very early period attempts have been made to prevent this decomposition; and in some degree these attempts have been successful, more especially with animal bodies. The Egyptians were acquainted with so perfect a means of embalming animal substances, that the bodies of men and animals prepared by its earliest inhabitants have combated for centuries the influence of time, and have been found in a perfect state by our contemporaries. This being effected, it is reasonable to hope that some means may yet be provided that shall arrest the destruction of vegetable substances. It is not to be expected that it will ever be possible to give a perpetuity to a particular form of substance, but it is possible to remove in part the cause, and thus to give a lengthened continuance to one particular constitution of elementary principles.

If the trunk or branch of a tree be cut horizontally it will be seen that it consists of a series of concentric layers, differing from each other in color and tenacity. In distinct genera or species of trees these layers present very different appearances, but in all cases the outer rings are more porous and softer than the interior. Wood is essentially made up of vessels and cells, and the only solid parts are those coats which form them. These vessels carry the sap which circulates through the tree, gives life and energy to existence, and is the cause of the formation of leaves, flowers and fruit. But when the tree is dead, and the sap is still in the wood, it becomes the cause of vegetable decomposition by the process of fermetation. Fourcroy, the celebrated chemist, says, there are five distinct species of vegetable fermentation, the saccharine, the coloring, the vinous, the ascetous, and the putrefactive. But we are but little acquainted with the process by which the decomposition is carried on, but the effect is certain unless the albumen, one of the constituent proximate principles of vegetable matter, be disposed of, or be made to form with some other substance a compound not subject to the same process of decay. We are, it appears, indebted to Mr. Kyan for the discovery that albumen is the cause of putrefactive fermentation, and the subsequent decomposition of vegetable matter.

Circumstances favorable to Vegetable Decomposition.

Wood is not equally liable to decay under all circumstances. When thoroughly dried it is not so quickly decomposed as when in its green state, for in the latter condition it has in itself all the elements of destruction, and it is scarcely possible to prevent the effect if it be then used in building. But supposing the timber to be perfectly seasoned, it is more liable to decay under some circumstances than others. Timber is most durable when used in very dry places. Time, however, which decays all things but the thinking principle, affects the hardest wood even when employed in the most advantageous circumstances.—Yet timber which has been used in places where it receives no other moisture than that which it absorbs from the atmosphere has been known to last for seven or eight hundred years, though its elastic and cohesive powers are invariably injured.

When timber is constantly exposed to the action of water the decomposition effected will depend upon the nature and chemical composition of the substance. Vegetable matter is a compound, and an ingredient may be removed without destroying the whole. A portion of wood may be soluble in water, but other parts are not; so that after a definite period the continued action of water upon a piece of timber ceases, and if it can sustain the influence of this cause until that period, there is no termination to its endurance, except from those casualties which it might have been able to bear in its original state, but cannot after the removal of that portion of its substance soluble in water. Should a piece of timber that has been for a long time exposed to water be brought into the air and dried, it will become brittle and useless: this is usually the case with the timber taken from peat bogs, unless it should happen to be impregnated with some mineral substance that has stayed the action of the water.

When wood is alternately exposed to the influence of dryness and moisture it decays rapidly. It appears, from experiments that have been made, that after all the matter usually soluble in water has been removed, that a fresh maceration and contact of the air produces a state of matter in that which is left which renders it capable of solution. A piece of timber may then in this manner be more and more decomposed, until at last the whole mass is destroyed. The builder is sometimes compelled to use wood in places where it will be exposed to alternate dryness and moisture; fencing, weather boarding, and other works, are thus exposed. In all these cases he may anticipate the destructive process and provide against it. The wood used in such situations should be thoroughly seasoned and then painted or tarred, but, if it be painted when not thoroughly seasoned, the destruction will be hastened, for the evaporation of the contained vegetable juices is prevented.

There is one other circumstance to be considered, the influence of moisture associated with heat. Within certain limits the decomposition resulting from moisture increases with the temperature. The access of the air is not absolutely necessary to the carrying on of this process, but water is; and as it goes on, carbonic acid gas and hydrogen gas are given off. The woody fibre itself is not free from this decomposition, for, as the carbonaceous matter is abstracted by fermentation, it becomes more susceptible of this change. This statement is proved by the circumstance, that when quick lime is added to the moisture, the decomposition is accelerated, for it abstracts carbon. But the carbonate of lime produces no such effect: a practical lesson may be learnt from this fact; if timbers be bedded in mortar, decomposition must follow, for it is a long time before it can absorb sufficient carbonic acid to neutralize the effect, and the dampness which is collected by contact with the wet mortar increases the effect. When the wood and the lime are both in a dry state, no injury results, and it is well known that lime protects wood from worms.

When the destructive process first becomes visible it is by the swelling of the timber and the formation of a mould or fungus upon its surface. The fungus or cryptogamic plant rapidly increases, and soon covers over the whole surface of a piece of timber, having a white, greyish-white, or brownish hue. When the seeds of destruction are thus once sown they cannot be readily eradicated; it need not therefore be a matter of surprise that many of the foreign woods used in this country have so little perpetuity when the reader is informed, that the heat of the hold of the vessel in which they are brought is sufficient of itself to cover them with mould or mildew. Heat and moisture may be considered the prominent causes of the rapid decomposition of vegetable subtances. When wood is completely and constantly covered with water this effect is not produced, and we have an example in the fact, that, although those parts of a vessel which are subject to an occasional moisture are liable to dry rot, yet those parts which are constantly beneath the water are not ever thus affected; and although the head of a pile, which may be now and then wetted by the casual rise of the tide, and is then dried again by the sun, may be decomposed, yet those parts which are always covered with water have been found in a solid state after centuries of emersion.

MEANS OF PREVENTING DECAY.

It cannot be thought a matter of small importance that we should have some means of preventing the decay to which wood appears to be so subject. Many experiments have been made under the hope of discovering a simple and effective process for the accomplishment of this purpose. Whenever there is a desirable object which seems to offer a prospect of fame or wealth to him who can secure it, there will always be many persons who, impelled by a sanguine disposition, or by bad motives, will propose schemes which are not founded on scientific principles, and frequently produce more harm than good. This we have frequently seen, and in a time like the present, when all men seem to be speculating for an existence, rather than seeking wealth and honorable independence by the legitimate exertion of intellect or skill, the public are peculiarly exposed to the impositions of the weak and of the crafty. Scarcely a month elapses but we hear some new specifics against the decay of timber, and yet when brought to the test of experiment they are found to be utterly useless. Some fortunate observation, some unexpected result, as the patentees inform us, led to the discovery; and as to the reason why this or that process should be effective, they neither know nor care. We do not, however, in these censures include the process proposed by Mr. Kyan, which we shall presently have occasion to explain.

Felling Timber.

Something may be done towards the prevention of decay by felling the timber at a proper season. A tree may be felled too soon or too late, in relation to its age, and to the period of the year. A tree may be so young that no part of it shall have the proper degree of hardness, and even its heart-wood may be no better than sap-wood; or a tree may be felled when it is so old that the wood, if not decayed, may have become brittle, losing all the elasticity of maturity. The timber grower is more likely to adopt from interested motives, the former of these errors, and fell his timber too young. His object is to obtain as much timber as possible, but a tree is not in its maturity when it ceases to grow, for after this period its fibres gain firmness and density. The time required to bring the several kinds of trees to maturity varies according to the nature of the tree and the situation in which it may be growing. Authors differ a century as to the age at which oak should be felled, some say one hundred, and others two hundred years; it must then be regulated according to circumstances. Although the oak of our own country is so valuable to the builder, yet it is to be feared that it is seldom allowed to attain its maturity, the grower being anxious to sell and the builder to buy; the one seeking to obtain its value himself, rather than leave it to posterity, the other to purchase at as low a price as possible, not caring for the character of the timber.

But it is also necessary that the timber-trees should be felled at a proper season of the year; that is to say, when their vessels are least loaded with those juices which are ready for the production of sap-wood and foliage. The timber of a tree felled in spring or in autumn, would be especially liable to decay; for it would contain the element of decomposition. Mid-summer and mid-winter are the proper times for cutting, as the vegetative powers are then expended.

There are some trees, the bark of which is valuable, as well as the timber; and as the best time for felling is not the best for stripping the bark, it is customary to perform these labors at different periods. The oak-bark, for instance, is generally taken off in early spring, and the timber is felled as soon as the foliage is dead; and this method is found to be highly advantageous to the durability of the timber. The sap-wood is hardened, and all the available vegetable juices are expended in the production of foliage. Could this plan be adopted with other trees, it would be desirable; but the barks are not sufficiently valuable to pay the expense of stripping.

Seasoning Timber.

Supposing all these precautions to be taken in felling timber, it is still necessary to season it; that is, to adopt some means by which it may be dried, so as to throw off all the juices which are still associated with the fibres of the wood. As soon as the timber is felled, it should be removed to some dry place; and, being piled in such a manner as to admit a circulation of air, remain in log for some time, as it has a tendency to prevent warping. The next process is, to cut the timber into scantlings, and to place these upright in some dry situation, where there is a good current of air, avoiding the direct rays of the sun. The more gradually the process of seasoning is carried on, the better will be the wood for all the purposes of building. Mr. Tredgold says, "It is well known to chemists, that slow drying, will render many bodies less easy to dissolve; while rapid drying, on the contrary, renders the same bodies more soluble. Besides, all wood, in drying, loses a portion of its carbon, and the more in proportion as the temperature is higher. There is, in wood that has been properly seasoned, a toughness and elasticity which is not to be found in rapidly-dried wood. This is an eqident proof, that firm cohesion does not take place when the moisture is dissipated in a high heat. Also, seasoning by heat alone, produces a hard crust on the surface, which will scarcely ermit the moisture to evaporate from the internal part, and is very injurious to the wood.

"For the general purposes of carpentry, timber should not be used in less than two years after it is felled; and this is the least time that ought to be allowed for seasoning. For joiners' work it requires four years, unless other methods be used; but, for carpentry, natural seasoning should have the preference, unless the pressure of the air be removed."

Many artificial methods of seasoning timber have been proposed; and a brief notice of some of those which have been found most useful will be required.

Seasoning by a Vacuum.

All the vegetable and animal juices are kept in their particular vessels by the pressure of the atmosphere; remove that pressure, and the animal fluids could no longer be retained by the veins and arteries, and the vegetable fluids would exude and appear on the surface of the plant. Place a small piece of wood beneath the receiver of an air-pump, and exhaust the air, and in a short time the wood will be covered with drops of the liquid which can no longer be retained, as the atmospheric pressure is removed. Mr. Langton thought that this might be applied to the extraction of those vegetable juices in timber, known to be the cause of its decay. An arrangement was therefore adopted, by which large masses of timber might be enclosed in a vessel having such machinery as would be necessary to exhaust the air, heat being at the same time employed so as to vaporize the exuded juices. The vapor is conveyed away by pipes surrounded by cold water, and is condensed into a liquid, having a sweet taste. This process is deserving of more attention than has hitherto been given to it.

Water Seasoning.

It has been stated by various writers, that wood immersed in water for about a fortnight and then dried, is better suited for all the purposes of the joiner. There can be no doubt that immersion in water tends to neutralize the effect of the saccharine matter, by dilution or an almost absolute removal. This process has also the effect of rendering the wood less liable to crack and warp; but, if we judge by Duhamal's experiments, it injures the strength of the material, and should not, therefore, be adopted in any instance where the timber is to be employed by the carpenter. Evelyn recommends boards that are to be used for flooring, to be seasoned in this way: "Lay your boards," he says, "a fortnight in water (if running, the better, as at a mill-pond head); and then setting them upright in the sun and wind, so as it may pass freely through them, turn them daily; and thus treated, even newly-sawn boards will floor far better than those of a many years' dry seasoning, as they call it." Timber intended for ship-building may be immersed in sea-water; but that which is to be used for houses ought to be placed in fresh water; for if timber, or any other building material, be impregnated with salt, it will ever be wet, for salt attracts moisture so readily, that it may be used approximately as a hygrometer. Plaster or mortar made with salt water, will always sweat with a moist atmosphere; and timber intended for the house-carpenter, if impregnated with salt, will always be damp, or covered with a crystalized efflorescence. Much injury, however, is sometimes done by not thoroughly immersing the timber; the carpenter should therefore be careful, when he employs this method of seasoning, that the timber is entirely covered with water, and that it be not exposed to its adtion for too long a time.

Seasoning by Smoking and Charring.

Authors who have written upon the seasoning of timber have spoken of the effects of smoke, and the carbonization of the surface. We have adopted the same arrangement, but it will be necessary to caution the reader against a misconception of a very inaccurate expression. Timber cannot be seasoned by either smoking or charring, but seasoned timbers may be made more capable of resisting the effects of certain situations by these processes. Should a piece of timber, containing the vegetable juice, be smoked or charred, it would be a means of accelerating decomposition; for preventing all means of evaporation, the common sources of protection, would become sources of destruction. But when timber is to be used in situations where it is liable to be attacked by worms, or to produce fungi, it may be desirable to smoke or to char it.

Seasoning by Boiling or Steaming.

Timber is sometimes seasoned by steaming or boiling, both of which means are frequently adopted by ship-builders. The strength of timber appears to be somewhat impaired by these processes, but it is generally less liable to shrink or crack. Duhamel states that he boiled a piece of wood, and then dried it upon a stove, but, in drying, it lost part of its substance, as well as the water contained; and upon a repetition, he found that it had lost still more of its weight. Four hours' exposure to steam or boiling water is sufficient for timbers of ordinary dimensions, and the drying afterwards goes on very rapidly, but it should be done as gradually as possible. The joiner frequently finds it necessary to steam or boil wood, to bend it into a particular curve, and also the ship-builder. It has been stated by writers on ship-building, that boiling increases the durability of timber, and in proof of this, they inform us that the planks in the bow of a ship, which are bent in this way, are never effected by the dry rot.

It may now be inquired whether, after the most perfect seasoning, timber is secured against the process of decay? To this question a negative answer must be given.—However well the timber may be seasoned it will certainly rot if placed in a damp situation, the rapidity of the decomposition depending upon the nature and state of the wood and the activity of the destroying agent. As the builder seldom attempts any other seasoning than that which depends upon drying his timbers, it is absolutely necessary that he should carefully avoid the rise of damp, and adopt every means in his power to prevent this evil. Timbers are usually placed in contact with walls, but it must not be supposed that this is sufficient to keep them from the access of damp, for they are frequently the conducting media. Brick-work very readily absorbs moisture, and also throws it upwards, so that the ends of timbers are in contact with the very source of mischief. To prevent the rise of damp upwards, it is common to use, for a few feet above the foundations, cement, a substance impervious to water, instead of mortar, or to place between the coarses zinc or slate.—But that these plans may be effective, the basement walls should be surrounded with an open area, for, if in contact with the earth on their sides, they can be of no value. To prevent dampness from entering in front, the brickwork should be covered with compo, or some substance impermeable to water.

Another thing to be considered, for the security of timbers, is to arrange, in every plan of a building, for a perfect circulation of air. Ventilation is a most important requisite in the construction of a building, although it is generally a matter of very little importance in the consideration of those who have to plan or construct buildings. The ventilation of roofs is by no means difficult, but there are often so many obstacles to the ventilation of flooring, that the designer will not give sufficient attention to his subject to provide against them. These things, however, are not matters of speculation, to be attended to by those who have no higher employment, but are absolutely necessary for the construction of a work that is intended to survive the builder.

But we must pass from this subject to a consideration of some of those plans which have been proposed to secure well seasoned wood from the effects of dampness, and the ravages of insects, though it must be confessed that but few of them have been successful.

Attempts have been made from a very early period to prevent the destruction of wood, by impregnating it with some substance capable of restraining its ravages.—The muriate of soda, or common salt, has been thought a good preservative against decay, when the wood is thoroughly impregnated with it. The wooden posts which support the roof of a salt mine are said to be preserved by the constant infusion of salt, and that a vessel covered with fungus will have her timbers cleaned by immersion in salt-water. Whatever may be the advantages of this process, it is quite certain that it can never be extensively employed, for the salt absorbs water so readily, that the timbers would be constantly damp.

In the year 1670, a Mr. Jackson proposed to immerse timber in a composition of muriate of soda, Epsom salts, lime, potash, salt-water, and other substances; but neither he nor any body else could ever discover the value of this process. This person was permitted to prepare some timber to be used in the National yards, and it was found that vessels built with it was less durable than those in which unprepared wood was used.

Sulphate of iron, or green copperas in water has been recommended as a good mixture, in which to place wood, that is to be used for the purposes of building. It is said that timber boiled in a solution of sulphate of iron, becomes so hard when dry, that moisture cannot penetrate it. This may possibly be the case, but the change must be effected by the removal of some portion of woody fibre, and the admission of the sulphate in its place in the same manner as the wood found in the London clay has been fossilized by that substance.

Lime has been recommended as a preservative against the decay of timber. There is a difference of opinion among writers as to the value of this substance, for the particular purpose. It is well known that quicklime with moisture rapidly destroys vegetable matter, but Mr. Tredgold says, that a large quantity of fresh quick-lime in contact with wood, absorbs the water, hardens the sap, and thus, keeping it in a perfectly dry state, renders it very durable. This gentleman quotes the opinion of Mr. Chapman, who says, that vessels employed in the Sunderland line trade have been forty years old without needing any repair, or showing the slightest evidence of decay in the timbers. A writer, who recommends the impregnation of wood with lime, says, that wood buried in the earth, and surrounded by lime, is protected from the ordinary causes of decay. But Dr. Birkbeck objects to the plan, for he says, assuming such principle to be correct, there is a great inconsistency as to the effects produced upon animal and vegetable matter, and there can be no doubt that the substance which destroys one, will destroy the other.

The attention of scientific men has been recently directed to the experiments made by Kyan, and from the very excellent exposition of his plan, by Dr. Birkbeck, we are induced to hope that it may be found highly advantageous. Having made a great number of experiments with a view to ascertain the primary cause of vegetable decomposition, he was at last convinced that albumen was that cause, and that to neutralize its effects would be to prevent decomposition. Some plan was required similar to that adopted in tanning. The gelatine in animal bodies is quite as liable to decomposition as the albumen of vegetables; but when tannin, the infusion of oak bark, is combined with it, the destructive properties are lost, and the animal matter becomes durable, and almost incapable of decay. Reasoning upon this effect, Mr. Kyan imagined that it might be possible to prevent vegetable decomposition by causing the albumen to form a combination with some other substance; and knowing the affinity of corrosive sublimate for the albumen, he entered upon a series of experiments, which led him to propose the use of that substance as a protection for timber.

A few extracts from the published lecture read by Dr. Birkbeck, before the Society of Arts, may put the subject more clearly before the reader.

"Mr. Kyan inferred that, as wood consists of various successive layers, in which the albumen, or juices containing albumen, circulated freely; it is quite certain that, as these juices within the wood, with the watery parts, fly off by the leaves, that the albumen remains behind, and it is probable that this albumen, which from its nature is peculiarly prone to enter into new combinations, is the thing in wood which begins the tendency to decomposition, and produces ultimate decay, whether that decomposition is attended with the formation of cryptogamic substances, or whether in the less organized form, the change occurs with the simple production of what has been called the Dry Rot. He (Mr. Kyan,) conceived, therefore, if albumen made a part of wood, the latter would be protected by converting that albumen into a compound of protochloride of mercury and albumen; and he proceeded to immerse pieces of wood in this solution, and obtained the same result as that which he had ascertained with regard to the vegetable decoctions. Having done so, it became necessary to employ various modes of experiments as well as comparative experiments. Now it is not clear in what part of the wood the vegetable albumen may be found, though it exists more especially in that part of the tree which is denominated the alburnum or sap, and is found between the heart wood and the innermost layer of bark. The experience of all practical men has confirmed the opinion that this portion of wood is the first to decay.

"It is probable that, as the alburnum becomes successive layers of wood, it loses a quantity of albumen; or that, in consequence of the pressure which takes place by the addition of each successive layer, it becomes so situated, as to lose a part of its exposure to the vessels where a change may occur, and therefore becomes in some measure protected: for that which is one year alburnum or sap, may be, and indeed generally is, proper wood the next.

"The mode in which the application of the solution takes place is in tanks, which may be constructed of different dimensions, from twenty to eighty feet in length, six to ten in breadth, and three to eight in depth. The timber to be prepared is placed in the tank, and secured by a cross-beam to prevent its rising to the surface. The wood being thus secured, the solution is then admitted from the cistern above, and for a time all remains perfectly still. In the course of ten or twelve hours, the water is thrown into great agitation by the effervescence, occasioned by the expulsion of the air fixed in the wood, by the force with which the fluid is drawn in by chemical affinity, and by the escape of that portion of the chlorine, or muriatic acid gas, which is disengaged during the process. In the course of twelve hours this commotion ceases, and in the space of seven to fourteen days, varying according to the diameter of the wood, the change is complete, so that as the corrosive sublimate is not an expensive article, the albumen may be converted into an indecomposable substance at a very moderate rate, and the seasoning will take place in the course of two or three weeks."

Mr. Kyan's method of seasoning has been already tested under circumstances so severe, that they may be said to have proved its efficiency. A piece of oak was five years in the fungus pit in Woolwich yard, a place notorious for the rapid and almost instantaneous destruction of vegetable matter, and it was as sound when taken out as when put in. This was the most severe test to which the method could be subjected, and its having sustained the trial is a proof of the value of the discovery. It has, however, been objected to the process, that the impregnation of timber with corrosive sublimate must unfit it for use in ship-building; but Mr. Kyan has furnished evidence to the contrary, and in our opinion proves that salubrity is one advantage. We strongly recommend the builder to make experiments himself upon wood prepared by Mr. Kyan, by using it in places where decay is rapid.

As the season is fast approaching when clover and other grass seeds will be sown, we deem it advisable to bespeak for their future pastures and meadows, from our agricultural brethren, a liberal bestowal of seed. He who sows *scantily* must expect to reap in a proportionate degree, or to gather more weeds than hay. In every soil there are ample supplies of the seed of every variety of wild and noxious herbage, and if these are not supplanted by a wholesome covering of artificial grasses, they will inevitably germinate, and show their pestilent fronts to the annoyance of proprietors, and the discomfort of their stock: for the earth will be busy in despite of all the maltreatment it receives at human hands.

THE HOLLOW-HORN.—As this is the season of the year when we may expect this disease to make its appearance among the horned tribe, we would remind their owners that by pouring a tea-spoonful of the spirits of turpentine in the cup or cavity in the back of the head of cattle, they may save them from the effects of this always unpleasant, and often fatal disease.

CONSUMPTION OF A GREAT CITY.—Paris in 1822, according to Count Chalrol, consumed the following animals and articles.

931,000	Pigeons.		
1,289,000	Chickens.		
549,000	Turkeys.		
328,000	Geese.		
131,000	Patridges.		
177,000	Rabbits.		
174,000	Ducks.		
Butter and Eggs,	value	10,348,800	francs.
Fish,	"	3,417,600	"
Oysters,	"	599,400	"

From the New-York Farmer.

No. II

GENERAL SKETCHES.

BY H. C.

Having in a former number sketched some of the general features of the Agriculture of New-England, I shall proceed to speak in a cursory manner of some other parts of the country, which I had an opportunity of imperfectly and hastily observing. Every allowance must be made for the observations of a passing traveller. He can at best give only the prominent points, which present themselves; and in regard to these, with the most honest intentions, he may convey very erroneous impressions, for his own impressions may themselves be erroneous. I dare say the experience of many a traveller will bear me out in saying that a country often appears very differently to the same individual in going or returning through it, though he may in each case travel by the same road. To a person, who judges of a country only by passing over it, a clear or a cloudy, a fair or a stormy day will often make a material difference in his judgment. His own condition, his cheerful health or his indisposition will sometimes give unconsciously a coloring to his opinions. The company in which he travels are not always without their influence upon him; the condition of the taverns, the state of the roads, and the season of the year. Then he is always liable through the ignorance, or the selfishness, or the prejudices of those whom he meets with to be imposed on by partial or false information. These considerations, and other obvious occasions of mistake in facts and opinions ought to be taken into the account before we charge a traveller either with ignorance, or misrepresentation through negligence or design. In truth no just account can be given either of the condition of a country or the character and manners of its inhabitants without a residence among them for some time; and this under circumstances peculiarly favorable to observation.

In the remarks made in my former number, it may be thought by some that I have hardly done justice to New-England. The truth is that the predominant occupations in New-England are not agricultural; manufactures and commerce prevail over others; and agriculture has become only a secondary interest. Yet notwithstanding this, I am satisfied that when the character of her soil and climate are taken into consideration; and the amount of land actually under cultivation are duly considered, the total amount of her productions will be found large in proportion; and creditable to the skill, the persevering enterprise, and the sprit of agricultural improvement prevailing among her inhabitants. Enough at least will be seen to show what might be accomplished by the same labor, enterprise, and spirit, applied in a manner equally judicious and, as far as soil and climate are concerned, under circumstances more conspicuous.

New-York, an empire within itself, has all the elements of agricultural prosperity and improvement. She embraces a large amount of the most productive soil, with the means in profusion for preserving and increasing its fertility. She abounds even in her remote settlements with facilities of access to markets, where the demand is equal to any amount of production, which may be furnished; and with an intelligent, sharp-sighted, and active population, ready to avail themselves of any means which may be presented, for advancing the great, absorbing, overwhelming object of pursuit throughout the whole country, the attainment and increase of wealth. Her commerce, her manufactures, her crowded and busy cities, her soils, her canals, her steamboats, her railroads, her turnpike roads evince a progress in the art of civilized life almost miraculous; place her among the fist class o prosperous and improved communities on the earth; and disclose a destiny, to which she is rapidly approximating, rarely presented in any condition of social life. May her progress in the developement of her immense resources still be onward; and so highly blessed with all the means and elements of social prosperity, may she be true to her higher duties and faithful to interests infinitely more valuable than wealth, the social order, the intellectual cultivation, and the moral improvement of her immense and rapidly increasing population.

Of the Island of New-York, little can be appropriated to cultivation, and little is capable of cultivation; and it is in this respect as ungenial as the roughest parts of New-England. Wealth and luxury however, have sprinkled over those parts of it upon which the dense population of the city has not yet encroached, many beautiful embellishments; and labor bestowed in unstinted measure upon small parcels, and stimulated by the unceasing and absolutely insatiate demands of the neighboring capital, have made some of its unpropitious spots fertile and productive. The abundant and I may say magnificent supply of vegetables and fruits in the market of the city of New-York: and a large proportion of them grown within the immediate neighborhood, indicate an extraordinary amount of labor and skill. The farming on Long-Island, within a distance of ten miles of Brooklyn, towards Jamaica, is in many places very fine, limited mainly to the production of vegetables, fruit, and grass. Beyond this I have had no opportunity of extending my excursions; but what I saw in this distance sevred only to strengthen the desire to proceed further and see more.

The passage up the Hudson now so common and familiar loses none of its interest by repetition. In a fine day it presents an uninterrupted succession of picturesque and interesting objects. The height of the banks however renders it impossible to know much of the cultivation, though occasional views are presented indicating an intelligent and highly improved and productive husbandry. Orange, Duchess, and Columbia have long been celebrated for their improved and successful husbandry; and for their crops, their flocks, and their dairies. The butter of Orange County known in New-York by the name of Goshen butter, has an established reputation throughout the country. It is not all of equal goodness; but the first quality of Goshen butter for ferkin butter deserves all the commendation, which it has received. The advanced price which it always commands, one would think would be a sufficient stimulus to more care, neatness, and skill among other farmers in this most important article of farm produce; but with the exception of the Philadelphia market, where this article is always prime, it must be admitted that few things come to the market of a poorer quality or in a more miserable condition than this; and as to the quality of that which is found at the tables of steam-boats, canal-boats, and hotels, it is in general detestable, and fit only for the making of soap, or the greasing of cart-wheels. In a journey of three thousand miles the public tables in a great majority of cases presented butter of a quality that even our recollection revolts from. Why it is so, what are the causes of failure in the manufacture and preservation of this article, we shall probably hereafter take an opportunity to consider; but almost the whole may be comprehended under one general fault in one part of the process or another; and that is the want of cleanliness. This is one of the cardinal sins of the country. I recollect some years since staying at a lodging house at some Medicinal Springs, at that time a place of much resort, where it was ascertained that the butter from which the public table was supplied was kept in an open ferkin under the bed in the family bed room! The flavor of much of the butter which is put upon the public tables indicated its residence in some depository of broken meat, and sour bread, some musty closet, by the offensive odor of which the "whole lump is levened." I have always admired the ethical arrangement of an old friend, in whose moral calendar cleanliness was ranked next to godliness; and I confess I am sometimes more than half disposed to regard it as important in respect to morals as to comfort.

Dutchess county is distinguished for its excellent wool and the quantity of Pork, which it sends to the New-York market. A large amount of beef likewise is stall fed in Dutchess county. Hitherto I have had an opportunity of glancing only at some of the Dutchess county farming, so much celebrated; but I am anticipating with great interest the pleasure of looking at it with more leisure and advantage at some future time. The farm of Mr. Holbrook at Hyde-Park, I have visited with great satisfaction. He is fortunate in the services and an intelligent and skilful steward. Mr. Thomas Midford whose excellent management, especially in his dairy, and particularly in the raising of young stock, I have peculiar satisfaction in acknowledging. The calves and young cattle which I have seen reared by him, have been of a superior description and evinced the most skilful and faithful attention. The churning here is done by water power, and all the dairy arrangements are admirable, as I have seen on a former visit. Mr. Midford's crops of corn and of ruta baga have been large and fine, and his ploughing and sowing very superior. The condition of the premises throughout, indeed, garden and pleasure grounds, as well as farm and its appendages, evince industry and skill on the part of the laborers, and taste and liberality on that of the proprietor.

February 1837. H. C.

From the Farmer and Gardener.

SOWING OF GRASS SEEDS.—Such farmers and planters as may not have put in their grass seeds last autumn should do so as soon as the frost is out of the ground. For *clover*, there is but one opinion as to the superiority of spring sowing, and although many give the preference to sowing timothy seed in August, still there are those, whose opinions are worthy of consideration, that advocate the practice of setting it in spring on the growing wheat or rye: so also, indeed, with respect to almost every other of the artificial grasses.

If you intend to sow *clover* seed alone on your grain fields, you should not think of seeding less than from 12 to 16 pounds to the acre.

Timothy, if sown alone, should be in the proportion of from 2 to 2½ gallons of seed to the acre.

Rye Grass alone 2 bushels to the acre.

If *Clover* and *Timothy* be sown together, from 10 to 12 lbs. of the former seed and a peck of the latter would not be found too much.

If you purpose carrying your mixture still further, sow 10 lbs. of clover seed, 6 quarts of timothy, ½ bushel of herd's grass to the acre,—or

Of *clover* 8 lbs., *orchard grass* 1 bushel, *tall meadow oat* 1 bushel, and *herd's* grass ½ bushel.

In Europe the following is in many districts a popular mixture, 2 bushels of *rye grass* seed, and from 12 to 20 lbs. of *clover* seed to the acre.

It is usual to sow the orchard and tall meadow oat in early autumn, but there is no question that they would succeed now. The orchard grass should be moisted with water and permitted to remain so for a day before sowing.

Whatever grass seeds you sow on your winter grain, be sure to pass a light harrow, and roller over them. You need not apprehend any injury to your grain, for although some roots may be dragged out, you will be more than remunerated by the addition you will receive from the tillering of the branches of the plants which will be imbedded in the soil during the process. That the grass seed will derive advantage from being thus securely placed beneath the soil, common sense and reason both concur in affirming. They will be much more likely to escape destruction from birds than if left upon the surface; they will vegetate with greater certainty, and being well fixed in the earth, their roots will be much better able to withstand the droughts of summer and the frosts of winter. We need not say that the operation of harrowing and rolling should be performed when the ground is in a state to bear the treading of the horse without injury, as it will strike the intelligent reader that if done when the ground is *wet*, much injury will result to the grain.

LUCERNE—Those who may feel disposed to try their fortune with this valuable grass, can do so as soon as the ground is relieved from the frost and dampness. It should be sown on a dry rich soil, which had been previously well cleaned. From 16 to 20 quarts of seed should be sown. It may be put in with the spring barley and oats. In England and Scotland it is frequently cut four times in a season.

OATS—The earlier, after the frost is out of the ground, that you get your oats in, the better, and if you can possibly spare them, from your other crops, a portion of manure, do so; for you may rest assured, notwithstanding custom has allotted them to grow on the poorest part of the farm, unaided by nutritious substances of any kind, they would be all the better of a dressing of something calculated to urge them forward. It is to be sure in the general by no means a profitable crop, but then it is a most necessary one, and, therefore, should find favor. But should there be no manure to spare, do, if you can, give the soil an extra ploughing, and thus in part atone for your neglectful culture. We often hear farmers complaining of the degeneracy of, and the falling off of this grain in weight, and may not this be accounted for in the fact, that they are generally grown on the very poorest spots that are to be found, and left to grope their way to maturity in the best way they can.

Two or 2½ bushels to the acre is the proper quantity of seed. They should be well harrowed in.

POTATOES—Should the weather admit of it, you should get in your *early potatoes* from the middle to the latter end of this month. But you should not dream of reaping a good crop unless you are liberal in your bestowal of labor and manure in the preparation of the soil. Your ground should have a southern exposure, and either be a good soil naturally, or be made so by art. It should be thoroughly and deeply ploughed and harrowed; then strike your rows about 27 or 30 inches apart, place your sets about 10 inches distant from each other, throw in your rows a goodly portion of unfermented stable manure, then cover them with the soil, either by running a furrow on either side, or by hand-hoeing. In either event, no *clods* should be permitted to come in contact with the sets. As soon as there is the least indication that the potatoes are coming up, run the harrow crosswise the rows; when the potatoes are up two or three inches, plough a furrow on either side from the potatoes; this must be replaced by throwing the furrow back again. This process will greatly improve the tilth of the soil, and thereby afford the young potato plants an additional chance of moving onward in their growth. After the furrow is thrown back, the rows should be gone over with a hand-hoe, cleaned of all weeds, and so regulated as neither to retain too much moisture, nor to present a surface that would easily suffer by drought. In two or three weeks more another ploughing and hoeing will be necessary; for it is important to keep the ground stirred and clean. This second ploughing however should not be so near to the plants in the rows as the former; and after this, the *cultivator* instead of the plough must be used to complete the work in about two or three weeks, which will be determined by the advance of weeds, and the wants of the potatoes.

CARROTS AND PARSNIPS.—As soon as the frost is entirely out of the ground, you may begin to sow the seeds of these roots, for field culture, and thence up to the 1st of May, the sooner they are in the larger will be their yield, and as they are alike excellent as food for man and beast, we have always been surprised that comparatively so few were raised. An acre, well prepared and cultivated, in suitable soil, will yield from 500 to 600 bushels, which would be sufficient to keep four cows fully to their milk during the winter.

MANURE.—Carry out your manure to your fields in which you intend to use it. If you intend to top-dress your meadows, or growing crops of grain, the sooner that is done the better, taking the precaution never to let your wagons or carts go on either when the ground is soft.

LIME.—If you intend to use any this season, it is time you had made your arrangements for procuring or burning it. If intended to be used on your meadows, the sooner the better it is spread thereon; if on your corn ground, you cannot get it on too early, as it should receive sufficient ploughings to thoroughly incorporate it with the soil.

ASHES.—Do not omit to provide yourself with a sufficient quantity of this delightfu substance; to give your corn plants a dres ing, however trifling the quantity applied, it will speak out most eloquently.

FENCES.—See to your fences and have them thoroughly repaired, and thus secure yourself against the inroads of stock of all kinds.

TOOLS AND IMPLEMENTS.—These must be examined and put in order,—and in fact at this critical period of the year, the farmer should have his eyes on the search in every direction.

From the New-England Farmer.

FARMERS' WORK.

Cows which are expected to calve, ought to be lodged by themselves in some convenient place, under cover for a week or two before calving, as such care may be the means of saving the life of the calf, and perhaps of the dam also. In order that it may be ascertained what is the time when cows may be expected to calve, an account should be kept of the time when each cow is put to the bull. The day and night after a cow has calved, she should be put under cover, her drink should be luke warm, and she should not be exposed to the dampness of the night.

Inflamed teats should be washed with two drachms of sugar of lead in a quart of water. Should tumors appear, apply a common warm mash of bran, with a little lard.

To prevent cows from sucking their own milk, it is said that rubbing the teats frequently with old and strong smelling cheese, is effectual.

The following prescription for drying cows, which continue to give milk till too near the time of their calving; or to expedite their becoming fat enough to be good beef, is taken from *Monk's Agricultural Dictionary*, an English work of established reputation.

"Take an ounce of powdered alum; boil it in two quarts of milk till it turns to whey; then take a large handful of sage, and boil it in the whey, till you reduce it to one quart; rub her udder with a little of it, and give her the rest by way of drink; milk her clean before you give it to her, and as you see need, repeat it. Draw a little milk from her every second or third day, lest her udder be over-charged."

From the New-England Farmer.

FARMERS' WORK.

Ewes and Lambs.—It is incumbent on every good husbandman and faithful shepherd, to feed his Ewes plentifully for a few weeks before, and for a considerable time after they produce their lambs. Good farmers have told us that they have found it very beneficial to give to each of their ewes about one half a gill of Indian corn a day, for 5 or 6 weeks before they have yeaned, and while suckling, to give them good roots, or some other juicy food. The want of milk in the ewes, is the most general cause o. death in the lambs. Keep the mothers well, and their offspring will thrive and be strong.

The *Farmer's Manual* says, "If you have stored more turnips than are sufficient for the use of the table, give them to any stock that will eat them, except your sheep; give to them potatoes, hut not turnips at this season, for turnips will injure the lambs."

Weak lambs should be treated in all respects as if they had been drowned, and you was endeavoring to restore them to life. Apply gentle and regular warmth; give them warm milk, frequently, in small quantities, (the milk of the sheep is best,) and if the ewe has milk sufficient for the support of the lamb, you may generally raise it, otherwise the lamb usually dies. It requires more care and labor to nurse one feeble lamb, when its dam yields too little milk for its support than it would for an hundred, if they were healthy and well kept.

If your sheep, whether store sheep or ewes with lamb, have good hay, about a quart of potatoes a day, to each, will it is said be very beneficial, and an ample allowance. But when the object is to fatten them, (says a writer in Rees' Cyclopedia,) about a gallon of potatoes a day, with a little hay will be the proper quantity; but this is dependent in part on the size of the animals, and in part on the quality and quantity of the hay, which is allowed them. Potatoes, besides their use as food for sheep, are said to be very serviceable to those animals as an article of diet, which usually supersedes the necessity of *medicine*. They have, when given raw, an opening or purgative quality, which is thought to be of use, and to answer a similar purpose with sheep which is effected with swine by brimstone and antimony.

Care should be taken to place in the stable, small tubs or troughs of water for the sheep to drink in. They will do very well in summer without water, as they feed when the dew is on, but they need water in winter, especially if fed mostly on dry food. Deane's N. E. Farmer states that "when sheep have colds and discharge mucus from the nose, good feeding, together with pine boughs given occasionally, will cure them; or tar spread on a board over which a little fine salt is strewed, will induce the sheep to lick up tar, and this will cure a cold."

The *Yankee Farmer*, in giving directions for raising lambs, observes that "great care should be taken when lambs are born, for it is frequently the case that their fore teeth are not cut, which makes it very difficult for them to hold the teat, so as to suck when young and weak, and it is common for lambs to get discouraged, though ever so rugged at first. To remedy this evil rub the thumb nail, or any hard substance, over the gums, sufficiently hard to cause the teeth to cut through, and the lambs will then be able to suck without any difficulty."

Clay has been recommended as useful for restoring and preserving health to sheep. A writer in the New-York Farmer gives the following remarks on this subject:—"I am told on creditable authority, that a gentleman, who was losing his sheep without apparent cause, had occasion to use some clay about his house in the winter, and observed that his sickly flock ate it with avidity; he caused a load to be placed in their yard, much of which was devoured, and his sheep speedily recovered.

"As a cure, therefore, I would recommend clay to be placed in the sheep yard, which can, at worst do no harm, as the animals will not eat it, unless prompted by instinct."

From the New-England Farmer.

Calves.—The following mode of rearing Calves, adopted by the Society, denominated Shakers, in Canterbury, N. H., was communicated in a letter from Francis Winkley, to Levi Bartlett, of Warren, N. H., and was published in the N. E. Farmer, in 1824; but such have been the changes since that period, in our subscription list that it would probably be new to many of our readers.

"We let calves that come in the fore part of March, suck a week or ten days, then take them from the cow, giving them a moderate allowance of new milk to drink till they have learned to drink it freely; then put in some skimmed milk; and we feed them wholly with skimmed milk, taking care to give it at about the temperature of milk taken directly from the cow, by heating a part of it and mixing it with the rest. Care should be taken not to scald the milk, when heated; also, not to give them any sour milk, for this will make them scour. The trough or vessel in which they drink their milk, should likewise be kept clean, and not suffered to become sour. We let the milk stand about twelve hours before it is skimmed; giving a calf at first about four quarts, night and morning; increasing the mess as need requires, till he is six weeks old, from which time till ten weeks old, he will require, perhaps about 12 quarts per day.

"When about ten weeks old, we begin to diminish the quantity of milk for about the space of two or three weeks, at which time we wean them. During the whole process, from two to fourteen weeks of age, calves should be well supplied with good hay, salt and provender, such as oats, wheat, bran and oil cake, ground fine.

"The particular advantages to be derived from the above method of treatment, are the following:

"1. It is much cheaper than to let them suck in the ordinary way; whereas it makes a great saving of cream for butter, and that without injuring the calves, if they are properly attended to.

"2. It prevents calves from moaning or pining, so much while weaning as they would otherwise do, when taken from the cows.

"3. It not only prevents the cows being injured in consequence of the calves biting the teats, but also prevents their holding back the milk from the milker, which often serves to diminish the quantity of milk afterwards.

"The only disadvantage to be found in the above method of treatment is, that it requires some more labor to feed them, where they thrive equally well in every respect as those do which are permitted to suck in the ordinary way.

Advertisements.

AVERY'S ROTARY STEAM ENGINES.—AGENCY.

—The subscriber offers his services to gentlemen desirous of procuring Steam Engines for driving SAW-MILLS, GRAIN-MILLS, and OTHER MANUFACTORIES of any kind.

Engines only will be furnished, or accompanied with *Boilers* and the necessary *Machinery* for putting them in operation, and an Engineer always sent to put them up.

Information will be given at all times to those who desire it, either by letter or by exhibiting the Engines in operation in this city.

Inquiries by letter should be very explicit and the answers shall be equally so.

D. K. MINOR,
132 Nassau-st., New York.

FOR SALE AT THIS OFFICE,

A Practical Treatise on Locomotive Engines, with Engravings, by the CHEVALIER DE PAMBOUR—150 pages large octavo—done up in paper covers so as to be sent by mail—Price $1 50. Postage for any distance *under* 100 miles, 40 cents, and 60 cts. for any distance exceeding 100 ms.

ALSO—*Van de Graaff on Railroad Curves*, done up as above, to be sent by mail—Price $1. Postage, 20 cents, or 30 cents, as above.

ALSO—Introduction to a view of the works of the *Thames Tunnel*—Price *fifty cents*. Postage as above, 8 cents, or 12 cts.

*** On the receipt of $3, a copy of each of the above works will be formarded by mail to any part of the United States.

10 10t

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2½	by	½,	15 ft in length,	weighing		$4\frac{68}{100}$	per ft.
280	"	2	" ½,	"	"	"	$3\frac{50}{100}$	"
70	"	1½	" ½,	"	"	"	2½	"
80	"	1¼	" ⅜,	"	"	"	$1\frac{25}{100}$	"
90	"	1	" ⅜,	"	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.
28 tf Philadelphia, No. 4, South Front st

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

TO MANUFACTURERS OF HYDRAULIC CEMENT.

PROPOSALS will be received by the subscriber, on the part of the James River and Kanawka Companies, for the delivery on the wharf, at the city of Richmond, Va., of Fifty Thousand Bushels of Hydraulic Cement. The amount called for must be furnished in quantities of about six thousand, bushels per month, commencing on the first of April and ending on the first of November next.

To avoid future litigation, it is to be understood, on making the proposals, that the bushel shall weigh seventy pounds NETT, and that the Cement shall be delivered in good ordder, and packed in tight casks or barrels.

Proposals will also be received for furnishing fifty thousand bushels, at any convenient point on the navigable waters of James River, or the north branch of James River, where the materials for its manufacture has been discovered.

Persons familiar with the preparation of the Cement, would do well to examine the Counties of Rockbridge and Botetourt, with a view to the establishment of works for the supply of the western end of the line; and a contract for the above quantities will be made with them before they commence operations.

As there will be required on the line of the James River and Kanawka Improvement, in the course of the present and next year, not less than half a million of bushels of this Cement, and some hundred thousand bushels more in the progress of the work towards the west, contractors will find it to their interest to furnish the article on terms that lead to future engagements.

Proposals to be directed to the subscriber at Richmond, Va. CHARLES ELLET, Jr.,
Chief Engineer of the J. R. and Ka. Co.
February 20th, 1837. 9 6t

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawaumkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.
Rochester, Jan. 13th, 1837. 4—y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior	back-strap Shovels		
150	do	do	do plain	do
150	do	do	do caststeel Shovels & Spades	
150	do	do	Gold-mining Shovels	
100	do	do	plated Spades	
50	do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hard-ware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACOTIN, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

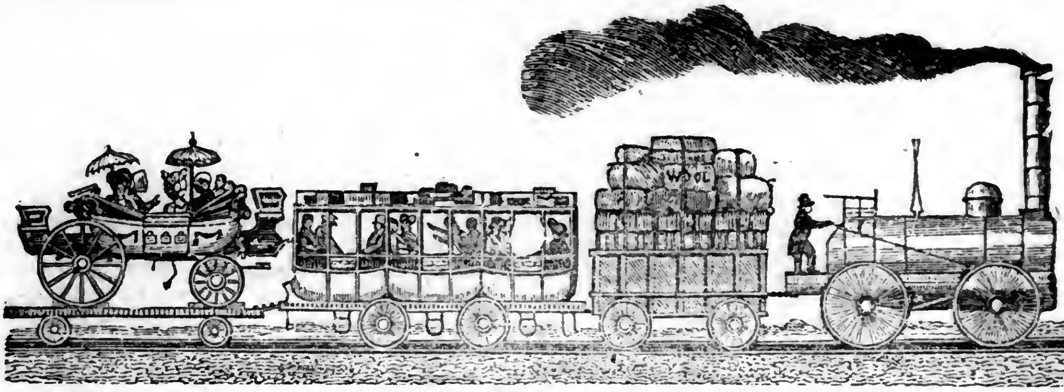
Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, MARCH 25, 1837. [VOLUME VI—No. 12.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MARCH 25, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America.*

☞ For List of Subscribers that have paid see page 191.

☞ For advertisement, "Rappahannock Canal, and Slack Water Navigation," see page 185.

We are requested to publish the following card, and we very cheerfully do so, as we published the report referred to—and hope ere long to lay before our readers the documents spoken of, from which it is probable the citizens of New-York will learn why the water works have progressed so tardily.—[EDS. R. R. J.]

A CARD.

The readers of the Water Commissioners' Report, published in the last number of the Railroad Journal, (March 18th) are respectfully informed that a series of Documents is in preparation, and shortly to be made public, in reply to the allegations contained in *that* and the *preceding* Report against the "late Chief Engineer." The community will thus be enabled to judge, by evidence the most authentic and unquestionable, of the *temper*, as well as the *regard*, for *truth* and *fairness*, in which these allegations have been made.

This duty would have been sooner performed, but it was not till within the last few days that the Report in which these charges are reiterated—though dated as early as the 9th of January—met the eye of the injured party. His motives for not noticing the subject at a still earlier date, he trusts will be righly appreciated.

New-York, 24th March, 1837.

RAILROAD AND CANAL STOCKS, in New-York and Philadelphia.

SALES OF STOCK IN NEW-YORK

March, 11th.

Mohawk Railroad	cash	79
Paterson Railroad	"	65
Boston and Providence	"	102¼
New-Jersey Trans.	"	100
Stonington	"	69
Worcester Railroad	"	91
Long Island Railroad	"	74
Paterson Railroad	"	65
Stonington Railroad	"	69
Harlaem Railroad		66
Utica and Schenectady	cash	118¼
Delaware and Hudson Canal	"	90
Morris Canal	"	95
New Orleans Canal	"	95

PHILADELPHIA STOCK MARKET.

March 17th.

RAILROAD STOCKS	Price of shares	Offered	Asked
New-Castle and Frenchtown	25	31¼	32¾
Do loan, 5¼ per cent	100	99	101
Wilmington and Susquehanna	50	38	42
Camden and Amboy, shares,	100	134	136
Do loan, 6's 1836	100	110	120
Danville and P shares	50	25	35
Norristown, do	50	33	33¼
Do 6 per cent loan	100	85	100
Valley Railroad	7¼	1	3
Westchester do	50	20	28
Minehill do	50	57	59
N. L. and Penn. Tp. do	40	34¼	35
Philadelphia and Trenton do	100	125	127¼
West Philadelphia Railroad	50	20	30
Harrisburg and Lancaster	50	46	48
Cumberland	25	15	20
Beaver and Meadow	50	57	57
MISCELLANEOUS STOCKS			
North American Coal Company	25	12	14
Steam Bt. Sts. Columbian	100	18	22
Exchange Stock	100	70	80
Arcade	100	55	75
Theatres—Chestnut street	600	625	675
————Walnut street	250	175	220
————Arch street	500	325	375
Gas Company	100	100	102
CANAL STOCKS.			
Schuylkill Navigation, shares	50	162	163
Do loans, 5 1845	100	98	100
Do do 1855	100	100	101
Do do 5½ 1837	100	98	100
Lehigh Coal and Navigation	50	82	83
Do loan, 6 1833	100	97	98
Do do 6 1839	100	97	98
Do do 6 1844	100	99	100
Do do 5 1840	100	96	97¼
Union Canal, shares	200	180	190
Do loan, 1836	100	83	86
Do do 1840	100	85	90
Chesap'k & Delaware Canal, shares	200	20	40
Do loan, 1837	100	60	67
Do do 1840	100	60	67
Delaware and Hudson,	100	83	84
Do loan	100	95	100
Louisville and Portland	100	112¼	117
Convertible 6 per cent. loans,	100	110	120
Sandy and Bever	100	60	80
Morris Canal	100	91	92

☞ It will not do, these hard times for money, to be too modest. The *Paper Maker* must be paid, the *Engraver*, the *Ink Maker*, and the *Printer* must be paid; —then why not Pay the Publishers and the Editors the *current year* and all *arrearages* for the Journal? *It must be done.*—PLEASE REMIT BY MAIL.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its engravings, ***neatly done*** on wood, and issue in six *parts* or ***numbers,*** of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars,* or *five dollars* for two copies—***always in advance.*** The first number will be ready for delivery early in April—Subscriptions are solicited.

☞ Missing Numbers Wanted.—If any of our subscribers have numbers 4, 5, 6 and 7, of Volume or *five last* year, which they do not desire to preserve, they will confer a special favor by sending them to us, that we may complete a few copies of the volume.

⁂ If any of our subscribers are in want of ***any other*** number of the same volume to complete their volume they will please give early notice and they shall be sent.

The Title page and Index for last year, or volume five, will be forwarded to subscribers with our next number.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

I. ON THE CHANGES OF TEMPERATURE CONSEQUENT ON ANY CHANGE IN THE DENSITY OF ELASTIC FLUIDS, CONSIDERED ESPECIALLY WITH REFERENCE TO STEAM. BY MR. THOMAS WEBSTER, M. A. OF TRINITY COLLEGE, CAMBRIDGE. COMMUNICATED BY MR. JAMES SIMPSON, M. INST. C. E.

My attention having been for some time directed to the theory and constitution of fluids, it has appeared to me that there are some properties of which little notice has been taken, but which, being of considerable practical importance, ought to receive the attentive consideration of scientific men, and especially of those who possess the opportunities of deciding on their value. On the present occasion I beg to offer a few observations respecting these properties. I wish, then, to call attention to the *change of temperature* which always accompanies a *change in the density* of an elastic fluid, and to the consequent change in the elastic force due simply to that change in temperature, as distinguished from the change which is due to the change of density according to the law of Boyle. It has long been observed, that the sudden compression of any quantity of air is attended with a great degree of heat, and its sudden expansion with a great degree of cold. Thus, if a piston, having a small piece of tinder attached to it, be pressed suddenly down in a cylinder of air or gas, the heat evolved, or squeezed out, by the compression will ignite the tinder; and again, if a delicate thermometer be placed under the receiver of an air-pump, it will indicate cold produced on every stroke of the pump. These effects will not continue long, since there will be an immediate transfer of heat, according to the well known laws of the radiation of heat; thus the heat evolved by the condensation will be rapidly lost among, and that absorbed by the expansion will be supplied from, the surrounding bodies, the general fact being, that the temperature always tends rapidly to equilibrium. The beautiful and simple apparatus of Gay-Lussac may be mentioned, since it exhibits at once both the phenomena in question. Let two spherical glass vessels communicate with each other by a stop-cock, and have a delicate thermometer suspended at their centres; then if one have the air exhausted, and the other be filled by a condenser, either with common air or with a gas, and the stop-cock be opened so that the condensed air rushes into the empty vessel, the thermometer in one vessel will sink and in the other will rise; namely, it will sink in that which is being emptied, or in which the air is expanding, and it will rise in that which is filling, or in which the air is being condensed; and when the experiment is made with great care, it will be seen that the cold indicated by one corresponds exactly to the heat indicated by the other. If another thermometer be suspended in the empty vessel close by the orifice, that is, just where the air is in the act of expanding, a very great degree of cold will be indicated; and this will diminish rapidly as it is placed further from the orifice. These indications of heat and cold continue but for a very short period, since the equilibrium of temperature is almost instantaneously restored. No accurate measure of the heat absorbed and developed can be procured by direct observations on the thermometer; it may, however, be calculated from the change in the elastic force, as we shall see presently. This experiment of Gay-Lussac does not appear to have been repeated on a large scale; but I conceive that if a large cylinder of thin metal were placed in communication with a vessel of condensed air at a great pressure, the cold produced at the one end, where the expansion was proceeding, and the heat produced at the other, where the condensation was taking place, would be quite sensible to the hand, and a series of air-thermometers would indicate very different states of temperature at the same distances from each end. But the important practical inquiry is the change which this developement and absorption of heat produces on the elastic force of the fluid; there must be increase of elastic force due to this increase of temperature, and a diminution of elastic force due to the diminution of temperature, besides the increase and dimunition which is due to the change of density according to Boyle's law. In fact, we know that Boyle's law is not true, unless the compressed air is allowed time to cool, as was distinctly ascertained in the series of experiments made by order of the Academy of Paris on this subject. In the complete investigation of it by Desormes and Clements, which I have detailed at full length in my Theory of Fluids, Article 98, the increment of temperature is calculated by a series of mathematical reasoning, from this very change in the elastic force for which I contend. The problem proposed was "to determine the increment of temperature for a given small condensation." They observed the successive changes which the mercurial column underwent when air was first let into an exhausted receiver, and after it had lost the small increase of temperature due to the small condensation. The column always sunk by a small quantity, and the amount of this change enabled them to determine the amount of heat developed for a given condensation. Of the accuracy of their results there cannot be the least doubt, for two other and quite independent phenomena, in which the same causes are called into operation, namely, the production of sound and the vibration of a cylindrical column of air, give results according with very great accuracy. The preceding facts are mentioned, to give confidence in the principle for which I contend, that whenever there is a change in elastic force according to the law of Boyle due to the density, there is also an additional change in the elastic force due to the change of temperature, which is the necessary consequence of this change in the density: for it must be remembered, that in all the experiments, the elastic force agrees with the law of Boyle so soon as the equilibrium of temperature is restored.

On this part of the subject it is unnecessary to insist, since the facts are well established for most of the elastic fluids, but the experiments, so far as I have become acquainted with them, do not extend to steam, and unless there be some reason for excluding steam from the general properties of all other elastic fluids, we must admit the preceding conclusions with respect to it also. Now so far from having any reason to except steam from these laws, we have every reason for believing that steam separated from its water, and maintained at a higher temperature than 212°, differs in no respect from the permanent gases. It can be readily liquified, but doubtlessly all the gases can be reduced to the same form by a proper increase of pressure and diminution of temperature.

For if we consider steam as an elastic fluid owing its elastic qualities solely to the repulsive power of heat, there can be no reason *a priori* for excepting it from the laws of other elastic fluids, which appear to owe their energy and existence to the same cause. Now so far as experiments have been made, it appears that steam expands equally for all equal increments of temperature; thus following the law of other elastic fluids. There is a passage in Professor Robinson's Treatise on Steam which involves the principle in question, but which appears not to have been followed out. He says, "it is well "known that when air is suddenly expanded, "cold is produced, and heat when it is suddenly compressed. When making experiments with the hopes of discovering the "connexion between the elasticity and density of the vapors of boiling water and "also of boiling spirits of turpentine, we "found the change of density accompanied "by a change of temperature vastly greater "than in the case of incoercible gases. "When the vapor of boiling water was "suddenly allowed to expand into five times "its bulk, we observed the depression of a "large and sensible thermometer to be at "least four or five times greater than in a "similar expansion of common air at the "same temperature."

The fact of the depression being greater in the expansion of steam than of air at the same temperature, is explicable at once from the different constitutions of the two fluids with respect to the properties of heat; but on this I cannot at present enter. The fact is invaluable as coming from such a man, and, when viewed in connexion with the general theory of elastic fluids, and the above-mentioned law of Gay-Lussac respecting the expansion of steam for increments of temperature, en itles us to assume that, so long as steam retatins its gaseous character, it is subject to the laws of gases. These conclusions might be sustained by many well known phenomena respecting vapors and evaporation generally, but enough has been said to warrant our including steam in the general law of the French philosophers respecting elastic fluids: "That equal volumes of "all elastic fluids, taken at the same temperature and the same pressure, being suddenly compressed or expanded by the "same fraction of their volume, disengage "or absorb the same absolute quantity of "heat."

Now the degree of heat or cold produced depends on the rate at which the change takes place; and this consideration will lead to some important conclusions with respect to the expausion of high-pressure steam. The rate of expansion will obviously depend on the elastic force of the steam; the higher pressure therefore which we use the greater will be the cold and the greater the diminution of the elastic force beyond that which the law of Boyle would give. Suppose steam of ten atmospheres suddenly to expand to four times its bulk, then the elastic force of the expanded steam ought, on these principles, to be much less than the elastic force of steam of five atmospheres suddenly expanded to twice its bulk; and the greater the elastic force of the steam, the greater will be the deviation from the law of Boyle. So that, while Boyle's law will be nearly true for steam of one or two atmospheres, it will be most untrue for steam of five or ten atmospheres. These, I conceive, are results which may be readily tested by careful experiments. I know of none in which they have been fairly examined, for I am not willing to admit the conclusions which may be drawn from some accounts of steam worked expansively, and which would appear to militate against these principles; but on this I shall say more immediately.

It would appear then, that the mere rate of expansion may be such, that the diminution of elastic force, consequent on the diminution of temperature, may leave scarcely any elastic force in the expanded steam; so that there may be extreme cases in which the law of Boyle will appear absolutely false. These conclusions appear to me supported and illustrated by the facts, that high pressure steam does not scald, and that elastic steam is not so efficacious as gunpowder for throwing bullets or other masses.

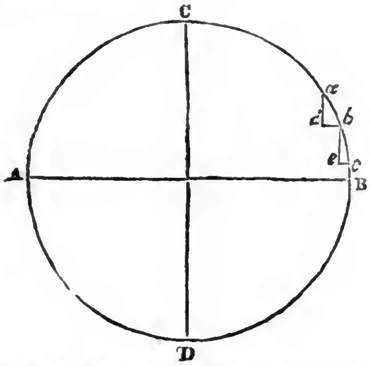
When low pressure steam expands into the air, it preserves very nearly both its density and its temperature, but when steam of a high pressure expands, the instantaneous augmentation of volume demands that a large portion of heat should become latent, or it cannot exist at all as steam. If the expansion were to stop the instant at which the elastic force of the steam becomes equal to that of the atmosphere, its temperature would (since the sum of the sensible and latent heat is invariable) descend only to 212°; but in consequence of the momentum which the particles have acquired from the rapidity of the expansion, it expands far beyond this limit, so that the diminution of temperature becomes greater, in proportion as its original elastic force was greater than the elastic force of the atmosphere. If this expansion takes place in a vacuum, the reduction of temperature will be greater still, since the particles of air present mechanical obstacles to the expansion. So that in some cases the elastic force may be lost almost entirely. We know, thanks to the ingenuity of Mr. Perkins, that highly elastic steam will impel bullets with considerable velocity; this velocity does not, however, appear to be equal to that which can be generated by gunpowder. Now in order to increase the velocity, we must increase the elastic force of the steam, the consequence of which being an increased rapidity of expansion, the additional reduction of temperature may more than nullify the original increase of elastic force, so that steam at a higher pressure will be less efficacious than steam of a less pressure. If this be the case, there is some temperature at which for a given ball the effect is a maximum, that is, greater than either at a higher or a lower temperature. But in the case of gunpowder the temperature of the elastic fluid is kept up by the continued consumption of fresh materials; the heat evolved during the combustion of these ingredients is quite prodigious, so that we have, in fact, the repulsive power of heat itself in full agency. I have said nothing respecting the density of the steam at different temperatures, my object not being to discuss this question fully, but merely to illustrate what must, I conceive, be the necessary consequence of increasing the temperature and elasticity of the steam beyond certain limits.

The application of these principles to the working of *steam expansively* is at once apparent; there will in every case be a diminution in the pressure exerted beyond what will be given by Boyle's law, and this will be greater the more rapidly the engine is worked. But on this subject I hardly dare venture any remarks; practical considerations are of much greater value than any which I can offer, especially as in one large class of engines, namely, in condensing engines, where the steam is worked at a low pressure, the deviations from the Boylean law, due to the cause which I have mentioned, cannot be considerable; still, however, these deviations must, I conceive, be appreciable whenever the steam is generated at a higher temperature than 212°. But in high pressure engines the deviations due to this cause must be considerable, and I would venture to suggest that if higher pressure steam be used than is from the circumstances of the case practically necessary, the steam generated is not applied in the most economical manner, so far as concerns the ratio of the work done to the fuel consumed. The preceding remarks have referred exclusively to steam separated from its water and maintained at such a temperature that it may be considered as a permanent gas. If the steam be not separated from its water, the case is so entirely different, that the preceding remarks do not at all apply.

If the space above the water be not saturated with vapor, that is, if the vapor which it contains have not the maximum density due to the temperature of the water, it is owing to the mechanical obstruction of the particles of air; but since we suppose the air removed, or the space full of steam, we have to consider the nature of the changes which take place when this given space is increased or diminished, that is, when the pressure on the surface of the water is diminished or increased. In this case the law of Boyle has no existence, for it applies only to a permanent gas, that is, it is only a steam law, when the vapor is detached from its liquid and contained in a space of such a temperature that it may be considered as a permanent gas. The pressure of the existing vapor on the surface of the water being the only limit to the formation of fresh vapor, whenever the pressure on this surface is diminished in the boiler by the withdrawal of a portion of the steam, fresh steam will instantly be formed, so that if, where steam is worked expansively, there be any water at the bottom of the cylinder, or any communication whatever with any water, the effect will be precisely the same as if the communication with the boiler were not entirely cut off; there will be a constant accession of steam, or fresh steam will be formed as fast as the piston rises. It has sometimes been stated that where steam is worked expansively, the effect is greater than the Boylean law would lead us to suppose; if such appear to be the case, it must be from some such cause as the above mentioned; either the steam is not entirely cut off, or there is some communication with water: the smallest quantity of water will be sufficient to increase very considerably the apparent effect, and cause a great deviation from the calculated elastic force. The whole theory of this subject is so intimately connected with the theory of heat, that the consequence of its known laws may be immediately traced in every application of steam; hence we may be convinced that there is a loss of elastic force, besides that which is due to the change in density, whenever steam is worked expansively, however much it may be practically overruled and modified. As a means of detecting this I would mention, that it ought to be shown by the greater supply of heat which a cylinder requires when the steam is worked more expansively, than where the same steam is worked less expansively. From these considerations we may see that there is a maximum in the useful effect of expansion working; but the complete determination of it is a purely practical question, and since it will depend on the conducting power of the metal, it must be somewhat different for every different engine.

II. ON THE FORCE EXCITED BY HYDRAULIC PRESSURE IN A BRAMAH PRESS; THE RESISTING POWER OF THE CYLINDER, AND RULES FOR COMPUTING THE THICKNESS OF METAL FOR PRESSES OF VARIOUS POWERS AND DIMENSIONS. BY PETER BARLOW, F. R. S. ETC., OF THE ROYAL MILITARY ACADEMY.

I am not aware that any of our writers on mechanics have investigated the nature and amount of the circumferential strain which is excited in an hydraulic cylinder by a given pressure on the fluid within; it will be proper, therefore, first to examine this question: viz., to find the circumferential strain on a ring of any material, arising from an internal pressure.



Let ab, bc, be any small elementary part of the circumference, which may be taken as right lines, and let the pressure on each of them be called p, which, being proportional to them, may be represented by the elements themselves, ab, bc, these being perpendicular to the direction in which the pressure acts. Resolve these pressures or forces into two rectangular forces, ad, db, be, ec, of which, ab, and be, will represent forces acting perpendicular to their direction or parallel to A B, and db and ec forces parallel to D C. Confining ourselves at present to the former, if we conceive the semi-circumference D B C to be divided into its component elements, it is obvious that the sum of the forces acting parallel to A B, will be equal to the sum of all the perpendiculars, ad, be, or to the whole diameter D C. That is, the sum of all the forces acting parallel to A B, will be to the sum of all the forces or pressure on the semi-circumference D B C, as the diameter to the semi-circumference. But the pressure on the semi-circumference is equal to the number of inches in the same, multiplied by the pressure per square inch, consequently the force or pressure exerted parallel to A, B, will be equal to the inches in the diameter, multiplied by the pressure per square inch, the ring being here supposed, for the purpose of simplification, only an inch deep. But to resist this pressure, we have the two thicknesses of the ring at D and C; therefore the direct strains on the circumference at any one point, as D, will be equal to the pressure of the fluid per square inch, multiplied by the number of inches in the radius.

We should come to the same result more simply, but perhaps not so satisfactorily, by conceiving a section passing through the diameter D C; then it follows that the pressure on this section, which is directly resisted at D and C, is equal to the number of square inches in the section, multiplied by the pressure per square inch. Therefore the strain on D or C singly, is equal to the pressure per square inch multiplied by the inches in the radius; the same as above.

TO INVESTIGATE THE NATURE OF THE RESISTANCE OPPOSED BY ANY GIVEN THICKNESS OF METAL IN THE CYLINDER OR RING.

It would appear at first sight, that having found the strain at D and C, it would only be necessary to ascertain the thickness of metal necessary to resist this strain when applied directly to its length; this, however is by no means the case, for if we imagine, as we must do, that the iron, in consequence of the internal pressure, suffers a certain degree of extension, we shall find that the external circumference participates much less in this extension than the interior, and as the resistance is proportional to the extension divided by the length, according to the law *ut tensio sic vis*, it follows, that the external circumference, and every successive circular lamina, from the interior to the exterior surface, offers a less and less resistance to the interior strain: the law of which decrease of resistance it is our present object to investigate.

In the first place, it is obvious that whatever extension the cylinder or ring may undergo, there will be still in it the same quantity of metal, or which is the same, the area of the circular ring, formed by a section through it, will remain the same, which area is proportional to the difference of the squares of the two diameters.

Let D be the interior diameter before the pressure is exerted, and D+d its diameter when extended by the pressure. Let also D′ be the external diameter before, and D′+d' the diameter after the pressure is exerted; then from what is stated above it follows, that we shall have

$$D'^2 - D^2 = (D'+d')^2 - (D+d)^2$$

$$\text{or, } 2D'd' + d'^2 = 2Dd + d^2$$

$$\text{or, } 2D' + d' : 2D + d :: d : d'$$

or since d' and d are very small in comparison with D′ and D, this analogy becomes D′ : D :: d : d'. That is, the extension of the exterior surface is to that of the interior as the interior diameter to the exterior.

But the resistance is as the extension divided by the length, therefore the resistance of the exterior surface is to that of the interior as $\frac{D}{D'} : \frac{D'}{D}$ or as $D^2 : D'^2$. That is the resistance offered by each successive lamina, is inversely as the square of the diameter, or inversely as the square of its distance from the centre; by means of which law the actual resistance due to any thickness is readily ascertained.

Let r be the interior radius of any cylinder, p the pressure per square inch on the fluid, t the whole thickness of the metal, and x any variable distance from the interior surface. Let also $rp = s$ represent the strain exerted at the interior surface, according to the principles explained in the preceding part of this paper. Then by the law last illustrated we shall have

$(r + x)^2 : r^2 :: s : \frac{r^2 s}{(r + x)^2}$ for the strain at the distance x from the interior surface: and consequently $\int \frac{r^2 s\, dx}{(r + x)^2} + \text{Cor.} =$ the sum of all the strains, or the sum of all the resistance. This becomes, when $x = t$, $R = r^2 s \left(\frac{1}{r} - \frac{1}{+ r t}\right) = s \frac{rt}{r+t}$. That is, the sum of all the variable resistances due to the whole thickness t, is equal to the resistance that would be due to the thickness $\frac{rt}{r + t}$ acting uniformly with a resistance s, or rp.

APPLICATION OF THIS RULE FOR COMPUTING THE PROPER THICKNESS OF METAL IN A CYLINDRIC HYDRAULIC PRESS OF GIVEN POWER AND DIMENSIONS.

Let r be the radius of the proposed cylinder, p the pressure per square inch on the fluid, and x the required thickness: let also c represent the cohesive strength of a square inch rod of the metal.

Then from what has preceded it appears, that the whole strain due to the interior pressure will be expressed by px, and that the greatest resistance to which the cylinder can be safely opposed is $c \times \frac{rx}{r + x}$: hence when the strain and resistance are in equilibrio, we shall have

$$(1) \qquad rp = \frac{rx}{r + x} \times c$$

$$\text{or } pr + px = cx$$

whence $x = \frac{pr}{c - p}$ (the thicknes) sought.

Hence, the following rule in words for computing the thickness of metal in all cases; viz, multiply the pressure per square inch by the radius of the cylinder, and divide the product by the difference between the cohesive strength of a square inch rod of the metal and the pressure per square inch, and the quotient will be the thickness required.

At present we have only considered the circumferential strain: to find the longitudinal strain, we have to multiply the area of the piston by the pressure per inch; while the resistance in this direction will be equal to the cohesive power of the metal multiplied by the area of the transverse section of the cylinder; so that when these are equal to each other we shall have

$$(2) \qquad 3{\cdot}1416\, r^2 p = 3{\cdot}1416\, (2rx + x^2) c$$

which gives $x = r \left\{ \sqrt{\left(\frac{p}{c} + 1\right)} - 1 \right\}$

And it is obvious that whichever of these two values of x, viz., (1) or (2,) is the greatest, is the one which must be adopted. It will appear, however, that in all practical cases the former is the greater; for it is only when p exceeds c that the latter value of x can be ever equal to the former. Let us, for example, find the relative values of p and c, when these values of x are equal to each other, by making

$$\frac{rp}{c - p} = r \left\{ \sqrt{\left(\frac{p}{c} + 1\right)} - 1 \right\}$$

this gives

$$\frac{p^2}{(c - p)^2} + \frac{2p}{c - p} = \frac{p}{c}$$

$$\text{or} \qquad p^2 c + 2pc\,(c - p) = p\,(c - p)^2$$

$$\text{or} \qquad p^2 - pc = c^2$$

$$\text{whence} \qquad p = c\,(\tfrac{1}{2} \pm \tfrac{1}{2}\sqrt{5})$$

That is, these two values of x can only be equal to each other when p exceeds c in the ratio of $(\frac{1}{2} \pm \frac{1}{2}\sqrt{5}) : 1$; which is an impracticable pressure; for it is obvious from the first value of x, that no thickness will be sufficient to resist an internal pressure which exceeds (per square inch) the cohesive power of a square inch rod of the metal; a result which at first sight appears to be paradoxical; but it will be observed that, with such a pressure, the interior surface will be fractured before the other parts of the metal are brought into action.

It will therefore be sufficient to attend wholly to the first expression; and here it may be observed that x and r, with the same pressure and cohesive power, being always in the same ratio, we may reduce the rule for finding the thickness of metal to the following tabulated form, in which it will only be necessary to mutiply the number standing against any pressure by the internal diameter of the cylinder or piston for the thickness required.

The cohesive strength of cast iron, according to experiments made at Capt. Brown's manufactory, is 7·26 tons per square inch; but his machine underrates its power 8 per cent.; (see my Essay on the Strength of Wood and Iron, page 258, 2d edition;) this added, gives us 7·86 tons, or 17,612 lbs., per square inch.

Mr. Rennie gives two results for the cohesive power of cast iron, viz.,

1st . .	= 18,656
2d . .	= 19,072
My experiment	= 17,612
Mean . .	= 18,685

We may, therefore, without sensible error, call the cohesive power 18,000 lbs. per square inch.

The cohesive power of the best gun-metal is given by Mr. Tredgold, in his edition of Buchanan's Treatise on Mill Work, 36,000 lbs. per square inch, and that of lead, 3328 lbs. per sq. inch; and with these numbers I have computed the following thickness for pipes of an inch diameter, for the various pressures given in the Tables, and which will apply to any other case by multiplying the tabular numbers by any given diameter.

TABLE FOR COMPUTING THE THICKNESS OF CAST IRON PIPES AND CYLINDERS.

COHESIVE STRENGTH OF CAST IRON, 18,000 lbs.

PRESSURE.	THICKNESS.	PRESSURE.	THICKNESS.	PRESSURE.	THICKNESS.	PRESSURE.	THICKNESS.
1000	·0294	2000	·0625	3000	·1000	4000	·1438
1100	·0325	2100	·0660	3100	·1040	4500	·1666
1200	·0357	2200	·0696	3200	·1080	5000	·1922
1300	·0388	2300	·0732	3300	·1122	5500	·2200
1400	·0421	2400	·0769	3400	·1164	6000	·2499
1500	·0454	2500	·0806	3500	·1207	6500	·2827
1600	·0487	2600	·0844	3600	·1250	7000	·3181
1700	·0521	2700	·0883	3700	·1293	7500	·3570
1800	·0555	2800	·0921	3800	·1337	8000	·4000
1900	·0590	2900	·0959	3900	·1382	8500	·4462

TABLE FOR COMPUTING THE THICKNESS OF GUN-METAL CYLINDERS; APPLICABLE ALSO TO GUNS AND MORTARS.

COHESIVE STRERGTH OF GUN-METAL, 36,000 lbs.

PRESSURE.	THICKNESS.	PRESSURE.	THICKNESS.	PRESSURE.	THICKNESS.	PRESSURE.	THICKNESS.
1000	·0143	2000	·0294	3000	·0454	4000	·0625
1100	·0157	2100	·0309	3100	·0471	4500	·0714
1200	·0172	2200	·0325	3200	·0487	5000	·0806
1300	·0187	2300	·0341	3300	·0504	5500	·0991
1400	·0202	2400	·0357	3400	·0521	6000	·1000
1500	·0217	2500	·0372	3500	·0538	6500	·1102
1600	.0232	2600	·0388	3600	·0555	7000	·1207
1700	·0247	2700	·0405	3700	·0572	7500	·1315
1800	·0263	2800	·0421	3800	·0590	8000	·1428
1900	·0278	2900	·0438	3900	·0607	8500	·1543

TABLE FOR COMPUTING THE THICKNESS OF LEAD CYLINDERS, WATER PIPES, ETC.

COHESIVE STRENGTH OF SHEET LEAD, 3320 lbs.

PRESSURE.	THICKNESS.	PRESSURE.	THICKNESS.	PRESSURE.	THICKNESS.
5	·00075	100	·0155	1100	·2477
10	·001510	200	·0320	1200	·2830
20	·003030	300	·0496	1300	·3217
30	·004559	400	·0684	1400	·3645
40	·006097	500	·0886	1500	·4120
50	·007645	600	·1102	1600	·4651
60	·009202	700	·1335	1700	·5246
70	·010769	800	·1587	1800	·5921
80	·012345	900	·1859	1900	·6690
90	·013931	1000	·2155	2000	·7575

For a pressure not found in any of the above Tables, it will be sufficiently correct to use the following proportion, viz:

As the difference of the two tabular pressures, between which the given pressure falls; is to the difference between the corresponding tabular thickness, so is the difference between the lesser tabular pressure and the given pressure, to the difference between the lesser tabular thickness and that required. Suppose, for example, the thickness for a cast iron cylinder were required for a pressure of 3650 lbs.

Pressure	3700	Thickness	·1293
Do.	3600	Do.	·1250
Difference	100	Difference	·0043

100 : ·0043 : : 50 : ·0021

Therefore ·1250
·0021

1271 the thickness sought.

As another example of the use of the Table, let the thickness of a cast iron cylinder be required, that will bear a proof pressure of 3 tons per circular inch, the interior diameter being 12 inches.

$$\text{Here } \frac{3 \text{ tons}}{\cdot 7854} = 3\cdot 819 \text{ tons or } 8554 \text{ lbs.}$$

per square inch. Call this 8500 lbs.; then, by Table I., the thickness for an inch cylinder is ·4462, consequently 4462 × 12 = 5·3544 inches, the thickness required.

It will of course be understood that the thicknesses given in the Table are the least that will bear the required pressure, and that, in common practice, presses ought not to be warranted to bear above one third the pressure given in the Table, unless it should appear that the estimated cohesive power of cast iron is too little; if this actually exceed 18,000 lbs., a corresponding reduction may be made in the computed thicknesses.

ON THE HOT AIR BLAST. BY MR. J. B. NEILSON, COR. MEM. INST. C. E. COMMUNICATED IN A LETTER TO THE LATE PRESIDENT, THOMAS TELFORD, Esq.*

I feel much pleasure in being able to comply with your request in mentioning to you what I conceive to be the nature of the advantages likely to be derived by the Iron Trade, and the country generally, from my invention of the Hot Blast, and at the same time, I shall very willingly state the circumstances, agreeably to your request, which, in the first instance, led me to direct my attention to the improvement of the process of iron-making.

About seven years ago, an iron-maker, well known in this neighborhood, asked me if I thought it possible to purify the air blown into blast furnaces, in a manner similar to that in which carburetted hydrogen gas is purified; and from this gentleman's conversation, I perceived that he imagined the presence of sulphur in the air to be the cause of blast furnaces working irregularly, and making bad iron in the summer months. Subsequently to this conversation, which had in some measure directed my thoughts to the subject of blast furnaces, I received information that one of the Muirkirk iron furnaces, situated at a considerable distance from the

* Although the application of heated air has been extended, and the subject tereated more at large since this paper was written, the detail of the discovery from Mr. Neilson to the late President, cannot fail to be interesting. In a future volume, the Council trust to be able to add a further communication from that gentleman on the subject.

engine, did not work so well as the others; which led me to conjecture that the friction of the air, in passing along the pipe, prevented an equal volume of the air getting to the distant furnace, as to the one which was situated close by the engine. I at once came to the conc'usion that by heating the air at the distant furnace, I should increase its volume in the ratio of the known law, that air and gases expand as 448 + temperature.

Example.—If 1000 cubic feet, say at 50° of Fahrenheit, were pressed by the engine in a given time, and heated to 600° of Fahrenheit, it would then be increased in volume to 2104·4, and so on for very thousand feet that would be blown into the furnace. In prosecuting the exper'men's which this idea suggested, circumstances however became apparent to me, which induced the belief on my part, that heating the air introduced for supporting combustion into air furnaces, materially increased its efficiency in this respect; and with the view of putting my suspicions on this point to the test, I instituted the following experiments.

To the nozzle of a pair of common smith's bellows, I attached a cast iron vessel heated from beneath, in the manner of a retort for generating gas, and to this vessel, the blow-pipe by which the forge or furnace was blown, was also attached. The air from the bellows having thus to pass through the heated vessel above mentioned, was consequently heated to a high temperature before it entered the forge fire, and the result produced, in increasing the intensity of the heat in the furnace, was far beyond my expectation, and so evident as to make apparent to me the fallacy of the generally received opinion, that the coldness of the air of the atmosphere in the winter months, was the cause of the best iron being then produced.

In overthrowing the old theory, I had however established new principles and facts in the process of iron-making, and by the advice and assistance of Charles M'Intosh, Esq., of Crossbasket, I applied for and obtained a patent, as the reward of my discovery and improvements.

Experiments on the large scale to reduce iron ore in a founder's cupola, were forthwith commenced at the Clyde Iron Works, belonging to Colin Dunlop, Esq, which experiments were completely successful, and in consequence, the invention was immediately adopted at the Calder Iron Works, the property of William Dixon, Esq.; where the blast being made to pass through two retorts placed on each side of one of the large furnaces, before entering the furnace, effected an instantaneous change, both in the quantity and quality of iron produced, and a considerable saving of fuel.

The whole of the furnaces at Calder and Clyde Iron Works were in consequence immediately filled up on the principle of the Hot Blast, and its use at these works continues to be attended with the utmost success; it has also been adopted at Wilsontown and Gartshirrie Iron Works in Scotland, and at several works in England and France, in which latter country I have also obtained a patent.

The air as at first raised to 250° of Fahrenheit, produced a saving of three-sevenths in every ton of pig-iron made, and the heating apparatus having since been enlarged, so as to increase the temperature of the blast to 600° Fahrenheit and upwards, a proportional saving of fuel is effected; and an immense additional saving is also acquired by the use of raw coal instead of Coke, which may now be adopted. By thus increasing the heat of the blast, the whole waste incurred in burning the coal into coke is avoided in the process of iron-making.

By the use of this invention, with three-sevenths of the fuel which he formerly employed in the cold air process, the iron-maker is now enabled to make one-third more iron of a superir quality

Were the Hot Blast generally adopted, the saving to the country in the article of coal, would be immense. In Britain, about 700,000 tons of iron are made annually of which 50,000 tons only are produced in Scotland; on these 50,000 tons, my invention would save in the process of manufacture, 200,000 tons of coal annually. In England, the saving would be in proportion to the strength and quality of the coal, and cannot be computed at less than 1,520,000 tons annually; and taking the price of coals at the low rate of four shillings per ton, a yearly saving of £ 296,000 sterling would be effected.

Nor are the advantages of this invention solely confined to iron-making: by its use the founder can cast into roods an equal quantity of iron, in much less time, and with a saving of nearly half the fuel employed in the cold air process; and the blacksmith can produce in the same time one-third more work, with much less fuel than he formerly required.

In all the processes of metallurgical science, it will be of the utmost importance in reducing the ores to a metallic state.

V. AN APPROXIMATIVE RULE FOR CALCULATING THE VELOCITY WITH WHICH A STEAM VESSEL WILL BE IMPELLED THROUGH STILL WATER, BY THE EXERTION OF A GIVEN AMOUNT OF MECHANICAL POWER, OR FORCIBLE MOTION, BY MARINE STEAM ENGINES. COMMUNICATED BY MR. FAREY, M. INST. C. E.

Notwithstanding the great experience which has been acquired in construeting steam vessels, few engineers possess any rule for determining *a priori*, what will be the speed of a new vessel, which is designed.

The usual course is, to institute to a comparison with some former steam vessel, whereof the dimensions and performance is known, and by estimating all the differences of dimensions between that former vessel, and the new-intended one, the difference of its expected performance from the known performance, is inferred. When the new intended vessel is not materially different from some previously known case, this method of comparison answers the purpose; but so many cases arise in practice, which are not comparable with any known case, that a general rule is greatly wanted, and the writer of this communication has kept the subject in view, from the first establishment of steam vessels till the present time, omitting no opportunity of ascertaining and recording the performance of every steam vessel whereof the form and dimensions could be ascertained, and at intervals arranging the observations in classes, and deducing rules from them, which have been amended and improved from time to time, as more complete information was attained.

Almost all experiments which have been made, on the resistance of drawing floating bodies, along the surface of unconfined, but tranquil water show, that the resistance increases as the square of the velocity; and hence it may be inferred, that if the draft, or direct pull. (such as horses exert on the towing line of a canal boat,) which is requisite to draw a vessel along the water at a rate of five miles per hour, is one ton, then to draw it at the rate of ten miles per hour, will require a pull of four tons.

It follows as a consequence, that the exertion of mechanical power, or forcible motion, must progress according to the cubes of the velocities, because an increased force is to be exerted with an equally increased velocity; for instance, if an exertion of 25 horse power will impel a given vessel at the rate of five miles per hour, it would require an exertion of 200 horse power, to impel the same vessel at the rate of ten miles per hour.

These two propositions are to be considered as assumptions, when applied to steam vessels, because the experiments on which the first is founded, viz., the rate of resistance being as the square of the velocity, have been all made on very small vessels, nevertheless they all concur in very nearly the same result*; and again, in steamboats, the water yields very considarably to the paddles, and a loss of power is thereby occasioned,† which is not con-

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* A fund of valuable information on this subject is contained in the papers of the late Colonel Beaufoy. Since the above was written, those papers have been published by his son in a quarto volume, which has been distributed in the scientific world; a copy is preserved in the library of the Institution.

† This loss had formerly a much greater influence than at present; because the improvements which have been made in proportioning the paddles of modern steam boats, has rendered the loss less considerable. I was formerly induced to suppose that the exertion of power increased by a higher ratio than the cubes of the velocities attained by the exertion. This notion arose in the course of some of my earliest deductions, from observations on the steamboats first used in Scotland; comparing their increase of speed with the power exerted by successive engines, of greater and greater magnitude, which were substituted one after another on board the same boats, it appeared that the exertion of power required to produce different velocities, corresponded to some intermediate stage between the cubes and the biquadrates of those velocities; an arithmetical mean between the cube and the biquadrate seemed nearly to correspond to those observations, but subsequently it was found out, that the loss occasioned by the yielding of the water

templated in framing the second proposition, (viz. that the power exerted must be as the cube of the velocity, because the resistance of draft is as the square of the velocity.)

Notwithstanding any doubts which may be entertained of the exactitude of the last proposition, the following rule (which proceeds on the assumption, that the impelling power which must be exerted, is as the cube of the velocity) will be found to give results which approximate to the actual performance of steam vessels in common use.

The rule contemplates the extent of surface which the bottom of the vessel exposes to contact with the water, and also the sectional area of the water which must be divided by the vessel, in advancing forwards; and numbers representing those two quantities, are combined into one sum, which is taken to represent the resistance of the vessel, compared with any other vessel of a different magnitude, but similar in form, the speed in both cases being equal.

In estimating the power exerted by the engines, the rule supposes the actual power, as shown by the indicator, with due allowance for friction, not the nominal power by which the engines are rated, which in modern engines is always very much less than the power actually exerted. For instance, Messrs. Boulton, Watt, and Co.'s marine engines, are calculated to exert about 7$\frac{3}{10}$ lbs. effective force, for each square inch of their pistons, and the motion of the pistons in their cylinders causes an expenditure of 31$\frac{4}{10}$ cubic feet of steam per minute, for every nominal horse power,* being a little different from their scale for land engines.

Messrs. Boulton, Watt, and Co.'s 50 horse marine engines, have cylinders 39$\frac{1}{2}$ inches diameter, their pistons moving 3$\frac{1}{2}$ feet stroke, and are calculated to make 26$\frac{1}{2}$ strokes per minute. Their 80 horse marine engines, have cylinders 47$\frac{1}{2}$ inches diameter, pistons 4$\frac{1}{2}$ feet stroke, and calculated at 22$\frac{1}{2}$ strokes per minute.

When a trial of any modern marine engine is made by an indicator, the effective or unbalanced pressure of steam, by which the piston is impelled, will be found much more than the assumed 7$\frac{3}{10}$ lbs. per square inch, after allowing amply for friction; 11$\frac{1}{2}$ lbs. per square inch is probably nearer to an average of good engines; but the very best are considerably more, even as much as 12$\frac{1}{2}$ lbs. per square inch. The actual power exerted, will be greater than the nominal horse power, in proportion as the actual force exerted by the piston is greater than the assumed standard of 7$\frac{3}{10}$ lbs. per square inch.

The approximate rule is as follows:—

I. Find the area of the transverse section of the vessel, under water, in square feet; extract the square root of that number of square feet; multiply the root by the length of the vessel at the water's surface, and divide the product by the greatest breadth of the vessel at the water's surface; then add the quotient to the above number of square feet; the sum is to be taken for a representation of the resistance of the vessel, compared with others of different sizes, but similar in form, the comparison being made, by the above mode of computation, when they are proceeding with the same velocity.

II. Find the number of horse powers actually exerted by the engines, according to observations made by the indicator, and multiply that number by 1000, in case of vessels of an ordinary form, such as were usually built for sea-going vessels seven years ago†; divide the product by the number previously found as above; then extract the cube root of the quotient; and that root will be near to the velocity of the vessel, in miles per hour, through still water.

Example, of a large vessel, 150 feet long, 27 feet broad, drawing 9$\frac{1}{2}$ feet water, impelled by two engines rated at 80 horse power each; she went 9$\frac{7}{10}$ miles per hour (in 1826).

The sectional area of the part under water, was 207.6 square feet; the square root of that is 14.4, which multiplied by 150 feet long, and the product divided by 27 feet broad, gives 80 for a representation of the surface of the bottom in contact with the water, and that added to 207.6 square feet, gives 287.6 to represent resistance. The engines were found by the indicator, to exert an effective force of 11$\frac{1}{2}$ lbs. per square inch of their pistons, (friction being allowed for,) when they made 23 strokes per minute, of 4$\frac{1}{2}$ feet; the pistons being 47$\frac{1}{2}$ inches diameter; that is, 128 horse power, actually exerted by each engine, or 256 horse power by both, this being multiplied by 1000, gives 256,000, which product divided by 287.6 gives 890; and the cube root thereof is 9.62 miles per hour, instead of 9.7 miles, as observed.

Another example, of a small vessel, 105 feet long, 17$\frac{1}{2}$ feet broad, drawing 5$\frac{1}{4}$ feet of water, impelled by one engine, rated at 50 horse power; she went 9$\frac{2}{3}$ miles per hour (in 1829.)

The sectional area was 62 square feet: square root thereof 7.87×105 feet long $\div$ 17$\frac{1}{2}$ feet broad$=17.25$, to be added to 62, making 109.25 to represent resistance. The piston, according to the indicator exerted 12$\frac{1}{2}$ lbs. per square inch effective force, (after allowing for friction;) and made 30 strokes per minute of 3$\frac{1}{2}$ feet, piston 39$\frac{1}{2}$ inches diameter, that is, an exertion of 97$\frac{1}{2}$ horse power; multiply that by 1000, and divide by 109.25, gives 892, the cube root of which is 9.626 miles per hour.

The above two vessels being the same in speed, but very different in magnitude, the accordance of the results given by the rule with the facts, shows that the rule makes a proper allowance for difference of magnitude.

Another example, of a small boat, 72 feet long, 15 feet broad, a very full built form, impelled slowly, by one engine of the oldest construction, called 10 horse power, made in Scotland, 1814.

Sectional area 42 square feet; square root thereof 6.48×72 feet long $\div$ 15 feet broad$=31.1$, to be added to 42, making 73.1 to represent resistance. The engine was very inferior to the modern ones*, and probably did not exert above 7$\frac{1}{2}$ lbs. per square inch of the piston, which was 22 inches diameter, 2 feet stroke, and made 32 strokes per minute, that would be 11.1 horse power. The form of this old boat being very round at the bows, and more resisting than the modern vessels, should have a lower multiplier, viz. 900 instead of 1600; therefore 11.1 horse power $\times$ $900 \div 73.1$ resistance, gives 136.7; the cube root of which is 5.15 miles per hour, which was very near the real speed of this boat.

Another example, of an old boat, 156 feet long, 33 feet broad, in America, 1816, im-

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to the paddles, had been very greatly increased when larger engines had been first substituted for smaller engines, but when larger paddle wheels, and paddles, were given to the larger engines, the speed was improved, and when so improved the power exerted came out nearly as the cubes of the velocities.

This notion would be no more worthy of being recorded than a multitude of other attempts to deduce rules from uncomparable observations, if a rumor of it had not, unknown to me, found its way into a memoire upon navigation by steam, read before the institution at Paris in 1826, by M. Seguin, who relates that he consulted me, when I resided at Leeds, and that I considered the resistance of vessels to be proportional to the fifth powers, divided by the cubes of the velocities, which Mr. Seguin says confirmed some opinions of his own.

Now the fifth power of any number being divided by the cube thereof, is only the same as the square of the number, and that is the proportion of force of draft, which I have always assumed to be requisite for overcoming the resistance of pulling a vessel through the water, with different velocities; but the mechanical power, or forcible motion, which must be exerted by a steam engine, in order to overcome that resistance, I assume to be as the cubes of those velocities; I explained to Mr. Seguin, that formerly I had supposed it to be a more rapid rate of increase than the cubes, something like an arithmetical mean between the cube and the biquadrate as above stated. The fifth power divided by the cube, was a statement made to me, and to which I assented, as giving correct results for the resistance of draft; but it is a needlessly complicated mode of expressing the square of a number. J. F.

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* That horse power being in all cases, according to Mr. Watt's standard, a force of 33,000 lbs. acting through a space of one foot per minute.

† For the very full built forms, such as were used for the early steam boats, built more than 14 years ago, the multipliers should be only 900; or for the very sharp improved forms built in the last two or three years, 1100.

* In those older examples previous to 1819, wherein no indicator observations were made upon the engines, the probable force exerted by the pistons, has been inferred from indicator observations, made since, upon other engines of similar structure and proportions of their parts.

pelled by one engine, piston 40 inches diameter, 5 feet stroke, 17 strokes per minute. she went $6\frac{1}{2}$ miles per hour. Sectional area 150 square feet; square root 12.25 × 156 ÷ 33 = 57.9 to be added to 150 = 207.9 for resistance; the piston probably exerted about $9\frac{1}{2}$ lbs. per square inch, which would be 61.5 horse power*. The form of this boat being very full, multiply by 900 and divide by 207.8 = 266.5, the cube root of which gives 6.43 miles per hour.

Another example, of a small boat, 85 feet length, $18\frac{1}{2}$ feet wide, $3\frac{3}{4}$ feet draft of water, impelled by two engines, pistons 22 inches diameter, $2\frac{1}{2}$ feet stroke, 34 strokes per minute (in 1818). Sectional area 62 square feet; square root thereof 7 87 × 85 feet length ÷ $18\frac{1}{2}$ feet wide = 36, which, added to 62, gives 98 to represent resistance. The engines were the earliest construction of combined engines, and probably their pistons did not exert above $7\frac{3}{4}$ lbs per square inch*; which would be 30.3 horse power. The boat was sharper than those of the older construction, being very similar in form to those before calculated with 1000 for a multiplier, which being used and ÷ 98 resistance, gives 309, the cube root of which is 6.76 miles per hour. The boat actually went $6\frac{5}{7}$ miles per hour.

Another example, of a large vessel, 136 feet long, 26 feet wide, $12\frac{1}{2}$ feet draft of water. Impelled by two engines rated at 60 horse power each, she went $8\frac{1}{2}$ miles per hour, 1825. Sectional area 227 square feet; square root 15.07 × 136 ÷ 26 = 78,8 to be added to 227, making 305.8 to represent resistance. The pistons 43 inches diameter, 4 feet stroke, 26 strokes per minute, exerting $11\frac{3}{4}$ lbs. per square inch, which is $107\frac{1}{2}$ horse power by each, or 215 horse power exerted by both engines. The form of the vessel was full, such as requires 900 for a multiplier; and 215 horse power × 900 ÷ 305.8 gives 633; the cube root of which is 8.59 miles per hour.

The above examples show that the rule applies to cases where the difference of speed is very considerable, as well as the difference of magnitude.

25th April, 1833.

* Vide note, p. 115.]

VIII. ON THE EFFECTIVE POWER OF THE HIGH-PRESSURE EXPANSIVE CONDENSING STEAM ENGINES COMMONLY IN USE IN CORNISH MINES. BY MR. T. WICKSTEED, CIVIL ENGINEER. COMMUNICATED IN A LETTER TO THE PRESIDENT.

At your request I beg leave to forward you some observations upon Cornish engines, which, although not entering into the detail you seem desirous of obtaining, will not, I trust, be quite devoid of interest.

Having received instructions from the Court of Directors of the East London Water Works to visit the mines in Cornwall, for the purpose of making inquires about the Cornish engines, I left London upon the 1st of August last, and returned upon the 20th of the same month.

My friends, Mr. John Taylor and Mr. Grout, kindly gave me letters of introduction, which enabled me to see any engine I was desirous of viewing.

The first mines I visited were the Wheel Friendship copper mines, near Tavistock, Devonshire, and the Redmoor and Holmbush copper, and the Wheel Brothers silver, mines, near Callington, Cornwall. At the Redmoor mine I saw an engine with a 50 inch cylinder, erected by Messrs. Petherick and West. The mine had not been long at work; the shaft was not more than 156 feet deep; there were two shafts with pumps in, and one was about 560 yards distant from the engine; the motion was communicated by means of horizontal bars, suspended by pendulum rods. The engine was working about two strokes per minute throughout the 24 hours; the work done was light, probably not equal to more than five horses' power; it consumed only three and one-third imperial bushels of coals per 24 hours. The engine had been worked the previous fortnight with turf cut off the neighboring moor, at a cost of eight-pence halfpenny per 24 hours; it required 18 feet square of turf, about 2 inches thick, to keep the steam up for that time. I mention this to show that when a large engine is erected to clear a mine, although in the first instance the work it has to do is not proportioned to its size, nevertheless, the consumption of fuel is nearly in proportion to the work done.

As regards the use of turf, it is evident, as these boilers were constructed with the intention of using coal as fuel, when the depth of the mine and the quantity of water increased, that turf could not be used without an alteration in the fire-places, the bulk of turf required being much greater than that of coal. Mr. Grout has since informed me, that he has ordered an engine and boilers for one of his mines, and that the boilers are to be constructed with a view to the use of turf only.

The next engine that I saw was one at the Fowey Consolidated mines, near St. Blazey. The cylinder was 80 inches, the pump stroke $9\frac{1}{4}$ feet, the duty was, in August, equal to 83,296,000 lbs., raised 1 foot high, with an imperial bushel, or 84 pounds of coals; it consumed about a bushel or 84 pounds of coal per hour. This is a most splendid engine, and does greater "duty" than any other engine in Cornwall; the construction of the valves and other parts of the engine is so perfect, that although its load was equal to about 51,000 lbs., the hand-gear might be worked by a boy of ten years of age, as far as strength was required; I worked it myself with perfect ease; whereas, although the load upon one of our engines of 36 inches cylinder is only about 12,000 lbs., it repuires not only a strong, but also a weighty man to work it.

The hand-gear is all bright work, and finished in first rate style. The quantity of bright work in an engine of course depends upon the taste of the person ordering it, and I certainly saw many Cornish engines of longer standing than the one in question, that displayed very little bright work; but that it can be executed as well in Cornwall as in any other county in England must appear evident to those who have seen this engine, and the founderies or engine manufactories at Hayle. At the latter place I saw an 80 inch cylinder, 12 feet long, in the boring machine, and could not perceive a flaw in it.

I was very much struck with the ease with which the engine in question appeared to work; there was scarcely any noise, the greatest was that of the steam in its passage through the expansive valve. To one who had been used to the noise of the pumping engines in London, it appeared remarkable.

The reason that this engine does more work than any other in Cornwall is, in my opinion, owing chiefly to the construction of the boilers, which are different to the generality, inasmuch as they have an internal tube, of about 21 inches diameter, passing through the main flue of the boiler, extending from the back part of the boiler as far as the bridge of the fire-place, dividing the flame as it passes from the fire-place, and thus where the heat is most intense the surface exposed to its action is greatest; there is also a tube of about the same diameter, and 36 feet long, around which the flue from the boilers passes before entering the chimney; into this tube the feed is sent before it passes into the boilers, and is previously heated to a temperature of 180° by means of the heat that might otherwise pass into the chimney unused.

The engines that I next viewed were the following: viz.

50 inch cylinder		at Charleston,	Near St. Austel.
76	Ditto	at East Crennis,	
66	Ditto	at Polgooth,	
85	Ditto	at the Consolidated Mines,	Near St. Day.
80	Ditto	at Ditto,	
30	Ditto	at United Mines,	

Although all of these engines were good ones, they were not equal to the Fowey Consols; as regards the last, viz. the 30 inch cylinder, the water that is raised out of the mine by this engine is conveyed by a pipe above ground to suppy a water-wheel; and, although it is small and not of modern construction, it is doing nearly twice the "*duty*" of the London pumping engines of 4 times greater area in the cylinder. I mention this engine particularly, because it is doing precisely the same work that a water-works engine has to do in lifting water into a reservoir.

I afterwards viewed the following engines: viz.

Two 80 inch cylinders		at Wheel Vor, near Helston.
One 90	Ditto	at North Roskear, near Redruth.
60	Ditto	at South Roskear, near Redruth.
80	Ditto	at Wheel Darlington, near Marazion.
30	Ditto	at Wheel Providence, near St. Ive's.

The 30 inch cylinder at the United Mines, the 80 inch cylinder at Wheel Darlington, and the 30 inch cylinder at Wheel Providence, were raising the water out of the shafts to the *surface*, and I had therefore an opportunity of seeing it thrown up, and I observed that in every case there were no bubbles of air mixed with the water, proving that the pumps were lifting "solid" water, (as it is termed in Cornwall,) and not partly water, and partly air, as had been suggested by those who have no faith in the reports of the work done by the Cornish engines.

The foregoing, with the exception of the engine at Wheel Jewel Mines, near St. Day, which was not at work while I wss there, were all the engines that I saw. And before I proceed to make any further remarks upon them, I beg to call your attention to the Table* that accompanies this Report, which gives further particulars of them, extracted from the "Monthly Reports."

As the accuracy of these Reports has been questioned, or to use plainer language, as it has been asserted that they are false, and that the Cornish engines do not perform the work stated, it may be as well to explain how these reports are made.

When the agents of a mine wish the "duty" of their engines to be published, an accurate measurement of the lifts is made and the diameter of the pumps, and other particulars, are recorded; a counter is fixed upon the engines by Capt. Thomas Lean, (the gentleman who had been appointed by the proprietors of the mines to take an account of the work of their engines,) and this counter has a Bramah's lock attached to it, the key of which he keeps. He visits each of the mines once per month, and takes an account of the strokes made by the engines during the preceeding month. In some instances there is another counter attached to the engine, which is open to the inspection of the engineer, agents, and engine-keepers.

The coals are supplied by a distinct party, who has to account to the agent of the mines for the coals consumed per month; the engine-keepers write orders for the coals they require, and at the end of the month the quantity of coals on hand is measured and deducted; the orders are considered as vouchers, which, after having been examined and countersigned by Capt. Thomas Lean, are passed. It is obviously the interest of the coal agent not to report a less quantity than actually is consumed, being accountable for the quantity used; he cannot therefore be supposed to combine with the engine keepers, whose object, if dishonest, would be to report a less quantity.

But supposing, for the sake of argument, that the engineers, and the agents of mine, were so disposed, and could get these gentlemen to combine with them for the purpose of making a false report, the insanity of such a proceeding will, I think, appear evident upon a perusal of the following statement.

The engines in Cornwall are designed, the drawings made, and the construction and erection of the machinery superintended, by gentlemen who are appointed as engineers to look after the machinery of the mines. The castings are made, and the work designed by the said engineers is executed, at two large "foundries," or engine manufactories, at Hayle.

There are more than twenty engineers employed in the mines in Cornwall, all of whom are anxious to construct the best engine, as the parties producing the engines that do the best duty, obtain, of course, the most employment. It is therefore a matter of jealous attention on the part of these gentlemen to take care that no engine shall have undue credit for doing the most work. It happens occasionally, where a great improvement has been made, that doubts are expressed as to the accuracy of the reported duty: in such cases the engineers and agents of the other mines call upon the parties whose engine is reported as performing extraordinary duty to allow them to prove it; this call is answered by fixing a time for the trial—the trial lasts for two or three days, during which time the engine is in the hands of the rival parties, who are on the watch to detect unfair play, if any should be attempted. If the result of this trial is favorable, the party in question receives due credit; if otherwise, his character as an honest man is lost. If this is not as severe a test of the accuracy of the reports as can be made, and not sufficient, then indeed prejudice must have its full swing, and no farther *proof* can be given, as gentlemen going into Cornwall from London and elsewhere, for the purpose of proving the truth of the statement made by the Cornish engineers, may with equal justice be charged with making false reports.

The reported "duty" is not necessarily the whole performance of the engine, the amount of which cannot always be obtained; it is, in fact, merely the weight of water lifted, multiplied by the height in feet to which it is raised, reduced to the number of pounds avoirdupoise raised one foot high, for every bushel of coals consumed, without reference to *friction*. Now as the friction of each engine, and the machinery worked by it, varies,—and as, although this friction has to be overcome, the amount of it is not reported, so the reported duty is not the whole performance of the engine: and, consequently, an engine which is reported as performing certain duty may, in fact, be doing as much work as another engine whose *reported* duty is greater.

The pumps in the mines in Cornwall are worked, and the water raised, as the engine goes "out of doors," the force of the steam is employed to raise the heavy pump rods; these rods are in many instances so weighty that without counterbalances, or, as they are termed in the country, "balance bobs," the engine would not be sufficiently powerful to raise them,—for instance, in some cases the pump rods are 150 tons in weight, which is equal to 336,000 lbs. Now the greatest load upon any engine reported in September last, was under 100,000 lbs. It is therefore necessary to have "balance bobs," or beams, one end of which is connected by a rod to the pump rod, and the other is weighted with iron as a counterbalance. These beams are in many instances as large as the beam of a 100 horse Boulton and Watt engine; it is evident that these cannot be worked without friction. In other cases the same engine not only works the pump rods that are in the shaft immediately under the end of the engine beam, but also the pumps in distant shafts, by means of horizontal rods extending in some instances half a mile. These rods are supported either by pendulum rods or work on friction wheels; in these cases the friction must be great. It must also be borne in mind that there is more friction in a small cylinder, in proportion to its area, than in a large one, and, in fact, in all the bearings and working parts of the engine,—the power increasing as the squares of the diameters, while the friction increases as the diameters, directly. There are other sources of friction, but the above examples will be sufficient to prove that, although there appears a discrepancy in the reported duties of the Cornish engines, as *friction* is not taken into the account, it does not *necessarily* follow that an engine, whose *reported* duty is great, should be, in fact, superior to one whose *reported* duty is less.

In addition to this, the *reported* duty, of the same engine doing the same work, may vary 7 or 8 per cent. at different times, merely in consequence of the different quality of the coals supplied.

(To be continued.)

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* This "Table of the work performed, &c., in January, 1835," is omitted.

RAPPAHANNOCK CANAL & SLACK WATER NAVIGATION.

NOTICE TO CONTRACTORS.

SEALED Proposals will be received until the 7th day of April next, by the subscriber, on behalf of the Rappahannock Company, at the office of their Engineer, in the Town of Fredericksburg, for the construction of four new dams, raising, covering and backing several others, several short canals, 14 new lift locks, of wood and stone combined, 10 guard locks, and other incidental works, for that portion of the Slack Water Navigation extending from the town of Fredericksburg to Barnett's Mills, a distance of 20 miles.

The prices for the work must include the expense of materials necessary for the completion of the same, according to plans and specifications that will be ready for examination on the 1st to the 7th April, inclusive.

The works to be completed by the 15th day of November of the present year.

It is believed that the work above offered for contract presents superior inducements, especially to such as have been accustomed to, and prefer contracts embracing heavy dry walling and carpentry, the materials of which are at hand and in abundance.

No fears need be entertained as to the healthfulness of the climate. The usual testimonials of character and responsibility will be expected to accompany the proposals.

P. MARTINEAU, Chief Eng.

March 18, 1337. 12—3t

AN ACCOUNT OF SOME EXPERIMENTS MADE IN 1823 AND 1824, FOR DETERMINING THE QUANTITY OF WATER FLOWING THROUGH DIFFERENT SHAPED ORIFICES. BY BRYAN DONKIN, ESQ., F. R. A. S., V. P. INST. C. E.

[The plates of this arti le are omitted until a subsequent number.]

The apparatus employed in these experiments having been made for a different purpose than that of merely ascertaining the quantity of water discharged, occasioned the peculiar form which is here described.

A, in Fig. 1, Plate ——., represents a vertical copper pipe of $3\frac{3}{8}$ inches interior diameter.

B, a horizontal pipe of the same diameter, joined to the lower end of *A* by what is usually called a mitre joint.

C, another pipe, joined to *B* in a similar manner, but so contrived that it could be turned up or down into a vertical or horizontal position.

Fig. 2 represents the outer end of the pipe *C*, with a cap, *D D*, fitting closely upon its outer side, and capable of being put on or taken off at pleasure; upon the end of cap *D* the ring *d d* was soldered, being about $\frac{1}{4}$ inch wide; this cap was employed for securing the different shaped orifices to the pipe *C*. For instance, where the efflux of water through an aperture in a thin plate of metal was intended to be tried, the cap was taken off, and a circular plate *e e*, of a corresponding diameter to that of the exterior of the tube *C*, was applied to the end of *C*, and the cap *D D* put over it to secure it in its place.

To guard against any leakage of water between the joinings of the cap, the pipe, and the plate, the joinings were filled with a soft cement made of tallow and bees' wax.

Upon the upper end of the pipe *A*, a copper cistern, *E*, was fixed. This cistern was about 2 feet diameter and 6 or 7 inches in depth; the length of the pipe *B* was 10 feet; of *C* about 1 foot 9 inches, and of *A* about 25 feet, measuring from the top of *E* to its junction with *B*.

The water was supplied from a circular cistern, *F*, of 6 feet $7\frac{1}{2}$ inches diameter, and 2 feet 10 inches in depth, by means of a sluice *f*, and the trough *g*.

During each experiment a man was placed to regulate the sluice, so as to keep the cistern *E* always full. And in order to ascertain the quantity of water discharged, a float with a graduated stem was placed in the said cistern *F*.

On the 28th of November, 1823, the following experiments were made in the presence of Professor Barlow, of Woolwich.

To the end of the pipe *C*, the conical pipe *G* was applied, by having a thin plate, *h*. soldered to it; the opening at the smaller end, which was $\frac{1}{2}$ inch in diameter, and that of the large end $2\frac{1}{2}$ inches diameter, and its length 12 inches; the discharge took place from the larger end of the cone, whilst the pipes *C* and *G* were in a vertical position; the height of the column of water from its surface in *E*, to the upper end of the cone *G*, was 22 feet 9 inches In 4 minutes it discharged 12·25 cubic feet of water, being at the rate of 3·0625 cubic feet per minute.

2d Experiment.—The conical pipe was inverted so that the discharge took place from the smaller end; in 4 minutes the discharge was 12·5 cubic feet, or at the rate of 3·125 cubic feet per minute.

3d Experiment.—The conical pipe was removed, and a thin plate with a hole $\frac{1}{2}$ an inch in diameter in its centre was applied to the end of the pipe *C*, the height of the column being 23 feet 3 inches; in 4 minutes the discharge was 8·2 cubic feet, or at the rate of 2·05 cubic feet per minute.

Nov. 29. The pipe *C* and the cone *G* were placed horizontally, with the smaller end of the cone outwards, and a column of 26 feet; in 8 minutes it discharged 26·8 cubic feet, being at the rate of 3·35 cubic feet per minute.

Dec. 1st. Pipe and cone horizontal, the larger end outwards, and 26 feet column; in 5 minutes discharged 15·4 cubic feet, or 3·08 cubic feet per minute.

Another experiment was continued for 8 minutes, and the discharge was at the rate of 3·09 cubic feet per minute.

Dec. 5. Two conical pipes, *H H*, each of which was of the same dimensions as the one above described, were united at their smaller ends, and applied to the pipe *C*; in 10 minutes the discharge through the double cone was 48 cubic feet, or at the rate of 4·8 cubic feet per minute, the column of water being 24 feet 3 inches.

A second experiment on the same day was made with a thin plate, having a $\frac{1}{2}$ inch hole through it, and a column of 24 feet 3 inches; in 10 minutes the discharge was 20·6 cubic feet.

In a third experiment, the double cone was tried again, and the discharge obtained was 47·4 cubic feet in 10 minutes.

Dec. 8. The 2 conical pipes last mentioned were separated, and joined together at their larger ends, as at *J J*; in this form a discharge of 20·8 cubic feet of water was obtained in 10 minutes, under a column of 24 feet 3 inches.

Dec. 12. The thin plate with a $\frac{1}{2}$ inch hole was again applied under a column of 24 feet 3 inches, and during 10 minutes discharged 20·75 cubic feet.

Same day. The single cone with the small end outwards, in 10 minutes discharged 32·2 cubic feet, and with the large end outwards, 29·7 cubic feet in the same time, under a head of 24 feet 3 inches.

Same day. The double cone united at their smaller ends, produced a discharge of 46·5 cubic feet in 10 minutes, and in 5 minutes 23·5 cubic feet.

June 8th, 1824. The discharge through the $\frac{1}{2}$ inch round hole in the thin plate during 15 minutes, was 31·75 cubic feet, under a column of water of 24 feet 4 inches high = 2·116 cubic feet per minute.

June 9. Through the same hole, and under the same column, the discharge was 42 cubic feet in 20 minutes;=2·1 per minute.

Through a round hole $\frac{1}{4}$ of an inch diameter, in a thin plate, the discharge was rather less than 16 cubic feet in 30 minutes, under a column of 25 feet $8\frac{1}{2}$ inches.

June 10. The $\frac{1}{2}$ inch hole through a thin plate gave a discharge of 65 cubic feet under a column of 25 feet $8\frac{1}{2}$ inches in 30 minutes, at the rate of 2·166 cubic feet per minute.

The single cone, with the smaller end outwards, delivered 58 cubic feet in 18 minutes, under a head of 25 feet $8\frac{1}{2}$ inches;= 3·22 cubic feet per minute.

On a subsequent day in June. The same experiment repeated, and in 20 minutes the discharge was 63·33 cubic feet;=3·166 cubic feet per minute. In this experiment, the small end of the cone was immersed about 6 inches below the surface of the water during the discharge, consequently the column was 25 feet $2\frac{1}{2}$ inches.

Another experiment on the same day, with the same cone, having its larger end outwards, and immersed seven inches below the surface of the water, discharged 59 cubic feet of water in 20 minutes;=2·95 cubic feet per minute.

The same experiment repeated during 10 minutes, gave a discharge of 29·46 cubic feet, or 2·946 cubic feet per minute.

In another experiment, the double cone joined at the smaller ends, in 18 minutes discharged 84·633 cubic feet under a head of 25 feet 9 inches;=4·7 cubic feet per minute.

Another experiment. The same double cone with its axis 7 inches under water, and a column of 25 feet 2 inches, discharged 56·5 cubic feet in 12 minutes;=4·7 cubic feet per minute.

Agriculture, &c.

From the Baltimore Farmer and Gardener.

AGRICULTURAL JURISPRUDENCE.

We learn from the *Silk Culturist*, that at the late term of the Supreme Court of Errors in Hartford, Connecticut, a question of Agricultural Jurisprudence was settled, which has often been the occasion of much controversy, and sometimes of a total interruption of that social intercourse and interchange of kind feelings and offices, without which, neighborhood ceases to be a blessing, and actually becomes a curse. The question arose in an action of trespass for taking a portion of the fruit from a peach tree. The facts in the case were these.—The trunk of the tree stood about four feet from the division line between the plaintiff and defendant, and its roots and branches extended some distance into and over the defendant's land. The defendant plucked the fruit from the branches overhanging his land, to within one foot of the line, for which the action was brought.

The defendant claimed—

1st. That he was tenant in common with the plaintiff in the tree, and consequently had a right to take from the branches on his side of the line.

2d. That if he was not tenant in common with the plaintiff, he was owner in severalty in that part of the tree which drew its nourishment from his soil, and that he had a right to take the fruit from the branches that overhung his land.

3d. That if he was not the owner of the part of the tree which is sustained by, and overhangs his land, still he was entitled to the fruit growing on such branches.

4th. That he had a legal right to remove the overhanging branches and projecting roots, they being a nuisance which he had a right to abate.

The court ruled the first three points against the defendant, and decided that the ownership of the tree was in the proprietor on whose land it was originally planted, and that he, of course, was entitled to all the fruit, though the roots and branches may have extended into and over the land of the adjoining proprietor. On the last point the court decided that the projecting roots and branches were nuisances which the defendant might haae abated; but that he had no right to appropriate the fruit to his own use.

ILLUMINATED DOOR PLATES.—A person in Philadelphia has invented a new article of the kind, which the United States Gazette describes thus:

"It is formed of very thick glass, ground on the inner surface—on the outer surface is placed the name in metalic letters, fastened with rivets, the plate set in a handsome frame of brass or silver, to suit the other furniture of the door. By day it is a handsome door plate, of the usual appearance; at night the entry lamp makes the name more conspicuous on the outside than it would appear in the sun light. Such a plate would aid the search for a physician's house at night."

Give such hogs as you have in your pen, once a week, a few shovels full of charcoal, or pieces of rotten wood.

From the Farmer and Gardener.

LEGISLATIVE PROTECTION TO AGRICULTURE.

We insert in another part of this day's journal, a very interesting report made in the Legislature of Ohio, on the expediency of encouraging the culture of *Silk* and *Beet*. Though young in years, Ohio is a most powerful State; great in all those physical resources and local advantages, which tend to impart importance to her as a member of the union; the influence of her counsels in giving an impetus to those new branches of American husbandry, cannot, therefore, fail to be of infinite service in putting them upon a footing of solidity, which will place them beyond the reach of contingencies, and pl ad for their encouragement with a force and fitfulness, that must find its way to the favor of the other legislative bodies of the confederacy.

While *Ohio*, in the West, the first of the new States, is nobly championing the cause of Agriculture, we are gratified to find that *New-Jersey*, one of the gallant old thirteen who so generously aided in breaking the shackles of the mother country, in the war of the Revolution—whose sons during that period of dismay and peril, stood side by side with those of Maryland, and Delaware, in the deadly strife—is actively awake in furthering the good cause—and most sincerely do we join our aspirations with those of the editor of the *Bugle*, expressed in the paragraph below, in the hope, that Maryland will not be slow to follow the lead thus auspiciously set her by her ancient ally—nay, we will go further, and hope, that every other State, whose councils have not already done so, will come to the rescue, with a determination to vie with each other, in the holy rivalry, of doing their respective States the most service

Culture of Silk and Sugar Beet.—In glancing over a New-Jersey paper we accidentally noticed the following among the proceedings in the Legislature of that State on the 7th inst. It evinces an enlightened policy, and sets an example which we hope Maryland will not be slow to follow.—[Kent Bugle.]

Mr. *Mollesson*, after an interesting report in favor of encouraging the culturs of Silk, and Beet Sugar. reported two bills in favor of the same, and 500 copies were ordered to be printed.

BUCKWHEAT STRAW.

In answer to a question put to us some time since, by "a young Farmer," whether "any use could be made of his buckwheat straw," we replied that it was better for his milch cows than the best timothy hay, that his cows would eat it with equal avidity; that if it had not been too long exposed to the vicissitudes of the weather, it would prove equally nutritious; that so far as the secretion of milk was concerned, it was infinitely preferable to any hay or fodder within our knowledge, and that if cut and boiled, it would make most excellent slop for his cows. In a conversation with a gentleman from Virginia a few days since, we were happy to find our own opinion and experience confirmed by an anecdote which he related. At the time of thrashing out his buckwheat, he was from home, and contrary to his usual practice, which was to cast the straw into the barn-yard amongst the other *litter*, his hands stacked it in a fold-yard, with his other hay and fodder, where it was accessible to a portion of his cattle. On his return home, he found that his stock had made as free use of the buckwheat straw, as with either his hay or fodder, thus establishing the fact that these animals, which should be admitted to be judges of what suits their own appetites, when left to their own choice, had by their selection of this hitherto neglected food, pointed out a new source of economy to the farmer and planter, which too many have not properly appreciated. Buckwheat as every one knows, can be grown upon almost any soil if planted from the opening of the ground in spring, till the beginning of July, and will not only yield a handsome return of grain, but a full and wholesome supply of as good hay as any agriculturist ever fed his cattle withal.

"Adversity," to use a trite adage, "is the mother of invention," so should the experience of the last few years teach every one engaged in tilling the earth, to husband every means within his power, and of resorting to every resourse within the compass of his ability, to make his stock comfortable, and keep them in plentiful supply of food during the inclemant months of winter. It is the custom of most farmers to sow buckwheat on the poorest spot on the farm, and even when thus treated, often without manure, with no other culture than a ploughing and harrowing, its product is from 20 to 30 bushels to the acre, according to the season. When placed under more advantageous circumstances, on good soil, or land properly manured, it has been known to give a produce of from 60 to 70 bushels to the acre. If then, instead of sowing a small patch merely to afford meal enough for the winter supply of those delightful cakes, which add so much to the luxury of the farmer's winter breakfast table he were to sow from 10 to 20 acres, how much of profit would ensure to him? how much wholesome food would he secure for his cows? and how much solid comfort to all and every thing around him? Than buckwheat grain, nothing is eaten more readily by the poultry and the pigs. For the former, it is the best in winter, largly contributing by the great proportion of lime of which it is composed, to make them lay; for the latter, or for breeding sows, if reduced to meal and boiled into slop, it is at once nourishing and fattening. For sows with young pigs, nothing is more conducive to the secretion of plentiful supplies of milk. And should the straw be cut and steamed, and thus given to milch cows, it would serve as a substitute for other slops, and would materially increase the quantity as well as quality of their milk.

Besides the above uses of this article, if sown early, in the proportion of 2 bushels to the acre, it would bear mowing twice during the season, and would afford most excellent grass for soiling: and beyond all question, there is no green crops that can be turned in with the exception of a clover-ley, that makes so good a dressing for ground for wheat as does buckwheat.

When sown for the grain, from 1 to 1½ bushels to the acre is enough seed.

NEW-YORK AGRICULTURAL CONVENTION.

The Albany Argus of the 20th instant, contains the proceedings of the State Agricultural Convention of New-York, convened at Albany, the capital of that State, on the 2d inst. *Anthony Van Bergen*, Esq. of Green county, was appointed President, four other gentlemen, Vice Presidents, and the same number, Secretaries.

A series of resolutions were reported to the Convention and unanimously adopted. We shall give an abstract of these with a view of showing their tendency and character. They set forth:

That it is of primary importance to all, that the great branch of agricultural labor should be specially encouraged and honored, and that the agriculturist should himself receive all those mental aids, and that stimulus to industry, which are calculated to make him more prosperous in his business, and more useful to society.

That we are particularly admonished by the scarcity and very high price of all the products of agriculture, to put forth our efforts to alleviate its labors and increase its productions;—That to the Legislature of the State, as the constituted guardians of the public weal, particularly appertains the duty of fostering and improving this primary source of wealth and happiness:—

That from the experience of the past at home and abroad, the Convention are confident, that the patronage of the government may be advantageously exerted, and without detriment to the financial operations of its treasury, to this great object.

1. By so raising the standard of instruction to the children of agriculture, as to enable them to understand, and to apply to productive labor, the best practices and improvements of the age; and

2. By imitating the successful examples furnished to other governments, of calling forth the skill, industry and competition of our citizens, by pecuniary reward and honorary distinction:—

That influenced by these views, the Convention respectfully recommend to the Legislature, *to appropriate a permanent fund, the interest of which shall amount to at least* THIRTY THOUSAND DOLLARS A YEAR, *to encourage the establishment, and to sustain in usefulness, a Central and County Agricultural societies*, and to promote generally the interests of husbandry, under such regulations and restrictions as to them shall seem meet, and that provision be made by law for introducing into the common schools of New-York, such books of elementary science, as may be best calculated to accelerate improvements in arts of productive labor.

A memorial, embracing the objects above specified, to the Legislature, was also adopted with equal unanimity.

Among the other resolutions adopted by the Convention, we find the following:

Resolved, That the exhibitions made to this Convention, of *silk fabrics and thread*, made from the indigenous mulberry of our country, affords ample evidence that the silk culture is admirably adapted to our soil and climate, and that nature has bountifully supplied us, should foreign resources fail, with an excellent material for its prosecution.

The Convention before adjourning recommended that another Agricultural Convention be convened in Albany on the first Thursday of February next, and that the several counties in the State take proper measures to be represented therein.

We notice these proceedings with feelings of unmingled pleasure, for every movement of the kind must serve to animate the breasts of the agriculturists of our land with the importance of attending to their own interests; for unless they do so, it must be obvious that no voluntary action will take place on the part of most of those who fill our legislative bodies.

—

POLICY OF DESTROYING WEEDS.

There is so much true philosophy, so much sound practical sense, in the following extract from one of Sir Humphrey Davy's lectures, that we cannot omit copying it.

"In all lands, whether arable or pasture, *weeds* of every description should be rooted out *before* the seed is ripe; and if they are suffered to remain in hedge rows, they should be cut when in flower, or before, and made into heaps for manure: in this case they will furnish more nutritive matter in their decomposition; and their increase by dispersion of seeds will be prevented. The farmer, who suffers weeds to remain till their ripe seed are shed, and scattered by the winds, is not only hostile to his own interests, but is likewise an enemy to the public; a few *thistles* will stock a whole farm; and by the light down which is attached to their seeds, they may be distributed over the whole country. Nature has provided such ample resources for the continuance of even the meanest vegetable tribes, that is very difficult to ensure the destruction of such as are hostile to the agriculturst, even with every precaution; seeds excluded from the air, will remain for years inactive in the soil, and yet germinate under favorable circumstances; and the different plants, the seeds of which, like those of the *thistle* and *dandelion*, are furnished with beards or wings, may be brought from an immense distance. The *fleabane* of Canada has only lately been found in Europe; and Linnæus supposes that it has been transported from America by the light downy plumes with which the seed is provided.

—

EXPERIMENTS OF VARIOUS MANURES ON POTATOES.

The following extracts from "*Dickinson's Agriculture*," will show that in Great Britain, particular attention has been given to *salt* as a manure. To show its utility as a manure in a more clear point of view, the following experiments were made by the Rev. Mr. Cartwright.

A certain portion of soil (ferruginous sand brought to a due texture by a liberal covering of pond mud) was laid out in beds one yard wide and forty long: of these, 25 were manured, the first excepted, as follows:

No of Beds.	Kinds of Manure applied.	Product of Potatoes.
1	No manure	157
2	Salt, ¼ peck	198
3	Lime, one bushel	150
4	Soot, one peck	192
5	Wood ashes, two pecks	187
6	Saw dust, three bushels	155
7	Malt dust, two pecks	184
8	Peat, three bushels	159
9	Decayed leaves, three bushels	175
10	Fresh dung, three bushels	192
11	Chandler's graves, nine lbs.	220
12	Salt, lime	167
13	Salt, lime, sulphuric acid	175
14	Salt, lime, peat	183
15	Salt, lime, dung	199
16	Salt, lime, gypsum, peat	201
17	Salt, soot	240
18	Salt, wood ashes	217
19	Salt, saw dust	180
20	Salt, malt dust	189
21	Salt, peat	171
22	Salt, peat, bone dust	178
23	Salt, decayed leaves	187
24	Salt, peat ashes	185
25	Salt, Chandler's graves	195

"The quantity of ingredients the same as when used singly.

On the same day the whole was planted with potatoes a single row in each bed; and that the general experiment might be conducted with all possible accuracy, each bed received the same number of sets.

On the 21st of September, the potatoes were taken up, when the produce of each row was according to the annexed table.

It is observed as being remarkable, that of ten different manures, most of which are of known and acknowledged efficacy, *salt*, a manure hitherto of an ambiguous character, is superior to them all, one only excepted, and that when used in combination with other substances, it is only unsuccessfully applied in union with that one, namely, *Chandler's graves*, no other manure seemingly being injured by it: possibly its deteriorating effects on Chandler's graves may be owing to its antiseptic property, which retards the putrefactive process by which animal substances undergo the changes necessary to qualify them to become the food of plants. This, however, he cannot, from any appearances in the soil when the plants were taken up, assert to have been the case. The extraordinary effects of salt, when combined with soot, he thinks are strikingly singular: there is no reason to suppose these effects were produced by any known chemical agency of soot and salt on each other. Were he to guess at the producing cause, he should conjecture it to be that property of saline substances by which they attract moisture from the atmosphere; for he observed those beds where salt had been used were visibly and palpably moister than the rest, even for weeks after the salt had been applied, and this appearance continued until rain fell, when of course, the distinction ceased. This property of attracting moisture had greater influence possibly, on the soot than on any of the other manures, as soot from its acrid and dry nature may be supposed to require a greater proportion of water to dilute it, than those substances which contain water already. It may be proper to observe, that on those beds where salt had been used, the plants were obviously of a paler green than the rest, though not less luxuriant: a circumstance which he thought worth noticing, and which he considered, though erroneously (as appeared by the event,) to indicate a want of vigor, which would be felt by the crop. It was observable also, that where salt was applied, whether by itself or in combination, the roots were free from that scabbiness which oftentimes infects potatoes, and from which none of the other beds (and there were in the field nearly fifty more than what made part of these experiments) were altogether exempt."

—

BURNING SURFACE SOIL AND CLAY.

The following simple and cheap process of burning surface soil and clay, and thus adding to your quantity of calcareous manures and increasing your ability to improve your lands, is very stronly recommended by that eminent English agriculturist, Mr. Curwen. Those living remote from large cities, whence supplies of ashes are usually drawn, and in the neighborhood of lime regions, could in this way, at a very trifling expense obtain ample resources for top dressing their meadows, corn fields, grain fields, and greatly multiply their ability for raising turnips and root crops generally.

Mounds of seven yards in length, and three and a half in breadth, are kindled with seventy-two bushels of lime. First a layer of dry sods or parings, on which one half of the lime is spread, mixing sods with it, then a covering of 8 inches of sods, on which the other half of the lime is spread, and covered a foot thick; the height of the mound being about a yard.

In 24 hours it will take fire. The lime should be immediately from the kiln. It is better to suffer it to ignite itself than to effect it by the operation of water. When the fire is fairly kindled, fresh sods must be applied. It is best to obtain a considerable quantity of ashes before any quantity of clay is put upon the mounds. The fire naturally rises to the top. It takes less time, and does more work to draw down the ashes from the top, and not to suffer it to rise above six feet. The lime is supposed to add full its worth to the quality of the ashes. Where limestone can be had it would be advisable to burn a small quantity in the mounds, as it would be a great improvement to the ashes, and at the same time help to keep the fire in.

METHOD OF BURNING LIME WITHOUT KILNS.

The practice of lime-burners in Wales was formerly to burn their lime in kilns, made broad and shallow, but lately they have begun to manufacture that article without any kilns at all.

They place the limestone in large bodies, the stones not being broken small, and calcine these heaps in the same way used for preparing charcoal. To prevent the flame from bursting out at the tops and sides of these heaps, turfs and earth are placed against them, and the aperture partially closed; the heat is thus regulated and transferred through the whole mass, and notwithstanding the increased size of the stones, the whole becomes thoroughly calcined. As a proof of the superior advantage that lime burnt in these clumps has over lime burnt in the old method, a preference is always given to that burned in heaps. This practice also prevails in England and Scotland.

TANNERS' BARK.

There is much doubt and scepticism prevailing with respect to the relative value of this substance as an improver of the soil. While some contend that it is a cold, inert body, deprived, by the process of tanning of its nutritive properties, others object to it upon the score of its being too heating. Here are qualities ascribed to it as opposite as human opinion can make them; but as it is among the infirmities of his nature for man to err in judgment, may it not be that neither of these opinions are correct. Prejudice too, may have its share of influence in the formation of them, and the truth may be found in the fact that their substance does not possess any one of the qualities here ascribed to it, in any injurious degree, but may in fact combine those which would render it, after being submitted to a judicious chemical process, a highly valuable manure. That the *tanning* principle is extracted no one can question; but in undergoing that deprivation, may it not imbibe other qualities equally conducive to the growth of vegetables? In the tanner's vat, it is placed in close contact with hides, and may it not receive certain portions of animal matter, eminently calculated to advance the healthful nurture of plants?—While in the hands of the tanner, more or less of lime in some of its forms are doubtless imparted to it. This, we know, when combined with earthy matters, or hard woody, fibrous substances, promotes active decomposition, and consequently, the elimination of gaseous particles, which becoming incorporated with the soil, form a valuable part of the pabulum of living vegetables. We are told upon the highest authority that when lime, whether freshly burnt or slacked, is mixed with any moist, fibrous, vegetable matter, there is a strong action between the lime and the vegetable matter, and they form a kind of compost together, of which a part is usually soluble in water; and that by this kind of operation, lime renders matter which was before comparatively inert, nutritive. Now, may it not be, that all that is wanting to render tanners' bark easy of decomposition, and to convert it into nutritive matter, is the application of a proper portion of lime, or some other substance capable of generating heat? Fermentation once excited, if permitted to go on, would soon convert it into a black vegetable mould. In that state, all would admit its applicability for the production of the food of plants. Rotten tanners' bark mixed with silicious earth, we all know, makes one among the best preparations for the flower bed; indeed we know no mould superior to it; from many years experience we can say that we would prefer it to any other. If then, it was that inert body which some would represent it, it certainly could not gain any thing by its combination with silica to impart to it that principle of active vegetation which it undoubtedly possesses. But let us see what is taken from it in its process of tanning.—The best oak bark, cut at the most auspicious season of the year, contains but 29 parts of the tannin principle out of 480 parts, and surely the abstraction of this minor portion of its whole constituent body, does not materially impair the capacity of the residuum for the purposes of production. But what has been found to be the constituents of this residuum? Why, by a minute analysis of 1,000 parts of dry oak bark, it was found to contain

Of woody fibre	876
Tannin	57
Extract	31
Mucilage	13
Matter rendered insoluble during evaporation, probably a mixture of Albumen and extract,	9
Loss—partly saline matter,	9

It must, therefore, be obvious from this exhibit, that after the separation of the TANNIN principle, there still remains much in the tanners' bark, which may be converted into vegetable nutriment, for of a thousand parts, only fifty-seven are found to combine with, and form a part of, the hides in the process of tanning. The substance abstracted, amounts to less than 6 per cent.; for as the analysis was made by incineration, the *loss* set down should not enter into the account against the residuum. Every one at all conversant with the *constituent properties of manure*, and with the physiology of plants, do know, that the substances which sustain the vitality of growing vegetables must be taken up either in a *liquid* or *gaseous* form, and that the exquisitely delicate ducts of their lymphatic vessels cannot receive any thing solid into them. From these premises, it is fairly deducible that tanners' bark, once reduced to vegetable mould, would be a valuable and healthful manure; the process then, by which it can be *reduced*, becomes an object of importance, and it is equally so, that by admixture with earth and lime, with unrotted horse manure or ashes, its decomposition can speedily be effected. Would it not then, in the absence of other vegetable matter be a valuable substance to spread on all fields where lime was intended to be used, whereon no clover-ley or grass sward existed? It strikes us that it would be; and we recommend its use, from an honest conviction that the happiest meliorating effects would result from it.—Deriving, as tanners' bark do, no little portion of animal matter during the period which it lies in contact with the hides, it may be said to possess both animal and vegetable salts, therefore, must be presumed to be highly forcing in its properties, and, hence, peculiarly adapted to tenacious soils, which may be, naturally, deficient in vegetable matter.

From the New-England Farmer.

MR. FESSENDEN:—If the following remarks are worthy of a place in your useful paper, you are at liberty to publish them, some years since there was a great scarcity of hay. At that time I had on hand a large stock of cattle. Sometime in the month of February my stock of hay was about all gone, and where to obtain more, I could not tell. It could not be had short of 20 miles, and there at the price of thirty dollars per ton.

One day I went to the stable, and no sooner than I entered, every eye was upon me for aid. You may imagine what my feelings were, when I knew of no relief which I could bestow. I stood a while to reflect on what course to pursue, or what to do. At last I thought of some flax which had been lying on the beams of my stable for several years, which had not been rotted. I threw down a few bundles, and gave some of the flax to my cattle. They took hold of it with such eagerness, that I was obliged to take it from them to prevent their being choked with it. I then took a block of wood and a broad axe and chopped it up short. I then gave a very little to my cattle, and continued so to do, until it was all gone.

From what I then discovered of the virtue and oily substance that the flax contained, I am of opinion that what I could take up between my two hands and fingers, after being chopped, and given to a cow each day through the winter, would carry her through the foddering season. My opinion is that the bulk of one ton of hay in flax, will be of more value to a stock of cattle than four tons of hay. I am also of opinion that oil can be obtained from flax. As I have an oil mill, I intend to try the experiment the ensuing season. I would recommend to farmers to sow more seed the coming spring than usual; for flax and the seed are of more value than people are aware of. STEPHEN PERLEY.

BY THE EDITOR.—The use of unrotted flax as food for cattle is new to us, and we have never, before we received Mr. Perley's communication, heard or read of its being applied to that purpose. We are of opinion that Mr. P. has made a valuable discovery, and are much indebted to him for its communication.

BEET CULTURE.

INTERESTING CORRESPONDENCE.

We have been favored with the following letter to Mr. Clay, together with Mr. C's. reply.—[United States Gazette.]

PHILADELPHIA, Dec. 19, 1836.

SIR,—Not conversant with the intended movements in regard to the proposed reduction of duties on various articles, but having glanced over the proceedings of congress and noticed that the subject will soon be before that body, and from the remarks on the proposed repeal of duty on Sugar, my mind reverted to that subject in which I have now for a year past, been so deeply interested. My pursuits are mercantile, but I feel that interest for any branch of industry that will benefit the country, that I have, so far as my efforts could avail, done all in my power, and I trust not without success, to introduce and establish in the United States, the culture of the Sugar Beet and the manufacture of Sugar therefrom.

I am aware it is making a great demand upon you, still I wish, most earnestly, to obtain your attention for a moment. I have recently been in a position to meet and become acquainted with Mr. James Pedder, from England, who had for years kept his eye upon the progress of the subject of making some attempt to introduce the same into the United States. I declined at first, persuaded that influence far greater than mine would be needed to introduce the matter successfully to our citizens.

However, deeming "nothing impossible to a willing mind," I proceeded. I introduced Mr. Pedder to our best agriculturists and chemists, and through them to James Ronaldson, Esq. Mr. Vaughan he had already known for several years. Mr. Vaughan, Mr. Ronaldson, and myself, conferred on the subject frequently, in Dec. 1835, and January 1836. I sought and procured such information as I could from the Journals of France and other publications, which was sufficient to decide its practicability, and became evident that it only required a hearty effort somewhere in order to succeed. With a subscription of $50 each from John Vaughan, James Ronaldson and Samuel Richardson, Esqrs., of this city we enabled Mr. Pedder to depart for France by agreement made on the 6th Feb. 1836, (vide his Report) which was entered into with him in the names of Mr. Roalndson, Mr. Vaughan, myself and others, and he departed from New-York on the 10th day of Feb. 1836, furnished with advances and credit on London to prosecute his object even beyond the terms of the agreement, if found requisite and useful. After his departure, every exertion was made to raise donations sufficient to meet the expenses of the undertaking, to INTRODUCE ALL REQUISITE ATTAINABLE INFORMATION, without any intention on our part ever to profit by sugar making. It was thought that a society would aid the thing, and disseminate it more advantagously.

Accordingly, from among the donors, the BEET SUGAR SOCIETY, was organized, but few of its members ever became sufficiently interested to take an active part. This was owing, I suppose, principally to their conviction that the undersigned was so actively engaged in it as to leave little to be done by them, beyond the liberal pecuniary aid which they cheerfully extended. To the active exertions, however, of my worthy colleague, Benjamin M. Hollinshead, complete success, in carrying through our first views, has been secured.

Mr. Pedder wrote to me on the subject, from France, and his letters were published. He returned and made the Report I send you herewith.

About 500 lbs. of seed, from France, have been disseminated through the country from Missouri to Maine.

I visited our State Legislature a few days before they adjourned last session, and though business was pressing upon them, obtained their very favorable notice of our efforts, by a reference (made indeed at an unseasonable time, but unanimous) to the Committee on Agriculture, and the same evening met the committee, who, satisfied, no doubt, of the propriety of the measure, reported next day and recommended an appropriation of three thousand dollars, to be placed in the hands of the Governor, to be applied to the introduction and dissemination of information relating to the manufacture of Beet Sugar and its encouragement, in the State of Pennsylvania.

From a press of business, though this recommendation unanimously passed the Senate, it failed to be noticed in the House, a circumstance, since, most deeply regretted by me, as it would have secured the active existence of the Society organized, and placed in their hands means to have rewarded ingenuity, by premiums, and made successful experiments in the production of sugar from our own soil. Thus left, with a heavy expenditure, and to reimburse the expenses of Mr. Pedder's mission, expense of the seed previously gratuitously distributed, publications, &c., reliance was had upon the well known, but too often taxed liberality of a certain portion of the benevolent and patriotic citizens of Philadelphia.

In this position of things, I have certainly the satisfaction to know, that the exertions, which have not been without labor, have availed much; for I am persuaded that the growing of the sugar therefrom, are destined soon to become parts of the agricultural and mechanical industry of the United States.

Even should no fostering care be extended to it, (such as wisdom and prundence would dictate,) native ingenuity, industry and perseverance, untrammelled by speculative jobbing, or joint stock beet sugar companies and land speculations, will fix it in the United States; and I think it is not going too far to predict that, in the present age, the product of sugar from our own soil, from the beet-root, will supply our own demand, and perhaps more.

France produced last year EIGHTY MILLIONS OF POUNDS OF BEET-ROOT SUGAR! more, by one-third, if I mistake not, than our Louisiana crop of the same period!! What does this not predict with our favorable soil and climate, where, already, this year, from the seed we have distributed, eleven per cent, of good granulated sugar is said to have been obtained from the root which in France yields but six per cent. average, and never over eight? My own observations have not positively verified this, but I am led to believe that it was obtained in the vicinity of Albany, New-York.

From the result of my own experiment (I have had opportunity to make but the one) though from accident my sugar did not granulate properly, I am fully satisfied that 8 per cent. of good sugar for refining, is to be obtained in the United States, from the beet-root.

The growing of Sugar Beet, and manufacture of sugar in the United States, so far as relates to this vicinity, stands thus:—In and about Philadelphia all who are interested (except indeed a few who have this season made and exhibited to me small quantities of sugar better than any I have seen from France,) are waiting to verify the success of others—every man is looking to his neighbor. In other sections of the country the subject has lately been taken up with more spirit. In March last, I received, in an indirect manner, a communication from Mr. M. Isnard of Boston, applying to be engaged in some branch of the manufacturing, by our society, under the impression that its object was the manufacture of sugar. Then, no society had yet been formed.

Informed of the real object we had in view, he turned his attention to excite an interest in Boston. Having had considerable practical experience himself, in all the departments of Beet-root sugar making, from having been engaged in its manufacture in France, he has, by his efforts, contributed to give an impulse to it in the State of Massachusetts.

Joint Stock Companies, Land Speculation, and a variety of ways for making money have been proposed, but none having for its object the true purpose of those engaged in this matter.

Some, disappointed in their visionary schemes of profit from the sudden increased value of land from its introduction, and failing to draw into their plans, those interested, have essayed to disparage the efforts of others whose consciousness of their own motives has been their guide, and to discourage its introduction.

Their success, small as it must be, will not be envied by the well wisher of his country's prosperity.

Herewith, I beg leave to transmit to you a translation of a document published by the Royal Society of Agriculture of France on the subject, which do me the favor to peruse at your earliest convenience and hand over afterwards to my friend Dr. Thomas P. Jones of Washington.

Do not suppose for one moment, Sir, that I have any scheme or plan in which I wish to engage you. I make this communication to you, simply because I have confidence in your large, honorable and patriotic spirit, and I am sure that any good work needs only to be known to you, to secure your approbation and enlist your efforts.

In what ways your assistance is to be rendered, I leave, respectfully and cordially, to your superior wisdom.

I am, with great regard and esteem,
Most respectfully, yours,
JACOB SNIDER, Jun'r.

To HENRY CLAY,
Senator of the United States.

WASHINGTON, 27th Dec. 1836.

DEAR SIR,—I received your favor of the 19th inst., with the paper published by the Royal Agricultural Society of France. on the subject of the manufacture of sugar from Beet. I have read those papers with much attention, and interest, attracted by what I had learnt of the progress of that manufacture in France, and by the patriotic endeavors of yourself and others in Philadelphia, to introduce it in the United States. I took pleasure in distributing some of the Silesian beet seed brought from France last spring, and for which I believe I was indebted to Mr. Ronaldson, and I caused some of them to be sowed at Ashland, my residence. Although it was late in the Spring, they grew very large and were more productive than any other beets which I have ever tried. There was a similar result with all to whom I gave any of the seed. I consider, then, that this important and first step towards the introduction of the manufacture of sugar from beet sufficiently ascertained. There is reason indeed to believe that the climate and soils of our country are better adapted to the growth of beets than those of France.

What is now wanted is a knowledge of, and experience in, conducting the processes by which sugar is extracted from the root. The paper from the French Society, which you have done me the favor to transmit to me, throws much valuable information upon this branch of the subject, and is, I think, worthy of publication and extensive diffusion.

In my opinion, the establishment of the manufature of Beet Sugar in the United States eminently deserves the liberal patronage of government. What, if sucessful, would so greatly redound to the common benefit, ought to be demonstrated by an experiment made at the common expense. For it is the apprehension, incident to all new and untried enterprises that now deter individuals from embarking in this. Owing to the diversity of opinions which exists as to the powers and duties of the general government, which otherwise would be the most fitting to bestow the proper patronage, perhaps an appeal had better be made to the liberality of one of the State governments; and I know of none to which it can be addressed with more propriety than that of Pennsylvania. Fortunately the sum necessary would not be large to make a full and fair experiment.

I have no doubt of the ultimate introduction of the manufacture either with or without the aid of government, and I believe at no distant day a great part of this necessary of human life will be derived from this new source. If we are to credit the authentic evidence obtained from the experience of France, the manufacture of sugar from beet is less costly than from cane.

Ought we not to admire, and to be profoundly penetrated with gratitude for the providential care which, at a moment when, from various causes, the supply of this necessary article is likely to prove inadequate to consumption, opens a new and boundless source, assuring the poor as well as the rich, in all times and in all countries, of an indispensable article of subsistence?

I beg you to accept my individual thanks for your valuable agency in bringing about the naturalization among us of this new manufacture.

I am, with great respect,
Your ob't servant,
H. CLAY,

JACOB SNIDER, Junr. Esq. Philadelphia.

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid, (continued.)

S. A. Davis, City, Sept. 16, 1837
Gideon Lee, " Jan. 1, 1838
E. W. Casey, " Jan. 1, 1838
Thos. Meredith, Carbondale, Pa. " 15, 1838
J. L. Baldwin, Mauch Chunck, Pa. Jan. 1, 1838
Jas. Durbin, Fort Ball, Ohio, July 1, 1838
S. Reed, Carmans, Md., June 10, 1836
A. P. Winchester, Golden, Md., Jan. 1, 1838
Wm. Dearing, Athens, Geo., Jan. 1, 1838
U. A. Boyden, Nashua Village, N. H., Jan. 1, 1838
D. Scott, Tuscaloosa, Ala., Jan. 1, 1838
W. S. Whitwell, Boston, Mass., Jan. 1, 1838
Jas. P. Hector, Manchester, Va., Jan. 1, 1838
C. W. Bankf, West Felecina, La., Jan. 1, 1837
A. G. Thorn, Jackson, La. Jan. 1, 1838

Advertisements.

CROTON AQUEDUCT.

NOTICE.—Sealed Proposals will be received by the Water Commissioners of the city of New-York, until the 22d day of April next, at 3 o'clock, P. M., at their office in the city of New-York, and until the 24th day of April, at 9 o'clock, P. M., at the office of their Engineer in the village of Sing Sing, for constructing a Dam across the Croton River, for the Excavation, Embankment, Back Filling, Foundation and Protection Walls; for an Aqueduct Bridge at Sing Sing, three Tunnels, several large and small culverts, and an Aqueduct of stone and brick masonry, with other incidental work, for that portion of the Croton Aqueduct which extends from the Dam on the Croton to Sing Sing, being between eight and nine miles in length

The prices for the work must include the expense of materials necessary for the completion of the same, according to the plans and specifications that will be presented for examination, as hereinafter mentioned.

The Work to be completed by the first day of October, 1839.

Security will be required for the performance of contracts—and propositions should be accompanied by the names of responsible persons, signifying their assent to become sureties. If the character and responsibilities of those proposing, and the sureties they shall offer, are not known to the Commissioners or Engineers, a certificate of good character, and the extent of their responsibility, signed by the first judge or clerk of the county in which they severally reside, will be required.

No transfer of contracts will be recognised.

Plan of the several structures and specifications of the kind of materials and manner of construction, may be examined at the office of the Commissioners, in the city of New-York, from the 10th to the 14th, inclusive, of April next. The line of Aqueduct will be located, and the map and profile of the same, together with the plans and specifications above mentioned, will be ready for examination at the office of the Engineer, at the village of Sing Sing, on the 15th day of April next, and the Chief or Resident Engineer will be in attendance to explain the plans, &c., and to furnish blank propositions.

Persons proposing for more work than they wish to contract for, must specify the quantity they desire to take

The full names of all persons that are parties to any proposition, must be written out in the signature for the same.

The parties to the propositions which may be accepted, will be required to enter into contracts immediately after the acceptance of the same.

The undersigned reserve to themselves the right to accept or reject proposals that may be offered for the whole or any part of the above described work, as they may consider the public interest to require.

STEPHEN ALLEN,
CHARLES DUSENBURY, } Water
SAUL ALLEY, } Commissioners.
WILLIAM W. FOX,
JOHN B. JERVIS,
Chief Engineer, New-York Water Works.
New-York, February 28, 1837. 10 5t

TO MANUFACTURERS OF HYDRAULIC CEMENT.

PROPOSALS will be received by the subscriber, on the part of the James River and Kanawka Companies, for the delivery on the wharf, at the city of Richmond, Va., of Fifty Thousand Bushels of Hydraulic Cement. The amount called for must be furnished in quantities of about six thousand, bushels per month, commencing on the first of April and ending on the first of November next.

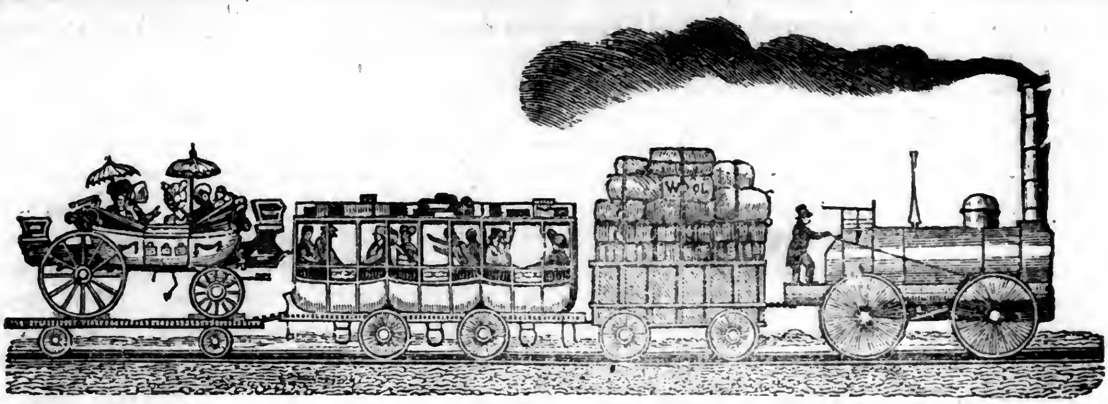
To avoid future litigation, it is to be understood, on making the proposals, that the bushel shall weigh seventy pounds NETT, and that the Cement shall be delivered in good ordder, and packed in tight casks or barrels.

Proposals will also be received for furnishing fifty thousand bushels, at any convenient point on the navigable waters of James River, or the north branch of James River, where the materials for its manufacture has been discovered.

Persons familiar with the preparation of the Cement, would do well to examine the Counties of Rockbridge and Botetourt, with a view to the establishment of works for the supply of the western end of the line; and a contract for the above quantities will be made with them before they commence operations.

As there will be required on the line of the James River and Kanawka Improvement, in the course of the present and next year, not less than half a million of bushels of this Cement, and some hundred thousand bushels more in the progress of the work towards the west, contractors will find it to their interest to furnish the article on terms that lead to future engagements.

Proposals to be directed to the subscriber at Richmond, Va. CHARLES ELLET, Jr.,
Chief Engineer of the J. R. and Ka. Co.
February 20th, 1837. 9 6t



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, APRIL 1, 1837. [VOLUME VI—No 13.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 1, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America*.

☞ For List of Subscribers that have paid see page 207.

☞ It will not do, these hard times for money, to be too modest. The *Paper Maker* must be paid, the *Engraver*, the *Ink Maker*, and the *Printer* must be paid, —then why not Pay the Publishers and the Editors the *current year* and all *arrearages* for the Journal? *It must be done.*— PLEASE REMIT BY MAIL.

WABASH AND ERIE CANAL.

NOTICE TO CONTRACTORS.—Sealed proposal will be received at the town of MAUMEE, in Lucas county, Ohio, *on the 15th day of May next*, for the construction of so much of the line of the Wabash and Erie Canal as lies between the head of the rapids of the Maumee River and the eastern termination of said canal, near the town of Mahatten, at the head of the Maumee Bay.

The length of the line offered for contract is about thirty miles, and embraces a large amount of embankment, much heavy river bluff excavation, a quantity of rock, a number of stone culverts, and 12 to 15 cut stone locks.

Thirty miles of the line, in addition to the above extending from the head of the rapids to the town of Defiance, will also be prepared, and offered for contract at the same time, should the number of applicants for contracts justify it.

Plans and specifications will be exhibited, and necessary information given, in relation to the work, after the tenth of May.

Bidders who are unknown to the acting Commissioner, as contractors, will be expected to accompany their proposals with recommendations of a substantial and unquestionable character.

LEANDER RANSOM.
Acting Commissioner.

Office of the Board of Public Works, Columbus, Ohio, Feb. 28, 1837, }
13—2t

PEARL-STREET HOUSE.—Who, of the thousands of Merchants that have been in the habit of visiting New-York for the last *ten* years, does not recollect the "PEARL-STREET HOUSE?" It was once the "*Merchants' House;*" but during the *past* year its old inhabitants could scarcely point out its site, so complete was its destruction by "the great conflagration." The *Pearl-street House* has, however, again reared its head, far above the surrounding buildings, and presents an external appearance, at once noble and inviting; an appearance which will not lead the visitor to dissappointment, on an *interior* examination.—This House, or Hotel, has its principal front on *Pearl*, and extends through to *Water*-street; is six stories on Pearl and seven on Water-street. Its principal entrance is by an easy flight of stairs to the *Exchange* room, which is about 50 feet square, with marble floor, and well lighted in front. In the rear of this, on one side, is the Dining room, which will accommodate over 350 persons, extending through to, and along Water-street—with *broad folding doors*, opening from the Exchange room, and several others communicating with the principal hall. There are one hundred and eighty Lodging rooms, well furnished—the beds can hardly fail to please, as each has a feather, a straw bed, and hair mattrass.

There is not another house in this city, probably not in the Union, except the Astor House, with as many conveniences as the Pearl-street House. There is one of Avery's *Rotary Steam* Engines and Boiler, which pumps all the water required in the establishment, and throws it from Pearl-street to the 7th story on Water-street. It furnishes steam to the *Kitchen*, to do all the *boiling*—and heats all the water required to do the *washing* of the house, and also for the Bathing rooms, of which there are a sufficient number to accommodate the guests of the house. On repeating our visit to this immense establishment, which has been completed, furnished, and occupied in less than nine months from its commencement, we come to the conclusion, that there is more room, and far more extensive accommodation, on the same space of ground, than can be found elsewhere in the United States. It is easy of access, and what is of great consequence to *strangers*, in case of *alarm* by fire, there can be no difficulty in finding the way *out*, as there are two principal stairways from the *streets* to the *roof*.

Those who are fond of a quiet, well furnished, and well arranged *home*, while at-

tending to business in New-York, will thank Alderman Peters, the Proprietor, for rebuilding the Pearl-street House; and those who are more especially fond of the good things which ought always to be found on the table and in the cellar of such an establishment, will be still more obliged to the Alderman for selecting Messrs. Flint and Whitall—gentlemen well known, the former as the keeper of the *old* Pearl-street House, previous to its destruction, and the latter as master of one of the Havre Packets—to preside over its destinies and provide for its guests.

On the 20th ult., the doors were opened to receive company, and thousands of our citizens paid their respects, not only to the gentlemen who guide its destinies, but also to the good cheer with which the tables were abundantly supplied; and we have now only to say to those who desire all the comforts which are to be enjoyed at any Hotel go and see for yourselves.

RAILROADS AND CANALS IN ILLINOIS.

We ask for the following communication, an attentive perusal. It illustrates, with great force and truth, the pervading spirit of the age; and it must surely satisfy those who are still incredulous as to the high destinies of that young State, that Illinois in a few years will be second, and but for her unrivalled *city*—only second, to the State of New York.

We are obliged to "The Far West" for the interest he expresses in the success of this Journal—and we are disposed to hold him to his very liberal offer to "keep us informed of the prospects of the public works in the State." We hope to hear often from him especially in relation to the probable connection of the public works in Illinois with other great works in other States.

GRAND SYSTEM OF INTERNAL IMPROVEMENT IN ILLINOIS. The Legislature of Illinois has recently adjourned, after passing an act to *establish and maintain* a general system of Internal Improvement. A Board of Commissioners of Public Works is appointed, who are authorized and required to adopt such measures as may be necessary for constructing and completing the following works:—

A Railroad from Cairo, at or near the the confluence of the Ohio and Mississippi rivers, to Galena on the Upper Mississippi to pass through Vandalia, Shelbyville, Decatur and Bloomington, intersect the southern termination of the Illinois and Michigan canal, and from thence through Savanna to Galena. Ranging through the centre of the State its entire length, five hundred miles.

A cross Railroad from Alton on the Mississippi to Mount Carmel on the Wabash via. Edwardsville, Carlyle, Salem, Fairfield and Albion, one hundred and seventy miles with a diverging fork from Edwardsville to Shawneetown on the Ohio, one hundred and fifty miles.

A cross Railroad from Lower Alton, via. Upper Alton and Hillsborough, intersecting the central Railroad at Shelbyville, thence via. Charleston and Paris, to the State line in a direction for Terra Haute, two hundred miles.

A cross Railroad from Quincy on the Mississippi, to the State line, near La Fayette, Indiana, via. Columbus, Clayton, Mount Sterling, Meredosia, Jacksonville, Springfield, Decatur, Sydney and Danville, two hundred and fifty miles.

A Railroad from Peoria on the Illinois river to Warsaw on the Mississippi, through Canton, Macomb and Carthage, one hundred and twenty miles.

A Railroad from Bloomington, a point on the great central Railroad to meet the Railroad from Warsaw at Peoria, and a point from the same at Mackinaw town via. Tremont, to strike the Illinois river at Pekin seventy-five miles.

A Railroad from Belleville via. Lebanon to intersect the Alton and Mount Carmel Railroad, twenty-five miles.

Specific appropriations are made for each route, besides which, two hundred and fifty thousand dollars are appropriated for the improvement of the great western mail route from Vincennes on the Wabash to St Louis:—and six hundred thousand to improve the navigation of the Great and Little Wabash, the Illinois, the Kaskaskia and Rock rivers, including a portion divided among certain counties to be used at their own discretion.

It will be seen that beside the great central Railroad, which touches the Mississippi at Galena, and of its confluence with the Ohio, there are four Railroads which run entirely across the State, besides one nearly two hundred miles in extent which intersects the Central Railroad, striking the Illinois river at two points. There are three terminations at the Indiana line; one near La Fayette, which opens a line of communication with New York, by the Maumee and Erie canal; one near Terra Haute, a point of the National road, and of intended communication with the Central canal of Indiana, and with Evansville, by a Railroad and one at Mount Carmel, below the rapids of the Wabash.

There are the terminations on the Ohio; one at Shawneetown, and one at or near the mouth of the river.

There are four terminations on the Mississippi, beside the one at its confluence; viz. Galena, the centre of the lead region on the Upper Mississippi; at Warsaw, below the Lower Rapids; at Quincy, and at Alton. Besides these terminations on the Mississippi, there is now organized, under a very liberal charter, a company who are about to construct a Railroad, intersecting the Quincy and La Fayette main cross Railroad, via. Springfield and Carrollton, to strike the the Mississippi at Grafton, at the confluence of the Illinois and Mississippi rivers, a most important point.

It should be remarked that less than twenty-five miles would connect the great Central Railroad, with the Ohio river at a point above the mouth of Cumberland river from whence a route has been projected through Princeton and Hopkinsville in Kentucky, and Clarksville Tennessee to Nashville, a distance of one hundred and thirty miles only, to effect the most important junction with the Nashville and New-Orleans Railroad. We have thus about one hundred and fifty miles of Railroad only to provide for to *open a direct Railroad communication between New Orleans and the Upper Mississippi and the Great Lakes!* A distance of nearly twelve hundred miles, through the heart of the most fertile region on the face of the globe.

To the prudent calculators of the North, the magnificent enterprise of the young State of Illinois may seem premature or extravagant. We beg them however to reflect that we have a territory equal to that of the State of New-York, the *whole of which is of extraordinary fertility.* That the enhanced value of the land in the immediate vicinity of the projected Railroads, will pay their cost *four times over.* That our population, not only in numbers, but in wealth, enterprise and intelligence, is rapidly increasing; and, what is a more important consideration perhaps than all others, such improvements are in accordance with the spirit of the age, and *our whole people call for them.*

The Great West.

COCHRAN'S MANY-CHAMBERED GUN.

We always take pleasure in speaking of important inventions, even though they may not tend *directly* to the construction of Railroads or Canals—and therefore we give the following testimonials of the value of Mr. Cochran's improvement in *fire-arms,* with a drawing and concise description of the improvement.

The *chambers,* or receptacles for the charge, are in the periphery of a cylinder of about 4 inches in diameter, and ⅞ths of an inch thick, which revolves horizontally on a pivot, bringing each chamber alter nately in a line with the barrel; on the under side, and about equidistant from the periphery, and centre of the cylinder is placed a small cone to receive the percussion cap. There is a cone to each charge, having a communication with the powder. When the cylinder is charged,—each having *nine* charges,—the caps are put upon the cones, and then the cylinder is put in its place and secured there by a spring.—When in its place, each chamber, or charge, points in a different direction, and each cap is perfectly protected from explosion, except the one communicating with the chamber in line with the barrel, and after discharging which, no further explosion can take place without moving a spring, which permits the cylinder to make the *one-ninth* of a revolution, thereby bringing another chamber, or charge, in line with the barrel. A person familiar with the use of this gun, having *extra* cylinders in his belt, can easily make *thirty shots in a minute*; as he would only remove it from his face *three* times, to make 36 shots.

The great facility with which it can be discharged, is not, as will be perceived, on reading Capt. Gordon's Letter, its highest recommendation. The *certainty* of explosion, even after long exposure in damp weather, is of the first importance; a quality which it appears to possess in an eminent degree.

The accompanying drawings show the positions of the cylinder in which is represented the chambers and the cones for the caps.

If further evidence, than the annexed letters from gentlemen every way qualified to give a correct opinion, is required, it can be furnished, by actual demonstration, to those who will call on Mr. Cochran, or Messrs. Richards & Richardson, of this city, who are the Agents of the Company engaged in the manufacture of the article.

☞ A specimen of this beautiful article may be seen at this office—where orders will be received for *Rifles* or *Pistols*.

I have examined, and seen fired the ingenious invention of Mr. John Cochran's many-chambered gun, and, have no hesitation in saying, it combines simplicity, neatness, and at the same time, great despatch; and for all the uses of warfare, should approve of it highly.

ANDREW JACKSON.

Washington, Jan., 1837.

I cheerfully unite in the above testimonial, of Mr. J. W. Cochran's gun.

ANDREW JACKSON, JR.

WASHINGTON CITY, Jan., 1837.

We, the undersigned, have witnessed the experiments made by Mr. John Cochran, with his many-chambered gun, and are of opinion, that we have never seen any thing to compare with it; as to its simplicity, safety, and the rapidity and certainty of its firing; it can be fired thirty times in a minute, with great effect; it is in our opinion, one of the most formidable weapons ever invented.

D. S. CLINCH,
G. J. DRANE, U. S. Army,
WM. P. DUVAL,
WM. COST JOHNSON,
S. WARRINGTON,
SAM'L. C. REID,
CH. G. RIDGELY.

WASHINGTON, Nov. 21, 1836.

COLONEL,—The enclosed report of Lieutenant Scott, which I have the honor to submit, fully confirms the high estimate I had formed of Mr. Cochran's gun, from the experiments instituted by me, on Saturday, in conformity with your instructions.

Under my supervision, the gun was loaded and discharged five hundred times; the results proving its great accuracy, safety, and facility of loading and firing. My attention was particularly called to the apparent danger of ignition, from the contiguity of the charges. But, from the experiments freely made by Mr. Cochran, by placing loose powder in the chambers over the balls, and around the caps, I am convinced that my apprehensions were unfounded.

I do not hesitate to say, that with my closest scrutiny, I could not discover any objections to Mr. Cochran's invention. It will be well to remark, that the gun was discharged in all, one thousand and eight times, without being cleaned, and without missing fire.

The flattened balls accompanying this, were fired through an inch plank against a brick wall, at a distance of 150 yards.

I am, Sir, very respectfully,
Your Obe't. Ser't.
(Signed) GEO. D. RAMSAY.
Capt. of Ordnance.

COL. T. BOMFORD, U. S. Ordnance.

For Mr. Cochran, with the compliments of GEO. D. RAMSAY.

WASHINGTON ARSENAL, Nov. 22, 1836.

SIR,—Having been present at the test of the gun with revolving Cylinders, invented by you, and being a witness to the many experiments, which were made on Saturday, the 19th inst., at this place, I can but attempt to express the great satisfaction it afforded me, to see the following successful trials made by you:

Firstly, As a smooth-bored gun, in regard to the accuracy with which it shoots a ball, I must say that nothing of the kind, that has heretofore come under my observation, can be compared with it; for at a distance of fifty yards, the size of a dollar was struck three times in succession.

Secondly, When the comparison (or rather contrast) was made between your gun and Hall's Carbine, as to the depth of penetration into pine wood, I was most astonished to see the great difference between the two: At the distance of fifty yards, your gun, the first shot, penetrated 4 inches, the second shot, 3 inches and 8-tenths, the third shot, 3 inches and 8-tenths; whilst Hall's Carbine at the distance of fifteen yards, only penetrated 2 inches and 8-tenths.

Thirdly, As to the speed with which it was fired,—while Hall's Carbine could only be loaded once, your Gun completely discharged its Cylinder containing nine charges, in the space of six seconds.

Fourthly, As to the certainty of discharge, in firing 1008 charges, not one cap failed, and when double shotted, and fired, no recoil was perceptible.

In fact, your gun, for simplicity, accuracy, and certainty, together with its other inestimable qualities, is, in my opinion, beyond improvement, and may be called a most complete fire-arm.

With very great respect,
I am, Sir, &c.,
JOHN M. ST. JOHN;
Master Armorer, &c., Washington Arsenal.

To JOHN COCHRAN, Esq.,
Brown's Hotel, Washington City.

The piece was fired this morning 500 times, making in all 1008. It is in the same order it was previous to the discharging it. Water was put into the chambers, and left for one hour and ten minutes.—Afterwards, it was discharged in the same manner as the others, without the least difficulty. It fires with great accuracy. I tried it with Hall's carbine, both being loaded, the firing was commenced, during the discharging of the nine chambers, the carbine could only be loaded once, not a cap missed. At the distance of 150 yards, charge 10 grains of powder, the ball perforated an inch pine board, and was flattened against the brick wall. For simplicity, it surpasses any thing of the kind I have yet seen; and as a fire-arm, its qualities can be summed up in three words: It is perfect.

J. B. SCOTT, 1st. Lieut. 4th Infantry.
Washington Arsenal, Nov. 20, 1836.

Mr. Cochran fired the nine chambers in *six seconds*.

J. B. SCOTT, 1st. Lieut. 4th Infantry.

COCHRAN'S GUN TESTED IN A BATTLE WITH THE SEMINOLES, IN FLORIDA, BY CAPTAIN GORDON.

NEW-YORK, March 17, 1837.

SIR,—Having had very ample opportunities of testing the very great superiority of your "Many Chambered" gun, it affords me great pleasure to state, for the public information, that I consider it far superior to any other now in use. Its peculiar adaptation to the purposes of war, gives it just and strong claims to the patronage of the General Government. I do not hesitate to declare it as my firm and decided opinion, that one hundred men, armed with your gun, would be equal, in point of efficacy, in battle, to one thousand armed with any other. Its superiority for hunting purposes is equally great, and cannot fail to secure for it the public favor.

The astonishing capability of your gun to resist dampness, or injury of its charge, when loaded, I consider of the greatest importance. A very striking and satisfactory instance of this manifested itself in the late battle with the Seminoles, on Lake Monroe. Your gun had at the time been loaded at least two weeks—had been taken out on one or more excursions, and exposed to the dampness of the atmosphere, which in that country is very great, and such other causes as had made it necessary to discharge and re-load all or most of the other arms similarly exposed,—yet, under these circumstances, without re-loading, yours went off in every instance, (the whole round of chambers,) as if recently charged. The simplicity of the machinery, and the great power with which it throws its balls, will justly enhance its estimation with all who will take the trouble to examine and make trial of them.

In conclusion, I will repeat, that I have no hesitation in giving it as my firm conviction that your's is by far the most efficient fire-arm ever offered to the public, and every way worthy of confidence and patronage.

I am, Sir, very respectfully,
Your most ob't. humble serv't.,
W. Gordon,
Captain U. S. Dragoons.
To Mr. John Cochran, New-York.

Canal Navigation.—The annexed notice from the Philadelphia Gazette, of 21st March, shows the advantages possessed by Philadelphia for early navigation.

With a Railroad to *Olean*, on the Susquehannah River, New-York might send goods to Pittsburgh earlier than it is now done from Philadelphia.

IMPORTANT TO MERCHANTS.

We have been favored with the following information in relation to the opening of the Pennsylvania Canals and Railroads, which cannot fail to prove gratifying to that portion of the business community engaged in the Western Trade—coming as it does from head quarters.

Canal Room, Harrisburg, March, 17, 1837.

C. G. Childs, Esq.

Dear Sir,—"On the Western Division they will commence letting water into the Canal on the 20th inst. The Portage Railroad is now in readiness, and in excellent order.—The Juniata Division is ready and filling.—The Susquehanna Division is in navigable condition, and the Eastern Divison is also ready and filling with water."

UNION CANAL.

Extract of a letter dated

Lebanon, March 18, 1837.

"Boatmen from the West, whose boats were left here last fall, have returned, and expect to leave here on the 21st inst. (Tuesday.) On Monday next they will commence loading some of the Lebanon boats."

The Schuylkill Canal will also be navigable on Wednesday. A very large amount of goods was carried to the different forwarding houses yesterday. This looks like going ahead.

The Delaware Division of the Pennsylvania Canal, from Bristol to Easton, we understand will be opened to-day. This will give an outlet to much Wheat, Flour, and other articles greatly wanted.

The following notice is taken from the Oswego Advertiser, of 13th March. It will be gratifying to business men to learn that the channels of transportation are so soon to be opened.

The Welland Canal.—We have been favored with the following information, by letter, (which was directed to all of our Forwarding Houses,) from officers of this Canal, re-affirming that it will be in readiness for navigation on the *15th of April*, which will be in season for the increased transit of merchandise and produce which this channel is likely hereafter to obtain.

Welland Canal Office,
St. Catharines, 8th March, 1837.

Messrs. Trowbridge & Grant—Gentlemen,—For your information I beg leave to annex a copy of the Engineer's letter, to the President, relating to, at what period the Canal may be in readiness for navigation this Spring.

I am respectfully, your ob't. ser't.,
John Clark, Secretary.

To W. H. Merrett, Esquire, President W. C. Co.—Sir,—Unless some unforeseen accident occurs upon the Canal line, I think the navigation may be stated to commence upon the 15th day of April. This date will be as soon as Lake Erie is free of ice.

Your obedient servant,
Francis Hall, Engineer.

Railroads appear to be advancing more rapidly in Germany than in France. That from Nuremberg to Furth transports weekly 18,000 travellers; that from Leipzic to Dresden will be opened immediately, and will join the Munich railroad at Augsburg, and in a few years will extend as far as Trieste. The subscription list for the railway from Magdebourg to Leipzic, the capital of which is fixed at 16,400,000fr. was filled in two days. A company is being formed for the establishment of a railroad between Hambourg, Berlin, and Magdebourg; it will extend 80 leagues, and will unite three towns with a population of five hundred thousand inhabitants, besides transporting an immense quantity of goods.

Triumph of Railways.—It was matter of some curiosity whether or not the engines could continue to work upon the Newcastle and Carlise railway during the continuance of the snow upon the road. The possibility of so working was fairly put to the test on the 26th ultimo, and the utility of railways demonstrated in a most striking manner.—In the deep cutting through the Cowan Hills, the snow had drifted to the depth of four or five feet; and when the Hercules came down on Monday morning, great number of country people had assembled to see how she would act in such an emergency, and to render any assistance which might be necessary. On arriving at the spot the engine made no bones of the matter, but dashed right into the drift, clearing its way through, apparently without the slightest difficulty, the snow at the same time flying over the top of the engine chimney like foam from the broken waves of a violent sea; and notwithstanding this and other similar obstructions, the train came down from Greenhead (twenty miles) in an hour and a quarter. The trains have continued regularly to keep their time, while all communication by common roads has been more or less most seriously obstructed if not entirely cut off for a time.—[Carliles Patriot.]

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

ERECNT* CANAL-BOAT EXPERIMENTS.—DESCRIPTION AND TABULATED RESULTS OF A SERIES OF EXPERIMENTS MADE TO ASCERTAIN THE ACTUAL TRACTIVE POWER EXERTED IN DRAWING BOATS ON CANALS, UNDER VARIOUS CIRCUMSTANCES OF LOAD, SPEED, &c. BY JOHN MACNEILL, ESQ., M.I.C.E., F.R.A.S., M.R.I.A.

The series of Tables which I now have the honor of presenting to the Institution, have no merit beyond that of an honest and accurate Register of Facts. That the Experiments which they record were made neither to support nor to invalidate any theory, the following account of their origin will demonstrate.

The attention of the Committee of Management of the Forth and Clyde Canal Company, had frequently, in the course of their extensive and varied experience, been directed to some results, in the use of boats of different forms, on different canals, which appeared to contradict notions considered to be long established. The paradoxical character and important consequences of these results, at length determined the Committee, that a careful examination of the circumstances under which they had been observed should be made, and that upon a scale which should be free from the usual objections attending experiments made with models. I had the honor of receiving their commands to design and conduct this inquiry. In July, last year, I carried the examination into effect, with the boats, and on the canals, which had apparently presented the anomalous facts. The object aimed at, and which was supposed would satisfactorily settle every question, was to ascertain the tractive power exerted in drawing these boats on the canals in question, under very various circumstances of load, speed, &c. At least, one beneficial result seemed certain to be attained by the parties who had the spirit to undertake the inquiry, in consequence of their being interested in the navigation of

* This term is preserved to distinguish these Experiments from others of the same kind, which Mr. Macneill had previously made on the Grand Junction Canal, &c.

the canals, viz.—it would determine which of the boats in use was best adapted for the purpose for which it was intended.

Though thus somewhat restricted by the very object of the inquiry, I could not help hoping, that a vigilant attention to all the circumstances attending the numerous and varied experiments which would be necessary to solve the problem, and a faithful register of every influential fact, might add some authentic data to the very small stock, hitherto collected from actual experiment, on this most important and interesting, but intricate, subject of physical science.

It is in this way that, I conceive, the practical engineer may frequently assist the physico-mathematician, and enable the latter to investigate and reduce to simple laws many of those apparent anomalies which often puzzle, and sometimes disappoint, the former. As neither my professional engagements, nor my acquirements, will permit me in any case to attempt mathematical discussions of this high and important character, I have aimed at no other distinction than that of a careful observer, and a faithful reporter of facts. This is the utmost of my pretensions in the present Paper, and so far as this, I must acknowledge, I am ambitious to establish a claim.

Canals.—The canals on which the experiments, which it is the object of this Paper to record, were made, are, viz.—the Forth and Clyde Canal, the Monkland Canal, and the Paisley (*Glasgow and Paisley*) Canal. These were measured in several places. Sections made out from these measurements are given in Plate 28, and they show, that each canal differs very materially from either of the others. These peculiarties should constantly be borne in mind in comparing and reasoning upon the experiments.

Courses.—The portions of the canals selected for the sites of the experiments in Tables I.—X. were straight, and as nearly uniform in breadth and depth as could bo obtained. These sites are designated, for distinction, the *courses.* On the Forth and Clyde Canal, there was no difficulty in the choice of a proper course of any desirable length. On the Monkland and on the Paisley Canals, no long line, free from objection, could be obtained; and, therefore, the courses on them were necessarily shorter.

Courses on the Forth and Clyde Canal.—Six stakes, marked *a, b, c, d, e, f,* were driven into the bank of the canal at intervals of 110 yards=$\frac{1}{16}$ of a mile. The first stake-interval *a-b* was used for getting the horses into the proper speed, and the boat into a uniform velocity, it is therefore not regarded in the Tables. The instants of the boat's passage of the stakes *b, c, d, e, f,* were accurately observed. These are given exactly as they stand in the minute-books of the recorders, in column C of the Tables. From these epochs the times of the passage of the boat through the stake-intervals, or *runs, b-c, c-d, d-e* and *e-f,* were obtained by simple substraction. These times are given in column E. The velocity in *milss per hour* and *feet per second* were then calculated from the preceding data, and the results are given in the columns F and H. In the experiment given in Table XII., the run extended about eight miles, but in this the tractive power only was observed.

Courses on the Monkland and Paisley Canals.—From reasons already stated, the courses on these canals were necessarily short. They had but three stake-intervals, and consequently only two runs In every other respect they were the same as the course on the Forth and Clyde Canal. In the experiment given in Table XI., the run extended along the whole canal, and was about eight miles in length; but in this, as in the similar long run on the Forth and Clyde, the tractive power only was observed.

Boats.—All the boats had been, or were, in actual use on the canals in question, except one which had never been tried before, which is called "New Boat," to distinguish it. Plans, &c. of the most remarkable boats are given in Plate 27. Their weights will be found in column P of the Tables.

The loads and speeds of the boats were varied so as to include every case that had occurred, or was likely to occur, in practice. The speeds or velocities are given in columns F and H, and the loads in column J. The effects of the various loads, and of the different distributions of them, upon the draught of the boats, are given in columns L and M.

Instruments, and Manner of using them.—The *Dynamometer,* or instrument for ascertaining the tractive power exerted, was made a part of the connexion of the towing-line with the boat, so that all efforts to draw the boat by pulling the towing-line acted upon the instrument, and were indicated by it. Efforts from 1lb. up to nearly 600lbs. were clearly indicated on a large dial-plate, and could be satisfactorily read off.*

The times of the runs were observed with chronometers in the following manner:—An assistant was so placed on the outside of the boat, that he could accurately observe the moment of passing a stake. When this happened, he called out, and the instant was observed and registered by two assistants, each with a separate chronometer. These time-observers were found, on comparing their registers, never to have differed more than half a second from each other, and that in a very few instances only. The tractive power was obtained by three assistants: one gave a signal every two seconds; another, on this signal, read off aloud the figures at which the index pointed; and a third registered. By this arrangement all hurry and confusion were avoided; each assistant had ample time to do the work allotted to him; and it is believed, that few errors, and none of any magnitude, occurred in making or noting the observations. The numbers representing the tractive power were written down in columns, each column corresponding to a run, or stake-interval. The sum of a column divided by the number of observations, gave a number which was considered to be the mean tractive power in lbs. exerted during each run. These calculations were afterwards checked by two other persons.

In many of the experiments the level of a theodolite, steadily fixed in the boat, was observed under the following circumstances:—The boat, with its load distributed for the experiment, being at rest, the bubble was brought to the middle of the tube, and the index set at zero. The bubble being preserved in the same place during the experiment, the angle read off on the limb gave the angle of variation, which the keel of the boat made with its position before starting, or the difference, if any, between a state of rest and one of motion. Many of the angles observed are given in column O.

For the purpose of ascertaining if the boat was raised in the water, a fine wire was stretched across the canal, over two pullies placed in posts erected on the banks, by heavy weights attached to the end of it, so that it was very nearly level across the canal, and about eight inches higher than the boat. A bit of paper upon it marked the middle of the canal. On the top of the boat four slips of thin wood were placed,—one near the bow, one near the stern, and the other two at equal distances between them. These slips of wood were suspended vertically on fine wire pivots a little above their centre, so that they hung upright, except when they came in contact with the wire stretched across the canal; the moment they did so, they gave way, inclined backwards, and allowed the boat to pass freely under the wire: the edges of these slips were hollowed out, and the groove filled with tallow, projecting a little before the edge of the slip. The slips were divided into inches and tenths. When the boat was prepared and ready for an experiment, it was brought under the wire, and, being steadied near the paper-mark, the division cut by the wire on each slip was noted down. When the boat in motion passed under the same point, the wire struck the slips in succession, and stripped off all the tallow above a certain point with a sharp and clean cut, so that it was perfectly easy to determine the height to which the boat rose when in motion, by examining the slips, and comparing the divisions at which the tallow terminated with those previously noted.

* This instrument was similar to one I had previously designed and caused to be constructed, for ascertaining the amount of the draught of carriages drawn by horses on turnpike-roads. The principle is the same as that used in the spring-weighing machine, but the index of this instrument in its simple form, when applied to measure horse-draught, vibrates too frequently, and over too large an arc, for correct observation. This is a consequence of the peculiar nature of horse-draught, which is not a uniform pull, as is popularly supposed, but a succession of impulses or strokes of the animal's shoulder against the collar. I added an apparatus, which indicated the mean force of the pulls, and not only reduced the vibrations of the index, but, like the fusee of a watch, compensated for the increasing resistance of the spring in high efforts. A detailed description of this Road-Dynamometer, and its application on the whole length of road from London to Holyhead, is given in *the Seventh Report of the Parliamentary Commissioners for Maintaining the Road from London to Holyhead.* The instrument is also described in the *Further Report made by the Commissioners appointed to Inquire into the Post-Office Department, on the Subject of the Mail Coaches, dated 13th Aug.,* 1835. The instrument used on the canals was made from my designs, by Messrs. Bramah, of Pimlico, and was most carefully and beautifully finished.

Weather.—The weather was, almost without exception, extremely favorable for the purpose. The direction of the wind, it force, &c., are noted i : col mn K.

Tables.—Such parts of the experiments as would admit of it, are classed together and tabulated to facilitate reference and comparison. Most of the columns have been described in the preceding paragraphs—the others require no explanation. The Tables I.—X. contain the experiments made on the courses. Tables XI. and XII. are the two eight-mile runs. In these the tractive power, indicated by the dynamometer, was read off as quick as it could be written down.

OBSERVATIONS.

1. That in the wide and deep canal, the tractive power was observed to increase with the velocity, but not in any uniform ratio.

2. That in the shallow and narrow canals, the increase of tractive power had a limit at a certain velocity; and, under certain circumstances, even decreased with the increase of velocity; so that it appears probable, that if the size of the canal bear a certain proportion to that of the boat, there is a certain velocity at which a boat may be drawn on a canal with a minimum tractive power. This velocity, on the Monkland and Paisley Canals, with boats like the Zephyr and the Swift, appears to be about nine miles per hour. And I think it probable that a similar effect would be observed on the Forth and Clyde Canal, if a boat similarly proportioned to that canal were used though the velocity and the minimum tractive power in such a case might be different from those on the other canals.

3. That, in the long run on the Forth and Clyde Canal, the surface of the water regarded on the side of the boat, when in motion, was concave or hollow about the middle of the length of the boat, rising at the bow and quarter, as is shown by the line *a b c*, in Fig. 1.

4. That, in the long run on the Paisley Canal, precisely the opposite effect took place, the surface of the water about the middle of the length of the boat being convex and higher there than at the bow and quarter, as *d e f*, in Fig. 2.

Fig 1.

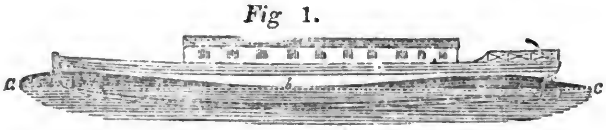
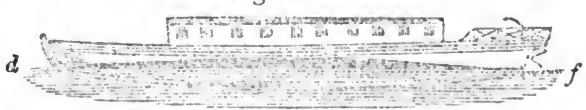


Fig. 2.



5. That there appears a relation between the tractive power and the horizontal position of the keel, the tractive power, it will be observed, diminishing and increasing in some ratio or other, as the angle of variation is smaller or larger.

6. That the boat absolutely rises during its motion. This fact was most satisfactorily demonstrated by the apparatus designed for the purpose. In some of the experiments, the mean of the several rises indicated by the four slips, was about four inches the bow being, in every case, more elevated than the middle and stern. As this phenomenon is of recent observation, and as the persons who have observed and announced it have been held up to unmerited ridicule, I beg leave to conclude with an extract from a paper read before the Philosophical Society of Cambridge, and published in their Transactions. The article is by one of the most profound physico-mathematicians in Great Britain, probably in the world, the Rev. James Challis, late Fellow of Trinity College,* Cambridge. The article is entitled, ***Researches in the Theory of the Motion of Fluids.*** Mr. Challis prefaces his Paper thus:—

"The subjects treated of in this communication are of a miscellaneous character, referring to several points of the theory of fluid motion, respecting which the author conceived he had something new to advance. In illustration of the principles he has attempted to establish, solutions are given of two problems of considerable interest:—the resistance to the motion of a ball-pendulum; and, the resistance of the motion of a body partly immersed in water and drawn along at the surface in the horizontal direction. The principal object in the solution of the latter problem is, to account for the rising of the body in the vertical direction on increasing the velocity of draught, which, in some recent experiments on Canal Navigation, has been observed to take place."

After an elaborate investigation of the law of this phenomenon, and showing that it must follow from the principles established by the Author in the preceding part of the Paper, he concludes by observing, that,

"To obtain a numerical result respecting the rise of the body corresponding to a given velocity, we will suppose, for the sake of simplicity of calculation, that when the vessel is at rest, the centres of the spherical ends, and consequently the axis of the cylindrical part, are in the plane of the horizontal surface of the water. This circumstance may be produced by *loading* the upper part of the body without altering its specific gravity. Let l = the length of the axis of the cylindrical portion; then the area of the horizontal section of the vessel, at the level of the water surface,s of it $lD + \frac{\pi D^2}{4} - \frac{D^2}{2}$ its breadth being D. Now $W - w$ must be equal to the difference of the quantities of fluid displaced in the states of rest and motion, and is therefore equal to $\gamma g\left(lD + \frac{\pi D^2}{4} - \frac{D^2}{2}\right)$, γ being small.—Therefore neglecting powers of $\frac{\gamma}{a}$ above the first,

$$\left(lD+\frac{\pi D^2}{4}-\frac{D^2}{2}\right)\gamma g=\frac{V^2D^2}{8}\left(2-\frac{\pi}{4}\right).$$

Let $\frac{l}{D} = 3$. It will then be found that $V^2 = 696 \text{ ft.} \times \gamma$. And if γ = one inch, or $\frac{1}{12}$, this equation gives $V = 5{\cdot}19$ miles per hour; consequently, if $V = 10{\cdot}4$ miles per hour, γ = 4 inches.

In general neglecting $\frac{\gamma^2}{a^2}$, &c.

$$W - w = \frac{V^2a^2}{2}$$

$$\left(\sin\theta\cos\theta\,(2\sin^2\theta + 1) - \frac{\theta}{2}\right),$$

Also, $W - w =$

$$\gamma g\left\{lD + \frac{D^2}{2\sin^2\theta}(\theta - \sin\theta\cos\theta)\right\}$$

nearly; therefore, as $D = 2a\sin\theta$, it will be found that

$$\gamma = \frac{V^2}{4g}\cdot\frac{\sin 2\theta\,(2\sin^2\theta + 1) - \theta}{4m\sin^2\theta - \sin 2\theta + 2\theta},$$ m being put for $\frac{l}{D}$.

If θ be assumed equal to 15°, and $m = 3$, this equation gives $V = 7{\cdot}35$ miles per hour when γ = 4 inches."

"These results, which probably are but very rough approximations to matters of fact, may yet suffice to show, that when vessels and boats of the usual forms sail in the open sea, they may be expected to rise in some degree upon an increase of their velocity, and so much the more as they are less adapted to *cleave* the water. Our theory shows that the rise is the same for bodies of the same shape and proportions, moving with the same velocity, whatever be their absolute magnitudes; also, that this effect is equally due to the pressures on the front and stern of the vessel. The theory, in fact, determines these pressures to be in every respect alike; so that if we proceeded to investigate the total pressure in the horizontal direction, we should find it to be nothing when the motion is uniform. This may serve to show, that, if friction be left out of consideration, a front ill adapted to cleave the water is not unfavorable to speedy motion, if the stern be of the same shape; and that the resistance to the motion of vessels in the open sea is principally owing to the friction of the water against their surface. This cause operates to produce unequal actions on the front and stern, making the directions of the motions of the particles in contact with the surface of the former *less* inclined to the horizon than they would be in the case of no friction, and of those in contact with the surface of the latter *more* inclined. To counteract this inequality, probably the stern should be less curved than the front."

JOHN MACNEILL.

December, 1835.

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* This gentleman has since succeeded to the Plumian Professorship of Astronomy, in the University of Cambridge, vacant by the appointment of Professor Airy as Astronomer-royal.

TABLE I. THE RAPID (First Set.—89 *Experiments*).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's name.	Instant of passing the Stake.	Stakes ... yards apart.	Time of passing ... interval.	Miles per Hour.	Tractive Power in lbs.	Feet per Second.	Kind of Tractive Power.	Load.	Wind.	Draught. Bow.	Draught. Stern.	Position of Wave.	Variation in Level.	Remarks. PLACE OF EXPERIMENT, FORTH AND CLYDE CANAL.
		m. s		sec.	miles	lbs.	feet.								
1	Rapid.	56 58 58 05 59 00 14 1 16	*b* *c* *d* *e* *f*	6[illegible] 6[illegible] 6[illegible] 62	3·33 3·54 3·46 3·63	33 30 3[illegible]·5 37·1	4·89 5·20 5·05 5·32	One Horse.	7 passengers, = c. q. lb. 9 2 1	unf. light	in. 12¼	in. 9	not obs.	not obs.	Weight of Rapid, when empty, 3 ton, 8 cwt. 2 qr. 20lb. Towing-line, 116 ft. long, attached 4½ft. from bow, and passed through two pulleys—Load distributed from bow to stern
2	Rapid.	5 53 7 03 8 17 9 20 10 22	*b* *c* *d* *e* *f*	60 64 63 62	3·75 3·52 3·57 3·63	30 25 31·3 30·4	5·50 5·16 5·24 5·32	do.	do.	fav. do.	do.	do.	do.	do.	
3	Rapid.	22 21 24 03 25 45 27 25½ 28 59	*b* *c* *d* *e* *f*	102 102 100½ 84½	2·21 2·21 2·24 2·38	24 23·5 23·5 23·5	3·24 3·24 3·28 3·49	One Man.	6 passengers, = c. q. lb. 8 0 15	unf.	not obs.	not obs.	do.	do.	
4	Rapid.	33 51 35 28 36 57 38 27 40 00	*b* *c* *d* *e* *f*	94 89 90 93	2·39 2·53 2·50 2·42	19·4 18·25 18 18	3·51 3·71 3·67 3·55	do.	do.	fav.	do.	do.	do.	do.	
5	Rapid.	50 03 51 13½ 52 24½ 58 37 54 51	*b* *c* *d* *e* *f*	70½ 71 72½ 74	3·19 3·17 3·10 3·04	33·1 28·3 28 2[illegible]·3	4·65 4·65 4·55 4·46	do.	do.	unf.	do.	do.	do.	do.	
6	Rapid.	20 1 29½ 2 38 3 46 4 57	*b* *c* *d* *e* *f*	69½ 68½ 68 71	3·24 3·29 3·31 3·17	26·3 24·8 24·1 23	4·75 4·82 4·85 4·65	do.	7 passengers, = c. q. lb. 9 2 1	fav.	in. 12¼	in. 9	do.	do.	
7	Rapid.	23 11 23 52 24 37 25 14½ 25 50½	*b* *c* *d* *e* *f*	41 42 37½ 36	5·49 5·36 6·00 6·25	76·1 64·5 95·7 99·7	8·05 7·85 8·80 9·17	One Horse.	9 passengers, = c. q. lb. 12 0 25	unf.	not obs.	not obs.	do.	do.	Bad experiment from irregular draught.
8	Rapid.	35 08½ 35 46 36 23 37 00 33 38	*b* *c* *d* *e* *f*	38½ 37 37 38	5·84 6·08 6·08 5·92	95 97 89 [illegible]4	8·57 8·92 8·92 8·68	do.	7 passengers, = c. q. lb. 9 2 1	fav.	in. 12¼	in. 9	do.	do.	
9	Rapid.	43 30 44 05 44 40 45 15 45 51	*b* *c* *d* *e* *f*	35 35 35 36	6·43 6·43 6·43 6·25	104·4 105 104 99·6	9·4[illegible] 9·43 9·43 9·17	One Horse.	7 passengers, and 10 cwt. = c. q. lb. 19 2 1	fav.	in. 11¼	in. 11¼	not obs.	not obs.	
10	Rapid.	51 25 52 00½ 52 34 53 09 53 44	*b* *c* *d* *e* *f*	35 34½ 34½ 35	6·43 6·52 6·52 6·43	131 121 118 110·9	9·43 9·57 9·57 9·43	Two Horses	do.	do.	do.	do.	do.	do.	
11	Rapid.	2 10 2 36 2 57½ 3 19 3 40	*b* *c* *d* *e* *f*	25½ 21½ 21½ 21½	8·82 10·47 10·47 10·47	261 302 299 286	12·94 15·35 15·35 15·35	do.	do.	do.	do.	do.	do.	do.	
12	Rapid.	10 53 11 16 11½ 37 11 59 12 21	*b* *c* *d* *e* *f*	23 21½ 21½ 22	9·7[illegible] 10·47 10·47 10·23	294 293 297 278	14·35 15·35 15·35 15·00	do.	do.	do.	do.	do.	do.	do.	

TABLE I. CONTINUED.—THE RAPID (FIRST SET).

13	RAPID.	19 51½ 20 13 20 33½ 20 54½ 21 17	b c d e f	21½ 20½ 21 22	10·47 10·91 10·71 9·98	316 300 306·8 290·1	15·35 16·09 15·71 14·67	Two Horses.	7 passengers, and 4½ ton, = c. q. lb. 94 2 1	fav.	12½ in.	in. $12\frac{2}{1}$	not obs.	not obs.	
14	RAPID.	25 55½ 26 17 26 38 26 59½ 27 21	b c d e f	21½ 21 21½ 21½	10·47 10·71 10·47 10·47	298 290 295 290	15·35 15·71 15·35 15·35	do.	do.	do.	do.	do.	do.	do.	
15	RAPID.	39 00½ 39 45½ 40 31½ 41 16½ 42 00	b c d e f	45 46 45 43½	5·00 4·89 5·00 5 17	73 71 78·7 72·5	7·33 7·17 7·33 7·59	do.	do.	do.	do.	do.	do.	do.	
16	RAPID.	49 13½ 50 06 50 54½ 51 41 52 26	b c d e f	52½ 48½ 46½ 45	4·29 4·64 4·84 5·00	54·0 61·9 62·9 70·3	6·29 6·80 7·10 7·33	do.	do.	do.	do.	do.	do.	do,	
17	RAPID.	19 28 20 15 21 03 21 52 22 42½	b c d e f	47 48 49 50½	4·79 4·69 4·59 4·46	68 56 60·2 55·7	7·02 6·88 6·73 6·53	do.	7 passengers, and 1 ton, = c. q. lb. 29 2 1	do.	12¼	12¼	do.	do.	Heavy Rain.
18	RAPID.	29 18 30 04½ 30 52 31 39 32 30½	b c d e f	46½ 48½ 47 50½	4·84 4·64 4·79 4·46	68 63·9 68·8 52·2	7·10 6·80 7·02 6·53	Two Horses.	7 passengers, and 1 ton, = c. q. lb. 29 2 1	fav.	in. 12¼	in. 12¼	not obs.	not obs.	
19	RAPID.	40 45½ 41 09 41 30½ 41 52 42 13½	b c d e f	23½ 21½ 21½ 21½	9·57 10·47 10·47 10·47	308 308 310 300	14·04 15·35 15·35 15·35	do.	do.	light	do.	do.	do.	do.	
20	RAPID.	7 15 7 38 8 00 8 22 8 43	b c d c f	23 22 22 21	9·78 10·23 10·23 10·71	292 289 292 296	14·35 15·00 15·00 15·71	do.	do.	do.	do.	do.	do.	do.	
21	RAPID.	14 11 14 39 15 08 15 37 16 06½	b c d e f	28 29 29 29½	8·03 7·76 7·76 7·59	312 327 350? 356?	11·79 11·38 11·38 11·19	do.	7 passengers, and 4½ ton = c. q. lb. 94 2 1	none	17	17	do.	do.	Tractive power doubtful. See Remark, Experiment, No. 44.
22	RAPID,	23 22½ 23 49½ 24 17½ 24 46 25 14½	b c d e f	27 28 29 28½	8·33 8·03 7·76 7·90	325 332 342 344	12·22 11·79 11·38 11·58	do.	do.	do.	do.	do.	do.	do.	
23	RAPID.	32 19 33 08 33 50 34 35 35 23½	b c d e f	49 42 45 48½	4·59 5·36 5·00 4·64	59·6 118 61·8 69·8	6·73 7·86 7·33 6·80	do.	do.	do.	do.	do.	do.	do.	Bad experiment. Horses going irregularly.
24	RAPID.	41 32½ 42 24½ 43 16 44 07 44 55	b c d e f	52 51½ 51 48	4·33 4·37 4·41 4·69	74 52 57 70	6·35 6·41 6·47 6·88	do.	do.	do.	do.	do.	do.	do.	
25	RAPID.	42 55½ 43 23½ 43 52 44 21½ 44 51	b c d e f	28 29½ 29½ 29½	8·03 7·59 7·59 7·59	355? 356? 360? 363?	11·79 11·19 11·19 11·19	do.	do.	do.	do.	do.	do.	do.	Bad experiment. Boy off horse. Tractive power doubtful. See Remark, Experiment, No. 44.
26	RAPID.	3 11½ 3 34 3 58 4 21 4 44	b c d e f	22½ 24 23 23	10·00 9·48 9·78 9·78	360? 348 351? 353?	14·67 13·75 14·35 14·35	do.	do.	do.	do.	do.	do.	do.	do.

TABLE I. CONTINUED.—THE RAPID (FIRST SET).

27	RAPID.	13 23 13 46 14 09½ 14 34½ 15 01½	b c d e f	23 23½ 25 27	9·78 9·57 9·00 8·33	374? 369? 366? 365?	14·35 14·04 13·20 12·22	Two Horses.	7 passengers, and 4½ ton, = c. q. lb. 94 2 1	none	in. 17	in. 17	not. obs.	not. obs.	Tractive Power doubtful. See Remark, Experiment, No. 44.
28	RAPID.	27 51 28 14½ 28 39½ 29 06 29 34½	b c d e f	23½ 25 26½ 28½	9·57 9·00 8·49 7·90	364? 345? 354? 355?	14·04 13·20 12·45 11·58	do.	do.	do.	do.	do.	do.	do.	do.
29	RAPID.	56 50½ 57 16½ 57 42 58 10½ 58 38½	b c d e f	26 26 28½ 28	8·65 8·65 7·90 8·03	354? 356? 363? 366·4	12·69 12·69 11·58 11 79	do.	do.	do.	do.	do.	do.	do.	do.
30	RAPID.	6 19½ 6 48 7 17½ 7 46 8 14½	b c d e f	28½ 29½ 28½ 28½	7·90 7·59 7·90 7·90	316 324 340 341	11·58 11·19 11·58 11·58	do.	do.	unf. light	do.	do.	do.	do.	
31	RAPID.	23 31 24 58 26 13½ 27 41 29 00	b c d e f	87 75½ 78½ 79	2·59 2·98 2·57 2·85	31 34 30 30	3·79 4·37 3·77 4·18	One Man.	do.	fav. light	do.	do.	do.	do.	
32	RAPID.	37 09 38 36 40 04 41 32 43 00	b c d e f	87 88 88 88	2·59 2·56 2·56 2·56	27 25 26 25	3·79 3·75 3·75 3·75	do.	do.	do.	do.	do.	do.	do.	
33	RAPID.	13 21 13 43 14 05	b c d e f	22 22	10·23 10·23	354? 351?	15·00 15·00	Two Horses.	7 passengers, and 3½ ton, = c. q. lb. 79 2 1	do.	16	16	do.	do.	Tractive Power doubtful. See Remark, Experiment, No. 44.
34	RAPID.	19 59 20 22½ 20 45 21 09½ 21 33	b c d e f	23½ 22½ 24½ 23½	9·57 10·00 9·18 9·57	358? 353? 334 334	14·04 14·67 13·47 14·04	do.	6 passengers, and 3½ ton = c. q. lb. 78 0 15	do.	not obs.	not obs.	do.	do.	do.
35	RAPID.	31 27½ 31 55 32 22½ 32 51 33 19	b c d e f	27½ 27½ 28½ 28	8·18 8·18 7·90 8·03	328 337 351? 367?	12·00 12·00 11·58 11·79	do.	7 passengers, and 3½ ton, = c. q. lb. 79 2 1	do.	16	16	do.	do.	do.
36	RAPID.	38 14 38 41 39 09½ 39 37 40 06	b c d e f	27 28½ 28½ 29	8·33 7·90 7·90 7·76	326 333 341 348	12·22 11·58 11·58 11·38	Two Horses.	7 passengers, and 3½ ton,= c. q. lb. 79 2 1	fav. light	in. 16	in. 16	not obs.	not obs.	
37	RAPID.	46 01 46 30½ 47 00½ 47 32½ 48 03½	b c d e f	29½ 29 32 31	7·59 7·76 7·03 7·26	238 249 245 238	11·19 11·38 10·31 20·65	do.	do.	do.	do.	do.	do.	do.	
38	RAPID.	55 41 56 12½ 56 44 57 15 57 46	b c d e f	31½ 31½ 31 31	7·14 7·14 7·26 7·26	274 247 256 243	10·48 10·48 10·65 10·65	do.	do.	unf. light	do.	do.	do.	do.	Heavy rain.
39	RAPID.	7 03 7 51½ 8 42 9 35 10 28	b c d e f	48½ 50½ 53 53	4·64 4·46 4·25 4·25	65 67 59 62	6·80 6·53 6·23 6·23	do.	do.	fav. light	do.	do.	do.	do.	Light rain.
40	RAPID.	17 21 18 27 19 35 20 41 21 45	b c d e f	66 68 66 64	3·41 3·31 3·41 3·52	46·4 44 45 46	5·00 4·85 5·09 5·16	do.	do.	none	do.	do.	do.	do.	

TABLE I. CONTINUED.—THE RAPID (FIRST SET).

41	RAPID.	15 31½ 15 57½ 16 18 16 39½ 17 01	b c d e f	24 22½ 22½ 21½	9·38 10·00 10·47 10·47	366? 376? 376? 375?	13·75 14·67 15·35 15·35	Two Horses.	7 passengers and 3½ ton, = c. q. lb. 79 2 1	fav. light	in. 16	in. 16	not obs.	not obs.	Tractive power doubtful. See Remark, Experiment, No. 44. Boat grazed.
42	RAPID.	22 57 23 23½ 23 48 24 13½ 24 39½	b c d e f	25½ 24½ 25½ 26	8·82 9·18 8·82 8·65	335 357? 367? 365?	12·94 13·47 12·94 12·69	do.	do.	unf. strng. brze.	do.	do.	do.	do.	Tractive power doubtful. See Remark, Experiment, No. 44.
43	RAPID.	28 32 29 00 29 30 29 59 30 28	b c d e f	28 30 29 29	8·03 7·50 7·76 7·76	337 328 337 338	11·79 11 00 11·38 11·38	do.	do.	fav.	do.	do.	do.	do.	Observed that the piston of the dynamometer had not range enough, therefore all preceding experiments in which the tractive power exceeds 350 lb, are doubtful.
44	RAPID.	39 32½ 40 02½ 40 33 41 03½ 41 33½	b c d e f	30 30½ 30½ 30	7 50 7 38 7·38 7·50	317 314 316 307	11 00 10·82 10·82 11·00	do.	do.	unf.	do.	do.	do.	do.	Gave sufficient range to the piston.
45	RAPID.	49 28½ 49 57 50 26½ 51 11 51 38	b c d e f	29½ 29½ 27	7·59 7·59 8·33	316 324	11·19 11·19 12·22	Two Horses.	7 passengers, and 3½ ton, = c. q lb 79 2 1	fav.	in. 16	in. 16	not obs.	not obs.	Bad Experiment. Horse broke loose.
46	RAPID.	56 56 57 28 57 57½ 58 29 58 59½	b c d e f	32 29½ 32½ 30½	7·03 7·59 6 91 7·38	274 278 279 291	10·31 11·19 10·15 10·82	do.	do.	unf.	do.	do.	do.	do.	
47	RAPID.	2 42 3 03½ 3 24 3 44 4 05½	b c d e f	21½ 20½ 20 20½	10·47 10·93 11·25 10·93	497 478 486 469	15·35 16·09 16·50 16·09	do.	do.	fav.	do.	do.	do.	do.	
48	RAPID.	12 35 12 58 13 20 13 42½ 14 04½	b c d e f	23 22 22½ 22	9·78 10·25 10·00 10·25	466 426 416 417	14·35 15·00 14·67 15·00	do.	do.	unf.	do.	do.	do.	do.	
49	RAPID.	39 37½ 40 01½ 40 24 40 46 41 08½	b c d e f	24 22½ 22 22½	9·38 10·00 10·23 10·00	437 451 428 427	13·75 14·67 15 00 14·67	do.	7 passengers, and 4½ ton, = c. q lb 94 2 1	fav.	16	17	do.	do.	
50	RAPID.	46 53 47 17½ 47 42 48 06½ 48 32½	b c d e f	24½ 24½ 24½ 26	9·18 9·18 9·18 8·65	425 433 426 428	13·47 13·47 13·47 12·69	do.	do.	unf.	do.	do.	do.	do.	
51	RAPID.	8 25 8 53 9 22½ 9 52½ 10 22½	b c d e f	28 29½ 30 30	8·03 7·59 7·50 7·50	343 344 350 332	11·79 11·19 11·00 11·00	do.	do.	fav. light	do.	do.	do.	do.	Warm sunshine.
52	RAPID.	16 16 16 47 17 18 17 47½ 18 18½	b c d e f	31 31 28½ 31	7·26 7·26 7 90 7·26	291 286 309 304 5	10 65 10·65 11·58 10·65	do.	do.	unf.	do.	do	do.	do.	
53	RAPID.	21 22 21 53 22 25 22 54 23 25½	b c d e f	31 32 29½ 29	7·26 7·03 7·59 7·76	321 305 326 310	10·65 10·31 11·19 11·38	do.	do.	fav.	do.	do.	do.	do.	
54	RAPID.	35 07 35 40 36 12 36 42 37 14	b c d e f	33 32 30 32	6·82 7·03 7·50 7·03	269 237 273 286	10·00 10·31 11·00 10·31	Two Horses.	7 passengers, and 4½ ton, = c. q. lb. 94 2 1	fav. light	in. 17	in. 17	not obs.	not obs.	

TABLE 1. CONTINUED.—THE RAPID (FIRST SET).

55	RAPID.	43 37 44 29 45 20½ 46 12 47 02	b c d e f	52 51½ 51½ 50	4·33 4·37 4·37 4·50	66 60 67 62	6·35 6·41 6·41 6·60	One Horse. Boy leading	7 passengers, and 4¼ tons, = c. q. lb. 84 2 1	fav. light	in. 17	in. 17	not obs.	not obs.	
56	RAPID.	58 49 59 55 1 00½ 2 07 3 10	b c d e f	66 64½ 66½ 63	3·41 3·49 3·38 3·57	54 49 46 56	5·00 5·12 4·96 5·24	do.	do.	do.	do.	do.	do.	do.	
57	RAPID.	9 37 9 59 10 22 10 45 11 07	b c d e f	22½ 23 22½ 22½	10·00 9·70 10·08 10·00	487 457 446 421	14·67 14·35 14·67 14·67	Two Horses.	do.	fav. very light	do.	do.	do.	do.	
58	RAPID.	16 04 16 27 16 51 17 16 17 43	b c d e f	23½ 24 25 26½	9·57 9·38 9·00 8·49	445 419 421 417	14·04 13·75 13·20 12·45	do.	do.	unf. very light	do.	do.	do.	do.	
59	RAPID.	37 46½ 38 14 38 41½ 39 10 39 39	b c d e f	27½ 26½ 28½ 29	8· 8 8·49 7·90 7·76	391 383 405 402	12·00 12·45 11·58 11.38	do.	do.	do.	19½	15½	do.	do.	Weight shifted forward.
60	RAPID.	44 28 44 55 45 25 45 54 46 23½	b c d e f	27 30 29 29½	8·33 7·50 7·76 7·59	388 404 416 409	12 22 11·00 11·38 11·19	do.	do.	do. light	do.	do.	do.	do.	
61	RAPID.	9 34 10 02 10 31 11 00 11 29½	b c d e f	28 29 29 29½	8·03 7·76 7·76 7·59	412 410 437 430	11·79 11·38 11·38 11·19	do.	do.	fav. very light	do.	do.	do.	do.	
62	RAPID.	16 37½ 17 06 17 36 18 05½ 18 35½	b c d e f	28½ 30 29½ 30	7·90 7·50 7·59 7·50	356 364 378·9 353	11·58 11·00 11·19 11·00	do.	do.	unf. very light	do.	do.	do.	do.	
63	RAPID.	33 02 33 30 33 59 34 27½ 34 56	b c d e f	28 29 28½ 28½	8·03 7·76 7·90 7·90	403 384 419 430	11·79 11·39 11·58 11·58	Two Horses.	7 passengers, and 4¼ tons, = c. q. lb. 94 2 1	unf. very light	in 19½	in 15½	not obs.	not obs.	Towing-line attached 5½ ft. from bow.
64	RAPID.	49 41 50 10½ 50 40 51 10½ 51 40	b c d e f	29½ 29½ 30½ 29½	7·59 7·59 7·38 7·59	386·8 413 414·6 428	11·19 11·10 10·82 11·19	do.	do.	do.	do.	do.	do.	do.	Towing-line taken through one pully only, and 4 ft. 1 in. from the bow.
65	RAPID.	28 54 29 21 29 49 30 18 30 46½	b c d e f	27 28 29 28½	8·33 8·03 7·76 7·90	3[illegible]6 323 360·6 367 8	12·22 11·79 11 38 11·58	do.	do.	do.	do.	do.	do.	do.	Outrigger used 6 ft. 4 in. from the gunwale, and 5 ft. from the bow.
66	RAPID.	42 51 53 21 43 50½ 44 20 44 50½	b c d e f	30 29½ 29½ 30½	7·50 7·59 7·59 7·38	295·6 292·3 315·2 301·4	11·00 11·19 11·19 0·82	do.	do.	do.	do.	do.	do.	do.	No outrigger.
67	RAPID.	18 31 19 01 19 32 20 02 20 33	b c d e f	30 31 30 31	7·50 7·26 7 50 7·26	303 272·5 281 261	11·00 10·65 11·00 10·65	do.	do.	do.	do.	do.	do.	do.	Outrigger, 3 feet 8 in. from gunwale, 5 ft. 6 in. from bow.
68	RAPID.	31 55 32 21½ 32 48 33 17 33 45	b c d e f	26 26 29 28	8·49 8·49 7·76 8·03	366 378 382·6 419	12·45 12·45 11·38 11·79	do.	do.	do.	do.	do.	do.	do.	

TABLE I. CONTINUED.—THE RAPID (FIRST SET).

69	RAPID.	53 20 53 48 54 17 54 45 54 13½	*b* *c* *d* *e* *f*	28 29 28 28	8·03 7·76 8·03 7·90	468 438·5 473·5 477·7	11·79 11·38 11·79 11·58	Two Horses.	7 passengers, and 4¼ tons = *c. q. lb.* 94 2 1	fav. light	in. 19½	in. 15½	not obs.	not obs.	Towing-line from the bow.
70	RAPID.	18 44½ 1 13 1 41 2 09	*b* *c* *d* *e* *f*	26 29 27½ 28	8·49 7·76 8·18 8·03	328·4 314·2 386·4 365	12·45 11·38 12·00 11·79	do.	7 passengers, and 3 ton, = *c. q. lb.* 69 2 1	none	15⅜	15⅜	do.	do.	A barge passed at 1 m. 12s.
71	RAPID.	8 10½ 8 37 9 05½ 9 33 10 01½	*b* *c* *d* *e* *f*	27½ 28½ 27½ 27½	8·18 7·90 8·18 8·18	326·6 351·1 362·6 364·7	12·00 11·58 12·00 12·00	do.	do.	unf. light	do.	do.	do.	do.	
72	RAPID.	13 54½ 14 21 14 48 15 16 15 44	*b* *c* *d* *e* *f*	26½ 27 28 28	8·49 8·33 8·03 8·03	337 339 358 365	12·45 12·22 11·79 11·79	Two Horses.	7 passengers, and 3 ton, = *c. q. ld.* 69 2 1	unf. light	in. 15⅜	in. 15⅜	do.	do.	
73	RAPID.	26 03 27 11 27 39 28 07½ 29 36½	*b* *c* *d* *e* *f*	28 28 28½ 29	8·03 8·03 7·90 7·76	289·3 301·5 318·3 312·4	11·79 11·79 11·58 11·38	do.	do.	do.	do.	do.	do.	do.	
74	RAPID.	57 51 58 18 58 46 59 15 59 43	*b* *c* *d* *e* *f*	27 28 29 28	8·33 8·03 7·76 8·03	335·7 335·5 351·4 382·6	12·22 11·79 11·38 11·79	do.	do.	do.	do.	do.	do.	do.	
75	RAPID.	10 19 10 43 11 09 11 34 11 59	*b* *c* *d* *e* *f*	24 26 25 25	9·38 8·65 9·00 9·00	396·3 363 406·4 410	13·75 12·69 13·20 13·20	do.	do.	do.	do.	do.	do.	do.	
76	RAPID.	25 29 25 55½ 26 22 26 50 27 18	*b* *c* *d* *e* *f*	26½ 26½ 28 28	8·49 8·49 8·03 8·03	386·5 384·5 393·5 405·5	12·45 12·45 11·79 11·79	do.	do.	do.	do.	do.	do.	do.	

VII. ON THE EFFECTIVE POWER OF THE HIGH-PRESSURE EXPANSIVE CONDENSING STEAM ENGINES COMMONLY IN USE IN CORNISH MINES. BY MR. T. WICKSTEED, CIVIL ENGINEER. COMMUNICATED IN A LETTER TO THE PRESIDENT.

Particulars of the Cornish engines, showing that they are not inapplicable for water-works purposes:—

First—The steam is raised to about 40 lbs. pressure upon the square inch, and the admission of it into the cylinder is cut off when the piston has travelled one-third, one-fourth, one-eighth, or even one-tenth of the length of the stroke, according to the work to be done, and during the remainder of the stroke the expansive power of the steam is exerted.

Second—The boilers are tubular, in some instances having an internal tube, *b b*, and a feed tube, *c c*, as represented in the accompanying drawing; in other instances these tubes are not introduced. I consider their introduction an improvement; the quantity of surface of the boiler exposed to the action of the fire, or heat of the flues, in proportion to its cubic contents of water, as compared with the Boulton and Watt boiler, is as 60 to 37, or as 3 to 2 nearly.

Third—All those parts of the boilers, cylinder, and pipes containing steam which are exposed to the air in most engines, are in the Cornish engines completely cased with a non-conducting material, which, in fact, renders the engine and boiler houses, where this system is carried to its full extent, as cool as the inside of a dwelling-house where there are only ordinary fires. Very little heat is lost when the engine stands still for twelve hours, and if it is necessary to start it during the night, or in case of emergency, scarcely any time is lost in raising the steam, and one-fourth the fuel only is required after the engine has been standing all night; whereas, in the common engines and boilers, where every vessel containing steam is much exposed, it takes from twenty minutes to half an hour, firing hard, to raise the steam.

Fourth—The steam and exhausting valves are (what are termed in the county) "double beat valves;" they may be said to combine the advantages of the circular and slide valves, although not constructed like either; the effect is, however, that a man, who would not have strength to raise the valves of a 36 inch cylinder made according to the ordinary construction, may with perfect ease work the valves of an 80 inch cylinder, as made in Cornwall; the exhausting valves and the pipes leading to the condenser are made of much greater area than ordinarily.

Fifth—The length of the stroke is greater, and the number of strokes per minute fewer, than in other engines.

Sixth—The water is raised by a solid plunger working through a stuffing box, instead of a packed piston or bucket, so that, the packing being external, any leakage is detected immediately, without the delay attendant upon examining and fresh packing the ordinary packed pistons; and the pump may thus be made always to do its full duty, instead of, as is frequently the case, the water escaping by the piston when the packing becomes imperfect, or through bad valves when a bucket is used, and which cannot be detected until it increases to such an extent that the irregular working of the engine denotes it.

Seventh—The valves of the pump, instead of having their hinges in the centre, obliging the water to pass through a confined space between the valve and the side of the valve box, and lying almost flat upon their seats, making it necessary for them to rise much higher than would otherwise be required to deliver the quantity of water, and causing upon its descent so forcible a blow as to render it necessary to admit air under the valves, partially destroying the vacuum in preference to shaking the engine to pieces, and with openings through them of one-half or two-thirds the area of the pump barrel, rendering much greater power requisite to overcome the friction of the water in its passage through them,—instead of this arrangement, the valves are hung at the circumference of the circle and open in the centre, and the lower ones are fixed directly under the pump barrel;—they lie at a considerable angle to the horizon, so that a less rise of the valves is sufficient for the passage of the water, and the openings are made *equal* in area to the pump barrel. The effect is, that, without the admission of air, as is absolutely necessary in the ordinary pumping engines, and which diminishes the quantity of water raised per stroke, although working under more than three times greater column of water, they make no blow of any consequence upon the return stroke.

Eighth—The cataract is used, by which the engine may be made to work from 1 to 12 strokes per minute, as may be required, consuming coals nearly in proportion to the number of strokes; the best rate however is about 5 or 6 strokes per minute. The cataract is peculiarly applicable to engines used in draining mines, where the work to be done increases in proportion as the working of the mine progresses: and also to engines for water-works where the demand increases every year, and the power must increase in proportion. To illustrate this, when one of the London water-works was first established, there were two engines of 30 horses' power, afterwards one of 20 horses' power, and afterwards one of 80 horses' power erected; the number of engines increasing as the demand for increased supply. Now if an engine upon the Cornish plan had been erected, which at 8 strokes per minute had been equal to 160 horses' power, then by working it 3 strokes per minute it would have been equivalent to the two 30 horse engines only, at 4 strokes to the two 30 horse and the 20 horse engines, and at 8 strokes equal to all of them. In this case one engine would have answered the purpose, and the saving that would have been made in engines, boilers, buildings, &c., wear and tear of machinery, labor, and current expenses, is evident.

Ninth—As the extent of pipes in a water works district increases, the amount of friction must also increase, and the engine must work under a greater pressure; there must consequently be a greater load upon the pump. The ordinary engines would not be able to work under this increased load, and a smaller pump must be used; but as this would not give a sufficient quantity of water a new engine must be erected, and this has been the case hitherto; whereas, in a Cornish engine, by increasing the pressure of steam, or by working a less proportion of the stroke by the expansive force of the steam, this increase of expense may be much longer deferred.

Tenth—The Cornish engines, in which the before named arrangements have been adopted, do about three times more work, with the same quantity of fuel, than the common water-works pumping engines. As this has, however, been declared impossible, I will endeavor to prove the contrary by a comparison of the two engines.

The common water-works engine is worked with steam at a pressure generally of two and a half or three pounds above the pressure of the atmosphere; the admission of steam is not cut off until the piston has made three-fourths or seven-eighths of its stroke, and the principle object in view in cutting it off at all is to make the danger of the piston travelling too far, and the chance of breaking the bottom of the cylinder, beam, or parallel motion, less.

On the 18th of February last, I tried the power of an engine upon this construction; the experiment lasted one hour, and 469 lbs. of good Holywell Main large coals were used. The diameter of the cylinder was 60 inches, length of stroke 7 feet 9 inches; the engine made 869 strokes in the hour, or 14.48 strokes per minute; the pressure of steam was $2\frac{1}{2}$ lbs. per square inch above the pressure of the atmosphere, which was $14\frac{3}{4}$ lbs.; the vacuum in the condenser equal to $13\frac{1}{4}$ lbs.; the diameter of the pump was 27 inches, the length of the stroke 7 feet 9 inches, the pressure upon the pump piston equal to a column of water of 115 feet in height, load upon pump piston 28,577 lbs., equal to 10.1 lbs. pressure per square inch of the steam piston; as the pressure of the steam, minus $1\frac{1}{2}$ lb. for imperfect vacuum in the condenser, was $15\frac{3}{4}$ lbs., the friction of the engine must have amounted to 5.65 lbs. per square inch.

The steam used in the hour may be found thus:—the area of cylinder was 19.63 square feet, and the steam was cut off at 1 foot 3 inches from the end of stroke, making length of the stroke for the dense steam 6 feet 6 inches, which, multiplied by the area, gives 127.6 cubic feet per stroke, add $\frac{1}{10}$ for loss of steam per stroke in the vacancies of the cylinder, making a total of about 140 cubic feet of steam per stroke, which, multiplied by the number of strokes per hour, (869×140,) is equal to 121,640 cubic feet of steam, generated under a pressure of 35 2 inches of mercury, at a temperature of about 222° Fahrenheit.

The "duty" p rformed was 34,467,052 lbs. raised 1 foot high with a bushel, or 84 lbs. of coals.

The power of the engine during the time of trial was $(\overset{\text{lbs. load.}}{28,577}\times\overset{\text{stroke.}}{7.75}+\overset{\text{strokes per min.:}}{14.48}\times 33,000)$ equal to 97.2 horses' power.

The steam used was equal to 1251 cubic feet per hour per horses' power, to produce which, at a temperature of 222° Fahrenheit, would require about 0.856 cubic foot of water, and to convert this quantity of water into steam at 222°, it *required*, 4.82 lbs. of coals.

Now supposing the admission of steam was cut off when the piston had travelled one-sixth of its stroke, the operation of its expansion, and the pressure at different stages, and mean pressure of the whole, will be seen by the following Table.

	lbs. pressure per square inch.
During $\frac{1}{6}$th of the stroke dense steam was admitted at a pressure of	17.25
At $\frac{2}{6}$ of the stroke the steam had expanded to twice its volume, and the pressure was reduced to	8.62
At $\frac{3}{6}$ ditto ditto three times	5.75
At $\frac{4}{6}$ ditto ditto four times	4.31
At $\frac{5}{6}$ ditto ditto five times	3.45
At $\frac{6}{6}$ ditto ditto six times	2.87
	6)42.25
Mean pressure per square inch	7.04 lbs.

If the steam had worked dense throughout, the pressure would have been 17.25 lbs. throughout, but 6 times the quantity of steam would have been required; whereas, with one-sixth the quantity of steam, the mean pressure is 7.04 lbs. per square inch, showing that as the quantity of fuel required is in proportion to the steam generated, by working the engine thus expansively the effect is as 2.4 to 1.

If, however, the steam was to be generated under no higher pressure than 17.25 lbs per square inch, it would be necessary to have the area of the steam cylinder 2.4 times greater than the one hereinbefore mentioned, to raise the load; that is to say, a cylinder of nearly 93 inches in diameter, with 7.04 lbs. pressure per square inch, instead of a cylinder 60 inches with $17\frac{1}{4}$ lbs. pressure per square inch. As this would obviously be disadvantageous, inasmuch as there would be a great increase of friction, the practice of using steam of higher temperature, say from 35 lbs. to 40 lbs. above the pressure of the atmosphere, has been adopted in Cornwall. In fact, the general dimensions for a Cornish engine to do the work hereinbefore stated, would probably have been as follows, viz.

Diameter of cylinder	57 inches.
Length of stroke	10 feet.
Number of strokes per minute	7
Diameter of pump piston	34 inches.
Length of stroke	10 inches.
Load on pump piston	45.805 lbs.
Load per square inch on steam piston	18 lbs.

In addition to the foregoing, which only shows the advantage to be 2.4 instead of 3, as I have before stated it to be, there is a very considerable saving in fuel in consequence of the casing, which saving is of course greater in proportion in engines where steam of a high temperature is used; and there is also less friction, in consequence of the slow motion of the engine, and from the other causes already stated, which, in my opinion, are fully equal to make up the difference. It is hardly necessary to observe here, that the more the steam is worked expansively the greater is the proportional advantage.

The principle of expansion is not *new*; it is the extent to which it has been carried, especially of late years, by the successful adoption of steam at a higher temperature than is used in the common condensing engine, which is new.

The late Mr. Watt took out a patent in 1782 for working steam expansively, and in his specification, dated March 12th, 1788, he says, "My new improvement in steam or fire engines, consists in admitting steam into the cylinder of the engine only during some certain part or portion of the descent or ascent of the piston, and using the elastic force which remains in the said steam expanding itself in proceeding to occupy larger spaces as the acting powers on the piston, through the other parts or portions of the length of the stroke of the piston."

He then shows, that if steam of 14 lbs. pressure is admitted into a cylinder, and cut off at one fourth of the length of the stroke, that at half the stroke the pressure is reduced to 7 lbs.; at three-fourths of the stroke to $4\frac{2}{3}$ lbs.; and at the end of the stroke the steam would be reduced to $3\frac{1}{2}$ lbs., or one-fourth of its original power. He then shows that the sum of all these powers is greater than 57 hundredth parts of the original power multiplied by the length of the stroke, and consequently, that one-fourth the steam, thus used, produces more than half the effect that four times the quantity would have produced if worked dense through the whole stroke.

He then says, "consequently, the said new or expansive engine is capable of easily raising columns of water, whose weights are equal to 5 lbs. on every square inch of the area of its piston, by the expenditure of only one-fourth the contents of the cylinder of steam at each stroke."

He had previously shown that the engine working dense steam might be loaded to 10 lbs. per square inch of the area of the piston.

And lastly, he says, "and though, for example, I have mentioned the admission of one-fourth of the cylinders full of steam, as being the most convenient, yet any other proportion of the content of the cylinder will produce similar effects, and in practice I actually do vary the proportions as the case requires."

The casing of the cylinders, boilers, and steam pipes is not new either, but I have never seen it carried to the same extent as it is at present in Cornwall.

Great and deserved credit is due to the perseverance, energy, and ingenuity of the Cornish engineers for bringing the expansive engine to the state that it now is, and for the daily improvements which, although taken separately may appear trivial, are in the aggregate of great importance.

I will conclude this portion of my observations by referring you to the printed Report of the public trial to which the Fowey Consols engine before mentioned has been exposed, in which it is stated, that the engine raised above 125 millions of lbs. one foot high, with 94 lbs. of coals, or nearly 112 millions with 84 lbs., or an imperial bushel. This is the greatest performance of any engine; and the engineers, Messrs. Petherick and West, cannot fail to receive the credit they so richly merit.

Although it is admitted by some engineers in London, that the reports from Cornwall may be true, and that water may be raised out of the *mines* at the expense of power reported, nevertheless, they assert that it is not applicable to water works purposes, on account of the variation in the pressure.

That there is a variation in the pressure where the water is forced into the pipes directly from the engine is certain, and it must be dependent upon the quantity of water drawn from the mains by the tenants, and as this varies, so the pressure must vary—the variation is either not very great, or is periodical; thus the pressure during the day is greater than at night, and during summer greater than in winter. In either case, the increased pressure arises from the circumstance of a greater quantity of water having to be forced through the same pipes in a given time; consequently, the velocity must be greater, and as a matter of course the friction, which increase of friction must be overcome by increased power. If the only variation was a periodical one, and at each period the pressure was steady, then reservoirs at different altitudes, to suit the different pressures, would supply the district as well as a steam engine; (even this position has been disputed;) but as at every stroke of the engine there is a slight variation, not amounting, however, during any of the periods before named to more than 5 or 6 feet, then, as the mean difference is $2\frac{1}{2}$ feet, and in case of a reservoir it would be necessary to have its altitude equal to the greatest pressure, there would be a loss amounting to the difference between the mean and the greatest altitude. It should be observed that the *greatest* portion of the metropolis supply is from summit reservoirs.

Supposing that a Cornish engine could not be worked in the same manner as a London water-works engine, which, however, is not the case, and that it were necessary to work it under a fixed pressure, varying, however, at *given* periods, the loss, as before shown, is trifling. Suppose it to be $2\frac{1}{2}$ per cent; or taking the variation at 20 feet, instead of 5 feet, the loss would then be 10 per cent; the gain, however, by adopting the Cornish engine, is 300 per cent.

There would, however, be an advantage in working either a Cornish or a London pumping engine under a fixed pressure instead of a variable one, and much less danger; for in all single engines, working under a pressure that varies, and where from the great extent of mains and services there is great liability to accident from the bursting of pipes, or sudden shutting off an important main by accident or design, the danger of the piston traveling too far, and thereby breaking the beam, or the cylinder bottom, is very great, and the only safeguard is the vigilance of the engine-keeper, who, if he is constantly watching, may take the engine "in hand," in case of a sudden variation in its speed, and thus prevent the accident which might otherwise have disabled the engine. This is not by any means a hypothetical case.

It would therefore be the safest plan to work the engine under a fixed load, even at the loss of a little power, if at the same time the liability to accident was rendered infinitely less.

In most cases, therefore, where the pressure under which the engine works is known, *and it ought to be known*, I should recommend the adoption of a standpipe, the water rising from the engine in one pipe, and flowing over either at the top, or through communicating pipes, at any level required, into the descending pipe communicating with the mains in the district. The engine might then work under a regular load; any fracture of the pipes in the district would not affect the engine; its only liability to accident being from the fracture of one leg of the standpipe, which of course could be provided against by extra strength of materials.

Although I have shown how (upon the supposition of the variation in pressure being an objection to the application of the Cornish engine to water-works purposes) the supposed difficulty may be overcome, I by no means intend to allow that the engines in Cornwall are not subject to chances of as great and even greater variation; for if any valve breaks, which is very likely to happen where there are so many pumps at work, if the water at any time fails, and air is suddenly admitted through the suction-pipes, &c., &c., in all such cases, the resistance to the power of the engine is reduced, and if the parts of the engine were not made strong enough to resist the force of a sudden blow, fracture would take place; but they are generally, and ought always, to be strong enough.

In conclusion, I beg to observe, that if the Cornish engines do the work that it is stated they do, and if they are applicable to water-works purposes, of both of which I have no doubt, then the saving is most important; for supposing instead of *three* engines, consuming 3000 tons of coals per annum, *one* could be erected doing the work of the three, and only consuming 1000 tons, assuming the price of coals delivered to be 18s. per ton, the saving in coals alone, without reference to the savings in the reduced number of engine-keepers and stokers, the current expenses of one engine instead of three, the wear and tear of machinery and buildings, would be £1800 per annum.

Nov. 4, 1835.

M. Degousse has succeeded in piercing a fourth Artesian Well, at Meaux. The depths of the bores of these wells are from 164 to 295 feet English, and the water rises to from $3\frac{1}{4}$ feet to 16 feet 4 inches English. The quantity obtained at the Fulling Mills is 66 English gallons a minute, and that at the Seminary 37 gallons. The water is very soft, and has been proved by an analysis to be fit for every purpose.

RAILROAD AND CANAL STOCKS, in New-York and Philadelphia.

SALES OF STOCK IN NEW-YORK

March, 30th.

Mohawk Railroad	cash	70
Paterson Railroad	"	65
Boston and Providence	"	95
New-Jersey Trans	"	$92\frac{1}{4}$
Stonington	"	69
Worcester Railroad	"	91
Long Island Railroad	"	64
Paterson Railroad	"	65
Stonington Railroad	"	55
Harlem Railroad		64
Utica and Schenectady	cash	114
Delaware and Hudson Canal	"	$73\frac{1}{4}$
Morris Canal	"	79
New Orleans Canal	"	95

PHILADELPHIA STOCK MARKET.

March 21st.

	Price of shares	Offered	Asked
RAILROAD STOCKS			
New Castle and Frenchtown	25	29	30
Do loan, 5½ per cent	100	99	101
Wilmington and Susquehanna	50	33	35
Camden and Amboy, shares,	100	130	136
Do loan 6's 1835	100	110	120
Danville and P shares	50	25	35
Norristown, do	50	27	29
Do 6 per cent loan	100	85	100
Valley Railroad	7½	1	3
Westchester do	50	20	25
Minehill do	50	57	59
N. L. and Penn Tp. do	40	34½	35
Philadelphia and Trenton do	100	121	123
West Philadelphia Railroad	50	20	30
Harrisburg and Lancaster	50	46	48
Cumberland	25	15	20
Beaver Meadow	50	57	57½
MISCELLANEOUS STOCKS			
North American Coal Company	25	12	14
Steam Bt. Sts Columbian	100	18	22
Exchange Stock	100	70	80
Arcade	100	55	75
Theatres—Chestnut street	600	625	675
——Walnut street	280	175	200
——Arch street	500	325	375
Gas Company	100	100	102
CANAL STOCKS			
Schuylkill Navigation, shares	50	155	153
Do loans, 5 1845	100	93	100
Do do 1855	100	100	101
Do do 5½ 1837	100	98	100
Lehigh Coal and Navigation	50	72	75
Do loan, 6 1833	100	97	98
Do do 6 1839	100	97	9[illegible]
Do do 6 1844	100	99	100
Do do 5 1840	100	96	97½
Union Canal, shares	200	180	190
Do loan, 1836	100	83	86
Do do 1840	100	85	90
Chesap'k & Delaware Canal, shares	200	20	40
Do loan, 1837	100	60	67
Do do 1840	100	60	67
Delaware and Hudson,	100	70	70½
Do loan	100	95	100
Louisville and Portland	100	112½	1[illegible]7
Convertible 6 per cent. loans,	100	110	120
Sandy and Bever	100	60	80
Morris Canal	100	81	83

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid, (continued.)

Witherell Ames, and Co., city, to January 1, 1838

C. F Howell, city, Jan. 1, 1838

Adam Hall, " Jan. 1, 1838

I. Aitkins, Paulins, N. Y. Jan. 1, 1838

W. H. Talcott, Albany, " Jan. 1, 1838

H. Burden. Troy, " Jan. 1, 1838

" Advertising " " Jan. 1, 1838

E. C. Scott, Newburgh " Oct. 1, 1837

J. B. Sargent, " " Jan. 1, 1838

H. & S. Parmlee Little Falls N. Y. January 1. 1838

C. Minor, Wilksbarre, Pa., Jan. 1, 1838

Mr. Steaf, Downington, " In Full

James Seymour, Chicago, Ill. March 15, 1833

W. S. Wait, Greenville, Ill., Jan. 1, 1838

James Blake, Indiannapolis, Indiana, January, 1, 1838

D. Dessler, Tuscumbia, Alabama, January, 1, 1838

Engineer and General Superintendent of T. D & C. R. R. Co., January 1, 1838

President of T. D & C R. R. Co., January 1. 1838

P. Kirkwood, Jamaica, L. I. Jan. 1, 1838

Col. H. Long, Hopkington, N. H. January 1. 1838

Advertisements.

☞ MISSING NUMBERS WANTED.—If any of our subscribers have numbers 4, 5. 6 and 7, of Volume or *five last* year, which they do not desire to preserve, they will confer a special favor by sending them to us, that we may complete a few copies of the volume.

*** If any of our subscribers are in want of *any other* number of the same volume to complete their volume they will please give early notice and they shall be sent.

The Title page and Index for last year, or volume five, will be forwarded to subscribers with our next number.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its engravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

FOR SALE AT THIS OFFICE,

A Practical Treatise on Locomotive Engines, with Engravings, by the CHEVALIER DE PAMBOUR—150 pages large octavo—done up in paper covers so as to be sent by mail—Price $1 50. Postage for any distance *under* 100 miles, 40 cents, and 60 cts. for any distance exceeding 100 ms.

ALSO—*Van de Graaff on Railroad Curves*, done up as above, to be sent by mail—Price $1. Postage, 20 cents, or 30 cents, as above.

ALSO—Introduction to a view of the works of the *Thames Tunnel*—Price *fifty cents*. Postage as above. 8 cents, or 12 cts.

*** On the receipt of $3, a copy of each of the above works will be forwarded by mail to any part of the United States.

10 10t

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice

4—ytf H. R. DUNHAM & CO.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N. Y.
51tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

TO ENGINEERS.

WE are gratified to be able to announce to those desiring INSTRUMENTS, that Messrs E. & G. W. BLUNT of this city, are now prepared to furnish at short notice, LEVELS, from different manufacturers, among others from Troughton & Sims, which they warrant of the first quality. Circumferentors, Levelling Staves, Prismatic Compasses, Mathematical Instruments, Books for Engineers, etc. constantly on hand.

One of the above firm is now in England superintending the manufacture of Theodolites, Transit Instruments, etc —and any orders for Instruments, not now on hand, will be forwarded him, and executed promptly.

*** Orders will be received and promptly attended to by the Editors of this Journal. 9 4t

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N. Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention.

HENRY BURDEN.
Troy Iron Works, Nov. 15, 1836. 47—tf

TO MANUFACTURERS OF HYDRAULIC CEMENT.

PROPOSALS will be received by the subscriber, on the part of the James River and Kanawka Companies, for the delivery on the wharf, at the city of Richmond, Va., of Fifty Thousand Bushels of Hydraulic Cement. The amount called for must be furnished in quantities of about six thousand, bushels per month, commencing on the first of April and ending on the first of November next.

To avoid future litigation, it is to be understood, on making the proposals, that the bushel shall weigh seventy pounds NETT, and that the Cement shall be delivered in good ordder, and packed in tight casks or barrels.

Proposals will also be received for furnishing fifty thousand bushels, at any convenient point on the navigable waters of James River, or the north branch of James River, where the materials for its manufacture has been discovered.

Persons familiar with the preparation of the Cement, would do well to examine the Counties of Rockbridge and Botetourt, with a view to the establishment of works for the supply of the western end of the line; and a contract for the above quantities will be made with them before they commence operations.

As there will be required on the line of the James River and Kanawka Improvement, in the course of the present and next year, not less than half a million of bushels of this Cement, and some hundred thousand bushels more in the progress of the work towards the west, contractors will find it to their interest to furnish the article on terms that lead to future engagements.

Proposals to be directed to the subscriber at Richmond, Va CHARLES ELLET, Jr.,
Chief Engineer of the J. R. and Ka. Co.
February 20th, 1837. 9 6t

CROTON AQUEDUCT.

NOTICE.—Sealed Proposals will be received by the Water Commissioners of the city of New-York, until the 22d day of April next, at 3 o'clock, P. M., at their office in the city of New-York, and until the 24th day of April, at 9 o'clock, P. M., at the office of their Engineer in the village of Sing Sing, for constructing a Dam across the Croton River, for the Excavation, Embankment, Back Filling, Foundation and Protection Walls; for an Aqueduct Bridge at Sing Sing, three Tunnels, several large and small culverts, and an Aqueduct of stone and brick masonry, with other incidental work, for that portion of the Croton Aqueduct which extends from the Dam on the Croton to Sing Sing, being between eight and nine miles in length

The prices for the work must include the expense of materials necessary for the completion of the same, according to the plans and specifications that will be presented for examination, as hereinafter mentioned.

The Work to be completed by the first day of October, 1839.

Security will be required for the performance of contracts—and propositions should be accompanied by the names of responsible persons, signifying their assent to become sureties. If the character and responsibilities of those proposing, and the sureties they shall offer, are not known to the Commissioners or Engineers, a certificate of good character, and the extent of their responsibility, signed by the first judge or clerk of the county in which they severally reside, will be required.

No transfer of contracts will be recognised.

Plan of the several structures and specifications of the kind of materials and manner of construction, may be examined at the office of the Commissioners, in the city of New-York, from the 10th to the 14th, inclusive, of April next. The line of Aqueduct will be located, and the map and profile of the same, together with the plans and specifications above mentioned, will be ready for examination at the office of the Engineer, at the village of Sing Sing, on the 15th day of April next, and the Chief or Resident Engineer will be in attendance to explain the plans, &c., and to furnish blank propositions.

Persons proposing for more work than they wish to contract for, must specify the quantity they desire to take

The full names of all persons that are parties to any proposition, must be written out in the signature for the same.

The parties, to the propositions which may be accepted, will be required to enter into contracts immediately after the acceptance of the same.

The undersigned reserve to themselves the right to accept or reject proposals that may be offered for the whole or any part of the above described work, as they may consider the public interest to require.

STEPHEN ALLEN,
CHARLES DUSENBURY, } Water
SAUL ALLEY, } Commissioners.
WILLIAM W. FOX,

JOHN B. JERVIS,
Chief Engineer, New-York Water Works.
New-York, February 28, 1837. 10 5t

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B —Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

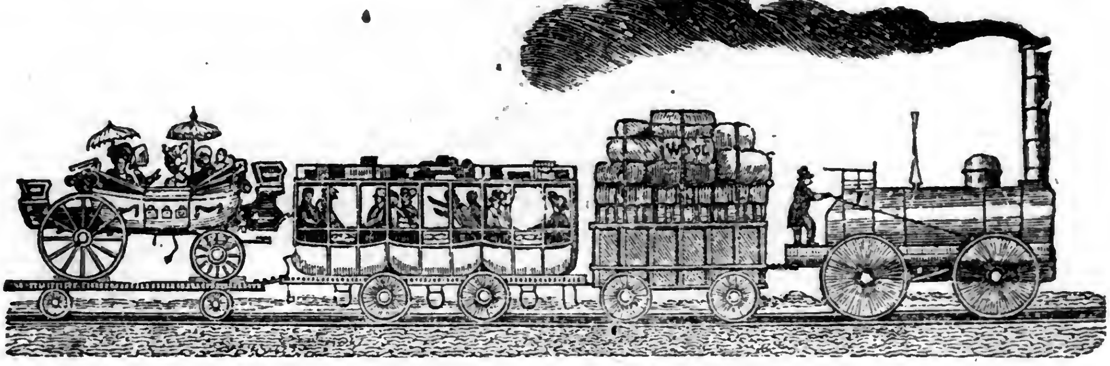
FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rochester, Jan 12th, 1837. 4—y



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] | SATURDAY, APRIL 8, 1837. | VOLUME VI—No. 14.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 8, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America*.

☞ It will not do, these hard times for money, to be too modest. The *Paper Maker* must be paid, the *Engraver*, the *Ink Maker*, and the *Printer* must be paid, —then why not Pay the Publishers and the Editors the *current year* and all *arrearages* for the Journal? *It must be done.*—PLEASE REMIT BY MAIL.

NEW-YORK AND ALBANY RAILROAD.—We are pleased to find that the friends of this work are still resolved to push the work on—and we ask the attention of our readers to the following notice for opening the Books for the purpose of obtaining subscribing to the balance of the stock. The city of New York has a deep interest in the early completion of this road—and upon the citizens of NEW YORK we call for prompt and efficient aid to build the Road.

The following letter from William Norris, Esq., of Philadelphia, will be read with much interest by those who have read the account of the performance of his Engines.

For the Railroad Journal.

PHILADELPHIA, April 3d, 1837.

Messrs. MINOR & SCHAEFFER—

Gentlemen,—I received in due time your Railroad Journal, of March 11; containing a letter from A. G. Steere, Esq., of the New-York and Erie Railroad—and until this moment, press of business and unavoidable absence from home for the last week, have prevented my replying to the same.

To Mr. Steere's remarks, I reply, that, however wonderful such performances may seem to him, they are nevertheless all *substantially true*, and can be authenticated by the affidavits of scientific men, of the first eminence for talents and integrity.

Mr. Steere has based his calculations on previous theories, and seems determined to adhere to them, without admitting a probability of a change as science advances. He must then believe that Pambour has firmly established a Theorem forever, and that all the results of scientific experiments, from this date, as regards traction, friction, &c. &c., must be (to be true) in accordance with the formula so laid down. This is preposterous.

I am well aware, that the performances of my Engines, in giving results 50 per cent. better than any other, have created surprise, and in some instances doubt, but I can prove by disinterested persons of *well known* integrity, the facts of every performance, as detailed in my Circular, and I can appeal to yourselves, (Messrs. Minor & Schaeffer,) and also to 51 other gentlemen, as witnesses of the experiment of 19th July last. There was no mistake, no deception there.

In the course of this communication, I

shall record some experiments still more wonderful, that are also FACTS, **and which will stagger Mr. Steere's belief still more, in the possibility, or** PERHAPS PROPRIETY, **of abolishing old Theories.**

During the last summer, when the **Stationary Engine** was out of order and under **repair,** the George Washington Engine, for **about 27 days,** performed all the duties required on the Plane—and in one instance, **for 5 days** in succession, the mode of operation was thus, viz:—At the foot of the **Plane,** two cars would be attached to the **Engine,** which, with the Tender, seldom **weighed** less than 26,000 lbs. This load **was then** dragged to the summit in from 2 **to 3 minutes.** The cars were then detached, **and the Engine** secured to the rope, **while at the foot** and on the other track, **5 or 6 cars** were likewise attached to the **rope**—the Engine would then be put in **operation,** descending the Plane, and dragging up by the rope, the cars so attached. **The greatest** weight dragged up in this way **was 47,450** lbs.

Another of my Engines, the "Benjamin **Franklin,"** has been, during the winter and **spring,** also performing the duties required **of the** Stationary Engine.

On the 16th ultimo, I put on the road **two new Locomotives,** built for the State **of Pennsylvania,** viz:—The "James Madison" and "La Fayette," both these Engines ascended the Plane with loads. On **the afternoon of the** same day, the La Fayette dragged up the Plane 38,000 lbs.—**When about** half way up, from 50 to 60 **persons,** from the crowd that had stationed **themselves** at that point to witness the experiment, jumped on the cars, and for a **moment** impeded her progress, (the wheels **slipping,)** but as soon as she was relieved **of this extra load,** she ascended to the top, **and immediately** descended with the two **cars,** stopping at pleasure in the descent. **In consequence of the late hour, no further trial was made that afternoon.** This performance was witnessed by 200 gentlemen, **many of Science,** amongst whom was Capt. **Tallcot, of the** New-York and Erie Railroad.

On the 18th another trial was contemplated, **and for this purpose,** two cars were **loaded with Pig Metal** and weighed, but on **arrival at the foot** of the Plane, a drizzling **rain** commenced, and soon formed a slimy **coat on the rails**—which were then in the **worst possible** condition. The two loaded **cars were detached** and the Engine sent **up the Plane** with the Tender, the weight **of which loaded,** was upwards of 10,000 **lbs., and** notwithstanding the bad condition of the rails, the Engine drew up this load in the very short space of 1 min. 40 seconds. This performance was also witnessed by Capt. Tallcot.

A third trial was deferred (in consequence of the derangement of the regular business on the Plane during the experiments) until the arrrival of Judge Wright, of New-York, at whose request the foregoing experiments were projected, he having been detained from them unexpectedly. A letter was received from the Judge last week, during my absence, informing of his arrival at, and departure from Philadelphia, but stating his intention of remaining in Philadelphia on his return, for the purpose of witnessing the experiments—and it would give me great pleasure to have Mr. Steere's company at the same time, to prove to him that old Theories MAY be abolished. When this trial takes place, Judge Wright shall superintend the weighing of the Engine, Tender, and load—shall take the measurements of the safety valve and lever, to ascertain the pressure—shall leave the whole matter under his absolute control, and when the result is published, I hope Mr. Steere will then admit that there is something *new under the* sun.

The La Fayette is performing daily on the Columbia Railway, and any persons can, at any time, see for themselves, the immense powers of this Engine. She drags with ease 25 loaded cars, over abrupt curves and high grades, and on a rise of 52 feet per mile, with the actual weight of 241,275 lbs. (taken from the Weigh Masters' Books) attached to her, she has come to a dead stand, and started again without the least difficulty from a state of rest. On Friday last, March 31st, this Engine brought in attached to her, the unprecedented and enormous load of 45 cars, 25 of which were loaded, and this load she carried over the grade of 52 feet rise per mile, without any difficulty, not a single instant's delay, but steadily at the rate of nearly nine miles per hour. Let unbelievers come and see for themselves.

The dimensions of La Fayette are as follows:—

Whole weight	18,725 lbs.	Including water and fuel while in operation on the road.
Weight on drivers	11,375 "	

Diam. of Cylinders, $10\frac{1}{2}$ inches,
Length of Stroke, 18 inches.

I am, Gentlemen, very respectfully,
Your obedient servant,
WILLIAM NORRIS.

POSTSCRIPT.

PHILADELPHIA, April 4, 1837.

Gentlemen,—Will you please add to the performances of the La Fayette Engine, the following:—

On Saturday last, (1st instant,) she took out the enormous load of 332,330 lbs. behind her, exclusive of weight of Engine and Tender—the weight is given me by the Weigh Master.

Yours very respectfully,
WILLIAM NORRIS.

We give the following extract from a letter written by a gentleman in Michigan, in relation to an article published in a recent number of the Journal, as we give many other communicatiens, on the authority of those from whom we receive them—our object is always to give correct information.—[Editor Railroad Jourrnal.]

To the Editors of the Railroad Journal.

"In the last number of your Journal received here (St. Clair, Michigan,) is a statement relative to the Western Railroad through Canada, and the Northern Railroad through, or across the peninsula of Michigan, that is not exactly correct. I will therefore give you a brief statement of the exac present situation of the two Roads in question. The Great Western Railroad (as it is called) commences at Hamilton, (head of Lake Ontario,) runs to London and thence to Chatham, on the Thames, the point of termination on the River St. Clair, has been left open for three objects, firstly, for a survey, secondly, that it may be carried to that point which will connect it with the Michigan Northern Road, and lastly, that it *possibly* may be carried from Chatham to Sandwich, opposite Detroit before it shall be carried farther West. The Senate of Michigan Legislature have just passed a bill (which no doubt will receive the sanction of the lower house,) providing for the construction of the St. Clair and Romeo Railroad, and for its final extension across the peninsula to Lake Michigan. You therefore will perceive at a glance that the communication from Albany to Lake Michigan via the Western Railroad, (when that shall be carried west to the St. Clair River) will be by this road without reference to Lake Huron or Fort Gratiot, as indeed it should be, this being decidedly the best route, whilst the Fort Gratiot Road never had an existance at all, except in the train of its projectors."

Respectfully, your obt. servt.
H. N. MONSON,
Secretary and Treasurer.

We welcome CLINTON to our columns again; and trust he will not again forget that the subject on which he writes is one of vast importance to this city—and that the columns of the Journal are open to its discussion.

The facility of opening an easy communication between this city and Wyoming Valley, and coal region, is not properly understood—although one in which every inhabitants is deeply interested. If "Clinton" will aid us it shall not be our fault if it is not better understood hereafter.—[Editors Railroad Journal.]

For the Railroad Journal.
CLINTON. NO. VI.

The Susquehanna River running a south east course from the New-York State line, breaks through the monntains, and enters the Valley of Wyoming. Within 80 rods after its debouch into the Valley, it receives from the east, the Lackawanna River; then turning to the south west, the Susquehanna flows in a placid sheet of water, but once slightly entangled, twenty miles to Nanticoke. In this distance of twenty miles, the mountains recede; so that, in the centre, from the top of one mountain to the top of the other, on the opposite side of the river, it is about six miles. At Nanticoke they approach each other quite near, are precipitous and high; here too are the Nanticoke Falls. The water, compressed between these giant, and rugged hills, tumbling and dancing over the dam now erected at the Falls renders the scene strikingly grand, the Valley on both sides the river, has a large extent of bottom land, or river flats, on the west side, about the middle of the valley, the flats extend two miles back. These lands are extremely rich, easy to work, and almost inexhaustible in their productiveness. The uplands in the Valley, though not naturally so fertile, or easy of tillage, yet, under good management, are made to produce wheat, corn, oats, and grass, in abundance. Many are of opinion, that Wyoming Valley was once a lake, and the hypothesis is not without numerous facts and cojent reasons to sustain it. About half way down the Valley, on the easterly bank of the river, stands Wilkesbarre, the county town of Luzerne. It is beautifully situated, laid out into handsome squares, has besides the country buildings, a Methodist, and a Presbyterian Meeting House; an Episcopal Church, and an Academy. That the Church and Presbyterian Meeting Houses, has each an organ, speaks well for the spirit and taste of the inhabitants. There are three or four points of view from which the Valley may be seen to advantage. From the top of Inman's hill, half way from Willkesbarre to Nanticoke, from the top of Ross' hill, half way from Kingston to Plymouth, from Prospect-rock on the mountains south east of the Borough of Wilkes-Barre. The summer view from the first, presents below, the large sheet of water, formed by the Nanticoke dam; the hills and dales of Hanover and Newport; farm houses and orchards; highlands covered with sheep, meadows alive with cattle, the flats waving with grass. On the opposite side of the river the rich Shawney flats and the thriving village of Plymouth. To the north east, you behold the Susquehanna like a beautiful ribbon, checked with islands wending slowly through the charming vale, as if it lingered, loath to leave a spot never equalled in loveliness. The spires and white houses of the Borough—the long bridge spanning with its noble arches, the wide river. How tame are words! How inadequate all power of expression! to give even a faint idea of the loveliness of this summer prospect! Campbell's painting from the bright region of Fame, with a rainbow for his pallet, could convey no just impression of its surpassing beauty. Governor McKean, then a Judge of the Supreme Court, near half a century ago, on coming to the mountains that overlooked Wyoming, referring to the contest then raging between the New-England men and the Pennsylvanians for the Canal, said, "beautiful indeed! and yet it is no wonder such a spot should be the object of eager contention."

Rich and beautiful as is the prospect on the surface, it is cold, dead and lifeless, compared either with the riches or beauty of what lies beneath the soil. Visit the Plymouth mines. Visit Bennett's great mine at Pittston. Drive your carriage between the pillars of Anthracite in the great Baltimore mine; see the glittering coal reflecting all hues of the rain-bow, consider how necessary to human happiness, to prosperity, even to existence. See the inexhaustible stores, the boundless deposites, and say if another spot so rich and beautiful exist on earth. Wyoming Valley is about twenty miles in length, and may average four miles in width. At a greater or less depth all this has layers of coal beneath the surface; that would be eighty square miles, or 51,200 acres; but that which lies beneath the River or River flats will not be worked for two centuries; this takes up half from present use or present value, leaving about 26,000 acres. But experience has shown that, generally, on the east side of the River, mines near the mountains, say a strip 1½ miles wide from the lower to the upper part of the Valley, the coal lies much more accessible, level, free and easy to be raised. Why, gentlemen, a year ago, J. J. Astor might with his single purse, have monopolized the coal in Wyoming that will be worked for the next hundred years. It is too late now. Numerous capitalists have been purchasing, and lands have risen an hundred per cent. Hundreds are lots that could have been bought for 15 or 20 dollars an acre, now sell for from 30 to 40; and in particular instances have run up to 80 or 100 an acre. But a great deal is yet in market, and prices are not yet up to one fourth the intrinsic value of the land. Take these facts; the veins of coal most accessible are from 12 to 24 feet in thickness, the average 18 feet. Now a cubic yard is estimated to weigh a ton. An acre then may be fairly calculated to yield 30,000 tons of coal. How much deeper, veins would add it is hardly necessary to inquire. Many persons in Schuylkill, who own veins rent them out, receiving as rent 50 cents a ton for the coal taken. At that rate an acre of coal land would be worth 15,000 dollars. Where is the error in this. Yet coal lands are selling in Wyoming for from 15 to 20 dollars an acre, richly worth 500 taking all chances; and a most advantageous investment of capital at 100 dollers per acre.

The Canal to tide from Columbia is pushing on to completion. Coal then may be taken by that route to New-York or Boston, at a price not to exceed five dollars a ton, estimating coal in the mine at 40 cents a ton. The bill on its passage in Pennsylvania,—already appropriates six hundred thousand dollars to the north branch Canal. Presently the way to the little and great lakes, to Seneca, Cayuga, Erie and Ontario, will be open to Wyoming Anthracite, and without a competitor. The Morris and Lehi Canal are now just completing too, within sixteen miles of the seat of Wyoming, and a law has just passed authorising the Lehi Company to make a Railroad to the Valley, which will, probably, forthwith be done. Coal can then, by that route, be delivered in New-York at $4.80 cents. Bear in mind that Pittston, at the junction of the Lackawanna with the Susquehanna, not surpassed in deposites of coal, is only 106 miles from the Park—only 106 miles on a straight line from your City Hall! A Railroad from Newburgh and a Railroad from Elizabethtown point, are projected to meet at Stroudsburgh, and thence to extend to Pittston. By these, cars of coal could go from the mine either to Newburgh or your city in a day.

Oow comes the main object of this communication; why is not your city awakened to the importance of this matter? why is not a bold and decisive effort made to participate in the coal trade? Behold how Western Philadelphia has grown up under the wholesome stimulus and nutriment of her coal business.

New-England capital and enterprise would find in Wyoming sources of great public usefulness, and individual wealth. Wyoming is just opening to the world. Nothing can retard its prosperity. But those who mean to share in the exciting scenes of speculation that are about to take place this summer, while thousands and tens of thousands will be won, should come with long purses and cool heads. This matter of wild speculation is to be regretted, but inevitable—the prize is too rich, not to be struggled for.

To the Editors of the R. R. Journal:

ON THE RETARDATION OF THE VELOCITY OF STEAMBOATS IN ASCENDING RAPIDS. BY M. R. STEALEY, CIV. ENG., FRANKFORT, KY.

It is a well ascertained fact, that a steamboat having a given power, capable of propelling at a certain maximum velocity on still water, cannot ascend a rapid where the velocity of the current is nearly equal to the speed attained on still water, and that the progress of the boat in ascending a rapid added to the velocity of the current, is not as great as the velocity of the boat on an expanse of water void of motion; and consequently, that the speed of the boat in stemming a current, is retarded in a greater ratio than the opposing velocity of the current would seem to indicate—there is then evidently some new opposing or retarding force to be encountered in ascending a rapid, in addition to that of the current; and it is believed, that the greater part, if not the whole of this force, is attributable to gravity.

In elucidation of this position, it may be observed, that when there is motion in the water occupying the channel of a river, there is also a proportionate descent in its surface in the direction of that motion, or current; one is a necessary consequence of the other, each being to some extent modified by local causes. It will then be perceived, that the surface of water running in an open channel assumes the form of an inclined plane, upon which, when a boat ascends, it not only encounters the resistance of an opposing current, but also that which gravity opposes to the ascent of bodies on inclined planes.

Having all the necessary data given, it would be easy to calculate the amount of power, necessary to overcome the gravitating force of a body on an inclined plane, by the ordinary formula, applicable to the motion of bodies on stationary planes.—The surface of a rapid, however, is not a *stationary*, but a *moveable*, plane; and it becomes necessary from this cause, to adopt an essentially different method of calculation from the forms, in order to arrive at the true result. And it may be observed, that the omission to draw this distinction between stationary and moveable planes, has heretofore been the cause of underrating the resisting force under consideration. If a body moving on a fixed plane, possesses sufficient power within itself, to propel it along the plane, at a given velocity, the amount of power expended by the body, is precisely the same as would be expended, when the plane moves with the same velocity in an opposite direction, and the powers of the body is exerted in maintaining a fixed position in reference to any stationary object beyond the plane. And generally, the resistance to the motion of a body traversing a plane, and the power expended in order to overcome that resistance, should be estimated by the resistance which the body traverses on the plane, whether the latter is moveable or stationary.

It will be readily perceived from the preceding remarks, that in the case of a steamboat ascending a rapid, an instance presents itself when the plane is moveable, and the body by its inherent power exerts a force to pass along that place. For the sake of illustration, we will assume a rapid, the ratio of inclination of which is 1 foot in 500, with an uniform velocity of 500 feet per minute. On such a current, a body left to itself, would be carried down 1 foot of perpendicular height, in each minute of time. Now, if this body can exert a force capable of moving itself up this plane, at a relative velocity equal to the velocity of the plane or current,—the body will then be stationary in reference to any *fixed object on the shore;* but it is evident, that at the end of each minute, it will be in a position on the plane *one foot higher*, than the position it occupied on the plane at the beginning of the minute, because by the hypothesis, the current would have descended through that perpendicular height in this space of time. Here then are two forces acting in opposition to each other. One, the current exerting a force equal to taking the body downward through one foot in one minute, and that exerted by the body in maintaining a stationary position; the latter counteracting the former they are in equilibrio, and consequently equal—and, therefore, although the floating body or boat has *actually* remained stationary, it has *virtually* expended power sufficient to have raised itself through one foot of perpendicular space in one minute of time.

The power expended therein, overcoming the force of gravity on moveable planes or currents, should be estimated, not by the *actual* height to which the floating body of boat is elevated, as ascertained by reference to some fixed object beyond the plane, or on the shore; but by the virtual *height measured on the plane itself;* and this, for any given time, will be estimated by the relative distance traversed, and the perpendicular elevation due to that distance by the ratio of the inclination of the plane.

Let W = weight of the boat in tons.

V = virtual velocity of the boat per minutes.

H = Height of the plane.

L = Length.

T = Time of ascent.

(15 = No. of tons raised 1 foot high in 1 minute equal to 1 horse power) and N = No. of horse power necessarily exerted at each instant of time, to overcome the graviting force, and A = the aggregate mechanical force expended in the time T expressed in horse power acting for 1 minute.

$$-\frac{W\ V\ H}{15\ L} = N.$$

or making J the inclination of the plane, we have

$$\frac{W\ V\ (\sin.\ J)}{15} = N. \text{ and } N\,T = A.$$

In the foregoing investigation, the current is assumed to have uniform velocity; when the rapid is long and deep, however, the velocity of the current will be accelerated. The greater the depth of water on the rapid, and the more direct its course, the nearer the accelerated motion will approximate to the velocity assigned by theory to the motion of a body rolling down an inclined plane—and the less the depth of water, and the more sinuvus the channel, the more closely the current will approach to an uniform velocity. In fine, the accelerating force is so much dependent on, and modified by local circumstances, that no formula admitting of general application, can be given, from which the accelerated velocity can be deduced, and it can therefore only be ascertained by observation. When the motion is accelerated, the formula above given can be applied, by dividing the rapid into sections, considering each separately, and thence deducing a general result.

The following statement from the New-York Evening Star will give a good idea of the *un*-certainty of Railroad travelling in Winter. We shall be greatly obliged to those in charge of *other* Railroads if they will write and give us a statement of the number of days delay caused by the severity of the weather, on the roads under their charge.—[Editors Railroad Journal.]

From the New-York Evening Star.

WINTER TRAVELLING—RAILROADS.—The

facilities of winter travelling, and the skill and energy in using them have so much increased, that fewer interruptions have taken place on many of our public roads this winter than has heretofore existed during the same season of the year. A short notice of some of the facts may be interesting.

The improvements in snow ploughs and scrapers have demonstrated that travelling over railroads can be continued in winter with nearly the same certainty as in the mild season of the year. The snow and ice during the last winter, though less than the preceding season, was about the same which is usual on our winters—still the impediments to travelling over *railroads* was overcome in a great degree, and they were very little interrupted between the commencement of the winter and the opening of the spring.

The transportation of goods and passengers over the

Lowell Railroad	was stopped only	two days.
Boston and Worcester Railroad		do.
Boston and Providence	do.	one day.
Camden and Amboy	do.	part of a day.
New-Jersey	do.	do.
Utica and Schenectady	do.	one day.
Mohawk	do.	do.

How much the Pennsylvania and Southern roads were interrrupted is not at present known to us, but it may fairly be inferred that the general improvements alluded to, have produced similar results there.

From the Long-Island Star.

WILLIAMSBURGH BRANCH OF THE L. I. RAILROAD. WHY NOT LET THE LOCOMOTIVE COME INTO BROOKLYN?—We understand that the work on this branch has been commenced. It is intended that the locomotive, without any delay, shall take the passengers from Bedford to the ferry. The Corporation of Williamsburgh have been wisely regardful of the interest of their city, in granting this permission.

With care in managing the engine, and proper precautions to give timely notice of its approach, we know not why all the expense and delay of the horse establishment at Bedford may not be avoided, and the current of country travel be continued in its accustomed channel.

The subject of permitting the engine to come into Brooklyn, is one of most pressing importance. It should immediately receive the attention of the Corporation of Brooklyn and of the citizens.

If public opinion were tested on the subject, we have no doubt that the engine would be permitted to come into the city so as to give passengers ready and rapid access to the ferries. Different circumstances exist now from those attending the commencement of the Company's operations, and these circumstances require prompt action and a ready adaptation of means to the preservation of the interests of the city.

Several routes have been proposed in addition to the present track upon Atlantic-street, by which a safe and convenient entrance could be made into the city. It has been suggested that the Redford road as lately laid out, continued to any point within the city, would secure all the advantages required.

Let ready means be taken by the Common Council for securing a full examination of this subject in as short a time as possible. There is no subject at present agitated which so much demands attention!

COMMERCE AND NAVIGATION OF THE UNITED STATES.—The statements of the Commerce and Navigation of the United States, annually prepared at the Treasury Department, have just been completed for the year ending the 30th of September, 1836. The following is a summary of the whole, reported to the Secretary by the Register of the Treasury:

The imports during the year ending on the 30th September, 1836, have amounted to $189,980,035, of which there was imported in American vessels $171,656,442, and in foreign vessels $18,323,593. The exports during the year ending on the 30th September, 1836, have amounted to $128,-663,040; of which $106,916,680 were of domestics, and $21,746,360 of foreign articles. Of the domestic articles, $80,845,-443 were exported in American vessels, and $26,071,237 in foreign vessels. Of the foreign articles, $16,282,366 were exported in American vessels, and $5,463,994 in foreign vessels.

1,255,284 tons of American shipping entered, and 1,315,523 cleared, from the ports of the United States. 680,218 tons of foreign shipping entered, and 674,721 cleared, during the same period.

The registered tonnage, as corrected at the office, for the year ending on the 30th September, 1836, amounted to	897,774
The enrolled and licensed tonnage amounted to	872,023
And the fishing vessels to	111,304
Tons	1,882,102
Of the registered tonnage, amounting, as before stated, to	897,774
There were employed in the whale fishery	144,680
The total tonnage, of shipping built in the United States, during the year ending 30th September, 1836, amounted to—	
Registered vessels	46,645
Enrolled do	66,982
Tons	113,627

From the Oswego Advertiser.

THE GREAT WESTERN RAILROAD COMPANY.

This is the style of the new company formed in Upper Canada under the sanction of the Provincial Parliament, from the London and Gore Railroad Company.—The Parliament has also passed an act, granting, by way of loan to the company, the sum of $800,000. The work is to be commenced with the opening of the Spring. The line of road is from Hamilton, (on Burlington Bay,) at the head of Lake Ontario to Point Edward, at the foot of Lake Huron, and opposite to Fort Gratiot. The distance is 132 miles. From London we understand a Southern branch, along the Thames, is to be extended to Chatham, the head of Steamboat navigation on that river. Thence is every facility for Steamboat communication with Detroit.

There is no Railroad on the continent of more value or likely to be productive of greater results than this. It will effect a communication between New-York and the remote West, with which no other route can contend. A reference to the map will satisfy any one, that by this route a passage can be accomplished from New-York to Fort Gratiot, in Michigan, in 40 hours! and in 42 hours to Detroit!! When the Michigan Railroad, across the Peninsula, is completed, the distance between New-York and Chicago will be only from 55 to 60 hours! This may be easily shown:

From New-York to Albany, by steamboat,	10	hours.
" Albany to Oswego, by railroads,	10	"
" Oswego to Hamilton, by steamboat,	12	"
" Hamilton to Detroit, *railroad*,	10	"
	42	"
" Detroit to Chicago, by R. R. and S. B., about	15	"
	57	"

From the Pittsburgh Working Mens' Advocate.

TRADE OF THE CENTRAL PARTS OF THE UNITED STATES.

Few persons, even amongst those most interested, unless they have very carefully attended to the ranges of the river vallies on each side of the Appalachian system of mountains, can have formed an adequate idea of the peculiarly advantageous position of Pittsburgh. But from some recent evidence we are inclined to believe that more correct views have been taken of the commercial value of this city, in New-York, than has been taken in Philadelphia.

TRADE OF THE WEST.

The favorable position of Baltimore, in reference to the trade and intercourse with the West, is strikingly exemplified in the following paragraph from the New-York Express:

"There is a plan on foot for organizing a Steam Freighting Company, the object of which is to transport goods from this city to Baltimore. It is stated that goods could be shipped by this route and reach Pittsburgh in one hundred hours. This would be an immense thing for the West. The plan is already before the Legislature of this State for a charter."

The preceding was cut from a Baltimore paper, we now place it before those most concerned. The Baltimore editor says—"This will be an immense thing for the West." So it would, but it would be a much more vast thing for the EAST. By a calculation on data, we boldly say of the soundest kind, there will in 1850 exist within that part of the United States westward of the great Appalachian system of mountains upwards of thirteen million of inhabitants. It will, of course be a boon of no small value for any city to be the principal Atlantic depot or emporium for the trade of such regions. This is a subject we shall take care not lose sight of, but at present we confine ourselves to Pittsburgh.

Few who have heard the name of this city, but who know that it occupies the ground around the junction of the Monongahela and Allegheny rivers, but comparatively few are acquainted with the remarkable features of these two streams. The Allegheny has its remote sources in New-York at N. lat. 42° 20′, and with large inflections but with a general course a very little west of south, and receiving most of its tributary waters from the eastward and from the mountains.

The Monongahela has its highest sources in Virginia, at about N. lat. 38° and 40′, and pursuing so nearly a due northern general course, that a meridian line passing through Pittsburgh, passes also very nearly over the extreme fountains of this river.

From the preceding elements it is seen that the two constituent streams which form the Ohio river at Pittsburgh, flow almost directly towards each other. It may be here remarked, that the mountain structure by no means terminates with those most prominent ridges or chains to which by pre-eminence has been given the title of mountains: and again, that the streams, particularly in Pennsylvania, Maryland and Virginia, which rise in the Appalachian valleys, as soon as they assume the size to deserve the name of rivers, flow either along those valleys or almost at right angles to them. Any person may satisfy themselves of the correctness of these remarks by examining on a map the general course of the Delaware, Susquehanna, Potomac, and James rivers. In none, however, of those Atlantic streams are these features in physical geography more striking than in the general courses of the Allegheny river. At their junction the united streams under the name of Ohio apparently continues the general course of the Monongahela, which is not by any means the case. The general course of the latter river from its source to the mouth of Turtle Creek, eight miles above Pittsburgh is maintained, but here in obedience to the natural laws of the rivers of this region it inflects to North-West, at right angles to the general range of the mountains, and pursuing that course joins the main branch and the now combined volume piercing a real chain of the Appalachian continues a northwestern direction to the influx of Beaver river, below which it gradually curves until assuming the general course of the principal constituent stream, the Allegheny, flows upwards of one hundred miles very nearly parallel to the Monongahela, but in a directly opposite course.

From the sources of the Monongahela to within eight miles of its mouth, the distance between it and Ohio is about a mean of fifty miles, and the intermediate space traversed nearly centrically by a ridge, which though not usually regarded as such, is in fact an Appalachian spine, which is again continued between the confluents of Allegheny and Beaver. The city of Pittsburgh therefore, occupies a position in one of the river passes, and the only deep gorge in existence from the mountain into the interior of the continent between the sources of the Allegheny to those of the rivers which contributed to form the Mobile and Appalachicola.

In fine, examining the combined features of this projection, with the relative geography of the whole region in which it is situated, it may at once be pronounced as unequalled. It is remarkable, that in the struggle between Philadelphia and Baltimore for the western commerce, Pittsburgh may remain tranquil as regards the contest. Let the Atlantic emporium be on the Delaware, or on the Chesapeake, or Potomac, or let emporia be formed on all these, which must indeed be the case, still the Ohio at Pittsburgh must receive the largest share of the transit commerce.

Again, the advantages of this remarkable position, are not to be bounded by the Ohio trade, as it is just as completely secured by nature to form a point on the great line of lake trade, as it is for that of the Mississippi basin. Let this line be completed by whom it may, and let its Atlantic termination be where it may, the line will follow the great gorge of the Ohio from Pittsburgh to Beaver, and thence by the latter, and thence to Cleaveland.—Those who are most ready to follow the suggestions of nature will profit most, and let it be known to all whom it may concern—that the laws of nature are like those of the Medes and Persians.

From the Oswego Advertiser.

☞ The Provincial Parliament of Upper Canada was prorogued on Saturday, the 4th March, instant. 152 bills were passed this session in the Lower House, and 107 in the Legislative Council. This looks like doing business. The Lieut. Governor, in his speech, on closing the session, highly compliments both branches of the Legislature, on the harmony and mutual good feeling which has prevailed between them.—On the subject of Internal Improvement, he says:

"The next measures of this session to which I deem it proper particularly to advert, are those which relate to the Internal Improvement of the Province, *such as the completion of that noble undertaking, the Welland Canal:*

The formation of the Great Western, and also of a Northern Railroad:

The opening of the Navigation of the River Trent:

The survey of the Ottawa:

The general improvements of the roads, (a portion of which are to be MacAdamized,) and various grants for the formation of harbors, &c."

From the Springfield (Mass.) Journal.

RAILROADS.

The annual reports from the different Railroad Corporations in this State, have been submitted to the Legislature and printed. The Western Railroad has been surveyed and located nearly to Connecticut River, and double the experimental surveys originally deemed necessary, west of the River, have been made. The distance from the freight depot of the Boston and Worcester Railroad in Worcester, to the Connecticut River is 54 miles—thence to the State line, West, 63 miles, making the entire length of the road 117 miles. There is no grade between Worcester and Connecticut River exceeding 50 feet per mile, and the entire line is free from short corners. The line from East Brookfield to Stony Hill in the west part of Wilbraham, is about 27 miles, and pursues the general course of the Chicopee River. The first section, from Worcester to Brookfield, is under contract and the work commenced, and the other portion will be ready for grading on the opening of the spring. Although the route from Stony Hill to Connecticut River, (about 7 miles) is not yet officially located, it is generally understood that the "Garden Brook route" is approved of as the best, and that the road will strike the river just above Springfield Bridge. Locomotive power will be sufficient for any part of the road, west as well as east, of the River. Receipts of two installments, $300,000; interest on do. $2,899. Expenses to January 14, Engineer Department, including survey, $30,319 36—incidental expenses, $9,757 97—paid for land damages, $220.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

III. AN ACCOUNT OF SOME EXPERIMENTS ON THE EXPANSION OF WATER BY HEAT. BY THE LATE T. TREDGOLD, M. INST. C. E.

The expansion of water, by increase of temperature, is one of those experimental subjects that has not received the degree of attention its importance would lead us to expect; but, as even the smallest addition to any part of knowledge contributes towards its increase, I have ventured to send this mite for the consideration of the members of the Institution.

I began by a series of trials with a thermometer, containing water instead of mercury, to find the point at which the volume of water is a minimum, by cooling successively down to 32° with snow and water, and observing the decrease of bulk, which continued till the temperature was 40°; the rise again was then sensible. In like manner by cooling, the decrease continued till the temperature was about 39°, when the rise became sensible. So small and uncertain, however, was the rate of increase or decrease, that we may practically estimate 40° as the temperature corresponding to the maximum density of water.

Having marked the tube at the point when the temperature was 40°, and also another point within the range of the tube, I divided the distance between these, into four equal parts. With this precaution I immersed the water themometer, and a mercurial one, in a vessel of hot water, and as it cooled compared the temperatures as the water contracted to each division on the tube. The mean of several trials was as follows:

Temp.	112°	4th or upper division,
—	104°	3d.
—	90°	2d.
—	74°	1st division.
—	40°	maximum density,

I intended to repeat the trials and to correct these numbers; but the cold weather commenced, and instead of attending to the higher degrees of heat, my attention was directed to the lower ones. The bulb of the thermometer was immersed in a mixture of snow and salt, and a mercurial one placed beside it, but I found the two were not alike affected by the mixture; the water thermometer rose rapidly till it arrived at, or very near to the third division on the tube, when it exploded. At the moment of explosion, the central part of the mass of water, and that in the tube were both perfectly fluid, and the fragments of the bulb were lined with a thin coat of ice, beautifully crystallized. The fractured bulb presented a singular appearance, the whole being cracked into very fine gores, somewhat less than one-twentieth of an inch in breadth at the middle, and exceedingly regular.

The temperature of a mixture of snow and salt is —5°, or 5 degrees below zero; hence, if the expansion below 40° had been the same as far above 40° the thermometer ought not to have risen quite to the second division; but, as it rose very nearly to the third division, it seems that the expansion below 40° is much greater than at a corresponding number of degrees above 40°; and that the common opinion is not quite correct in this respect.

I have not had leisure to follow up these trials, for they consume an immense quantity of time; but from those made by others, and checked by my own, I have deduced a formula for calculating the expansion at any temperatnre.

If we consider the force with which matter resists the entrance of heat to be inversely as the square of the distance of its elementary atoms; then, the bulk being as the cube of the distance, the resistance to heat will be inversely as the square of the cube root of the volume, and the increments of expansion by heat directly as the $\frac{2}{3}$ power of the volume. The sum of the increments will, therefore, be as the $\frac{5}{3}$ power of the volume, and the equation must give zero at 40°; hence it will be $A\,(t - 40°)^{\frac{5}{3}} =$ the expansion, where A is a coefficient to be found by experiment, and t denotes the temperature.

The calculation is easy enough by logarithms, for, $\log A + \frac{5}{3} \log (t - 40) =$ log of the expansion;

$$\text{or } 3\left(\frac{\log \text{expansion} - \log A}{5}\right) = \log (t - 40°).$$

The formula in the last form applies to my experiment, and becomes

$$3\left(\frac{\log \text{expansion} + 3{\cdot}09555}{5}\right) = \text{the log}$$

$(t - 40)$, the expansion at 112° being considered unity; hence the comparison is easy, and is as under.

Expansion.	Temperature by experiment.	Temperature by formula.
1	112°	112°
0·75	104°	100°
0·5	90°	87°
0·25	74°	71°
0·00	40°	40°

The coincidence is as near as we could expect, considering how difficult it is to insure perfect accuracy in the observations; but, before we proceed further in experiment, it is natural to ask how it will agree with others already made.

The expansion of water from 40° to 212° has been found to be 0·04333, its bulk at 40° being unity. By substituting this value in the formula, we fihd the coefficient A, and have the rule $\frac{5}{3} \log (t - 40) + (-6{\cdot}910909)$, or its equivalent $\frac{5}{3} \log (t - 40) - 5{\cdot}089091 =$ the log of the expansion.

The formula being in this case derived from a probable hypothesis, it is more likely to express the true expansion, than one made out merely to fit a short range of experiments. The absurd conclusions which may follow from an experimental rule are avoided; and that such conclusions do arise out of formulæ made to fit a particular set of experiments, we have an evidence in the case under consideration; for Dr. Young* has given a formula for calculating the expansion of water, which becomes negative when the temperature is 540°; indicating that water would decrease in bulk, by increasing its temperature above that point; this is a cirumstance too improbable to guide us in any practical application of the fromula.

The annexed Table shows the bulk and expansion for a few temperatures.

* Lectures on Natural Philosopny, Vol. II. p. 392.

Temperature.	The expansion. By experiment.	The expansion. By formula.	Bulk by formula.	Temperature.	Expansion by formula.	Bulk.
40°	0	0	1·0000	400°	0·1484	1·1484
64°	0·00133	0·00162	1·00159	800°	0·5155	1·5155
102°	0·00760	0·00791	1·00791	1000°	0·7610	1·7610
212°	0·04333	0·04333	1·04333	1171°	1·0000	2·0000

In my own experiments, the formula was in defect in the temperatures between 40° and 112°; here it is in excess; the difference may arise from the expansion of the glass in my trials. According to this formula, water will expand to double its bulk at 40° by a temperature of 1171 degrees. What would be the force of the steam to confine it to the liquid state at that temperature? There is abundant scope for curious research in this matter: it is one where speculative opinion feels the want of experience.

I am not aware of there being any experiments on the expansion of water above the boiling point. When I find an opportunity, I intend continuing the series as I can, using something to color the distilled water, for facility of observing; and I trust soon to be able to communicate some account of my progress.*

* It is not certainly known whether Mr. Tredgold ever followed out the consideration of this interesting subject; but, as he made no further communication thereon to the Institution, and his premature death took place soon after the date of this paper, it seems probable that his experiments were never resumed.

IV. PARTICULARS OF THE CONSTRUCTION OF THE LARY BRIDGE, NEAR PLYMOUTH. BY MR. J. M. RENDEL, CORR. M. INST. C. E.

As this bridge is founded on a shifting sand, in a rapid tideway, and presents some novelties in the design, it is hoped that an account of the methods successfully adopted for laying and securing the foundations, and some particulars of the superstructure, will be acceptable to the members of the Institution.

The Lary, over which this bridge is built, and from which it derives its name, is the estuary of the river Plym, and connected with Plymouth Sound by Catwater. The general width of the estuary is half a mile, but at the site of the bridge the shores abruptly approach each other, and form a strait between 500 and 600 feet wide.—The tide rushes through this strait with a velocity of 3 feet 6 inches a second, and flows on an average 16 feet perpendicular. The depth at low water is from 5 to 6 feet.

By boring it appeared that the bed of the river was sand to the depth of 60 feet—the lofty lime rock on each shore dipping abruptly from high water, and forming a substratum nearly horizontal across the strait. The sand in the wide parts of the estuary above and below the bridge is fine; at the site of the bridge the current leaves only the coarser kind; but this is not sufficient to resist the heavy land floods, to which the Plym is liable, and it frequently happens that the bed of the river is scoured away several feet in depth in winter and refilled in the summer.

When called on by the Earl of Morley, who built this bridge at his sole expense, to prepare a design, I furnished one on the principle of suspension, spanning the whole width of the strait, and having the towers on its rocky shores. Our president* was consulted by his lordship, and the plan being approved of by him, an act was obtained in the session of 1823 authorising its erection; but on the commencement of the works, difficulties arose which led to the abandonment of the suspension bridge and the ultimate adoption of the present one of cast iron.

The drawings (see Plates I. and II.) which accompany this paper, will, I trust, give a general idea of the finished structure. The arrangement of the design differs materially from other works of a similar nature: first, in the masonry of the piers finishing at the springing course of

* The late Mr. Telford.

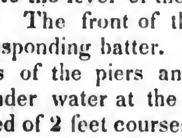
the arches; secondly, in the curvilinear form of the piers and abutments; and thirdly, in the employment of elliptical arches. The adoption of these forms for the piers and arches in unison with the plan of finishing the piers above the springing course with cast iron instead of masonry, has, as I had hoped, given a degree of uniform lightness, combined with strength, to the general effect, unobtainable by the usual form of straight sided piers carried to the height of the roadway, with flat segments of a circle for the arches.

Having given these particulars of the situation and design of the work, I will now add some information as to the proportions of the several parts of the structure.

The centre arch is 100 feet span, and rises 14 feet 6 inches; the thickness of the piers, where smallest, being 10 feet. The arches adjoining the centre are 95 feet span each, with a rise of 13 feet 3 inches. The piers taken, as before, are each 9 feet 6 inches thick. The extreme arches are each 81 feet span, and rise 10 feet 6 inches. The abutments are in their smallest dimensions 13 feet thick, forming at the back a strong arch abutting against the return walls to resist the horizontal thrust. The northern abutment forms a considerable projection, which was deemed advisable in consequence of the obliquity of the adjoining wharf below the bridge; as well as to afford the noble proprietor an opportunity of building a toll-house on extra-parochial ground. The ends of the piers are semicircular, having a curvilinear batter on the sides and ends formed with a radius of 35 feet, and extending upwards from the level of high water to the springing course, and downwards to the level of the water at the lowest ebb. The front of the abutments have a corresponding batter.

The parts of the piers and abutments which lie under water at the lowest ebbs, are composed of 2 feet courses of masonry with offsets, as will be better understood by reference to the drawing. (See plates)

The roadway between the abutments is 24 feet wide, supported by 5 cast iron equidistant ribs. Each rib is 2 feet 6 inches in depth at the springing, and 2 feet at the apex by 2 inches thick, with a top and bottom flange of 6 inches wide by 2 inches thick, and is cast in 5 pieces; their joints, (which are flanged for the purpose,) are connected by screw pins with tie plates equal in length to the width of the roadway, and in depth and thickness to the ribs; between these meeting plates the ribs are connected by strong feathered crosses, or diagonal braces with screw pins passing through their flanges and the main ribs.—The springing plates are 3 inches thick, with raised grooves to receive the ends of the ribs, which have double shoulders, thus:



These plates are sunk flush into the springing course of the piers and abutments, which, with the cordon and springing course, are of granite. The pier standards and spandril fillings are feathered castings, connected transversely by diagonal braces and wrought iron bars passing through cast iron pipes, with bearing shoulders for the several parts to abut against. The roadway bearers are 7 inches in depth by $1\frac{1}{2}$ thick, with a proportional top and bottom flange; they are fastened to the pier standards by screw pins through sliding mortices, whereby a due provision is made for either expansion or contraction of the metal—the roadway plates are $\frac{7}{8}$ of an inch thick by 3 feet wide, connected by flanges and screw pins, and project 1 foot over the outer roadway bearers, thus forming a cornice the whole length of the bridge.

After what has been stated of the character of the river and nature of its bed, it is unnecessary to remark that extreme caution was indispensable in preparing and securing the foundations.

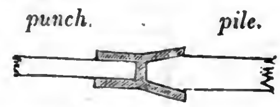
We commenced by driving sheeting piles to a depth of 15 feet around the whole area of the base of the piers and abutments.—These piles are of beech plank, 4 inches thick, having their edge grooved to fit thus:

and were driven in double leading frames fixed to temporary guide piles:—great attention was paid to have them perfectly close. When pitched they were from 16 to 18 feet long, properly hooped and shod with plate iron shoes, weighing on an average 2 lbs. each. These piles were driven with a cast iron weight of 450 lbs. worked by seven or eight men in what is termed a ringing engine. They were driven several feet below low water by means of punches.

As these pilings were carried on, the sand was excavated from the space they enclosed to a depth of 5 or 6 feet below the general level of the river, and from 9 to 10 feet below the level of low water of ordinary tides. These excavations were effected by means of sand spoons of the following construction. Strong canvas bags, capable of containing about 2 cubic feet of sand, were firmly secured to elliptical rings of wrought iron, each ring having a socket to receive a long wooden handle in the direction of its transverse axis, and a swivel handle through its conjugate axis. Stages were fixed on the leading frames in which the sheeting piles were driven, at about 3 feet above low water, and each spoon was worked by three men in the following manner:—a rope was fastened to the loop in the swivel handle of the spoon frame, one end of which was passed over a single block fixed a few feet above the level of the stage, and the other end was held by one of the workmen, whose business it was to pull the spoon when at the bottom towards him, while a second pressed it downwards and guided it, by means of the long wooden handle, till it was thought to be filled; the third man, who was stationed at the rope which worked through the single block, then hoisted the spoon to the stage and discharged its contents into a shoot, which drained into the river. After the laborers had become used to the work, these operations were carried on with considerable despatch, favorable tides generally affording from 3 to 4 hours' work per day.

As these excavations proceeded, the ground was piled with whole timbers of large Norway and small sized Memel, and as many of beech as could be procured of the desired length; these piles, being properly shod and hooped, were driven from temporary stages, fixed above high-water level, by weights varying, according to the size of the pile, from 10 to 15 hundred weight; they were disposed in five rows, in the width of the foundations, from 4 feet to 4 feet 6 inches from centre to centre, and were driven till they did not sink more than one inch with eight blows of the 15 hundred weight driver falling from a height of 25 feet, and then received twenty additional strokes with the same weight and fall.

These piles, none of which were less than 35 feet long, were driven to the level of the stage, and then punched to their proper depth. The punches used for this purpose were made of sound and well seasoned elm, hooped throughout their length, and having at their lower ends a strong cast iron ring, about 18 inches wide; this ring had a thick partition plate, cast in the middle of its width, which separated the head of the pile from the end of the punch; the lower end of the ring was cast a little conical, and the pile heads were made to fit it accurately thus,



By this means the pile heads were but little injured, and the loss of momentum occasioned by the intervention of a punch was reduced to a mere trifle.

The next operation was to cut off the bearing piles to their proper depth, and to pave and grout the spaces between them. The usual mode of cofferdams was manifestly inapplicable to such a bed of sand; I therefore, in an early stage of the works, proposed to the contractors that the pile heads should be levelled, and the spaces between them paved by means of a diving bell. To save expense, this bell was made of wood, and with the necessary machinery was finished and put to work within six weeks from the time it was determined on. With its assistance the works were carried on with expedition and success. When in operation it contained two men, who, being provided with the necessary instruments for cutting off the piles, paving the spaces between them, &c., continued at work for four hours, when they were relieved by two others.

As much depended on the regularity with which the pile heads were levelled, great care was bestowed on this part of the work. It was accomplished in the following manner:—the four angular piles of each foundation being cut as low as the water would permit, were accurately levelled from a plug on the shore, to ascertain how much each had to be reduced to bring it to its proper level; on each of these piles was marked the portion remaining to be cut by the bell men, which being done, all the remaining piles were levelled from them, by means of a spirit-level, accurately adjusted in a piece of wood, sufficiently long to be applied to three piles at a time. The paving between the pile heads was performed in an equally simple and satisfactory manner.

As this econominal bell answered every required purpose, a general description of the whole apparatus may prove acceptable.

The internal dimensions of the bell were 5 feet 6 inches in length, 4 feet 6 inches in width, and 5 feet in height; the sides, ends, and top were made of two thicknesses of 1½ inch well seasoned elm board; the inner case was constructed with its joints parallel to the top and bottom or mouth of the bell, whilst those of the outer one were vertical, or at right angles to the inner joints; the top joints were crossed in the same manner as the sides; all the joints had a slip of flannel, saturated in a composition of bees' wax, laid between them, and were dowelled together and set as close as possible by means of screw clamps, &c., the sides were rabbeted to the end, and the internal angles were strengthened with brackets. The whole surface between the inner and outer case was covered with double flannal, saturated as just described, and was then connected together by a number of wooden pins, dipped in tar and tightly driven; the top was perforated with six holes of 6 inches diameter each, in which was firmly fixed a corresponding number of strong lenses set in white lead; a hole of 3 inches diameter was made in the centre, in which was fixed a brass pipe with a screw to attach the air tube; four hoops of wrought iron, two internal and two external, were screw-bolted together through the sides and ends of the bell: internal and external cross-lacings were also screw-bolted to those hoops, and to the sides and top of the bell. In these lacings, the chains by which the bell was suspended, were fixed in strong iron eyes, which passed through the top of the bell, and were riveted to the inner lacings. All the screw-bolts were driven with tarred oakum, and every precaution was taken to render the whole airtight. The bell thus finished weighed about 1 ton 10 hundred weight, but it required from 5 to 6½ tons to sink it, and overhaul the ropes by which it was suspended; cast iron plates, from 1¾ to 2 inches in the thickness, were therefore hung externally round its sides and ends, till it was sufficiently loaded to sink with steadiness in about 25 feet of water.

The bell was provided with two movable seats and a foot-board for the divers, and at top long boxes were fixed, in which their tools were kept; it was supplied with air by a double acting force-pump, the cylinders of which were 7 inches diameter in the clear, the pistons making a 14 inch stroke. This pump was generally worked by four men, and made, on an average, according to the depth of water and run of the tide, about eight double strokes per minute.

Around the foundations on which the bell was to be employed, temporary piles were driven, and cut off level about 15 feet above high water, and cross braced; on the top of these piles whole Memel tembers were firmly fixed, care being taken to have the side beams parallel to each other. A strong frame, equal in length to the distance between the parallel beams of the above stage, and about 4 feet wide, mounted on four small cast iron flanged wheels, traversed on an iron railway laid on the beams; this frame was moved on the railway by means of a rope connected to the sides, and worked by two common winches, one fixed at each end of the stage; on the beams of this traverse frame a railway was also laid, on which worked a carriage, mounted in a similar manner, and sufficiently large and strong to carry a purchase machine capable of raising the bell by the labor of four men; the bell was suspended to this carriage by two treble blocks, the upper block being lashed to one of the cross beams of the frame, and the lower connected to the sling chains of the bell by a strong shackle. This traverse frame was easily moved by winches affixed to the ends of the long frame, over which ropes worked, having their ends made fast to the purchase machine frame.

By these traverse frames the bell was moved with great celerity to any part of the foundations. The machinery required the attendance of six active men, viz. one to each of the four winches, and two to the purchase machine. It was the sole business of a careful man to attend to the signals of the divers, and to direct the men at the machinery and air-pumps accordingly. The signals were communicated by a line, one end of which was fixed in the bell, and the other held by the signal-man, whose place was on the stage. To avoid confusion in the signals, any thing requiring great precision was communicated to either the divers or signal-man by means of a board attached to the line on which either party wrote with chalk, and by these means a regular correspondence could be carried on.

By means of the bell and apparatus, the works proceeded with safety and expedition, and I feel confident that diving-bells may be employed by the bridge builder in a variety of cases with much greater advantage and economy than coffer-dams.

The foundations being prepared, and guides fixed to the plank piles, caissons were floated off from the shore with one, and in some instances two courses of masonry, and sunk. The greatest success attended these operations from the care that was taken to get the foundations perfectly level: of course, the heads of the plank piles were not cut off until the caissons were sunk.

The bottoms of the caissons were made of beech plank and beams; the bottom plank was 4 inches thick and laid in the transverse direction of the pier, across which the beams 12 inches by 8 inches were placed so as to correspond with the rows of piles in the foundation. The spaces between the beams were filled with masonry set in Pozzuolana mortar, and grouted; and a flooring of 3 inch plank, closely jointed and well caulked, so as to be perfectly water tight, covered the masonry and beams. The top and bottom planks were trenailed to the beams, and the whole strengthened by a strong frame of beech, a foot square, surrounding the bottom and fastened to it by strong screw bolts and trenails.

The upper surfaces of the beams of this frame were grooved to receive a strong tongue, fitting a corresponding groove in the bottom beams of the sides and ends of the caissons, which were made in the usual way, and connected to the bottom by strong lewes irons fitted to cast iron boxes, firmly fixed in the bottom planking. The lewes irons were fixed about 8 feet apart, and were easily removed when the masonry was brought up to the height of the caisson. The introduction of the tongue in the bottom beams of the caisson proved of the greatest utility, as it prevented leaks from the slight sinkage of the bottom between the lewes irons, which it is impossible to prevent when the caisson grounds.

The caissons were furnished with sluices, and made 15 feet high, which gave the masons an opportunity of working about five hours each tide on an average of neaps and springs.

The masonry of the piers and abutments is composed of solid compact limestone, raised in the quarries of the noble proprietor of the bridge* in the adjoining cliffs, and Dartmoor granite, the latter used only, however, in the springing courses and cornices. The limestone is quarried in masses, varying from two to six tons weight, and these were taken to the work on a railroad, continued from the quarries across the river on a stage or temporary bridge, passing close to the piers and abutments, and under the stages on which the diving bell was worked as before described, and the machinery used in working the bell was applied to taking the stone from the wagons, and in setting it. This machinery was found of incalculable advantage in building with such heavy blocks of stone, moving them with ease and the minutest accuracy from over head, and, consequently, without obstructing or incommoding the builders in the caissons.

Experience having taught me that the mortar used in the construction of these works is of an excellent quality, I shall, I hope, be excused if I add to this already long paper a few words on this subject.

The blue lyas stone got from the coast of Dorsetshire was burnt at the bridge as the works proceeded, and, whilst hot from the kiln, was ground in a mill to a fine powder. It was then taken to another mill, and in its powdered state, mixed with prepared Pozzuolana and sand, and ground until it formed a tough paste, no more water being used than was absolutely necessary. The best mortar, or that used in the bottom courses of the piers and abutments, and for the front work, was composed of one measure of powdered lime, one measure of Pozzuolana, and two meas-

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* From these quarries the large blocks of stone used in paving the breakwater are taken.

ures of sand. The backing mortar was prepared with one measure of lime, half a measure of Pozzuolana, and two measures and a half of sand: the sand was of an excellent quality, got from the site of the bridge.

The following circumstance will sufficiently prove the goodness of this mortar. Some masonry, which had been done in one of the foundations about twelve months, had to be removed, when the stones were found so firmly united, that gunpowder was necessary to separate them.

I have before described the bed of the river to be a loose sand moved by the slightest increase of current, and that this circumstance, together with the difficulty of founding piers and abutments, induced me to propose a suspension bridge spanning the whole width of the river. It was however hoped, when a change of plan became necessary, that the plank piles, with the aid of some stone thrown round them, would be sufficient to meet the increased current occasioned by the bridge; but as the erection of the piers and abutments proceeded, the necessity of a more extended security for the foundations became manifest, as the bed of the river, for its whole width, and to an extent of from 50 to 60 feet above and below the bridge, was gradually scouring away. I therefore proposed to form an artificial bed, to the full extent to which the natural one was removed, with clay from 18 inches to 2 feet thick, and to cover the clay with rubble stone of all sizes from 200 lbs. each downwards. This plan of operation was suggested by observing these materials in vast abundance in the adjoining limestone quarry spoil hills, and after I had submitted the clay to experiment, and found it capable of resisting a current acting immediately upon it at a velocity of 7 feet per second. The clay and stone were deposited with great regularity, giving to the channels under each arch a slight concavity in the middle: the combined thickness of the clay and stone is from 2 feet to 2 feet 6 inches, and just replaces the loss of the natural bed.

By this union of materials an indestructible bed has been produced. The clay shields the natural bed from the current, whilst at the same time it forms a tenacious cement in which the stone buries itself and which is hardened by the volume of water constantly pressing on it. In six months after this work was finished, I ascertained that sea weeds were growing over its surface, and that it was sufficiently firm to resist an oyster dredge.*

Messrs. Johnson of Grosvenor Wharf, London, were contractors for the masonry, &c., and Mr. William Hazledine, of Shrewsbury, for the iron work.

The contract amount for the masonry, &c., was	£13,365 0
The contract amount for the iron	13,761 0
Making the total cost	£27,126 0

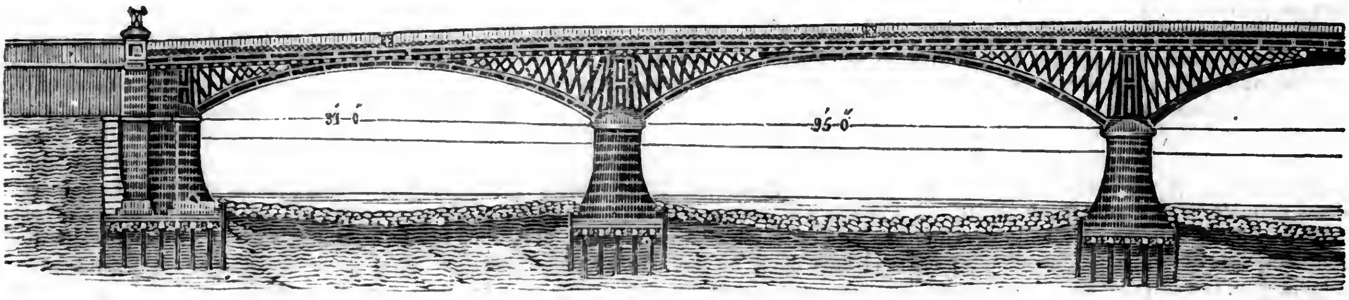
The work commenced in August, 1824, and the Bridge was opened in July, 1827.

* At the present time (1836) the surface is so hard, that heavily laden wagons would not sink in it.

CAST IRON BRIDGE OVER THE LARY, NEAR PLYMOUTH.

By JAMES M. RENDEL, Civil Engineer.

Plate 1.



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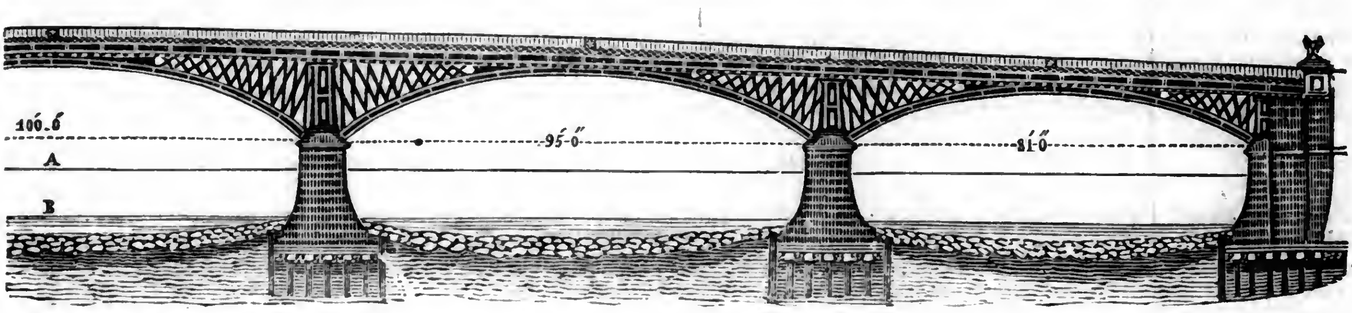


VATION.

A, High water Spring Tides. B, Low water Spring Tides.

Plan of the Roadway.

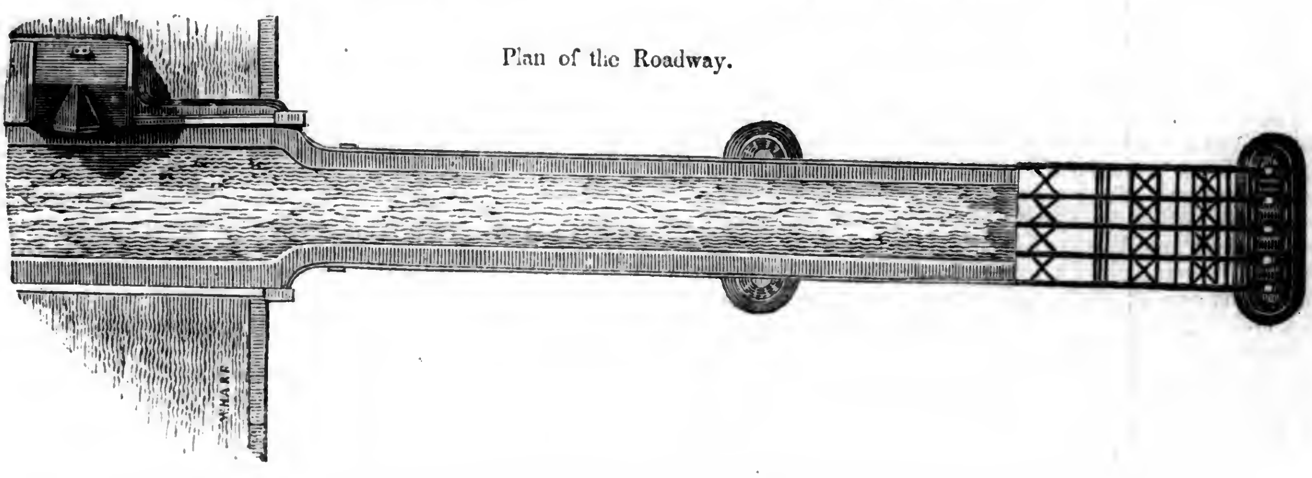
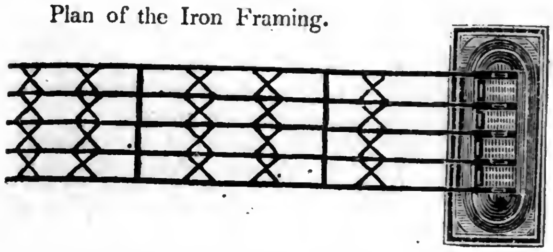


Plate 1.

Plan of the Iron Framing.



Plan of the Foundation.

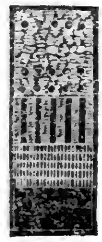
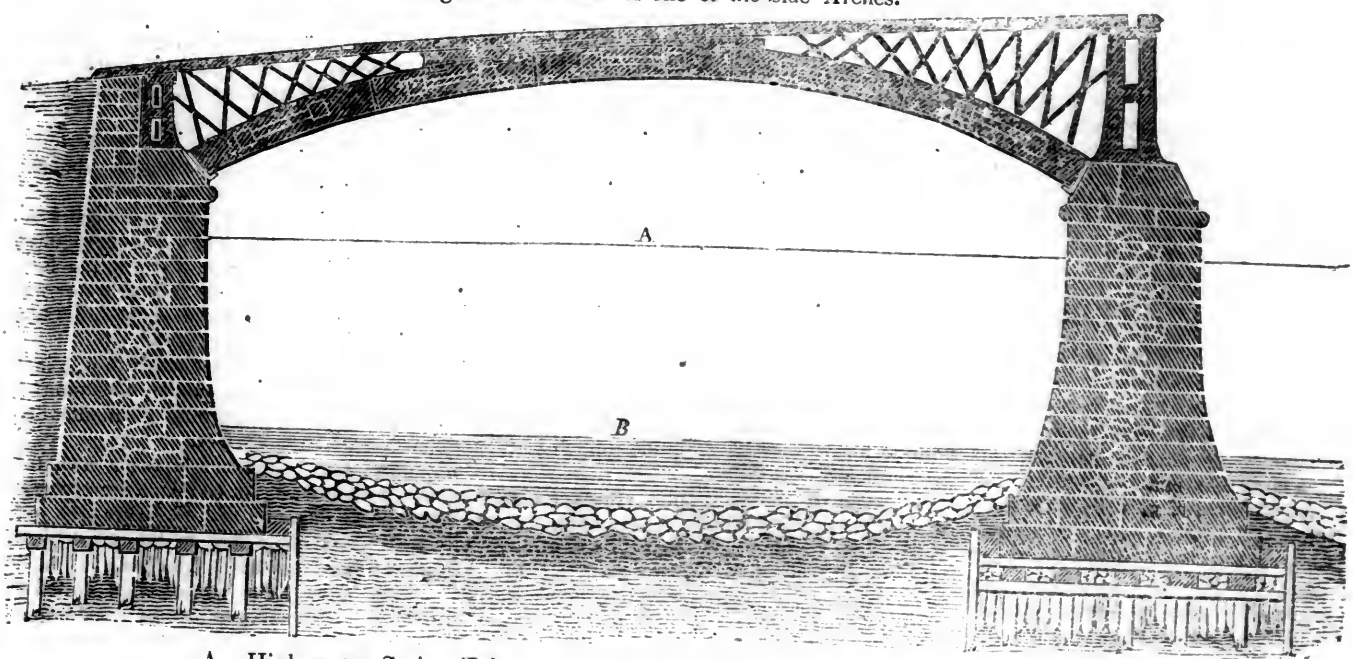
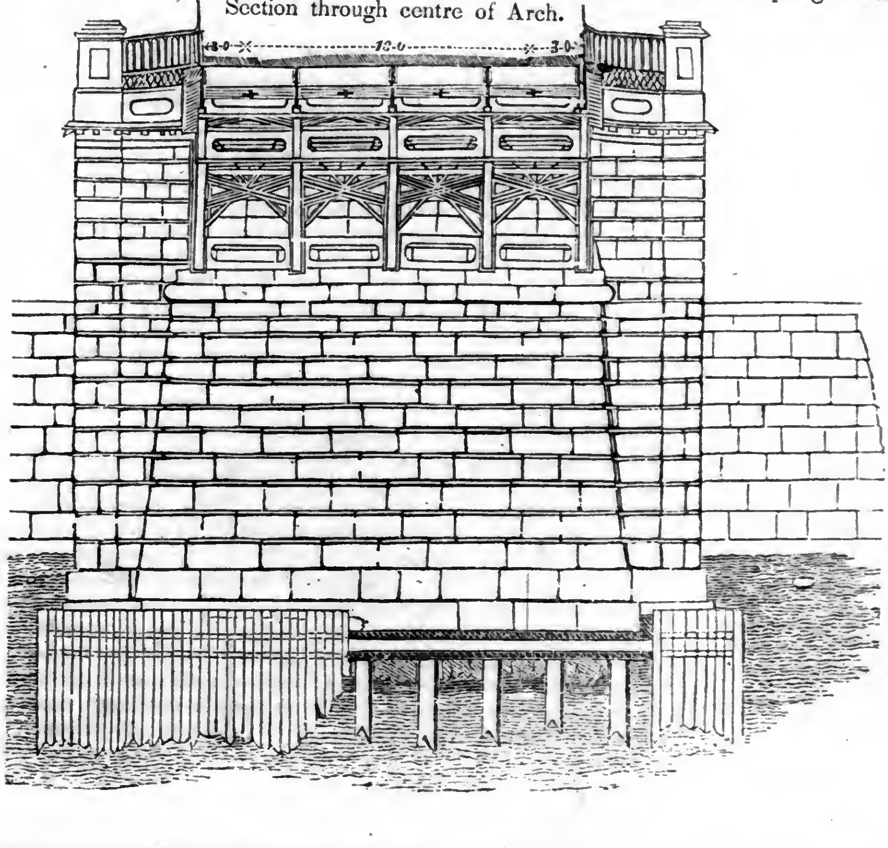


Plate 2.
Longitudinal Section of one of the Side Arches.

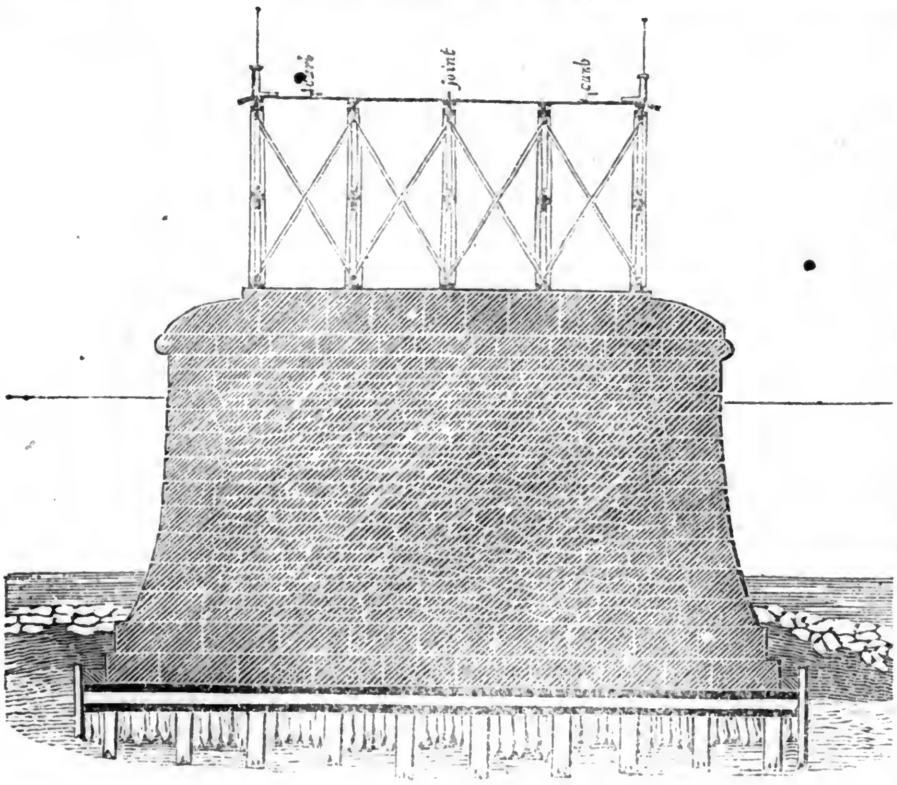


A, High water Spring Tides. B, Low water Spring Tides.

Section through centre of Arch.



Section through centre of Pier.



AN ACCOUNT OF SOME EXPERIMENTS MADE IN 1823 AND 1824, FOR DETERMINING THE QUANTITY OF WATER FLOWING THROUGH DIFFERENT SHAPED ORIFICES. BY BRYAN DONKIN, ESQ., F. R. A. S., V. P. INST. C. E.

The apparatus employed in these experiments having been made for a different purpose than that of merely ascertaining the quantity of water discharged, occasioned the peculiar form which is here described.

A, in Fig. 1, Plate ——., represents a vertical copper pipe of $3\frac{3}{8}$ inches interior diameter.

B, a horizontal pipe of the same diameter, joined to the lower end of *A* by what is usually called a mitre joint.

C, another pipe, joined to *B* in a similar manner, but so contrived that it could be turned up or down into a vertical or horizontal position.

Fig. 2 represents the outer end of the pipe *C*, with a cap, *D D*, fitting closely upon its outer side, and capable of being put on or taken off at pleasure; upon the end of cap *D* the ring *d d* was soldered, being about $\frac{1}{4}$ inch wide; this cap was employed for securing the different shaped orifices to the pipe *C*. For instance, where the efflux of water through an aperture in a thin plate of metal was intended to be tried, the cap was taken off, and a circular plate *e e*, of a corresponding diameter to that of the exterior of the tube *C*, was applied to the end of *C*, and the cap *D D* put over it to secure it in its place.

To guard against any leakage of water between the joinings of the cap, the pipe, and the plate, the joinings were filled with a soft cement made of tallow and bees' wax.

Upon the upper end of the pipe *A*, a copper cistern, *E*, was fixed. This cistern was about 2 feet diameter and 6 or 7 inches in depth; the length of the pipe *B* was 10 feet; of *C* about 1 foot 9 inches, and of *A* about 25 feet, measuring from the top of *E* to its junction with *B*.

The water was supplied from a circular cistern, *F*, of 6 feet $7\frac{1}{2}$ inches diameter, and 2 feet 10 inches in depth, by means of a sluice *f*, and the trough *g*.

During each experiment a man was placed to regulate the sluice, so as to keep the cistern *E* always full. And in order to ascertain the quantity of water discharged, a float with a graduated stem was placed in the said cistern *F*.

On the 28th of November, 1823, the following experiments were made in the presence of Professor Barlow, of Woolwich.

To the end of the pipe *C*, the conical pipe *G* was applied, by having a thin plate, *h*. soldered to it; the opening at the smaller end, which was $\frac{1}{2}$ inch in diameter, and that of the large end $2\frac{1}{2}$ inches diameter, and its length 12 inches; the discharge took place from the larger end of the cone, whilst the pipes *C* and *G* were in a vertical position; the height of the column of water from its surface in *E*, to the upper end of the cone *G*, was 22 feet 9 inches In 4 minutes it discharged 12·25 cubic feet of water, being at the rate of 3·0625 cubic feet per minute.

2d Experiment.—The conical pipe was inverted so that the discharge took place from the smaller end; in 4 minutes the discharge was 12·5 cubic feet, or at the rate of 3·125 cubic feet per minute.

3d Experiment.—The conical pipe was removed, and a thin plate with a hole $\frac{1}{2}$ an inch in diameter in its centre was applied to the end of the pipe *C*, the height of the column being 23 feet 3 inches; in 4 minutes the discharge was 8·2 cubic feet, or at the rate of 2·05 cubic feet per minute.

Nov. 29. The pipe *C* and the cone *G* were placed horizontally, with the smaller end of the cone outwards, and a column of 26 feet; in 8 minutes it discharged 26·8 cubic feet, being at the rate of 3·35 cubic feet per minute.

Dec. 1st. Pipe and cone horizontal, the larger end outwards, and 26 feet column; in 5 minutes discharged 15·4 cubic feet, or 3·08 cubic feet per minute.

Another experiment was continued for 8 minutes, and the discharge was at the rate of 3·09 cubic feet per minute.

Dec. 5. Two conical pipes, *H H*, each of which was of the same dimensions as the one above described, were united at their smaller ends, and applied to the pipe *C*; in 10 minutes the discharge through the double cone was 48 cubic feet, or at the rate of 4·8 cubic feet per minute, the column of water being 24 feet 3 inches.

A second experiment on the same day was made with a thin plate, having a $\frac{1}{2}$ inch hole through it, and a column of 24 feet 3 inches; in 10 minutes the discharge was 20·6 cubic feet.

In a third experiment, the double cone was tried again, and the discharge obtained was 47·4 cubic feet in 10 minutes.

Dec. 8. The 2 conical pipes last mentioned were separated, and joined together at their larger ends, as at *J J*; in this form a discharge of 20·8 cubic feet of water was obtained in 10 minutes, under a column of 24 feet 3 inches.

Dec. 12. The thin plate with a $\frac{1}{2}$ inch hole was again applied under a column of 24 feet 3 inches, and during 10 minutes discharged 20·75 cubic feet.

Same day. The single cone with the small end outwards, in 10 minutes discharged 32·2 cubic feet, and with the large end outwards, 29·7 cubic feet in the same time, under a head of 24 feet 3 inches.

Same day. The double cone united at their smaller ends, produced a discharge of 46·5 cubic feet in 10 minutes, and in 5 minutes 23·5 cubic feet.

June 8th, 1824. The discharge through the $\frac{1}{2}$ inch round hole in the thin plate during 15 minutes, was 31·75 cubic feet, under a column of water of 24 feet 4 inches high = 2·116 cubic feet per minute.

June 9. Through the same hole, and under the same column, the discharge was 42 cubic feet in 20 minutes; =2·1 per minute.

Through a round hole $\frac{1}{4}$ of an inch diameter, in a thin plate, the discharge was rather less than 16 cubic feet in 30 minutes, under a column of 25 feet $8\frac{1}{2}$ inches.

June 10. The $\frac{1}{2}$ inch hole through a thin plate gave a discharge of 65 cubic feet under a column of 25 feet $8\frac{1}{2}$ inches in 30 minutes, at the rate of 2·166 cubic feet per minute.

The single cone, with the smaller enp outwards, delivered 58 cubic feet in 18 minutes, under a head of 25 feet $8\frac{1}{2}$ inches; = 3·22 cubic feet per minute.

On a subsequent day in June. The same experiment repeated, and in 20 minutes the discharge was 63·33 cubic feet; =3·166 cubic feet per minute. In this experiment, the small end of the cone was immersed about 6 inches below the surface of the water during the discharge, consequently the column was 25 feet $2\frac{1}{2}$ inches.

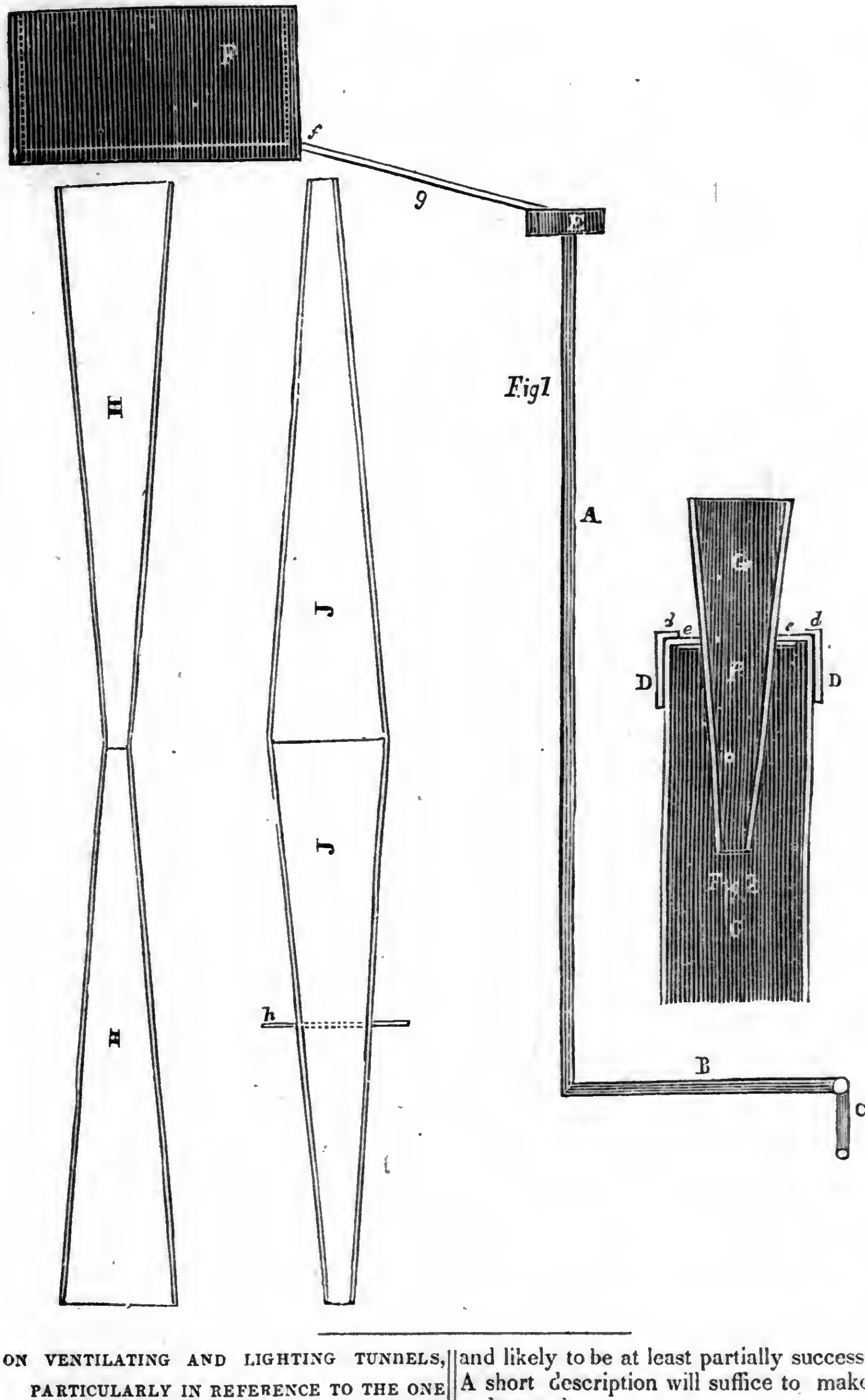
Another experiment on the same day,

with the same cone, having its larger end outwards, and immersed seven inches below the surface of the water, discharged 59 cubic feet of water in 20 minutes ;=2·95 cubic feet per minute.

The same experiment repeated during 10 minutes, gave a discharge of 29·46 cubic feet, or 2·946 cubic feet per minute.

In another experiment, the double cone joined at the smaller ends, in 18 minutes discharged 84·633 cubic feet under a head of 25 feet 9 inches ;=4·7 cubic feet per minute.

Another experiment. The same double cone with its axis 7 inches under water, and a column of 25 feet 2 inches, discharged 56·5 cubic feet in 12 minutes ;=4·7 cubic feet per minute.



been built in the arch of the tunnel, and over this a circular shaft or well, 10 feet diameter, raised in strong brickwork. If it be found expedent to cover the well as a protection from the rain, it may be done with glass, raised on columns of such height as to admit a free circulation of air between the surface of the ground and the roof.

So much for ventilation. But as the light afforded by the shafts is confined to the space immediately below them, the desideratum is to throw it along the tunnel, and I think this may be done so as to give a useful light by means of plane reflectors of tinned iron placed on the ground between the two lines of railway, at such an angle as to reflect the light where it will be most useful. The idea was suggested by the rum vaults in the West India Docks where the marks on the casks are ascertained by catching the faint light from the windows upon a small piece of tin plate, and throwing it on the casks. Those who have seen this done have generally been surprised at the useful effect produced ; but in the case of the tunnel, the light coming directly down the shaft is more powerful, and the effect of the experiments I have made has much exceeded my expectations. I shall take care that the results of any future observations be communicated to the Institution.

P. S.—In compliance with the promise given in the preceding paper, I have procured from Mr. George Smith, the resident engineer on the Leeds and Selby Railway, the annexed observations on the subject containing the result of his recent experience. Though they do not in all respects realize the expectations I had formed from the first experiments which were made before the tunnel was completed, or the railway formed, I may remark, that while the shafts seem to be very serviceable for ventilation, the light they supply is useful to those whose duties require them to pass through the tunnel on foot or unaccompanied with an engine. Mr. Smith's remarks are dated December 1835, and are as follows :—

"At the present period when there are "so many railways in progress and in contemplation, many of them with tunnels of "considerable length, the following observations on the effects of the Locomotive "Engines, working in the tunnel of the "Leeds and Selby Railway, may be interesting to those who have not the opportunity of witnessing those effects daily "and under all circumstances.

"The tunnel of the Leeds and Selby "Railway is nearly half a mile in length, "situated at the commencement of that railway at the Leeds end, and has a slight "ascending inclination in going from Leeds. "The situation and inclination cause a considerable difference in the quantity of "steam discharged from the chimneys of "two engines travelling in opposite directions.

"The ascending engine laboring at a "first start against the inclination, to get "into speed, (which is scarcely done before leaving the tunnel,) causes a great "expenditure of steam, &c., while an en-

ON VENTILATING AND LIGHTING TUNNELS, PARTICULARLY IN REFERENCE TO THE ONE ON THE LEEDS AND SELBY RAILWAY. BY J. WALKER, ESQ., F. R. S. L. AND E., PRESIDENT INST. C. E.

The want of ventilation and light seems the greatest objection to tunnels on railways and canals. An attempt is making to remedy both these evils in the tunnel now (1832) forming on the Leeds and Selby Railway, near Leeds, by a plan weich is simple, not attended with much expense, and likely to be at least partially successful. A short description will suffice to make it understood.

The tunnel is nearly half a mile long: the greatest depth from the surface about 80 feet. As three shafts were required for raising the excavation during the progress of the work, it occurred to me, that by placing them at nearly equal distances, and walling them in a permanent manner, they might be left open to the surface afterwards. A strong elliptical casting, about 8 feet long and 5 feet wide, has therefore "gine coming in the opposite direction, "having a clear fire, and every means taken "to prevent the generation of steam, by "opening the fire-door and pumping water "into the boiler, expends very little, and "that through the safety valve, the smoke "from the chimney not being perceptible. "It will therefore be necessary to detail the "effect of an engine passing through the "tunnel from the Leeds end only.

"The fires of the engines are made up, "previous to starting, with coke mixed "with coal, to hasten the ignition of the "former; the smoke from the coal is of "course mixed with that of the coke and "steam, adding to the density of what es-"capes from the chimney, and continues "to do so for some time, frequently through "the whole length of the tunnel: but not-"withstanding this, the tunnel is generally "clear in less than five minutes after; in "many cases nearly as soon as the engine "has left it. This of course is governed, "in a great measure, by the force and di-"rection of the wind. In foggy weather "there being little or no wind, the smoke "from the coal is left after the steam is "condensed, and forms itself into a cloud "which sails slowly along the roof, travel-"ling at the rate of from two to three miles "per hour; a great part of it ascends the "shafts, but from the heavy state of the "atmosphere, a considerable portion passes "them and discharges itself at one end of "the tunnel. It should here be mentioned, "that the entrances into the shaft from the "tunnel are much contracted, having not "more than 5 feet in the longitudinal, and "8 feet in the transverse direction of the "tunnel, and much of the smoke, &c., "passes on each side of the shafts; and in "consequence of the sluggishness of the "draught on those days, the lower part of "the cloud has not sufficient time to alter "its course up the shafts.*

"The engines, having coal mixed with "the coke in their fire-boxes, left the Leeds "depot during a very heavy morning, and "followed each other quickly through the "tunnel: each left a cloud behind, the one "keeping at a considerable distance from "the other. The smoke (the steam ap-"pearing to have been condensed) seemed "to have lost its usual sulphurous smell, "and resembled a dense fog—the dense-"ness appearing greater from the darkness "of the tunnel; and such is the freedom "of those clouds from any thing unpleasant, "that passengers in close carriages are not "aware of having passed through them, "which they do almost instantaneously.

"Passengers are never annoyed with the "steam, &c., from the chimneys of the "engines, as it does not descend low "enough, except on heavy days, and even "then, the progress of the engines carries "them forward before it is so low as to "affect them.

"From the effects described above, it "appears evident, that in tunnels situated "only a short distance from the starting-"place, it is extremely probable little or no "inconvenience will be felt by the passen-"gers passing through them.

"Previous to the opening of the Leeds "and Selby Railway, great doubts were "entertained by many, and among others "a celebrated lecturer, as to the fitness of "the atmosphere for respiration, in a tun-"nel worked by locomotive engines; now "that the incorrectness of that idea is fully "proved, as far as regards a tunnel half a "mile long, those doubts are still enter-"tained by many individuals, as to tunnels "of much greater lengths. These doubts "will probably prove as groundless as the "former ones, for the following reasons:—

"A considerable quantity of the steam "from the engines ascends the shafts at "all times, but there is no doubt a large "portion is also condensed in the tunnel; "and were there no shafts at all, the steam "could not remain long uncondensed, sur-"rounded, as it will ever be, by walls al-"ways at an even temperature, a short dis-"tance from the ends of the tunnel, satu-"rated with moisture, and the surface in "many parts covered with water.

"The coke, particularly when in a high "state of combustion, gives out little smoke, "and, from its having passed through the "steam, loses, like the coal, the greater "part, if not all its offensiveness; and "mixing with the air that has been used "for combustion, will, from its boyancy, "readily find its way along the top of the "tunnel to the first shaft, and make its "escape up it.

"Two great inconveniences in tunnels, "are noise and want of light; the former "it will be difficult to remedy, the latter "may be easily so, by carrying oil or porta-"ble gas lamps with the carriages. Oil "lamps are used with the evening trains, "during the winter months, on the Leeds "and Selby Railway, and give sufficient "light in their passage through the tunnel. "Some experiments were made with tin "reflectors at the bottom of the shafts, and "although the light reflected was sufficient "to read the larger print in a newspaper "advertisement at all parts of the tunnel, "(there being three shafts,) it is very doubt-"ful whether lighting tunnels by reflection "will be of use for passengers. The rays "of light are thrown on the walls so very "obliquely, that, from the rough and dirty "state of their surface, few are again re-"flected from them, and these are too "feeble for the eye to accommodate itself "to so great a transition during the time a "train would be passing through a tunnel "of moderate length. A passenger sitting "in a close carriage, having only the walls "to look at, would, under such circum-"stances, fancy himself in total darkness, "although the tunnel generally might be "moderately light. The difficulty of keep-"ing reflectors clean from the effects of "damp, steam, &c., would be a considera-"ble expense in a long tunnel; and it must "also be borne in mind, that the moment "an engine has passed a reflector, it be-"comes of no use to the train attached to "that engine, as it is immediately sur-"rounded with steam, &c., forcing its way "up the shaft, and the next reflector, in a "long tunnel, would probably be a quarter "of a mile from the one thus thrown into "darkness."

* This naturally suggests the propriety of having the shafts much larger, probably the same diameter as the width of the tunnel.

Aeronautic Observations.—Mr. Green, who recently ascended in a balloon with Lord Clanricarde, observed that surveyors and architects could with greater facility take plans of noblemen's estates by ascending in a balloon, as they could have a bird's-eye view of every locality, and if they only once adopted that method they would never relinquish it. Since the suggestion, an artist named Burton called on Mr. Green to obtain from him the plan of a balloon constructed so as to act in the above way, it being connected to the car by a swivel. The inventor proposes to build a wagon for the purpose of fastening a balloon to it, which, when filled with gas, which can be done in various parts of the country at gas company's gasometers, may be conveyed to any place a surveyor requires, where, on a calm day, he can take plans, carrying with him the proper instruments. The balloon will then be fastened by ropes to the spot most favorable for observations, and raised to an elevation of 300 or 400 feet, as necessary. In this way a bird's-eye view can be taken of any town or city. Mr. Green is willing at any time that his balloon, by way of experiment, may be made use of in that way.—[Lond. Mech. Mag.]

Steam Carriages on Common Roads.—A committee of the British House of Lords have, by their report to the House, objected to the reduction of prohibitory tolls on such carriages; on the ground of the danger in frightening horses, of setting fire to buildings, &c., of the greater skill required to manage such locomotives than those on railways; and more especially from the opinion that such enterprises cannot become profitable to those who engage in them, and that, therefore, any encouragement on the part of the Legislature would only give rise to wild speculations, ruinous to those who pursue them. G

New Surveying Instruments.—M. Lalanne, Engineer of the *Ponts et Chaussees*, in France, has laid before the *Academie des Sciences* three instruments for typographical surveying, which, if they accomplish all that the inventor promises, correctly and with facility, will be eagerly sought after. To the immense number of surveyors, who are about to commence operations in every part of the United Kingdom, under the numerous Railroad Acts which have passed this session, such instruments would be invaluable. They are, 1st, a Levelling Instrument, or Carriage, which it is only necessary to run over the ground, the levels of which are desired, and the section is at once obtained; 2nd, a Drawing Instrument, which lays down the plan of the ground; and can be mounted on the carriage of the Levelling Instrument; 3rd, a Power-measuring Instrument, or Dynamometer, which exhibits the effort exerted on every point of the line passed over.—[Mag. Pop. Science.]

COPPER ORE RAISED IN CORNWALL.—The quantity of copper ore raised at about eighty mines in the county of Cornwall, during the past twelve months, was 140,981 tons of 21 cwts., the average produce of which was $8\frac{1}{4}$, giving 11,639 tons 11 cwt. of copper; the average price for the ore was £6,17 per ton, amounting to £957-752,86. With three or four exceptions not one of these mines belong to a public company.

MINING IN CORNWALL.—The steam engines now at work in the mines of Cornwall, are equal in power to at least 44,000 horses. One bushel of coal does as much work as sixteen bushels did in the earlier stages of the employment of steam power.—[Newton's Jour.]

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid, (continued.)

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Jas. Collins, Brooklyn, L. I., Oct. 1, 1837

Advertisements.

☞ MISSING NUMBERS WANTED.—If any of our subscribers have numbers 4, 5, 6 and 7, of Volume or *five last* year, which they do not desire to preserve, they will confer a special favor by sending them to us, that we may complete a few copies of the volume.

*** If any of our subscribers are in want of *any other* number of the same volume to complete their volume they will please give early notice and they shall be sent.

The Title page and Index for last year, or volume five, will be forwarded to subscribers with our next number.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one. which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its engravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

TO MANUFACTURERS OF HYDRAULIC CEMENT.

PROPOSALS will be received by the subscriber, on the part of the James River and Kanawka Companies, for the delivery on the wharf, at the city of Richmond, Va., of Fifty Thousand Bushels of Hydraulic Cement. The amount called for must be furnished in quantities of about six thousand, bushels per month, commencing on the first of April and ending on the first of November next.

To avoid future litigation, it is to be understood, on making the proposals, that the bushel shall weigh seventy pounds NETT, and that the Cement shall be delivered in good ordder, and packed in tight casks or barrels.

Proposals will also be received for furnishing fifty thousand bushels, at any convenient point on the navigable waters of James River, or the north branch of James River, where the materials for its manufacture has been discovered.

Persons familiar with the preparation of the Cement, would do well to examine the Counties of Rockbridge and Botetourt, with a view to the establishment of works for the supply of the western end of the line; and a contract for the above quantities will be made with them before they commence operations.

As there will be required on the line of the James River and Kanawka Improvement, in the course of the present and next year, not less than half a million of bushels of this Cement, and some hundred thousand bushels more in the progress of the work towards the west, contractors will find it to their interest to furnish the article on terms that lead to future engagements.

Proposals to be directed to the subscriber at Richmond, Va. CHARLES ELLET, Jr.,
Chief Engineer of the J. R. and Ka. Co.
February 20th, 1837. 9 6t

CROTON AQUEDUCT.

NOTICE.—Sealed Proposals will be received by the Water Commissioners of the city of New-York, until the 22d day of April next, at 3 o'clock, P. M., at their office in the city of New-York, and until the 24th day of April, at 9 o'clock, P. M., at the office of their Engineer in the village of Sing Sing, for constructing a Dam across the Croton River, for the Excavation, Embankment, Back Filling, Foundation and Protection Walls; for an Aqueduct Bridge at Sing Sing, three Tunnels, several large and small culverts, and an Aqueduct of stone and brick masonry, with other incidental work, for that portion of the Croton Aqueduct which extends from the Dam on the Croton to Sing Sing, being between eight and nine miles in length

The prices for the work must include the expense of materials necessary for the completion of the same, according to the plans and specifications that will be presented for examination, as hereinafter mentioned.

The Work to be completed by the first day of October, 1839.

Security will be required for the performance of contracts—and propositions should be accompanied by the names of responsible persons, signifying their assent to become sureties. If the character and responsibilities of those proposing, and the sureties they shall offer, are not known to the Commissioners or Engineers, a certificate of good character, and the extent of their responsibility, signed by the first judge or clerk of the county in which they severally reside, will be required.

No transfer of contracts will be recognised.

Plans of the several structures and specifications of the kind of materials and manner of construction, may be examined at the office of the Commissioners, in the city of New-York, from the 10th to the 11th, inclusive, of April next. The line of Aqueduct will be located, and the map and profile of the same, together with the plans and specifications above mentioned, will be ready for examination at the office of the Engineer, at the village of Sing Sing, on the 15th day of April next, and the Chief or Resident Engineer will be in attendance to explain the plans, &c., and to furnish blank propositions.

Persons proposing for more work than they wish to contract for, must specify the quantity they desire to take

The full names of all persons that are parties to any proposition, must be written out in the signature for the same.

The parties to the propositions which may be accepted, will be required to enter into contracts immediately after the acceptance of the same.

The undersigned reserve to themselves the right to accept or reject proposals that may be offered for the whole or any part of the above described work, as they may consider the public interest to require.

STEPHEN ALLEN,
CHARLES DUSENBURY, } Water
SAUL ALLEY, } Commissioners.
WILLIAM W. FOX,
JOHN B. JERVIS,
Chief Engineer, New-York Water Works.
[N]ew-York, February 28, 1837. 10 5t

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.
4—ytf H. R. DUNHAM & CO.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.
ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron, Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N. Y.
51tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

TO ENGINEERS.

WE are gratified to be able to announce to those desiring INSTRUMENTS, that Messrs E. & G. W. BLUNT of this city, are now prepared to furnish at short notice, LEVELS, from different manufacturers, among others from Troughton & Sims, which they warrant of the first quality. Circumferentors, Levelling Staves, Prismatic Compasses, Mathematical Instruments, Books for Engineers, etc constantly on hand.

One of the above firm is now in England superintending the manufacture of Theodolites, Transit Instruments, etc.—and any orders for Instruments, now on hand, will be forwarded him, and executed promptly.

*** Orders will be received and promptly attended to by the Editors of this Journal. 9 4t

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N. Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention.
HENRY BURDEN.
Troy Iron Works, Nov. 15, 1836. 47—tf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,
WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
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N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.
HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

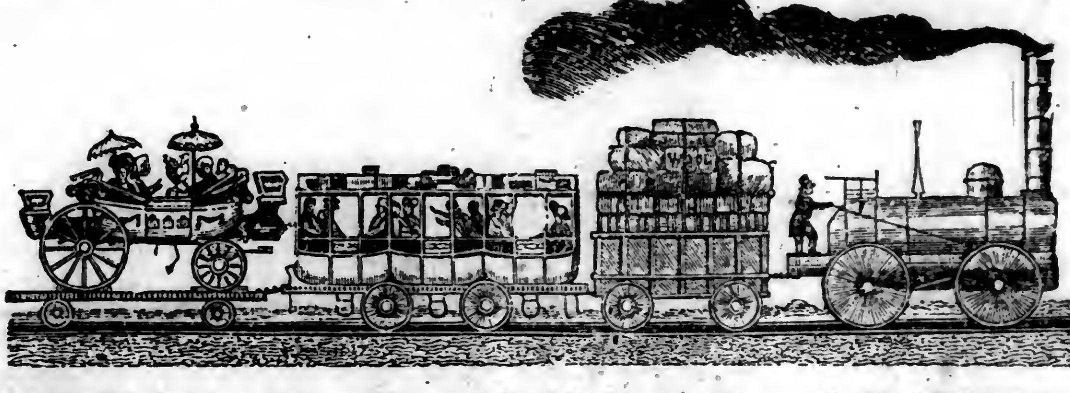
P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.
Rochester, Jan. 13th, 1837. 4—y



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

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D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.]

SATURDAY, APRIL 15, 1837.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 15, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America.*

GREAT WESTERN RAILWAY THROUGH CANADA AND MICHIGAN.

We have been furnished with documents in relation to these roads, from which we shall make several extracts for our next number. They go to establish the route as laid down in the Report, published in No 7, or 18th February, of this Journal.

CANAL BOAT EXPERIMENTS.—In this number of the Journal will be found a continuation of the article on Canal Boat Experiments, which was commenced in our last.

These experiments were made by John Mac Niell, Esq., and published in the 1st Volume of the "Transactions of the Institution of Civil Engineers" of Great Britain, a work of great value, which we are now republishing in the Journal, and also in *Numbers*, with all the engravings neatly done on wood.

This article will be found highly interesting and valuable to many of our readers at the present period, when the enlargement of the *Erie*, and the construction of numerous other canals occupies so much attention; and we therefore ask for it particular attention; and also at the same time request those, who may appreciate its value to give us their aid in *extending the circulation of the Journal.* The additional cost of publishing the Journal this year, in consequence of *republishing* the "*Transactions*" will be several hundred dollars, and we look to its friends, in different parts of the country for an increased circulation.

We are indebted to Mr. Stevenson, of Edinburgh, for several Railway pamphlets. This gentleman, the son of David Stevenson, Esq., C. E., of Edinburgh, is about making a professional tour through the United States.

We commend him to the courtesy of the profession, to which he bears in his manners a sufficient passport, independent of the high testimonials from many distinguished gentlemen.

We are also indebted to A. A. Denton, Esq., C. E., for his Report of the Montgomery Railroad Company,—to David Scott, Esq., C. E., for his Report to the board of public works of Ohio, relative to the Zanesville and Maysville Railroad, and the Chillicothe and Cincinnati Railroad; and to other friends for the annual report of the Petersburgh Railroad Company, the Lagrange and Memphis Railroad Company, and the *Texas Railroad Navigation* and *Banking* Company, all of which will receive attention in due time

MAGNETIC NEEDLE OF THE SURVEYOR'S COMPASS.

Though the principle of the directive power of the needle is well known, we believe that the following case may not be of rare occurrence, and state it for the benefit of the makers and users of instruments.

A Surveyor's Compass had been ordered which we procured and forwarded in complete order. It was returned, because when levelled by the bubbles, the needle was so much inclined as to touch the limb of the compass box

When we received the instrument, no such fault was found to exist, the needle was again found to be perfectly free and horizontal when the compass was leveled.

This is easily explained. For every degree that we approach the North pole, the *dip* of the needle is increased by one degree nearly. The latitude of the place in question was more than two degrees to the north of this city. On examining the limb and ascertaining the space occupied by 2° 20′, we were not surprised to find that this amount of deviation from horizontality, should cause the needle to touch.

The remedy was to place a counterpiece of brass or copper wire upon the needle, the adjustment being made here. On reaching the place of destination, the north pole will again be found to dip, and this is to be prevented by moving the counterpiece until the needle is exactly balanced.

These counterpoises in one shape or other were formerly quite common, but we have recently seen a vast number of instruments without any thing of the kind.—Such a Compass, though properly adjusted while in the shop, no sooner reaches a distance of 60 miles or more, to the North or South. than the respective pole will be found to have a tendency to dip by a very considerable and unpleasant amount.

We would recommend Instrument Makers to supply this counterpoise in all instances—for we are well convinced that they are often blamed for bad workmanship, when the very power that renders the needle useful is the true cause of the difficulty.

The dip not being constant in the same place, renders this adjustment still more necessary.

It need hardly be mentioned, that the construction of an extemporaneous counterpoise, can be accomplished by any one who uses an instrument.

Marion City and Missouri Railroad.—Until very recently we have heard nothing in relation to "Internal Improvements in Missouri," but present indications are highly favorable to the commencement and progress of such works, as must develope the resources of that State. We give the following a place in our columns, and solicit others on the same subject:—

INTERNAL IMPROVEMENTS IN MISSOURI.

Messrs. Editors:—As a portion of your readers may be interested in the improvements of the "Far West," I take the liberty of sending for insertion in the Journal, (should you deem it of sufficient importance,) the following brief account of the operations of the Marion City and Missouri Railroad Company:

This Company, during the last session of the Legislature of Missouri, obtained a charter to construct a railroad from Marion City, on the Mississippi river, about a hundred and thirty miles above St. Louis, to a point on the Missouri river, opposite to Brownville. The distance between these two points along the railroad route is about a hundred and fifty miles.

The Company, however, did not wait for a charter to commence their operations. Last summer a survey was made from Marion City to the town of New-York, in Shelby county, a distance of fifty-one miles, since which time a portion of the road has been prepared for the superstructure, and the cross sleepers delivered for seven miles of the route, from Marion City to Palmyra, and this part of the road will be completed and in operation in the course of the following summer.

Taking the whole distance of the road from Marion City to the Missouri river, the route is one of the most remarkable that has ever been surveyed. Nine-tenths of the distance may be said to require neither clearing, grubbing, nor grading. The route runs along a connected chain of prairies, from a half mile, to two, three and four miles in breadth, and the average quality of the lands adjacent to the route is not surpassed by any in Missouri.

Marion City, the terminating point of this railroad on the Mississippi, is situated on the west bank of the river, on an extensive prairie, embracing a surface of from five to six square miles. A portion of this prairie is subject occasionally to overflow during very high floods. Last spring, when the flood was at its highest mark, since 1828, the high water mark was about 18 inches below the average level of the river bank, in front of the town, a portion of the interior was overflown. In order, however, to remove the whole from danger, a levee is to be thrown up surrounding the town. The whole of the levee is now under contract, nearly one half is already thrown up, and the whole is to be completed according to the conditions of the contract by the middle of April.

Two steam saw mills are already in operation at this place, and two others, together with a steam flour mill, will be put in operation in the course of the spring and summer following. These, together with other works of a public nature, now in progress, prove that the Company have taken hold of their original plan of improvements with a gigantic hand. Attempts were made through private interests to throw the dead weight of detraction on the character of these improvements; but it has recovered by its own elasticy from the momentary pressure. The Marion City railroad is the first that has been started in the State of Missouri; and, according to the extensive arrangements already made, its progress and completion must be certain and successful.

A project is now in agitation, to bave a survey made of a railroad route from Cincinnati through Indianapolis, to connect with the Marion City and Missouri railroad. Should this plan of a railroad succeed, and there is no doubt of its practicability, it would form a continuation of the *Charleston* and *Cincinnati* railroad. There would then be a continuous line of railroad from Charleston to Brownville on the Missouri river; besides there is now in contemplation the project of a railroad from Boonville, westward to some convenient point on the western boundary of Missouri, for the purpose of embracing the Santa Fe trade. A more splendid system of railroad communication, could not be devised through any portion of the United States. Such is the rapid progress of internal improvements, that in ten years this project may be realized. T.

March 10, 1837.

We commend the following article from the Courier and Enquirer to the attention of all who feel an interest in the progress of internal improvement in this State or Union.

Enlargement of the Erie Canal.—We are pleased to perceive that this subject is exciting the attention of this city and elsewhere, which its intrinsic importance so imperiously demands. But more especially is this a measure in which the city of New-York is directly interested to a greater extent than even the western counties of this State. All who are familiar with the growth and prosperity of our city during the last thirty years, are well aware that its greatest advancement has taken place since the opening of the Erie canal in 1824, and that in point of fact we may date our extraordinary and rapid increase in wealth and population from that period. The completion of the great work, opened a new world for enterprise and industry, the product of which was emptied into this city and gave new life and vigor to every branch of business. It not only enabled us to command the resources of the western part of this State, but it gave a new value to all the country bordering on the Lakes, and induced hundred of thousands to resort to that region under the conviction that through the medium of our Erie Canal they could always reach the market and avail themselves of its advantages. In short its value to us is absolutely incalculable, at the same time that it has actually caused a whole empire laying on our north-western waters, to spring into existence with a degree of rapidity that is almost incomprehensible, and which appears to have been the work of enchantment.

In consequence of this wonderful increase in the population of the north-west, and the inexhaustible agricultural wealth of that region, the great object of the Erie canal is about to be in a measure frustrated by its want of capacity to do the business, which the fertility of soil and untiring industry and enterprise of the west already presents. In point of fact, the canal at this moment cannot transport to market the produce of the country which depends upon it as the only permanent avenue to the ocean; and if such be the case now, when the western emigrant is in a measure consuming what is raised in that country,—what will it be in five years from this time, when the whole of that region will be under cultivation, and its annual product for exportation be equal to the whole produce of the grain growing States of the Union at this day? We need not answer. The produce must and will find a market somewhere and when it cannot reach the best, it must of necessity, be diverted to some other. From our position, the immense amount of our exports, the activity, energy, and enterprise of our people, New-York must ever be the great commercial emporium of the United States, unless facilities are afforded for getting to another market in less time and at less expense. If we will not take the necessary measures to bring the produce of the country where nature designed it should come, but compel it to go to Philadelphia or Baltimore, it follows of course, that the merchants must send that produce abroad, and bring back the avails in imports. Thus it is possible, that by neglecting to do our duty, we may to a certain extent, counteract the benificent designs of Nature in our behalf; and it is to this bearing of the subject, that we would call the attention of every member of the Legislature, and every thinking man in this community.

It is the solemn and the sacred duty of our Legislature to act promptly and definitively on this question. Of course they should not waste the people's money; but at any and every cost, they should enlarge the Erie canal within the shortest practicable period, even if it should cost double the sum to accomplish it in *three* that it would in *six* years. The whole cost of such enlargement, be it what it may, is a mere drop in the bucket, compared with the certain and irreparable consequences of suffering the Western trade to be diverted from this city for a single season. It must not, if we can avoid it, ever be permitted to find any other avenue to the ocean than through our port, and in all our legislation, this great object should never be lost sight of, by those to whom the people entrust the guardianship of their best interests.

A friend handed us a few days since, a memorandum, setting forth the necessity of enlarging the Erie Canal, which he intended as a kind of text book for ourselves in alluding to this subject; but it is so well condensed that we give it to our readers as exhibiting in very few words, the whole merits of the contemplated improvement.

"The Erie Canal is too small for the present business in the most *busy* times of the year."

Its business has rapidly increased, and will increase more rapidly.

1st. From the increase amount of produce raised by the millions who have within the last three years, emigrated to Indiana, Illinois, Michigan and Missouri.

2d. From the numerous channels of communication now opening with Lake Erie, viz:

The Wabash and Erie canal, connecting the navigable waters of Wabash with Lake Erie. It runs through a rich and well settled country, and will bring an immense amount of property into Lake Erie, which now goes to New-Orleans or to Baltimore; (will be done in less than three years.)

2. Mad River and Lake Erie Railroad; (almost completed.)

3. Illinois and Michigan Canal, from the steamboat navigation on the Illinois river, to Lake Michigan, at Chicago.

4. Improved navigation of the Fox and Wisconsin rivers.

5. Erie and Kalamezoo Railroad, and a great number of Railroads to the interior of Michigan, Indiana, Illinois, &c.

The natural increase of business *without* the opening of these new channels, will choke up the canal in four years—when they are opened, the canal can do little more than half the business offering unless enlarged. When the business becomes so large as to impede the progress of boats in the canal, a part, (and not a small part) will find its way to Philadelphia. Pennsylvania, in anticipation of this, is opening numerous channels of communication between the Lake and Philadelphia—*as follows:*

1st. The Mahoming canal, connecting the Ohio and Pennsylvania canals, from Arkansas to New Castle. Through this canal in *nine months a canal-boat can go from Cleveland on Lake Erie to Pittsburg.* From Cleveland to Philadelphia, the distance by this route, is 160 miles less than to New-York by the Erie canal.

2. The Western section of the Pennsylvania Canal to Erie, will be completed in two years.

3. The Erie and Philadelphia Railroad through Northumberland. The most wealthy men in Philadelphia, with ***Nicholas Biddle*** at their head, are interested in this work, and it will be made as fast as money can make it. It will be 100 miles nearer than the New-York and Erie Railroad.

4. The Conneaut and Beaver Railroad, from Lake Erie to Beaver and Pittsburg, will be done in two years.

5. The Cleveland and Pittsburg road; in three or four years.

These will *all* be completed before the canal can be enlarged. As soon as the business of the canal is obstructed, it will go off to Philadelphia in these channels—and when once diverted, it may be difficult to get it back again."

Novel Experiments on Railways.—Since the opening of the Durham and Sunderland Railway, a novel experiment has been tried upon the line, which proves the practicability of railroad vehicles being propelled by wind. A temporary mast and sail were erected on a vehicle, which was set going at an easy rate. On the sail being trimmed to the wind, the speed increased to the rate of ten miles an hour. A train of five coal wagons was afterwards attached, but no additional sail hoisted. The train was set going as easy as possible to give it motion, when the speed increased to the rate above mentioned. The experiment was repeated for several days between Sunderland and Hendon, each way, with the same success, and was witnessed by numbers of spectators, who were much delighted with the novelty of the scene.—[Mining Jour.]

The New Vehicle Retarder.—Much curiosity has been excited in Oxford by repeated trials of a new invention intended to regulate the speed of carriages when descending a hill, by means of which the coachman can instantly or progressively lock both the hind wheels. The apparatus was applied to a four-horse stage, which was loaded with passengers, and, on ascending or descending a hill, was found to answer all the purposes intended. The inventor then proposed that the coach should be taken down the hill without horses, and it was frequently stopped while proceeding at the rate of twelve miles an hour. Many practical gentlemen had ample proofs of the principle of the invention by having the coach lifted up, and the two hind wheels allowed to turn free on the axle, when it was found that a two-pound weight, placed on the extremity of the wheel, would gently bring it round; but when the first degree of retarding power was applied, it took a weight, so placed, of fifteen pounds to bring it gently round; the second degree, thirty-six pounds; the third degree, fifty-six pounds; and the fourth degree, three quarters of a hundred; but with this weight no one person was capable of moving either wheel on its axle. Mr. B. Pearson, organist of the city church, is the inventor.—[Oxford paper.]

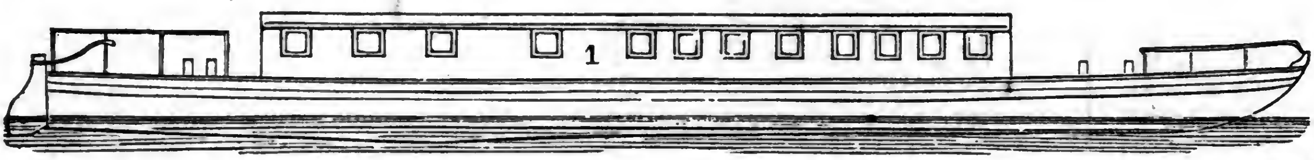
To prevent Milk from turning Sour.—Add to each quart of milk about 16 grains of bi carbonate of soda. It does not injure the taste of the milk, and aids remarkably the digestion of it. One of the large milk establishments of Paris has no other means of keeping the milk which remains, an advantage which is highly appreciated in large concerns of the kind.—[Jour. de Connais, Usuelles.]

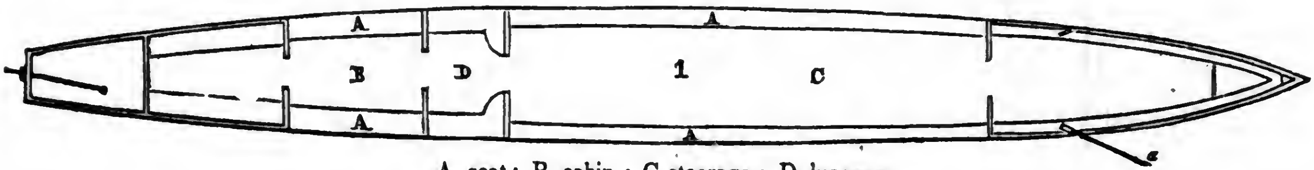
Irradiation of Light.—It is a curious fact, that if the same letters of the same size precisely are painted on two boards, the one white on a black ground, and the other black on a white ground, that the white letters will appear larger, and be read at a greater distance, than the black. This is owing to what is called the irradiation of light. It depends on this, that the impression made on the bottom of the eye by bright objects extends a little wider than the actual portion of the organ struck by the light, and invading the space occupied by the darker objects, makes the brighter appear larger than they really are.—[Railway Mag.]

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGIFEERS.

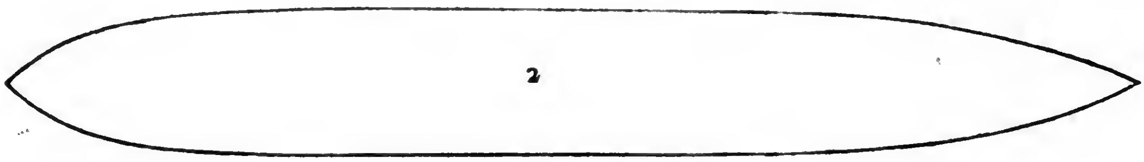
Plate 1.

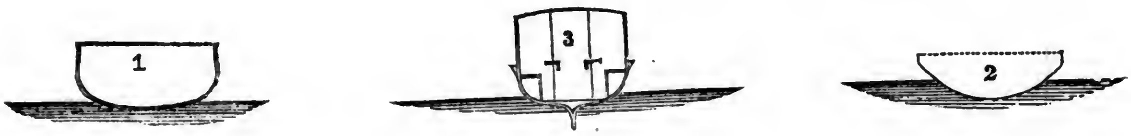
Plans.—1, Eagle ; 1, Hawk ; 2, Velocity ; 3, Rapid ; 4, Zephyr ; 5, Lark. Sections.—2, Velocity ; 3, Rapid ; 1, Eagle ; 1, Hawk. Elevation.—1, Eagle ; 1, Hawk. *a*, towing line.

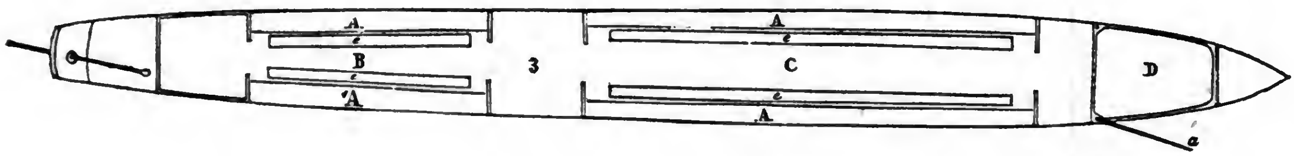


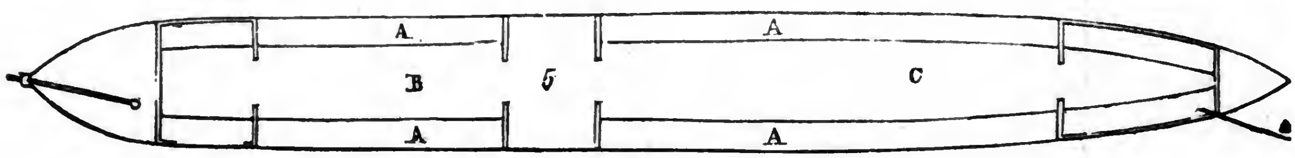


A, seat ; B, cabin ; C, steerage ; D, luggage.









3.—A, seat ; B, cabin ; C, steerage ; D, luggage ; *e*, table. 4.—A, seat ; B, steerage ; C, cabin. 5.—A, seat ; B cabin ; C, steerage.

Transverse Sections of the Canals, taken within the limits of the Courses.

Plate 2.

FORTH AND CLYDE CANAL.—Length of course, 550 yards.

MONKLAND CANAL.—Length of Course, 550 yards.

GLASGOW AND PAISLEY CANAL.—Length of Course, 8 miles.

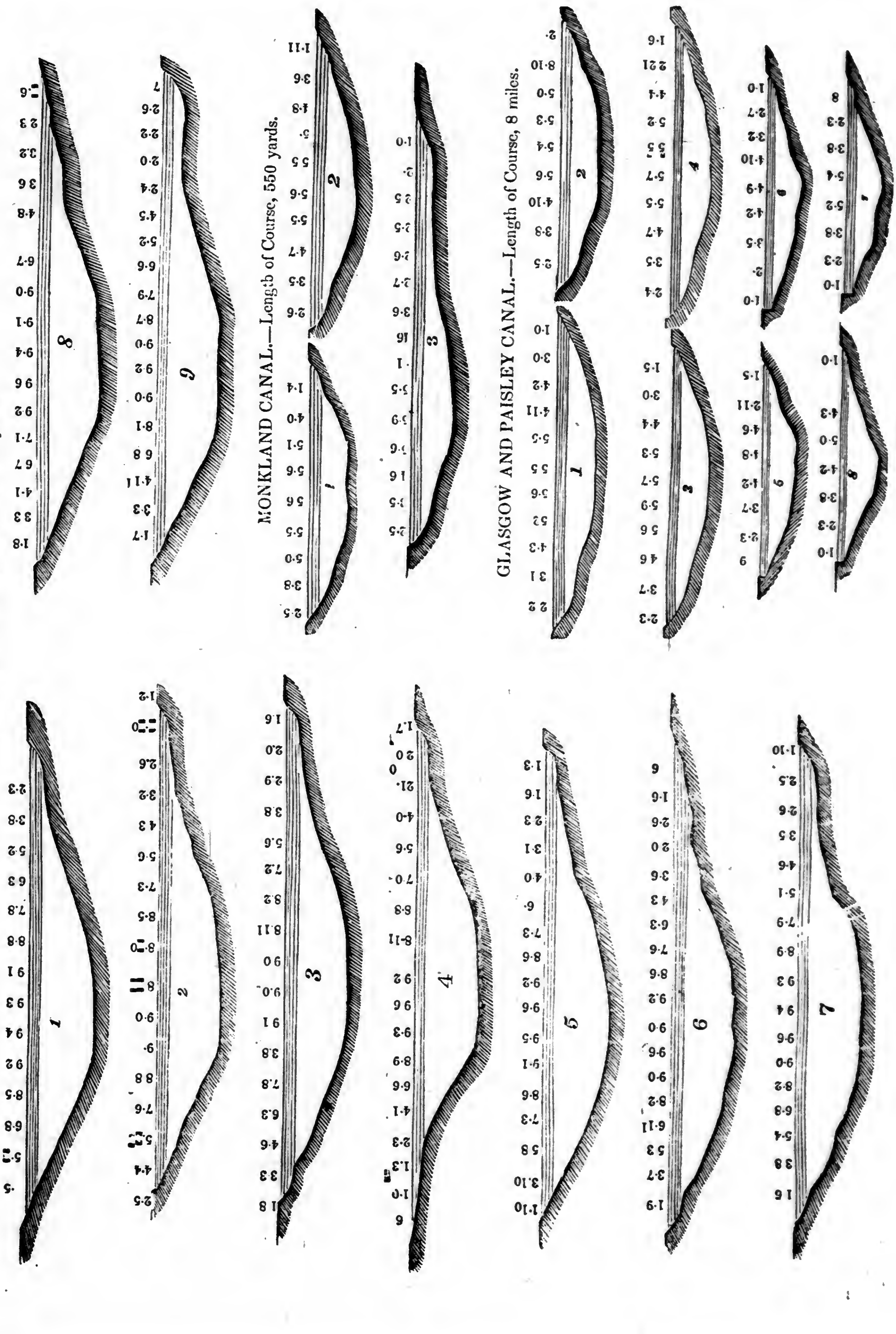


Plate 2.

GLASGOW AND PAISLEY CANAL.—Length of Course 8 miles.

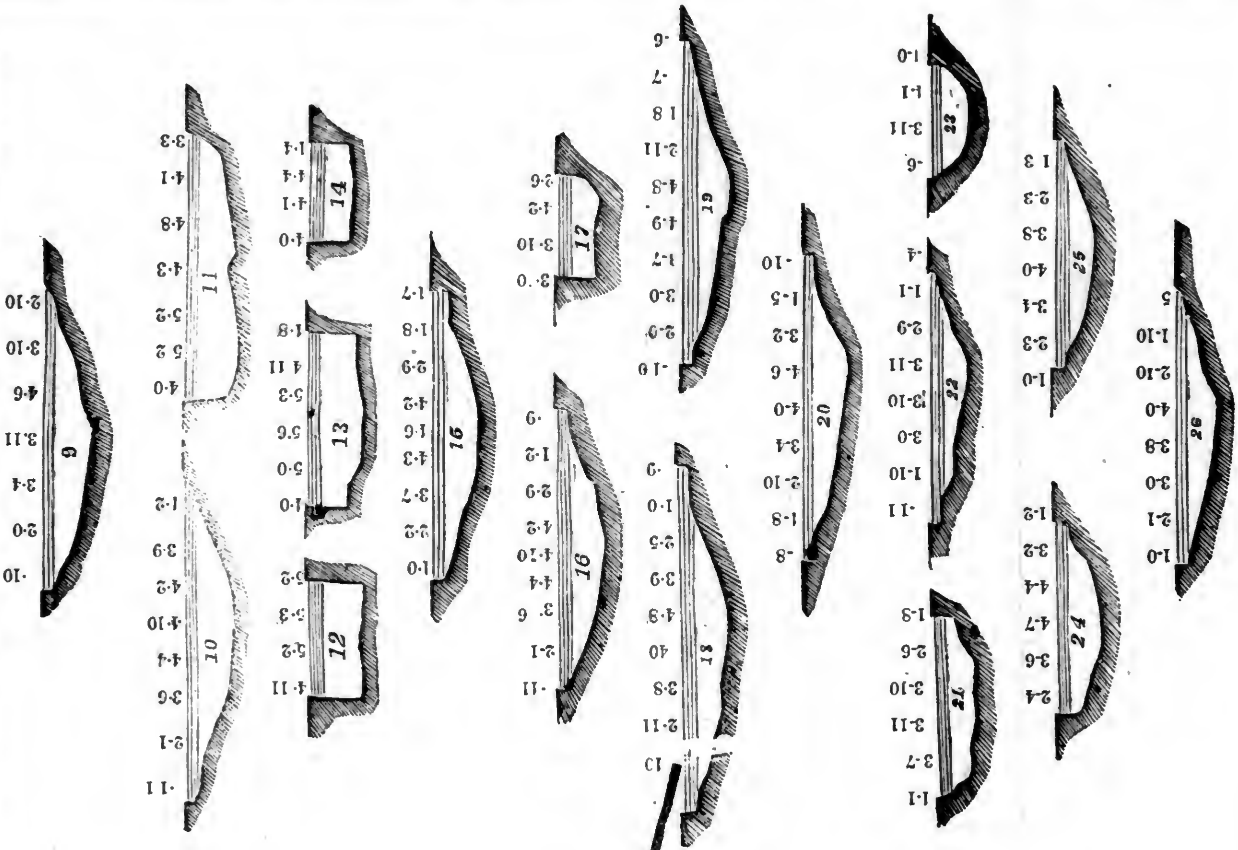


TABLE I. CONTINUED.—THE RAPID (FIRST SET).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's Name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing the Stake-interval.	Miles per Hour.	Tractive Power in lbs.	Feet per Second.	Kind of Tractive Power.	Load.	Wind.	Draught. Bow	Draught. St'rn	Position of Wave.	Vriation in Level.	REMARKS. PLACE OF EXPERIMENT. FORTH AND CLYDE CANAL.
77	RAPID.	37 07 37 35½ 38 04½ 38 33 39 02½	*b* *c* *d* *e* *f*	28½ 29 28½ 29½	7·90 7·76 7·90 7·59	319·4 307·4 346·3 348·8	11·58 11·38 11·58 11·19	Two Horses.	7 passengers, and 3 ton, = *c. q. lb.* 69 2 1	unf. light	in. 15⅜	in. 15⅜	not obs.	not obs.	
78	RAPID.	49 52 50 14 50 35 50 56 51 17	*b* *c* *d* *e* *f*	22 21 21 21	10·23 10·71 10·71 10·71	474·1 454·5 438 440·6	15·00 15·71 15·71 15·71	do.	do.	do.	do.	do.	do.	do.	
79	RAPID.	6 48 7 44 8 41 9 39 10 38	*b* *c* *d* *e* *f*	56 57 58 59	4·02 3·95 3·88 3·81	64·6 56 53·7 52·6	5·89 5·78 5·69 5.59	Two Men	do.	do.	do.	do.	do.	do.	
80	RAPID.	53 28 53 58 54 26 54 55 55 24	*b* *c* *d* *e* *f*	30 28 29 29	7·50 8.03 7·76 7·76	253 280·8 301 292·3	11·00 11·79 11·38 11·38	Two Horses.	7 passengers, and 2 ton, = *c. q. lb.* 49 2 1	do.	14	14	do.	do.	
81	RAPID.	22 05 22 30½ 22 55½ 23 20½ 23 46	*b* *c* *d* *e* *f*	25 25 25 25½	8·82 9·00 9·00 8·82	337·3 355·8 356·5 351·2	12·94 13·20 13·20 12·94	do.	do.	fav. light.	do.	do.	do.	do.	
82	RAPID.	36 25 36 44 37 03½ 37 23½ 37 44	*b* *c* *d* *e* *f*	19 19½ 20 20½	11·84 11·54 11·25 10·93	482 483·2 461 434·5	17·37 16·92 16·50 16·09	do.	do.	do.	do.	do.	do.	do.	

TABLE I. CONTINUED.—THE RAPID (FIRST SET.)

83	RAPID.	55 26 57 32 58 35 59 38 40½	b c d e f	66 63 63 64½	3·41 3·57 3·57 3·60	47 44 43·5 41	5·00 5·24 5·24 5·28	Two Men.	do.	do.	do.	do.	do.	do.	
84	RAPID.	30 06½ 30 27 30 47½ 31 08 31 28½	b c d e f	20½ 20½ 20½ 20½	10·93 10·93 10·93 10·93	420 372 380·8 374·8	16·09 16·09 16·09 16·09	Two Horses.	7 passengers, and 1 ton, = c. q. lb. 29 2 1	fav. strng	do.	do.	do.	do.	
85	RAPID.	40 45 41 11 41 35½ 42 00½ 42 26½	b c d e f	26 24½ 25 26	8·65 9·18 9·00 8·65	302·3 300 294·2 300	12·69 13·47 13·20 12·69	do.	do.	do.	12⅛	12⅛	do.	do.	
86	RAPID.	55 32 56 00 56 28 56 56 57 25½	b c d e f	28 28 28 29½	8·03 8·03 8·03 7·59	234·6 242·2 261·3 250·6	11·79 11·79 11·79 11·19	do.	do.	do.	do.	do.	do.	do.	
87	RAPID.	6 18 7 16½ 8 12½ 9 11 10 08	b c d e f	58½ 56 58½ 57	3·84 4·02 3·84 3·95	45·2 45·7 41·7 43·8	5·64 5.89 5·64 5·78	One Horse. Boy leading	do.	do.	do.	do.	do.	do.	
88	RAPID.	27 45 28 46 29 42 30 40 31 36½	b c d e f	61 56 58 56½	3·69 4·02 3·88 3·98	56·8 45·1 42 42	5·41 5·90 5·69 5·84	Two Men.	do.	fav. light	do.	do.	do.	do.	
89	RAPID.	51 21 51 46 52 10½ 52 36 53 01	b c d e f	25 24½ 25½ 25	9·00 9·18 8·82 9·00	263·6 264·4 248 255	13·20 13·47 12·94 13·20	Two Horses.	7 passengers, = c. q. lb. 9 2 1	do.	12¼	9	do.	do.	

TABLE II.—THE ZEPHYR (FIRST SET.—36 *Experiments*).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing the stake-interval.	Miles per Hour.	Tractive Power in lbs.	Feet per Second	Kind of Tractive Power.	Load.	Wind.	Draught. Bow	Draught. St'rn	Position of Wave.	Variation in Level.	REMARKS. PLACE OF EXPERIMENT, FORTH AND CLYDE CANAL.
		m. s.		sec.	miles	lbs.	feet.								
90	ZEPHYR.	5 03 5 52 6 42 7 33 8 27	b c d e f	49 50 51 54	4·59 4·50 4·41 4·17	35·5 38·4 41·6 39·1	6·73 6·60 6·47 6·11	Two Horses.	7 passengers, = c. q. lb. 9 2 1	fav. light	in. 7	in. 5	not obs.	not obs.	Weight of ZEPHYR, when empty, 2 ton, 2 cwt. 2 qr. 5 lb. Towing-line, 11ft. from bow.
91	ZEPHYR.	16 35 17 00½ 17 26½ 17 54 18 20½	b c d e f	25½ 26 27½ 26½	8·82 8·65 8·18 8·49	175·5 169 164·6 155·6	12·94 12·69 12·00 12·45	do.	do.	do.	do.	do.	do.	do.	
92	ZEPHYR.	28 50½ 29 15 29 39 30 03 30 27	b c d e f	24½ 24 24 24	9·18 9·38 9·38 9·38	202 188·7 181·2 175·6	13·47 13·75 13·75 13·75	do.	do.	do.	do.	do.	do.	do.	
93	ZEPHYR.	39 10½ 39 27 39 44 40 01 40 18	b c d e f	17½ 17 17 17	12·86 13·24 13·24 13·24	347 343·8 349 349	18·86 19·41 19·41 19·41	do.	do.	do.	do.	do.	do.	do.	

TABLE II. CONTINUED.—THE ZEPHYR (FIRST SET.)

94	ZEPHYR.	39 20 39 39 39 57 40 15 40 33	b c d e f	19 18 18 18	11·84 12·50 12·50 12·50	357·5 360 372·8 361	17.37 18·33 18·33 18 33	do.	7 passengers, and 1 ton, = c. q. lb. 29 2 1	do.	8¼	7¼	do.	do.	
95	ZEPHYR.	47 04 47 28½ 47 52 48 17 48 40	b c d e f	24½ 23½ 25 23½	9·18 9.57 9·00 9·57	237·4 230·5 211 222·7	13·47 14·04 13·20 14·04	do.	do.	do.	do.	do.	do.	do.	
96	ZEPHYR.	1 15½ 2 17 3 14½ 4 13½ 5 18	b c d e f	61½ 57½ 59 64½	3·66 3·91 3 81 3·49	36·5 42·7 34·9 31·5	5·37 5·74 5·59 5·12	One Horse. Boy leading.	do.	do.	do.	do.	do.	do.	
97	ZEPHYR.	13 59½ 14 52½ 15 45½ 16 38 17 32	b c d e f	53 53 53½ 54	4·25 4·25 4 21 4·17	47 46 38 39	6·23 6 23 6·17 6·11	One Horse. Boy riding.	do.	do.	do.	do.	do.	do.	
98	ZEPHYR.	47 23½ 47 42 48 00 48 19½ 48 38	b c d e f	18½ 18½ 19 18	12·16 12·16 11·84 12·16	370 370·8 360 369·2	17·84 17·84 17.37 17·84	Two Horses.	7 passengers, & 1t. 6 cwt. = c. q. lb. 35 2 1	do.	9¼	7¾	do.	do.	ZEPHYR, with 1 ton, 6 cwt. and 7 passengers, nearly equal to the weight of the RAPID and 7 passengers.
99	ZEPHYR.	55 14 57 37½ 56 01½ 56 26 56 51	b c d e f	23½ 24 24 25	9·57 9·38 9·18 9.00	250·8 227·4 223 224·7	14·04 13·75 13·47 13.20	Two Horses.	7 passengers, & 1t 6 cwt. = c. q. lb. 35 2 1	fav. light.	in 9	in 7½	not obs.	not obs.	A barge passed, 56m. 40s.
100	ZEPHYR.	2 01 2 32½ 3 04 3 33½ 4 03½	b c d e f	31 31 29 30	7·14 7·14 7·59 7·50	138·5 152·5 167·2 156·9	10·48 10·48 11·19 11·00	do.	do.	do.	do.	do.	do.	do.	
101	ZEPHYR.	12 14½ 13 08 14 03 14 58 15 53	b c d e f	53 55 55 55	4·21 4·09 4·09 4·09	45·5 45·2 40 41·1	6 17 6·00 6·00 6·00	do.	do.	do.	do.	do.	do.	do.	
102	ZEPHYR.	34 22 34 41½ 35 00 35 19½ 35 39	b c d e f	19½ 18½ 19½ 19½	11·54 12·16 11·54 11·54	410·4 391·5 456·4 345·2	16·92 17·84 16·92 16·92	do.	7 passengers, and 2 tons, = c. q. lb. 49 2 1	do.	10	9	do.	do.	
103	ZEPHYR.	57 49 58 14 58 39 59 05 59 31	b c d e f	25 25 26 26	9·00 9·00 8·65 8 65	272 243·6 240 2 250·2	13·20 13·20 12·69 12·69	do.	do.	fav. very light	do.	do.	do.	do.	
104	ZEPHYR.	1 27 1 50 2 13 2 35½ 2 58	b c d e f	23 23 22½ 22½	9·78 9·78 10·00 10·00	317·7 281·2 274·8 252·9	14·35 14·35 14·67 14·67	do.	do.	do.	do.	do.	do.	do.	
105	ZEPHYR.	13 31½ 14 23½ 15 12½ 16 05 16 58	b c d e f	52 49 52½ 53	4·33 4·59 4·29 4·25	44·2 55·4 45·4 47 4	6·35 6·73 6·29 6·23	do.	do.	do.	do.	do.	do.	do.	
106	ZEPHYR.	48 49 49 44 50 40 51 36 52 31½	b c d e f	55 56 56 55½	4·09 4·02 4·02 4·05	54·1 50·9 47·8 48·8	6·00 5·89 5·89 5·89	Two Horses.	7 passengers, and 3 ton, = c. q. ld. 59 2 1	do.	do.	do.	do.	do.	
107	ZEPHYR.	3 09 4 10 5 10½ 6 10½ 7 10½	b c d e f	61 60½ 60 60	3·69 3·72 3·75 3·75	92·3 76·4 69·7 65·8	5·41 5·45 5·50 5·50	do.	do.	do.	12	11	do.	do.	Stern drawn foremost.

TABLE II. CONTINUED.—THE ZEPHYR (FIRST SET).

108	ZEPHYR.	10 11 10 30 10 49½ 11 09 11 28	*b* *c* *d* *e* *f*	19 19½ 19½ 19	11·84 11·54 11·54 11 84	449 8 434·2 418·4 407·4	17·37 16·92 16·92 17·37	Two Horses.	7 passengers, and 3 ton' = *c. q. lb.* 69 2 1	fav. light	in 12	in. 11	not obs.	not obs.	
109	ZEPHYR.	20 58 21 25 21 51 22 18 22 45	*b* *c* *d* *e* *f*	27 26 27 27	8·33 8 65 8 33 8·33	272·3 262·7 299·5 291·3	12·22 12·69 12·22 12·22	do.	do.	do.	do.	do.	do.	do.	
110	ZEPHYR.	29 41 30 08 30 33 30 59 31 25	*b* *c* *d* *e* *f*	27 25 26 26	8·33 9·00 8·65 8 65	293 0 295·7 283·5 306·5	12·22 13·20 12 69 12·69	do.	do.	do.	do.	do.	do.	do.	
111	ZEPHYR.	20 12½ 20 34 20 55 21 16 21 36½	*b* *c* *d* *e* *f*	21½ 21 21 20½	10·47 10·71 10·71 10·97	441·1 418·2 406·4 423·4	15·35 15·71 15·71 16·09	do.	7 passengers, and 4½ ton, = *c. q. lb* 94 2 1	do.	13¾	12¾	do.	do.	
112	ZEPHYR.	33 36 34 04½ 34 32 34 59 35 27	*b* *c* *d* *e* *f*	28½ 27½ 27 28	7·90 8·18 8·33 8·03	275·0 321·0 351·0 377·	11·58 12·00 12·22 11·79	do.	do.	do.	do.	do.	do.	do.	
113	ZEPHYR.	42 54 43 49 44 42 45 33 46 24	*b* *c* *d* *e* *f*	55 53 51 51	4·09 4·25 4·41 4·41	59·8 59·8 62·7 57·6	6·00 6·23 6·47 6·47	do.	do.	do.	do.	do.	do.	do.	
114	ZEPHYR.	34 41 34 59 35 18 35 37 35 55	*b* *c* *d* *e* *f*	18 19 19 18	12·50 11·84 11·84 12·50	401·0 384 0 375·6 372 7	18·33 17·37 17·37 18·33	do.	7 passengers, & 1 13cwt. = *c. q. lb.* 42 2 1	do.	9¾	S,	do.	do.	1 ton 13cwt. made the ZEPHYR and 7 passengers nearly equal to the VELOCITY, with 7 passengers.
115	ZEPHYR.	17 03 17 26 17 48½ 18 11½ 18 33½	*b* *c* *d* *e* *f*	23 22½ 23 22	9·78 0·00 19·78 10·23	291 5 271·0 267·0 269·4	14·35 14·67 14 35 15·00	do.	do.	do.	do.	do.	do.	dur. run. bow elev. 11′	
116	ZEPHYR.	58 18 59 05 59 52 0 40 1 28½	*b* *c* *d* *e* *f*	47 47 48 48½	4·79 4·79 4·79 4·64	67·1 59·1 53·5 69 9	7·02 7 02 6 88 6 80	do.	do.	do.	do.	do.	do.		Bubble vibrating a little.
117	ZEPHYR.	8 52 9 55 10 55 11 52 12 47	*b* *c* *d* *e* *f*	63 60 57 55	3·57 3·75 3·95 4·09	37·8 39·9 50·2 42·0	5·24 5·50 5·78 6·00	Two Horses.	7 passengers, & 1t. 13 cwt. = *c. q. lb.* 12 2 1	fav. light	in. 9¾	in. 8½	not obs.		
118	ZEPHYR.	19 52 20 10 20 28 20 47 21 06	*b* *c* *d* *e* *f*	18 18½ 18½ 19	12·50 12·16 12·16 11·84	414·5 386·3 372·0 372·0	18·33 17·84 17·84 17·37	do.	do.	do.	do.	do.	do.	dur. run. bow elev. 27′	
119	ZEPHYR.	38 52 39 15 39 37 40 00 40 23	*b* *c* *d* *e* *f*	23 22½ 22½ 23	9·78 10·00 10·00 9·78	302·6 270·8 528·3 258·6	14.35 14.67 14.67 14.35	do.	do.	do.	11¼	7¼	do.	do. do. elev. 7½	Weight shifted forward.
120	ZEPHYR.	51 20 51 44 52 07½ 52 30 52 53	*b* *c* *d* *e* *f*	24 23½ 22½ 23	9·38 9·57 10·00 9·78	280·8 259·2 266·7 250·6	13.75 14.04 14.67 14.35	do.	do.	do.	8¼	10¼	do.	do. do. elev. 15½′	do. aft.
121	ZEPHYR.	10 25 10 47 11 08 11 29 11 50	*b* *c* *d* *e* *f*	22 21½ 20½ 21½	10·23 10·47 10·97 10·47	328·8 311·2 317·3 283·0	15·00 15·35 16·09 15·35	do.	do:	do.	9½	8½	do.	do. do. dep. 20′	Weight distributed equally.

TABLE II. CONTINUED.—THE ZEPHYR (FIRST SET).

122	ZEPHYR.	12 06½	*b*					do.	do.	do.	do.	do.	do.	do. do. elev. 22′	
		12 32	*c*	25½	8·82	230·2	12·94								
		12 57	*d*	25	9·00	241·8	13·20								
		13 24	*c*	27	8·33	237·1	12·22								
		13 50	*f*	26	8·65	238·6	12·69								
123	ZEPHYR.	21 18	*b*					do.	do.	do.	do.	do.	do.	do. do. elev. 22½	
		21 41½	*c*	23½	9·57	257·5	14·04								
		22 06	*d*	24½	9·18	253·0	13·47								
		22 30	*e*	24	9·38	256·7	13·75								
		22 53	*f*	23	9·78	245·2	14·35								
124	ZEPHYR.	7 17	*b*					do.	do.	do.	8	10	do.	do. do. elev. 26′	Weight shifted aft.
		8 15	*c*	24	9·38	246·0	13·75								
		9 10½	*d*	25	9·00	253·6	13·20								
		10 04	*e*	24	9·38	259·2	13·75								
		11 01	*f*	23	9·78	249·0	14·35								
125	ZEPHYR.	36 01½	*b*					do.	do.	16	11½	7¼	do.	do. do. elev. 32′	Weight shifted forward.
		36 23	*c*	23½	9·57	254·5	14·04								
		36 44½	*d*	25½	8·82	243 0	12·94								
		37 06	*e*	25½	8·82	253·2	12·94								
		37 27	*f*	25½	8·82	259·2	12·94								

TABLE III.—THE LARK (31 *Experiments*.)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's Name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing the stake interval.	Miles per Hour.	Tractive power in lbs.	Feet per Second.	Tractive power.	Load.	Wind.	Draught. Bow	Draught. St'rn	Position of Wave.	Variation of Level.	REMARKS. PLACE OF EXPERIMENT, FORTH AND CLYDE CANAL.
		ms. se.		sec.	miles.	lbs.	feet.								
126	LARK.	1 18½	*b*					Two Horses.	7 passengers, = c. q. lb. 9 2 1	fav. light	in. 10¼	in. 10¼	not obs.	dur. run. bow elev. 25½	Weight of LARK, when empty, 3 ton 3 cwt. 1qr. 4lb.
		1 36	*c*	17½	12·86	386·0	18·86								
		1 57	*d*	21	10·71	355·0	15·71								
		2 17½	*e*	20½	10·97	337·0	16·09								
		2 38	*f*	20½	10·97	317·7	16·09								
127	LARK.	27 05	*b*					do.	do.	do.	do.	do.	do.	do. do. elev. 15′	
		27 30	*c*	25	9·00	256·5	13·20								
		27 54	*d*	24	9·38	253·6	13·75								
		28 18½	*e*	24½	9·18	256·1	13·47								
		28 42	*f*	23½	9·57	264·8	14·04								
128	LARK.	41 04	*b*					do.	do.	fav. stronger than last.	do.	do.	do.	do. do. level	
		41 53	*c*	49	4·59	64·7	6·73								
		42 45	*d*	52	4·33	55·9	6·35								
		43 35	*e*	50	4·50	56·5	6·60								
		44 30½	*f*	54½	4·13	46·5	6·06								
129	LARK.	52 44	*b*					do.	do.	not steady.	do.	do.	do.	do·	
		53 53	*c*	69	3·26	26·0	4·78								
		55 02	*d*	69	3·26	23·3	4·78								
		56 12	*e*	70	3·21	20·8	4·71								
		57 25	*f*	73	3·08	28·6	4·52								
130	LARK.	18 30	*b*					do.	7 passengers, and 5 cwt. = c. q. lb. 14 2 1	fav. light	10½	10½	do.	do. do. elev. 27′	5 cwt. made the LARK and 7 passengers nearly equal to the RAPID, and 7 passengers.
		18 48	*c*	18	12·50	396·0	18·33								
		19 08	*d*	20	11·25	368·7	16·50								
		19 27½	*e*	19½	11·54	370·6	16·92								
		19 47	*f*	20½	10·97	364·5	16·09								
131	LARK.	27 02½	*b*					do.	do.	do.	do.	do.	do.	do. do. elev. 17′	
		27 26½	*c*	24	9·38	279·7	13·75								
		27 50	*d*	23½	9·57	270·8	14·04								
		28 13½	*e*	23½	9·57	251·5	14·04								
		28 36	*f*	22½	10·00	265·0	14·67								
132	LARK.	36 51½	*b*					do.	do.	fav. stronger than last.	do.	do.	do.	do. do. elev. 3′	
		37 47	*c*	56½	3·98	43·8	5·84								
		38 43	*d*	56	4·02	50·1	5·89								
		39 35	*e*	52	4·33	43·4	6·35								
		40 33	*f*	48	4·69	39·1	6·88								
133	LARK.	0 38	*b*					do.	7 passengers, and 12 cwt. = c. q. lb. 21 2 1	do.	11½	11½	do.	do. do. elev. 29′	12cwt. made the LARK, and 7 passengers nearly equal to the VELOCITY, and 7 passengers.
		0 57	*c*	19	11·84	393·4	17·37								
		1 16½	*d*	19½	11·54	372·3	16·92								
		1 36	*e*	20½	10·97	363·6	16·09								
		1 56	*f*	20	11·25	366·8	16·04								

TABLE III. CONTINUED.—THE LARK.

134	LARK.	8 46 9 09½ 9 33½ 9 57 10 20½	*b* *c* *d* *c* *f*	23½ 24 23½ 23½	9·57 9·38 9·56 9·57	286·2 280·2 278 5 265·6	14·04 13·75 14·04 14·04	do.	do.	fav. light	do.	do.	do.	do. do. elev. 19′	
135	LARK.	22 35 23 33 24 30 25 27 26 24½	*b* *c* *d* *e* *f*	58 57 57 57½	3·88 3·95 3·95 3·91	34·6 35·2 45·5 39·2	5·69 5·78 5·78 5·74	Two Horses.	7 passengers, and 12 cwt. = *c. q. lb.* 21 2 1	fav. fresh breeze.	in. 11½	in. 11½	not obs.	dur. run. bow elev. 1½′	
136	LARK.	52 34 52 53½ 53 12½ 53 32 53 51	*b* *c* *d* *e* *f*	19½ 19 19½ 19½	11·53 11·84 11·54 11·54	404·8 398·3 382·3 388·0	16·92 17·37 16·92 16·92	do.	7 passengers, and 1 ton, = *c. q. lb.* 29 2 1	do.	11¾	11¾	do.	do. do. elev. 24′	
137	LARK.	2 18½ 2 43 3 07 3 31 3 53	*b* *c* *d* *e* *f*	24½ 24 24 22	9·18 9·38 9·38 10·23	295·0 295·2 293·1 293·5	13·47 13·75 13·75 15·00	do.	do.	do.	do.	do.	do.	do. do. elev. 13′	
138	LARK.	14 45 15 40 16 39 17 37 18 34	*b* *c* *d* *e* *f*	55 59 58 57	4·09 3·81 3·88 3·95	37·0 36·5 35·6 36·0	6·00 5·59 5·69 5·78	do.	do.	do.	do.	do.	do.	do. do. level.	
139	LARK.	27 52 30 30 32 55 34 10 36 03	*b* *c* *d* *e* *f*					do.	do.	do.	do.	do.	do.		Boat drifted with the wind.
140	LARK.	44 45 45 05 45 26 45 47 46 07½	*b* *c* *d* *e* *f*	20 21 21 20½	11·25 10·71 10·71 10·97	435·0 415·0 393·0 387·0	16·50 15·71 15·71 16·09	do.	7 passengers, and 2 ton = *c. q. lb.* 49 2 1	do.	13½	13½	do.	do. do. elev. 29′	
141	LARK.	57 35½ 58 01 58 26 58 51½ 59 17	*b* *c* *d* *e* *f*	25½ 25 25½ 25½	8·82 9·00 8·82 8·82	388·7 334·0 329·0 334·7	12·94 13·20 12·94 12·94	do.	do.	do.	do.	do.	do.	do. do. elev. 26′	
142	LARK.	7 17 8 15 9 10½ 10 04 11 01	*b* *c* *d* *e* *f*	58 55½ 53½ 57	3·88 4·05 4·21 3·95	46·2 48·2 46·6 36·1	5·69 5·95 6·17 5·78	do.	do.	do.	do.	do.	do.	do. do. level.	
143	LARK.	36 01½ 36 23 36 44½ 37 06 37 27	*b* *c* *d* *e* *f*	21½ 21½ 21½ 21	10 47 10·47 10·47 10·71	448·7 422·6 400·0 401·0	15·35 15·35 15·35 15·71	do.	7 passengers, and 3 ton, = *c. q. lb.* 69 2 1	do.	14¾	14¾	do.	do. do. elev.	
144	LARK.	46 33 47 32 48 29 49 28 50 26	*b* *c* *d* *e* *f*	59 57 59 58	3·81 3·95 3·81 3·88	41·3 56·6 49·3 34·0	3·59 5·78 5·59 5·69	Two Horses.	do.	fav. fresh brze.	in. 14¾	in. 14¾	not obs.	dur. run. bow elev. 3½′	The towing-line dragged along the water a short distance.
145	LARK.	58 29 58 55 59 21½ 59 48 14	*b* *c* *d* *e* *f*	26 26½ 26½ 26	8.65 8.49 8.49 8.65	359.2 369.3 354.4 359.0	12.69 12.45 12.45 12.69	do.	do.	do.	do.	do.	do.	do. do. elev. 28′	
146	LARK.	41 46 42 11 42 36½ 43 05 43 36½	*b* *c* *d* *e* *f*	25 25½ 28½ 31½	9·00 8·82 7·90 7·14	432.3 408.0 380.6 372.1	13.20 12.94 11.58 10.48	do.	7 passengers, and 4¼ ton,= *c. q. lb.* 94 2 1	fav. very light	16½	16½	do.	do. do. elev. 30′	
147	LARK.	56 05 57 07 58 10 59 13 14	*b* *c* *d* *e* *f*	62 63 63 61	3·63 3·57 3·57 3·69	47.3 43.2 56.8 45.8	5.32 5.24 5.24 5.41	do.	do.	do.	do.	do.	do.	do. do. level	

TABLE III. CONTINUED.—THE LARK.

148	LARK.	9 29½ 10 01 10 35½ 11 08½ 11 41	b c d e f	31½ 34½ 33 33½	7.14 6.52 6.82 6.72	248.5 181.6 195.2 176.7	10·48 9·57 10·00 9·85	do.	do.	do.	do.	do.	do.	do. do. elev. 5'	
149	LARK.	24 36 25 02 25 28 25 54 26 24	b c d e f	26 26 26 30	8·65 8·65 8·65 7·50	421·2 413·4 432·4 419·5	12·69 12·69 12·39 11·00	do.	do.	do.	do.	do.	do.	not obs.	
150	LARK.	12 05½ 12 29½ 12 52 13 14½ 13 37	b c d e f	24 23½ 22½ 22½	9·38 9·57 10·00 10·00	463·7 456·2 430·7 412·0	13·75 14·04 14·67 14·67	do.	do.	do.	do.	do.	do.	do. do. elev. 45'	
151	LARK.	22 07½ 22 34½ 23 01½ 23 29 23 57	b c d e f	27 27 27½ 28	8·33 8·33 8·18 8·03	377·8 377·5 402·6 422·0	12·22 12·22 12·00 11·79	do.	do.	do.	do.	do.	do.	do. do. elev. 37'	
152	LARK.	39 28 39 51 40 13½ 40 36 40 57	b c d e f	23 22½ 23½ 21	9·78 10·00 10·00 10·71	474·[illegible] 458·2 431·0 424·7	14·35 14·67 14·67 15·7[illegible]	do.	do.	do.	18	15	do.	do. do. elev. 34'	Weight shifted forward.
153	LARK.	52 35 53 02½ 53 30½ 53 58 54 26	b c d e f	27½ 28 28½ 27	8·18 8·03 7·90 8·03	398·[illegible] 382· 413· 426·	[illegible]2·00 [illegible]1·79 [illegible]1·58 [illegible]1·79	Two Horses.	7 passengers, and 4½ ton, = c. q. lb. 94 2 1	fav. light	in. 18	in. 15	not obs.	dar. run. bow elev. 35'	
154	LARK.	6 13½ 7 10 8 08 9 08 10 11	b c d e f	56½ 58 60 63	3·98 3·88 3·75 3·57	50·9 55·6 44·8 40·6	5·84 5·69 5·59 5·24	do.	do.	do.	do.	do.	do.	do. do. level.	
155	LARK.	37 53 38 17½ 38 40½ 39 03½ 39 26½	b c d e f	24½ 23 23 23	9·18 3·78 9·78 9·78	144·4 449·3 436·0 422·2	13 47 14·35 14·35 14·35	do.	do.	do.	14¾	17¾	do.	do. do. elev. 32'	Weight shifted aft.
156	LARK.	59 03 29 26 59 50 12 35	b c d e f	23 24 22 23	9·78 9·38 10·23 9·78	179·0 160·5 149·2 133·7	14·35 13·75 15·00 14·35	do.	do.	fav. very light	19½	13	do.	do. do. elev. 5'. At rest. depd 4'	Weight shifted forward. Towing-line 5 ft. from the Stern. Dynamometer 5 ft. 6 in. from the bow.

From the Saratoga Sentinel.

HIGHLY IMPORTANT INVENTION.—ELECTRO MAGNETIC ENGINE.

In company with Dr. Steel and several other gentlemen, we called upon Messrs. Davenport and Cook, of this village on Saturday, with a view of examining the Electro Magnetic Engine invented by the senior partner.

The ingenuity, yet simplicity of its construction, the rapidity of its motion, together with the grandeur of the thought that we are witnessing the operations of machinery propelled by that subtle and all pervading principle electricity, combine to render it the most interesting exhibition we have ever witnessed.

Although we shall say something on the subject, it is perhaps impossible to describe this machine by words alone, so as to give more than a faint idea of it to the reader.

It consists of a stationary magnetic circle, formed of disconnected segments. These segments are permanently charged magnets the repelling poles of which are placed contiguous to each other. Within the circle stands the motive wheel, having the projecting galvanic magnets, which revolve as near the circle as they can be brought without actual contact. The galvanic magnets are charged by a battery, and when so charged, magnetic attraction and repulsion are brought into requisition, in giving motion to the wheel —the poles of the galvanic magnets being changed more than a thousand times, per minute.

Having in its construction but one wheel, revolving with no friction except from its own shaft, and from the wires connecting it with the galvanic battery, the latter of which can scarcely be said to impede the motion in any degree, the durability of this engine must be almost without limit.

There is no danger to be apprehended from fire or explosion: and we understand it is the opinion of scientific gentlemen who have examined it, that the expense of running this machine will not amount to one fourth as much as that of a steam engine of the same power.

From the time when the Greek philosopher supposed the magnet possessed a soul, its mysterious power has been regarded with increasing interest and attention to the present day. In addition to its utility in the compass, thousands have labored in vain attempts to obtain through its agency a rotary motion. So intense has been the application of some to this subject, that in the attempt they have even lost that elevating attribute of our species, reason. It was reserved for Mr. Davenport to succeed where so many had failed.

He commenced his labors more than three years ago, and prosecuted them under the most discouraging and unfavorable circumstances—sustained by a constitutional perseverance and a clear conviction of ultimate success. He obtained the first rotary motion in July, 1834,; since which time he has devoted his whole attention to improvements in his machine. During this period it has passed through five different modifications, and is now brought to such a state of simplicity and perfection (having apparently the fewest possible number of parts) that the proprietors consider no further important alterations desirable, except in the due proportions of the different magnets, in which they are daily improving.

We were shown a model in which the motive wheel was $5\frac{1}{2}$ inches diameter, which elevated a weight of *twelve pounds*. And to illustrate the facilities for increasing the power of this engine, another model was exhibited to us with a motive wheel of eleven inches in diameter, which elevated a weight of *eighty-eight pounds*. Although thes models have been for some time in progress, and we have occasionally been permitted to examine them, we have waited till the present period when the practicability of obtaining a rapid and unlimited increase of power seems to be placed beyond a doubt, before expressing an opinion, or calling the public attention to the subject.

If this engine answers the expectations of the inventor, (and we believe no one can assign a *reason* why it should not, it is destined to produce the greatest revolution in the commercial and mechanical interests which the world has ever witnessed. We may consider the period as commencing when machinery in general will be propelled by power concentrated upon the plan of this engine; when the vessels of all commercial nations will be guided to their point of destination and urged forward in their course by the same agent triumphantly contending against winds and tides, with the silent sublimity of unseen but irresistible power.

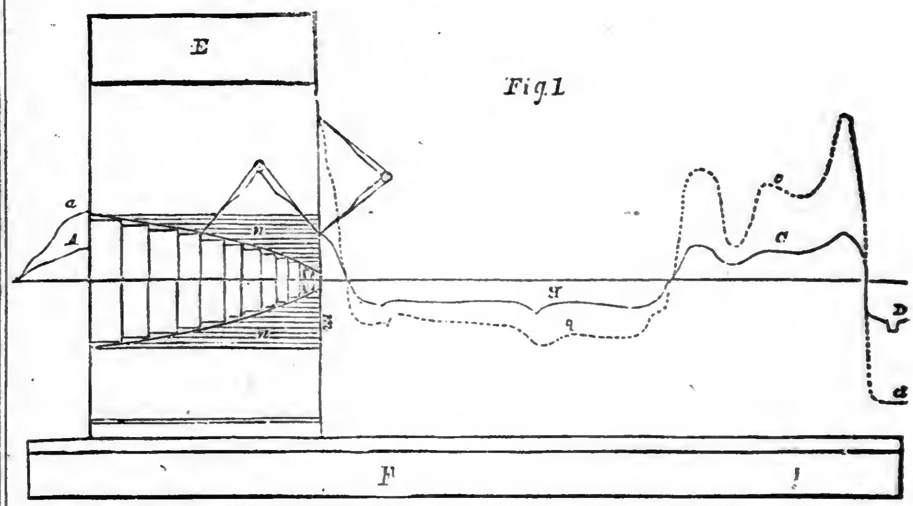
The prophetic ken of science is happily exhibited by Dr. Lardner, in his treatise on the Steam Engine. His far seeing genius seems to have anticipated the invention of which we are speaking. "Philosophy," said he, "already directs her finger at sources of inexhaustible power in the phenomena of electricity and magnetism, and many causes combine to justify the expectation that we are on the eve of mechanical discoveries stil greater than any which have yet appeared: and that the steam engine itself, with the gigantic powers conferred upon it by the immortal Waft, will dwindle into insignificance in comparison with the hidden powers of nature still to be revealed, and that the day will come when that machine, which is now extending the blessing of civilization to the most remote skirts of the globe, will cease to have existence except in the page of history."

From the integrity, perseverance, and mechanical skill of Ransom Cook, Esq., who has himself made an important invention in this engine, and has undertaken to bring the same into use, we anticipate a speedy introduction of its merits to the public. It is hoped that he may prove a second Livingston to another Fulton. He is about to depart for our large cities, in some of which he contemplates the erection of powers for mechanical purposes.

Several individuals, agents of Messrs. Davenport and Cook, are also departing with models to secure letters patent in the different countries in Europe and South America.

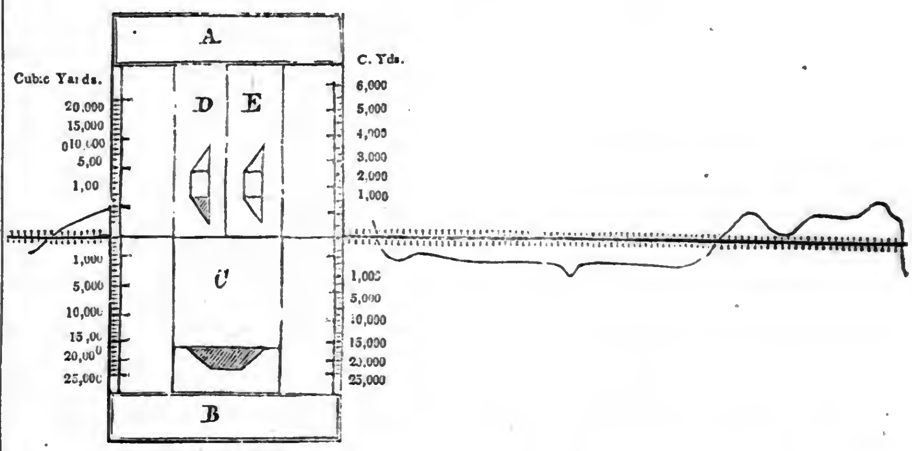
Plate 3.

Fig. 1



E, Vertical Scale 200 feet to 1 inch, Base 30 feet, Slope $1\frac{1}{2}$ to 1. F, Straight edge.

Fig. 2.

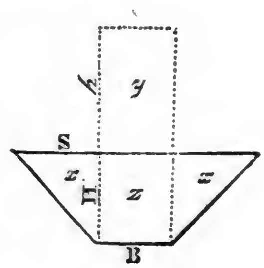


A, Vertical Scale 100 feet to 1 inch, Base 30 feet, Slope $1\frac{1}{2}$ to 1. B, Quantities given in cubic yards for lengths of 1 chain. C, Middle and Slopes together. D, Slopes without Middle. E, Middle without Slopes.

A METHOD OF REPRESENTING BY DIAGRAM AND ESTIMATING THE EARTHWORK IN EXCAVATIONS AND EMBANKMENTS. BY JOHN JAMES WATERSTON, A. INST. C. E.

The object of this paper is to describe the construction of two sets of scales, by the use of one of which a section may be plotted, representing the actual amount of material contained in any cutting or embankment, of the relation of which to each other a mere profile of the country, from not showing the contents of the side slopes, gives but an imperfect idea, even to professional men, particularly if the heights and depths be at all considerable, or if the slopes be not uniform; and by the other a computation of the quantities may be made, almost by the arithmetical process of addition only.

The principle on which the first operation is effected, is to accumulate the contents of the slopes x, x, into the rectangle y, over the middle part z in cutting, and under it in embanking, which is done by



the formula $h = \frac{r}{B} H^2$, wherein B denotes the base or width of the excavation or embankment, as the case may be, H its depth, r the ratio of the slope, or of S to H, and h the height of the rectangle y, substituted in lieu of the slopes x, x. From this theorem, the scale shown on the drawing (plate No. III, fig. 1.) is constructed, the heights H being marked on the vertical line m, and the supplemental heights h on the lines n, n, at right angles to it; and if a curve be drawn through the extremities of the latter lines, it will, as is evident from the equation, be a true parabola.

The scale thus constructed is used as follows. The axis being laid over the line of the railway, one leg of the dividers is placed at the point where the perpendicular line m is intersected by the surface of the ground, and the horizontal distance to the curve being taken in the compasses, is set off vertically over the point of intersection. The scale is then moved along, the axis coinciding with the surface of the railway,* which is easily done in practice by running it on a straight edge, as shown on the plan, and the operation is repeated until a sufficient number of offsets being obtained, the line of section *a b c d* is drawn through them, and may be considered supplemental to the actual section of the ground *A B C D*, the superficies included between them representing what is due to the *slopes*, and that between the latter and the line of the railway what is due to the *middle*, while the product of the whole area, multiplied by the base or width of roadway, gives the total cubical content of the cutting or embankment. But the scale to be described presently, is better adapted for reducing the quantities to *figures*, the above being intended more to exhibit to the *eye* the true amounts of excavation and embankment, which, it is conceived, may be useful, especially in parliamentary investigations, in which the engineering evidence so frequently turns on such points.

In applying the scale to the case of canals, the process will be the same as in the foregoing, which has been described as for railways and roads, except that the line of supplimentary profile, instead of being referred to the line denoting the surface of the banks, must be plotted from a parallel line drawn below it, at a distance equal to the transverse area of the water channel divided by the width or base at that surface; and, indeed, in the cuttings for railways this will also have to be done to an extent, to allow for the ballasting. And with respect to an objection that may be taken to the number of the proposed scales it will be necessary to possess, in consequence of every combination of *original* vertical scales with width of base requiring one of them peculiar to itself, I would remark that though no doubt this is the case,† of the formula $H'=H\sqrt{\frac{lr}{B}}$, in which H, r and B, are the name as in the text, l is the latus-rectum of the parabola, and H' the point in the new graduation to be substituted for H in the original division; and practically there is no very great variety in the scales commonly used by engineers and surveyors, or at all events the same individual generally adopts the same scales for the same purposes.

The scale shown on fig. 2 was suggested by my ingenious friend, Mr. Henry E. Scott, to whom it occurred as a modification of the above, which I had described to him. It is exceedingly simple, and the mode of using it almost self-evident. The ordinary section has only to be divided into equal lengths of say a chain, and the scale being applied to it at each point of division, with zero on the base line, the cubic quantity contained in that length on the given width and slopes is read off at the intersection with the surface of the ground; after which the content of the whole cutting or embankment is obtained by simply adding those figures together. The degree of accuracy that will be afforded must of course depend on the minuteness of the graduation, as all measurements with scales do; and if it appears impossible to go to *feet and inches* by this one, unless the section be very large, it should be borne in mind that the result given is final, and that (to say nothing of the liability to error in casting) any portion of inaccuracy that may be in it is not subject to increase by multiplication, which, if considered, may be found to affect to as great an extent quantities calculated from the *primary* dimensions.

The construction of the scale is derived from the easily investigated formula $H=\sqrt{\frac{B^2}{4r^2}+\frac{9A}{r}}-\frac{B}{2r}$, in which A is the transverse area in square yards, the other letters expressing the same elements as before; or if Q denote the cubic content in yards, the equation $H=\sqrt{\frac{B^2}{4r^2}+\frac{9Q}{22r}}-\frac{B}{2r}$ is adapted for calculating the quantities in lengths of a chain each. This will give the total content, but as, when estimates are in progress, the angle the ground will stand at may not have been precisely ascertained, and perhaps have to be corrected afterwards, it is sometimes desirable to keep the slopes separate for a time from the middle or rectangular part, in which

Q = number of cubic yards.	I. Middle and Slopes together. $H=\sqrt{\frac{B^2}{4r^2}+\frac{9Q}{22\,r}}-\frac{B}{2r}$				II. Middle without Slopes. $H=Q\,\frac{9}{22B}$	III. Slopes without Middle. $H=\sqrt{\frac{9Q}{22r}}$			
	r = ½	1	1½	2		r = ½	1	1½	2
	H Feet.	*H* Feet.	*H* Feet.	*H* Feet.	Feet.	*H* Feet.	*H* Feet.	*H* Feet.	*H* Feet.
250	3.2	3.1	3.0	2.8	3.4	14.3	10.1	8.2	7.1
500	6.2	5.7	5.4	4.8	6.8	20.2	14.3	11.6	10.1
750	9.0	8.1	7.5	6.8	10.2	24.8	17.5	14.3	12.4
1000	11.4	10.2	9.3	8.6	13.6	28.6	20.2	16.5	14.3
1500	16.1	13.9	12.5	11.5	20.4	35.0	24.8	20.2	17.5
2000	20.4	17.3	15.4	14.1	27.3	40.5	28.6	23.3	20.2
2500	24 3	20.3	18.0	16.3	34.1	45.2	32.0	26.1	22.7
3000	27.9	23.1	20.3	18.4	40.9	49.6	35.0	28.6	24.8
4000	34.6	28.1	24.5	22.1	54.5	57.2	40.5	33.0	28.6
5000	40.7	32.6	28.2	25.3	68.2	64.0	45.2	36.9	32.0
6000	46.2	36.8	31.7	28.3			49.6	40.4	35.0
7000	51,4	40.3	34.8	31.1			53.5	43.7	37.9
8000	56.3	44.1	37.8	33.6			57.2	46.7	40.5
9000	60.9	47.5	40.5	36.1			60.6	49.6	42.9
10,000	65.3	50.7	43.2	38.3			64.0	52.2	45.2
11,000		53.7	45.6	40.5				54.8	47.3
12,000		56.6	47.9	42.6				57.2	49.6
13,000		59.3	50.3	44.6				59·7	51.4
14,000		62.0	52.5	46.5				61.9	53.5
15,000		64.7	54.7	48.4				64.0	55.4
16,000			56.7	50.2					57.3
17,000			58.7	52.0					59.1
18,000			60.7	53.7					60.8
19,000			62.6	55.3					62.4
20,000			64.5	56.9					64.0
21,000				58.5					
22,000				60.1					
23,000				61.6					
24,000				63.0					
25,000				64.4					

* Strictly, the line m should be *vertical*, but, except where the heights and depths are great or the inclinations steep, the error from holding it perpendicular to the gradient is not of practical importance.

† If only the parabolic curve, and the tangential line m at its apex, be marked permanently on the scales, and the perpendiculars n, n, be traced on it as the occasion requires, one scale will be enough for every purpose, the division of the tangent m (by which, and the curve, the lines n, n are also determined) being effected by the use one point being thus gained, all the others of course follow by equidistances. When the latus-rectum is large, the parabola is more obtuse, and the lines n, n, better defined.

case the scale may be conveniently graduated on the one edge for the middle portion by $H = Q\frac{9}{22B}$, and on the other, for the slopes, by $H = \sqrt{\frac{9Q}{22r}}$ The above table has been constructed by way of specimen from these formulæ, and shows the heights which, measured on the scales, give the points corresponding with the cubic quantities in the first column, the length in all cases being taken as one chain, the width or base as thirty feet, and the slopes as stated; but the quantities for other lengths, widths, and slopes are, as I need hardly say, in the simple proportion of the variation in any one of the dimensions.

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University of Georgia, Athens, Geo., June 10, 1836

PHILADELPHIA STOCK MARKET.
April 7th

	Price of shares	Offered	Asked
RAILROAD STOCKS			
New-Castle and Frenchtown	25	29	29½
Do loan, 5½ per cent	100	99	101
Wilmington and Susquehanna	50	33	36
Camden and Amboy, shares,	100	131	131½
Do loan, 6's 1836	100	110	120
Danville and P. shares	50	25	35
Norristown, do	50	21	25
Do 6 per cent loan	100	119	120
Valley Railroad	7½	1	3
Westchester do	50	20	28
Minehill do	50	57	59
N. L. and Penn. Tp. do	40	34½	35
Philadelphia and Trenton do	100	121	123
West Philadelphia Railroad	50	20	30
Harrisburg and Lancaster	50	46	48
Cumberland	25	15	20
Beaver Meadow	50	57	57½
MISCELLANEOUS STOCKS			
North American Coal Company	25	12	14
Steam Bt. Sts. Columbien	100	18	22
Exchange Stock	100	70	80
Arcade	100	55	75
Theatres—Chestnut street	600	625	675
————Walnut street	280	175	220
————Arch street	500	325	375
Gas Company	100	95	100
CANAL STOCKS.			
Schuylkill Navigation, shares	50	154	156
Do loans, 5 1845	100	98	100
Do do 1855	100	100	101
Do do 5½ 1837	100	98	100
Lehigh Coal and Navigation	50	76	77
Do loan, 6 1838	100	97	98
Do do 6 1839	100	97	98
Do do 6 1844	100	99	100
Do do 5 1840	100	96	97½
Union Canal, shares	260	180	190
Do loan, 1836	100	83	86
Do do 1840	100	85	90
Chesap'k & Delaware Canal, shares	200	20	40
Do loan, 1837	100	60	67
Do do 1840	100	60	67
Delaware and Hudson,	100	69	69½
Do loan	100	95	100
Louisville and Portland	100	112½	117
Convertible 6 per cent. loans,	100	110	120
Sandy and Bever	100	60	80
Morris Canal	100	75	78

NEW-YORK AND ALBANY RAILROAD.

NOTICE.—The books will be open for subscribers to the capital stock of the New-York and Albany Railroad Company, on the 25th, 26th and 27th days of April, from 10 A. M. to 2 P. M. on each day, at the following places:

At the office of the New-York and Harlem Railroad, No. 18 Wall street, New-York.

At the Mechanics' and Farmers' Bank, Albany.

At the Farmers' Bank, Troy.

Also, at such places as the Commissioners, residing in the counties of Westchester, Putnam and Dutchess, may appoint at the times herein specified.

On Monday, 8th May,	in Eastchester,
Tuesday, the 9th,	in White Plains,
Wednesday, 10th,	in Bedford,
Thursday, 11th,	in New Castle,
Friday, 12th,	in South East,
Saturday, 13th,	in Paterson,
Monday, 15th,	in Rawlings,
Tuesday, 16th,	in Dover,
Wednesday, 17th,	on Dover Plains,
Thursday, 18th,	in Armenia.

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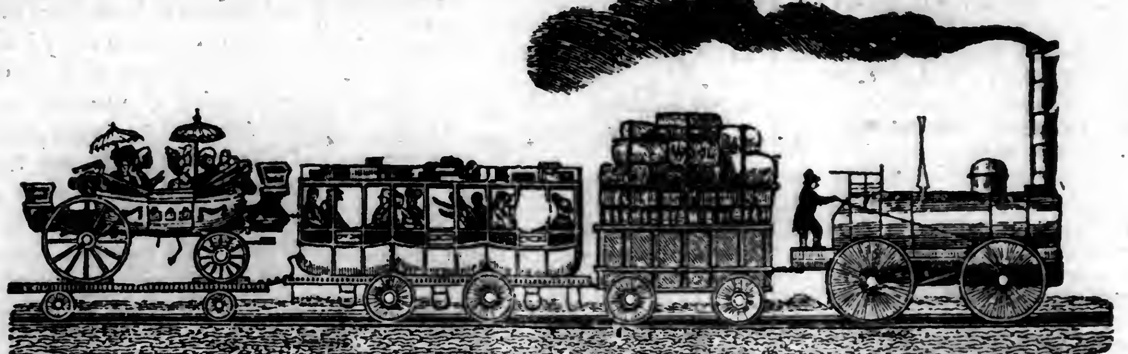
Jeremiah Anderson.

Shares $100 each, $5 to be paid at the time of subscribing. 14-3t

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its engravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribors *three dollars*, or *five dollars* for two copies—*always in advance.* The first number will be ready for delivery early in April—Subscriptions are solicited.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, APRIL 22, 1837. [VOLUME VI.—No. 16.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 22, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America.*

ENLARGEMENT OF THE ERIE CANAL.—The country on the Upper Lakes, whose trade is chiefly with the city of New-York, is but beginning to be settled, yet the Erie Canal is so crowded as to retard the progress of boats. The exports and imports of Michigan, for example, have probably more than doubled within the last eighteen months, and are still, in all human probability, less than one-third of what they will be three or four years hence. The same is true of the contiguous portions of Indiana, Illinois and Wisconsin. The commerce of the northern part of Ohio is still rapidly increasing, and and that of Western New York is far, very far from the ultimate limit of its expansion. By what means of conveyance is the produce of these immense regions to reach New-York, and how are the manufactures of the Eastern States and Europe to be brought to us? Have the great importing merchants of New-York reflected, that the consumption in this North Western country of the products of Europe, of Asia, of the West Indies, will give employment to twice their present amount of shipping? Through what channel are we to receive these products, and which of the Atlantic cities will supply us? It is very certain that New-York cannot without either enlarging the Erie Canal, or building another, or both.

Those who ask for the enlargement of the Erie Canal, do not ask the State of New-York to spend one cent in the accomplishment of that object. The tolls will pay the interest on the requisite loans, and in 20 years, create a sinking fund sufficient to pay the principal. Michigan and Wisconsin, Illinois and Indiana will pay all the expenses, in the tolls on our merchandise. The Legislature of New-York has but to *will* the accomplishment of the work, and it will go on without expense. Loans to any requisite amount can be made on the credit of the tolls—endorsed by the State—which endorsement would subject the State to no manner of risk. The commerce of an immense and wealthy region, and the inevitable course of events, are pledged to pay for the improvement.

When the Pittsburgh and Erie, and Pittsburgh and Cleaveland Railroads connecting us with Philadelphia and Baltimore, are completed, a considerable portion of our trade will be with those cities. Four years hence, the country of the Upper Lakes can trade, to the amount of a good many millions, with Baltimore and Philadelphia, and at the same time double its present business with New-York.

We are sceptical as to railroads being the best vehicles for the transportation of heavy produce—though they may do well, still, we believe, canals will do better. We therefore think that *if the Erie Canal is enlarged*, New-York will still have the advantage in the competition with Philadelphia and Baltimore, for the trade of the North West; otherwise, not.—[Detroit Jour. and Cour.]

At a meeting of the Stockholders of the Paterson and Hudson River Railroad Company, on the 30th March ult., the following persons were elected Directo s for the ensuing year:—James L. Morris, Ph. Dickerson. E. B. D. Ogden, Peter Crary, J. D. Beers, Wm. Carnes, Jr., John Colt.

E. B. D. Ogden having declined a reelection as President, James L. Morris was elected President of the Company; E. B. D. Ogden, Treasurer, and A. S. Pennington, Secretary.—[Paterson Intel.]

The Legislature of Michigan adjourned on the 21st inst. Among the most important acts passed are the following:

The General Banking Law.

An act to provide for the appointment of a board of Commissioners of Internal improvement.

An act to authorise the cons'ruction of certain works of Internal Improvement.

An act authorising a loan of five million dollars for the construction of works of Internal Improvement.

The act for the organizat on and support of Primary Schools.

The act to organize the University of the State of Michigan.

The act providing for a geological Survey.—[Buffalo Daily Com. Adv.]

We find the following, among other toasts, which were drank at the late celebration of St. Patrick's Day, at Pittsburgh:

By H. H. Van Amringe.—Education. The great Railroad of *internal* improvement; may the main line and the branches be extended and continued, until it pervades all the ends of the earth, and brings the Nations as one Family, to the great Author and universal Centre of truth, liberty, peace and happiness.

Seizure of a Railway.—Yesterday, at 2 o'clock, Mr. Macintosh, the contractor for this and many other public works, who claims a large sum as due to him from the London and Greenwich Railway Company, for the excavations and buildings executed by him thereon, took possession, by virtue of an execution, of the whole work, from London-bridge to Deptford, including the buildings, iron-rails, and steam-carriages, with every fixture, moveable, and other appurtenance. The clerks, money-takers, gate-heepers, engineers, conductors, constables, and other officers belonging to the establishment, were not a little astonished when they were informed by the officers of the sheriff that "their occupation was gone." Remonstrance, however, was vain; their respective departments were speedily filled up by persons in the employ of the new possessor. The claim of Mr. Macintosh is reported to amount to £300,000.—[London Post.]

Experiment on the Lowell Railroad.—The Boston Post states that on Saturday, March 25th, an experiment was tried on the Boston and Lowell Railroad, with a new engine built at Lowell, for the Stonington road. The weight of the engine is about 10 tons.

A train of 49 burden cars was drawn from Boston, to the turnout in Woburn, a distance of 10 miles, in 51½ minutes. The load exclusive of engine was as follows:—

25	cars—373 bales pressed cotton and wool,	177,364 lbs.
195	" groceries, &c.	26,142
19	" coal—6,000 lbs.	114,000
49	cars weighing	191,000
	Tender to locomotive	14,400
		522,906 lbs.

or 261 tons.

The load, which occupied a length of 820 feet, was started on the bridge at Boston without assistance, was taken up planes of 10 feet to a mile, and stopped and started again on a plane of that inclination.

On the 18th of January, the small engine 'Patrick' of nine tons weight, also built at Lowell, took a load of 35 cars, weighing in all 201 tons in 2 hours 14 minutes, from Boston to Lowell, 26 miles.

In both cases the experiment was made without any previous preparation, the engines, cars and rails, being in their usual working state.

Among recent scientific works, few have attracted so much attention, as Buckland's Bridgewater Treatise on Geology. Whether for the originality and forcible nature of the reasoning for the clear and neat diction, or for the elegant manner in which the work is published.

An edition has already appeared in this country, and from the fame of Prof. Buckland as a geologist, there is no doubt as to the rapid sale of the successive editions in this country and in Europe.

We have extracted the very clear and distinct description of the operation of Artesian Wells, for the benefit of our readers.

ARTESIAN WELLS.

FROM BUCKLAND'S BRIDGEWATER TREATISE—GEOLOGY AND MINERALOGY.

The name of Artesian Wells is applied to perpetually flowing artificial fountains, obtained by boring a small hole, through strata that are destitute of waters, into lower strata loaded with subterraneous sheets of this important fluid, which ascends by hydrostatic pressure, through pipes let down to conduct it to the surface. The is name derived from Artois (the ancient Artesium) where the practice of making such wells has for a long time extensively prevailed.*

Artesian Wells are most available, and of the greatest use, in low and level districts where water cannot be obtained from superficial springs, or by ordinary wells of moderato depth. Fountains of this kind are known by the name of *Blow Wells*, on the eastern coast of Lincolnshire, in the low district covered by clay, between the Wolds of Chalk near Louth, and the sea shore. These districts were without any springs, until it was discovered that by boring through this clay to the subjacent chalk, a fountain might be obtained, which would flow incessantly to the height of several feet above the surface.

In the Kings well at Sheerness, sunk in 1781 through the London clay, into sandy strata of the Plastic clay formation, to the depth of 330 feet, the water rushed up violently from the bottom, and rose within eight feet of the surface. (Phil. Trans. 1784.) In the years 1828 and 1829 two more perfect Artesian Wells were sunk nearly to the same depth in the dock yards at Portsmouth and Gosport.

Wells of this kind have now become frequent in the neighborhood of London, where perpetual Fountains are in some places obtained by deep perforations through the London clay, into porous beds of the Plastic clay formation, or into the Chalk.*

Important treatises upon the subject of Artesian Wells have lately been published by M. Hericart de Thury and M. Arago in France, and by M. Von Bruckmann in Germany. It appears that there are extensive districts in various parts of Europe, where, under certain conditions of geological structure, and at certain levels, artificial fountains will rise to the surface of strata which throw

* In common cases of Artesian Wells, where a single pipe alone is used, if the boring penetrates a bed containing impure water; it is continued deeper until it arrives at another stratum containing pure water; the bottom of the pipe being plunged into this pure water, it ascends within it, and is conducted to the surface through whatever impurities may exist in the superior strata. The impure water, through which the boring may pass in its descent, being excluded by the pipe from mixing with the pure water ascending from below.

* One of the first Artesian Wells near London was that of Morland House on the north-west of Holland House, made in 1794, and descrbed in Phil. Trans London 1797. The water of this well was derived from sandy strata of the plastic clay formation, but so much obstruction by sand attends the admission of water to the pipes from this formation, that it is now generally found more convenient to pass lower through these sandy strata, and obtain water from the subjacent Chalk. Examples of wells that rise to the surface of the lowest tract of land on the West of London may be seen in the artesian fountain in front of the Episcopal palace at Fulham, and in the garden of the Horticultural Society. Many such fountains have been made in the town of Brentford, from which the water rises to the height of a few feet above the surface.

This height is found to diminish as the number of perpetually flowing fountains increases; and a general application of them would discharge the subjacent water so much more rapidly than it arrives through the interstices of the chalk, that fountains of this kind when numerous would cease to overflow, although the water within them would rise and maintain its level nearly at the surface of the land.

out no natural springs, and will afford abundant supplies of water for agricultural and domestic purposes, and sometimes even for moving machinery. The quantity of water thus obtained in Artois is often sufficient to turn the wheels of corn mills.

In the Tertiary basin of Perpignan and the Chalk of Tours, there are almost subterranean rivers having enormous upward pressure. The water of our Artesian Well in Roussillon, rises from 30 to 50 feet above the surface at Perpignan and Tours. M. Arago states that the water rushes up with so much force, that a Cannon Ball placed in the pipe of an Artesian Well is violently ejected by the ascending stream.

In some places application has been made to economical purposes, of the higher temperature of the water rising from great depths. In Wurtemburg Von Bruckmann has applied the warm water of Artesian Wells to heat a paper manufactory at Heilbrown, and to prevent the freezing of common water around his mill wheels. The same practice is also adopted in Alsace, and at Constadt near the Stutgardt. It has even been proposed to apply the heat of ascending springs to the warming of green houses. Artesian Wells have long been used in Italy, in the duchy of Modena; they have also been successfully applied in Holland, China,* and North America—By means of similar Wells, it is probable that water may be raised to the surface of many parts of the sandy deserts of Africa and Asia, and it has been in contemplation to construct a series of these Wells along the main road which crosses the Isthmus of Suez.

I felt it important thus to enter into the theory of Artesian Wells, because their more frequent adoption will add to the facilities of supplying fresh water in many regions of the earth, particularly in low and level districts, where this prime necessary of life is inaccessible by any other means; and because the theory of their mode of operation explain one of the most important and most common contrivances in the subterraneous economy of the Globe, for the production of natural springs.

* An economical and easy mode of sinking Artesian Wells and boring for coal, &c. has recently been practised near Saarbirch, by M. Sellow. Instead of the tardy and costly process of boring with a number of iron rods screwed to each other, one heavy bar of cast iron about six feet long and four inches in diameter, armed at its lower end with a cutting chisel, and surrounded by a hollow chamber, to receive through valves, and bring up the chips of the perforated stratum, is suspended from the end of a strong rope, which passes over a wheel or pully fixed above the spot in which the hole is made. As the rope is raised up and down over the wheel its action gives to the bar of iron, a circular motion, sufficient to vary the place of the cutting chisel at each descent.

When the chamber is full, the whole apparatus is raised quickly to the surface to be unloaded, and is again let down by the action of the same wheel. This process has been long practised in China, from whence the report of its use has been brought to Europe. The Chinese are said to have bored in this manner to the depth of 1000 feet—M. Sellow has with this instrument lately made perforation 18 inches in diameter and several hundred feet deep, for the purpose of ventilating coal mines at Saarbirch. The general substitution of this method for the costly process of boring with rods of iron, may be of much public importance, especially when water can only be obtained from great depths.

Mode of supporting the Poor in Belgium.—Viscount Vilain XIII, who has been long appointed Minister at Rome, has resigned his office as Governor of East Flanders. Before quitting Ghent, Viscount Vilain addressed a circular to the different functionaries under his government, in which are some interesting details relating to the operations of the charitable workshops (*atteliers de charite*), established in different parts of Flanders. He states that the number of these institutions amounts to forty-three; that the total prime cost of material and salary paid to the poor amounts to 176,378 francs, and the same of manufactured articles to 162,583 francs, leaving a loss upon the whole of only 13,804 francs. Thus, at the expense of 13,804 francs, provision and employment have been given to 2265 poor people during the whole of the winter and part of the spring; and thus, at the trifling expense of six francs per person, forty-three parishes have been rescued from the evils of mendicity, and a large body of poor creatures, who must otherwise have begged or starved, have been actively and usefully employed, and have had the means of supporting their families without other parochial relief. The letter adds, that the average loss of six francs only arises from defective administration in some of the parishes, since it results that, in twenty-five out of forty-three, the loss has not exceeded two francs, and indeed in some of these has not been more than eighty centimes per person. In seven parishes the receipts nearly balance the expense, so that the poor have cost little or nothing; and in four parishes the returns have exceeded the expense, so as to leave a balance in the hands of the directors after supporting all the poor. These are remarkable results, and are well worthy the attention of the philanthropists in England and Ireland; for what can be more praiseworthy, more advantageous or honorable to the community, than the establishment of institutions by which pauperism, idleness, and immorality are neutralized without expense, and by which a number of persons who would be otherwise thrown upon the public workhouse, or become burdens to the parish, are actively employed, and encouraged in habits of industry and economy? Viscount Vilain earnestly recommends the establishment of similar worshops throughout the whole country. Were he able to effect his benevolent object, he would obtain one of the most important and most beneficial results ever effected in a civilized nation; and Belgium would present the phenomenon of a whole population purged, as it were, of idleness and pauperism. Whilst upon the subject, it may be observed, according to official statistical documents, published by order of the minister of the interior, that the total gross amount of the revenue of hospitals, charitable establishments, and of the divers sums expended upon the poor, amounted, in 1833, to 11,647,000 francs, or about 285 francs per individual. The number of the poor in the provincial workhouses has been reduced from 3454 in 1827, to 2662 in 1833, a remarkable diminution, seeing that the population has increased in an inverse ratio, having augmented from 3,800,000 in 1827, to 4,061,000 in 1833. The same document states, that the total number of persons receiving instruction at the various colleges, schools, and places of education of all denominations, amounted altogether to 353,342 in 1826, whereas in 1833 the number of children attending the 5229 primary schools alone exceeded 370,000. If the progress of education had been great, the diminution of immorality is not less striking, for one finds the number of foundlings (*enfans trouves*) to have amounted to 11,023 in 1823, whilst in 1833 they did not exceed 7997. This is not a place to develope subjects of this kind, but the above examples will suffice to show, that Belgium is making considerable progress in those branches of administration and general morality which are the most essential to the well-being of a nation. It must not be omitted to state, that the tables in question give the population to the 1st of January 1835 at 4,165,953 souls; the superfices of the soil at 3,420,570 hectares (each 2½ acres,) of which 381,470 hectares, or about one-tenth, are uncultivated, not including more than 100,000 hectares or 1–34th of roads and canals. In France, the uncultivated land, out of a superfices of 52,570,000 hectares, amounts to 9,000,000, or one-sixth; and the roads, canals, streets, &c. to 1,216,746, or one-fifth; both of which show a remarkable balance in favor of Belgium.—

Algerine Mortar.—The mortar used by the ancients in their buildings has always been highly praised as much superior to that of the moderns. Pananti, a recent Italian writer on Algiers, paid a good deal of attention to the subject when residing in Africa, supposing it probable, from the well-known stationary character of Oriental habits, that the ancient method of preparing it might be preserved there, though lost in Europe. He informs us, that the mortar used at Algiers is made of two parts wood-ashes, three parts lime, and one part sand—to this composition they give the name *Tabbi*. After mixing these ingredients together, they throw in a quantity of *oil*, and beat the whole together for three days and nights without intermission, by which time it has attained the proper consistence. After being used in building, it becomes harder than marble, is impermeable to water, and resists the operation of Time and the elements.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

TABLE IV.—THE VELOCITY (23 *Experiments*).

A No. of Experiment.	B Boat's name.	C Instant of passing the stake.	D Stakes 110 yards apart.	E Time of passing the stake-interval.	F Miles per hour.	G Tractive power in lbs.	H Feet per second.	I Kind of tractive power.	J Load.	K Wind.	L Draught. Bow.	M Draught. St'n	N Position of Wave.	O Variation in Level.	P REMARKS. PLACE OF EXPERIMENT, FORTH AND CLYDE CANAL.
		m. s.		sec.	miles.	lbs.	feet.								
157	VELOCITY.	14 16 14 36 14 55½ 15 15 15 35½	b c d e f	20 19½ 19½ 20½	11·25 11·54 11·54 10·97	407·8 396·7 382·3 375·1	16·50 16·92 16·92 16·09	Two Horses.	7 passengers, = c. q. lb. 9 2 1	not obs.	in. 11	in. 8	not obs.	dur. run. bow elev. 43	Weight of VELOCITY, when empty, 3 ton. 15 cwt. 2 qr. 9 lb.
158	VELOCITY.	29 38 30 04 30 29 30 53 31 19½	b c d e f	26 25 24 26½	8·65 9·00 9·38 8·49	283·0 267·2 259·6 261·4	12·69 13·20 13·75 12·45	do.	do.	do.	do.	do.	do.	do. do. elev. 29	
159	VELOCITY.	59 13 59 31½ 59 51 11 29½	b c d e f	18½ 19½ 20 18½	12·16 11·54 11·25 12·16	440 5 415·2 383·4 382·4	17·84 16·92 16·50 17·84	do.	do.	do.	do.	do.	do.	do. do. elev. 86	
160	VELOCITY.	25 40 26 06 26 31½ 26 55 27 21	b c d e f	26 25½ 23½ 26	8·65 8·82 9·57 8·65	314·1 327·0 360 6 347·2	12·69 12·94 14·04 12·69	do.	7 passengers, and 1 ton, = c. q. lb. 29 2 1	do.	11	11	do.	at rest bow dep 11' dur. run. elev. 33'	
161	VELOCITY.	35 21½ 35 41 36 01 36 21 36 41½	b c d e f	19½ 20 20 20½	11·54 11·25 11·25 10·97	467·7 444·7 426·7 423·8	16.92 16·50 16·50 16·09	do.	do.	do.	do.	do.	do.	do. do. elev. 43'	
162	VELOCITY.	44 56 45 51 46 46 47 44½ 48 43	b c d e f	55 55 58½ 58½	4·09 4·09 3·84 3·84	47·0 42·1 38·4 37·5	6·00 6·00 5·64 5·64	do.	do.	very light	do.	do.	do.	do. do. level	
163	VELOCITY.	21 12½ 21 33½ 21 55 22 17 22 38	b c d e f	21 21½ 22 21	10·71 10·47 10·23 10·71	474·6 442·4 425·4 429·0	15·71 15·35 15·00 15 71	do.	7 passengers, and 2 tons = c. q. lb. 49 2 1	do.	12¼	12¼	do.	do. do. elev. 30'	
164	VELOCITY.	32 43 33 10 33 36½ 34 03½ 34 30	b c d e f	27 26½ 27 26½	8·33 8·49 8·33 8·49	362·6 358·4 381·0 386·7	12.22 12·45 12.22 12·45	do.	do.	do.	do.	do.	do.	do. do. elev. 43'	
165	VELOCITY.	43 54 44 44 45 37 46 30 47 22½	b c d e f	50 53 53 52½	4·50 4·25 4·25 4·29	63·2 57·3 51·5 55·5	6·60 6·23 6·23 6·29	do.	do.	do.	do.	do.	do.	do. do. level.	
166	VELOCITY.	18 22 18 46 19 09 19 31½ 19 54	b c d e f	24 23 22½ 22½	9·38 9 7 8 10·00 10.00	484·5 467·3 451·0 424·5	13·75 14·35 14·67 14·67	Two Horses.	7 passengers, and 3 ton, = c. q. lb. 69 2 1	very light	in. 13½	in. 13½	not. obs.	dur. run. bow elev. 36'	

TABLE IV. CONTINUED.—THE VELOCITY.

167	VELOCITY.	28 08 28 36 29 03½ 29 32 30 00½	b c d e f	28 27½ 28½ 28½	8·03 8·18 7·90 7·90	386·0 376·7 387·8 412·0	11·79 12·00 11·58 11·58	do.	do.	do.	do.	do.	do.	do. do. elev. 40′	
168	VELOCITY.	39 17 40 11½ 40 05½ 41 00 41 54	b c d e f	54½ 54 54½ 54	4·13 4·17 4·13 4·17	53·4 50·4 57·6 54·3	6·06 6·11 6·06 6·11	do.	do.	do.	do.	do.	do.	do. do. level	
169	VELOCITY.	6 29 6 52 7 14½ 7 37 8 58	b c d e f	23 22½ 22½ 21	9·78 10·00 10·00 10·71	462·8 455·0 447.5 438·2	14·35 14·67 14·67 15·71	do.	do.	do.	17½	10	do.	at rest. bow dep. 45′ dur. run. elev. 52′	Weight shifted forward.
170	VELOCITY.	25 55 26 21 26 47 27 13 27 41	b c d e f	26 26 26 28	8·65 8·65 8·65 8·03	432·6 419·3 424·3 436·2	12·69 12·69 12·69 11·79	do.	do.	none	15½	12	do.	dur. run. bow elev. 52	do.
171	VELOCITY.	35 42½ 36 06 36 28 36 50 37 12½	b c d e f	23½ 22 22 22½	9·57 10·23 10·23 10·00	488 471·2 423·6	14·04 15·00 15·00 14·67	do.	do.	do.	do.	do.	do.	do. do. elev. 29	
172	VELOCITY.	1 32 1 55½ 2 19 2 41½ 3 40	b c d e f	23½ 23½ 22½ 22½	9·57 9·57 10·00 10·00	482·5 461·5 447·3 440·7	14·04 14·04 14·67 14·67	do.	do.	do.	16½	11⅝	do.	do. do. elev. 24′	Weight shifted aft.
173	VELOCITY.	30 23½ 30 48 31 12 31 38 32 07	b c d e f	24½ 24 26 29	9·18 9·38 8·65 7·76	504·5 489·2 481·3 485·7	13·47 13·75 12·69 12·38	do.	7 passengers, and 4½ ton, = c. q. lb. 94 2 1	do.	do.	15½	15½	do. do. elev. 54′	Heavy swell.
174	VELOCITY.	41 31 42 26 43 20 44 15 45 14	b c d e f	55 54 55 59	4·09 4·17 4·09 3·81	51·3 53·2 55 8 46·1	6·00 6·11 6·00 5·59	do.	do.	do.	do.	do.	do.	do. do. level	
175	VELOCITY.	54 16½ 54 44 55 12 55 42 56 12	b c d e f	27½ 28½ 29½ 30	8·18 7·90 7·59 7·50	450·5 443·0 450·0 449·0	12·00 11·58 11·19 11·00	Two Horses.	7 passengers, and 4¼ ton, = c. q. lb. 94 2 1	none	watr. in. 15½	watr. in. 15½	not obs.	dur. run. bow elev. 45′	
176	VELOCITY.	15 15 15 40 16 08 16 26 17 06	b c d e f	25 28 28 30	9·00 8·03 8·03 7·50	484·8 491·7 491·3 487·4	13·20 11·79 11·79 11·00	do.	do.	do.	20½	10		at rest, dep. 45′	Little Swell. Weight shifted forward.
177	VELOGITY.	6 10½ 6 35 7 00 7 27 7 54	b c d e f	24½ 25 27 27	9·18 9·00 8·33 8·33	500·4 505·6 506·0 522·0	13·47 13·20 12·69 12·22	do.	do.	do.	do.	do.	not obs.	at rest dep. 45 dur. run. bow elev.	
178	VELOCITY.	22 49 23 14 23 39 24 05 24 32	b c d e f	25 25 26 27	9·00 9·00 8·65 8·33	489·5 492·8 504·2 512·1	13·20 13·20 12·69 12·22	do.	do.	do.	18	13	do.	do. do. bow elev. 52′	Weight shifted aft.
179	VELOCITY.	40 56 41 20 41 45 42 11½ 42 38½	b c d e f	26 25 26½ 27	8·65 9·00 8·49 8·33	489·2 502·0 460·0 509·0	12·69 13·20 12·45 12·22	do.	do.	do.	12¾	18	do.		do.

TABLE V.—THE EAGLE (28 *Experiments.*)

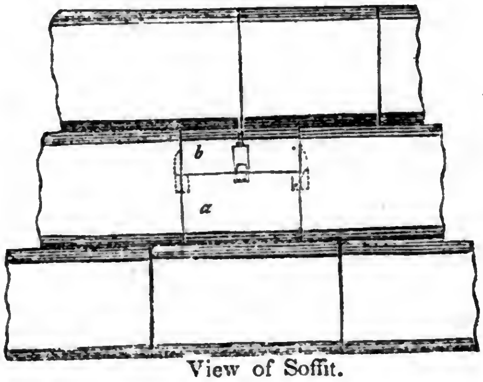
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's Name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing the Stake-interval.	Miles per Hour.	Tractive Power in lbs.	Feet per Second.	Kind of Tractive Power.	Load.	Wind.	Draught. Bow	Draught. St'rn	Position of Wave.	Variation in Level.	REMARKS. PLACE OF EXPERIMENT. FORTH AND CLYDE CANAL.
		m. s.		sec.	miles.	lbs.	feet.								
180	EAGLE.	10 10	*b*	21	10·71	381·6	15·71	Two Horses.	7 passengers. = *c. q lb.* 9 2 1	none	watr. in. 18 from mrk.	watr. in. 18 from mrk.	not obs.	dur. run. bow elev. 13′	Weight of EAGLE, 3 ton. 14 cwt. 0qr. 15lb. Towing-line fixed 15¼ft. from bow. The lines of draught not being marked on this boat; the boats were therefore taken from two marks placed above the water at stem and stern.
		10 31	*c*	18	12·50	335·5	18·33								
		10 49	*d*	19½	11·54	415·6	16·92								
		11 08½	*e*	20	11·25	400·0	16·50								
		11 28½	*f*												
181	EAGLE.	22 51	*b*	25½	8·82	292·1	12·94	do.	do.	do.	do.	do.	do.	do. do. elev. 15′	
		23 16½	*c*	24	9·38	295·4	13·75								
		23 40½	*d*	25	9·00	303·0	13·20								
		24 05	*e*	24	9·38	300·8	13·75								
		24 29	*f*												
182	EAGLE.	34 15½	*b*	54½	4·13	63·6	6·06	do.	do.	do.	do.	do.	do.	do. do. level	
		35 10	*c*	55	4·09	57·5	6·00								
		36 05	*d*	54½	4·13	59·7	6·06								
		36 59½	*e*	54½	4·13	55·9	6·06								
		37 54	*f*												
183	EAGLE.	48 59	*b*	23½	9·57	336·3	14·04	do.	do.	do.	do.	do.	do.	do. do. elev. 10′	
		49 22½	*c*	21½	10·47	322·8	15 35								
		49 44	*d*	23½	9·57	310·4	14·04								
		50 07½	*e*	23½	9·57	289·3	14·04								
		50 31	*f*												
184	EAGLE.	14 00½	*b*	20½	10.97	418·8	16·09	do.	7 passengers, and 1 ton, = *c. q. lb.* 29 2 1	do.	16⅛ from mrk.	16⅛ from mrk.	do.	do. do. elev. 16′	
		14 21	*c*	19½	11.54	417·1	16·92								
		14 40½	*d*	19½	11.54	407·0	16·92								
		15 00	*e*	20½	10.97	395·2	16·09								
		15 20½	*f*												
185	EAGLE.	24 56½	*b*	21½	10·47	334·6	15·35	Two Horses.	do.	do.	do.	do.	do.	do. do. elev. 16′	
		25 21	*c*	25	9·00	322·8	13·20								
		25 46	*d*	25	9·00	316·4	13·20								
		26 11	*e*	26	8·65	300·6	12·69								
		26 37	*f*												
186	EAGLE.	36 02	*b*	52	4·33	69·8	6·23	do.	do.	do.	do.	do.	do.	do. do. level	
		36 54	*c*	52	4·33	60·4	6·35								
		37 34	*d*	53½	4·21	55·2	6·17								
		38 39½	*e*	53½	4·21	59·4	6·17								
		39 33	*f*												
187	EAGLE.	2 16	*b*	21	10·71	404·3	15·71	do.	do.	do.	14 from mrk.	17½ from mrk.	do.	do. do. elev. 1′	Weight shifted forward.
		2 37	*c*	20	11·25	416·6	16·50								
		2 57	*d*	20½	10 97	395·5	16·09								
		3 17½	*e*	21½	10·47	378·3	15·35								
		3 38	*f*												
188	EAGLE.	21 34	*b*	22	10·23	396·2	15·00	do.	do.	do.	17¼ from mrk.	14⅛ from mrk.	do.	do. do. elev. 38′	do. aft. Little swell.
		21 56	*c*	19½	11·54	404·1	16·92								
		22 15½	*d*	20	11·25	375·2	16·50								
		23 35½	*e*	21	10·71	369·5	15·71								
		23 56½	*f*												
189	EAGLE.	50 50	*b*	22	10·23	415·8	15.00	Two Horses.	7 passengers, and 2 tons, = *c. q. lb.* 49 2 1	none	watr. in. 14½ from mrk.	watr. in. 14½ from mrk.		dur. run. bow elev. 2′	Very little swell.
		51 12	*c*	20	11·25	425·8	16·50								
		51 32	*d*	21	10·71	414·5	15·71								
		51 53	*e*	21½	10·47	402·0	15·35								
		52 14½	*f*												
190	EAGLE.	2 45	*b*	26	8·65	363·0	12 69	do.	do.	do.	do.	do.	near bow	do. do. elev. 16′	
		3 11	*c*	25	6·00	354·5	13·20								
		3 36	*d*	25	9·00	336·5	13·20								
		4 01	*e*	26	8·65	341·8	12·69								
		4 27	*f*												
191	EAGLE.	18 07	*b*	39½	5·69	122·1	8·35	do.	do.	do.	do.	do.	not obs.	do. do. level.	
		17 46½	*c*	38½	5·84	119·8	8·57								
		19 25	*d*	41	5·49	105·1	8·05								
		20 06	*e*	40½	5·56	102·2	8·15								
		20 46⅓	*f*												
192	EAGLE.	42 38	*b*	22½	10·00	404·2	14·67	do.	do.	do.	14¼ from mrk.	16⅛ from mrk.		at rest bow dep. durin. run. elev. 15′	Weight shifted forward.
		43 00½	*c*	21	10·71	404 2	15·71								
		43 21½	*d*	21	10·71	374·0	15·71								
		43 42	*e*	22	10·23	367·1	15·00								
		44 04	*f*												

TABLE V. CONTINUED.—THE EAGLE (28 *Experiments*).

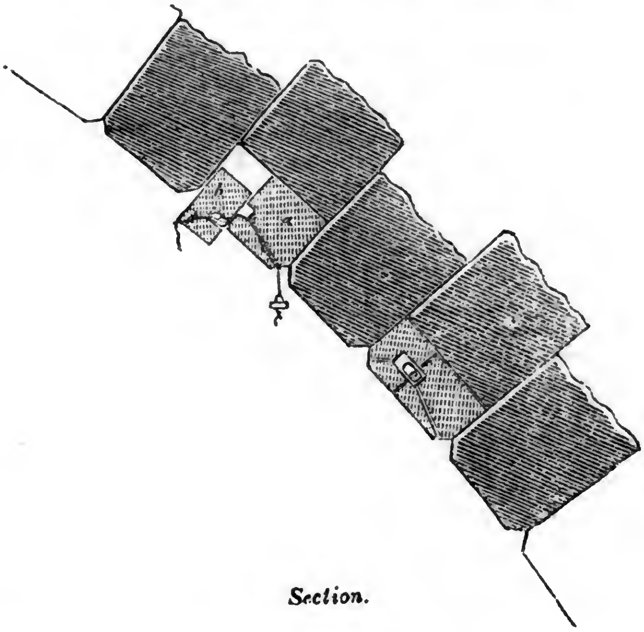
193	EAGLE.	22 05 22 27 22 49 23 10½ 23 32	*b* *c* *d* *e* *f*	22 22 21½ 21½	10·23 10·23 10·47 10·47	419·7 400·0 421·8 388·0	15·00 15·00 15·35 15·35	do.	do.	do.	16⅜ from mrk.	13⅛ from mrk.	do.	at rest bow elev. 15' durin. run. 30'	do. aft.
194	EAGLE.	51 28 51 50½ 52 13 52 35 52 56	*b* *c* *d* *e* *f*	22½ 22½ 22 21	10·00 10 00 10·23 10·71	426·4 417·8 416·7 399·7	14·67 14·67 15·00 15·71	do.	7 passengers, and 3 ton, = *c. q. lb.* 69 2 1	do.	13⅝ from mrk.	13⅝ from mrk.	20 ft. from the bow.	do. do. elev. 14'	
195	EAGLE.	8 31½ 8 57 9 22½ 9 48½ 10 16	*b* *c* *d* *e* *f*	25½ 25½ 26 27½	8·82 8·82 8·65 8·18	363·1 357·4 372·4 372·0	12·94 12·94 12·69 12·00	do.	do.	do.	do.	do.	10 ft. from the bow.	do. do. elev. 23'	
196	EAGLE.	24 15 24 54 25 32½ 26 12 26 51	*b* *c* *d* *e* *f*	39 38½ 39½ 39	5·78 5·84 5·69 5·78	133·3 127·5 121·0 113·5	8·46 8·57 8·35 8·46	do.	do.	do.	do.	do.	none	do. do. level.	
197	EAGLE.	50 31 50 54½ 51 16½ 51 38½ 52 00	*b* *c* *d* *e* *f*	23½ 22 22 21	9·57 10·23 10·23 10·47	414·1 423·5 418·0 391·6	14·04 15·00 15·00 15·35	do.	do.	do.	12⅛ from mrk.	15⅛ from mrk.	not. obs.	at rest. bow ded. 15 during. run. elev. 15	Weight shifted forward.
198	EAGLE.	12 57 13 21 13 44 14 06 14 27½	*b* *c* *d* *e* *f*	24 23 22 21½	9·38 9·78 10·23 10·47	415·7 411·7 413·0 400·8	13·75 14·35 15·00 15·35	Two Horses.	7 passengers, and 3 ton, = *c. q. lb.* 69 2 1	none	watr. in. 15¼ from mrk.	watr. in. 12¼ from mrk.	do.	not. obs.	Weight shifted aft.
199	EAGLE.	36 59 37 23 37 45½ 38 09½ 38 32	*b* *c* *d* *e* *f*	24 22½ 24 23	9·38 10·00 9·38 9·78	441·5 446·1 423·5 424·5	13·75 14·67 13·75 14·35	do.	7 passengers, and 4¼ ton = *c. q. lb.* 94 2 1	do.	12½ from mrk.	12½ from mrk.	35ft. from the bow.	dur. run. bow elev. 21'	Towing-line at 15ft. from bow
200	EAGLE.	50 01½ 50 27½ 50 54 51 21 51 49	*b* *c* *d* *e* *f*	26 27 27 28	8·65 8·33 8·33 8·03	452·6 385·7 406·8 413·0	12·69 12·22 12·22 11·79	do.	do.	do.	do.	do.	15ft. from the bow.	do. do. elev. 23'	
201	EAGLE.	1 40 2 17½ 2 54 3 29½ 4 06	*b* *c* *d* *e* *f*	37½ 36½ 35½ 36	6·00 6·16 6·34 6·16	170·5 151·4 147·4 150·5	8·80 9·04 9·30 9·04	do.	do.	do.	do.	do.	not. obs.	do. do. level.	
202	EAGLE.	20 23 20 47 21 12½ 21 36 22 21½	*b* *c* *d* *e* *f*	24 25½ 23½ 25½	9·38 8·82 9·57 8·82	422·8 413·3 439·3 427·3	13·75 12·94 14·04 12·94	do.	do.	do.	10¾ from mrk.	14 from mrk.	15ft. from the bow.	do. do. elev. 27'	Weight shifted forward.
203	EAGLE.	36 39½ 37 05 37 29 37 53 38 18½	*b* *c* *d* *e* *f*	26½ 24 24 25½	8·49 9·38 9·38 8·82	429·4 439·0 442·8 432·3	12·45 13·75 13·75 12·94	do.	do.	do.	14 from mrk.	11 from mrk.	not obs.	do. do elev. 37'	do. aft.
204	EAGLE.	5 25 5 47 6 09 6 31 6 53	*b* *c* *d* *e* *f*	22 22 22 22	10·23 10·23 10·23 10·23	438·4 419·7 400·0 372·4	15·00 15·00 15·00 15·00	do.	7 passengers, and 2 .13ct= *c. q. lb.* 62 2 1	do.	14¼ from mrk.	14¼ from mrk.	do.	do. do. elev. 17'	2 ton. 13cwt. made the EAGLE, and 7 passengers, nearly equal to ZEPHYR, with 4 ton. 4cwt. 2 qr. and 7 passengers.
205	EAGLE.	22 53 23 20 23 46 24 12 24 39	*b* *c* *d* *e* *f*	27 26 26 27	8 33 8·65 8·65 8·33	357·5 351·0 367·6 375·2	12·22 12·69 12·69 12·22	do.	do.	do.	do.	do.	do.	do. do. elev. 17'	
206	EAGLE.	39 53½ 40 17 40 40 41 02½ 41 26	*b* *c* *d* *e* *f*	24½ 23 22½ 23½	9·18 9·78 10·00 9·57	395·1 407·0 411·2 485·6	13·47 14·35 14·67 14·04	do.	do.	do.	do.	do.	do.	do, do. elev. 31'	Towing-line altered from 15½ ft. to within 3 ft 9 in. of the bow.

Plate 5.

RESTORING ARCHSTONES AT BLACKFRIARS BRIDGE.



View of Soffit.



Section.

DESCRIPTION OF THE PLAN OF RESTORING THE ARCHSTONES OF BLACKFRIARS BRIDGE. BY JAMES COOPER, A. INST. C. E. COMMUNICATED IN A LETTER TO THE SECRETARY.

From the perishable nature of the material with which even the largest bridges were built, before the use of granite became so common as it has of late years in the more important structures of this kind, the best plan of repairing parts falling to decay, is a point of some consequence. With a view to contribute towards the stock of information on the subject, I beg to offer to the Institution the accompanying drawing (plate No. V), showing the mode that has been adopted by Messrs. Walker and Burges, of restoring the archstones of Blackfriars Bridge, with the following observations in explanation of it.

The decayed part is first cut out for the whole height of the course, to the depth of 15 inches generally, but in faulty places sometimes as much as 2 feet, and never in shorter lengths than a foot; and the beds and sides of the opening being dressed fair, moulds or templates are fitted into it to get the correct shape for the new work.

The stone is inserted in two thicknesses, the lower of which *a*, is dovetailed or radiated rather more than the original archstone, and the upper, *b*, slightly tapered like a wedge, to enable it to be driven; the dimensions of the two when put together making up the size of the cavity. Circular holes are sunk opposite each other in the adjoining beds of the two pieces to receive the dowel *c*, that in the lower part, *a*, being half the length of the dowel deep, while the corresponding hole in the part *b*, is deep enough to receive the dowel completely, so that when deposited in the hole, the dowel may offer no obstruction to getting the stone in; and from the bottom of these holes, openings, *d*, *e*, of about ¾ inch diameter are drilled to the chamfers on the face of the joints.

The dovetailed stone, *a*, is first set in mortar, and brought to a bearing on its bed, by wedging applied in the place afterwards to be occupied by the other half, *b*; which is next covered with mortar on the beds and joints, and driven in by wooden beetles until the circular holes in the beds come opposite each other, when, the cord *d* having been disengaged, the dowel *e* (held by it in the hole in the bed of the upper stone *b*) is drawn or pushed half its length into the stone *a*. Should the new stone be sufficiently in contact with the old work, which the sound from the beetle readily denotes, and be otherwise properly driven, mortar is rammed down the hole *d*, so as to surround the dowel and keep it in its proper place. The cord *e* for drawing the dowel home runs in a groove in the bed of the stone *a* from the dowel hole to the face of the archstone, and sometimes when it is not brought into action the dowel is pushed with a jointed piece of iron wire inserted through the opening *d* in the upper stone.

The wedge-formed stones, *b*, are usually 12 inches thick on the face, tapering off half an inch at the depth of 15 inches, and run from a foot to 2 feet 6 inches long, which they seldom exceed, as when thicker or longer they are found unwieldy to drive. These limitations are not, however, required in the dovetailed stone *a*, which is put in in as long lengths as are supplied, and its thickness is regulated by the cavity to be filled, the other stone, *b*, being, as has just been stated, generally uniform in this dimension. The dowels, which are of Craigleith stone, are 5 inches long and 3 inches diameter in the middle, diminishing to 2½ inches at the ends.

When the new stone is inserted, as has been described, and the dowel secured in its place, it is evident that neither half can drop out, and that on the hardening of the mortar, though *two* pieces, they become for practical purposes *one* archstone. But while the work is in progress, and before the stone *b* is put in, the dovetailed stone *a* has a tendency to slide out, which is sometimes met by strutting from the scaffolding, or by leav. a small tenon on the under side of the new stone fitting into a mortise in the masonry beneath; but within six or eight courses on either side of the crown of the arch, and in other places, when a considerable length has been taken out, a joggle *f*, 4 inches long by 2½ inches square, is inserted at each end of the new work, or in the case of a very short stone at one end only, being let from the upper bed of the stone *a* diagonally into the vertical joint between the new and the old work, so that half is in one and half in the other.

So far as I am aware, the above scheme is new, and it seems fully to meet the difficulties of the case; the new stones filling completely the hollows left by the old ones cut out, which from the radiation of the joints in an arch they could not if put in as one piece, and so giving a perfect bearing between the original and the restored work, while the whole is secured without injury to the adjoining masonry by external wedging or otherwise.

ON THE RELATION BETWEEN THE TEMPERATURE AND ELASTIC FORCE OF STEAM, WHEN CONFINED IN A BOILER CONTAINING WATER. BY MR. FAREY, M. INST. C.E.

This subject has occupied the attention of many able experimenters, and the condence of the results which they have attained separately, leaves no doubt of the facts hereinafter stated.

Mr. Watt made experiments in 1764, and repeated them in 1774. Mr. Southern went over them again in 1797 with great accuracy, and formed a theorem for calculating the results; Dr. Robinson and M. Bettancourt also made similar experiments; likewise Mr. Dalton, Mr. Woolf, and Mr. Philip Taylor; also Dr. Ure.

The writer of this communication undertook, several years ago to compare all the different experiments which had then been made, in order to obtain a standard, and was induced, after a careful examination*, to adopt Mr. Southern's theorem as the most authentic, being found very consistent with itself, and being confirmed, at several points of the scale, by the actual experiments of others, although the complete scales promulgated by some of those others were very discordant, from having been interpolated between the actual experiments by incorrect theorems; and particularly some scales which had been extended by such theorems beyond the range of their actual experiments, were found to be very far from the truth. In consequence, Mr. Southern's scale was made the foundation of all the Writer's computations and statements respecting steam; many of which have since been published.

The principal object of the present communication is, to show the coincidence between Mr. Southern's scale, and that of a new series of experiments made in Paris, in 1829, by a Committee of the Academy of Sciences, which confirms the standard so completely, as to leave no doubt of its truth.

Another object of the communication is to put on record, in the papers of the Institution, a memorial of the fair claim of our countryman, Mr. Southern, to the merit of priority in accurate determination of this law, in opposition to the unfounded assertion of the French author, who has published the new experiments, that the academicians had first established the truth in 1829, and that the previous determinations in England were erroneous†. Mr. Southern's determination is not mentioned in this sweeping condemnation, although it had been republished by Mr. Watt, Dr. Brewster, Dr. Thomson, and in the Writer's Treatise on the Steam Engine, also in that of Mr. Tredgold, and is well known, and very generally adopted, in fact, by the French academicians themselves.

The French experiments were continued up to twenty-four atmospheres; Mr. Southern's went only as far as eight atmospheres; he found the corresponding temperature to be 343·8 degrees of Fahrenheit's thermometer, and the academicians found it to be 341·8 degrees, or just two degrees less. At four atmospheres, Mr. Southern found the temperature 293·9 degrees, and the academicians 293·7. This last is not an accidental coincidence, but an adoption of Mr. Southern s scale, through Mr. Tredgold, though not acknowledged as such.

The French academicians have formed a theorem for calculating the temperatures corresponding to the elasticities, and by means thereof have extended their scale from twenty-four atmospheres upwards; nevertheless, they did not use their own theorem for the most useful part of the scale below four atmospheres, but they adopted a theorem from Mr. Tredgold in lieu of their own.

That theorem was made by Mr. Tredgold, from Mr. Southern's experiments, in lieu of Mr. Southern's own theorem, merely because Mr. Tredgold did not think that a power with a fractional index, viz., 5·13, is likely to represent the law of nature. This induced him to employ a higher power, with 6 for an index; and in consequence, his formulæ did not correspond at all with Mr. Southern's experiment at eight atmospheres, although it did correspond at four atmospheres. The academicians use an index of 5 in their theorem, rendering it very nearly the same in effect as Mr. Southern's.

In adopting this formula from Mr. Tredgold, (who quotes Mr. Southern's experiments, and takes them as his basis,) the French academicians could not have been ignorant of Mr. Southern's determinations, nor of their accuracy; for at eight atmospheres, his experiments and theorem is nearer to their own experiments than Mr. Tredgold's theorem, which they have adopted for that part of their scale which is below four atmospheres, and which theorem gives a result identical with Mr. Southren's theorem and experiments, at two and a half atmospheres, although Mr. Tredgold's becomes very incorrect below boiling, and also above four atmospheres.

Under these circumstances, it was not candid that all mention of Mr. Southern's determinations should have been suppressed, when in fact they are adopted at second hand, and through a less correct version than his own; and when it was found requisite to amend that version, and put it back very near to its original value, the author of that original should have been cited.

In a former report by the Academy in 1825, a Table was given, which is exactly Mr. Southern's numbers, and it would have been only fair, that his standard should have been acknowledged when adopted*. The merit of extending it, by further experiments, up to twenty-four atmospheres, in 1829, and thereby proving Mr. Southern's exactitude, is willingly acknowledged by the Writer of this communication, to be due to the French academicians.

When the temperature due to an elasticity of twenty-four atmospheres is calculated by Mr. Southern's theorem, it gives 438·2 degrees of Fahrenheit's thermometer, whilst the French experiment is 435·6, or only 2·6 degrees less; of this difference, some part is occasioned by the difference in the French and English mode of reckoning what an atmosphere is†. Again, for sixteen atmospheres, Mr. Southern's theorem gives 401·0 degrees, and the French experiment 368·5, or 2½ degrees less. At eight atmospheres, 2 degrees less, as before stated.

These small differences are less than the inevitable uncertainties of observation in such experiments, and it is to be remarked, that the elasticities were measured by the French academicians by the compression of air included in a manometer, and not by a direct measure of a column of mercury, or a loaded safety valve; whereas Mr. Southern used both those means, and employed very correct thermometers, and therefore his scale is of as much authenticity as that of the French; and the Writer of this communication does not think it requisite to make any alteration in the standard which he adopted long ago for all his calculations on this subjects, and of which many are published in his Treatise on the Steam Engine, where the subject is fully explained; and it is only necessary to give an extract therefrom, in order to state Mr. Southern's determination of a correct scale.

"From the comparison of a great number of his experiments, Mr. Southern invented a method of calculating the elasti-

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* The mode of examination was that which Mr. Smeaton and Mr. Watt pursued in similar cases, viz., to form curves for representing each scale, the temperature, in degrees of the thermometer, being the ordinates, and the elasticities, in atmospheres, being the abscissæ of the curves.

† The French account of the occasion of making their experiments on the temperatures corresponding to different elasticities of steam, in 1829, contains the following passage:—"Science did not then possess this knowledge, and engineers appointed to superintend the construction of steam engines, had no other guidance than some discordant measures upon the temperatures which correspond to the elasticities between one and eight atmospheres; for higher pressures there was no result of direct experiments, nor any theory which could supply the deficiency."

It is afterwards stated that only one experiment by Mr. Perkins was obtained in England, and that is shown to be altogether erroneous; and then, that "Germany was more advanced than England, for the results in question, Mr. Arzberger, at Vienna, having made experiments," but they are also shown to be inexact.

* In the account of the experiments of 1829, the former Table of eighteen hundred and twenty-five, is mentioned as "having been only presented temporarily, and as having been only deduced from interpolation of all the experiments which seemed to merit the most confidence, from the ability of the observers, and from the nature of the methods of observation;" but no mention is made of Mr. Southern, although the numbers are his.

† The French reckon an atmosphere to be equal to a column of mercury $\frac{76}{100}$ of a metre in height, which is only 29·92 inches, and the boiling point of their thermometer is adapted thereto, whereas, since about the commencement of the present century, the English have reckoned it to be 30 inches. This cirumstance accounts in some degree for their scale of temperatures differing rom Mr. Southern's.

city of steam at different temperatures, when saturated with water; his method is embodied in the following rule, which will give results very nearly corresponding with the experiments.

"To find the elasticity of steam of any given temperature, that temperature being expressed in degrees of Fahrenheit's thermometer, and the elasticity being expressed by the height, in inches, of the column of mercury that the steam will support.

"Rule. - To the given temperature in degrees of Fahrenheit, add the constant temperature 51·3 degrees, and take out the logarithm of the augmented temperature from a table of logarithms; multiply that logarithm by the constant number 5·13, and from the product (which is a logarithm) deduct the constant logarithm 10·94123; then by the table of logarithms find the number corresponding to the remainder, (which is also a logarithm,) and that number is one-tenth of an inch less than the height required; therefore, by adding one-tenth of an inch to the said number, we have the proper height, in inches, of the column of mercury that the steam will support*.

"Example.—What is the elasticity of steam at 212 degrees of temperature? 212 deg + 51·3 deg = 263 3 deg; the logarith of that number is 2·42045, which × 5·13 = 12·4169; from this logarithm deduct the constant logarithm 10·94123. and the remainder is 1·47567; the number corresponding to this logarithm is 29·9 inches, and, adding one-tenth of an inch thereto, we have thirty inches of mercury for the required elasticity.

"The rule may be used conversely to find the temperature of steam of any given elasticity thus. Deduct one-tenth of an inch from the height in inches of the column of mercury; take out the logarithm of the diminished height, and add to it the constat logarithm 10·94123; then divide the sum of these logarithms by the constant number 5·13; and find the by Table of logarithms, the number which corresponds to the quotient: that number is 51·3 degrees more than the required temperature; therefore deduct 51·3 from the said number, and the remainder is the proper temperature in degrees of Fahrenheit.

* "The effect of multiplying the logarithm by 5·13, is to raise the 5·13th power of the temperature, when augmented as above, and then the effect of deducting the constant logarithm 10·94123, is to divide the high power previously raised, by a very large number, viz.,(87 344 000 000) eighty-seven thousand three hundred and forty-four millions. The quotient resulting from this division of the high power, with the constant addition of one-tenth of an inch, is the required elasticity in inches of mercury."

"Example: What is the temperature of steam of an elasticity of 120 inches of mercury? 120 inc.—·1 = 119·9 inc. The logarithm of that number is 2·07882, to which add the constant logarithm 10·94123 = 13·02005, for the sum of the logarithms, which being divided by 5·13 constant number, gives 2·53802 quotient. The number corresponding to that logarithm is 345·2 degrees, from which deduct the constant temperature 51·3 degrees, and we have 293·9 degrees for the required temperature.

"The following Table has been calculated by Mr. Southern's theorem.

"Temperature. Degrees of Farenheit.	Elasticity. Column of mercury; inches.
32 freezing	0·18
42	0·25
52	0·35
62	0·50
72	0·71
82	1·01
92	1·42
102	1·97
112	2·68
122	3·60
132	4·76
142	6·22
152	8·03
162	10·25
172	12.94
182	16 17
192	20·04
202	24·61
212 boiling.	30·00

These numbers are nearly identical with experiments.

These numbers are from the French Academicians.	Temperature Degrees of Fahrenheit.	Elasticity. Column of mercury; inches.
212	212 =1 Atmos.	30·00
	222	36·32
	232	43·60
	242	52·20
250·5	250·2=2 Atmos.	60·00
	252	61·90
	262	73·00
	272	85·80
275·2	275 =3 Atoms.	90·00
	282	100·30
	292	116·70
293·7	293·9=4 Atmos.	120·00
	302	135·20
307·5	309·2=5 Atmos.	150·00
	312	156·00
	322	179 30
320·4	322·3=6 Atmos.	180·00
	332	205·40
331·7	333·7=7 Atmos.	410·00
	342	234·40
341·8	343·8=8 Atmos.	240·00"

Treatise on the Steam Engine, Vol. I. p. 72.

It is presumed that it has now been shown that English engiacers have, for more than 30 years past, been in possession of a standard scale, which is very accurate, and also of a theorem whereby the temperatcres corresponding to elasticities, exceeding 8 atmospheres, may be correctly represented, notwithstanding assertions to the contrary.

The complete scale laid down by the French Academicians is as follows.

Elasticities. Atmospheres.	Temperature in Degrees Fahrenheit.	These numbers are calculated according to Mr. Southern's rule, which proceeds by the 5·13th power.
1	212·0	212.0
1½	234·0	233·7
2	250·5	250·2
2½	263·8	263·8
3	275·2	275·0
3½	285·1	285·0
4	293·7	293·9
4½	300·3	301·9
5	307·5	309·2
5½	314·2	316·0
6	320·4	322·3
6½	326·3	328·1
7	331·7	333·7
7½	336·9	338·9
8	341·8	343·8
9	350·8	
10	358·9	
11	366·8	
12	374·0	376·3
13	380·7	
14	386·9	
15	392·9	
16	398·5	401·0
17	403·8	
18	408·9	
19	413·8	
20	418·5	421·1
21	423·0	
22	427·3	
33	431·4	
24	435·6	438·2

1 to 4 atmospheres: Thus far was calculated by Mr. Tredgold's rule, which proceeds by the 6th power.

4½ to 24 atmospheres: These were calculated by the French Academiciane' rule, which proceeds according the 5th power.

Note. At 4 atmospheres this complete scale changes its law of progression all at once, from the 6th power to the 5th power, which cannot be correct in principle. Neither the 6th power nor the 5th will give correct results in the lower part of the scale, between boiling and freezing, nor in the higher part of the scale. But Mr. Southern's fractional power 5·13, applies without change throughout the whole range, from freezing up to the temperature of melting tin.

By examing the French scale, it appears to correspond with Mr. Southern's at 4 atmospheres within $\frac{2}{10}$ of a degree, but in advancing only to 4½ atmospheres, it falls short $1\frac{6}{10}$ degrees therefrom, and yet, up at 24 atmospheres, the deficiency is but $2\frac{6}{10}$ degrees.

The French theorem is virtually to the same effect as that of Mr. Southern, for the logarithm of the elasticity in atmospheres is divided by 5 (instead of 5·13) in order to extract the 5th root, from which root unity, or 1, is to be deducted, and the remainder divided by the constant decimal ·7153, the quotient expresses the increase of temperature above boiling, in terms of the interval between freezing and boiling, that is, the said quotient expresses what fractional portion of 180 degrees of Fahrenheit, the temperature is above the boiling point.

This is by no means a convenient rule, and does not apply without modification to temperatures below boiling, which Mr. Southern's does most accurately. The French rule, if modified, becomes inaccurate.

The only question as to the law of progression in the French rule being better than that of Mr. Southern's, is whether the 5·13 power is more authentic than the 5th power. Now the Academicians found Mr. Tredgold's rule, which proceeds by the 6th power, did better than their own, between one and four atmospheres, but it will not correspond either at lower or higher parts of the scale, whilst Mr. Southern's corresponds accurately below, and very nearly throughout.

Mr. Southern's theorem is prefarable to any other for calculations concerning the heights of mountains, according to observations of the temperatures at which water is found to boil at their summits and at their bases.

On considering all these circumstances, we shall find good reasons for adhering to Mr. Southern's theorem, because it is unquestionably accurate in all the lower part of the scale below boiling, and also above the same, as far as experiments can be made with certainty; and the new experiments of the academicians prove, that at very high parts of the scale, it cannot be far from the truth; but as there is no certainty in the exactitude of either temperatures or elasticities, when so great as 438 degrees and 24 atmospheres, it is not advisable to adopt a new law of progression for the sake of reconciling differences of 2½ degrees from uncertain observations, when that new law will not correspond so well as the established law, with very certain and unquestionable observations.

67, Guildford St eet, Russell Square,
1 May, 1833.

P. S. It would be useful information, if some of the junior members, who have leisure, would undertake to calculate the temperatures according to Mr. Southern's rule, for every half atmosphere between 8 atmospheres and 24 atmospheres, now that the French experiments have shown that his rule will apply to such an extent with very probable uccuracy.

Items.

EXPEDITIOUS CALCULATION.—The actuary of a savings' bank in the neighborhood of Fitzroy square, has invented a machine for expeditiously and accurately calculating the interest due to depositors, the value of which may be deduced from the following particulars:—The accounts open on the 20th November, 1835, were 2,421, and occupied the late actuary four weeks.—The accounts open on the 20th November, 1836, were 2,734, and occupied the present actuary only 74 hours. An opinion may be formed of the assistance given by the machine from the following detail of the miutiæ necessary to arrive at the materials for the annual return required from savings' banks by the Commissioners for the reduction of the National Debt. The time taken to calculate the interest on 2,734 accounts, to enter it on the ledgers, to make the additions, to rule the lines, to take out each account under its proper classification, and to take out the folios of 4,292 closed accounts, amounted to 74 hours, making an average of 9¼ hours for each of the eight ledgers, or 91⅜ accounts per hour.

WEAR OF CARRIAGE WHEELS.—It has been calculated, by an engineer of eminence, that every four-horse coach deposites 12 lb. of iron in every 100 miles of its journey, and that consequently, assuming the number of such coaches passing daily between London and Birmingham alone to be 20, the weight of iron deposited during every transit exceeds 240 lbs. These results, it is stated, are not conjectural, but derived from investigations applied to the horse-shoe and the tire of the wheel—in the first instance, previously to use; and, in the second, after the wear and tear of the road had rendered them useless; and they have been found, it is added, as to every ton weight of iron so tried, nearly uniform.

BUSTS AND PORTRAITS.—A new instrument has been invented in Paris, called the Phisiognotype, for the moulding of busts, on a principle which renders the likeness to the original a mechanical certainty. Busts in plaster are thus produced for five francs each. Another machine, entitled the Portrait-mirror, has also been constructed, by which a portrait may be taken in twenty minutes, from the reflection of the face of the original in a looking-glass.—[Athenæum.]

MORUS MULTICAULIS NOT PRODUCED FROM ITS OWN SEEDS.

The following statement agrees with what we were first to inform our countrymen of, in this journal, more than two years ago, on the authority of an experiment reported in the *Annales de l'Agriculture Francaise*, that the *morus multicaulis* had been found to be merely a variety of white mulberry, and did not reproduce its own kind by seeds. This very important fact (if true) we have again and again endeavored to impress on the agricultural public—but apparently to no purpose. The anxiety to obtain seeds of the *morus multicaulis* has been so great, that encouragement has been thereby afforded to extensive frauds, by the seller substituting seeds of another kind. But even if the seeds had been what they were supposed to be, if from trees of the true *multicaulis*, the failure and disappointment would probably have been as great.

But though believing that the seeds of this plant are not to be relied on for reproducing their own kind, we are not inclined in any case to trust to reported opinions, or authority that is the least doubtful, when the facts can be tested by accurate experiment. We have the means of making such an experiment, in seeds of the *morus multicaulis* taken last summer from trees which grew within the enclosure of the high walls which surround the Penitentiary of Virginia, and near which no other kind of mulberry grew, to affect the seeds by a mixture of the fecundating farina. If *these seeds* will not produce the *morus multicaulis*, it may be thereafter safely pronounced, that seeds are not only not to be relied on to produce this kind, but that the result of reproduction of the like kind rarely, if ever, occurs.

"This mulberry, it is now well ascertained, is a hybrid variety, and not a true species—the seed will not produce its like. We have been informed by a gentleman who purchased a plant, three or four years since, of some nurserymen of our vicinity, that with considerable care he raised quite a number of seeds. The plant was taken up upon the appearance of severe weather, and placed in a cellar where the frost did not penetrate—the roots were slightly covered with earth. Pursuing this course two succeeding winters, it attained the size of a large shrub with numerous ramifying branches—the third season it produced seeds. No other species or variety grew in the vicinity of the plant, and the blossoms consequently could not have been fertilized but by its own pollen. These seeds were carefully sown, and the result was a number of seedling plants, with foliage of all sizes and textures from the common white, to that of the parent. No better proof is needed to confirm what we now state, and have heretofore stated."

[American Gardener's Magazine.]

SUCCORY COFFEE.—Succory root, cut, oot, dried, torrefied, and ground to powder, is most extensively employed as a subditute for coffee, or rather, I ought to say, st adulterate coffee. A full account of the preparation of it will be found in the *Annales des Chemic*, lix. p. 307. Its consumption is so great, that some fear has been expressed of its seriously injuring trade in, and cultivation of, coffee; and the Chancellor af the Exchequer has prepared to lay a tax on it. I am told that it is employed very largely by grocers to adulterate their coffee, by coffee-house keepers, and by economical house-keepers. It yields a perfectly wholesome and agreeable beverage, but wants that fine aromatic flavor peculiar to coffee, and for which the latter is celebrated.—[Mr. Perira's Lectures in the Medical Gazette.]

A NEW METHOD OF PLAYING THE VIOLIN.—A Monsieur Isoard has constructed a violin to be played by a pair of bellows. The performer holds the instrument after the manner of the violincello; his feet work the bellows, and his right hand directs the stream of air to the string requiring it.—[Musical World.]

or the inner bark of the linden tree. For the upper part any kind of cloth may bo used, and the shoes lined with linen or cotton. The soles are then varnished or covered with the following composition:—One quart of flax-seed oil, two ounces of rosin, half an ounce of white vitriol, which must be boiled together for half an hour After which take four ounces of spirits of turpentine, and two ounces of white oak saw-dust, which h s been exposed twenty-four hours to the sun; mix these ingredients well together, and put them on the soles of the shoes with a brush or in any other way, which, when dried, will render them impervious to water."

A Machine on a new principle, for raising Water, Coals, &c.—The construction of this power is very simple, and its steady operation is quite assured. Its chief agent is a pair of wheels; or, if necessary, a series, moving with their diameters in the direction of the weight to be raised,—say the shaft of a mine. Taking the one pair of wheels, moving on the same axis, we find that, from the end of a radius or arm in each, a chain descends, so as to hang on opposite sides of a square passage. To each chain are suspended at different but regulated distances, quadrangular frames, to the upper sides of which strong projecting iron rims, moving on the principle of the hinge, are attached. The boxes, or receptacles for the weight to be raised, have corresponding edges on each side. When the wheel above is turned, and a single box below is placed in connexion with the lowest frame, it is caught by its rim, and, with one revolution of the wheel, is sent up as high as the frame on the opposite side to that on which it is borne; here it is again caught and sent up to the apparatus on the opposite side again, and so on, by alternate transmission, it is brought to the top of the shaft. The machine being kept constantly laden below, and its wheel constantly turned above, it follows, that, at each revolution of the wheel, a box is delivered; and thus, in an exceedingly short space of time, a vast body of matter can be carried up through any depth of shaft. The raising of water is performed by means of the same machinery, only buckets with valves in the bottom are used instead of boxes. The machine could be most humanely employed, in large mines, in quickly sending the workmen up or down, to save them from their present tedious and tiresome expedients for that purpose.—[Mining Journal.]

Interesting to Blacksmiths.—Permit me to describe a machine which I have just seen, and which, for utility and simplicity, is truly admirable. The article I allude to is a substitute for a smith's bellows, and is far more powerful than the kind in common use. It is constructed in the way of fanners, and stands immediately behind the forge. The box of the implement is only eighteen inches diameter, and the fans which fill the box are only five inches broad, and are fastened upon a horizontal shaft of ¾-inch iron. On the end of the shaft is a pulley two inches diameter, and right above which is a larger pulley twenty-inches diameter, with a crank in the centre, which the man at the fire drives with one hand, while he guides the iron in the fire with the other. Around the large pulley and down to the small one is a leathern belt, by which this machine is driven, and with such ease that a child may drive it. The blast is so constant and so efficient, that the contriver prefers it for heavy work to the best bellows, which cost him 6*l*., while he has the blast-bellows for about 30*s*; and he adds, that, for a few more shillings, he could have it driven by wind. Although bellows on the same plan have been used and driven by steam and by water at our large iron-works, yet the merit of constructing one to work with the hand, belongs to Mr. William Bowle, blacksmith, Lower Bridge-street, Stirling. What adds much to the value of this contrivance is, its being easily purchased, that it requires little room, and is in many respects superior to the kind in common use. I hope, therefore, the sons of Vulcan will duly appreciate the contrivance.—[Correspondent of the Stirling Journal.]

Instrument applicable to various diseases of the Lungs.—A. M. Maissiat has submitted to the French Academy of Sciences an instrument, by which he proposes to convey liquids into the cavities of the lungs, or extract from it any gas, or liquid, to hold it in a state of dilatation, &c., as circumstances may require. He has also invented and laid before the same body another instrument, which is an improvement upon cupping glasses, and may entirely supersede the use of leeches.

Discovery of Roman Remains.—A great many Roman remains have been recently discovered at Exeter; consisting, it is said, of a complete Roman city below the western market, which has been lately excavated and rebuilt on a grand scale. The relics prove the existence of the ancient Isca of Ptolemy and Antonius on this spot. They consist of more than 400 Roman Coins, of copper and silver, from Claudius to Valens; a very great quantity of the ancient red Samian pottery, sepulchral urns, amphoræ, pateræ, simpula, two curious lamps, lachrymatories, terracottas of great beauty, relating to mythological subjects, two sepulchral vaults, &c. The excavations are superintended by Captain Short, of Heavitree, who is considered an able and excellent antiquary.—[Mining Journal.]

Effect of the velocity of air upon its use in smelting Iron.—Mr. Teploff, one of the Russian mining corps, in an article on the improvements recently introduced into the smelting of iron in Russia, makes the following statement. In the smelting furnaces of the Ural, where the quantity and velocity of the blast are properly regulated, 1.4 of pig iron is obtained by 1 of charcoal fuel, while in other furnaces they obtain but .4 and .6 by the same consumption of fuel.

The velocity of the blast being increased, the heat within is increased, without a corresponding consumption of fuel. In an experiment made by order of the government, it was found that one hundred cubic feet of air, under a pressure of two inches of mercury, produced the same effect as two hundred cubic feet, under a pressure of one inch, with this difference, that in the latter case, twice the fuel was consumed which was required in the former case.

In one furnace which is mentioned, 22,000 lbs. of iron were obtained in twenty-four hours, by 16,000 lbs. of charcoal. Previous to the due regulation of the draught, they consumed twice this amount of fuel for the same yield of iron.

This economy is obtained by duly proportioning to each other the size of the blast-pipe, and the pressure of the draught. The relation of these to each other varies with the furnace.

M. Teploff asserts that the results thus obtained exceed those with the hot-air blast; but it does not appear that any comparisons have been made under his examination, and with the charcoal fuel.

To regulate the draught, it is recommended to place two mercury or water-gauges, one near the blast pipe, the other near the governor of the blowing-machine. By varying the pressure, and the diameter of the nozzle of the blast-pipe, making the latter smaller as the former is increased, and *vice versa*, the best proportion is to be ascertained.—[Annales des Mines, vol. vii.] G.

New code of night signals on steamboats.

A new plan of signal lights for steamboats, to enable them to pass each other with safety at night, the invention of Captain W. D. Evens, of H. M. Packet Vixen, has recently been adopted in the Milford post office packets. Nautical men say, that it is the most efficacious of any of the many schemes hitherto proposed to prevent, or at least, to diminish the number of fatal accidents which occua by steamboats at night. It consists in placing a red light on the starboard bow, and a blue light on the larboard bow, with a common light on the fore-mast head. The effect of these lights, so placed, is to indicate immediately, to an observer, in the darkest night, the direction in which the vessel exhibiting them may be steering—which we understand, is all that is required generally to ensure safety; for it appears that most of the unfortunate accidents, which have occurred by steamboats running foul of each other in the night, were caused by each being ignorant of the others course. And, therefore, it is much to be regretted, that so simple and excellent a plan as this, has not long since been in operation;—by which many of those collissions so fatal to life and property might have been averted.

[Cork Standard.]

St. Petersburg.—Within the three last years, this capital has extended itself greatly. New streets have been erected in various directions, in parts which were formerly quite beyond the boundaries of the city; and numerous other improvements are in the course of taking place; one of which is to convey an abundant supply of water from the Neva to all parts of the town. The works of the St. Isaac's Church are now proceeding with great rapidity, no fewer than three thousand men being employed on them daily during the present summer. Of the twenty-four granite columns (each of a single piece, 42 feet high) which are to adorn the exterior of the dome, fifteen are already erected, and the remaining nine have been prepared at the quarries. At present, the forest of scaffolding which surrounds the edifice renders it impossible to judge precisely what the effect will be; yet there is little risk in predicting that, when completed, it will prove the most stupendous architectural monument of modern times; not, indeed, altogether the rival of St. Peter's at Rome, as far as depends upon actual dimensions alone, but eclipsing it both in splendor of materials and in grandeur of style.—[Archit. Mag.]

THE GENERAL ARCHITECTURAL IMPROVEMENT OF LONDON.—We are happy to see that this subject is attracting the attention of Parliament; Mr. Alderman Wood has obtained a select committee to consider the propriety of a new street from Southwark Bridge to the Bank of England; another from Waterloo Bridge to the New Road; a third, from Lothbury to the Post Office; a fourth, from the Post Office to Smithfield; a fifth, from Holborn to the Strand; a sixth, through Southwark; a seventh, from St. Paul's to Blackfriars' Bridge; an eigth, from Oxford Street southwards; and a ninth, from Westminster Abbey to Belgrave Square. Sir Robert Peel hoped that an enlarged view would be taken of the subject, and that the house would not fall into the error it had committed with respect to railroads. Perhaps the best mode of proceeding with railroads would have been to appoint competent persons to survey the whole country, and to report upon the most eligible lines; but, though it was now too late to take that course, something of the same kind might be done, with a view to the contemplated improvements of the metropolis; and, before money of any kind were expended, some foresight ought to be used as to the future extension of London. If commissioners could be found, in whom the public would have confidence, for a rational and comprehensive plan, it would be a subject of much congratulation.—[Ibid.]

In Russia, during 1834, there were published 844 works, 728 of which were originals, and 116 translations. These last form about one-eighth of the whole, whereas, in 1833, the translations amounted to a sixth, and in 1831 to a fifth. The number of scientific works was 430, of which 359 were originals. Works purely literary were 271, and of these 226 were original. Of the whole amount 544 were in the Russian language, 91 in the German, 54 Hebrew, 46 Latin, 37 Polish, 36 French, 26 Lithuanian, Ethonian, Finlandish, and Swedish, 3 Italian, 3 Greek, 3 Samogitian, 1 Dutch, 1 English, 1 Arabic, and 1 Persian. At no period was the press of Russia more actively employed than it is at this moment.

STRONG METAPHOR.—Two brothers recently from the old country, via Halifax, were lately walking up the Worcester Railroad, and their curiosity was some what astonished by the iron tracks, but soon the cars hove in sight, and the following dialogue took place:

Michael.—Och brither; d'ye see that quare cr-crachure a coming?

Patrick.—Troth an' I do. What, in the divil and his grandmother does it mane?

Michael.—Faith, an' it's not me that is to tell ye, but dont an'ye stand out of the way, ye'll learn quite satisfactorily, I'm thinking. Don't ye min' how hard he brathes—he must have been running right tightly for a long space.—[*The car whizz'd by.*]

Patrick.—Och, Mike, we're completely lost; for by my mother's milk, *it is Hell in harness*, and just the sort of coach I once dreamt the ould divil took the morning air in!

Agriculture, &c.

HAY FROM SCOTLAND.

An English paper says—"It forms a curious item of the agricultural commerce of this country, that we are now exporting hay to America. A vessel is about to sail with a cargo of 10,000 stone of hay from Aberdeen, and a larger will follow from Clyde. The hay is pressed by the hydraulic press, and the bulk has been thus reduced [sufficiently] for transportation."

The hay thus spoken of has reached this country and finds a quick sale at from 22 to 25 dollars a ton, principally at Boston. If Great Britain, with nearly three times as many horses, cattle and sheep, in proportion to its population, as are owned in the United States, is not only able to provide for their wants, but furnish large supplies of hay for exportation, it proves that England is far ahead of us in productive farming, and that we ought to mend our agriculture at once. It is the *cultivation of roots*, that enables English farmers to keep so many cattle, and spare us their surplus hay; and American farmers must follow the example, or fail of their profits and success. It is surprising with what tenacity our farmers cling to old usages; and persist in mowing ten acres of land to get fifteen or twenty tops of hay, when two acres of roots will furnish more and far superior food. There is hardly a crop produced, more certain than the ruta baga, unless attempted on soils decidedly unfavorable, and their excellence has been fully tested for feeding and fattening cattle and sheep; yet not one half our farmers can be induced to attempt the culture of the root. It is satisfactory to know, however, that the root culture is gaining ground.

SKINLESS OATE.

Extract of a letter to the Editor of the Genesee Farmer at Drummondville, U. C.:—I am glad to have the opportunity of requesting you to call upon such of your subscribers as have cultivated the skinless oats, since 1834, to communicate through your publication what has been the result. In the Genesee Farmer for July and October, 1834, very encouraging accounts are given of the culture of this grain; but I regret to state that my experience has not been so favorable. I sowed last spring upon about a quarter of an acre, seed which had been carefully picked by hand, and in which, consequently, there was no mixture. The growth was vigorous, and as stated by Mr Thorp, (Oct.) the oats ripened earlier than the common oat; but on thrashing, the return was not above half a bushel; though the land had been well manured the preceding spring for corn and potatoes, and the rest of the field yielded at the rate of 34 bushels per acre of barley, of the first quality produced in this neighborhood.

"I have seen somewhere in the Genesee Farmer, a statement of one thousand bushels [of what?*] produced from one acre. Is this well authenticated? Few people will believe it. I had, in 1835, a produce of 300 bushels per acre; last year only 200, under the same favorable circumstances as to manure and cultivation."

* If the writer alludes to Ruta Baga, we have no doubt but 1000 bushels, and more, have been raised on an acre.

From Loudon's Gardener's Magazine.

VITALITY OF SEEDS.

It will be in the recollection of our readers, that, in October, 1834, we published some interesting details of the opening of a British tumulus, near Maiden Castle, by Mr. Maclean, who found therein a human skeleton, and a portion of the contents of the stomach, containing a mass of small seeds, which neither the operation of the gastric juices, nor the lapse of probably twenty centuries, had sufficed to destroy. Many of these seeds have been subjected to various careful experiments, to ascertain whether the vital principle was extinct; and we have the satisfaction of announcing that Professor Lindley has happily succeeded in producing plants from several of these seeds. These plants have confirmed the opinion expressed by the learned professor, on a first inspection of the seeds, that they were those of the rubus idæus, the common raspberry. The plants are now very vigorous, have produced much fine fruit this season, and form an object of the greatest curiosity and attraction to horticulturists. This highly interesting circumstance proves the raspberry to be an indigenous plant in this country, growing at a very early period, and then constituting an article of food. (*Dorset Chronicle*, as quoted in the *Bath Journal*, of Sept. 12, 1836.) We have seen the raspberry plant alluded to in the Horticultural Society's garden The facts are extremely interesting; and we hope Dr. Lindley will compare this case with others of the kind upon record and favor the world with a memoir on the subject.

For the New-York Farmer.

BLACK FLY.—Sow a bushel of dry ashes to the acre on your turnip field as well as all other vegetables of the same class while the dew is on (or are moist) when they are two or three days old, and it will preserve them against the small black fly, should there come rain to wash it off immediately, repeat it, the ashes also is highly beneficial to promote the growth of the young plant. Oftentimes the black fly will take every vestage from the fields and lead a person who did not see his field during the first few days to believe the field bad, and attribute the evil to that cause. Many farmers are well acquainted with the above facts, but they are not generally known—and this may be of service.

A NEW-ENGLAND FARMER.

From the New-England Farmer.

THIRD ANNUAL REPORT OF THE MANAGERS OF THE BOSTON ASYLUM AND FARM SCHOOL.

The managers of the above institution respectfully submit to the corporation the following report:—

The present board of managers was elected in the month of June last, and this report commences with that period.

The objects of the institution are presumed to be well understood. To rescue from the ills and the temptations of poverty and neglect, those who have been left without a parent's care; to reclaim from moral exposure those who are treading the paths of danger; to "place the solitary in families;" to give to those who know nothing of the ties or influence of home, some taste and fondness for a local habitation, at the least; and to offer to those, whose only training would otherwise have been in the walks of vice, if not of crime, the greatest blessing which New-England can bestow upon her most favored sons, a good education, are some of the purposes for which the Asylum and Farm School was endowed. Under the blessing of God, success has thus far attended the exertions which have been made to accomplish these objects. From the monthly reports of the superintendent, and from the personal examination of the establishment on Thompson's Island, the board of managers are satisfied that there has been much improvement in the character of the boys who have been committed to the charge of the institution. In the last report of the superintendent, 62 boys are placed in the highest or first grade, 40 in the second, 4 in the third, and 1 in the fourth.

The number of boys on the island at the time of the last report, was 92; since that time 18 boys have been admitted, and three withdrawn. The number on the 1st of January, 1837, was 107; all of whom, as well as all other persons connected with the establishment on the island, were in good health, and there has been no death at the institution since the last report was made. The occupations and employment of the boys vary with the season. In spring, summer and autumn, the larger boys, in classes, work upon the garden and farm, of whose labor they perform a large part. The younger boys have small gardens of their own, which afford them recreation when released from school. In the winter season most of them attend school, where they are instructed in the learning usually taught in our common schools, and some of them assist in making clothes and mending shoes. The winter evenings are occupied with the study of geography, and the use of globes; botany, and practical agriculture; lecturing on different subjects, singing and reading.—The superintendent states that "every boy in the institution is required to be present during the evening exercises, if he is able, which are very pleasing to them, and which we all enjoy very much."

A large number of mulberry trees have been planted upon the island, and there are many silk worms at the establishment. It is contemplated to improve the advantages of the location in the production of raw silk for manufacture.

As to the success of the boys in the farming operations, Capt. Chandler, the superintendent, says, "they have succeeded far beyond my expectations; I think they have done more work, and done it better, than the boys of their age who have been regularly brought up to the business in the country generally do." And as to the comfort and contentedness of the boys, he says, "they are all comfortably clad with woollen clothes, shoes, stockings and caps, and appear to be as happy in their present situation as boys generally are under the paternal roof. They appreciate their advantages, and most of them are grateful to the benefactors of the institution and their friends for placing them here. The boys are well supplied with books, and keep them in excellent order; our library contains between 4 and 500 volumns of well selected books. I have also an agricultural library containing about 30 volumns, to which the boys have access."

Opportunities are occasionally offered to the friends of the boys at the institution, of visiting them on the island in the summer months.

The school is under the immediate charge of Mr. George B. Hyde, and he as well as the superintendent and all engaged in the establishment, are believed to merit the continuance of the confidence which has hitherto been reposed in them.

During the past summer, several parties of ladies and gentlemen, at the request of the board of managers, visited Thompson's Island. At these visits there have been many persons present, and an examination of the boys in their different studies has been accompanied by some remarks on the objects and prospects of the institution.—Among these who have thus visited the island, have been many strangers, who have always expressed their interest and pleasure in its objects and condition.

And how should it be otherwise than an object of interest; an institution designed to rescue the destitute orphan boys of our city from vice and ruin; to withdraw them from scenes and associates, whose contaminating influence would quickly destroy the perceptions of conscience, and leave them, deprived of that monitor, to pursue the impulses of passions which inevitably destroy their victims. Many are the worthy objects of the charitable institutions among us; our hospitals relieve the sufferings of the sick, and restore them to health and usefulness; they are a blessing which may be required by all of us, and we would not detract from their deserts. But we conceive that an institution which is to rescue immortal beings from the stain of sin, which could hardly otherwise be avoided, which is intended to have an influence on the youthful mind, and lead it to an understanding of its own capacities, responsibilities and hopes, deserves the fostering care of an enlightened, benevolent community, as much as those associations whose aim is to cure the diseases of the body, or to restore the wanderings of intellect. Such an institution as the Asylum and Farm School, is in true accordance with the spirit of the pilgrims; it carries into effect the first objects of their solicitude, the education of the young—of that young whose talents would otherwise be employed to violate the peace and virtue of society.

It will be seen by the report of the finance committee, that the expenses of the institution for the year ending January 1, 1837, have amounted to $6,100, while the receipts for the same time have amounted to 3,500, leaving a deficiency of $2,600. To meet this excess of expenditure over income, and to prevent its recurrence, it will be necessary to appeal to the liberality of the public. The board of managers had intended to have made that appeal in the autumn of the past year; but the condition of the financial affairs of this community induced them to defer it. They would recommend the subject to their successors as one requiring their attention when a suitable time shall have arrived for its execution, with the confidence that the appeal will be cheerfully and promptly answered.

For the managers.

WILLIAM GRAY.

COMMERCE OF OSWEGO.

The following statement shows the amount of Merchandize transported on the Erie and Oswego canals, for lake Ontario and the Upper Lakes through the Port of Oswego, by the forwarders of this village, during the gear 1836:

Forwarders.	*Tons for lake Ontario.*	*Tons for Upper Lakes.*	*Total.*
Bronson & Crocker,	2,556¾	935½	3,492¼
Henry Fitzhugh,	1,939¼	940	2,879¼
Trowbridge & Grant,	1,324	1,884½	3,208½
Charles Smith, Jr.	683¼	3,321½	4.004¾
Tons,	6,503	7,080½	13,584¾

82,339 barrels of Salt were shipped by the three first named houses above, to ports on lake Ontario and the Upper Lakes.

In relation to the trade of the Upper Lakes, it should be borne in mind that of the 183 days from the opening to the close of navigation on the Welland Canal, it was only in condition for use 92 days. Our forwarders are generally refused goods in New York in September and October, and large amounts of merchandise destined for this route went to Buffalo, with the principal part of the tonnage of Lake Ontario, to transport them, owing to the uncertain state of the Welland Canal. The Canadian government have now taken this canal, and it is announced that it will be navigable on the 15th April next.

STATEMENT of articles shipped from Oswego, by the Oswego canal to the Erie canal, during the season of 1836.

Wheat, bushels,	112,224
Flour, barrels,	94,667
Corn and Rye, bushels,	26,005

Other grain,	"	51,726
Bran and ship stuff,	"	74,002
Pork (principally from Ohio,)		5,864
Beef, barrels,		390
Ashes, casks,		7,467
Domestic spirits, casks,		2,063
Boards and Scantling, feet,		8,390,998
Square timber, cubic feet,		192,122
Shingles, bunches,		489
Staves, pieces,		541.823
Wood, cords,		1.412
Clover and Grass seed, lbs,		46,040
Flax seed,	"	1,200
Cheese,	"	1,456,640
Butter and Lard,	"	644,256
Tobacco, (from Ohio,)	"	242,160
Wool,	"	62,996
Domestic cottons manufactured,		60,099
Ditto Woollens,	"	8,926
Merchandise,	"	805,378
Leather, lbs,		19,035
Furs,	"	10,000
Peltrie,	"	49,300
Furniture,	"	354,366
Lead ore, (from St. Lawrence,)		650,112
Pig Iron, lbs,		1,274.135
Iron Ware,	"	52.226
Stone, lard, and articles without designation, Tallow, Bacon, &c. &c.		5,897,831

Statement of sundry articles coming from places out of the State and shipped by the Erie canal in the year 1836, taken from the collector's books:

Staves, pieces,		530,823
Flour, barrels,		9,441
Wheat, bushels,		60,384
Corn,		17,286
Barley,		35,424
Other grain,		11,950
Pork, barrels,		831
Beef,	"	390
Ashes,	"	189
Grind stones, lbs,		78,986
Tallow,	"	30,023
Bacon,	"	151,462
Tobacco,	"	188,2[illegible]6
Clover and Grass seed,		29,505
Flax seed,		1,200
Butter and lard,		37,266
Furs,		4,060
Peltrie,		13,972
Merchandise,		18,893
Furniture,		7,832

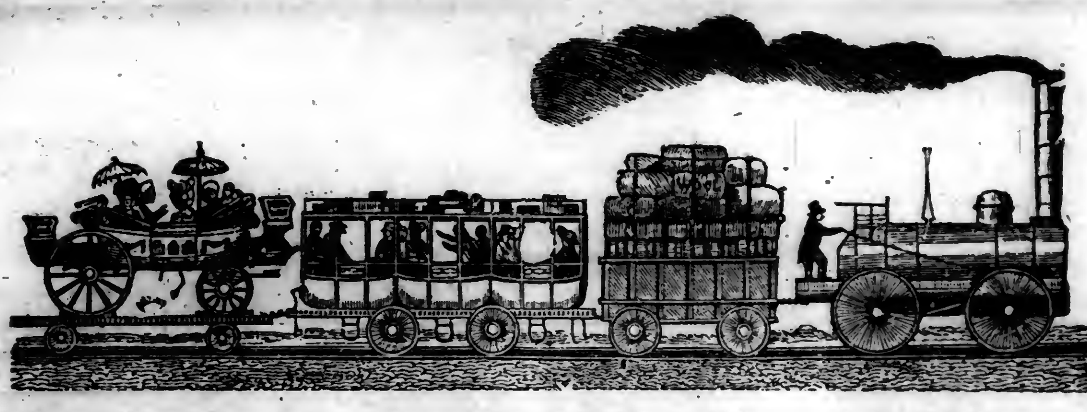
LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid, (continued.)

Dr. McNeven, city New-York, 1st Jan. 1838
M. Delano, Camillus, N. Y. 1st Jan. 1838
D. Hurd, Royalton, N. Y. 1st Aug. 1838
W. D. Wallack, Portsmouth, Va. 1st Jan, 1838
S. Bowman, Bowmans Mills, Va. 1st Jan. 1838
J. D. Steele, Baltimore, Md. 1st Sept. 1837
G. F. De La Roche, Baltimore, Md. 1st Dec. 1837
Col. Jas. G. Totten, Newport, R. I. 1st Jan. 1838
Beaver Meadow R. R. and Coal Company, Beaver Meadow, Penn. 1st Jan. 1838
Lt. J. M. Berrian, Detroit, Michi. 10th Feb. 1838

PHILADELPHIA STOCK MARKET.

April 7th.

	Price of shares	Offered	Asked
RAILROAD STOCKS			
New-Castle and Frenchtown	25	30	31
Do loan, 5½ per cent	100	99	101
Wilmington and Susquehanna	50	33	36
Camden and Amboy, shares,	100	130	131
Do loan, 6's 1836	100	110	120
Danville and P shares	50	25	35
Norristown, do	50	21	25
Do 6 per cent loan	100	85	100
Valley Railroad	7½	1	3
Westchester do	50	20	28
Minehill do	50	57	59
N. L. and Penn. Tp. do	40	34½	35
Philadelphia and Trenton do	100	118	120
West Philadelphia Railroad	50	20	30
Harrisburg and Lancaster	50	46	48
Cumberland	25	15	20
Beaver Meadow	50	52	58
MISCELLANEOUS STOCKS			
North American Coal Company	25	12	14
Steam Bt. Sts. Columbian	100	18	22
Exchange Stock	100	70	80
Arcade	100	55	75
Theatres—Chestnut street	600	625	675
———Walnut street	280	175	220
———Arch street	500	325	375
Gas Company	100	95	100
CANAL STOCKS			
Schuylkill Navigation, shares	50	156	158
Do loans, 5 1845	100	98	100
Do do 1855	100	100	101
Do do 5½ 1837	100	98	100
Lehigh Coal and Navigation	50	79	79½
Do loan, 6 1833	100	97	98
Do do 6 1839	100	97	98
Do do 6 1844	100	99	100
Do do 5 1840	100	96	97½
Union Canal, shares	200	180	190
Do loan, 1836	100	83	86
Do do 1840	100	85	90
Chesap'k & Delaware Canal, shares	200	20	40
Do loan, 1837	100	60	67
Do do 1840	100	60	67
Delaware and Hudson,	100	71½	72½
Do loan	100	95	100
Louisville and Portland	100	100	110
Convertible 6 per cent. loans,	100	100	110
Sandy and Bever	100	60	80
Morris Canal	100	75	78



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, APRIL 29, 1837. [VOLUME VI—No. 17.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 29, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America.*

☞ SUBSCRIBERS IN THIS CITY, who change their residence on the 1st of May, will please give notice at the office, 30 Wall-street, *Basement Story.* It is desirable that the notice should specify their late and future residence.

We ask attention to the following notice of Professor Hackley.

A COURSE OF INSTRUCTION IN CIVIL ENGINEERING, by informal lectures, to occupy two months, commencing the 1st week of May.—Comprising

The use of the theodolite, level, Compass plain table, cross, and sextant explained upon the instruments themselves: topographical drawing executed under supervision; survey of routes; problems of excavation and embankment; railroad curves; all the usual details of construction upon common roads, railroads, and canals; including bridges, culverts, tunnels, and the various kinds of motive power; nature, strength and stress of materials; masonry, carpentry and constructions in iron; alluvial deposites, guaging of streams, &c.—The whole purely elementary. Terms of admission to the course, $20.

Apply to C. W. Hackley, Professor of Mathematics in the University, 32 Waverly Place.

To the Editors of the R. R. Journal.

NEW-YORK, April 22d, 1837.

GENTLEMEN—Being a reader of your very useful Journal, I have observed that much has been said respecting the performance of the Locomotives of Mr. Norris, and their superiority in ascending inclined planes. I do not doubt the statements of Mr. Norris as regards the power of his Engines, and presume that his experiments have been correctly made; but they were all made when the road was dry and in the best possible condition: if the rails had been wet the result would have been much less, owing to the decrease of the adhesion in wet weather.

The communications which have been published in the Journal, between Mr. Norris and Mr. A. G. Steere, of N. Y. and Erie Railroad, have probably been caused by the miscalculation of the gravity of loads upon inclined planes, by Mr. Steere, he using the rule given by Pambour, the fallacy of which is very apparent, at least it appears not to give the result we wish to find, as it would give all the gravity on an angle of 45°, which is impossible; a weight suspended with all its gravity will hold or retain at a state of rest one of twice as heavy on an angle of 45°:

I admit that the rule given is perfectly applicable, as it respects the velocities of falling bodies upon inclinations; but what is necessary in the case under consideration, is, to find what weight suspended with all its gravity, or what amount of power applied to the crank of the Locomotive, will hold or retain at a state of rest, any given load, on any given inclination; then if a sufficient quantity of weight or power be applied to overcome the friction, the load will commence moving up the the plane.

I will submit the following table to those interested in the subject, and one of great importance in the construction of railways.

I have not been very precise in my calculations and experiments in forming the above table, but it will be found to vary much from the result of the rule used by Mr. Steere, in his calculations; by the above table, the gravity of a ton (2240) on an angle of 4°, would be 100 lbs.; but by rules given, it would be 156.8, as an angle of 4° is 7 feet rise in the 100 or 369 per mile. I will leave this subject to be settled by those more interested and better qualified for the task than myself.

	Level.	5¼th per mile. $\frac{1}{1000}$	7 ft. per mile. $\frac{1}{754}$	12 " $\frac{1}{440}$	16 " $\frac{1}{330}$	21 " $\frac{1}{250}$	50 " $\frac{1}{106}$	66 " $\frac{1}{80}$	106 " $\frac{1}{50}$	360 " $\frac{1}{15}$	1056 " $\frac{1}{5}$	5280 " $\frac{1}{1}$
Angles of inclination	0	m. 3.5	m. 4.6	m. s. 7.8	m. 10.3	m. 14	m. s. 33.3	m. 43.8	dg.m. 1.12	dg.m. 3.40	dg.m 11.30	dg. 45
Gravity of a ton in lbs.	ton. 0	lbs. 1.6	lbs. 2	lbs. 3.3	" 4.4	" 5.7	13.8	" 17.8	" 30	" 92	" 286	" 1120

Very respectfully,

Your ob't serv't,

E. F. ALDRICH.

TABLE V. CONTINUED.—THE EAGLE.

207	EAGLE.	52 00 52 27½ 52 54½ 53 21 53 58	b c d e f	27½ 27 26½ 27	8·18 8·33 8·49 8 33	361·0 363·8 406·3 399·8	12 00 12 22 12·45 12 22	Two Horses	7 passengers,& 2t 3cwt. = c. q. lb. 62 2 1	none	watr 14¼ from mrk.	watr 14¼ from mrk.	do.	dur run bow elev. 37′	Towing-line 8 ft. 9 in. from bow.

TABLE VI.—THE HAWK.—(34 *Experiments.*)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's Name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing the stake interval	Miles per Hour.	Tractive power in lbs.	Feet per Second.	Tractive power.	Load.	Wind.	Draught. Bow	Draught. St'rn.	Position of Wave.	Variation in Level.	REMARKS. PLACE OF EXPERIMENT, FORTH AND CLYDE CANAL.
		m. s		sec.	miles.	lbs	feet.								
228	HAWK.	59 59 18 36 55 1 15½	b c d e f	19½ 18 19 20½	11 54 12·50 11·84 10·97	422·7 417·4 397·1 373·7	16·92 18·33 17·37 16·09	Two Horses.	7 passengers, = c. q. lb. 9 2 1	one	watr in. 16 from mrk	watr. in. 18⅜ from mrk.	not obs.	dur. run. bow elev. 8′	Weight of HAWK, 3 ton, 16 cwt. 0 q. 24 lb. Marks 18½ in. above the water were made at bow and stern, when the boat was empty.
209	HAWK.	17 34 17 56½ 18 19½ 18 42 19 05½	b c d e f	22½ 23 22½ 23½	10·00 9·78 10·00 9·57	347·9 320·5 309·0 297·2	14·67 14·35 14·67 14·04	do.	do.	do.	do.	do.	do.	do. do. elev. 14′	
210	HAWK.	27 04½ 27 39 28 13½ 28 48 29 22½	b c d e f	35½ 34½ 35½ 34½	6·34 6·52 6·34 6·52	147·3 127·7 139·0 133·0	9·30 9 57 9·30 9·57	do.	do.	do.	do.	do.	do.	do. do. elev. 1′	
211	HAWK.	48 14 48 32½ 48 52 49 12 49 32	b c d e f	18½ 19½ 20 20	12·16 11·54 11 25 11·25	431·0 408·0 388·2 376·6	17·83 16·92 16·50 16·50	do.	7 passengers, and 7 cwt. = c. q. lb 16 2 1	do.	17⅛ from mrk.	17 from mrk.	do.	do. do. elev. 18′	7cwt. made the Hawk and 7 passengers nearly equal to the LARK with 1 ton and 7 passengers.
212	HAWK.	58 32½ 52 56 59 19 59 42 05½	b c d e f	23½ 23½ 23 23½	9·57 9·57 9·78 9·57	340 6 323·5 302·0 302·0	14·04 14·04 14·35 14·04	do.	do.	do.	do.	do.	do.	do. do. elev. 20′	
213	HAWK.	29 23½ 29 44 30 04½ 30 25½ 30 47	b c d e f	20½ 20½ 21 21	10·97 10·97 10·7 10·47	518·2 488·1 443·7 423·0	16·09 16·09 15·71 15·33	do.	7 passengers, and 4¼ ton, = c. . lb 94 2 1	do.	12½ from mrk.	12½ from mrk.	do.	do. do. elev. 16′	
214	HAWK.	40 25½ 40 51½ 41 18½ 41 45½ 42 13	b c d e f	26 27 27 27½	8·66 8·33 8·33 8·18	127·4 395·4 130·0 148·2	12·6 12·22 12·22 12·0	do.	do.	do.	do.	do.	15 ft. from the bow.	do. do elev 31′	
215	HAWK.	51 16½ 52 06 53 53 54 43½ 55 36	b c d e f	49 47½ 50 52½	4·55 4·70 4·50 4 29	75·33 67·31 54·30 54·8	6 67 6·9 6 6 6 29	do.	do.	do.	do.	do.	not obs	do. do. evel.	
216	HAWK.	12 06 12 31 12 58 13 26 13 53	b c d e f	25 27 28 27	9·00 8 33 8·03 8·33	127·0 108·0 121·2 145·1	13·2 12·22 11·79 12·22	do.	do.	fav. gh	11 from mrk.	14 from mrk	do.	do do. elev 35′	

TABLE VI. CONTINUED.—THE HAWK.

217	HAWK.	24 3½ 24 57 25 23½ 25 51 26 20½	b c d e f	25½ 26½ 27½ 29½	8·82 8·49 8.18 7·59	412·0 401·0 425·6 417·5	12·94 12·45 12·00 11·19	Two Horses.	7 passengers, and 4¼ ton, = c. q. lb 94 2 1	fav. light.	watr in. 14 from mrk.	watr in. 11 from mrk.	not obs.	dur. run. bow elev. 49′	Weight shifted aft.
218	HAWK.	17 23 17 45 18 06 18 27½ 18 49	b c d e f	22 21 21½ 21½	10·23 10.71 10·47 10·47	471·2 451·4 435·7 404·7	15·00 15 71 15 35 15·35	do.	7 passengers & 3t. 17 cwt. = c. q. lb. 96 2 1	do.	13 from mrk.	13 from mrk.	do.	do. do. elev 20′	3 ton 17 cwt. made the HAWK and 7 passengers nearly equal to the RAPID with 4¼ ton and 7 passengers.
219	HAWK.	58 44 59 10 59 37 03 39	b c d e f	26 27 26 26½	8·65 8 33 8·65 8·49	409·8 392·4 420·0 447·8	12·69 12·22 12·69 12·46	do.	do.	do.	do.	do.	do.	do. do elev. 29′	3 ton 12 cwt. made the HAWK and 7 passengers nearly equal to the LARK with 4¼ ton and 7 passengers.
220	HAWK.	34 50 35 10½ 35 31 35 52½ 36 14	b c d e f	20½ 20½ 21½ 21½	10·97 10·97 10·47 10·47	510·7 453·2 415·0 407·2	16 09 16·09 15·35 15·35	do.	7 passengers, & 3t. 12 cwt. = c. q. lb. 81 2 1	do.	13¾ from mrk.	13¼ from mrk.	do.	do do. elev. 12′	
221	HAWK.	48 45 49 11 49 37 50 03 50 31	b c d e f	26 26 26 28	8·65 8 65 8·65 8·03	411·3 404·3 408·3 414 0	12·69 12 69 12 69 11·79	do.	do.	do.	do.	do.	do.	do. do. elev. 37′	
222	HAWK.	14 29½ 14 50 15 11 15 32 15 55	b c d e f	21½ 21 21½ 22½	10·47 10·71 10·47 10 00	465·0 420·5 397·6 369·0	15·35 15·71 15·35 14·67	do.	7 passengers, and 3 ton, = c. q. lb. 59 2 1	do.	14 from mrk	14 from mrk.	do.	do. do. elev. 15′	
223	HAWK.	25 19 25 43 26 08 26 33½ 27 00	b c d e f	26 25 25½ 26	8·65 9·00 8·82 8·49	402·0 380·6 388 0 380·1	12·69 13·20 12·94 12·45	do.	do.	do.	do.	do.	do.	do. do. elev. 31′	
224	HAWK.	42 15½ 42 59½ 43 48 44 38 45 26½	b c d e f	44 48½ 50 48½	5·11 4·64 4·50 4 64	89 7 69·0 67·1 80·0	7·5 6·80 6 60 6·80	do.	do.	do.	do.	do.	do.	do. do. dep. 2′	
225	HAWK.	18 16½ 18 36 18 57 19 19½ 19 41	b c d e f	20½ 21 22½ 21½	10·97 10·71 10.00 10·47	 427·0 402 2 390·6	16 09 15·71 14·67 15·35	do.	7 passengers, & 2t. 12 cwt. = c. q. lb. 61 2 1	do.	14½ from mrk.	14½ from mrk.	do.	do. do. elev 15′	2 ton 12 cwt. made the HAWK and 7 passengers nearly equal to the RAPID with 3 ton and 7 passengers.
226	HAWK.	28 58 29 23 29 49 30 14½ 30 40½	b c d e f	25 26 25½ 26	9·00 8·65 8·82 8 65	405 5 384·7 386 0 390·6	13·20 12 69 12 94 12·69	Two Horses	7 passengers & 2t. 12cwt. = c. q. lb. 61 2 1	fav. light	watr in. 14 from mrk.	watr in. 14½ from mrk	not. obs.	dur. run. bow elev. 30′	
227	HAWK.	42 11½ 42 32½ 42 54½ 43 16 43 37	b c d e f	21 22 21½ 21	10·71 10·23 10·47 10·71	457·7 406·1 412·5 489·2	15.71 15·00 15·35 15·71	do.	do.	do.	do.	do.	do.	do. do. elev. 12′	
228	HAWK.	1 23 1 45 2 06 2 27½ 3 18½	b c d e f	22 21 21½ 21	10·23 10·71 10·47 10·71	461·6 397·5 403·3 390·3	15·00 15·71 15.35 15·71	do.	7 passengers & 2t. 7 cwt. = c. q. lb. 56 2 1	fav.	14¾ from mrk.	14¼ from mrk.	do.	do do elev. 13′	[illegible] ton 7 cwt. made the HAWK and 7 passengers nearly equal to the LARK, with 3 ton and 7 passengers.

TABLE VI. CONTINUED.—THE HAWK.

229	HAWK.	19 30½ 19 55 20 20 20 45 20 10½	b c d e f	25½ 25 25 25½	8·82 9·00 9·00 8·82	401·8 380·7 387·1 384·5	12·94 13·20 13·20 12·94	do.	do.	do.	do.	do.	do.	do. do. elev. 31′	
230	HAWK.	47 32 47 53 18 14 48 35 48 57	b c d e f	21 21 21 22	10·71 10·71 10·71 10·23	454·4 407·2 382·5 372·6	15·71 15·71 15·71 15·00	do.	7 passengers and 2 tons, = c. q. lb. 49 2 1	do.	15 from mrk.	15 from mrk.	do.	do. do. elev. 14′	
231	HAWK.	51 42½ 52 08 52 33 52 59 53 24	b c d e f	25½ 25 26 25	8·82 9.00 8·65 9·00	393·0 358·8 367·4 379·7	12·94 13·20 12·69 13 20	do.	do.	do.	do.	do.	do.	do. do. elev. 34′	
232	HAWK.	5 57½ 6 46 7 38½ 8 31 9 21½	b c d e f	48½ 52½ 52½ 50½	4·64 4·29 4·29 4·46	74·6 66·0 60·7 58·1	6·80 6·29 6·29 6·53	do.	do.	do.	do.	do.	do.	do. do. level	
233	HAWK.	23 19½ 23 44 24 08½ 24 30 24 56	b c d e f	25½ 24½ 23½ 24	8·82 9·18 9·57 9·38	397·9 373·3 382·3 369·4	12·94 13·47 14·04 13·75	do.	do.	do.	13¼ from mrk.	16⅜ from mrk.	do.	at rest dep. dur. run. elev. 29′	Weight shifted forward.
234	HAWK.	50 48 51 12 51 38 52 02½ 52 26	b c d e f	24 26 24½ 23½	9·38 8·65 9.18 9·57	367·8 359·1 390·9 395·7	13·75 12·69 13·47 14·04	do.	do.	fav. light.	16½ from mrk.	13½ from mrk.	do.	do. do. elev. 42′	Weight shifted aft.
235	HAWK.	49 57 50 21 50 46 51 09½ 51 32½	b c d e f	24 25 23½ 23	9·38 9·00 9·57 9·78	400 374.5 383 390	13·75 13·20 14·04 14·35	Two Horses.	7 passengers, and 2 ton, = c. q. lb. 49 2 1	fav. very light	watr. in. 1[illegible]⅛ from mrk.	watr. in. 12⅝ from mrk.	not obs.	bow elev. at rest 30′ during run. 57′	Weights shifted.
236	HAWK.	28 24 28 44 29 05 29 26 29 47	b c d e f	20 19 21 21	11·25 11·84 10·71 10.71	446·6 396·2 386·3 374·5	16·50 17·37 15·71 15·71	do.	7 passsengers, and 1t. 12cwt. =c. q. lb. 41 2 1	do.	15⅜ from mrk.	15⅜ from mrk.	do.	do. do. elev. 15′	HAWK, with 7 passengers, 1 ton, 12cwt. nearly equal to RAPID, with 2 ton and 7 passengers.
237	HAWK.	41 04 41 28 41 53 42 16½ 42 40	b c d e f	24½ 24¼ 23½ 22½	9·18 9·18 9·57 10·00	379·3 362·5 374·3 360·4	13·47 13·47 14·04 14·67	do.	do.	do.	do.	do.	do.	do. do. elev. 25′	do.
238	HAWK.	54 42½ 55 03 55 23 55 44 56 06	b c d e f	20½ 20 21 22	10·97 11·25 10·71 10·23	456·6 406·2 380 372·6	16·09 16·50 15·71 15·00	do.	7 passengers, & 1t 5cwt. = c. q. lb. 34 2 1	do.	15¾ from mrk.	15⅜ from mrk.	do.	do. do. elev. 14′	HAWK, with 7 passengers and 1 ton, 5cwt. nearly equal to LARK, with 1 ton, 18cwt. 7 passengers, and to ZEPHYR, with 3 ton, 7 passengers.
239	HAWK.	4 38 5 02½ 5 27½ 5 51½ 6 15½	b c d e f	24½ 25 24 24	9.18 9.00 9.38 9.38	369·4 348·5 356·6 357·5	13·47 13·20 13·75 13·75	do.	do.	do.	do.	do.	do.	do. do. elev. 34′	
240	HAWK.	21 50½ 22 10 22 30½ 22 50½ 23 12½	b c d c f	19½ 20½ 20 22½	11·54 10·97 11·25 10·00	450·6 381·7 375·2 363·3	16·92 16·09 16·50 14·67	do.	7 passengers, and 12cwt. = c. q. lb. 21 2 1	do.	11¾ from mrk.	11¾ from mrk.	do.	do. do. elev. 6′	HAWK, with 7 passengers and 12cwt. nearly equal to the RAPID, with 1 ton and 7 passengers.

TABLE VI. CONTINUED.—THE HAWK.

241	HAWK.	31 40½ 32 04 32 26 33 50 34 14	b c d e f	23½ 23 23 24	9.57 9.98 9.98 9·38	366.1 343.9 341 3 318.5	14.04 14.35 14.35 13.75	do.	do.	do.	do.	do.	do.	dur. run. bow elev. 12′	

TABLE VII.—THE RAPID (SECOND SET—43 *Experiments*).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing the stake-interval.	Miles per Hour.	Tractive Power in lbs.	Feet per Second.	Kind of Tractive Power.	Load.	Wind.	Draught. Bow	Draught. St'rn	Position of Wave.	Variation in Level.	REMARKS. PLACE OF EXPERIMENT, FORTH AND CLYDE CANAL.
		min. sec.		sec.	miles	lbs.	feet.								
242	RAPID.	41 20 41 51½ 42 23 42 55 43 28	b c d e f	31½ 31½ 32 33	7·14 7·14 7·03 6·82	338·7 322·1 328·1 273·7	10.48 10·48 10·31 10·00	Two Horses.	7 passengers, and 4¼ ton, = c. q. lb. 94 2 1	unf. strng	in. 16	in. 16	not obs.	dur. run. bow elev. 17′	RAPID weighed when empty, 3 ton, 8cwt. 2qr. 20lb.
243	RAPID.	53 19 53 45 54 13 54 43 55 15	b c d e f	26 28 30 32	8·65 8·03 7·50 7·03	496·4 483·5 492 412·7	12·69 11·79 11·00 10.31	do.	do.	do.	do.	do.	do.	do. do. elev. 40′	A Passage-boat passed at 5 sec.
244	RAPID.	5 54 6 20 6 48 7 17½ 7 47	b c d e f	26 28 29½ 29½	8·65 8·03 7·59 7·57	499·5 477·8 477·5 473·5	12·69 11·79 11·19 11·19	do.	do.	do.	do.	do.	do.	do. do. elev. 48′	
245	RAPID.	37 51 38 18 38 46 39 15½ 39 45	b c d e f	27 28 29½ 29½	8·33 8·03 7.59 7.59	483.8 477·5 547·8 477·2	12·22 11·79 11·19 11·19	do.	7 passengers, and 4 ton = c. q. lb. 89 2 1	do.	16	do.	do.	do. do. elev. 40′	RAPID, with 7 passengers 4 ton, nearly equal to the LARK, with 4¼ ton and 7 passengers.
246	RAPID.	35 13½ 35 47 36 09 36 40 37 11	b c d e f	33½ 32 31 31	6·72 7·03 7·26 7·26	488·8 470 466 428	9·85 10·31 10·65 10·65	do.	do.	do.	do.	do.	do.	do. do. elev. 25	
247	RAPID.	11 51 12 16½ 12 42½ 13 10 13 38	b c d e f	25½ 26 27½ 28	8·82 8·65 8·18 8·03	456 442.8 455 467·2	12·94 12·69 12·00 11·79	do.	do.	fav.	do.	do.	do.	do. do. elev. 1° 6′	
248	RAPID.	49 32½ 49 56½ 50 21½ 50 45½ 51 10½	b c d e f	24 25 24 25	9·38 9·00 9·38 9·00	447·1 447·5 429·6 360·6	13·75 13·20 13·75 13·20	do.	do.	do.	15⅛	15⅛	do.	do. do. elev. 50′	RAPID, with 7 passengers 3 ton, and 7cwt. nearly equal to the VELOCITY, HAWK, and EAGLE, with 3 ton and 7 passengers.
249	RAPID.	4 07 4 34½ 5 02 5 29 5 57	b c d e f	27½ 27½ 27 28	8·18 8·18 8·33 8·03	419·3 411·4 452·8 453	12·00 12·00 12·22 11·79	do.	do.	light	do.	do.	do.	do. do. elev. 55′	
250	RAPID.	21 58 22 22 22 44½ 23 07½ 23 31	b c d e f	24 22½ 23 23½	9·38 10·00 9·78 9·57	480·5 436.4 413.5 370	13·75 14·67 14·35 14·04	do.	7 passengers, & 2t 15cwt. = c. q. lb 64 2 1	do.	14⅛	14⅛	do.	do. do. elev. 10′	RAPID, with 7 passengers and 2 ton 15cwt. nearly equal to the LARK, with 3 ton and 7 passengers.

TABLE VII. continued.—THE RAPID (Second Set.)

251	Rapid.	33 14½ 33 41 34 08½ 34 36 35 04½	b c d e f	26 27 27½ 28½	8·49 8·18 8·18 7·96	106·8 390 400 417·5	2·4 12·06 12·08 11·58	Two Horses.	7 passengers, & 2t. 15 cwt. = c. q. lb 54 2 1	fav. light	14⅛	in. 14⅛	not obs.	dur. run. bow elev. 35′	
252	Rapid.	57 41 58 04 58 26 58 47 59 09	b c d e f	23 22 21½ 22	9·78 10·23 10·47 10·23	450 420 419 406	14·3 15·0 15·35 15·00	do.	7 passengers, & 2t 17cwt = c. q. lb. 56 2 1	none	13⁵	13⁵	do.	do. do. elev. 38′	Rapid, with 7 passengers & 2t. 7cwt. nearly equal to the Eagle, Velocity, and Hawk, with 2t. and 7 passengers each.
253	Rapid.	6 58 7 23 7 50 8 15½ 8 45	b c d e f	25½ 26½ 25½ 26½	8.82 8·49 8·32 8·49	401 372 407 397	12·9 12·45 12·94 12.45	do.	do.	do.	do.	do.	do.	do. do. elev. 48′	
254	Rapid.	21 07½ 21 29½ 21 41½ 22 13 22 35	b c d e f	23 23 21½ 23	10·23 10·23 10·47 10·23	440 400 400 382·2	15·00 15·0 15·35 15·00	do.	7 passengers, & 1t 15cwt. = c. q. lb. 44 2 1	do.	12¾	12⁵	do.	do. do. elev. 8′	Rapid, with 7 passengers, 1t 15cwt. nearly equal to the Lark, with 2t. and 7 passengers, and Zephyr, with 3t. and 7 passengers.
255	Rapid.	30 46 31 12 31 38½ 32 05 32 32½	b c d e f	26 26½ 27 27	8·65 8·49 8·33 8·33	360 361·6 352·2 358·8	12·6 12·45 12·22 12·22	do.	do	do.	do.	do.	do.	do. do. elev 35′	
256	Rapid.	24 45 1 08 1 28 1 50½	b c d e f	21 21 22 22½	10·71 10·71 10·23 10·00	461 412·8 373 352	15·71 15·7 15·0 14·67	do.	7 passengers, & 1t 7cwt = c. q. lb 36 2 1	do.	12	11¾	do.	do. do. elev. 18′	Rapid, with 7 passengers, and 1t. 7cwt. nearly equal to the Velocity, Eagle, and Hawk, with 1t. and 7 passengers each.
257	Rapid	18 06 18 35 19 02 19 28 19 57	b c d e f	29 27 26 29	7·76 8·33 8·65 7·76	389 308 346 323·7	11·38 12·22 12·69 11·38	do.	do.	do.	do.	do.	do.	do. do. elev. 42	
258	Rapid.	26 05½ 26 27 26 50 27 12 27 34	b c d e f	21½ 23 22 22	10·47 9·78 10·23 10·23	374 351 350 325	15·35 14·35 15·00 15·00	do.	7 passengers, and 15cwt. = c. q. lb. 24 2 1	do.	do.	do.	do.	not obs.	Rapid, with 7 passengers and 15cwt. nearly equal to the Lark, with 1 ton and 7 passengers, and to the Zephyr, with 2 ton and 7 passengers.
259	Rapid.	35 35 36 04 36 30 36 57 37 25	b c d e f	29 26 27 28	7·76 8·65 8·33 8·03	302 8 338·5 306·2 302·2	11·38 12·69 12·22 11·78	do.	do.	do.	do.	do.	do.	not obs.	
260	Rapid.	11 42 12 14 12 49	b c d	32 35	7·03 6·43	320 323	10·3 9·43	Two Horses.	7 passengers, and 1 ton, = c. q. lb. 29 2 1	none	in. 11¼	in. 11¼	20 yards before the boat.	dur. run. bow elev. 1° 0′	
261	Rapid.	18 39 18 59 19 20	b c d	20 21	11·25 10 71	425 387	16·50 15·71	do.	do.	do.	do.	do.	just astern	do. do. elev. 10	
262	Rapid.	27 13 27 33½ 27 54	b c d	20½ 20½	10·97 10·97	391 375	16·09 16·09	do.	do.	do.	do.	do.	do.	do. do. elev. 10′	

TABLE VII. CONTINUED.—THE RAPID (SECOND SET.)

263	RAPID.	33 34 33 59 34 22	b c d	25 23	9·00 9·78	366 349	13·20 14·3[illegible]	do.	do.	do.	do.	do.	about the middle of the boat.	do. do. lev. 6'	
264	RAPID.	40 27 41 04 41 40	b c d	37 33	6·08 6·25	17[illegible] 164	8·92 9·17	do.	do.	do.	do.	do.	about 12ft. from the bow	do. do. elev. 9	
265	RAPID.	49 53 50 25 50 59	b c d	32 34	7·03 6·62	324 345	10·31 9·71	do.	do.	do.	do.	do.	about the bows, and a heavy wave after the boat	do do. elev. 1° 1	
266	RAPID.	59 17½ 16 1 19	b c d	59 62½	3·31 3·6[illegible]	48 36	5·59 5·28	do	do.	do.	do.	do.		do. do. level	
267	RAPID.	7 2 7 39 8 17	b c d	37 38	6·08 5·92	145 125	8·92 8.63	do.	do.	do.	do.	do.	about the quarter	do. do. elev. 15	
268	RAPID.	21 10 21 31½ 21 53	b c d	21½ 21	10·71 10·47	406 342	15 71 15·35	do.	do.	do.	1 ½	9½	at the middle of the boat.	do. do. leve	Shifted the weights to the bow.
269	RAPID.	28 28½ 28 57 29 25	b c d	28½ 28	7·90 6·03	364·7 385	11·58 11·79	Two Horses.	7 passengers, and 1 ton, = c. q. lb. 20 2 1	none	in. 14½	in. 9½	just at the bow.	dur run. bow elev. 25'	Heavy swell.
270	RAPID.	36 59 37 24 37 48	b c d	25 24	9·00 9·38	318 259	13·20 13·75	do.	do.	do.	do.	do.	15 feet farther aft.	do. do elev. 15'	Swell not so easy.
271	RAPID.	50 51½ 51 22½ 51 53	b c d	31 30½	7·26 7·38	362·7 431	10·65 10·82	do.	do.	do.	do.	do.	about [illegible]0 yards before the boat.	do. do. elev. 54'	
272	RAPID.	58 38 59 11 59 44	b c d	33 33	6·82 6·82	313·5 346	10·00 10·00	do.	do.	do.	do.	do.	a little before the boat.	do. do. elev. 43'	
273	RAPID.	6 54 7 42 8 30½	b c d	48 48½	4·69 4·64	82 78	6·88 6·80	do.	do.	do.	do.	do.	after the boat.	do. do. dep. 12'	Swell very slight.
274	RAPID.	14 3 14 24 14 45	b c d	21 21	10·71 10·71	395 348	15·7[illegible] 15·71	do.	do.	do.	do.	do.	in midships	do. do. dep. 5'	

TABLE VII. CONTINUED.—THE RAPID (SECOND SET).

275	RAPID.	23 20 23 44 24 7	b c d	24 23½	9·38 9·57	322 271	13·75 14·04	do.	do.	do.	do.	do.	about 18ft. from the bow.	do. do. elev. 22′	
276	RAPID.	45 20 45 48 46 14½	b c d	28 26½	8·03 8·49	373 389·6	11·79 12·45	do.	do.	do.	9	14	at the bow.	do. do. elev. 1°17′	Weight shifted to stern; swell very high, rose 3 feet.
277	RAPID.	54 10 54 30½ 54 51	b c d	20½ 20½	10·97 10·97	375 370·6	16·09 16·09	do.	do.	do.	do.	do.	at mid-ships	do. do. elev. 27′	Not so high.
278	RAPID.	3 53 4 26 4 59	b c d	33 33	6·82 6·82	324·6 350	10·00 10·00	Two Horses.	7 passengers, and 1 ton, = c. q. lb. 29 2 1	none	in. 9	in. 14	30 yrds before the boat, broken water behind the boat.	dur. run. bow elev. 1°18′	
279	RAPID.	12 58 13 52 14 43	b c d	54 51	4·17 4·41	60 58·7	6·11 6·47	do.	do.	do.	do.	do.		do. do. elev. 17′	Very little swell.
280	RAPID.	30½ 56 1 22	b c d	25½ 26	8·82 8·65	368 340·6	12·94 12·69	do.	do.	do.	do.	do.	at mid-ships	do. do. elev. 42′	
281	RAPID.	16 52 17 15½ 17 38	b c d	23½ 22½	9·57 10·00	383·5 328	14·04 14·67	do.	8 passengers, and 1 ton, = c. q. lb. 11 3 3	do.	not obs.	not. obs.		not. obs.	
282	RAPID.	31 55 32 15 32 35	b c d	20 20	11·25 11·25	366 347	16·50 16·50	do.	8 passengers, = c. q. lb. 10 3 3	do.	11	8¾		dur. run, bow. level	
283	RAPID.	40 38 41 03½ 41 30	b c d	25½ 26½	8·82 8·49	319·7 366·5	12·94 12·45	do.	do.	do.	do.	do.		do. do, elev. 45′	
284	RAPID.	00 22½ 1 45	b c d	22½ 22½	10·00 10·00	301 278·6	14·67 14·67	do.	do.	do.	do.	do.		do. do. elev. 2′	Very little swell.
285	RAPID.	9 24½ 10 15 11 06½	b c d	50½ 51½	4·46 4·37	61 67	6·53 6·41	do.	do.	do.	do.	do.			

TABLE VIII.—NEW BOAT (14 *Experiments*).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's Name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing the Stake-interval.	Miles per Hour.	Tractive Power in lbs.	Feet per Second.	Kind of Tractive Power.	Load.	Wind.	Draught. Bow	Draught. St'rn	Position of Wave.	Vriation in Level.	REMARKS. PLACE OF EXPERIMENT. FORTH AND CLYDE CANAL.
		m. s.		sec.	miles.	lbs.	feet.								
286	NEW BOAT.	4 28	b	25	9·00	206·5	13·20	Two Horses.	6 passengers, and 1 ton, = c. q. lb. 28 0 15	none	not obs.	not obs.	not obs.	not obs.	Experiments on Keels of different forms. Keel 30ft. long, 6in. deep, tapered off to a point at 4ft. from the ends. Boat 61ft. 6in. long.
		4 53	c	25	9·00	185	13·20								
		5 18	d	23	9·78	202·8	14·35								
		5 41	e	29	9·38	223·5	13·75								
		6 05	f												
287	NEW BOAT.	26 28½	b	19	11·84	307	17·37	do.	do.	do.	do.	do.	do.	do.	Heavy rain.
		26 47½	c	18½	12·16	299	17·84								
		27 06	d	19	11·84	290·8	17·37								
		27 25	e	19	11·84	267·8	17·37								
		27 44	f												
288	NEW BOAT.	35 40	b	35	6·43	96·8	9·43	do.	do.	unf. strng	do.	do.	do.	do.	
		36 15	c	36	6·25	86·6	9·17								
		36 51	d	36	6·25	84	9·17								
		37 27	e	36½	6·16	81·7	9·04								
		38 03½	f												
289	NEW BOAT.	48 32½	b	25½	8·82	193·8	12·94	do.	do.	do.	do.	do.	do.	do.	
		48 58	c	25½	8·82	202·5	12·94								
		49 23½	d	24	9·38	190·7	13·75								
		49 47½	e	25	9·00	186·6	13·20								
		50 12½	f												
290	NEW BOAT.	46 25	b	29	7·76	164·5	11·38	do.	do.	do.	in. 24	in. 21⅛	do.	do.	Triangular Keel 20ft. long, 7in. deep.
		46 54	c	28½	7·90	163	11·58								
		47 22½	d	27½	8·18	178·8	12·00								
		47 50	e	28½	7·90	151·6	11·58								
		48 19½	f												
291	NEW BOAT.	55 45	b	25	9·00	180·6	13·20	do.	do.	do.	do.	do.	do.	do.	
		56 10	c	23½	9·57	203·7	14·04								
		56 33½	d	23½	9·57	209	14·04								
		57 57	e	24	9·38	191	13·75								
		58 21	f												
292	NEW BOAT.	2 38	b	16	14·06	339	20·63	do.	do.	do.	do.	do.	do.	do.	
		2 54	c	17	13·24	346·6	19·41								
		3 11	d	17½	12·86	318	18·86								
		3 28½	e	18	12·50	303	17·33								
		3 46½	f												
293	NEW BOAT.	17 18½	b	18½	12·16	316·6	17·84	do.	do.	not so strng	do.	do.	do.	do.	Keel 20ft. long. 10in. deep in the middle, curved to both ends.
		17 37	c	20	11·25	288	16·50								
		17 57	d	20	11·25	273	16·50								
		18 17	e	20	11·25	277·5	16·50								
		18 37	f												
294	NEW BOAT.	29 40	b	25	9·00	203·5	13·20	do.	do.	do.	do.	do.	do.	do.	
		30 05	c	24	9·38	192·8	13·75								
		30 29	d	25	9·00	192·5	13·23								
		30 54	e	24	9·38	196·8	13·75								
		31 18	f												
295	NEW BOAT.	39 15½	b	52½	4·29	50	6·29	Two Horses	6 passengers, and 1 ton, = c. q. lb. 28 0 15	unf. not so strng	in. 24	in. 21⅛	not obs.	not obs.	Very little swell.
		40 05	c	53	4·25	49	6·24								
		41 01	d	54	4·17	47·7	6·11								
		41 55	e	54	4·17	48	6·11								
		42 49	f												

TABLE VIII. CONTINUED.—NEW BOAT.

296	New Boat.	20 48 21 07 21 27 21 46½ 22 06	b c d e f	19 20 19½ 19½	11·84 11·25 11·54 11·54	298 476 251 257	17·37 16·50 16·92 16·92	do.	do.	do.	23	21⅜	do.	do.	Keel 10 feet long, 14 in. deep in the middle, being the segment of a circle, the middle of which was 27 feet from the middle of boat forward.
297	New Boat.	27 33½ 27 57 28 21 28 41 29 07	b c d e f	23 24 23 23	9·57 9·38 9·73 9·78	207 214 221 200·7	14·01 13·75 14·35 14·35	do.	do.	do.	do.	do.	do.	do.	
298	New Boat.	37 11 37 51½ 38 28 39 06½ 39 45	b c d e f	40½ 36½ 38½ 38½	5·53 6·16 5·8 5·8	73 88 71·8 78.5	8·15 9·04 8·57 8·57	do.	do.	do.	do.	do.	do.	do.	

TABLE IX.—THE SWIFT (First Set—11 *Experiments*).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's name.	Instant of passing the stake.	Stakes 110 yards apart.	Time of passing the stake-interval	Miles per hour.	Tractive power in lbs.	Feet per second.	Kind of tractive power.	Load.	Wind.	Draught.		Position of Wave.	Variation in Level.	Remarks.
											Bow.	St'n.			PLACE OF EXPERIMENT, GLASGOW AND PAISLEY CANAL
		m. s.		sec.	miles.	lbs.	feet.								
299	Swift.	21 25 21 49 22 13	b c d	24 24	9·38 9·38	233·3 230·6	13·75 13·75	Two Horses.	7 passengers, and 3 tons,= c. q. lb. 60 2 1	light	in. 13½	in. 13¾		dur. run. bow elev. 4′	
300	Swift.	33 30½ 33 46½ 34 04	b c d	16 17½	14·06 12·86	521·7 475	20·33 18·86	do.	do.	do.	do.	do.	17 feet from stern on larboard side.	do. do. elev. 6′	Boat one-third the width of the canal from the towing-path.
301	Swift.	39 59 1 19	b c d	20 20	11·25 11·25	358 344	16·50 16·50	do.	do.	do.	do.	do.	more forward than last experiment.	do. do. elev. 8′	
302	Swift.	51 14½ 51 39 52 03	b c d	24½ 24	9·18 9·38	250 221	13·47 13·75	do.	do.	do.	do.	do.	at midships	do. do. elev. 5′	Horses did not go steady.
303	Swift.	4 40 5 04 5 30	b c d	24 26	9·38 8·65	272 222	13·75 12·69	do.	do.	do.	do.	do.		do. do. dep. 5′	
304	Swift.	13 36 14 01 14 27½	b c d	25 26½	9·00 8·49	268 161	13·20 12·45	do.	do.	do.	do.	do.	about 1-4 from bow.	do. do. elev. 29′	Not a good experiment.
305	Swift.	21 47 22 20 22 53	b c d	33 33	6·82 6·82	360 371	10·00 10·00	do.	do.	do.	do.	do.	10 yards a head of boat.	do. do. elev 1° 7	

III. IMPROVED CANAL LOCK, BY JOSHUA FIELD, SQ., F.R.S., V.P.INST.C.E.

The numerous and extensive navigable canals by which this kingdom is intersected have tended in a great degree to exhaust every natural source from which water for their supply can be obtained; this renders the further extension of these important channels of commerce difficult, and in many cases impracticable. Some canals are altogether supplied by artificial means at an enormous expense, others only in part, whilst the greater number, depending upon natural sources alone, are more or less in want of water, and consequently the navigation is interrupted during the driest season of the year.

To lessen the great want of water by the common canal locks has long been a standing desideratum amongst engineers, and perhaps no subject has engaged more talent and ingenuity than the solution of this hydrostatic problem. Numerous contrivances have been resorted to, some to save the whole and others part of the lockage water: many of these are beautiful in theory, and perfectly successful upon a small scale, but when they have been tried upon the full magnitude they have uniformly failed, chiefly from the circumstance of the scheme involving some prodigious moving plunger or caisson, floated or suspended; and in most cases this vessel has been required to be perfectly water or air tight, and poised with the utmost precision,—conditions hardly to be obtained in practice, and if attained, the expense alone would defeat the object.

When the rough usage to which canal locks are subject is considered, and the ignorance of the persons necessarily employed in the management of them, it does not seem probable that any conservative lock will succeed until the whole apparatus shall be reduced to fixed masonry, and no other machinery employed than common gates and paddles, or sluices; for of all that have been invented, and for which upwards of twenty patents have been granted, none have been brought into practice for any length of time, except those of the side-pond class which save half the water, and which, though less simple than the common lock, consist of the same parts, and are found completely manageable by the persons usually employed on canals. Having been engaged in the execution of the largest conservative lock that has been constructed, my mind has been long engaged in the pursuit of some more simple means of effecting the same object, for very little reasoning on the subject will be sufficient to show that every common lock full of water, let down from the upper to the lower level, possesses in itself a physical power or force sufficient to raise an equal quantity of water from the lower level to the height from which it has descended,—action and reaction, cause and effect, being equal.

The method by which I propose to render the descending lock of water available for raising an equal quantity is, in its simplest form, as follows: at a suitable distance from any common lock, in any direction I have a side pond or basin, of an area and depth equal to the lock and communicating with it by a large and long culvert, rather under the lower level; the diameter and length of this culvert must be such that it will contain as much water as the lock. each end of the culvert is to be provided with a sluice, shown in the diagram, Fig. 1, at A and B. (Plate VI.)

The lock being full or equal to the upper level, and the side pond empty, or equal to the lower level, the operation will be as follows:—when the sluice or valve at A is opened, the head of water in the lock will very gradually put the water contained in the culvert in motion, the velocity accelerating by the laws which govern the motion of fluids, until the levels of the water in the lock and side pond coincide; at this time the column of water in the culvert will have acquired a velocity due to the height fallen, it will then continue to move forward with a momentum that will not be destroyed, until the water has risen in the side pond to the height from which it descended in the lock, abating somewhat for the loss of effect from the friction of the water against the sides of the tunnel, &c., the water gradually coming to rest, when the sluice *B* in the side pond must be shut to retain it,—the converse operation is performed by opening the sluice *B*, when the lock will fill and the side pond become empty.

The principle of this lock may be well illustrated by the vibrations of a pendulum, which in like manner, actuated by the force of gravity, falls to the lowest point with an accelerating velocity, when it requires a momentum sufficient to raise it up the other side of the arc, nearly to the height from which it fell, the loss being only that arising from the friction of the suspending point and the resistance offered by the air.

It is from the close analogy it bears to the pendulum that I judge the culvert should contain as much weight of water as the lock that it may acquire sufficient momentum: it may contain more, but I think it should not contain less; thus the quantity of water raised will be equal to the quantity fallen, less the loss by friction in its transit;—the friction against the sides of a tube or culvert is simply as the diameter of the tube, while the area is as the square of the diameter, therefore the larger the tube the less in proportion will be the friction, hence the larger the lock the more complete will be the effect, and the operation of a model cannot be, like most other models of conservative locks, so perfect as a full-sized lock.

Although a lock upon this principle has not been executed upon the full scale, I have tried it in a model of sufficient magnitude to justify the greatest confidence of its perfect success.

The model consisted of two cisterns five feet long by twenty inches wide, having a communicating pipe of eight inches in diameter and forty-five feet long; a door valve, having a lever to open it, was fitted to each end of the pipe opening into the cisterns; a graduated scale was accurately placed in each cistern, and a ready means provided or adding to or taking from the water of either cistern as occasion might require—experiments were then made with various differences of levels, from twelve inches downwards, the results of which are here stated.

Difference of level 12 inches—the water rose in the opposite cistern		10½
8 inches	Do.	7¼
6 "	Do.	5¼
4 "	Do.	3 11/16

When tried at less differences it apparently rose to the same height, and when both the doors or valves were left open, it continued vibrating nearly an hour before it came quite to rest; and it is remarkable that the vibrations, whether twelve inches or one-eight of an inch, were performed in equal times, namely 10 seconds. This experiment was tried in 1816, and I have annexed a sketch of the apparatus used for the purpose. Fig. 2.

Having described the principle in its simplest form, and given the results of the experiments made with the model, I shall now point out several modifications that have occurred to me in applying it to the purpose proposed.

The column of communication in the model and so far as spoken of hitherto, is straight; but this would remove the side pond to an inconvenient distance from the lock, and occupy much ground. This objection is removed by the plan proposed in Fig. 3, wherein the column forms a volute round the side pond or basin, by which means very little ground is required, and the sluices or paddles at each extremity of the culvert are brought very near together.

Fig. 4 shows its application to a double lock;—here the culvert is carried in a large circle, under the bed of the upper level,—one lock forming the side pond for the other.

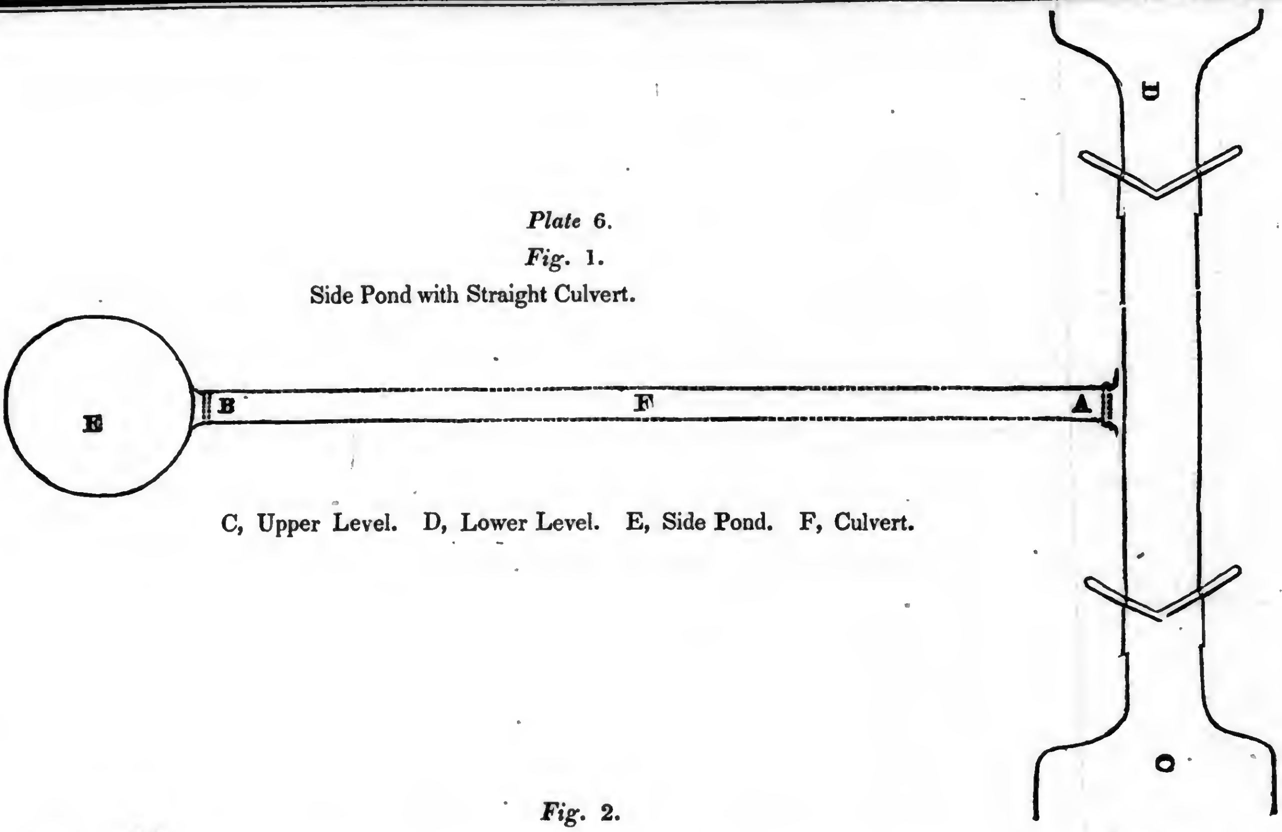
The next and last modification I shall notice is described in Fig. 5. The object here is to dispense with the side pond altogether. As this is not so obvious as the former methods, it may be necessary to refer to the letters in the sketch. Let *A* be a long culvert, leading from the lock up into the upper level, at *B*, having a sluice at each end, as before; there is a branch near *B* leading into *C*, which is an open cut from the lower level. Now when a lock full of water is to be discharged, the sluice at *D* is to be opened, the water will then run along *A*, and out at *C*, into the open cut; when half the water has run out, a swinging valve, situated at *E*, must be moved so as to shut the passage into *C*, and open it into the upper level *B*; the water having acquired its greatest momentum, will continue to run up into the upper level until the lock is empty, when *B* must be shut. The converse operation is thus performed:—open *B*, and the water will flow freely into the lock; when that is half full shut *B*, and the swinging valve *E* will open, and the column in motion will draw up water from the open cut, until the lock is full.—This modification, I admit, is open to many objections, and is one I should certainly not adopt;—the methods described in Figs. 3 and 4, are I conceive best adapted for practice.

The principle upon which this lock depends is the same as that of the hydraulic ram of Montgolfier, much used in France for raising water a considerable height, by a small fall. The experiments made by him, and those who have followed him, show that the loss by friction is not great, even in his pipes, which seldom exceed two inches in diameter; this, with the result of my experiments with much larger pipes, leads me to expect the loss in a culvert of four or five feet diameter will be very inconsiderable. A

Plate 6.

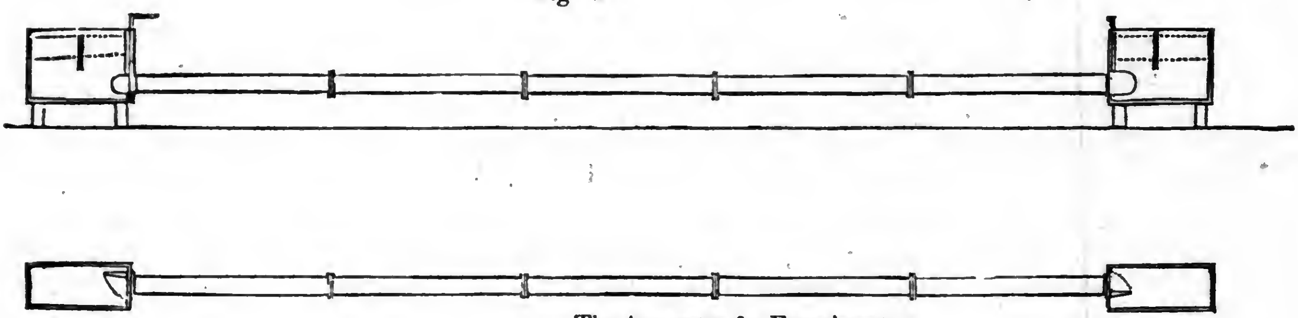
Fig. 1.

Side Pond with Straight Culvert.



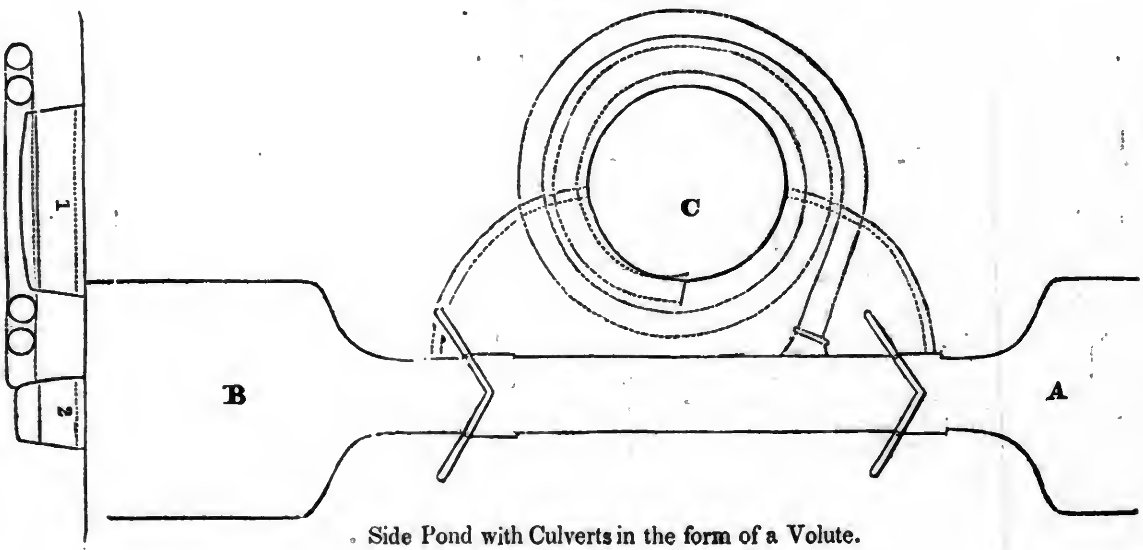
C, Upper Level. D, Lower Level. E, Side Pond. F, Culvert.

Fig. 2.



The Apparatus for Experiment.

Fig. 3.

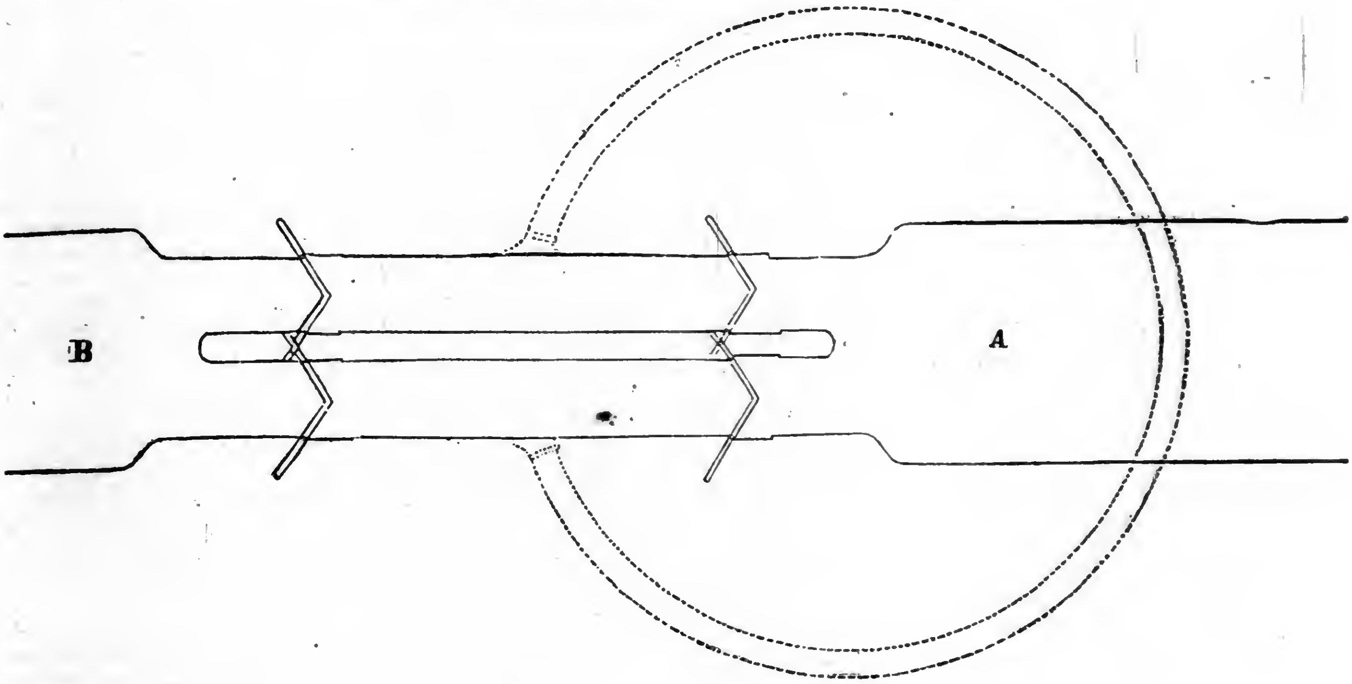


A, Upper Level. B, Lower Level. C, Side Pond.
1 Side Pond. 2, Lock.

Side Pond with Culverts in the form of a Volute.

Fig. 4.

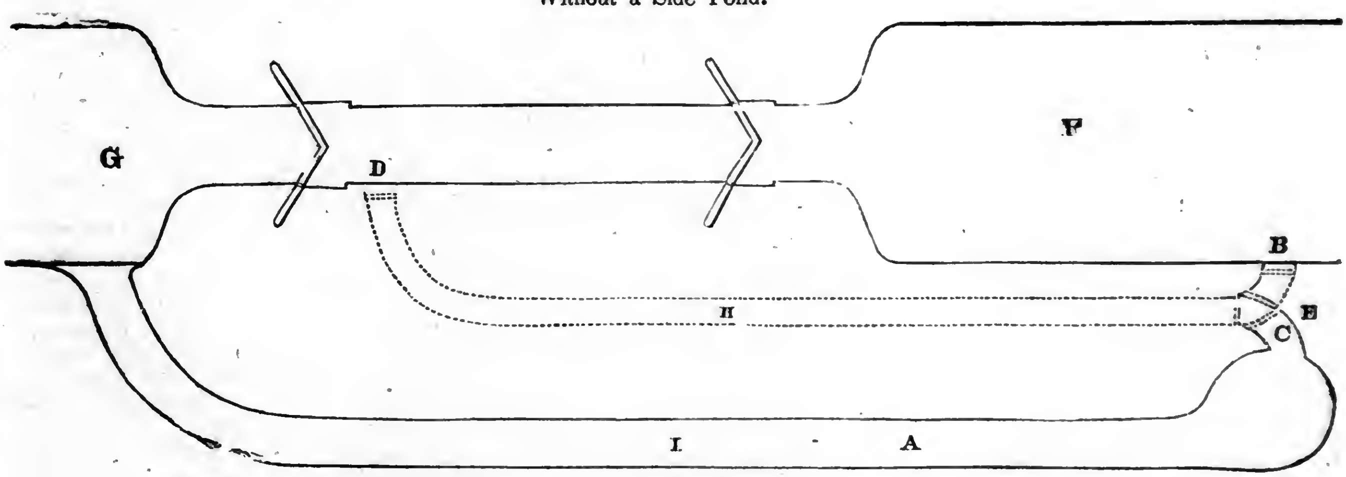
Double Locks with Circular Culvert under Upper Level.



A, Upper Level. B, Lower Level.

Fig. 5.

Without a Side Pond.



F, Upper Level. G, Lower Level. H, Long Culvert. I, Open Cut to the Lower Level.

calculation made also from the table given by Smeaton, of the head of water necessary to overcome the friction of pipes up to twelve inches' bore, at various altitudes, leads to the same result.

The time it would take to pass a barge, or to change the level of a lock upon this principle, would certainly not be longer than is required at present, and perhaps not so long.

I should imagine that a lock, well constructed upon this principle, having the culvert very smooth, would save nine-tenths of the water, and that the change would be effected in less than one minute. On an attentive consideration of this subject, several methods have occurred to me of making the large sluices, or paddles, so as to be quickly and easily opened and shut, and of various securities in the management of so large a column in motion, with some necessary compensations, &c., which would be obvious to any one about to adopt it.

I beg to present the foregoing remarks to the Institution of Civil Engineers, in the hope that the idea therein suggested being generally known may lead to the practical opperation of the plan.

From the Repertory of Patent Inventions

SPECIFICATION OF THE PATENT GRANTED TO WILLIAM GILYARD SCARTH AND ROBERT SCARTH, OF LEEDS, IN THE COUNTY OF YORK, DYERS, FOR THE MANUFACTURING OR PREPARING OF A CERTAIN SUBSTANCE FOR BLUE DYERS FROM MATERIALS NOT HITHERTO USED FOR THAT PURPOSE, APPLICABLE FOR DYING BLUES AND OTHER COLORS.—Sealed February 26, 1836.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, we, the said William Gilyard Scarth and Robert Scarth, do hereby declare the nature of our invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say):

Our invention relates to that part of the process of dying wherein the substance called woad is used for dying blue and other colors, and our invention consists in the manufacture or preparation of that substance by the application of shumac peat, oak bark, and the stalks, stems, and other parts of the hop plant, in place of the plant heretofore cultivated and used for that purpose, and which is well known, and called woad.

Having thus explained the object of our invention, we will describe the manner of carrying the same into effect.

Take any quantity of the shumac of commerce, the same is to be springled with water and placed in a heap, in order to produce fermentation, in like manner to the course pursued with the preparation of the plant heretofore used, commencing with that part of its process at which it is set to ferment, and the result of such fermentation, when shumac is the material operated on, will be so similar to the like process of fermentation of the product of the plant heretofore employed, that a workman acquainted with the preparation of the substance called woad by dyers, as heretofore practised, will, when he is applying the material called shumac, readily judge of the maturity of the process, and when it is ready for the purposes of the dyer, whether for dying blue or other color. The great object of the workman is to see that the heap of shumac is equally fermented in all parts. The product thus obtained will then be suitable, and is to be used in the same manner as woad obtained from the material or plant heretofore used.

In using peat as a substitute for the product of the plant heretofore employed in the manufacture of the substance used by dyers called woad, peat will in some instances be found to be in such a condition as to be suitable at once to be used by the dyer, and this will readily be judged of by taking a sample and testing it; but should the peat not be found suitable for proceeding at once to the preparation of the woad vat, then the peat is to be pulverized, and submitted to the process of fermentation, by placing it in heaps and applying water, till it becomes of that state or condition to be suitable, and this will readily be judged of by a workman acquainted with the production of the substance as heretofore practised in obtaining it from the plant now in use.

In applying oak-bark, or the stalks, stems, and other parts of the hop plant in the manufacturing or producing the substance used by dyers called woad, such oak-bark, and the stems or stalks and other parts of the hop-plant, are, when dry, to be ground into a powder, and which is to be treated in a similar manner to the powder or balls prepared from the plant heretofore employed in order to produce fermentation; and the maturity of the process of fermentation is to be judged of in like manner as if the prepared material from the ordinary plant was being fermented, and having completed the process of fermentation, the material thus produced will then be ready to be prepared or manufactured into the wood-vat in precisely the same manner as heretofore pursued when using the fermented product of the plant called woad, or the plant now cultivated for the purpose of making or preparing what is by dyers called woad.

Having thus described the nature of our invention, and the manner of carrying the same into effect, we would remark that what we claim as our invention is the manufacturing or preparing of the substance called woad for blue-dyers by the application of shumac, peat, oak-bark, and the stalks, stems, or other parts of the hop-plant, as a substitute for the plant called woad, that is, the plant now cultivated, which, being prepared by grinding and fermentation, is, when applied by dyers for dying blue and other colors, called woad, as above described.—In witness whereof, &c.

SALT HAY FOR MANURE.—Mr. E. B, of Lynn, Mass., is of opinion that Salt Hay is worth five dollars per ton, for manure, to be spread on mowing land. He says he once spread a quantity of salt hay in the spring of the year on some low grass land, and the yield of grass was as great as ever had been under any circumstances. It is very valuable as litter under cattle and forms a most valuable ingredient in compost. The above authority is that of a most careful and honest farmer; and deserves entire confidence. Salt hay is generally estimated at two-thirds the value of English. There are several kinds of it; some of it too coarse for any purpose but that of litter. We speak of the finest quality; when well cured it is eaten with great avidity by the cattle, and is substantial and nutritious. It will not answer for milch cows, as it very soon diminishes the secretions of milk. Of course it cannot be often afforded to use it for manure. In cases of extraordinary abundance, however, or low price of English hay; or of damage to the salt hay in curing from the tide or rains, it may sometimes be profitably applied as manure. The fact of its successful application in this way is at least worth recording. H. C.

MANUAL LABOR SCHOOLS AND COLLEGES. We are so satisfied of the importance of these American innovations upon the old worn-out system of education in Europe, and of their congeniality with the spirit of our republican institutions, that we take great pleasure in urging upon the community the necessity of engrafting them deeply into the structure of all our schools and colleges—public or private. As an example of their great utility we refer to an oration recently delivered by a pupil of the Manual Labor High School of Elyria, Ohio, as inserted in the Advertiser of that place. The vigor of thought shown in this document, is itself a proof of the invigorating influence of wholesome manual labor in useful arts conjointly with the exercise of the mind, on more speculative and abstruse studies.—Many of the students, we learn, of this school entirely support themselves by their manual labor. The orator, referring to the olden systems, says truly:

"They are destructive to human life; though they cultivate the tree of science, they sow the seeds of death. Now what is to be done? Shall the cause of education be abandoned? Shall the world fall back into barbarism? Or shall science continue to be watered with human blood, and college bowers become the graves of the students?"

Again:

"Does manual labor have a good effect upon the body? Evidently it does; it enlivens the circulation of the blood, strengthens the digestive powers, and keeps in healthful action the whole system; and the most serious effects often result from confinement; the limbs become weak, the operations of the system sluggish, the whole body debilitated, and some fatal disease soon follows. Now, if it has these effects upon the body, it must have a very strong effect upon the mind, by means of the sympathy which exists between the two,—so that, when the body is diseased, the mind is incapable of discharging its functions. Can a fine lady pursue the business of a milliner in a house daubed with filth and covered with cobwebs? just as possible for the mind to pursue its employment in a body made sluggish by inaction and tainted with disease. Another great benefit arising from the manual labor system, is, the pecuniary aid it renders to the student; and, indeed, without this aid, the benefits of education would be denied to a great part of community."

[Our common schools afford abundant education gratuitously, but they do not give food and raiment.]

"Some oppose this system no doubt, for the very reason which makes the republican and the philanthropist love it; because it unlocks the temple of science, throws open the iron gates, and bids the indigent youth enter and eat of the banquet hitherto provided only for the rich."—[Sunday Morning News.]

We republish the following extract from the Dunkirk Beacon, of April 19th, with the single remark, that the work is only *suspended*, in consequence of the depressed state of the business of the country.—[Editors R. R. Journal.]

NEW-YORK AND ERIE RAILROAD.

We learn with regret, that a rumor has obtained circulation, that the New-York and Erie Railroad Company have suspended their operations, and will abandon the work. This rumor has undoubtedly arisen from the late prudential determination of the Directors of that Company, to dismiss a portion of their Engineers, and thereby diminish a large daily expenditure of money.—The deep interest felt by the whole community in the successful prosecution of this work, has very naturally excited fears that it will not go on, and the judicious act, under present circumstances, of curtailing the operations of the Company, has given currency to the report, that that work will be relinquished. It gives us pleasure to say, that there is no foundation for the report that the work will be abandoned. We understand that the surveys in Chautauque and the Cattaraugus, will be continued, though with a diminished number of Engineers, and that the line of road will be prepared for letting to contractors, whenever the present general pecuniary alarm shall have subsided. It is confidently believed, that the lapse of a few weeks will produce this desirable change in the condition of the country. This great work *cannot be abandoned*. The feelings—the interests, the necessities of the whole Southern section of the State, *City and County*, requie and will enforce its construction.

From the Poughkeepsie Telegraph.

Mr. Cornelius Husted, of Pine Plains, in this county, fattened this fall, a "lady pig" and eleven "blooming responsibilities," the weight of which was twenty-four hundred and thirty-seven pounds.

DUCTHESS OUTDONE BY TOMPKINS.

We are authorised to state, that Mr. C. H. Morrell, of Lansing, has fattened a sow and her litter of twelve pigs, the aggregate weight of which, in a dressed condition, was 3 550 pounds. The pigs were 9 months and 10 days old.

This is the largest product from a single family, of the age, which we have any account of.—[Ithaca Chronicle.]

CHEAP MANURE.—"Raise a platform of earth on the headland of a field, eight feet wide, one foot high, and of any length according to the quantity wanted. On the first stratum of earth lay a thin stratum of lime fresh from the kiln; dissolve or slake this with salt brine from the nose of a watering pot; add immediately another layer of earth, then lime and brine as before; carrying it to any convenient height. In a week it should be turned over, carefully broken, and mixed, so that the mass may be thoroughly incorporated. This compost has been used in Ireland; has doubled the crop of potatoes and cabbage; and is said to be far superior to stable dung."

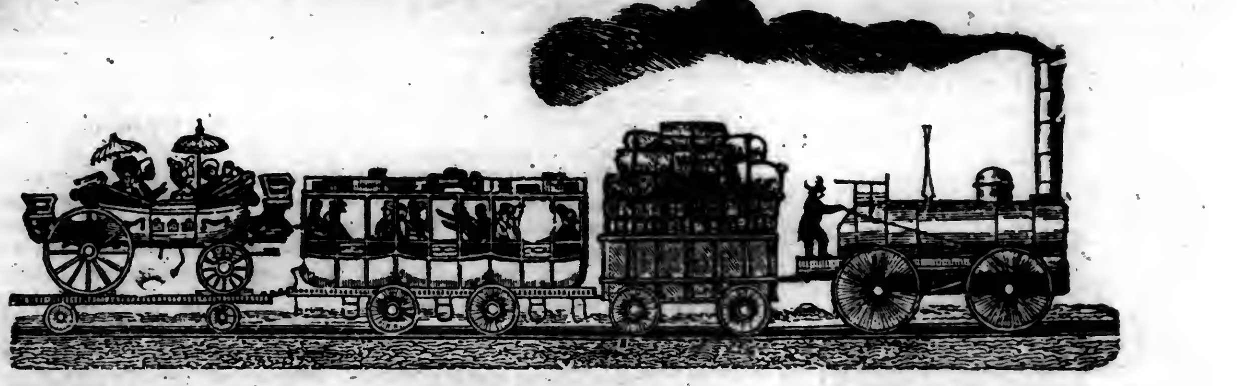
I have tried the above manure with some success; but not with success equal to the above statement. Something must depend on the kind of soil to which it is applied.

H. C.

From the Springfield Journal.

BOSTON PIGGERY.—About six miles from the city, in West Cambridge, is the Boston Piggery. At least for 700 hogs are here constantly kept in pork condition, *entirely* on the offal from the dwelling houses in Boston, every one of which is visited in turn by the city carts. The offal increases, and the contractor calculates that it will be sufficient hereafter to fatten 1,000 hogs. He now receives four cart loads a day, and pays the city $3,500 a year, or about $2,75 a load. He receives three dollars a day for what the hogs leave. The city Treasury loses $1000 a year by the operation, and it is said the man makes three times that sum. The pig pen is an enclosure of fifteen acres, with places of shelter from the storm. As the hogs attain their size, they are slaughtered on the spot—the fat barrelled up, and the lean sold in the city. According to the rule in the country, the contractor should furnish each family in the city once, a year with a spare-rib, for the food furnished the piggery.

Advertisements.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, MAY 6, 1837. [VOLUME VI—No. 18.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MAY 6, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William-street, and *opposite the Bank of America*.

☞ SUBSCRIBERS IN THIS CITY, who change their residence on the 1st of May, will please give notice at the office, 30 Wall-street, *Basement Story*. It is desirable that the notice should specify their late and future residence.

The following notice has been accidentally overlooked by us, until this time, therefore, ask for it particular attention.

MACHINERY FOR PREPARING RAILROAD TIMBER.

We give publicity to the following communication, as the best mode of answering the desire of the writer.

PEMBROOKE, Genesee Co., April 27, 1837.

Messrs. Minor & Schaeffer.

Gentlemen—On perusing the Journal of 24th December last, I found some remarks of William Dewey, Esq., in his Report upon the Watertown and Cape Vincent Railroad, which drew my attention to the subject of Machinery for preparing timber for the foundation of Railroads.

Having some knowledge of Mechanics' as also of Engineering, I turned my attention to the subject during the past winter, and have constructed a model. The design of which is to be attached to a Locomotive, and placed on a section of the road finished for that purpose. A travel of 55 rods will transport, cut and prepare two sills, and four ties to be delivered to the workmen at the end of the track. And as the track is extended will prepare a large load of timber. The sills are straitened on one side, or split in the centre. Ties split or quartered as may be desired, and rails and ribing sawed of any size required.

The machine is extremely simple not likely to get out of repair. Requires but two hands to manage it, and may prepare a load of timber without stoping to shift the Logs. The cost of Machine will probably fall below $500.

I take the liberty of addressing you, gentleman, for the reason that I suppose it something likely that Mr. Dewey may not be in the city. You will oblige me therefore by communicating these lines to him, and as I am about to construct a full size machine under the patronage of the Buffalo and Batavia Railroad association. Mr. Dewey would oblige me much by giving it a personal examination when finished.

A communication from Mr. Dewey, would also be very acceptable.

Very respectfully,

Your obedient servant,

AMOS TYRELL, JR.

From the Athens, (Tenn.) Journal.

HIWASSEE RAIL ROAD.

It will be seen by the subjoined letter, from the President of the Wetumpka and Coosa railroad, that that Company is anxious to connect their road with the Hiwasse road, which we have not a doubt will be effected in a few years. While on the one hand we are rejoiced to see a spirit of enterprise prevailing amongst our citizens, on the other we cannot help being astonished at finding some amongst us who yet remain so blind to their own interest, and the prosperity of East Tennessee, as to be guilty of throwing all the difficulties in the way of the improvement of their country that they are capable of.

In our view, the Hiwassee railroad will be the most grand and important link in all the railroads of the United States. In Virginia and North Carolina a number of railroads are constructing and in contemplation, which will be extended to the Tennessee line; and, finally, connected the great Charleston and Cicinnnati railroad; and in Georgia and Alabama a number are constructing, all converging to a point, or nearly so, near the line of our State, and all these roads, on the north, south, east and west will be connected together by the Hiwassee road. The Charleston and Cinnati road will ultimately be extended to the northern lakes, and numerous other roads from the interior of the whole north-west will be constructed and connected with it; the New-Orleans road will also be extended to and connected with the Charleston and Cincinnati road; and thus the whole Atlantic sea-board and the northern lakes will be connected together by the Hiwassee road.

WETUMPKA, Feb. 6, 1837.

Gen. S. D. JACOBS,—

Dear Sir: Your letter of the 10th of last month, addressed to John D. Williams, Esq. was laid before the Board of Directors for the Wetumpka and Coosa railroad company, and by them I have been instructed to communicate with you as to our views and intentions, and to give you such information as would probably be interesting to your company. The Wetumpka and Coosa railroad company was chartered in 1835, with power to run a railroad from Wetumpka to the mouth of Beaver creek, on the Coosa river, being at the head of the shoals in said river. During the last session of our Legislature, our charter was amended, and the right given to run the road on to Gunter's landing, or to the Georgia line, or both, if the company should deem it proper. The object of our company is to build the road to one of said points as early as practicable. We have already had the road surveyed upwards of one hundred miles, and our engineer, Capt. D. H. Bingham, and corps, are now locating the first thirty miles, ready for contract, as advertised, upon the first of next month. You speak of a connection with our company. Upon that point we should be pleased to hear from you more defin tely as to the nature and terms of the connexion you wish. Your propositions have been received with pleasure by our Board, as opening to our view the accomplishment of an object to which we have looked with great anxiety and solicitude. We are well aware of the benefit to be hoped for from the completion of the railroads now in progress and contemplation in our country, and to none do we look forward with more pleasure or more hope of advantage to our immediate section of the country, than the Hiwassee railroad, and to show you the feelings and wishes of our Board, by their order I herewith transmit you the following resolutions adopted on the subject of your communication:

Whereas, the Wetumpka and Coosa railroad company have it in view to extend their road so as ultimately to form a conjunction with the Charleston, Cincinnati and Louisville railroad, near Knoxville, in Tennessee: And whereas, a communication has been received from the President of the Hiwassee railroad company, asking for the ultimate views and determination of this company in relation to such extension—Therefore,

Res lved, That this company deem it expedient to extend our road to the Tennessee line, and that we will heartily co-operate with the Hiwassee railroad company, in opening a communication from Knoxville, Tennesse, to Wetumpka, Alabama.

Resolved, That this company appoint an agent to visit that part of Georgia and Tennessee through which our road will run, with authority to make such arrangements with any company in Georgia, whose road shall be in the direction of the proposed extension of our road, and with the Hiwassee railroad company, as may be necessary to effect the objects of this company.

Resolved, That the President of this company transmit a copy of these resolutions, with such remarks as he may deem necessary to accompany them, to the President of the Hiwassee railroad company.

The agent alluded to in the above resolutions, will probably not visit you before we hear from you a again.

Very respectfully,
Your obedient servant,
ALWIN A. McWHARTER,
President of the Wetumpka railroad company.

OCEAN STEAM NAVIGATION.

An article in the London Nautical Magazine, for March, furnishes the following notice of preparations which are making in England, in reference to the establishment of regular steam packet communications between that country and the United States. The boats, it will be seen, are to be of extraordinary dimensions, with machinery of corresponding power.

There are two vessels at present building to run direct from Bristol and London to New-York. The great Western Saip Company's vessel is building at Bristol, and is of the following dimensions and power:

Length between Perpendiculars,	316 ft.
Beam,	35 "
Depth in hold,	22 "

The engines are 400 horse power, having cylinders 73 inches diameter, and 7 feet stroke.

This noble vessel is expected to be ready in the course of the approaching summer, and will most probably make her first voyage in August next. She is intended to carry twenty-five days' fuel—a quantity quite sufficient to ensure the regular performance of the voyage in all weathers.

The British and American steam navigation company, whose head quarters are in London, have contracted with Messrs. Curling, Young & Co. of Limehouse, for a vessel of 1,795 tons, builders' measurement, and of the following dimensions and power:

Length between Perpendiculars,	335 ft.
Beam,	40 "
Depth,	27 "

to have engines of 460 horse power, having cylinders 76 inches in diameter, and 7 feet stroke. The engines are fitted to work either with or without Hall's con lenser, at the option of the engineer. This magnificent vessel, the largest steam vessel ever yet propelled, will have capacity for twenty-five days' fuel, 800 tons of measurement goods, and 500 passengers.

We sincerely wish both the Bristol vessel and the London one all manner of success; and when we reflect on the immense intercourse between this country, the United States and Canada—sixty thousand people having landed at New-York from the 1st January to 1st September, and twenty-seven in Quebec last year—the increase that will naturally take place when the passage is shortened at 15 days, instead of 37, the present outward average passage of the New-York packet ships, we do not think that any, out of the numerous plans before the public, hold out stronger inducement to the capitalist than such undertakings.

It is difficult to estimate the national benefit that will accrue to both countries by the establishment of steam communication between them—the one with an overflowing population, the other with inexhaustible reserves of fertile lands—the one the greatest manufacturing, the other the most extensive producing country, in the world—both talking the same language, and allied by blood, religion, and feeling, with one another. Thus much, we may affrm, that it will greatly improve both countries, and render perpetual the peace that now so happily exists between them.

NEW-JERSEY RAILRORD.—We find in the Newark Daily Advertiser the following account of the business of this road.

We extract the subjoined statement of the business of the N. J. Railroad from the forthcoming Directory of this city:

Statement of the number of passengers carried on the New-Jersey Railroad, from its opening, Sept. 15th, 1834, to April 9th, 1837, furnished from the Books of the Company.

During the first seven and a half months there were carried,	60,064
During the year ending 1st of May, 1836,	176,751
During the year ending 9th April, 1837,	339,351

The Railroad opened for use from Rahway and Elizabethtown to New-York on the 1st January, 1836, and from East Brunswick (oppsite New-Brunswick) July 10th, 1836. The whole of the present line of Railroad has not been in use a full year, and as the viaduct over the Raritan is not yet finished, the business arising from the extended part is but partially developed. The number of passengers which have been carried to and from Newark and E. Brunswick and the intermediate places, exclusive of the passengers between Newark and N. York, during the year ending April 9th, 1837, is 102,931

The number carried between Newark and N. York in the same line,	236,420
Whole number during the year as above stated,	339,351

The increase of passengers for the first quarter of the present year, over the first quarter of the last year, is as follows:—

In January, Febuary, and March, 1836,	41,741
In January, February, and March, 1837,	69,228

The increase would have been greater if the business of the cities of New-York and Newark and the country generally, had not been so depressed, but the vast number of passengers compared with what were carried before the construction of the Railroad, fully proves that the travelling facilities now enjoyed by Newark has greatly increased the intercourse of Newark with New-York, and the different places on the line of the

Railroad. A further increase may be anticipated from the construction of the continuous line of Railroad across the State, for the completion of which an Act was passed at the last session of the Legislature of this State, and accepted by the Joint Companies, who are required to finish this connecting link of Railroad as soon as the New-Jersey Railroad is in use to New-Brunswick. This work will not only be highly advantageous to this city in its southern intercourse, but beneficial to the State and to the whole community, and will greatly augment the revenue of the New-Jersey Railroad and Transportation Company.

The Calais and Milltown Railroad was commenced upon last week, and it is expected the road will be ready for cars in October next.—[Portland Advertiser.]

THE CANALS.—The nmmber of boats cleared and toll received by the collector of tolls at Albany, on the three first days of canal navigation in the years 1834, '35, '36 and '37, are as follows :

1834	boats	80	toll	$5,097 23
1835	"	83	"	7,056 44
1836	"	52	"	5,800 40
1837	"	140	"	14,888 70

This result is certainly calculated to excite some surprise, when the prevailing depression in money matters is considered.

• [Albany Argus.]

From the Rushville Illinois Journal.

THE RUSHVILLE RAILROAD.—The Engineer W. Pollock has commenced examination and survey of the route for this road, to the Illinois River. We are much pleased with being able to announce this fact to our readers. There cannot now remain a doubt but it will be prosecuted with vigor to its final completion, and which will be a link in the great internal improvement which is about being commenced to connect the trade of this section of the State with those of Lake Erie and of the eastern cities, by the means of the Maume Canal

The Railroad from Beardstown, to Springfield, the future seat of Government, and there to insect the State Railroad from the Wabash. This means of communication, will cut off at least one thousand miles of difficult navigation, and will give to our merchants and others, a near and safe communication to the Lakes and the cities of New-York and Philadelphia. By this means the distance and expense of transportation will be reduced. This enterprise speaks much in favor of the knowledge and forecast of our enterprising fellow citizens—as they are unaided by any enactments of our Legislature. That the stock will be profitable, there cannot now remain a shadow of doubt. It will be the great thorough fare from the Wabash to Mississippi, and passing the seat of Government of this State. And again it is on the Route laid down for a Railroad from Alton via Carlton, Jacksonville and Beardstown to Rushville, Monmouth, on to Galena. Thus we will have the wealth of the mines, soil &c., passing on our Railroad. This is not ideal or imaginary ideas—they are self evident.

When it is known that for six or seven months in the year that all the mining region are shut out from market, by ice or low water—which cannot much longer be the case. Then we say that the stock must and will be profitable.

RAILROADS AND IMPROVEMENTS IN MICHIGAN.

We copy the following letter to the Editors of the Daily Express, to show the spirit of the people of Michigan, in these hard times. It is highly interesting to all kinds of mechanics.

From the New York Daily Express.

DETROIT, April 10, 1837.

The Spring has come forth here with all its "melting influences," and our river, with the exception of an occasional floating mass, from the upper lakes, is entirely free from ice. The navigation is open as far as Cleveland, and we are looking daily for a water communication with Buffalo.—Business has already made a brisk move, and we have a goodly promise of a busy summer. The contracts and projects for building during the coming season, are very numerous, and not a few buildings are already being erected. This has created a great demand for mechanics and laborers. They ask, and receive their own prices.—This demand is not like to be supplied, as I understand the contractors upon the railroad between this place and Ann Arbor require a very large number of workmen, for the construction of that road, and are offering the highest prices. Let Eastern mechanics and laborers look this way. There is no place where "working men" will meet with a warmer reception than in Detroit.

Some adequate idea may be formed of the growth of our city, from a Directory lately published, from which I extract a few Statistics. In March, 1834, there were but 1973 inhabitants, and 541 dwellings and stores. By the sensus taken early in the winter, it was ascertained that there are 9763 inhabitants, and exceeding 1300 stores and dwellings. Thus the population in two years and a half, has nearly doubled, and the number of buildings more than doubled!

The railroads—one running north-west, to Pontiac, another west to Ann Arbor, being a portion of the Detroit and St. Joseph's route, are under contract as far as the places above mentioned. It is believed that they will both be in operation, a part of the way, during the Summer. The Pontiac road, early in the season. A turnpike company was chartered by the last Legislature to construct a timbered road, between this city and Pontiac. One of the company informs me that so soon as the weather permits, the turnpike will be commenced, and if laborers can be had, finished by the middle of the Summer. The roads leading in every direction from Detroit, have hitherto been culpably neglected. They have been left in a condition both disgraceful to our public spirit and deeply injurious to the interests of the city. The attention of the citizens has been called to the subject during the past winter, and meetings held to devise the best means of remedying the evil. It is hoped that the public feeling will not sleep again until all of our great highways are at least in a passable condition. I extract further from the Directory. "There are seven churches in Detroit—two Catholics—one Episcopalian—one Presbyterian—one Methodist—one Baptist, and one German Lutheran. Four of the edifices for worship are built with taste and magnificence. Among the public buildings are the State House, City Hall, Theatre, Museum, Circus, Michigan Garden, and three Markets. There are two daily and one semi-weekly newspapers—a college (St. Philips') under the direction of the Catholic Bishop—two or three female seminaries—a number of literary, scientific, and charitable institutions—and three banks, 'all possessing in an eminent degree the confidence of the people in regard to soundness and stability.'"

I have given you in a former letter some statistics showing the increased trade of Detroit during the past year. I cannot, however, refrain from again alluding to the astonishing increase of commerce and navigation upon our Lakes. It is an unanswerable argument to those cavilers who contend that the whole prosperity and business of the West is but excitement and speculation, having nothing permanent or valuable.

In 1819, there was but *one* steamboat on the lakes, and this one sufficient for the trade at that period. There was last summer *thirty steamboats* of the largest size in navigation of the lakes between this port and Buffalo. Seventeen of these, forming an aggregate of 2080 tons, are owned in this city. These thirty boats, with one hundred and fifty vessels of other denominations, did not suffice for the trade of the last summer. Of the one hundred and fifty vessels, eighty-four, amounting to 5147 tons, belong to this port. Very justly does the author of the Directery conclude—"This affords a flattering and unequivocal proof of the prosperity of the capital of Michigan, and gives a glimpse of what it will be ten years hence."

I ought perhaps to add that a large number of vessels and steamboats have been built during the past winter, or are now building. There is now constructing in one of our yards a steamboat larger, I believe, than any at present floating upon the lakes. I intended when I commenced this letter, to say something of the interior of this State, whence I have just returned from an excursion of two weeks. I must, however, defer what I have to say to a future letter, as I find myself at the end of the sheet. I will barely add, that I have been delighted with the beauty of the country—the fertility of the soil—the thriving and bustling aspect of the villages—and the universal air of enterprise, intelligence, and contentment through the whole country that I have visited. I have come back more than ever convinced of the abundant resources and wealth of Michigan.

Yours, &c. W.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

TABLE IX. CONTINUED.—THE SWIFT (FIRST SET).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's name.	Instant of passing the stake.	Stakes 110 yards apart.	Time of passing the stake-interval.	Miles per hour.	Tractive power in lbs.	Feet per second.	Kind of tractive power.	Load.	Wind.	Draught. Bow.	Draught. St'n	Position of Wave.	Variation in Level.	REMARKS. PLACE OF EXPERIMENT, GLASGOW AND PAISLEY CANAL
306	SWIFT.	29 56 30 37 31 17½	b c d	41 41½	5·49 5·42	268·8 347·7	8·05 7·95	do.	do.	do.	do.	do.	do.	do. do. elev. 58′	
307	SWIFT.	38 50½ 39 37½ 40 25	b c d	47 47½	4·79 4·76	91·2 76·6	7·02 6·95	do.	do.	do.	do.	do.	do.	do. do. elev. 3′	
308	SWIFT.	44½ 1 12½ 1 39	b c d	28 26½	8·03 8·49	266.6 358.8	11·79 12·45	do.	do.	light	do.	do.		do. do. elev. 1°20	
309	SWIFT.	52 15 52 49 53 23	b c d	34 34	6.62 6.62	341·8 335·5	9·71 9·71	do.	9 passengers,& 2t. 15 cwt. = c. q. lb. 67 0 25	do.					

TABLE X.—ZEPHYR AND RAPID LASHED TOGETHER.—(2 *Experiments*.)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's Name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing the stake interval	Miles per Hour.	Tractive power in lbs.	Feet per Second.	Tractive power.	Load.	Wind.	Draught. Bow	Draught. St'rn	Position of Wave.	Variation in Level.	REMARKS. PLACE OF EXPERIMENT, FORTH AND CLYDE CANAL.
		min. sec		sec.	miles.	lbs.	feet.								
310	ZEPHYR and RAPID lashed together.	53 20 53 5 54 28 55 03½ 55 40	b c d e f	34 34 35½ 36½	6·62 6·62 6·34 6·16	297·5 264·4 231 501·5	9·71 9.71 9·30 9·04	Two Horses.	7 passengers, = c. q. lb 9 2 1	not obs.	in. 7	6	not do.	not obs.	
311	do.	21 46 22 07 22 28 22 52½ 23 17	b c d e f	21 21 24½ 24½	10·71 10·71 9·18 9·18	 472 521·8	15·71 15·71 13·47 13·47	Three Horses.	do.	do.	do.	do.	do.	do.	In this experiment the pu'l went above the range of the Dynamometer in the first two stake-intervals.

TABLE XI.—THE SWIFT (Second Set.)

ACTUAL TRACTIVE POWER OBSERVED IN WORKING THE SWIFT EIGHT MILES ALONG THE GLASGOW AND PAISLEY CANAL, AT THE ORDINARY PASSENGER-SPEED, OR NINE MILES PER HOUR.

Tractive Power in lbs.	Remarks.	Tractive Power in lbs.	Remarks.	Tractive Power in lbs.	Remarks.	Tractive Power in lbs.	Remarks.
170	Load—Eleven passengers and 2 ton. 15cwt., equal to 69 cwt. 3 qr. 20 lb. from Half-way House to Glasgow, and one passenger additional from the Culvert to Glasgow.	225		350		240	pass Bridge.
400		215		240		310	
400		210		300		260	
280		225		305		235	
260		195		270		245	
265		220		235		240	pass Course—Place where the Experiments were made.
240		285	pass Bridge.	230		230	
230	pass Mile-stone.	270		235		215	
240		230		240		215	
230		220		235		240	
220		235	pass Mile-stone.	225		210	
210		230		225		200	
205		235		240		235	
210		245		230		200	
215		270		260	Barge passes.	120	pass Aqueduct.
215		260		250		120	
210		230		275	turn.	150	
220		205		250		150	
245	turn corner.	215		230	pass Mile-stone.	130	
235		235		230		120	
265		235		210		100	
245		300	pass Narrow Bridge.	215		110	
205		360		235		110	
220		350		235		110	
200		300		225		100	
200		240		215		90	
195		290		215		100	Port Eglinton.
190	stop and take in a passenger. Load, therefore, about 71 cwt.	320		215			
390		300	A Boat passed.	230			
425	go on again.	270		240			
380		320		235			
230		250		270			
220		340	pass Bridge. Bad turn.	260			

TABLE XII.—THE ZEPHYR (Second Set).

ACTUAL TRACTIVE POWER OBSERVED IN WORKING THE ZEPHYR EIGHT MILES ALONG THE FORTH AND CLYDE CANAL, AT THE ORDINARY PASSENGER-SPEED, OR NINE MILES PER HOUR.

Tractive Power in lbs.	Remarks.	Tractive Power in lbs.	Remarks.	Tractive Power in lbs.	Remarks.	Tractive Power in lbs.	Remarks.
395		370		405		315	
395	Load—Nine passengers and 3 ton, equal to 72 cwt. 0qr. 25lb.	375		395		305	
395		350		340		300	
400		250		190	stopped by a Vessel at Brdge.	310	
415		240		70		295	
445		285	turn.	0		300	turn.
565		320		0		325	

TABLE XII. continued.—THE ZEPHYR (Second Set).

460		325		00		325	
190	pass Bridge.	350		170	pass Bridge.	340	
20	take off Rope.	420		330		300	
20		425		380		310	pass Culvert.
20		420		385		270	turn.
300		260	pass Bridge.	385		310	
310		0		390		370	
310		0		380		355	
100	pass Barge.	0	pass Mile-stone.	385		385	
0		440		370		360	
0		445		370		280	
0		395		370		265	turn.
80		385		335	pass Mile-stone.	245	
300		365		330		300	
355		380		270		370	
395		386		160		360	
420		385		150	pass Stockfield Bridge.	310	
425		360		0	stop.	320	pass Mile-stone.
425		350		0		345	
410		355		0		360	
405		330		130	start again.	390	
405		325		310		390	
405		350		355		390	
375		320		355		400	
355		345		345		400	
355		340	turn.	340		400	
345		290		315		370	Lamb-hill Bridge.
320		200		320		140	
320		230					
330		250					

On the Locks commonly used for River and Canal Navigation. By Mr. W. A. Provis, M. Inst. C. E.

1st. *Simple dam locks.*

The earliest approximation to what is now known by the name of lock, consisted of a simple dam formed across the bed of a river, so as to raise the water to such a height as to allow vessels to float along it. Where the river had a considerable fall with a strong current, it was necessary to have these dams at short distances from each other, otherwise the requisite depth of water could not be obtained. As the whole space between two of these dams was in fact the lock, it was necessary in passing from one level to another, to run down the water for the whole of that distance, thereby causing considerable delay, and a waste of water that would now be considered a serious evil. In China these dams are very common; they have also been used on the continent of Europe, and what is not a little extraordinary, are at this very day in use in our own country. My brother having given me a description of one of these which he saw on the river Ouse, near Tempsford, in Bedfordshire, I here insert it. The river is somewhat contracted in its breadth by a wall on each bank, between these two a third, or middle wall, is built, with cutwater ends. At the middle of each of the passages formed by these walls a sill is extended across the bottom of the channel, and pile planks are driven along its upper side, with the necessary sheeting to prevent the water getting under it. On one of the side walls a beam similar to the balance of a common canal lock gate is placed, which turning horizontally upon an axis, one end is made to abut against a projecting piece of timber which is fixed in the middle wall; this beam and the before mentioned sill form the top and bottom of a frame, on the upper side of which a row of vertical planks is placed, one at a time, so as to form the working dam; the other space has a piece of timber fixed at the top of its two side walls, corresponding with the sill below, and vertical planks are placed between these in the same manner as at the other opening, but as vessels are not intended to pass through more than one of the openings, the upper beam in the other is fixed. The use of this second space or opening is to allow the water to be run off more expeditiously, particularly during floods. In going up the stream, a vessel passes the place where the temporary dam is to be formed, and then the moveable or balance beam is swung round, the vertical planks put down, and the water thereby completely stopped till it rises to such a height as to run over the top of the dam; before this takes placel the vessel has sufficient water, and she proceeds on her voyage to the next dam above; these dams are kept open when there is no vessel near, and at all other times when there is sufficient water for navigation without penning it up. It may appear, at first, that it would be more advisable to have a complete gate similar to those now generally used on canal locks, but a gate would be attended with those inconveniences, that the water could not be run out in so short a time by its paddles as it can when the whole space which the gate would occupy is available, and also the difficulty of opening against a rapid stream a gate of the required size. Though this principle of damming up the water was a valuable improvement in our river navigation at the time it was introduced, yet as it is only applicable when water is abundant, and must at this time be considered a very rude mode of passing from one level to another, it requires no argument to show that it must soon give way to the adoption of our modern locks.

2d. *Lock with a double set of gates, but no chamber walls.*

The evils attendant on the dams just described were in a great measure removed by the introduction of double sets of gates or sluices; the upper set being constructed so near to the lower, as only to leave room enough for the vessel or vessels to float between them. Framed gates were also used instead of separate beams and planks, because the space to be emptied or filled was so small, that a very short time was required to pass the water; and there was no stream of sufficient strength to prevent their being easily opened. Where these locks are intended for rivers, it is usual to make a side cut or artificial canal for the purposes of the navigation, and to leave the river course for the passage of the surplus water. A quick bend of the river is generally chosen for one of these cuts, and to keep the water in the upper part of the river to a sufficient height for navigation, a dam or weir is made across the old river course at, or below the point where the artificial cut quits it. The lock is then built at the most convenient part of the cut, and its fall made equal to the difference in the levels of the water at the top and at the bottom of the dam or weir. When a vessel is going up the river, she floats along the cut, and passes between the lower gates into the lock, the lower gates are then closed, and the valves or paddles of the upper gates being opened, the water flows into the lock, and rises to the level of the upper part of the river; the upper gates are then opened, and the vessel floats out of the lock. Of course the reverse of this operation would conduct a vessel down the river.

It will be obvious to every one, that the sides of these locks must rise above the level of the higher part of the river, otherwise the water would flow over and injure them. The gates should also rise above the highest water's surface, or the water would flow over their tops and probably into the passing vessel, so as to endanger its safety or damage its cargo. It has been common to make the gates no higher than the water's surface, but the before mentioned inconveniences show the necessity of making them higher, and of constructing the dam or weir of sufficient breadth to take off with facility all the surplus water.

The abutments for the gates have been made of timber, brickwork and masonry, but when the double set of gates was first introduced, it was usual to leave the space between the upper and lower gates unprotected by either timber or any kind of building. Of course the agitation of the water in the lock was constantly washing away the earthen banks, thereby causing a risk of their being broken down by such continued weakening; and by enlarging the space between the two sets of gates, it occasioned a loss of time in emptying and filling, as well as a waste of water.

3d. Locks with a double set of gates, and the sides of the chamber secured by timber.

To check the mischievous tendency of leaving the chamber unprotected, the side banks of many old locks have been in part secured by driving a row of piles along the base of each slope, and fixing planks at the back of them, so as to form a wooden wall for about half the height of the lock; but there is sometimes a risk in trying this experiment, for the space between the two sets of gates being frequently lined or covered with puddle, resting on a porous substratum, the water often escapes by the sides of the piles, and causes not only leakage but a danger of blowing up the lock.—Examples of this sort of lock may be seen on the river Lea navigation.

4th. Common modern canal lock.

It is not until the construction of artificial canals became very general that locks were brought to any thing like perfection, for the difficulty of procuring sufficient supplies of water had been but partially felt when our inland navigation was confined to a few of the principal rivers.

When canals had spread themselves in various directions over the country, and water became so scarce and valuable as to be the cause of much litigation and expense, it was necessary to be careful of every resource, and to use it with the strictest economy. For this purpose, the space between the upper and lower gates was contracted to such a breadth as only to leave room enough for the vessel, and the bottom and sides were constructed of brickwork or masonry, instead of sloping banks of earth. By these means the superficial area of the lock was reduced to very little more than that of the vessel, and consequently was as small as it could be made.

The difference of altitude between the upper and lower levels, where the locks are constructed, varies according to local circumstances. Where the ground is longitudinally steep and water plentiful, the locks are generally made of greater lift or fall than where the ground is comparatively flat and water scarce. It is evident that, where the superficial area of locks is the same, one having a rise of 12 feet would require twice the quantity of water to fill it that would be requisite for one of 6 feet. Having many locks, however, of small lifts instead of a few of greater, increases the expense as well as the time for passing them.

For narrow canals these locks are generally made about 80 feet long, and $7\frac{1}{2}$ to 8 feet wide in the chamber. On the Caledonian canal they are 180 feet long, 40 feet wide, and 30 feet deep. Locks are also constructed of every intermediate size.

Lock gates have till lately been made of timber; but in consequence of the difficulty of procuring it of sufficient size for those on the Caledonian canal, cast iron was partially adopted for the heads, heels, and ribs. Iron gates, cast in one piece, have been used on the Ellesmere canal, as well as others with cast-iron framing and timber planking.

Whether constructed in a single leaf, or a pair of leaves, the gates of locks are usually made to turn horizontally upon a pivot at the bottom of the heel; but there is a singular exception at the locks on the Shrewsbury canal, where, at each end of the lock, a single gate is made to rise and fall vertically, in grooves in the side walls. A pulley is fixed on its axis about 12 feet above the lock, over this a chain is passed, one end of which is fixed to the top of the gate, and the other to a weight, by which the gate is so nearly balanced as to allow of its being worked up and down by one man. On entering or quitting the lock, the boats pass under these gates.

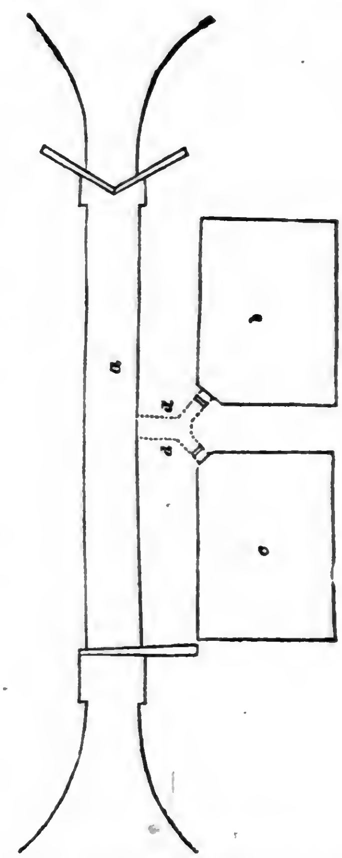
I am not aware of any lock in England of greater rise than 18 feet, but Tatham in his work on canals, (p. 164,) mentions one of 20 feet rise, built in 1643, by Dubie, between Ypres and Furnes, to connect the canals which bear those names. There are two pair of upper gates to this lock to guard against accidents.

On the Languedoc canal there is a celebrated circular lock, which has had more credit bestowed upon it than it deserves. The fact is, it is nothing more than a circular basin, into which three canals of different levels descend by common locks.

Various modifications of this principle have from time to time been adopted, either to save water, time, or expense.

5th. Locks with side ponds.

When water is scarce, it is common to construct side ponds, by which a considerable portion (in general one half) is saved. The usual number of these ponds is two, for it has been determined by experience, that when a greater number have been made use of, the loss occasioned by leakage and evaporation has sometimes been more than equal to the additional quantity of water retained.



In the accompanying sketch, *a* is a common lock, *b* and *c* two side ponds, (each equal to the area of the lock,) *d d* two culverts with paddles, each communicating with the lock and one of the side ponds. Supposing the lock to fall 8 feet, the bottom of the pond *b* will be 4 feet, and that of *c* 6 feet below the surface of the lock when full. If a vessel is to descend, it enters the lock when full, and the gates being closed, the paddles of the side pond *b* are opened, and the water flows into it till the level of the water in the lock is lowered, and that in the side pond raised, till they are the same, which will be when the water in the lock has sunk 2 feet; the paddles of the side pond *b* are then closed, and those of *c* opened; a similar operation then goes on till the water in the lock has sunk 2 feet more, when the paddles of *c* are also closed, and the remaining 4 feet of water in the lock is run into the lower level of the canal, through the paddles in the lock gates. When the lock is to be filled the water in *c* is first run into the lock, which raises its surface 2 feet, the water in *b* is next run into it, which raises the surface another 2 feet, making together half a lock full, the upper half is then run down from the higher level of the canal.

6th. Locks for the transit of vessels of different sizes.

Where vessels of different sizes have to pass the same locks, three pairs of gates are sometimes placed instead of two,—the distance between the upper and lower pairs being sufficient to admit the largest vessels, and that between the upper and middle pairs being adapted to the smaller class. By this contrivance, when a small vessel is to be passed through, the lowest pair of gates is not used, and when a large vessel goes through, the middle pair of gates is not worked. Thus, it is evident, that the quantity of water contained between the middle and lower pair of gates is saved when a small vessel passes, compared with what would be required were the middle set of gates omitted.

7th. Parallel double transit locks.

But where the transit is great, much time and water may be saved by a double transit lock, which is, two locks placed close to and parallel with each other, with a communication between them, which can be opened or cut off at pleasure by valves or paddles.

As one of these locks is kept full and the other empty, a vessel in descending floats into the full one, the upper gates are then closed, and the water is run, by means of the connecting culvert, into the empty lock, (the gates of which were previously closed,) till the water in the two locks is on the same level, which will be when each is half full; the connecting paddles are then closed, and the remaining half of the water in the descending lock is run into the lower canal. The next descending vessel has to be floated into the lock which remains half filled, and which consequently requires only half a lock of water to be run from the upper pond to raise it to the proper level, and then that half is transferred to the lock previously used, to serve the next descending vessel; but supposing a vessel to be ascending after the first descent, it will enter the empty lock, and receive a quarter lock of water from that which remained half filled: of course three-quarters of a lock of water is now required from the upper canal to complete the filling. If a descending vessel next follows, it enters the full lock, and its water is run into the lock which was previously left a quarter full. and when both have arrived at the same level, it is evident they will be each five-eighths full; and the succeeding descending vessel will require only three-eighths of a lock of water from the upper pond or canal. From these observations it will be seen that the double transit lock saves nearly one-half the water which a common single lock would require.

Sometimes the two parallel locks are made of different sizes, to suit the various description of vessels that may have to pass.

8th. Locks connected longitudinally, commonly called a chain of locks.

When loss of water is of no consequence, a considerable expense is sometimes saved, by placing the locks close together without any intermediate pond, for by passing from one immediately into the other, there is only required one pair of gates more than the number of locks so connected, besides a proportionate saving of masonry.—Thus, 8 connected locks would only require 9 pairs of gates, whilst, if they were detached, they would require 16 pairs, but to show that these cannot be adopted with propriety, excepting when water is abundant, it is necessary to observe that every two alternate ascending and descending vessels will require as many locks full of water as there are locks; for instance, if a vessel has just ascended, it has left all the locks full, a descending vessel then enters the upper lock, and when its gates are closed, the water is run down, but all the locks below being previously filled, they cannot contain it, and it consequently passes over the gates or weirs of all of them into the lower canal: the vessel has by this means descended to the level of the second lock, the water in which must also be run into the lower canal, for the same reason as already stated. When the water of all the locks has thus been run down, an ascending vessel will require all these locks to be filled from the upper canal, which, however, will be retained in the locks ready for the succeeding vessel to pass down. From this it will be evident that where 8 locks are connected, a descending vessel draws no water from the upper canal, because the locks are previously all filled, but it empties 8 locks of water into the lower canal; an ascending vessel on the contrary empties no water into the lower canal, because all the locks were previously emptied, but it draws 8 locks full from the upper canal in order to fill them consequently the passing of one ascending vessel, and one descending, requires 8 locks full of water.

9th. Other modes for passing vessels from one level to another.

By substituting machinery, either wholly or in part, have been adopted; but these have either failed entirely, or not been brought into general use.

AN ACCOUNT OF THE NEW OR GROSVENOR BRIDGE OVER THE RIVER DEE AT CHESTER.

[The drawings from which the engravings of this bridge (plates Nos. VII. and VIII.) have been made were furnished by Mr. John B. Hartley, son of the engineer under whose direction the edifice was built, and the following account has been derived from a letter from him to the President, accompanying the plans, and other original communications in the possession of the Institution, and partly from the minutes of conversation at several meetings when Mr. Trubshaw, the contractor for the work, was present*, while such other trustworthy sources of information as were accessible have also been referred to. The statements, so far as they go, rest therefore on good authority, but the Council cannot help regretting that they are unable on this occasion to present a connected account of the work worthy of its magnitude, directly from the pen of some one of the gentlemen engaged in its construction.

Though the site of the new bridge is quite apart from that of the old one, and the latter exists as before with the exception of being no longer the leading thoroughfare, a short notice of the ancient structure, as supplied by antiquarian writers, has not been considered altogether out of place.]

The old bridge over the Dee at Chester extends from the city to a suburb on the opposite side of the river named Handbridge.

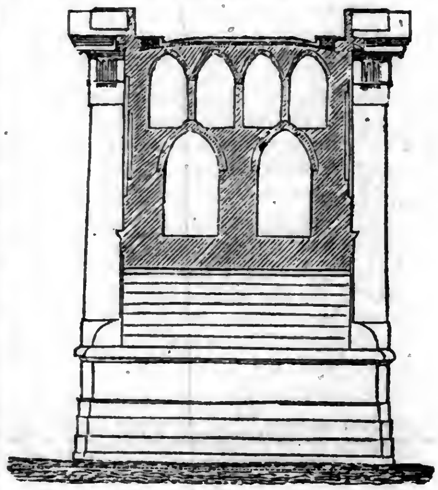
* Orig. Commun. Vol. IV. No. 9, and Vol. V. No. 16; Min. of Convers. Vol. V. Nos. 8, 9, and 13.

The first notice of a bridge in this place occurs in the thirteenth century, during which it is recorded to have fallen down or been carried away twice. Those structures were most probably of timber, but on the second accident alluded to a stone erection seems to have been substituted at the cost of the citizens: this was in 1280, and it does not appear that the bridge has been entirely rebuilt since, though it is mentioned that part next Handbridge was "made new" in the year 1500. The two arches on this side are plainly of later build than the rest; one of them is in form a segment of a circle, the other is very slightly pointed, while the remaining arches are pointed Gothic. The whole has been repaired and widened within the last few years.

As usual in former days, Chester Bridge was provided with its gates, which remained until towards the end of last century. Each extremity of the bridge was guarded in this manner, and over the gate next the city stood a tower, named "Tyrer's Tower," for raising water from the wheels under some of the arches for the supply of the town: the tower no longer exists, and there is now only one gate, a modern edifice, on the English side of the river, but the water works and the weir still remain.

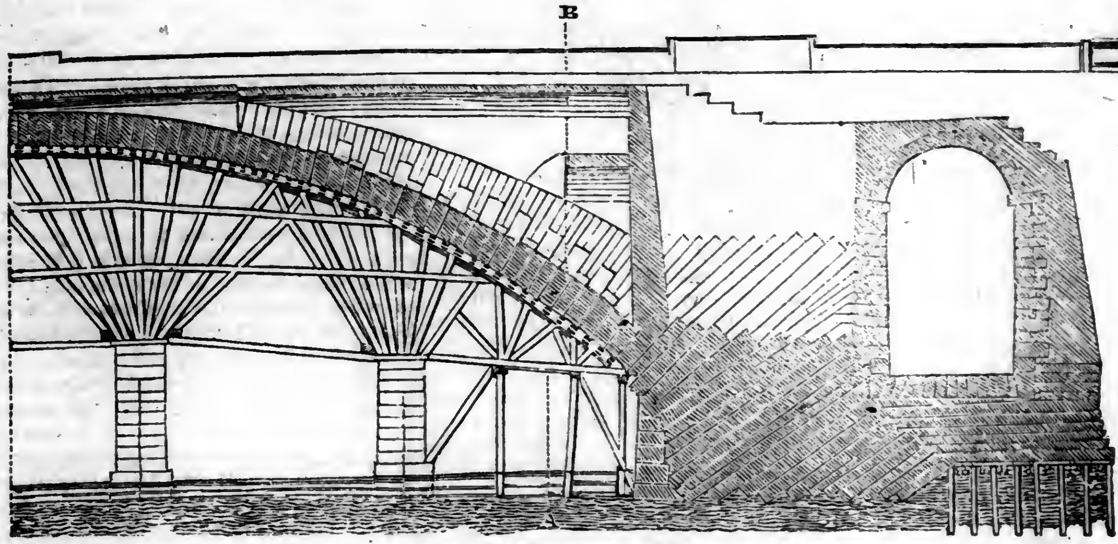
Plate 7.

Cross Section throguh the line A. B.



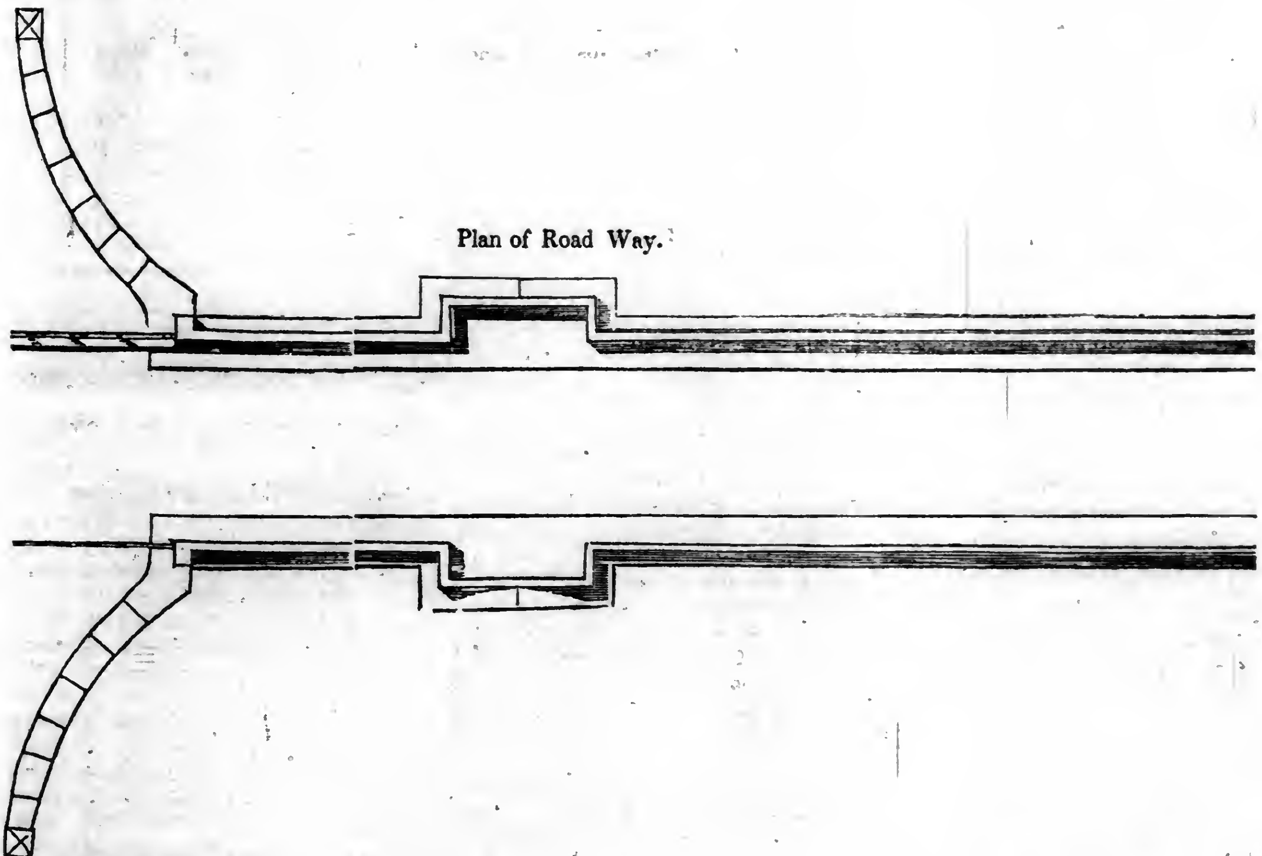
Cross Section through the Crown.

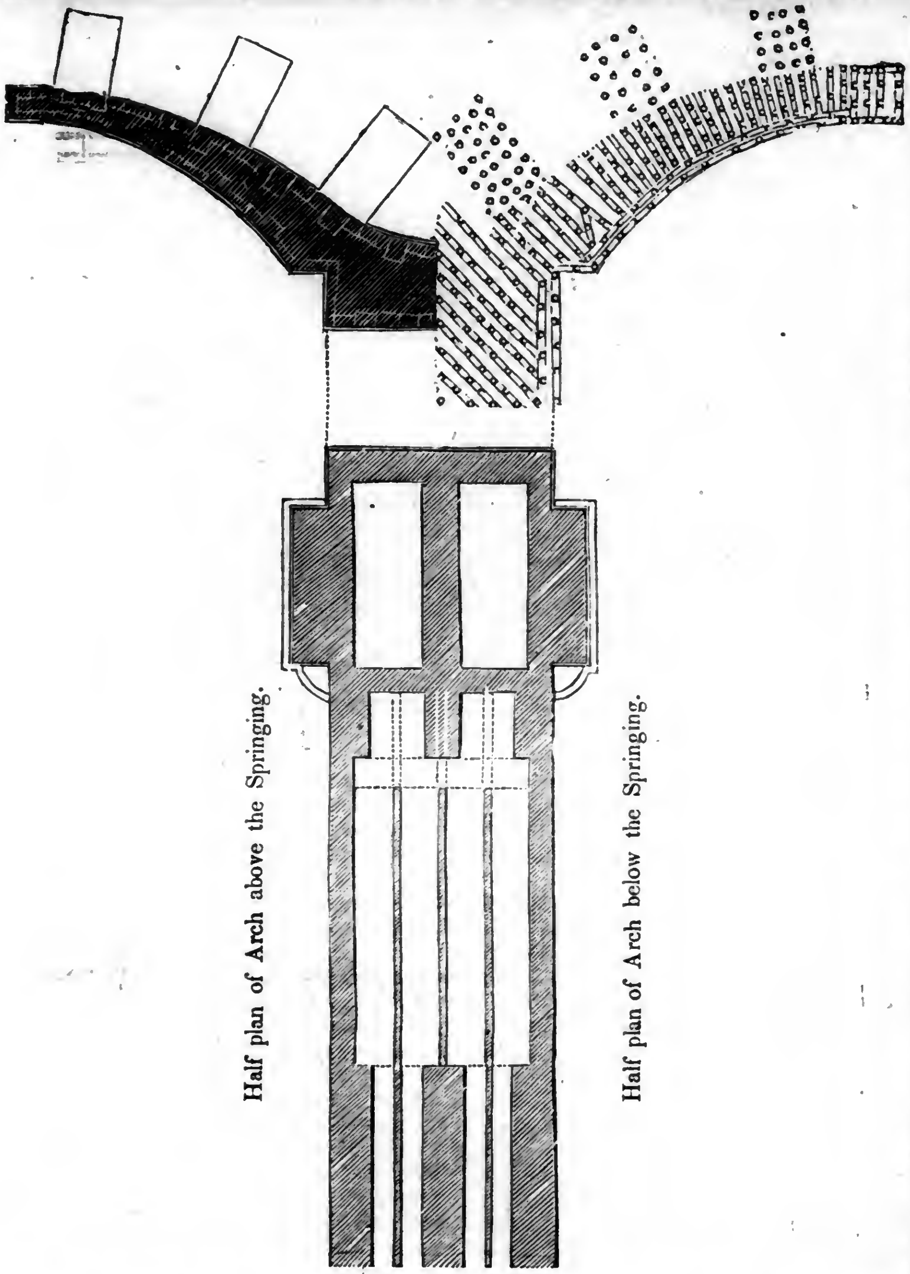
CHESTER BRIDGE.



Half Section showing the centre.

Plan of Road Way.





The bridge, thus irregular alike in workmanship, form and dimension, consists of seven arches supported on huge piers or buttresses, and has been aptly and pithily described as "a long fabric of red stone, extremely dangerous and unsightly, and approached by avenues on the Chester as well as the Handbridge side, to which the same epithet may be safely applied."* The inconvenience of a steep and twisting passage of this kind on the main communication between Wales and the centre and north of England, became more felt every day amid the rapidly growing intercourse arising from the improvement of the roads in the principality, particularly that to Bangor and Holyhead, and at length brought about a conviction of the necessity of a new bridge. It was many years, however, before any active measures were taken to carry so desirable an object into effect, nearly a quarter of a century having elapsed between the period when the late Mr. Harrison of Chester projected the structure on the site it now occupies, and the beginning of the work; and by this time, from advanced age and declining health, the superintendence of its execution required too much exertion for the strength of that most respectable practitioner, whose works have added so much to the architectural embellishment of his picturesque native city. Under these circumstances Mr. Hartley of Liverpool was applied to by the commissioners to undertake the management, which he consented to do on the condition that no alteration should be made from Mr. Harrison's external design, but that the interior and all practical points should be left entirely to him. It may be proper to add that Mr Harrison had given two elevations, one having the abutments ornamented with Grecian Doric columns, the other having a plain niche with a pannel over it, and that the latter was adopted by Mr. Hartley's advice.

The new bridge is situated about a quarter of a mile to the west of or lower down the river than the old one, stretching from the rock below Chester Castle towards the village of Overlegh, with a boldness that appears still more striking if the view be from the low ancient bridge. The valley of the Dee here skirts close round the city, the ground next which rises rapidly, and the road is carried with a slight fall from the castle gate on an embankment, which, after ascending gently over the bridge, is continued across the broader plain on the other side of the river, until it falls into the Flintshire road from the old bridge. The harbor is below the site, but vessels occasionally pass above the bridge, which from its great height offers no obstruction to navigation. The flow of the tide so far up the river is not more than twelve feet in ordinary springs.

The abutments are founded on the solid rock, except the back part of that on the north or city side, where, a fault occurring from the rock dipping down almost vertically as shown on the section, piling became necessary; and so soft was the material with which the fissure was filled, (a kind of quagmire or quicksand,) that the piles went down five or six feet at a blow for a considerable part of their depth. On the head of the piling a floor of stone was laid and the abutment built upon it. In consequence of the defect in the foundation just mentioned it was considered prudent, with a view to keep the lateral thrust of the arch within the limit of the rock, to make the springing a foot lower and the crown as much higher than was at first intended, and this was the only deviation from the original design that took place in the work.

The arch is a segment of a circle of 140 feet radius, the span or chord being 200 feet, and the rise or versed sine 42 feet. The archstones are 4 feet deep at the crown, and increase to 6 feet at the springing, but from the mode followed in laying the masonry, it will be seen that the principle of the arch is carried through the abutments, even down to the foundations, the radiating joints giving place to horizontal ones only in what is comparatively superstructure.

To prevent flushing near the haunches and rectify any tendency to change of form in the arch on the removal of the centre, the first course above the springers was laid upon a wedge of lead 1½ inch thick on the face and running out to nothing at the extremity of the bed, and strips of sheet lead eight or nine inches wide were also introduced in the joints on each side, up to where the point of pressure was considered to change its position from the front to the back of the archstones, or in fact in the present case over about two-thirds of the whole soffit. This disposition remained unaltered until the easing of the centre let the whole of the arch settle on the lead, which from its yielding nature then caused the pressure to be spread evenly over the whole of the bed of each course, and thereby prevented drafts or openings at the back of the archstone joints; the wedge-piece at the springing also acting by way of ad-

* Ormerod's Cheshire, Vol. I. p. 285.

justment, and counteracting the inclination of the arch in coming to its bearing when the centre is struck to throw an undue weight on the intrados of the springing course. Judging from the soundness of the archstones throughout, this plan seems to have answered fully the end sought, the weight having been received so uniformly and gradually on all points, that not the slightest appearance of *spaulching* or cracking is perceptible in the work of the great arch.

In setting the keystones three thin strips of lead were first hung down on each of the stones between which they were to be inserted, and the keystone being then besmeared with a thin greasy putty made of white lead and oil, was driven down with a small pile-engine, the lead acting as a slide and preventing grating until the stone was quite home.

The mode in which the spandrils were made up internally, by tiers of pointed arches with flag-stones or landings at top to carry the road material, will be seen by a glance at the cross section on plate No. VIII; and indeed beyond what has been already stated, and the materials used which are now to be described, with the mode of dressing them, there does not seem much of importance as regards the construction of the permanent part of the work which an inspection of the plans will not readily supply.

The river face of the abutments up to the springing, and the first two courses of archstones above, are of granite; the key-course with one on each side of it and the quoins all through the arch are of the limestone known as Anglesea marble, and the rest of the work, including all the other archstones, almost entirely of the sandstone of the country. The granite was brought from Craignair near Castle-Douglas in Kirkcudbrightshire, the limestone partly from Anglesea and partly from the similar quarries of Wagbur near Burton in Kendale, and the other stone for the outside works from Manley near Northwich and Peckforton near Nantwich in Cheshire, the quarries of both which places produce a superior kind of the new red sandstones. The principal part of the banking is of a similar sandstone, found adjacent to the site of the bridge. The mortar used was made from the lime found in the neighborhood, mixed with twice its bulk of sand.

The external faces of the bridge and abutments, with the cornices, parapets and dressings, are neatly tooled; the land-arches and wings slightly chamfered in the joints and then scappled off, so as to have a rougher and more rustic appearance. The archstones of the main arch are also chamfered in the soffit joints, two inches on each arris.

The centre on which the stupendous arch of Chester new bridge was raised, and which is stated by Mr. Hartley to have been exclusively designed by Mr. Trubshaw, claims a detailed notice, from the novelty of the principle it was formed on, the efficiency with which it did its work, and the economy that attended its use. The centre consisted of six ribs in width, and the span of the arch was divided into four spaces by means of three nearly equidistant piers of stone built in the river, from which the timbers spread *fan-like* towards the soffit, so as to take their load *endwise*. The lower extremities of these radiating beams rested in cast iron shoe-plates on the tops of the piers, and the upper ends were bound together by two thicknesses of 4 inch planking bending round, as nearly as they could be made, in the true curve of the arch. On the rim thus formed the *lagging* or covering, which was 4½ inches thick, was supported over each rib by a pair of folding wedges, 15 or 16 inches long by 10 or 12 inches broad and tapering about 1½ inch;—for every course of archstones in the bridge there were therefore six pairs of striking wedges. The horizontal timber of the centre was only 13 inches deep, and the six ribs were tied together transversely near the top by thorough bolts of inch iron, but with a view not to weaken and injure the timber more than was absolutely necessary, the least possible of iron was used.

From this description and an examination of the drawing it will be observed, that the centre differs essentially from those that have been used elsewhere. At first sight it reminds one of that employed by Smeaton in building Banff bridge, but the likeness is only apparent. Each rib of the latter is a complete connected frame from pier to pier, though supported intermediately, and is capable of being eased only as one mass by the folding wedges which are placed under and carry it; whereas in the Chester centre each rib is composed of four distinct and independent parts, and carries the wedges on its outer rim instead of being borne by them, so that it can be struck gradually, being made tight at one place and slackened at another, according to the symptoms shown by the arch as its support is removed and the stonework comes to its bearing. Mr. Trubshaw's principle is, therefore, in a few words, to arrange the timber so as to have the strain all in a vertical direction, doing away with the necessity of much horizontal tying, which from its sinking he considers apt to derange the framing, and to ease immediately under the covering instead of under the sill of the centre; and with this construction he would strike a centre soon after the arch was finished, while the mortar was yet as it were a paste, easing a little at first and then giving some time for the joints to accommodate themselves, and so proceeding. His method of striking is to keep up the crown and let the haunches down, and though this has a tendency to press the keystone up, he states that he has found a greater and more usual difficulty to be in managing an arch after the key was lowered, as it must be at once and beyond recall with centres of the usual make.

The centre was of fir, and with the exception of the parts already mentioned as otherwise, was composed entirely of whole and half timbers;—pieces from 22 to 36 feet long were not bored with more than one hole, and it of small size, so that, the material being sound when taken out, the whole cost to the contractor was only about £500, an amount which, even allowing for the advantage derived from the accidental circumstance of a quantity of seasoned wood being opportunely required for a public work in the neighborhood, must still be considered a very low price for a structure requiring 10,000 cubic feet of timber. That the expectations of the projector were fulfilled in other respects also, is proved by the circumstance of half the arch being turned before the centre was finished, while the fact that on its removal the crown sunk only from 2¼ to 2⅝ inches, the joints remaining perfectly close and no derangement of form being perceptible, attests the skill and care at once of the carpenter and the mason.

In reference to the temporary works, it seems necessary only further to mention that the archstones were carried to their places by the traversing machine now usually adopted for such purposes, which, though old in principle, it is believed assumed its present form in the hands of the late Mr. Rennie, as a means of working the diving bell in his operations at Plymouth. Of the contrivance, though it scarcely requires description in the present day, it may be shortly said, that it consists in suspending the body to be moved to a carriage travelling on a railway fixed on a frame of timber, which frame is itself moved in like manner on a similar railway under and at right angles to it, so that the carriage has a double motion and can be brought over any point within the range of the frames to deposit its load. In the present case the *inferior* railway extended from abutment to abutment, resting on the intermediate piers, and on it travelled two transverse frames of from 45 to 50 feet span, so as to embrace the whole width of the arch; and there being thus a carriage at each end of the bridge, the setting of the archstones did not consume much time.

To be continued.

Agriculture, &c.

From the New-York Farmer.

PLOUGHING MATCH.

The ploughing match, for the purpose of testing the comparative merits of several ploughs which were exhibited at the Fair of the American Institute last fall, was witnessed by a numerous assemblage of gentlemen, on the farm of General Johnson, near the Wallabout, Long Island, on Friday 28th of April. The arrangements of the committee for this trial were well made; the ground selected unsurpassed by any other field in the country, for such a purpose, having been cultivated by its present venerable, and highly respectable proprietor, and his immediate ancestors, for *more than two centuries*, and now in a high state of cultivation; the teams good, and the day as bright and as fine as could be desired; and of course the exhibition was interesting, and highly gratifying to those who witnessed it.

There were five ploughs on the ground which were used, only four of them however, came from the Institute; the fifth belonged to Mr. Wyckoff and was tried with the others for his satisfaction.

The ploughs used were arranged in the field and tried as follows—viz:

1st. "Dutcher's Patent cast iron Plough."

2d. Mr. Wyckoff's plough, also cast iron, "Steven's Patent."

3d. "Weaver's Patent cast iron Plough," from Baltimore.

4th. "Dysdale's *Iron*," or rather as it is usually called, "Scotch Plough"—being *entirely* of iron; and

5th. "Miner and Horton's cast iron Plough," from Peekskill, N. Y.

These ploughs were all held by the judges and many other gentlemen, both practical and unpracticed farmers; and most of them performed quite as well as could have been expected, considering their condition, which was by no means suitable for the objects of the trial. No plough, however good it may be when used sufficiently to become smooth and bright, can be properly appreciated and judged of from a first trial; and any plough maker who risks the character of his work in that condition, with a view of testing its comparative merits with other ploughs, deserves, at least disappointment, if not defeat.

The gentlemen who acted as judges were every way competent to decide upon the relative merits of the ploughs. They tested them fairly, and decided justly, according to their performance; and no one interested in the decision, if disappointed, has, in our opinion, cause to complain of any thing except his own want of preparation.

The award of the judges, after mature consideration, was as follows:

"The undersigned committee, appointed be the American Institute, critically to examing the several Ploughs exhibited, and put into operation on the farm of General Jeremiah Johnson, at the Wallabout, report—

That on such examination they do unanimously agree, and decide that the yellow plough of Josiah Dutcher is the best, and that the plough of Minor and Horton is the second best, both as to their structure and operation. The committee would further state that the plough brought and tested by Mr. Wyckoff, although not within the province of the committee to decide upon, is deemed equal to the second best,—Dated at the Wallabout, this 28th day of April, 1837.

Leffert Lefferts,
John Wyckoff,
Gerrit Kowenhoven,
Nicholas N. Wyckoff,
James Cropsey,
Jeremiah Lott."

By this report it will be seen that number 1, took the first premium, and number 5, the second—number 2, being equal to number 5, but not entitled to compete for the premium, as it was not exhibited at the Fair of the Institute. Number 3, and 4, were not mentioned in the report,—number 1, or *Dutcher's* plough, was in good condition for work, had a good team and performed admirably.

Number 5, or *Minor and Horton's* plough was not in good condition, being rough, and *without coulter*, except a sort of Rhinoceros horn, or cutter, extending up from the *share*, and its real merits were not generally appreciated. If it had been as well prepared for action as number 1, it would have stood an equal, if not the best, chance for the first premium.

Number 2, or Mr. Wyckoff's plough was in perfect order and by many persons deemed the best in the field.

Number 3, or "*Weaver's* plough" was by no means in proper condition for use. It was rough, and like number 5, with-*out* coulter, and *with* the *horn* projecting upwards from the share. This plough has an apparatus under the back end of the beam, where it comes in contact with the handle, for regulating its work. Mr. Weaver, the maker, was not present, and the only gentleman who had used it, and who properly understood the regulation of it, was obliged to leave the exhibition before it had had a proper trial, and therefore its merits were not duly appreciated. We have however great confidence in this plough, and do not doubt but that it will be found, when properly tested, a valuable implement. We have been informed by a gentleman who has given it a fair trial—having *three* of them in use on his own farm, that it is *superior* to any plough he ever held; and we can only again remark that when a person desires to test the merits of a *machine*, or *invention*, he must, if he would succeed, have it in *order* for competition. A plough can no more easily make good work, in a *rough* state, than a horse can make good *time* when taken from the plough to the race course.

Number 4, the "Scotch, or Drysdale, plough," made entirely of *iron*, with handles projecting far behind, found little favor except with those who had been accustomed to its use. It made good work—yet not equal to the others, and was omitted in the Report of the judges.

After noticing in detail the Ploughs, it may be proper to mention those who distinguished themselves as *ploughmen*. The judges of course, were most conspicuous—they all displayed both skill and judgment—yet to *Gerrit Kowenhoven, Esq.*, whom we heard say that he had followed the plough more than *forty years*," we must yield the palm. He was indeed master of the art. There were many others with whom we were unacquainted, who needed no label on their hats to indicate their pursuits—even a casual observer might read, in their manner of handling the implements, their honorable calling. The greater number of those who aspired to, and enjoyed the honor, of "guiding the plough" were unskilled in, or at least for a *long time* unused to, the business. There were those however, of this number who did themselves much credit, and the work justice. The most and persevering industrious, of those present, was the veteran editor of the Commercial Advertiser, with "frock and trowsers"—who, although for many years more familiar with driving the quill than either oxen or mules, displayed to the satisfaction of all, the powerful effects of early impressions, so deeply indeed, are his early agricultural habits seated that even the "aristocratic notions," which he is sometimes *accused* of having imbibed by a residence in New-York, could not keep him from testing every plough on the ground, and ploughing more than any other man present.

After a full and satisfactory trial, in which several acres were "turned up" and many more trodden down by the multitude present, the company adjourned.

The field labors of the day ended, those of the table commenced in due season, at the mansion house, near the lower Williamsburgh ferry—General James Tallmadge, president of the Institute, presiding, assisted by General Johnson. The fare was substantial, such as farmers are accustomed to, and there was enough of it. The chair having been called upon for a toast, General Tallmadge rose and addressed the company in an appropriate and effective manner, as will appear from the following brief sketch:—

Being called upon for a toast, he would ask the favor to precede it with a few remarks. He wished to express the thanks of the American Institute to the gentlemen and farmers who had given so numerous and respectable attendance this day, on the trial of the plough. It was an essential means and the true source of national wealth and prosperity. The ancients had the *cornucopia*, or horn of plenty, as their emblem of wealth, because they had attained only the *pastoral condition*. But we had made farther advance in agriculture, and the *plough*, as the means of agricultural wealth, was adopted by the Institute as the emblem of *plenty*.

He said a slight reference to historical events connected with the plough, and the spot on which we had been assembled—and the incidents associated with the early circumstances of the surrounding country, might be acceptable and somewhat curious. He would therefore state that the first plough which ever turned the American soil, was on the field which had this day been selected for the experiment by the Institute. The incident, after such intermediate events, was worth recollection. The Pilgrims of New-England had come to this country bringing with them little else but life—the love of liberty—and the desire of religious freedom. The Walloons who settled on the field where we are this day assembled, were first provided with the plough and a team—about 1622. The necessity and the early habits of those first settlers, induced them to cultivate their soil for a time with the hoe.

Tobacco was the leading object of cultivation, and the early records show a colonial law compelling, under penalties, persons to plant as many hills of corn as tobacco; and also, as a proof of the early protection and encouragement of domestic industry, giving bounties to "persons who should cross the *Spuytendeyvil*, make clearings and plant corn in the wilderness."

The colonial statute book now shows an act of the Legislature of 1708, giving bounties for killing *wolves* and *wild cats* in Kings county, and on the soil which we have this day been ploughing. But, Mr. T., said, the act was supposed, by some persons, not to extend to the ferocious animals called *shavers* which now infest Wall-street. But its directions to get rid of the "*young cubs*," as the *most mischievous*, were worthy of consideration.

In the same year (1708) an act was passed for the encouragement of *whaling*, off Sandy Hook, by the *Indians*, and privilege for them from arrest, with penalties, on any person who sold them liquor, or got from them any fishing tackle, going to or returning from their whaling voyages.

Mr. T., said the members of the Institute entered into all the sympathies of their fellow citizens under the pressure of the present hard times. Others would explain the causes of the present distress. That was not his purpose. But the Institute could tell the sufferers for want of money, a sure remedy. It was for farmers' boys, of all ages, from sixteen to sixty, to stick a little more to the *plough*. It has a wonderful power of creating wealth, and a proper and just encouragement and protection of its labor, will do more for the public good than the repeal of the treasury order, or even the friendship of Nic. Biddle.

The declared object of the American Institute was to encourage agriculture, commerce, manufactures, and the arts. It seemed to be a fit occasion to submit a few facts bearing on these great sources of national prosperity.

Free trade objects to the protection of the home laborer of the country, and the manufacturer to be broken down, under the competitton of European labor.

Commentary—One and a half million of bushels of wheat have been imported the last year.

Woolens, about	20 millions
Cottons,	19 "
Silks,	18 "

The Institute says—we should use our own country, and our own labor to produce for our own wants. Before the act, repealing in part the system of protection, the importation of silk was eight millions—The last year it was eighteen millions.

1830, the free articles imported,	$12,700,000
The total importations,	70,000,000
1834, the free articles imported,	68,000,000
Total importations,	126,000,000
1835, the free articles imported,	77,000,000
1836, total importations,	180,000,000

The excess of importations over our exportations, was last year sixty-one millions—a balance of trade against our country, in a single year, nearly equal in amount to the whole metallic circulating medium. This balance is a constant drain of our specie currency—and needs no prophet to tell the causes of our monied distress. It leaves no doubt of the duty of the country to afford a just protection to its labor, and its agricultural and manufacturing productions, till it shall supply its wants, and thus with the exportations, shall be enabled to provide for the balance of trade, while it retains its circulating medium.

In conclusion, General T., begged leave to offer the following toast:

The Badge of the American Institute.—The plough, the ship, the loom, and the eagle—as the emblems of agriculture, commerce, and manufactures, guided by the arts.

General Johnson, the Vice-President, having been called on for a toast, gave a sentiment in Dutch, to the memory of three eminent Walloons who first settled at the Wallabout, but whose names we cannot now repeat, as they were not taken down at the time, which we exceedingly regret, as the remarks and toast of the venerable descendant of the early settlers of the New Netherlands formed one of the most interesting incidents of the occasion—we may possibly give it hereafter.

William L. Stone, Esq., having been callee upon by the chair, rose and spoke to the following effect:

Mr. President—I rise cheerfully in obedienec to your call, but, in doing so, I must beg you distinctly to understand that, although I ventured to challenge your Honor to compete with me in holding the plough, I shall not have temerity to attempt a competition with such a practised debater in speech making. In guiding the plough, I must persist in maintaining my superiority; in the art of eloquence, I cannot approach you by a fearful distance. There is, however, one point, Mr. President, in which I shall yet take the liberty of going beyond the chair. You have just been edifying and interesting us by some of the fruits of your antiquarian researches. You have not only been shaking the dust from the musty records of our early Dutch history, but have hastily glanced at some of your classic recollections of a yet earlier day. But, sir, before I have done, I intend to outstrip you in travelling backward.

We have met to day, sir, for an important object connected with the husbandry of our country. It happens, moreover, to be a very suitable season for such a festivity. It is a time closely corresponding with one of the great festivals instituted by the Greeks, and commemorated by the Romans, in the honor of Ceres, the fair goddess of corn and harvests, of potatoes and cauliflowers,—of mangel-wurtzel and ruta-baga. There were two festivals sacred to this divinity—the one in harvest time, in commemoration of the abduction of her beautiful daughter Proserpine, by Pluto, and the other at planting time, in memory of the mother's anxious search for her stolen daughter. These celebrations were kept with great spirit; and we are now assembled at the recurrence of the last mentioned festival.

Mr. President, I am somewhat partial to the celebration of festivals, and the indulgence of innocent recreations. I think that in this respect, the ancients were wiser in their generations than we. Relaxation of mind and body are necessary alike to the elasticity of both. We have all become utilitarians, and have not the time to spare for even rational amusements. Still, Mr. President, I cannot but think, that our ancestors who celebrated the appropriate festival of the harvest home—those who danced joyously around the May-pole, and twined the garland for the fair brow of the Queen of May—were, on the whole, a happier people than those of our own time. We are always laborious and care-worn. They had frequent seasons of throwing off their cares, and with light hearts could reinvigorate their constitutions, and reanimate their spirits, by rural sports among flowers, and groves, and fountains.

I have often, Mr. President, been charged with being an aristocrat, and I hope I shall not be treading upon the toes of the democracy, if I confess the charge to be true. I believe I am. Yes: I am in favor of an order of nobility—of which the husbandmen should be the members, and the plough the escutcheon. Sir, the calling of the husbandman is a noble one, and the farmers are the nobles of the earth.—"The sun," said the lofty souled Tecumseh, when asked by the American commissioners to seat himself in their tent, "is my father, and the *earth* is my mother, and I will repose upon her bosom." This was a noble tribute from one who had not yet emerged from the hunter state, in honor of those who draw their sustenance from the bosom of our common mother.

Perhaps, sir, it will be expected that I shall say something specifically on the subject of *ploughs*. But there would not be time to enter at large upon the history of the machine, and the many improvements they have undergone from the day of their invention, down to the fine little red plough that I have just been holding, made by the friend at my right, [Mr. Wyckoff]—for that I take to be, on the whole, the best on the ground. I will, therefore, speak of the first plough-maker—albeit a difficult matter to identify him to a certainty. I think, however, that Adam must have been the inventor. After he had forfeited his proud estate in Paradise—when horticulture and floriculture could no longer be his exclusive pursuits—he was driven forth to till the ground. He then became a farmer. And if he was as sensible and as ingenious a man, as I take him to have been—for he doubtless was a Yankee—he must have invented a plough. He would have been sadly wanting in sagacity and self-respect, if he depended upon the spade—and there were no Irishmen in those days—a circumstance inducing me to believe the spade was unknown. Be that as it may, however, the plough was an early implement in husbandry. It was acknowledged by Xenophon, and its merits were sung by Horace, Pindar and Virgil. There is, however, a hiatus in its history, from the days of Adam to those of Triptolemus: This Triptolemus was a noble fellow—worthy in all respects to stand at the head of the order of nobility of which I have been speaking. His birth was illustrious, since, according to the beautiful mythology of the Greeks, he was the son of Oceanus and Terra—of the earth and ocean. Others, however, claim that he was the son of Celsus, King of Attica, by Neæreus, and was born at Eleusis. Hence the sublime Eleusinean mysteries, the nature of which it has puzzled so many of the modern learned to divine. He was doubtless a beautiful child, since he was adopted by Ceres, who took him to nurse at her own breast. She became so attached to him, that she undertook to divest him of all particles of mortality, by causing him to sleep upon beds of live coals—her own supernatural powers of course preserving him from harm. His mother, however, one luckless evening, having discovered that her little one was not lying upon a bed of roses, uttered such a shriek as to dissolve the charm, and prevent him from arriving at absolute purification from earthly matter by the process of fire. But the goddess determined still to do her best for the child, and watched an opportunity for his advancement.

I have already alluded to the rape of Proserpine, and the search of Ceres to find her. Pluto, to prevent being tracked, leaped into his own murky homestead, with his stolen bride, through the fountain of Cyane—and all trace of him would have been lost, but for the circumstance that the poor girl dropped her veil upon the margin. The anxious parent was three years upon the search, and on her return, found the agriculture of the world in a wretched condition. The fields, untilled, had grown up with thorns and briars. The fences were down—the gates and bars were out of order—the hedges wanted trimming—and the barn-doors were off from their hinges. Indeed every thing, in farmer's phrase, "had gone to rack and ruin" during her absence. Finding the husbandry of the world in such a deplorable condition, she cast about for a professor of agriculture, and designated Triptolemus for that important office. She taught him thoroughly in the art of husbandry—from the clearing and fencing, and draining of land, to the mixture of composts, and the more refined principles of husbandry adopted only by those acquainted with the science of agricultural chemistry. She then gave him her own chariot, and sent him, thus provided, and thus qualified, through the world, to resuscitate the great interest under her own peculiar administration.

In his travels through Scythia, Lyncus undertook to slay him—as a punishment for which the offended Goddess changed him into a lynx. He was accompanied in his travels by Bacchus—which shows that he paid some attention to horticulture—that he could twine the grape vine, as well as hoe the pumpkin—and also that he drank good wine if any. His name is derived from two Greek words, signifying *triple ploughing*—thus by his very name inculcating a lesson to farmers to till their lands well. Indeed, Mr. President, thorough and frequent ploughing is one of the most essential characteristics of a good farmer. Pliny recommends ploughing four times, and so do Virgil, Sir John Sinclair and Jesse Buel.

This mission of Triptolemus was most useful, not only to himself, but to the world. Agriculture revived under his judicious instructions—the farmers became rich by producing, instead of buying—and such was their gratitude, that in the end the foster-son of Ceres was called to the throne, and deified at his death. Thus, Mr. President, I have traced the noble origin of husbandry, and gone beyond you in antiquity. Allow me, in conclusion, to congratulate you, and the members of the American Institute, upon their alliance this day with the farming interest. The New-York Agricultural Society is numbered with the dead. So also, I believe, is the New-York Horticultural Society. Cannot, therefore, the American Institute extend its broad ægis, to some extent, over those important interests? I hope something may be done upon this important subject. In the mean time, permit me, Mr. President, to propose as a sentiment—

THE PLOUGH AND THE PRESS.—Essential alike to prevent the sterility of MATTER and of MIND.

By THADEUS B. WAKEMAN.—No repetition of modern free trade policy, importing grain to starve the people.

By ADONIRAM CHANDLER.—*Our Country's Industry*—Whether in ploughing the land or the ocean, whether at the loom, in the field, or in the workshop, it is alike entitled to the protection of a wise and justly administered government.

By S. JENKS SMITH.—Agriculture—the parent of commerce and the foster mother of mechanics.

By FRANCIS INGRAHAM.—The memory of the Ameriaan Farmer, upon whom the cries of the world have been turned in admiration—the farmer of Mount Vernon.

By Col. JESUP.—The farm of General Johnson and the ploughmen of the American Institute—they have this day seen that *Stone* is sometimes found on the best soil.

By Capt. SAMUEL C. REED.—The American plough—May its future *energies* and *industry* create a thorough barrier to the importation of foreign grain or breadstuffs in all time to come.

By Mr. WILLIAMS.—May those who *hamdle* the plough never get under the *harrow*.

By D. K. MINOR.—THE PLOUGH—Guided by practical knowledge, improved by the Press—through the medium of *agricultural publications*, a sure source of wealth when others fail.

The President of the day having retired, Mr. Stone rose and remarked, that he was about to offer a toast which he doubted not would be universally acceptable. He was about to propose the health of a gentleman with whom he had had the pleasure of an acquaintance for twenty years—a gentleman who was an eloquent and gifted member of the bar—who had adorned the halls of our State and national legislatures—who had presided with dignity in the Senate,—and who had reflected honor upon himself and country during his travels abroad, in most of the great European capitals. He had, moreover, shown himself a staunch friend to the great agricultural and manufacturing interests of the country. He begged leave, therefore, to propose—

"The health of the President of the American Institute, General JAMES TALLMADGE."

The toast was received and drunk with great enthusiasm.

A number of additional toasts and sentiments were given, and two or three speeches made, which have not been preserved. The festival was ended at "milking time," and the company from the city returned, just after the ruddy sun had sunk into a molten bed of amethyst and gold.

From the New-York Farmer.

DOMESTIC ECONOMY.

HANG OR DRIED BEEF.—Take eight ounces of common salt, two ounces of saltpetre, made into brine. This quantity to be applied to ten lbs. of Beef. It should lay in the brine four weeks; and then be hung up in the kitchen or some warm apartment to become dry. In order to preserve it from insects in summer, it should be tied up in a linen cloth.

The above receipt was given me by an excellent farmer and manager in Massachusetts; and the beef *cured by it* was of the finest description. H. C.

SALT OR CORNED BEEF.—One peck of coarse salt, four ounces of saltpetre, one and a half pound of coarse brown sugar. Add to the above ingredients, four gallons of spring water; boil and skim it until it is quite clear; when cold it is fit for use. The meat, either beef or pork, should be salted a few hours before it is put in the pickle. Hams and Tongues are very fine cured with the same pickle.

The above receipt is called Admiral Pococke's pickle, and is much approved and generally used in the British Navy. I have successfully tested its value. H. C.

HOUSEHOLD SOAP.—Put fourteen lbs. of Potashes to twenty lbs. of good grease for one barrel. Put the potashes into two pails of water over night; put the grease into a kettle and pour the potashes over it; let it boil moderately, filling it up with cold water until it thickens; then put it into the barrel, and fill it up, (a pail full at a time) stirring it about until the barrel is full.

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid, (CONTINUED.)

Mr. A. R. Lawrence, city New-York, 1st January, 1838

Chersant French, Consul, Philadelphia, Pa. 1st Jan. 1838

John Snowdon, Jr. Brownstown, Pa: 1st Jan. 1838

G. S. Greene, Warwick, R. I. 1st January 1838

L. Wernwag, Harpers Ferry, Va. 1st Jan. 1837.

C. W. G. Williams, Greenville, S. C. 1st Jan. 1839

Tomilson Fort, Milledgeville, Geo. 10th April, 1837

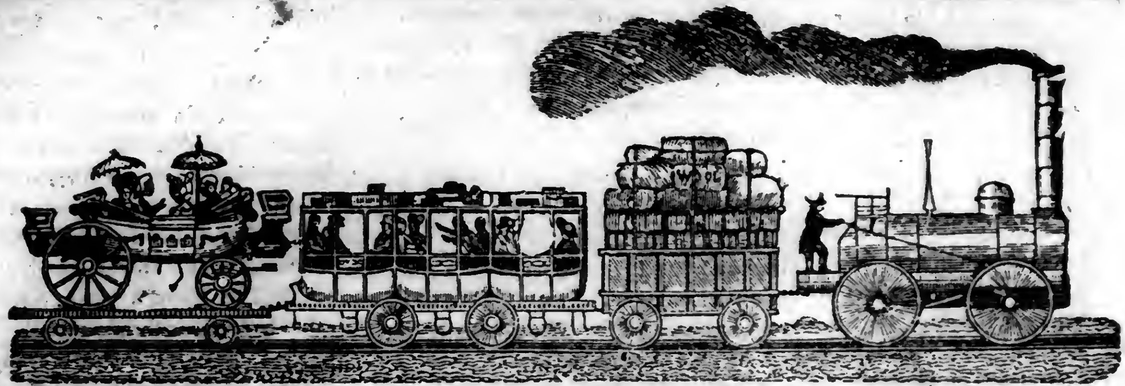
W. H. Belcher, St. Louis, Mo. 1st Jan. 1838

PHILADELPHIA STOCK MARKET.

April 29th

	Price of shares	Offered	Asked
RAILROAD STOCKS			
New-Castle and Frenchtown	25	29½	30½
Do loan, 5½ per cent	100	99	101
Wilmington and Susquehanna	50	33	36
Camden and Amboy, shares,	100	129	130
Do loan, 6's 1836	100	110	120
Danville and P shares	50	25	35
Norristown, do	50	20	22
Do 6 per cent loan	100	85	100
Valley Railroad	7½	1	3
Westchester do	50	20	28
Minehill do	50	57	59
N. L. and Penn. Tp. do	40	34½	35
Philadelphia and Trenton do	100	117	119½
West Philadelphia Railroad	50	20	30
Harrisburg and Lancaster	50	46	48
Cumberland	25	15	20
Beaver Meadow	50	50	54
MISCELLANEOUS STOCKS			
North American Coal Company	25	12	14
Steam Bt. Sta. Columbian	100	18	22
Exchange Stock	100	70	80
Arcade	100	55	75
Theatres—Chestnut street	600	625	675
————Walnut street	280	175	220
————Arch street	500	325	375
Gas Company	100	95	100
CANAL STOCKS			
Schuylkill Navigation, shares	50	156	155
Do loans, 5 1845	100	98	100
Do do 1855	100	100	101
Do do 5½ 1837	100	98	100
Lehigh Coal and Navigation	50	76	78
Do loan, 6 1838	100	97	98
Do do 6 1839	100	97	98
Do do 6 1844	100	99	100
Do do 5 1840	100	96	97½
Union Canal, shares	200	180	190
Do loan, 1836	100	83	86
Do do 1940	100	85	90

Chesap'k & Delaware Canal, shares		200	20	40
Do loan,	1837	100	60	67
Do do	1840	100	60	67
Delaware and Hudson,		100	62	63
Do loan		100	95	100
Louisville and Portland		100	100	110
Convertible 6 per cent. loans,		100	100	110
Sandy and Bever		100	60	80
Morris Canal		100	66	69



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, MAY 13, 1837. VOLUME VI—No. 19.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, MAY 13, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America.*

☞ SUBSCRIBERS IN THIS CITY, who change their residence on the 1st of May, will please give notice at the office, 30 Wall-street, *Basement Story.* It is desirable that the notice should specify their late and future residence.

Subscribers to, and advertisers in, the *Railroad Journal*, who have not paid the amount due us, will receive our *Circular*, with a *bill* annexed, for the same, *as it appears on our books.* We are fully aware of the difficulty which many subscribers find in remitting so small an amount, and we have, therefore, in many instances, let the accounts stand until they amounted to a sum which might be conveniently remitted by mail—and we now, in consequence of such delays of payment, find it very difficult to continue the publication of the work; and we are under the necessity of saying to those who are indebted, that *prompt payment nly* will enable us to complete *the present Volume of the Journal*; we therefore expect every man to remit the amount of his bill *by the earliest possible date.*

☞ If, by any means, *any subscriber has paid, and not been credited* with the amount paid—he will confer a special favor by sending us a *copy of the receipt*, so that we may correct our books, and at the same time know by whom the error was committed. With our best exertions to prevent such errors, they *have occurred*—we will, however, endeavor to avoid a repetition of them.

Subscribers near the Hudson river, and in Philadelphia and Baltimore—will be called upon by our Agent personally,

RAILROADS IN CUBA.—A company has been formed at Puerto Principe to construct a railroad from that to Neuvitas, sixteen leagues distant. Estimated cost, one million of dollars. The engineer is Mr. Edward Huntingdon, from the United States.

IMPROVED RAILWAY.—We have seen models of improvements in the construction of Railroads, made by our townsman, Isaac Cooper. So far as we are capable of judging we give our most decided approbation of the Plan. The objects proposed to be accomplished by Mr. Cooper on his new plan, are cheapness of construction, security against lateral pressure, facility of repairing, and durability of this material, and we think those objects are all attained.

Mr. Cooper has applied for a patent and has now in preparation a full description of his improvements, which will be published in a few days. We refer to this and to his models, as the best means of acquiring a knowledge of the plan.—[Ebensburg Sky.]

THE THAMES TUNNEL.—According to the Report of the Directors at the last meeting of the Thames Tunnel proprietors, the "great bore" has been driven *one hundred and thirty feet* nearer the Middlesex shore since the works recommenced, so that in a short time it is anticipated the lower-water-mark on the Wapping side will be reached, and the completion of the undertaking made a matter of comparative certainty.

MORE RAILROADS.—The Lockport Balance states that the Railroad between Lockport and Niagara Falls commences operation immediately—cars running twice a day each way. The Railroad between Niagara Falls and Buffalo, is put in good order for the season; and as there will be a Railroad from Lewiston to intersect the Lockport and Niagara Falls route, great facilities are offered for intercourse between several important points. In connexion with our Tonawanda Railroad, a track from Batavia to Buffalo or Lockport would give Rochester full enjoyment of the conveniences thereby afforded.—[Rochester Republican.]

APPLICATION OF STEAM TO AGRICULTURE.

Hitherto Agriculture has received little advantage from labor-saving machines compared with that which has been rendered to manufacturers and the mechanic arts; and although many of the implements of agriculture have been greatly improved, especially those great implements, the plough and the thrashing machine, the toil of human hands is still in full requisition; and as great an amount of animal labor as ever, is demanded on our farms. By what means this is to be materially lessened does not at present appear; but when these inventions and discoveries shall have been made, of which at least we will indulge a hope as not being distant, we shall perhaps then be as much surprised at the simplicity of the invention as were the companions of Columbus at his method of causing an egg to stand upon the small end. Professor Renwick lately deceased,* to the great regret of the friends of science, had made considerable progress in the application of steam to the purposes of ploughing, though we are ignorant of the particulars of his invention; in England they seem to have advanced in this matter, with considerable success, as appears from some accounts given in one of the late numbers of the British Farmers Magazine, from which we copy the following remarks.

"That the steam-engine would, at no very distant day, supply the place of animal labor in agriculture; and become as mighty an instrument in augmenting the productiveness of the soil, as it has proved in creating and economising manufactures, in navigating the ocean, and in travelling on land, was many years since predicted by Franklin (?) a prediction reiterated by Davy; and latterly acknowledged and enforced, as a great desideratum in science by many distinguished agriculturists. The successful application of Mr. Heathcoat's invention to the culture of bogs, the most repellent and obstinate of waste lands, leaves no room to doubt its applicability to soils already in cultivation. Coals are now procurable throughout Great Britain at prices, which have caused the steam-engines to be extensively introduced as a substitute for animal labor in many of the processes connected with agriculture.—Threshing, cleaning, grinding corn, chaff-cutting, and turnip-slicing, &c., are now performed by small engines, fixed on farm premises; even the churn has its steam-engine, managed by the dairy maid; and so great is the advantage arising to the dairy farmer from the regularity of motion; and economy produced by it, that hundreds of small engines, for this simple purpose alone, are used in the north of England and Scotland. But these are humble savings, compared with the benefits to be derived from the vast steam power, which may be applied to the soil itself. Those agriculturists who are acquainted with the effects produced by the valuable sub-soil plough, recently invented by Mr. Smith of Deanston, will readily appreciate the importance of an invention, which will enable them to employ that kind of plough at a much diminished cost per acre. Mr. Smith's plough, with steam-power, will effect a re-revolution in agriculture. Implements of husbandry have hitherto been restricted, in form, weight, and dimensions, to the management of a team of horses. A new class of instruments will take their place. The stiffest soils may be broken up, and pulverised to any desired depth; strong clays, the natural wheat lands, may be profitably cultivated, rendered more fertile, and fitted to bear a better, and more systematic rotation of crops.

Such are a few of the benefits, which land owners and agriculturists will derive from this substitution for animal power in husbandry. It is also no slight advantage, in a national point of view, that this important change will be effected, unaccompanied by any of those temporary evils, which too frequently attend the application of mechanical discoveries to existing arts. This invention will not displace a single individual from his accustomed healthy occupations; it will, on the contrary, occasion new and increased employment for agricultural laborers: it will restore to the support of man a considerable share of that large amount of produce, now sacrificed to the maintenance of agricultural horses; it will furnish employment to the rapidly increasing rural population of the empire, by rescuing millions of acres of bog and waste land from obnoxious sterility; it will find on their native soil multitudes of those Irish laborers, who annually emigrate to Great Britain in search of work and food; or who are forced with numbers of our own countrymen to prefer the dangers and hardships of emigration to wild and distant countries.

In the Mechanics' Magazine for July, there is a notice of a steam-plough, projected by Mr. Dickson, who has no doubt of its efficacy to plough all sorts of land, and adds that portable steam-ploughs will ere long be going about, and undertaking to plough for whomsoever may desire their assistance; and with very little more preparation than is now required to place a portable thrashing machine." An Edinburgh news-paper, states, that "Mr. Craig of that city, has taken out a patent for an American steam-plough, which costs much less than Mr. Heathcoat's, but probably is not sufficiently powerful for bogs. From our knowledge of the business of a farm the only objection we have to a steam-engine in such an establishment is, that it cannot do every thing. For all purposes, where horses cannot or should not walk, as on many descriptions of bog, a steam-plough may answer well; and there is no doubt that old arable land may be properly ploughed with steam-power; but would it also take the corn to market and do all other kind of road work. Would it carry out dung; and carry corn to the barn, or hay to the rick yard? If not then some draft horses must be kept; and if there be not a full complement, such work would go on very slowly and unsatisfactory."

"Since writing the above we have seen an account of a steam-plough made by Mr. Upton—London. He affirms that it can be made generally useful, and that an enormous saving in the expenses of a farm where it may be introduced, will soon be manifest. This steam-plough of Upton's is worked by Upton's patent lever steam-engine and his air-furnace boiler. If a single shared plough, the space occupied by the entire machine will be four feet by ten feet; if for trench ploughing, the dimensions will be the same; if for ploughing two, three or more parallel furrows at once then the breadth and length will be about five feet by twelve. The work done by the trenching ploughing, will be equal to any spade husbandry; and that by the parallel shares will be found very superior to any horse ploughing; inasmuch as the ground will not be trod or rammed down by horses feet; and as the steerer and ploughman will ride on the machine, the land will be left as light and open as possible, and resemble that of garden culture. To the steam-plough a harrow, drill, and seed box can be attached, when requisite, and the entire operation performed at one going, when it is for the last ploughing, without trampling the soil. The spots left in the angles of the field by Upton's steam-plough will be smaller than by any horse plough, as the steam-plough will turn if a single share, in thrice the breadth and length of a common wheel-barrow; and if a three shared plough, it will turn in the space of a small one horse cart. The simplicity of construction and small number of parts composing this steam-engine and boiler, and the great safety and security of the latter, will prevent the necessity of frequent and expensive repairs, as the only parts of the apparatus liable to wear and tear are the plough shares, soles, coulters, and harrow tines, which will only require the same repairs as if drawn by horses. The engine and boiler are calculated to go 50,000 miles or more, before any repairs could be wanted, unless from accident or unfair usage; and whenever from long use, very much worn, if the boilers were to burst, it could only extinguish its own fire without injury to any person close to it. The plough will require one steady man to direct and steer it; and a tractable boy to attend the fire and turn the steam off and on occasionally, the engine being of the most simple and efficient construction. The water tank will require replenishing now and then; and perhaps fuel will be required two or three times in the course of the day; and the

* The Report of Professor Renwick's death was, happily unfounded. Eds. New-York Farmer.

boiler is admirably constructed for burning either wood, peat or coke, or coal may be used. The single plough is calculated to do two acres per day. The double plough will do four acres; and the three shared plough will do six acres. The counter or trench plough would do about ten acres per day; but as it would be equal in power to the double shared plough, it would require the same quantity of fuel and expense.—The land cultivated by this plough would doubtless be found, from its efficiency, to produce crops nearly if not quite equal to spade husbandry, with which mode of husbandry I am thoroughly acquainted from practice; and in such case it would pay for the steam the first season."

Such are the accounts, which are given of these great inventions, upon authority, which must certainly be deemed respectable. We may be excused for remaining in some degree incredulous, as to the extraordinary advantages, which are here predicted to be brought about by them. At the same time it would imply a very gross self-esteem to say that no further improvements in this matter can be made; and an unwarrantable distrust of the testimony of other men, though they may be interested parties, to pronounce all there statements fictitious and visionary. We have no doubt that very great improvements in these matters are in progress; and after witnessing the wonderful and almost miraculous results of mechanical ingenuity and skill as applied to other of the arts within a few years past, we indulge the sanguine hope that great things are yet to be realized in this most important of all arts, agriculture, which even our dreams have not anticipated.

Our common ploughs have within a few years passed through most valuable improvements. The use of the cast iron plough has greatly reduced the expenses of their construction and repairs, and has already saved millions of dollars to the farmers in the country. The improved construction of the ploughs has likewise greatly reduced the power required for the draft, and the work is much better executed than formerly. In this matter however great improvements are still desirable.—The manner of our executing our work in general is wretchedly slovenly: and bears no comparison to the ploughing of the Scotch and English laborers. This in part is to be ascribed to the division of labor among them, where a ploughman is only a ploughman, and trained exclusively to this business from his childhood. With us it is not so; but we may hope that these fine examples of work, which these emigrants often set before us, together with the great improvement in the instrument itself, will stimulate to a more vigorous and successful emulation.

H. C.

NAVIGATION.—Our bay and the channel out of the harbor, have been clear from ice for the last day or two, though the lake by us is yet much clogged; but being completely broken up, we hope to be rid of it in a few days.—[Dunkirk Beacon.]

A NEW CONSTRUCTION OF RAILWAYS.

M. Perkins has just exhibited a new plan of railways, which he has secured by patent, and which from the explanation given by him, would appear calculated to supply the desideratum so long desired, and indeed appears to form an era in the progress of those great national undertakings towards perfection.

The plan embraces two modes of construction, founded on one common principle, viz. the continuous support of the rails In the one case this is effected by blocks of vitrified earth, as hard and durable as granite, and which lock into one another, being laid on a concrete foundation: and in the other, by an additional depth of concrete supplying the place of sleepers altogether. Upon the former plan, wooden bearers, four inches in the base, four thick, and two wide, on the top, rest upon the vitrified blocks; and in the latter, upon the concrete, to which they are firmly secured.—In both cases, iron bars, with the means afforded for expansion and contraction, are fixed on the wooden beams, and the foundation being continuous and solid, in fact like one block of granite the whole length of the road, no vibration is felt, as the numerous persons who rode in the wagon unanimously testified; and this is an important attainment in railway constructions. The saving by the plan first described will, it is stated, be full £4000 per mile, in four rows: and by the latter. very much more—in fact so enormous will it be, as to give a new feature to railways, and astonishingly facilitate their construction in all parts of the country. We should much like to see it in practice, which is alone the test: so fallacious are frequently found to be the results when based alone on novelty and experiments.—[Mining Journal.]

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

AN ACCOUNT OF THE NEW OR GROSVENOR BRIDGE OVER THE RIVER DEE AT CHESTER.

Continued from p. 283.

The Act of Parliament under which this bridge has been built was obtained in the session of 1825; the works were contracted for by Mr. James Trubshaw, of Haywood in Staffordshire, early in 1827, and immediately commenced, the son of the contractor being resident throughout; the first stone was laid by the present Marquess of Westminster (then Earl Grosvenor) on the 1st of October in the same year; and the bridge was formally opened on the 17th of October, 1832, by the Princess Victoria, on the occasion of Her Royal Highness's visit to Eaton Hall, and named, at the request of the Commissioners, Grosvenor Bridge, but it was not thrown open to the public generally until New-Year-Day, 1834.

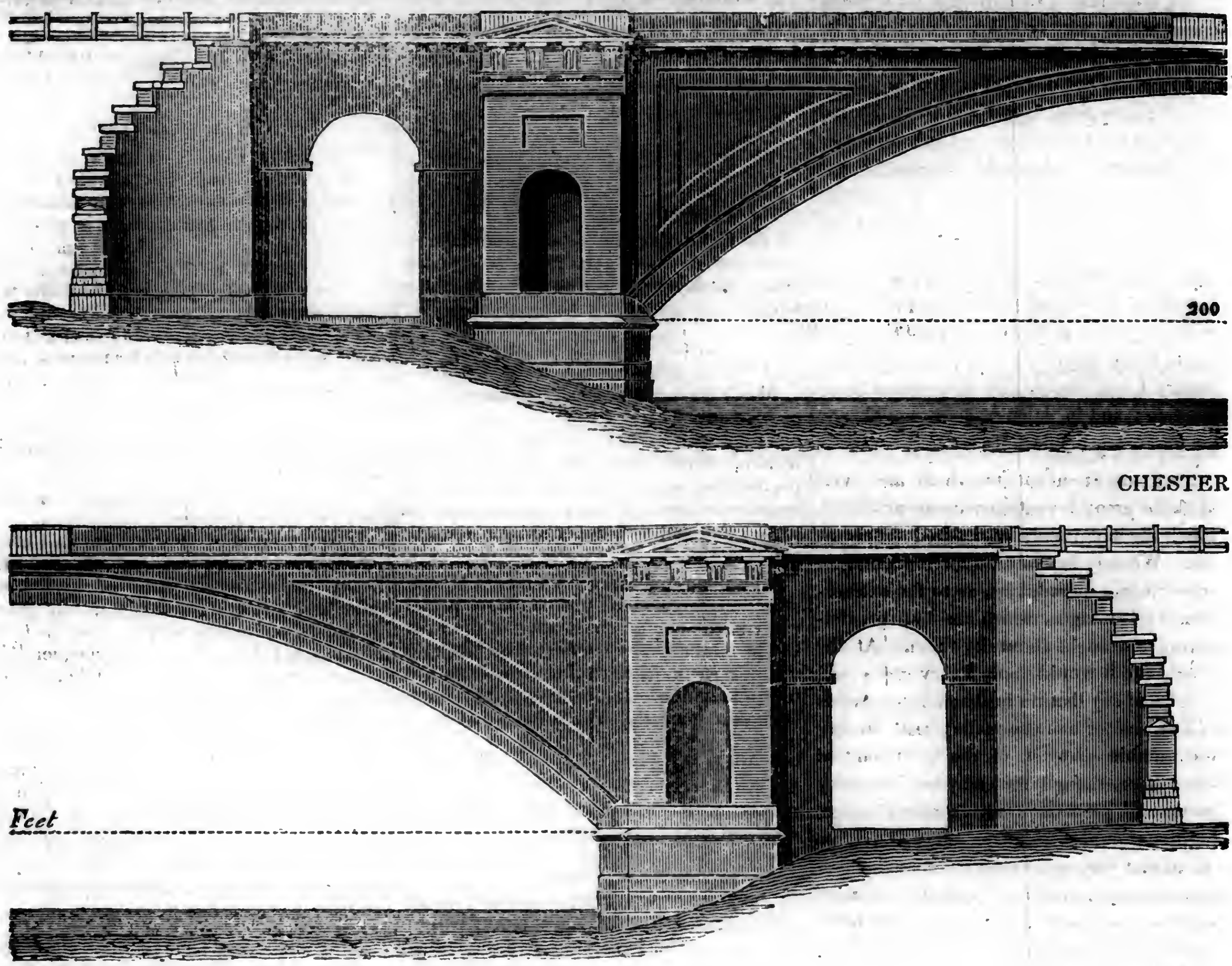
The total cost of the work was £49,900, in which is included a sum of £7500 for the heavy embankments required in the approaches. The money was partly raised by bonds, and partly advanced by the Commissioners for the Loan of Exchequer Bills, and is secured on tolls charged both on the new and the old bridge, the revenue yielded by which is about £3000 a-year.

The following table*, containing the leading dimensions of the largest stone arches that have been built (from 150 feet span upwards), will enable a comparison to be made between the bridge it has been the purpose of this paper to describe, and others approaching but not equalling it in magnitude of arch.

* The dimensions of the continental bridges have been gathered from M. Perronet's *Description des Projets et de la Construction des Ponts*, M. Gauthey's *Traite de la Construction des Ponts*, and Von Wiebeking's *Theoretisch-Practische Wasserbaukunst;* and in the cases of the discrepancies that sometimes occur, (particularly as to the span of the ancient bridge of Vieille Brioude, which is stated to be 183 feet by Perronet, in his bold project for the bridge of Melun, and also as to the rises of some of the other arches,) Gauthey's Work has been preferred, as it seems entitled to be from the character of its talented editor, the late M. Navier, in whose death the Institution has too soon to lament the loss of a valued honorary member.

Name.	River.	Form.	Span.	Rise.	Keystone.		Date.	Engineer.
			Feet.	Feet.	Ft.	In.		
Claix (Grenoble)	Drac	Circular	150	54	3	1	1611	
Gloucester	Severn	Elliptical	150	35	4	6	1827	Telford.
London	Thames	Elliptical	152	37½	4	9	1831	Rennie.
Tournon	Doux	Circular	157	65	......		1545	
Verona	Adige	Elliptical	160	53	......		1354	
Lavaur	Agout	Elliptical	160	65	10	9	1775	Saget.
Gignac	Erault	Elliptical	160	44	6	5	1793	Garipuy.
Vieille-Brioude	Allier	Circular	178	69	5	3	1454	Grenier and Estone.
Chester	Dee	Circular	200	42	4	0	1833	Hartley.

Plate 6.



CHESTER BRIDGE.

XV. ON THE STRAIN TO WHICH LOCK GATES ARE SUBJECTED. BY PETER W. BARLOW, CIVIL EN.

Having of late been engaged in estimating the dimensions of timber required for Lock Gates, I have been led to the consideration of the different strains to which they are liable, and the results of my investigations having, in some instances, been rather unexpected and interesting, I beg to lay them before the Institution of Civil Engineers, in the hope that they will prove of utility.

In England of late years, lock gates of large d me isions have been constr cted of an arched figure, with a view to increasing their strength; how far an advantage is gained by this construction, it is chiefly the object of the present paper to investigate. Previously, however, to entering into these inquiries, it will be necessary to explain the nature of the strains to which the common straight gate is exposed.

The best angle for the sally of lock gates made of straight timber is a subject which has already engaged the attention of some mathematical men, but I must observe, with respect to those investigations which I have had the means of examining, that they seem to be founded on data evidently incorrect. A common straight gate is exposed to two strains; one a transverse strain, produced by the weight of water at right angles to its surface, which is equal to half the weight applied in the middle; the other a strain in the direction of its length, produced by the pressure of the opposite gate upon its extremity. This latter strain, if the salient angle was of 45°, or the gates stood at right angles to each other, would of course amount to half the weight on the opposite gate, so that at this angle a lock gate has, in addition to the transverse strain, an equal strain in the direction of its length.

Before we can arrive at the angle at which, with given dimensions of timber, the greatest strength will be given to a pair of gates, it becomes necessary to know the amount of transverse strain produced by the end pressure of the other gate; or in a beam loaded in the middle, the additional transverse strain produced by a given degree of pressure applied at the ends. In order to ascertain this point precisely, it would be necessary to have a distinct set of experiments, which would not only be difficult to execute, but very uncertain in their results; and as precision in this point is not necessary to the present question, I think, by the examination of M. Girard's experiments, we may arrive at it sufficiently near for our purpose.

These experiments were made upon a large scale by order of the French government, and although there appears to be some irregularity in the results, I have no doubt they are as correct as the uncertain nature of such inquiries will permit.

The following is an abstract of his experiments on the strength of oak baulks loaded at the end, and with the weight the same timbers would bear loaded in the middle, calculated by the rules given in Barlow's work on timber; by which a comparison can be made of the relative strength when subjected to a direct and transverse strain.

The timbers experimented upon by Girard were not in every case completely broken, but there is no doubt the weight they were subjected to was very little short of that which would have completed the fracture.

TABLE I.—Abstract of GIRARD'S EXPERIMENTS on the Strength of Timber loaded on the End.

No. of experiments.	DIMENSIONS OF THE TIMBER. Length.	Breadth.	Thickness.	Weight in pounds the beam bore applied to the extremity.	Weight in pounds the same beam would bear loaded transversely	Ratio.	REMARKS.
	FEET.	INCHES	INCHES.				
1	8	6.21	5.03	93616	8598	·092	
2	8	6.39	4.17	94018	6078	·064	Broken.
3	8	6.21	3.99	69165	5390	·078	
4	8	5.23	3.89	50526	4325	·085	Broken.
5	8.628	5.15	4.17	50608	4900	·097	Broken.
6	7.549	6.02	5.15	115359	9980	·087	
7	7.549	6.21	5.05	103799	9909	·095	
8	7.549	6.12	4.085	73095	6396	·087	Broken.
9	7.549	6.21	3.99	63177	6336	·100	Broken.
10	7.549	4.96	3.99	44857	4924	·109	
11	6.471	6.12	5.24	87494	12366	·141	
12	6.471	6.21	5.15	87481	12013	·136	
13	6.471	6.21	3.99	87079	7392	·085	
14	6·471	6.30	3.99	72823	7313	·100	Broken.
15	6.471	5.24	4.17	103622	6525	·063	
16	6.471	5.05	4.25	82261	6674	·081	
17	7.549	6.21	4.25	87443	7022	·080	
18	8.628	6.21	5.32	82332	9607	·116	Broken.
19	8.628	6.21	5.15	103863	8993	·087	
20	8.628	7.37	6.21	137966	15584	·113	
21	8.628	7.45	.21	137866	15764	·114	
					Mean	·996	

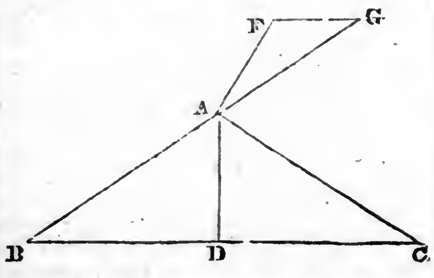
It thus appears that the force required to break a timber in the direction of its length, is about ten times that which would break it if it applied transversely at the middle; from which I infer that the strain in the direction of the gate produced by the pressure of the opposite one, is equal to an additional strain of one-tenth applied transversely.

A difference exists in the comparison made in the preceding Table and in the case of lock gates, which it is necessary to make some remarks upon; viz., that a lock gate has a transverse pressure acting in addition to that produced by the other gate, so that the end pressure is exerted upon it after it is already deflected by a transverse strain which is of course not the case in the comparison made in the Table. How far this may effect the question, or how much greater effect the compressive force may have in consequence of the beam being already deflected, it is very difficult to determine, but from an examination of the subject, I am induced to think that the deflection is so small as very slightly to increase the effect of the end pressure.

The amount of the effect will of course depend upon the degree of deflection the beam has sustained from the transverse pressure, and if it amounted to a quantity exceeding one-twentieth of the length, (which would make the lever by which the end pressure acted exceed one-tenth of that by which the transverse strain acted,) a greater effect than one-tenth would be produced; but as the ordinary load which timber is expected to sustain, does not produce at the utmost a deflection exceeding one hundredth part of the length, I cannot conceive the transverse strain above named materially to alter the comparison, and I have accordingly, in the following investigation, assumed one-tenth as the amount of additional strain produced by the end pressure of the opposite gate.

It now becomes necessary to get an expression for the amount of the strains above mentioned at any angle of salience, which is arrived at in the following manner:—

Let AB, AC, represent the two gates, meeting at the point A; draw the line AD from the point A perpendicular to BC, and let BD, which represents half the breadth of the lock, $= l$, also



let the pressure of water upon the length l of the gate be indicated by w and the angle ABD $= \varphi$.

Then the length of the AB and any angle φ will be expressed by $l \sec \varphi$

and the pressure upon it by $w \sec \varphi$

The transverse strain produced by this pressure on the centre of the beam at the same angle will be $\frac{1}{4} w \sec \varphi$

It now remains to find the amount of compression in the direction of the gate, produced by the opposite gate.

Let AF represent the force or tendency of the gate AC to turn upon the point C, which is of course equal to half the weight upon the gate A C,

$$\text{or} = \tfrac{1}{2} w \sec \varphi$$

The force may be resolved into AG, FG, the one GF is supported by an equal and opposite force in the gate AB, and the other will represent the force in the direction of the gate, the expression for which may be found as follows;

as sine ∠ AGF : AF : : sine ∠ AFG : AG

or sine $\varphi : \frac{1}{2} w \sec \varphi :: \cos \varphi : \frac{1}{2} w \sec \varphi$

$$\frac{\cos \varphi}{\text{sine } \varphi} = \tfrac{1}{2} \operatorname{cosec} \varphi$$

The whole amount of transverse strain at any angle φ will therefore be represented by the expression,

$$\tfrac{1}{2} w \sec \varphi + \tfrac{1}{20} w \operatorname{cosec} \varphi$$

from which we may readily obtain the angle at which the strain is a minimum as follows;

$$\sec + \varphi + \operatorname{cosec} \varphi = \min$$

$$\text{or } \tan \varphi \sec \varphi \, d\varphi - + \cot \varphi \operatorname{cosec} \varphi \, d\varphi = 0$$

$$\text{whence } \tan^2 \varphi = \tfrac{1}{10} \operatorname{cotan} \varphi$$

$$\text{and } \tan^3 \varphi = \tfrac{1}{10}$$

$$\tan \varphi = \sqrt[3]{\tfrac{1}{10}} = \tfrac{1}{10} \sqrt[3]{100} = .4641$$

$$= \tan \angle\, 24° \, 54'$$

The salient angle of a pair of oak gates, when the strain is a minimum, is therefore 24° 54′

In the question of the best angle for lock-gates, it becomes necessary to consider that the length of the gate also varies as the secant of the angle φ. The angle 24° 54′ is therefore not that at which, with a given section of timber, the greatest strength will be obtained; for although the strain is the least at this angle, yet the gates, by their greater length, are less able to resist it than at some intermediate angle, when the strain is slightly increased. The expression now becomes

$$\sec^2 \varphi + \tfrac{1}{10} \sec \varphi \operatorname{cosec} \varphi = \min$$

$$2 \sec^2 \varphi \tan \varphi \, d\varphi + \tfrac{1}{10} (\tan \varphi \sec \varphi \operatorname{cosec} \varphi - \cot \varphi \operatorname{cosec} \varphi \sec \varphi) = 0$$

$$2 \sec \varphi \tan \varphi + \tfrac{1}{10} \tan \varphi \operatorname{cosec} \varphi = \tfrac{1}{10} \operatorname{cotan} \varphi \operatorname{cosec} \varphi$$

$$2 \sec \varphi \tan^2 \varphi + \tfrac{1}{10} \tan^2 \varphi \operatorname{cosec} \varphi = \tfrac{1}{10} \operatorname{cosec} \varphi$$

from which the cubic equation,

$$\tan^3 \varphi + \tfrac{1}{20} \tan^2 \varphi = \tfrac{1}{20}$$

This, being reduced, makes the tan. $= .25701$, or the angle 19° 25′, at which a pair of lock-gates should be situated, so as to have the greatest strength with a given section of timber.

Having obtained, in a manner I hope satisfactory, the angle of greatest strength for gates of straight timber, I conclude this part of my paper with a Table of the necessary dimensions of oak timber for lock-gates, varying from 6 to 20 feet in length, and from 8 to 20 feet in depth, which I believe are the limits of the dimensions of gates of this construction.

The first column in each division of the Table gives the amount of transverse strain produced by the pressure of water upon three feet depth of surface, at an angle of 19° 25′; and the second column the dimensions of square oak timber necessary to bear three times that strain.

TABLE II.

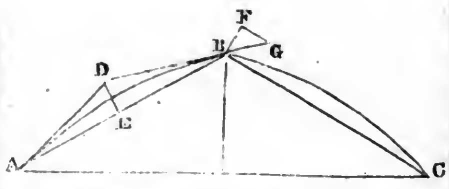
Length of Gate.	6 FEET DEEP. Strain produced by the pressure upon 3 feet surface.	6 FEET DEEP. Dimensions of Square Timber necessary to bear three times that strain.	8 FEET DEEP. Strain produced by the pressure upon 3 feet surface.	8 FEET DEEP. Dimensions of Square Timber necessary to bear three times that strain.	10 FT. DEEP. Strain produced by the pressure upon 3 feet surface.	10 FT. DEEP. Dimensions of Square Timber necessary to bear three times that strain.	12 FT. DEEP. Strain produced by the pressure upon 3 feet surface.	12 FT. DEEP. Dimensions of Square Timber necessary to bear three times that strain.	14 FT. DEEP. Strain produced by the pressure upon 3 feet surface.	14 FT. DEEP. Dimensions of Square Timber necessary to bear three times that strain.	16 FT. DEEP. Strain produced by the pressure upon 3 feet surface.	16 FT. DEEP. Dimensions of Square Timber necessary to bear three times that strain.	18 FT. DEEP. Strain produced by the pressure upon 3 feet surface.	18 FT. DEEP. Dimensions of Square Timber necessary to bear three times that strain.	20 FT. DEEP. Strain produced by the pressure upon 3 feet surface.	20 FT. DEEP. Dimensions of Square Timber necessary to bear three times that strain.
FEET.	TONS.	IN.	TONS.	IN.	TONS.	IN.	TONS.	IN.	TONS.	IN.	TONS.	IN.	TONS.	IN.	TONS.	IN.
5	1.601	4.86	2.134	5.35	2.668	5.77	3.202	6.13	3.735	6.45	4.269	6.74	4.803	7.01	5·336	7.26
6	1.921	5.49	2 561	6.05	3.201	6.52	3.842	6.92	4.482	7.29	5.123	7.62	5.763	7.93	6.403	8.21
7	2.241	6.09	2.987	6.70	3.735	7.22	4.483	7.67	5.229	8.07	5.976	8.45	6.724	8.78	7.470	9.10
8	2.561	6.66	3.414	7.32	4.268	7.89	5.123	8.39	5.976	8.83	6.831	9.23	7.685	9.60	8.538	9.94
9	2.882	7.20	3.841	7.92	4.802	8.54	5.763	9.07	6.723	9.55	7.684	9.98	8.645	10.38	9.600	10.75
10	3.202	7.72	4.268	8.50	5.336	9.16	6.404	9.73	7.470	10.24	8.538	10.71	9.606	11.14	10.672	11.54
11	3.522	8.23	4.695	9.06	5.869	9.76	7.044	10.37	8.217	10 92	9.392	11.41	10.566	11.87	11.739	12.30
12	3.842	8.72	5.122	9.60	6.402	10.34	7.684	10.98	8.964	11.57	10.246	12.10	11.526	12.58	12.806	13.03
13	4.162	9.20	5.548	10.12	6.937	10.90	8.325	11.59	9.711	12.20	11.099	12.76	12.488	13.27	13.874	13.74
14	4.482	9.67	5.974	10·64	7.470	11.46	8.966	12.18	10.458	12.82	11.952	13.40	13.448	13.94	14.940	14.44
15	4.803	10.12	6.402	11.14	8.064	12.00	9.606	12.75	11.205	13.42	12.807	14.03	14.409	14.55	16.008	15.12
16	5.122	10.56	6.828	11.63	8.536	12.53	10.246	13.31	11.952	14.01	13.662	14.65	15.370	15.24	17.076	15·78
17	5.443	11.00	7.255	12.11	9.071	13.05	10.887	13.86	12.699	14.60	14.514	15.26	16.339	15.86	18.142	16.43
18	5.763	11.43	7.683	12.58	9.603	13.55	11.526	14.40	13.446	15.16	15.369	15.85	17.289	16.48	19.209	17.07
19	6.083	11.85	8.109	13.04	10.138	14.04	12.167	14.93	14.195	15.72	16.222	16.43	18.251	17.09	20.277	17.70
20	6.404	12·26	8.536	13.49	10.672	14.54	12.808	15.45	14.940	16.26	17.076	17.00	19.212	17.68	21.344	18.31

In making use of the above Table, for obtaining the necessary dimensions of the lower timbers, it has to be considered that a great support is afforded by the sill of the Gate, which will of course permit with safety the use of less timber than the Table will give. The influence of this support cannot, however, extend beyond the second timber from the bottom, as the deflection of the planking will allow the whole of the pressure to be effective.

Curved Lock Gates.

In locks of large dimensions in this country, a curved figure is given to the gates, so that when united they resemble a Gothic arch; this figure, by giving greater strength permits a reduction to be made in the dimensions of the timber, and the gates are thereby rendered lighter, and more readily movable. The degree of curvature which will give the greatest strength, and the necessary dimensions of the timber in different sized locks, are of course points of considerable importance, not only on the score of economy, but from the greater degree of lightness that may be thus obtained; the opening and shutting can be performed with greater ease, and consequently a greater number of ships can be permitted to pass in a given time.

In order to estimate the degree of curvature which will give the greatest strength, it is first necessary to consider the nature and amount of the strains to which the Gothic shape gives rise, we may then perceive what variations, with respect to the degree of curvature and amount of salience, will tend to increase the strength, or vice versa.



Let AB, BC represent two gates meeting in the point B, and let the angle of salience, BAC, be equal to φ, also the angle DBE of a tangent to the curve of the gate, with the cord BA $= \theta$, and the pressure of water upon each gate $= w$. The gate AB, being loaded equally all over, will exert a pressure in the direction of the tangent, to the extremity of the gate, which will be represented by the line D B, (the perpendicular D E being equal to $\frac{1}{2}w$,) or equal $\frac{1}{2}w$ cosec θ.

This force is partly resisted by the compressive force of the opposite gate, which now, instead of adding to the transverse strain, as in the straight gates, is the means of diminishing it in proportion as it counteracts or destroys the tangential force D B. In order therefore to estimate the amount of strain, it becomes necessary to get an expression for this force, which may be done as follows. Let B F represent the force acting at right angles to the extremity of the gate B C, tending to turn it upon the point C, which is of course equal to half the pressure of water. Resolving this into the direction of the tangent of the curve AB, by drawing FG parallel to BC, and producing D B, we obtain the line BG, which represents the compressive force of the gate BC in the direction of the tangent D B, and which is equal $\frac{1}{2}w$ cosec $(2\varphi-\theta)$.

As the diminution of strain owing to this force is, in proportion it destroys the tangential force DB, the amount of the transverse strain at any angle, φ and θ may be found by the following proportion:

$\frac{1}{2}w \operatorname{cosec}\theta : \frac{1}{2}w\,\{\operatorname{cosec}\varphi - \operatorname{cosec}(2\theta -)\} :: \frac{1}{2}w : x$

$$\text{Or, } x = \frac{\frac{1}{2}w\,\{\operatorname{cosec}\theta - \operatorname{cosec}(2\varphi-\theta)\}}{\operatorname{cosec}\theta}$$

$$= \frac{1}{2}w\left\{1 - \frac{\operatorname{cosec}(2\varphi-\theta)}{\operatorname{cosec}\theta}\right\}$$

$$= \frac{1}{2}w\left\{1 - \frac{\sin\theta}{\sin(2\varphi-\theta)}\right\}$$

which is the true expression of the transverse strain or weight applied transversely in the middle of the length, which would have equal effect in breaking the timber.

It will at once be seen that when the gates united from a complete arch, that is, when the angles φ and θ become equal, the expression vanishes, the tangential force being then resisted by an equal compressive force in the opposite gate.

In this position, therefore, if the curve was mathematically true, the strain perfectly equal and regular, and the material also of an uniform density, the loading the arch would have no other effect than that of direct compression in the direction of the fibres, a description of strain which timber possesses great power to resist, as appears from the experiments of Girard. In practice this cannot, however, take place; the curve can neither be perfectly true nor the density of the material uniform, either of which defects would lead to a transverse strain, which, if sufficient weight was put on, would ultimately destroy the gate. In the former case, the flatter parts of the curve would naturally have a transverse strain upon the bottom fibres, from the abutments or terminations of it not being resisted with an equal degree of compressive force; the fibres would in consequence in some measure yield, and the relative position of the gates at the point of meeting would be changed, so as not to touch equally throughout; an increased compression would be brought upon particular fibres, which must of course yield, and the evil would continue to increase until fracture ultimately took place. In a similar manner, an irregular density of the material, by causing a yielding in some parts more than others, would bring on a change of shape which would ultimately produce the same results.

It therefore appears that in either case the cause which ultimately leads to fracture is the transverse strain produced from the irregularity of the curve, brought on by circumstances which cannot be controlled. Hence the nearer the curve can be preserved in the true figure of an arc of a circle, the greater the strength of the gates.

It has however to be considered that the arch is not composed of one complete timber, but that the fibres are disunited at the point of meeting, and consequently if that part from any cause should become flattened there are no fibres to resist the transverse strain thus produced; and as the flattening of this part of the arch is an effect which might probably arise from any yielding of the abutments, or wear of the heel posts in the hollow quoin, this would evidently be the weakest part of the curve. It therefore becomes necessary to deviate in a small degree from the true curve of the arch, by giving the gates greater length, and causing them to meet at a point a short distance from the curve, or in fact rendering them slightly Gothic; but as the security to the point is obtained at the expense of a constant transverse strain upon each of the gates, the deviation from the true arched figure should be as little as possible, consistently with the object in view, and by no means so great as is commonly employed in lock gates: I should think a deviation of one foot or eighteen inches quite sufficient for the purpose of locks of from forty to fifty feet wide.

General Remarks.

It was my intention to have concluded the preceding part of the article with a Table of the requisite dimensions of timber for gates of different sizes, both of the curves commonly employed, and of those which I should recommend; I find, however, that these calculations would require a greater length of time than I can at present devote to the subject, and I therefore conclude with a few general remarks on the results arrived at.

In the first place, with respect to the proper angle of straight gates, this being a subject naturally calculated to excite the propensities of the mathematician to set his maxima and mimima to work, a great number of solutions to the problem have been given; but I must remark, with every respect for that useful class of men, that they are frequently too anxious to commence investigations without sufficient data, and consequently arrive at results totally incorrect, which has certainly been the case in those investigations I have had an opportunity of examining on the subject.

It seems to me perfectly impossible to arrive at correct results, without first ascertaining the amount of transverse strain produced by the end pressure, which does not seem to have been done before; but having obtained this from Girard's experiments to be one-tenth of the effect of an equal weight in the middle of the length, I have little doubt that the angle 19° 25′ would be found, by experiments, to be very nearly that in which the greatest strength would be obtained with a given quantity of timber.

The angle commonly adopted in this country, is considerably more than 19° 25′, amounting generally to between 30 and 40 degrees, which is said to be preferred from the direction of the thrust being met by a large quantity of brickwork. I cannot, however, conceive this to be a matter of much importance, particularly as there are locks on the continent, of large dimensions, where the angle is considerably less, which have stood perfectly well. The angle of the celebrated sea-lock of Muyden is only 16° 30′, and the ancient lock of Sparendam, which was built in 1568, and has stood many storms without injury, has a sally of not more than one-sixteenth:—the angle ought certainly to be in some measure guided by the circumstances in which the gate is placed; at the same time, I consider the angle commonly made use of in England, to be decidedly larger than necessary, and a useless weight of material employed, which increases one of the evils of canal navigation,—the time consumed in passing the locks.

The employment of curved timber is undoubtedly advantageous, but its application is evidently made upon no fixed principles, as may be seen from the differences of the curves which have been adopted; some being so great as to very nearly approach the figure I have pointed out as the best, while others are so exceedingly flat that they possess little advantage over the straight gate.

To illustrate these differences in wooden gates, I have represented, in the accompying drawing, the curves employed in the gates of the St. Katharine's, London, and West India Docks. The dimensions are as follows:—

ST. KATHARINE'S DOCKS.

Width of the lock	45 feet.
Projection	11
Radius of the gate	117

Consequently the angle $\varphi = 29° \ 16'$, and $\theta = 6° \ 8'$.

LONDON DOCKS.

Width of the lock	40 feet.
Projection	9
Radius of the gate	50

Angle $\varphi = 23° \ 35'$, and $\theta = 13° \ 54'$.

WEST INDIA DOCKS.

Width of lock	45 feet.
Projection	10
Radius of the gate	120

Angle $\varphi = 26° \ 24'$, and θ 5° 53′.

With the aid of the preceding formulæ I have calculated the amount of transverse strain in each case, (half the pressure of water upon one gate being unity,) and the same, if they were of straight timber, having an equal salient angle. These formulæ are arranged in the following Table.

In order to make the comparison of the straight and curved gate more direct, there is also added a column of the amount of transverse strain on the latter, that on the straight gate being unity.

The fourth column illustrates the reduction of the dimensions of square timbe which may be permitted, owing to the dir minished strain.

TABLE III.

Gate.	Transverse strain, $\frac{1}{2}w$ being unity.	Transverse strain of straight timber having the same salient angle, $\frac{1}{2}w$ being unity.	Transverse strain, that on the straight gate being unity.	Dimensions of timber having equal strength, that on the straight gate being unity.
At St. Katharine's Docks,	·86	1.178	·73	·900
London Docks,	·56	1.229	·45	·766
West India Docks	·86	1.201	·72	·806

It thus appears that considerable advantage is gained in each case from the curvature, but that in the London Docks, from the radius being less, and the two gates in consequence approaching nearer the curve of a complete arch, the advantage is much greater, and the transverse strain in consequence reduced to less than half that of straight gates having the same salient angle.

The difficulty of obtaining timber of sufficient curvature has been urged as a reason for the flatness of the curves employed in wooden gates; this is certainly a consideration which must be attended to, but as similar curves are employed when the material made use of is cast iron, I cannot conceive this to be a point which has materially influenced the choice of the figure.

In the accompanying drawing (Plate VII.) are given the curves of the gates of the Caledonian Canal, the Dundee Docks and Sheerness Basin, which are of cast iron: they will be found to differ very materially from each other, being in one instance nearly as flat as in the West India and St. Katharine's Docks.

The following are the dimensions:—

CALEDONIAN CANAL.

Width of the lock	40 feet.
Amount of projection	10 "
Radius of curvature	75

Angle of sally $\varphi = 30°$, and $\theta = 8° \ 3'$

DUNDEE DRY DOCKS.

Width of entrance	40 feet.
Amount of projection	7 feet 6 inches.
Radius of curvature	67 feet.

Angle of sally $\varphi = 22° \ 2'$, and $\theta = 9° \ 12'$,

SHEERNESS BASIN.

Width of entranec	58 feet.
Amount of projection	12 feet 6 inches.
Radius of curvature	55 feet.

Angle $\varphi = 24° \ 5'$, and $\theta = 16° \ 55$.

To make a comparison of these curves, I have calculated a Table, as in the case of the wooden gates, containing the amount of the transverse strain which straight gates would have under similar circumstances.

The same formula is employed for this purpose as for the wooden gates, which may not be stricly true with cast iron; but I should not conceive the difference to be sufficient to affect materially the comparison.

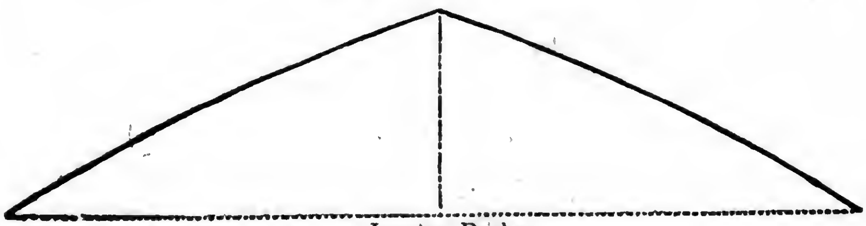
Gate.	Transverse strain, half the pressure of water being unity.	Transverse strain of a straight gate, with the same salient angle.	Transverse strain, that of the straight gate being unity.	Dimension of iron of similar section with the straight gate, that of the latter being unity.
At Caledonian Canal	·82	1.173	·700	·887
Dundee Docks	·72	1.247	·58	·834
Sheerness Basin	·44	1.215	·35	·704

It thus appears that in the gates of the Caledonian Canal the transverse strain is nearly as great as in the West India and St. Katharine's Docks. In those of the Dundee Docks and Sheerness Basin, a considerable improvement is made, particularly in the latter, where the strain amounts to little more than one-third of that which straight gates would have in the same situation; but I conceive that yb slightly diminishing the salient angle, and increasing the curvature of the gates, the advantage might be carried still further,—the same strength produced by less weight of material, and a lightness given which would greatly facilitate the passing and repassing of vessels.

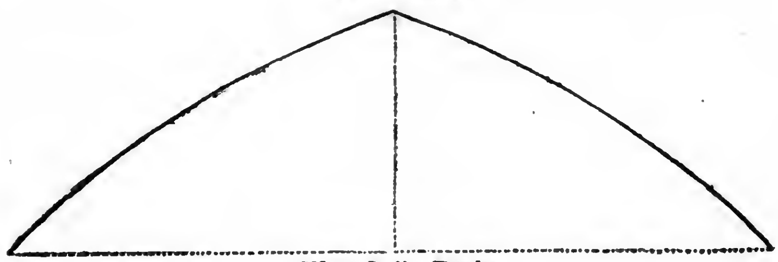
CURVES OF LOCK-GATES.

Plate 9.

St. Katherines Docks.

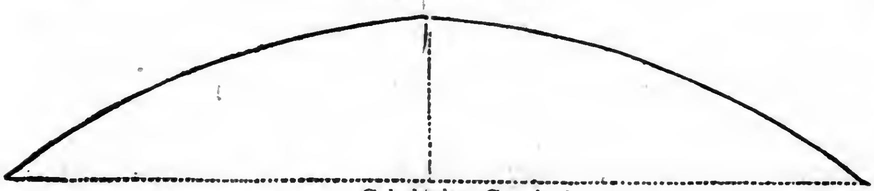


London Docks.



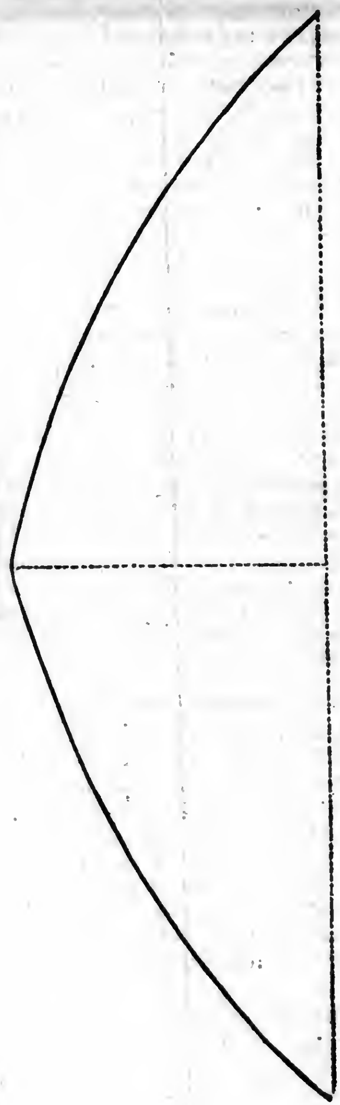
West India Docks.

Proposed Curves.

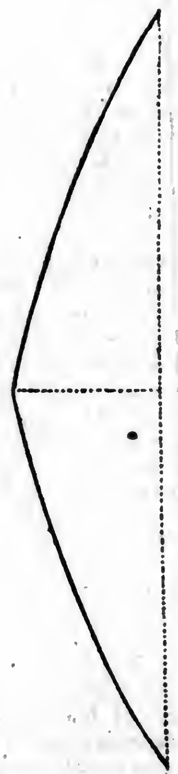


Caledonian Canal.

Sheerness Basin.



Dundee Docks.



Agriculture, &c.

Cultivation of the Prairies. The following letters from, and to, the Hon. H. L. Ellsworth, superintendant of the Patent Office at Washington city, give a better idea of the cost of cultivating the Western Prairies than we have before seen, and we think our readers generally will be pleased with a perusal of them.

Washington, Jan. 1, 1837.

Dear Sir—You doubtless expect some further statement than has been received respecting the investment made for you in the valley of the Wabash. A desire to meet my son, who was daily expected from Lafayette, has delayed my writing until this time. And now, let me say, generally, that the west has grown, and will continue to increase beyond the most sanguine calculations. Nor will any action of general government materially check the advancement of the lands which are judiciously located on the great western canals or railroads. Very little is yet known of the valley of the Wabash. Although the fertility of the soil is unequalled, still few have ever seen this country. The reason is obvious, there is no communication with it, and hence speculators and settlers have passed around it going west, either by the Michigan Lake, or by the Ohio and Mississippi rivers.

Five thousand persons left Buffalo in one day to go up the lake, and yet not one went into the valley of the Wabash. A slight inspection of the maps of Indiana, Ohio, and Illinois, will show a direct route to the Mississippi from the west end of Lake Erie, to be up the Maumee and down the Wabash valley to Lafayette. It may, therefore, be considered certain that when the railroad from St. Louis to Lafayette is completed, the great travel from the Mississippi valley to the east, will be by the lakes through the Wabash and Erie Canal the shortest and quickest route by several days. A person at the mouth of the Ohio will pass up to St. Louis, then take the railroad and canal to Lake Erie, in preference to following the meanders of the Ohio river in a steamboat. Can there be a doubt on this subject? What time will be occupied on this route to New-York? Not exceeding six days. From St. Louis to Lafayette, (240 miles,) one day may be allowed; from Lafayette to the lake, at the rate of 4½ to 5 miles per hour on the canal, (now in operation considerable part of the way,) forty-eight hours; on the lake, 24 hours; and from the lake to New-York city, via railroad, (now commenced,) not exceeding two days.

What changes this must make in the value of property on the route! The value of land depends on the fertility of the soil and the facility of transportation. From a personal inspection of the western States, during six years past, I am fully convinced the Wabash valley has the best soil and most favorable climate. In the latitude of Philadelphia, you avoid the extreme of great heat in summer and of cold in winter, and also avoid the danger of early frosts, so prevalent in a higher latitude. You may ask, what will be the markets for Indiana? I answer, New-York and New-Orleans.—The former by the Erie Canal, and the latter by the Wabash river, (navigable to Lafayette for steamboats,) and by the railroad above named to St. Louis, also Montreal by the Welland Canal. A choice of all these markets, equally accessible, is presented to farmers on the Wabash valley; and one peculiar advantage this valley possesses over Michigan and Wisconsin, is the early navigation of the Wabash river. The produce of this valley can by this river pass down to New-Orleans in flat boats, free of tolls, and be transported to Charleston, Baltimore, New-York, and Boston, six weeks before the New-York canal opens. This early market may be estimated at a good profit in business.

You may ask, if the Wabash and Erie Canals will surely be completed? Undoubtedly they will. Indiana and Ohio are pledged to complete them. Nearly all is now under contract, and government has given lands adjoining sufficient to finish the same, *without any expense to the States.*

As like causes (other things being equal) produce like effects, it will not tax your credulity to believe, that the rich lands of the Wabash valley will equal those on the Ohio, New-York, and Pennsylvania canals which vary from $25 to $60 per acre. Is it possible that lands, yielding forty bushels of wheat, seventy bushels of corn, sixty bushels of oats, and four hundred and fifty bushels of potatoes, and distant only ten to twelve days transportation from New-York or New-Orleans cities, can be less than $30 per acre?

In making selections, I have, when practicable, procured both prairie and timber, though I am sure there has been a common error to pass the rich prairie because timber cannot be found adjoining, at government price. Under this belief many settlers have, to their sorrow, entered the timber and left the prairie, because they suppose nobody would enter that without possessing the timber. This prairie has been lately entered. And such is the facility of raising timber on prairies by sowing the seed of black walnut and locust, that the desire for timber land has diminished.—Those who doubt the comparative value of prairie and timber land., will do well to consider that $12 is a fair price for clearing timber land. Timber land when cleared in the usual manner, is left incumbered with stumps and roots, fatal obstacles to labor-saving machines. $12,000 will be required to clear 1,000 acres of timber land; whereas the 1,000 acres of prairie can be put into tame grass, without ploughing.

A prairie farm may be put in complete cultivation, at from $3 75 to $9 per acre, according to the annexed computations from my son Edward, who has been extensively engaged in cultivating the prairie for the last year. The annexed letter from Mr. Newell will also give much valuable information on this point. From a personal examination of the lands in France and on the Wabash valley, I feel no hesitation in pronouncing the latter decidedly the best for the beet sugar manufacture.—In France, eight, ten, and twelve dollars per acre are paid for rent, and yet great profits are made. An acre of good land will yield 44,000 pounds of sugar beet, from which 2,400 pounds of sugar can be extracted, which at ten cents per pound, amounts to $240 per acre.

In England, paper is now made from the residuum of beets, after the saccharine matter is extracted. An application for a similar patent is now pending in the patent office. The sample of paper exhibited is very good, and the rapidity with which the paper is made, must materially reduce the price of this article. Many labor-saving machines are introduced to aid in the cultivation of new lands. In a few years, it is probable that ploughing on smooth lands may be effected by steam; and even now mowing and reaping are successfully done by horse-power.

Such are the profits of cultivation, that I would advise all who can, to improve some part of their lands. A small improvement will repay expenditures, and greatly enhance the value of the whole investment.

Three benefits may be expected:

1st. The crops will repay expenses, and yield great profit.

2d. The land cultivated, and the land adjoining, will be advanced several hundred per cent.

3d. If stock is put on the farm, the same may be numerically increased, and greatly enhanced in value, by improving the breed.

Either of these considerations is sufficient to justify cultivation, and guaranty a large return. I might mention the successful cultivation of hay in the west—from one and a half to two tons is a fair crop.—This can be cut and pressed without any labor-saving machines, for $2 per ton; and if the grass was cut by horse-power, the expense would be still less. The profits on one hundred heifers, at $5, might be easily supposed. Fifty breeding sows would probably give seven hundred pigs per annum; and by these means a large farm could be stocked, with little capital advanced.

Hay at New-Orleans varies from $20 to $50 per ton. An average, for the last three years, may be $30 The cost of floating down hay in flat boats, to New-Orleans, may be $8 per ton.

If, therefore, fifteen hundred to two thousand tons of hay could be cut on one thousand acres, would it not be a profitable crop?

There is a practice mentioned by Mr. Newell, and highly recommended by others of putting in hay seed without ploughing the ground. This is done by burning the prairie grass in the spring, and harrowing in the seed. The seed catches quick, and grows well. Blue grass, especially, succeeds, in this way, and the grass will sustain stock all winter without cutting any hay or fodder for them A large drove of horses were kept last winter at Indianapolis on blue grass, on the open fields, at the small expense of $1 per head per month.

From personal examination, I am convinced that ditching and hedging, as practised in Holland, England, and France, almost entirely, and now successfully adopted in Illinois, is cheaper than fencing by rails.

The general complaint of the earth crumbling by frost, is prevented by sowing blue grass seed on the sides. Mulberry trees might be raised on the slope of the ditch, with great profit. Indeed, such is the rapid growth of the mulberry in these rich prairie lands, that the purchase of this land at $1 25 an acre, and planted with these trees alone, would in a few years be highly valuable. Such is the extent of the prairie, that wood land will always be valuable for timber. The wood land is also rich, and fine for cultivation; and if trees under certain diameter are cut, a fine grazing farm may be easily made, and the good timber preserved. Similar pastures are found in Kentucky; these yield $3 profit per acre, annually. It may be asked, how can non-residents best cultivate their lands? I would remark, that it is customary to rent land (once broke and fenced) for one third of the crops delivered in the crib or barn. At this rent the tenant finds all.

I would advise to employ smart enterprising young men from the New-England States, to take the farm on shares. If the landlord should find a house, team, cart, and plough, and add some stock, he might then require one half the profits of the same. I would advise to allow, for fencing or ditching, a certain sum, and stipulate that the capital invested should be returned before profits were divided. A farmer could in this way earn for himself from $700 to $1,000 per annum, on a lease for five years.

The second year a mowing machine might be furnished, if one hundred acres were seeded down to tame grass. Mast for swine is found in great abundance, and the number of hogs could be easily increased to one thousand, by adding to the number of breeding sows.

Corn is easily raised, that it is found advantageous to turn the hogs into a field of this grain, without gathering it. It has long been the practice in the State of New-York, to raise oats and peas together, and turn in the swine to harvest the same when ripe. Experiments this summer in Connecticut, show a great profit in raising spring wheat and oats together, and feeding out the same to hogs. I have omitted to say, that good bituminous coal is found in the valley of the Wabash. The veins are from five to ten feet thick, and a large wagon load will supply one fire for a year. *Salt* also is manufactured in large quantities, and superior in quality to the Kenhawa salt.

Farmers in Illinois and Indiana are now successfully enclosing their lands by ditching, which has cost from fifty to seventy-five cents per rod.

The laws of the States of Indiana and Illinois, compel the owners of lands adjoining to pay one half of fencing, whenever they make use of, or derive any benefits from the fences of their neighbor. This lessens the expense of fencing one half.

If it be asked, what are the profits of cultivation? I answer, if the land is rented for five years, the profits accruing during this period, will repay the capital advanced in the commencement, with twenty-five per cent. interest per annum, and leave the farm worth $20 per acre at the expiration of the lease. Probably the profit will be much greater.

Yours, respectfully,
H. L. Ellsworth.

Lafayette, Nov. 1836.

Dear Sir—In consequence of the numerous inquiries by yourself, and others, relative to the improvement of wild lands, and especially prairies; the cost of cultivation; the quantity of crops; the market for the same, and the profits that may be expected, I have concluded to write you a general letter, to be used as might be thought proper. My knowledge is founded upon experience, having just completed a farm of eight hundred acres on the wild prairies.

The expense of breaking up the sod, is $2 25. This is a fixed price, and certain calculations may be made on it, wherever the land may be located. But a difference will exist in the cost of fencing, according to the distance the rails are carted. For the farm I have just fenced, the rails were hauled four miles. This distance will form the basis of my calculations. It is apparent that the cost of fencing will depend materially on the size and form of the area to be enclosed. An area of three hundred and twenty acres will cost much more than half of the amount required to fence six hundred and forty acres. The four sides of a half section are three miles; the two longest sides being one mile each, and the two shortest a half mile each. The four sides of a whole section, six hundred and forty acres, are four miles, requiring only *one quarter more fence* for *double* the quantity of land.

Twenty rails are allowed to a rod; this makes a "Virginia," or worm fence, eight rails high—the eighth rail (called a rider) being elevated twelve or eighteen inches from the seventh rail, and resting on crotches, (eight feet long,) crossing at each corner of the "worm." Rails of ordinary size, laid in this manner, make a durable and tight fence, over and through which no cattle or stock can pass.

First Estimate for improving six hundred and forty Acres.

Four miles, or 1,280 rods, 20 rails to the rod, gives 25,600 rails.	
Add for enclosures, cribs, &c. 1,400 rails; total of rails is 27,000, which, at $3 50 per thousand, gives	$945 00
For one log house and well, and laying up fence,	200 00
For breaking up six hundred acres, (allowing remaining forty for bad spots, enclosures, &c.,) at $2 25,	1,350 00
Allow for contingencies,	30 00
	$2,525 00

Making not quite $4 per acre, costs, including buildings, &c.

Second Estimate for three hundred and twenty Acres.

Three miles, or 960 rods, at 20 rails per rod, gives 19,200 rails.	
Add for enclosures, cribs, &c. 1,300; total of rails, 21,500, at $35, gives	$752 50
For well, laying up fence and one house,	175 00
For breaking three hundred acres, (allowing remaining twenty for enclosures, &c., at $2 25, gives	676 00
Add for contingencies,	25 00
	$1,628 50

Making near $5 per acre.

The above calculations may vary a few cents per acre, owing to slight fluctuations in price of laborers. One hundred acres will cost about $6 50 per acre, same buildings, &c.; and eighty acres will cost about $8 30 per acre, same buildings, &c.

I have found no difficulty in renting one hundred acres of land, fenced, at $2 50 per acre. The tenant made a handsome sum by the lease. It is common to hire land that is fenced or has been broken up, and give one third of the crop delivered in the crib or barn.

You will perceive the profit on one hundred acres, 40 bushels of corn is a small crop; 75 to 80 bushels a good one; one hundred acres, at 40 bushels, will yield 4,000, one third of which is 1,333 bushels, which, at 25 cents, is $3 33 per acre.—When the canal to Lake Erie is made, the price will be double; 30 bushels of wheat, is a fair crop; one third, 10 bushels, is equal, at present prices, to $12 50—deduct expenses, it will be $6 per acre; one half of the grass crop would be a fair proportion for the landlord, equal to one ton, which will be worth on the land $8, and deduct $1 for pressing, will leave $7 profit per acre, which will be doubled by carrying to New-Orleans.

Many farmers raise a sod crop, by dropping corn in the furrows when ploughing is done; sometimes this succeeds well, but there is too much uncertainty about it to make definite calculations. As a general remark, I would observe, that the first two crops will pay for the land, at government prices, fence the same and plough it, and on 320 acres, build a house worth $200. The land will sell readily at $10 per acre, if improved. Yours, respectfully,

E. A. Ellsworth.

To Hon. H. L. Ellsworth,
Washington City, D. C.

Danville, Nov. 12, 1836.

Dear Sir—

Your favor of August 30th, was duly received; and in answer to your inquiries I can say, that:

1. "Does your prairie land bear good wheat?" None can hardly be better.

2. "How is the best way to improve prairie land?" By ploughing it in the months of May, June, and July, with a plough peculiar to this country, which cuts a furrow two feet wide, and commonly three

inches deep, upon which sod, corn, oats, wheat, and most kinds of grain, grow well the first year, and with no farther labor in ploughing.

3. "How much wheat, corn, or oats, do you realize per acre?" The first year or so, of wheat, commonly thirty bushels; oats, forty bushels; corn, 30, &c., &c.—The second year more of corn and oats, and not much of wheat.

4. "Do sod crops do well?" They generally are fine, in a good season.

5. "How much grass on an acre?"—I can't say, but over two tons, when well set.

6. "Can blue grass be harrowed in on the turf?" It can, and does well.

7. "Can herds grass also: is this the best way?" It can also, and this is the best way.

8. "Is your country good for hogs?"* Not so good; it is too cold—yet there is good pork made here.

9. "Can you keep cattle on blue grass?" They are kept by some all winter on blue grass, if snow is not too deep.

10. "Is your prairie good for beets?" It is the best for all garden stuff, that I have ever seen, and there can be none better.

11. "Is there coal near you?" The coal beds here are inexhaustible; they are found almost on every considerable creek, and perhaps as much in Vermillion county, as any in Illinois.

12. "What is the price of cattle now?" About $4 per cwt., and higher now than formerly, owing to the great emigration and demand for them; and from the rapid settlements, they will not be lower, most likely, for years.

13. "How do ditch and turf fences do?" As yet, I have seen none upon the right plan; but a ditch and sod sown with blue grass, I have no doubt will answer every purpose, instead of fence.

14. "What is the comparative expense of rail fence and ditching?" That depends upon the distance you haul the timber.—But ditching may, by proper arrangements, be done cheap.

You ask me farther, whether I can furnish blue grass seed? I can, to the amount of sowing two hundred acres per year, price $1 per acre. This seed can also be got at Louisville and Cincinnati.

You have the goodness to say, that I may add any information in my possession. I do it cheerfully, believing that we have one of the finest countries in the United States. My experience here in farming has been not inconsiderable.

The prairie grass is an excellent substitute for tame grass, if it is well cured, and cut early. This grass, early in the spring, is equal to any pasture in the old States, and some have said better; but when it becomes hard, in August and September, it is of little or no account. A man and two horses can plant and tend forty acres of corn on the prairie, when the sod is well rotted; and, as an average crop, there will be fifty bushels per acre, and sometimes more. Oats grow finely, and yield from fifty to seventy bushels, on ground well tended. I think, also, there is no country superior to ours for hemp and tobacco; at least, none of the southern states in which I have been.

Sheep do as well here as in Kentucky, even on the prairie grass. I need hardly add, that this country is peculiarly adapted to the raising of mules, horses, and cattle, and they can be raised cheaper here than any state in which I have been, fifty per cent. at least I will say.

Fruit trees that I have tried, have grown remarkably thrifty, and, perhaps, faster than in most countries—which is the case of all trees. I have grown, from the seed, black and honey locust, sugar and walnut trees, ash and hickory—that of nine years' growth, is nine inches in diameter. My pear trees, about nine inches long when planted, produced fruit the sixth year.—My apple trees, from the seed, produced the fifth year; and some of the trees this year, (the ninth year, yielded me twenty bushels to the tree. I will not forget to mention, that flax also is luxuriant in its growth here.

You have said that you have the sugar beet seed, and proffer to send me a few, which will be most acceptable. I would like some of the hedge thorn for experiment also.

I live adjoining your land, and have eight persons in my family, and during this, and for years past, have had none sick in my family. This, perhaps, comprises all you may wish to know about our delighted country.

I have the honor of being yours, &c.,
JAMES NEWELL.

To Hon. H. L. Ellsworth,
Washington City, D. C.

* Reference is here made to the *prairies*, which have no shelter for hogs. In the woods adjoining, hogs live all winter on mast, and thrive well. The Wabash valley is famous for its hogs. I have kept a large herd of swine this past summer on the prairie. Timber will soon be planted, or sheds built, and then pork can be most easily raised on these lands.—H. L. E.

We are truly obliged to the writer of the following communication, and our readers, certainly cannot be less so; as the facts therein given may be implicitly relied upon, and are of deep interest to every practical farmer. We take M. at his promise, and give him notice that we shall often draw upon him for the results of his experience, and trust that our drafts will not be "protested for non-acceptance." If *accepted* we ask no *endorser*.

It will afford us great pleasure to aid him in "*hammering*" out the *truth* of such vast importance, into the brain of every wool grower or sheep raiser in the country.—[Eds. N. Y. F.

MANAGEMENT OF SHEEP.

Messrs Editors,—I have long since desired to contribute something useful to the columns of your valuable journal, which is the privilege and duty of every subscriber. Many are doubtless deterred from so doing, by the same reason which has influenced myself, viz., because they have nothing novel to communicate. I have discovered that novelty is not always associated with utility, and therefore, after due reflection, I am convinced I cannot better subserve the purposes for which your journal was established, than in this communication, bear my testimony in favor of something already known, of the highest importance, and of undoubted advantage, in every point of view, to all who practice it. I refer to the housing and protection of sheep, during the winter. This a trite subject Messrs Editors, but it is one, which will bear more hammering than you are aware of; and if it were possible to hammer it into the brains of every wool grower, I should congratulate myself as one of the greatest benefactors of the age.

Much has been published on the improvement of the breed of sheep, the best modes of keeping &c., but I fear to very little purpose. I have sometimes thought, that our great freedom as a nation, had an unfavorable influence upon private character, and is in some degree injurious to individual improvement. Every man as soon as he slips "his leading strings" is proud of "going upon his own hook," this is frequently a sort of independance of thought and action, which is too apt to degenerate into self-sufficiency and conceit of our own superior knowledge. These remarks are particularly applicable in my opinion, to the great majority of farmers. Almost every man you meet with, in these days, is disposed to consider his own kind of stock best, his system of tilling best, and his every thing in regard to management better than his neighbors. All experience and observation prove, that when a man thinks he has arrived at the point of perfection, and he begins to retrograde. This spirit of of self-sufficiency is fatal to all improvement. The rapid strides which agriculture is making towards perfection, renders it ridiculous for any one to say "my system is best, I know enough already, and will follow in no man's track." In my opinion, we all ought to consider, that in this country, the great science of agriculture is yet in its infancy, and loudly applaud every experiment that is made to develope the wonderful, and still hidden, resources of our soil. I am not, however, myself disposed to bow to every theorist and innovator, whether in religion, politics, or farming, but where experiments are based on common sense, and conducive to profit, I am ready for one, to adopt them. How much valuable information and solid advice have been tendered through the medium of your journal, which, if followed, would have increased our gains some ten, some twenty, and some an hundred fold!! yet this spirit of self-sufficiency rejects the experience of others, and rests satisfied with pursuing the beaten track of our grandfathers.

These observations have been deduced, not only from my own experience but those around me. I will now proceed to give you briefly the manner of managing my flock of sheep.

Until within two years, I have committed the abominable sin of allowing my flocks to be fed during the winter, about stacks, without any protection from the pitiless storm, and when I look back on the years and years which I did so, and recall their sufferings and death from exposure, it is really with shame and confusion of face that I make it known. I have, however, put a stop to so inhuman a course and accordingly set about building barns, in size 30 by 20 feet, 14 feet posts leaving an opening underneath, of 4½ feet from the ground. I have found the body of each building sufficiently large to contain hay enough, in an ordinary winter, for 100 sheep, and the accommodation or shed part ample for that number. All of them front the south with a passage way of some 8 or 10 feet wide, which is at all times open, and leaves them free to go in and out at pleasure. About the barns, which stand on my meadows, I have created board fences, made close, which, when feeding, afford great protection from winds; as regards the size of the yards, never having measured them, I am unable to say; but 60 by 100 feet is large enough. My hay is fed in boxes, with opening at the ends and sides, sufficiently wide for the admission of their heads. Some of your readers may smile when I inform them, that this is the first winter I have made use of boxes; this, however, it the fact, and such I have discovered in the saving of hay, that hereafter I shall 'veto' open racks, or scattering hay on snow or ground.

What is left in the boxes, every morning, is taken out, put in a pen until full, and then drawn away and fed to my cattle. Herein is great economy—the waste of feeding on the snow or ground, every practical farmer knows.

Raising a large crop of wheat yearly I am supplied with great abundance of straw, which is used partly for beds, and scattered about the yards—much of it, in cold weather, sheep will eat, and the residue is turned into manure. By the way, I think this a capital mode of disposing of straw, as it is soon cut up by being constantly trampled upon, and thereby converted into immediate use, without the delay of rotting.

From the beginning of winter to its conclusion, I feed daily to my last spring lambs, half a bushel of clean oats to the 100, a mixture of bran and oats I think preferable however, inasmuch as in the beginning of winter, oats alone is rather too stimulating and will occasion some to scour—the bran effectually counteracts it. Where bran cannot be obtained, feeding half the above quantity of oats, for the time of two or three weeks will answer.

I will here remark, that I have uniformly realized the greatest advantage in graining my lambs. Out of nearly 500, up to this time (middle of March) I have not lost one. It must be obvious to all, that with a view to promote growth and a good constitution, with any description of stock, feeding when young, and keeping up good condition, is of the highest importance.

To my full grown sheep, I have, until this winter, fed the same quantity of grain to the hundred, that I do to my lambs. They now look as well as when they were grained—but, it is almost solely to be ascribed to the protection which has been afforded them. It is my practice to give hay tiwce a day to all my sheep in ordinary weather, and when very cold, three times. So much for reference to my winter economy.

I am a firm believer in the good old maxim, "that stock well summered are half wintered," and to this end, my farm is divided into fields of from eight to fifteen acres each. I allow a flock to remain but a few days on a field, when they are changed to another. By so doing, the grass is not eaten too short, readily grows again, and the effects of fresh pasture so frequent during the summer, your readers can easily conceive.

As my object in this communication was to make known, in some degree, my own mode of management of sheep, but more particularly to add my testimony of the benefits to be derived from housing sheep during the winter, I will state some facts, which will lend additional weight.

Until the erection of my barns, it has been my misfortune to lose from 50 to 150 sheep every winter for the last eight or ten, notwithstanding the advantages of feeding oats and bran. The severity of last winter, all will readily remember; yet in consequence of the protection my sheep enjoyed, my loss was only 38 out of nearly 1600. My loss during this winter up to this period (as above stated) is only 6; my whole number of sheep at present is about 1800.

I will now record the loss of some of my neighbors, during the last winter, in the adjoining Co., (Cayuga,) none of whom had barns, sheds, or hovels provided for their flocks. One individual out of a flock of 1400, lost between 600 and 700—another, out 2000, lost nearly 400—another, from a flock of 1500, lost between 200 and 300, and the loss was nearly in the same proportion, with few exceptions, throughout this region!!

These are startling facts, and would seem not to require a word of comment. Will not humanity almost blush? That men will so utterly disregard their own interest is truly astonishing! They will make all needful arrangement for their horses and cattle, and get so absolutely neglectful of the comfort and benefit of, that, to me, most interesting of all domestic animals—sheep. Every one would naturally suppose that the above, who sustained such losses, would arouse themselves and prevent the recurrence of such devastations, by providing some sort of shelters—but no—to my certain knowledge not one of them have raised a finger to do it.

Will not my preparatory remarks apply to these and all others who do likewise? I called it self-sufficiency—it is more—it is downright inhumanity: a treatment they are not guilty, even to their dogs. But I shall leave your humane readers to apply the lash. But one word more—these are the very kind of farmers, referred to, who regret all experiments, all experience of others—who have arrived at the goal of perfection—they will tell you *"that housing of sheep is injurious to their constitutions"*—that they *know* their system of management is better than their neighbors. Have I not, Mr. Editors, proved conclusively that when men think—nay more—*know* they have arrived at the point of perfection; that moment they retrograde. "The beginning of wisdom is to know our own folly."

M.

Lansing, Tompkins Co., N. Y.

IMPROVED CORN.—We take the following correspondence from the Newark (N. J.) Daily Advertiser, and commend it to our readers, as well worthy their attention. We have no doubt of the correctness of the theory that a selection of the fairest and largest of the crop for *seed* will produce a superior article; and that perseverance in that course will richly reward the husbandman.

IMPROVING COMMON SEED-CORN.—The following interesting correspondence has been furnished to us for publication by the Hon. *James Parker*, as containing information that may be useful to the Agricultural community. Mr. Ellsworth's circular was addressed to each member of Congress, with a sample of the corn of which Mr. Baden's letter speaks. We see no reason why his theory is not equally applicable to other seeds. It is certainly worthy an experiment—

PATENT OFFICE, Jan. 30, 1837.

Sir: Hearing of some great improvements that had been made in the common corn, I addressed a letter to Mr. Baden, a highly respectable gentleman in Maryland, to ascertain what facts I could on the subject.

His letter is very interesting, and I transmit you a copy of it. This experiment of Mr. Baden shows most clearly what can be done to *improve seeds, by carefully selecting each year the best kind raised.* Theoretical opinions sustain Mr. Baden: but few experiments have been tried so successfully. What might be effected for agriculture by similar efforts.

The like efforts in improving the breed of animals have been crowned with great success, especially in Europe. I avail myself of this opportunity to send you a small sample of the corn mentioned by Mr. Baden. I will only add, that I have conversed with several persons who have planted the "Baden" corn; and the concurrent opinion of all sustain the statements made in the letter. I have a few samples at the Patent Office, of corn, raised in this neighborhood which has four and five ears on a stalk; and I expect soon some stalks, containing six, seven and eight ears. If this corn were generally introduced, how greatly the amount of bread stuffs might be increased, *without any extra labor.* I hope some public spirited citizens will try to improve wheat, oats, barley, and other grains.

I avail myself of the opportunity to mention the introduction of the Italian *spring wheat* with great success. A friend of mine, in Connecticut, raised the last year forty bushels on an acre. This grain is heavy; makes good flour; yields well; and the crop avoids all the danger of winter freezing. I have ordered a quantity of this corn and wheat to be shipped to Indiana, and intend to try both on the fine soil of the Wabash valley, the ensuing summer.

I am, yours, very respectfully,

HENRY L. ELLSWORTH.

N. B. Be careful to plant this corn in a place by itself. When good seed is planted in a field with poor seed, the former will degenerate.

H. L. E.

[Copy of Mr. Baden's Letter.]

NEAR NOTTINGHAM, PRINCE GEORGE'S Co., Maryland, January 26, 1837.

SIR: I received yours of the 14th, making inquiry respecting the "*Maryland Corn,*" which you understood I had raised. I have the pleasure to say that I have brought this corn to its high state of perfection by carefully selecting the best seed in the field for a long course of years, having especial reference to those stalks which produced the most ears. When the corn was husked, I then made a re-selection, taking only that which appeared sound and fully ripe, having a regard to the deepest and best color, as well as to the size of the cob. In the spring, before shelling the corn, I examined it again, and selected that which was the best in all respects. In shelling the corn I omitted to take the irregular kernels at both the large and small ends. I have carefully followed this mode of selecting seed corn for *twenty-two or twenty-three* years, and still continue to do so. When I first commenced, it was with a common kind of corn, for there was none other in this part of the country. If any other person undertook the same experiment, I did not hear of it; I do not believe others ever excised the patience to bring the experiment to the present state of perfection. At first, I was troubled to find stalks with even *two good ears* on them, perhaps one good ear and one small one, or one good ear and a "nubbin." It was several years before I could discover much benefit resulting from my efforts; however, at length the quality and quantity began to improve, and the improvement was then very rapid. At present I do not pretend to lay up any seed without it comes from stalks which bear four, five, or six ears. I have seen stalks bearing eight ears.

One of my neighbors informed me that he had a single stalk with *ten perfect ears on it*, and that he intended to send the same to the museum at Baltimore. In addition to the number of ears, and of course the great increase in quantity unshelled, it may be mentioned, that it yields much more than common corn when shelled. Some gentlemen in whom I have full confidence, informed me they shelled a barrel (ten bushels of ears) of my kind of corn, which measured a little more than six bushels.—The common kind of corn, will measure about five bushels only. I believe I raise *double or nearly* so, to what I could with *any other corn I have ever seen.* I generally plant the corn about the first of May, and place the hills five feet apart each way, and have two stalks in a hill. I can supply you with all the seed you may need, and I suppose I have now in my corn house fifty and perhaps more, stalks with the corn on them as they grew in the field, and none with less than *four*, and some *six or seven*, ears on them. I will with pleasure send you some of these stalks, and also some seed corn, if I can get an opportunity.

Early last spring I let George Law, Esq. of Baltimore city, have some of this seed corn; he sent it to his friend in Illinois, with instructions how to manage it. A few weeks since he informed me that the increase was *one hundred and twenty bushels on an acre*; that there was no corn in Illinois like it, and that it produced more fodder than any other kind. I have supplied many friends with seed corn, but some of them have planted it with other corn, and will, I fear, find it degenerate.

I have lately been inquired of if this corn was not *later* than other kinds? It is rather *earlier*; certainly *not* later. Corn planted in moist or wet soils will not ripen so quick as that which is planted on a dry soil. In the former, there will be found more dampness in the cob, although the kernel may appear equally ripe in both. In the two last years, the wet seasons have injured much corn that was too early "lofted" or housed.

I believe I have answered most of your inquiries. I hope I have not exaggerated—I have no motive for doing so. I raise but little corn to sell, as tobacco is my principle crop. Should I fail to send you some seed this spring, I will next summer gather some stalks with the corn, fodder, and tassels, and all, as they grow, and send to you, that you may judge yourself of the superiority of this over the common kind of corn.

Yours, &c.

THOMAS N. BADEN.

Hon. H. L. ELLSWORTH,
Commissioner of Patents, Washington city.

From the New-York Farmer.

GENTLEMEN:—It was my intention to have sent you the following communication, on the subject of planting Trees. long since; but through untoward circumstances the time has escaped and the season for making such improvements is almost here; however, as it is never too late to do good, I send it to you, and it is at yonr disposal.

Cold Spring, March 1837.

RICHARD M. CONKLIN.

As the winter months roll slowly along, and spring imperceptibly approaches, it is natural for the farmer while he enjoys his fire-side, to consider what he should first direct his attention to, in the way of improving his paternal acres, when that period arrives. Among the most prominent objects is the planting of trees; which may be done as soon as the frost releases the earth from its iron grasp, and nature revives from her death like sleep.

To the farmer who possesses a taste for the beautiful scenery of the country, I hardly need say how much it adds to that scenery, if it is embelished by snug dwellings, whose velvet lawns and gentle slopes are ornamented with trees, offering a cool retreat from the noon-tide heat. But alas! how often in our walks do we see the habitation of the farmer standing exposed to the burning rays of the sun, with not a single tree to offer its grateful shade, or relieve the eye with its green and refreshing verdure. It is indeed a charming sight, when the hills begin to extend their lengthened shadows and their purple peaks are illuminated by the parting rays of the sun, to look from an eminence into a quiet vale and behold the curling smoke arise from neatly painted or whitewashed cottages; but how much is added to the scene, if the white fronts of those cottages should peep from among trees, planted by the hand of industry and taste. The delightful fragrance too of many of our ornamented trees and shrubs is a sufficient reward for all the tronble and expense of planting. But, as I am addressing myself to that class in our community who are, in a good degree, obliged to make pleasure and profit go hand in hand, it will not be amiss to say that nearly all the varieties of fruit bearing shrubs and trees are both profitable and ornamental, and by no means deficient in fragrance. The grape vine for all of the above qualifications is conspicuous.

The highways are susceptible of being ornamented too, by the planting of trees, they offer to the weary traveller a resting place by the way side, while he may repose until his exhausted frame is renovated.

For the last mentioned purpose, the yellow locust is admirably adapted, in a favorable soil it grows rapid, stands erect, and when in flower is a beautiful and fragrant tree: indeed the importance of this tree as a matter of profit, induces me to urge upon the young farmer the necessity of attending to it in season. There are but few farms which will not, upon examination, furnish many waste places for the introduction of this valuable timber. There are many however, who live years on their farms without making the least effort toward this improvement, under the impression that perhaps they may never live to see the trees grow up large enough to be valuable. In reply to such objections I would observe, that should the farm pass from necessity out of the hands of the original owner, after he had improved it in the manner above named, yet it would command a much greater price; but on the contrary, should he hand it down to his posterity, surely it would afford him much more satisfaction in the evening of his days to reflect, that, instead of letting the golden moments escape, he had seized the opportunity and laid the foundation for a valuable inheritance for his children.

About ten years since I came into sole possession of a farm which consisted of one hundred and forty acres of land, twenty of which were hilly wood-land; the rest, excepting four acres of wet meadow or swamp, was arable. On looking about I found many waste places in the woods, along the roads, lanes, and fences where I could introduce locust trees. I accordingly set to work, and planted out at least five thousand. Many of these were set in the woods where the timber had been lately cut off: these are growing rapidly, and nearly all of them in a few years will be valuable timber. By replacing those which died the number probably had been kept good. It has been found by observation that locust on Long Island, from the time of planting until grown to sufficient size for timber, averages in yearly growth twelve and a half cents per tree. A few years since I sold a tree which had grown upon an average, sixty-two and half cents per year. The tree was sold as it stood, and the age was ascertained by counting the circles exhibited on the stump after sawing it off; according to which the tree had stood fifty years.

If locust timber grows in value as I have stated, and the farmer plants on a farm of one hundred and fifty or two hundred acres, five thousand trees in favorable places, those five thousand trees at the end of twenty-four years will be worth sixteen thousand dollars: no ignoble sum for a man to realize from the planting of trees.

Before I leave this subject, I feel it as an imperious duty to caution the public against purchasing seed in the city of New-York, and other places sold under the name of yellow locust seed; by far the greater part of this seed is a spurious kind; and some of the most noted seed stores in New-York have furnished a goodly quantity of this degenerate article.

At some more convenient time I will give my readers at large against the planting of the above mentioned seed, at present I will conclude by pointing out the visible difference between the genuine and the above mentioned spurious kind of locust, which will be nearly as follows, viz.

1. A proneness to branch into equilateral shoots.

2. An inclination to bear seed in pods nearly as large as some of our garden beans, so that a tree of two inches in diameter is frequently loaded with them.

3. The heart wood instead of being yellow exhibits a blue tinge.

4. The grain of the wood is not straight, or easily riven, but appears stringy and tough.

5. In seasoning it inclines to shrink and split.

R. M. Conklin.

Soap Making.—The subjoined is from a friend as well skilled in all matters of domestic economy and household management, as any one I have ever known.

H. C.

The last Soap I made, we used 20 lbs. of potashes and 25 lbs. of grease to a barrel; and it made excellent soap. Success much depends on having the best quality of potashes. I have a set-kettle in which I dissolved the potashes and put it into the trough in which we keep the soap; then melt the grease and put to it, the mass is then hot; having conveniences for heating the water, I have generally filled it up keeping the whole hot; by this means the ingredients incorporate quickly; and I have had but little to do after the first day. But I do not add the whole of the water at once. I prefer doing it by degrees, and stirring well at each time. There will be no difficulty, if you have good materials; and get them thoroughly incorporated. I have no doubt it may be effected as surely with cold water after the ingredients are mixed and put together; but it will require longer time and more labor to stir it. I have been troubled a little once or twice by getting weak potashes; and have been obliged to add more, but have always succeeded in the end.—Once I recollect I put more potashes than usual, and it was too powerful. I then added more grease and water and reduced it; the above proportion, I think, is about right, if the materials are good; if the potashes should prove otherwise, more may be added.—[Brookline.] B. G.

Wilmot's Early Rhubarb.—To those who cultivate the Rhubarb, we would earnestly recommend the Wilmot's Early, before any other variety. We have seen it this season at Mr. Pond's garden in Cambridgeport, two inches high. The growth is very rapid. This is a plant which every body may cultivate. The fruit is considered a delicacy, and medical men ascribe to it a salutary effect, particularly upon children. Four roots are enough to supply a family.

From the Mechanics' Magazine.

PROCEEDINGS OF THE MECHANICS INSTITUTE OF THE CITY OF NEW-YORK.

The weekly Tuesday Evening Scientific Meetings heretofore held in the Lecture Room of the Institute, will be re-opened on Tuesday Evening the 9th inst., at 8 o'clock, by a lecture from Mr. Hodge, on machine and other drawing. N. B. Mr. H., proposes opening a drawing-school in the Rooms of the Institute, should sufficient encouragement be given.

Chemical examination of the stomachs of two individuals supposed to have been poisoned by Arsenic—being the substance of a paper read before the Mechanic's Institute of the city of New-York, August 1836, by James J. Mapes, Esq.

No. 1. In the first case the coats of the stomach only were subjected to examination. They were cut into small fragments and subjected to the action of distilled water, at a temperature of 212°, for 3 hours.

To a small portion of the solution was added ammoniacal nitrate of silver; a bulky yellow precipitate fell down, which afterwards changed to a reddish brown, and was inferred to be a phosphate combined with animal matter; for had it been arsenite of silver it would have precipitated more rapidly, and presented a more decided color.

To a second portion of the solution, ammoniacal sulphate of copper was added to precipitate the arsenic, if any, in the form of an insoluble arsenite of copper, (scheele's green) a slightly green precipitate was formed, but of a doubtful character. This test, as well as the last, is entirely circumstantial; for common salt, onions, garlic and some other substances would, if recently partaken of by the deceased, have produced the same effect.

A third portion of the solution was subjected to the action of sulphuretted hydrogen, but no precipitate was formed.

A portion of the stomach apparently much inflamed, having been previously removed, was carefully drie to expell all the water, and to decompose the animal matter, was heated with black flax in a glass tube for the reduction of the arsenic, if any, in the metallic state: but no metallic ring, garlic, odor or white vapor appeared. On throwing the contents on burning coals,—an effect that is uniformly produced when metallic arsenic is converted to an oxide, or the oxide converted to the metallic state by means of heat; but even this odor is not conclusive evidence, as zinc is capable of producing the same odor. The metallic ring of arsenic, however, is considered as the best evidence we can have, amounting as it does to demonstration.

No. 2. Stomach with some of the contents was boiled as No. 1, in distilled water for three hours. The water in this case was slightly acidulated with nitric acid; the solution was filtered and evaporated to dryness, to drive off the nitric acid, re-dissolved and filtered, to get rid of the animal matter.

To a portion of the solution ammoniacal nitrate of silver was added; and to another portion was added the ammoniacal sulphate of copper, with results similar to those in No. 1. A third portion of the liquid was subjected to the action of sulphuretted hydrogen, which threw down a yellow precipitate. This precipitate being dried and heated with black flax in a glass tube gave none of the usual indications of arsenic.

As the two stomachs were brought to me preserved in alchohol, a liquid which is capable of taking up considerable quantity of arsenious acid, I filtered and evaporated, the solution; occasionally adding distilled water until the alchohol was entirely evaporated. With the ammoniacal nitrate of silver, the precipitate was quite characteristic; with the ammoniacal sulphate of copper it was too white and gelatinous; with the sulphuretted hydrogen the precipitate was too dark for the sulphuret of arsenic, this product on being dried and heated with black flax, gave no indication of metallic arsenic.

From the above experiments, I feel assured that no arsenic was contained in either of the stomachs above mentioned, their contents, or in the alcohol which preserved them, as both the circumstantial and positive tests would have detected, the one hundredth part of a grain had it been present.

The fact that no arsenic was found in the stomach, does not, however, prove that arsenic was not the cause of death; and especially, as the deceased vomited much and for a considerable time. The patient might have died either from the immediate or from the after effects of the poison, though none of this mineral was found. Had the patient died from the after effects, the arsenic would have been indicated by the inflamed state of the inner coat of the stomach, which would have been covered with red spots; and such was, indeed, the case. It is highly probable, therefore, tht the arsenic had been entirely removed from the stomach, by vomiting, before death.

There is a case of the same kind recorded in the Philadelphia Journal of Pharmacy, for July, 1834. The case was examined by Doctors James B. Rogers, Geo. W. Andrews and Wm. R. Fisher.

A lady was poisoned by arsenious acid, in soup, and died the same day, having vomited much. On examining the stomach and contents, not the slightest trace of arsenic was perceptible; but from a portion of soup that had been saved, it was obtained in abundance, by every test that was used. Doctors Prout and Christison, and Prof. Braude, have also cited cases similar to the above.

Advertisements.

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone.

The work contracted for must be finished by the 1st day of July, 1838.

Persons desirous of obtaining work are requested to apply at the office of the undersigned, in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, Jr.
Chief Engineer Jas. Riv. & Ka. Co.

P. S.—The valley of James River above Richmond is healthy.

16—10t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rohester, Jan. 13th, 1837. 4—y

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
New-York, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf . H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR.
Patterson, New-Jersey, or 60 Wall street, N.

51tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States 9—1y

NOTICE TO CONTRACTORS. WESTERN RAILROAD.

PROPOSALS will be received at the office of the Western Railroad Corporation, in Springfield, until the 10th May, for the grading and masonry of the second and third divisions of the road, extending from East Brookfield to Connecticut river, at Springfield—a distance of 35 miles.

Plans, Profiles, &c. will be ready for examination after the first of May. W. H. SWIFT,
Resident Engineer

Worcester, Mass., April 1, 1837. 14-6t

NOTICE TO CANAL CONTRACTORS.

SEALED proposals will be received at the office of the Commissioners of the Illinois and Michigan Canal at Chicago, from this day to the 20th May next for the construction of about eight miles of that part of the summit division of the said Canal, lying between the Chicago and desplaines River.

Also about three and a half miles of the same division, lying between the Saganaskee Swamp, and the western termination of the said division. And also about twelve miles of the Western division, lying between the Grand Rapids of the Illinois and the western termination of the Canal.

The two first portions offered for contract, are heavy work, the first deep earth excavation, divided into half mile Sections, the second mostly rocks, and divided into thirty chain sections; the third consisting of light earth excavation, a little rock and embankment, and is divided into forty-two chain sections.

No bond with security will be required of the Contractors, but the Commissioners will avail themselves of the powers granted them of awarding the contracts to the lowest responsible bidder, and it is expected that the bids of all those who are not personally known to the commissioners will be accompanied with the proper testimonials. And upon the award of work, it is expected that the parties will immediately enter into written agreements, or the contracts will be forfeited.

Plans, profiles, and specifications, giving all the necessary information, may be examined at the office of the Canal Commissioners, at Chicago, and those wishing to obtain contracts on this work, are requested to make a minute personal examination of the work previous to sending in their proposals.

Attest, J. MANNING, Secretary.

Chicago, March 24th, 1837. 16—3t

TO RAILROAD CONTRACTORS.

PROPOSALS will be received at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.

16—6t.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

350 tons	2½	by	⅝,	15 ft in length,	weighing			lbs. $4\frac{58}{100}$	per ft.
280	"	2 "	½,	"	"	"		$3\frac{50}{100}$	"
70	"	1½ "	½,	"	"	"		2½	"
80	"	1½ "	⅜,	"	"	"		$1\frac{25}{100}$	"
90	"	1 "	⅜,	"	"	"		⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2⅞, 3, 3⅛, 3¼, 3½, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

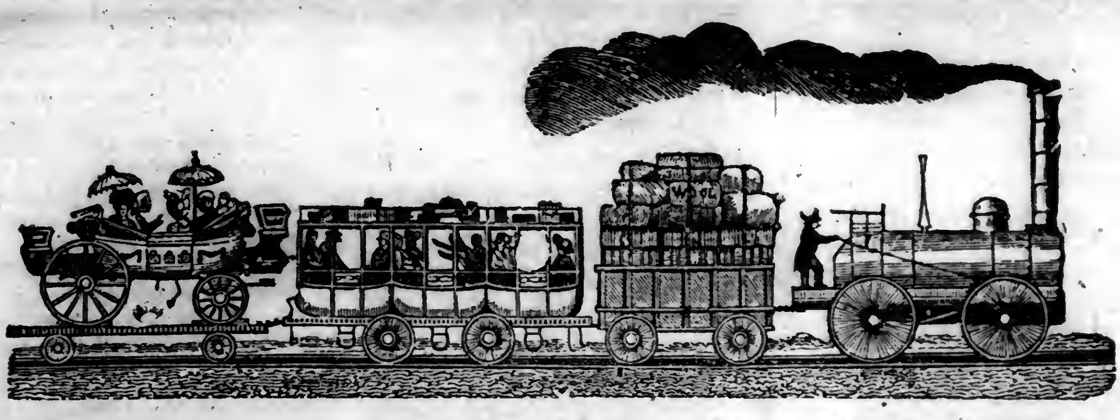
Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

28 tf A. & G. RALSTON & CO.,
Philadelphia, No. 4, South Front st.



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, MAY 20, 1837. VOLUME VI—No. 20.

CONTENTS:

AMERICAN RAILROAD JOURNAL.
NEW-YORK, MAY 20, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William-street, and *opposite the Bank of America*.

☞ SUBSCRIBERS IN THIS CITY, who change their residence on the 1st of May, will please give notice at the office, 30 Wall-street, *Basement Story*. It is desirable that the notice should specify their late and future residence.

HARLAEM RAILROAD.—We are pleased to perceive that the work on this road progresses to a close. It has indeed been a herculean work. Its excavations and embankments are probably heavier than on any other road in this country, of the same length; these, however, are but trifling affairs when compared with its TUNNEL, of over 600 feet, through solid rocks. This is a stupendous and very expensive work. It is now in a great state of forwardness, and will soon be the greatest curiosity and place of resort in the vicinity of New-York. The road is to be completed, we understand, in July, to Harlaem—when the cars will run through and do a large business. We shal be gratified to see it completed at the north end, as we shall then expect to see it brought down to the lower part of the city. It *must* and *will* be continued down into the business part of the city. It is less dangerous than stages—as there is no dodging from side to side. We again say that this road must be continued down into WHITE-HALL.

WILMINGTON AND SUSQUEHANNA RAILROAD.—We are happy to be able to notice the completion of another link in the great chain.

WILMINGBON, Del. May 9.

RAILROAD EXCURSION.—We attended the excursion given by the Wilmington and Susquehanna Railroad Company, on Friday last, and was much gratified with the same.—There were about 200 invited guests on board, citizens of this city and Philadelphia. The cars proceeded to within about a mile of the stupendous bridge erecting over Principio creek, and there remained until the party had sufficient time to visit this extensive piece of masonry. This bridge is the only important barrier in the way at present, and we were informed by Mr. Jones, the contractor, that it would be completed in about six weeks. The road is now finished to within four miles of the Susquehanna, and the whole distance to Baltimore will be ready for use about the fourth of July.

The company having enjoyed the refreshing virtues of the only liquor used in the construction of this bridge—cool spring water—returned to the cars where a portion of them partook of the hospitality of Mr Donergan, the able contractor on that portion of the road; and then returned to Elkton, where a sumptuous dinner was in waiting prepared by the Directors under the superintendance of that prince of caterers, Kincade. The hour being four and a half, P. M., ample justice was done to the same—and after a short discussion over the afterpieces the party proceeded homeward in good cheer.

This magnificent road, as far as constructed, is well made, and the country through which it passes is beautifully diversified by hills and dales, murmuring brooks, and gurgling rills, fierce running creeks, and the smooth face of North-East river, with a distant view of the Chesapeake, all tend to characterize it as one of the most pleasant routes of Railroad in the United States.—The cars are well constructed for the transportation of passengers, being airy and so arranged as to allow a walking passage through the whole train without inconvenience. The engines are of the first class, as an evidence of which, the distance from Elkton to Wilmington, 18 miles, was performed in 50 minutes.—[Baltimore Gaz.]

NEW-JERSEY RAILROAD.—Thus we progress.

This road is now completed for the use of the Locomotive from Bergen Hill about $2\frac{1}{2}$ miles from the Hudson river, to East Brunswick, and the cars will commence running on Monday by *steam*—passing through Newark, and stopping at the Depot, foot of Market-street, for Newark passengers, and also leaving and returning to that point the same hours as heretofore.

The fare has been reduced from the Newark Depot to Jersey City to 25 cents, and Newark passengers will be carried to and from the Depot to meet the arrival and departure of the trains, if desired, on the town tracks, (which are underlet,) at $6\frac{1}{4}$ cents.—The fare has also been reduced from Jersey City to Elizabeth to $37\frac{1}{2}$ cents, and to Rahway to 50 cents. Passengers will hereafter procure their tickets at the office.—[Newark Daily Advertiser.]

To the Editors of the Railroad Journal.

Gentlemen,—I have read with interest the communications in your Journal, from Mr. Steere and Mr. Norris, but without any desire to take part in a controversy which must be, or has already been, settled by experimental demonstrations; and my object now, is, merely to explain what appears to have been mis-conceived by Mr. Aldrich, the author of a communication in your last Journal, in reference to the "gravity of loads upon inclined planes."

Mr. A., says, "The communications which have been published in the Journal, between Mr. Norris and Mr. A. G. Steere of N. Y. and Erie Railroad, have probably been caused by the miscalculation of the gravity of loads upon inclined planes, by Mr. Steere, he, using the rule given by Pambour, the fallacy of which is very apparent, at least it appears not to give the result we wish to find, as it would give all the gravity on an angle of 45° which is impossible"

"I admit that the rule given is perfectly applicable, as it respects the velocities of falling bodies upon inclinations;"—

There is nothing new or peculiar in the rule used by Pambour for calculating the resistances caused by the gravity of loads; nor in the present case is there any need of discussing the laws of falling bodies. The rule is one demonstrated in all books of mechanics and is strictly a proposition in statics, as it may be and has repeatedly been shown, that when any power after having once been set in motion continues to draw a load up an incline with uniform velocity, the power and load are inequilibrium; and when the power is applied in a direction parallel to the surface of the plane the power and load are in the same proportion as the height and length of the plane. The correctness of this rule is almost universally admitted, it is the one used by Pambour, and does not by any means give the result stated by Mr. A., at an angle of 45°.

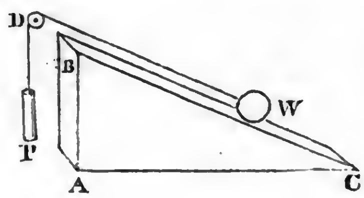
At an angle of 45° the length and height are as 1 to 0.7071068, or, the gravity of a ton will be little more than $\frac{7}{10}$ths of a ton instead of 1 ton as stated by Mr. A.

The ratio between the height and length of a plane is evidently one of equality when the plane is vertical; and it is equally evident that in such case, the ratio of the power and weight is that of equality, it being reduced to the equilibrium of two weights hanging over a pully.

The inclinations upon Railroads are generally so slight that the horizontal and absolute lengths will not differ sufficiently to require much, if any, correction for the measurements, which are made horizontally, and from Mr. A's result of the equality between the weight and power at 45° it would seem that he made the proportion between the power and weight equal to that between the height and base, instead of that between the height and length.—In the only other application of the rule by Mr. A., the angle (4°) is so small, and results have so few places of decimals, that it is not clearly discernible which proportion was adopted.

How Mr. A. arrived at the results given in his table, is not shown. They do "vary very much from the result of the rule" generally adopted; and if his method is correct, the fact is important and should be established.

The proposition upon which Pambour's rule is founded is thus enunciated in Hutton's Mathematics, Volume 2, page 164; "The power gained by the inclined plane is in proportion as the length of the plane is to its height. That is, when a weight W is sustained on an inclined plane, B C, by a power P, acting in the direction D W, parallel to the plane; then the weight W, is in proportion to the power P, as the length of the plane is to its height; that is, W: P:: B C: A B."



S.

ROCHESTER AND BATAVIA RAILROAD.—We are pleased to learn that this railroad is in a condition to permit Locomotives to pass upon it. The following letter published in the Courier, shows the importance of this road to the agricultural community, even by itself, but its present value is nothing compared with what it will be when continued westward to Buffalo, and eastward to Auburn, Syracuse and Utica, an event by no means distant.

BATAVIA, (Genesee Co.,) May 5, 1837.

DEAR SIR,—The appearance here this morning of the first locomotive engine, with its train of cars, created quite an excitement among us, and for a while dispelled the gloom of "*hard times*," and re-animated the spirits of our citizens. The railroad, 34 miles in length, connects the flourishing city of Rochester with this village, and brings the two places within two hours ride of each other, at the same time opening a new avenue for the discharge of our surplus produce directly into the Erie canal. In an agricultural point of view, perhaps no portion of western New-York is richer in all the great elements of wealth, than the section immediately around us; and, aided by this road, we must contribute greatly to the advancement of the commercial interests of Rochester—to say nothing of the advantages to the country generally. As a point for the purchase of wheat, I think I hazard nothing in saying that no place affords greater advantages than this. It being the point where the Holland Land Company originally located their principal office, and where their business has always been done, the roads, which intersect the farming territory in every direction, have been made directly to this village, making it, necessarily, the *natural* place for a market. Suitable ware-houses are now in progress of building, and we have nothing to ask but *easy times* for money, and good crops, to keep half the flouring mills of the State in constant operation. The railroad itself passes through a very rich and interesting section, and is spoken of as among the most permanent and best constructed in the country,—offering to persons travelling in this quarter an agreeable change, either from the canal at Rochester, or from the usually travelled route by stage from Buffalo eastward. It cost for a single track, with suitable turnouts, three locomotive engines, passenger and freight cars, &c. &c., about $10,000 per mile, which has been furnished entirely by the individual means (with two or three exceptions) of persons resident in one or other of the two places it connects, and speaks well for their enterprising spirit. After this week the trips of the locomotives will be regular, and should any thing bring you this way, allow me to hope you will make it convenient to pass over the Rochester and Tonnewanda Railroad.

From the Broome County Courier.

CHENANGO CANAL.—The superintendents have wisely adopted the prudent course of very gradually filling the canal with water. Though very firmly constructed, according to the opinions of the best judges, it was still necessary, as the strength of the banks was untried to test them. The water has been let in upon the whole line, and generally the work has stood firm. We have intelligence direct from the three divisions. Some little difficulty was experienced about the waste wiers, on the northern division, but the superintendent designed to put on a head of water again by Wednesday evening. The slight break which occurred last week, ten miles above Greene, is repaired, and the superintendent supposed that the banks there might be filled at the same time.—From that point to Binghamton, there is believed to be no defect. There is nearly a full head of water in our banks; and still it is probable, from one little obstacle and another, that several days will elapse before any boats will reach this village with goods.

From the Kingston, Luzerne Co. Herald.

The public will be pleased to learn that Edwin A. Douglass, Esq., the accomplished Chief Engineer of the Lehigh Company, is now in the neighborhood of Wilkes-Barre with his assistants, exploring, surveying &c., preparatory to fixing the line from Wilkes Barre to White's Haven.—This is the last link in the chain of communication remaining to be accomplished, to connect the Anthracite Valley (or, as it is called, the great coal formation of Pennsylvania) with the cities of Philadelphia and New-York. Baltimore on the South West—Philadelphia and New-York on the South and South-East—these three rival cities we shall soon see contending for our trade, while at the North all the villages and cities spread over some thousands of miles of thickly populated and fertile country, will look to Wyoming for the luxury of a winter fire.

From the Farmers' Register.

ACCOUNT OF THE GREENSVILLE AND ROANOKE RAILWAY.

December 1st, 1836.

As the Greensville and Roanoke Railroad is about to go into operation, a concise account of its origin, location, construction, and probable revenue, may not be uninteresting to at least a portion of your readers.

To secure the trade, and bring to its own market the produce of the great and fertile valley of the Roanoke, has always been considered a matter of the greatest importance by the town of Petersburg. For this purpose, (among the first in this country, though still a new work,) was the Petersburg and Roanoke railway constructed—an improvement which has far surpassed the expectations of its warmest advocates. Blakely, on the Roanoke, and nearly four miles below the falls, was selected as the point of termination of this road. This work, however, had scarcely gone into operation, when the Portsmouth and Roanoke Railroad was projected, to connect the towns of Portsmouth and Weldon, (the latter place on the Roanoke, four miles above Blakely) the object of which was to divert this same trade to Portsmouth and Norfolk. The Petersburg interest, thus in danger of being cut off from the trade of the upper Roanoke, saw at once the necessity of a branch from their road, to some point on that river still higher up than Weldon; and for this purpose, a joint charter was obtained from the legislatures of Virginia and North Carolina, for a railroad from some point in the vicinity of Hicksford, in Greensville county, to Wilkins' ferry, (now Gaston,) fifteen miles above Weldon.

During the summer of the past year, the surveys were commenced, vigourously prosecuted, the location finally determined, and the work let for construction in the latter part of September.

The line of the Greensville and Roanoke Railroad leaves the most western point of the Petersburg road, about three miles south of Belfield, and after crossing Fontaine's creek, about two miles from its commencement, keeps on the ridge between that and Beaver creek, till it reaches the summit between the waters of the Meherrin and those of the Roanoke. The valley of a ravine, emptying into the latter, is there made use of in the descent to the Roanoke. This location, the best that could possibly be obtained, is, on the whole, favorable; but yet, not as much so as the public might be led to suppose, from the term *ridge location*, in consequence of the sinuosities of this ridge at certain points.

This road is peculiarly adapted to the use of locomotive power, the curves being all short, and very gentle, and the grades easy, no where exceeding a rise of sixteen feet to the mile in the direction of the heavy trade, or of thirty-two feet to the mile in the opposite direction, except in the short descent to the Roanoke, of which more hereafter.

The following table will give the reader some idea of the curves, and the tangents, or straight lines, connecting them.

No. 1, is the junction of the Petersburg and Greensville roads—No. 17, is on the bank of the Roanoke; the other numbers are merely used to designate points of curve, and the terms *right* and *left*, are used on the supposition that the traveller is leaving Petersburg.

From No. 1—curve to right radius 2865 feet,	3,000	feet to
No. 2—straight,	7,800	feet
" 3—curve to left—radius 5730 feet,	1,200	"
No. 4—straight,	19,200	"
No. 5—curve to right—radius 5730 feet,	800	"
No. 6—straight,	7,400	"
No. 7—curve to left—radius 5730 feet,	800	"
No. 8—straight,	4,000	"
No. 9—curve to left—radius 5730 feet,	3,200	"
No. 10—straight,	6,900	"
No. 11—curve to right—radius 5730 feet,	500	"
No. 12—straight,	18,300	"
No. 13—curve to right—radius 2865 feet,	2,100	"
No. 14—straight,	3,800	"
No. 15—curve to left—radius 1910 feet,	2,100	"
No. 16—straight,	12,400	to No. 17.

From this table, we perceive that 79800 feet of this line are perfectly straight, and only 13700 curved, the whole length being 93500 feet, very nearly 18 miles. Again—of the curved portion, 6500 feet have a radius of 5730 feet—more than a mile; five thousand one hundred a radius of 2865 feet—more than half a mile; and only two thousand one hundred feet with a radius as small as 1910 feet. This last is the only objectionable curve on the line, and was necessarily adopted to avoid very heavy cutting. With the exception of these 2100 feet, a locomotive can pass as fast, and draw very nearly as heavy trains through the whole line, as though the road were perfectly straight.

As the numbers of the last table afford convenient marks of reference, let me here introduce a few remarks relative to the construction of the work, and the nature of the country through which it passes. Between points Nos. 1 and 2, nothing remarkable occurs—the whole consists of cutting from three to six feet—the soil principally clay. Between 2 and 3, is encountered a swamp, or highland slash, which was found very troublesome, being completely covered with water during winter and spring, and in summer, baked so hard, that a pick could scarcely penetrate the soil. The clearing through this swamp was very heavy. In this distance, also, is crossed Fontaine's creek. Over this stream is erected one of the handsomest stone structures in this country—now on the Raleigh and Gaston road. This viaduct is built of most beautiful granite, which was found in abundance at a distance of about three miles. At the roadway level, the bridge is one hundred and eighty feet long, and only six feet wide—the plate of the rail, being about forty-two feet above the surface of the water. The span, or archway, is sixty feet, and each abutment has a length of sixty feet. The abutments for the twenty feet next to the arch, are founded on solid rock, and have such a base, that with a batter, or slope, on each side, of one inch to the foot, they dwindle to a width of six feet, by the time they reach the level of the roadway. Over the whole is put a coping, beautifully cut, one foot in thickness, which projects on either side, six inches, which gives the bridge the appearance of being seven feet wide. This bridge is remarkable for its light and graceful appearance, being only seven feet deep from the top of the coping to the crown of the arch, or the stone work being only seven feet thick just above the crown or highest point of the arch, so that it looks as if it were actually suspended in the air. And yet there can be no manner of doubt as regards its strength or safety. The ring stones are two and a half deep, and measure two feet on the inner, and two feet two inches on the outer circle—the beds or joints of these ring-stones are cut perfectly smooth, as well as their faces, and they lie so nearly in contact, that it is almost impossible to run the blade of a knife between them. Such an arch supported by abutments sixty feet long, and founded on rock, will resist any pressure insufficient to crush the granite to dust. There are about one thousand eight hundred perches of stone in this structure, and the whole cost was about $10,500—which, when we consider that the stone had to be conveyed three miles, is very moderate. The embankment at either end of this bridge is very heavy—about thirty-six feet high, and in all, contains two thousand eight hundred cubic yards of earth.

From No. 4 to 5, there is a beautiful straight stretch of nearly four miles. The cutting in several places on this portion, is as much as twelve feet. Where the line crosses the head of Lynch's swamp, the ridge being much to the right, there is a very heavy embankment, thirty-four feet high in its deepest part, and containing nearly five thousand eight hundred cubic yards. Under this bank there is an arched culvert, (six feet span, ninety feet long, and containing three hundred to three hundred and fifty perches,) which is a most beautiful specimen of masonry. The cuts on this portion, were principally of clay. In them were sometimes encountered large isolated blocks of granite, measuring from five to ten feet in diameter, which had the appearance of having been, at one time, much subjected to the friction of water. At one place, also, the earth is impregnated with a good deal of iron ore, which rendered it exceedingly hard.

From No. 6 to 7, the first half is heavy cutting, the remainder a heavy bank. Here after sinking the cuts eight or ten feet, through clay, there was reached a stratum of sand, which scarcely needed the plough or pick. On this portion is situated the first depot, seven and a half miles from the junction of the two roads, and midway between Belfield and Gaston.

The short curve from No. 7 to 8, is on a heavy bank.

From No. 8 to 15, which includes all that portion of the railroad from near Puckett's cross roads, to the summit, near the Roanoke, a distance of seven miles, the location is most favorable—the country at one time, undulating so gently and regularly, that the hills just serve to fill up the small valleys, and at another, so regular and level, that the roadway scrapes along the surface, sometimes a foot or two above, at others a fevt or to below. The texture of the soil, very sandy and light.

Between No. 12 and 13, there is a second depot. Another temporary depot is constructing at 15.

The curve from No. 13 to 14, brings you to the proper direction for striking the head of the ravine, by which the descent is made to the Roanoke, and the curve from 15 to 16, brings you into the direction of that ravine. This ravine is then followed to the flats of the the river, and the same straight line pursued across these flats, which are here three-fourths of a mile wide, to the river.

From 15 to a point one thousand four hundred feet south of 16, there is a heavy cut, as much as thirty-one feet deep in one place, and containing nearly seventy thousand cubic yards. The top is of a stiff clay the middle third stiff clay mixed with large gravel—and the lower third, a mixture of clay and sand—the sand however prevailing. Next to this cut, the work consist principally of heavy embankment, till you reach the flats, across which there is a bank averaging about eight feet high.

After passing through the last curve, or on reaching point No. 16, a spectacle no less remarkable than beautiful strikes the eye. The straight stretch of road does not stop at the river, but continues on in the same straight line, nearly to the summit on the other side—a thing unparelleled in the annals of railroads: not only that a perfectly straight line could be obtained in the descent on this side—but that a valley should be so disposed on the opposite side, that this straight line, continued, should afford the very best location for the ascent to the next summit and this too across a valley, the flats of which are two hundred feet below the summit on either side. This straight line, when completed, will be three and a half miles long, and the Roanoke bridge, when completed, which is now in the course of construction, will greatly add to the beauty of the view.

About the last seven hundred feet of the straight line between No. 16 and 17, is a part of the Raleigh and Gaston Railroad. Just before reaching the Roanoke, the Greensville road curves down the river and runs into a noble warehouse, which is now constructing, three hundred feet by sixty. —This depot is immediately on the water's edge, and the wharf, only fifteen feet wide, will reach water sufficiently deep to float the largest bateaux. Cranes will be fixed on the wharf for raising produce from the boats to the level of the floor of the warehouse, which is made as high as the beds of the cars, so that the produce can be loaded on them, with but little additional trouble or expense.

At the point where the continuation of this straight line strikes the Roanoke, the river is about one thousand feet wide at the water level. A bridge is now constructing across it, which will be completed in the course of the coming year—built on the plan of Townes' lattice bridge, with double lattice, to consist of six pans—the piers and abutments of the finest granite, which is found here in the greatest abundance. These piers and abutments will be founded on the solid rock which forms the bed of the river. Along the whole of this line, stone is found in great abundance and of the best quality. This was a most fortunate circumstance, for on the latter half of the road, the number of drains is almost unprecedented. Wherever the line varies the least from the summit of the ridge, the head of some small ravine is crossed, which calls for at least a dry stone drain. The item of hauling, even now, is very considerable, but had stone been scarce, or only found at a distance, the expense of all the masonry, would have been very much increased. This stone most frequently occurs in the shape of large isolatedb locks, chiefly of granite, varying much in degrees of hardness.

Located as this road is, between two creeks, an abundant supply of white oak sills was easily obtained. Rails had to be obtained at a greater distance; but the Petersburg Railroad and the Roanoke river furnished ready means for their delivery at either end of the line. Thence they had to be wagoned to the points at which they were wanting.

Points of reference.	Elevation above tide.	Length of grade.	Rate per mile.	Total ascent or descent.	Ascends, descends, or is level.
1	141.40	3219	19.	11.50	ascends
2	192.90	4100	13.70	10.66	descends
3	142.24	1000	level	0.00	level
4	142.24	8750	32.20	53.37	ascends
5	195.61	2000	5.80	2.20	descends
6	193.41	8800	32.20	53.68	ascends
7	247.09	3000	15.84	9.00	descends
8	238.09	3824	32.20	23.33	ascends
9	261.42	5043	15.84	15.13	descends
10	246.29	6141	32.20	37.46	ascends
11	283.75	3150	level	0.00	level
12	283.75	3600	10.56	7.20	descends
13	276.55	3570	level	0.00	level
14	276.55	2100	24.82	9.87	ascends
15	286.42	6300	3.70	4.41	ascends
16	290.83	800	level	0.00	level
17	290.83	1800	12.67	4.32	ascends
18	295.15	2900	level	0.00	level
19	295.15	2800	12.67	6.72	ascends
20	301.87	2404	level	0.00	level
21	301.87	2200	16.37	6.82	ascends
22	308.69	2105	level	0.00	level
23	308.69	1500	50.16	14.25	descends
24	294.44	9100	93.45	161.41	descends
25	133.00	3200	level	0.00	level
26					

Grades.—The above table shows the beauty of the grades on this road. The first column contains mere points of reference, not corresponding to the similar numbers in the last table, but as those denoted points of curve, or changes of direction, so these the changes of grade. The second column, the elevation above tide water at Petersburg, of the point on the same line. The third, the length of grade from the point opposite, to the point in the next line. The fourth, the rate per mile. The fifth, the total ascent or descent in that distance. And the sixth, whether the grade rises, falls, or is level.

No. 1, is at the junction of the two roads. No. 26, at the Roanoke. From an inspection of this table, the reader will see that all the grades are as easy as is desirable, till we come to point No. 23. From 23 to 25, the grade is very heavy. At No. 1, you will perceive the elevation above tide, is 141.40 feet—at No. 23, 308.70 feet—and at 25, the elevation is 133 feet—about 8 feet below the point of commencement: so that from 23 to 25, a distance of only 10600 feet, the road had to descend through a greater space than it had risen in all the distance between 1 and 23. The great difficulty here, arises from the fact of the summit approaching so near the Roanoke, that enough *distance* is not allowed for an easier descent. Even with the present grade, there is as much as 30 feet cutting at its head, and 12 feet filling at its foot. Previously to locating this portion of the road, the whole neighboring country was examined, in hopes of a better descent; but every where the summit was found to approach too near the river. The country was also examined with a view to an inclined plane, with stationary power; but no location for such could be found, offering sufficient advantages to overcome the great objections always attendant on stationary power. As objectionable as this grade would be any where else, it is not attended with great disadvantages, situated as it is, so near the termination of the line. When the Raleigh and Gaston line is in operation, the locomotive which comes from Raleigh, having a head of steam, can, without expense, assist the Petersburg locomotive, with its train up this grade, and afterwards return to Gaston. The Petersburg locomotive, in like manner, when it arrives at the Roanoke, can perform the same good office for the Raleigh engine, on the south side of the Roanoke, inasmuch as quite a heavy grade is encountered there also, for the same reason. Again—a temporary depot with a turn-out, is fixing at the head of the grade, and a locomotive can, in two or three trips, take from Gaston to this depot, as much produce as it can carry thence to Petersburg, and the train may be thus formed on this turn-out, ready to connect to the engine bringing up the mail and passengers. A little experience will show the most economical method of managing the matter; but there can be no doubt that the grade adopted is infinitely preferable to the use of stationary power.

This grade will always be perfectly safe. For its superstructure, the largest timbers were selected, and iron two and a half inches by three-eighths, is used; there is no curve at its foot, and there is a level grade of nearly three-fourths of a mile, before reaching the river; so that even should a brake give way in the descent, there would be no danger of either running off, or of the passengers taking a cold bath in the Roanoke.

The construction not being completed, it would be premature now to estimate the total cost. But that deficiency may be supplied as soon as the work is finished, from the official accounts of actual expenditures for the road.*

Revenue.—I find Mr. Editor, that in these days, any railroad, or any railroad scheme, can be made on paper to yield a handsome revenue, so that under this head, I shall not resort to figures to make estimates of the future dividends which this road will probably yield, but merely satisfy myself with the statement of rather the sources, than the amount of its revenue. It will undoubtedly bring to market all the produce, (consisting of cotton, tobacco and small grain) of the upper Roanoke—the produce from a large portion of Northampton and Halifax, from Warren, Franklin, Wake, Chatham, Orange and Granville counties. To nearly all these, will merchandize and goods of various descriptions, be returned on this road. It will be a link in the great northern and southern mail routes, and of course, the transportation of the mail will be secured to it, as well as the great amount of travel which always accompanies, and will invariably stick to the mail. The local travelling, also, will be great. In fact, when I reflect, that in time, the Raleigh road is to be pushed south, that an improvement will be projected which will bring to this road the products of the rich lands of the Yadkin, and that the great western scheme, pushing itself into the very heart of Tennessee, and connecting with the Charleston and Cincinnati road, is to be connected at its eastern extremity with this work, I am completely at a loss to know what then would be the limit of its revenue, were none imposed by law.

The terms on which this work was let, and the manner in which it has been successfully prosecuted, is indeed a subject for congratulation with its friends. At the time it was let, a great number of public works were just about being commenced, and labor was very scarce. The demand for mechanics at the north was so great, that it was next to impossible to procure a good mason. Labor, during its whole construction, has continued very scarce, and consequently very high: provisions too, have reached a price almost unprecedented. If we add to all this, the unheard of winter and spring with which the road had to contend, we may well wonder at its steady progress towards completion. R. J.

* This communication was received early in December. The completion of the work has since been retarded much beyond the time then expected, by various unforeseen difficulties, which have increased the total cost to $227,000. The railway was opened entirely to the Roanoke, and its regular trade commenced on March 30th, 1837.—Ed. Far. Reg.

Railroads in Belgium.—M. Nothomb, the Minister of Public Works in Belgium, has just laid before the Chamber of Representatives, a return of the railways to be formed in the kingdom at the expense of the Government. They extend along 115 leagues, having their central point at Mechlin. They consist of two principal lines, one from the French frontier to Antwerp by Brussels, and the other from Ostend to the frontier of Prussia near Aix la-Chapelle, by Ghent, Mechlin, Louvain, Liege, and Veriers. When the King of Prussia has authorised the projected elongation, Antwerp and Ostend will be brought into communication with the Rhine and Cologne.

Egyptian Antiquities.—At the close of a series of lectures on Egyptian Antiquities, lately delivered at Exeter Hall, by Mr. Pettigrew, that gentleman unrolled a mummy, which had been presented for the occasion by Mr. Jones, of the Admiralty. This operation excited a marked feeling throughout the whole of the numerous auditory, including many individuals of distinction in the literary circles. In the commencement, Mr. Pettigrew noticed that the inscription on the outer case differed from that on the inner case containing the mummy. Both stated the party to have been a female; but the names and genealogies were different, and the latter stated the mother of the deceased to be living when her daughter died. It might be that the wrappings would settle the point; which, however, they did not, for no name was found on them, as often occurs. The mummy was Greco-Egyptian, and embalmed after the ancient manner—the bowels being extracted by an incision on the left flank, and the brains, probably, through the nostrils as the nose was much broken. The legs were separately bandaged, and the ankles bound by stripes of painted linen, about half an inch in breadth. The figures were not hieroglyphic, but simply ornamental.—Bands of the same kind surrounded the arms, which were crossed upon the breast; and a similar circle went round the neck. On each knee was a thin piece of gold, resembling the lotus flower; over each eye the providential eye of Osiris, of the same material; and another golden ornament upon the top of the ridge of the nose. There were rings on the fingers; but the opportuty was not sufficient for examining them, nor time for proceeding to the careful and laborious unrolling of the body to the end. The upper wrappers were not voluminous, and of coarse nankeen colored linen. Then came a complete envelope of asphaltus, and below that, the usual disposition and extent of linen rolls. On the soles of the feet were slight sandals, transversely striped black, white, and red, exactly like those painted on the bottom of the inner case. The finger and toe nails were gilt; and, altogether, the subject presented many objects for further investigation and study.

[Literary Gazette.]

XVIII. Experiments of the resistance of barges moving on canals, by Henry R. Palmer, Esq., V. P. Inst. C. E. Addressed to the late President, Thomas Telford, Esq.

The statements that have been laid before the public in reference to the swift passage of boats along the Ardrossan Canal, having occasioned a renewal of, and more extended inquiry into the subject of the resistance to which the motion o' boats and barges is exposed, I think it important that every useful fact relating to it should be collected and placed in the records of the Institution of Civil Engineers.

With this view I have transcribed the particulars of some experiments with which, through your kindness, I had the honor to be entrusted in the year 1824, when the comparison of the cost of conveyance by canals and railways constituted a popular question.

In the performance of the experiments referred to, I very soon perceived the difficulty of obtaining the results with that accuracy which was required.

The moving forces being animal power, one imperfection arose from the difficulty of preserving an equable motion. From the same cause I was unable to obtain, at will, any given velocity, so that the results might be obtained in the order required for a tabular registration. A third imperfection was occasioned by wind, which, however slight to the sensation, materially affected the results.

Considering, however, that the experiments were upon the large scale, that the circumstances affecting each are recorded, and that no assumptions were allowed to interfere, they are susceptible of some useful deductions, more especially when received, in comparative order, with facts which have been since and which may hereafter be obtained.

The purport of the experiments was entirely of a practical nature, and therefore they were tried by means strictly conformable with those actually in common use. The towing ropes were attached to the barges at the same parts as usual, the lengths of the ropes used were of the customary dimensions on each canal respectively, and the moving power exerted in the same position, viz., along the towing path on one side of the canal.

The results, therefore, do not exhibit precisely the resistances of the barges in a straight line, uninfluenced by the rudder, but that resistance which the circumstances oblige the horse to overcome, which from the obliquity of the line of force with that of the motion of the barge, gives an increased quantity in proportion. Although this error is of small magnitude, and will have little effect in the proportion of the results to each other, (which is an important feature in the experiments,) it may lead to incongruities in the comparison of these experiments with others determined by other means, if not attended to.

Method used for ascertaining the Resistances of the Barges moving on Canals.

A sheeve or pulley was suspended from the post to which the towing line is usually fastened, the towing line was then passed over that pulley, and the end of it fastened to the weights that were to indicate the resistance; the barge was then towed in the usual manner, and the weight being always insufficient at the commencement, it was raised up to the pulley, and was suffered to remain so, until the barge appeared to be in a regular and uniform motion. Additional weights were then suspended, until they fell to about 12 inches from the pulley, when they were so adjusted as to remain suspended there, their only motion being a slight vertical vibration, occasioned by the stepping of the men employed to draw the line.

A straight part of the canal was chosen, and the length through which an experiment was continued was divided into equal parts, each being marked by a stake. The equality of the motion was therefore ascertained by the time occupied in passing each division, so that when the divisions of the whole space had been passed in equal times, and the weights had during the whole time remained within the same limits of vibration, the experiment was considered as having been fairly made.

The experiments being made on different canals, it was always found necessary to practice the men in drawing the barges, before they were found to walk with sufficient regularity, and the loss of time thus engaged caused frequent regret that soldiers could not be obtained for the purpose.

One of the experiments (No. 17) given in the Table was furnished to me by Mr. Bevan, the engineer to the Grand Junction Canal Company. In the four last I was favored with the assistance of Professor Barlow, the late Mr. Chapman of Newcastle, Mr. B. Donkin, and Mr. Bevan.

No. Experiment.	Name of the Navigation.	Description of the Vessel.	Place of the Experiment.	Dimension of the Navigation.	Dimension of the Vessel.	Draught of Vessel.	Space of the Experiment.	Time of the Experiment.	Velocity in Miles.	Resistance, or moving Force.	Load, or useful effect.	Whole effect.	Fraction of Force to the Load.	Ditto, including the Barge.	Number of the Horses, Men, &c.	Observations.
				Feet.	Ft. In.	Ft. In.	Chains.	Min'tes	Miles.	lbs.	Tons.	Tons.				
1.	Mersey and Irwell.	Packet.	Near Runcorn.	48 wide 6 deep	62 9 long 13 9 wide	1 8 fr't 2 st'	79	12	4.9390	343	1.20	$43\frac{1}{2}$	$\frac{1}{73}$	. .	3	Vessels with masts and rigging.
2.	Do.	Kent flat.	From Barton to Meadwheel Lock.	River	64 10 14 6	4 1	165	48	2.5757	242	40	92	$\frac{1}{370}$	$\frac{1}{851}$	2	Surface exposed to wind much greater than that of ordinary canal barges.
3.	Do.	Haywood flat.	Old Quay to Meadwheel Lock.	Do.	Do.	2 0	265	56	3.5378	140	empty.	52	. .	$\frac{1}{832}$	2	Canal irregular in depth.
4.	Do.	Do.	Meadwheel to Barton Lock.	Do.	Do.	2 0	165	33	3.7575	140	do.	52	. .	$\frac{1}{832}$	2	Wind at the time sensibly affected the experiments. Nos. 3 and 4 disturbed the water considerably.
5.	Ellesmere.	Small boat.	Near Ellesmere.	30 wide 6 deep	69 long 3 6 wide	2 5	36.8	6	4.6000	168	10	$14\frac{1}{2}$	$\frac{1}{183}$	$\frac{1}{193}$	Men.	The only errors observable in the experiments on the Ellesmere Canal were attributable entirely to the wind, the effect of which is seen in the results.
6.	Do.	Do.	Do.	Do.	Do.	Do.	30.27	$4\frac{5}{6}$	4.6900	170	10	$14\frac{1}{2}$	$\frac{1}{132}$	$\frac{1}{191}$	Do.	
7.	Do.	Do.	Do.	Do.	Do.	Do.	30.27	6' 15"	3.6300	77	$10\frac{1}{2}$	15	$\frac{1}{305}$	$\frac{1}{436}$	Do.	
8.	Do.	Do.	Do.	Do.	Do.	Do.	39.27	7' 40"	2.9600	50	$10\frac{1}{2}$	15	$\frac{1}{470}$	$\frac{1}{672}$	Do.	
9.	Do.	Common barge.	Do.	Do.	68 6 long 7 0 wide	1 8 fr't 2 7 st'n	30.27	15' 30"	1.9000	50	21	30	$\frac{1}{940}$	$\frac{1}{1344}$	Do.	
10.	Do.	Do.	Do.	Do.	Do.	Do.	39.27	10'	2.9450	66	$10\frac{3}{4}$	$19\frac{3}{4}$	$\frac{1}{365}$	$\frac{1}{670}$	Do.	With the wind.
11.	Do.	Do.	Do.	Do.	Do.	Do.	39.27	10' 30"	2.8050	91	$10\frac{3}{4}$	$19\frac{3}{4}$	$\frac{1}{264}$	$\frac{1}{486}$	Do.	Against the wind.
12.	Do.	Do.	Do.	Do.	Do.	Do.	39.27	$10\frac{3}{4}$	2.7300	98	$20\frac{3}{4}$	$29\frac{3}{4}$	$\frac{1}{470}$	$\frac{1}{680}$	Do.	
13.	Do.	Do.	Do.	Do.	Do.	Do.	39.27	9	3.2700	175	$20\frac{3}{4}$	$29\frac{3}{4}$	$\frac{1}{266}$	$\frac{1}{381}$	Do.	
14.	Do.	Two barges.	Do.	Do.	Do.	Do.	39.27	$10\frac{1}{2}$	2.8050	164	21	39	$\frac{1}{237}$	$\frac{1}{532}$	Do.	
15.	Do.	Do.	Do.	Do.	Do.	Do.	18.63	5' 25"	2.5800	172	21	39	$\frac{1}{273}$	$\frac{1}{507}$	Do.	[1]This experiment made by Mr. Bevan.
16.	Do.	Do.	Do.	Do.	Do.	Do.	30.30	9' 5"	2.5000	196	42	60	$\frac{1}{460}$	$\frac{1}{689}$	Do.	[2]Corrected for the effect of the wind, estimated at 8 lbs. The weight in both cases was 72 lbs., and the experiment was repeated with the barge turned about, merely for this comparison.
17.	Grand Junction.	Common boat.	. .	. .	. .	. .	10 miles	4° 5'	2.45	80	. .	31	. .	$\frac{1}{868}$	[1] Horses.	
18.	Do.	Do.	Paddington.	45 wide 5 deep	69 feet	. .	10 chains.	2' 7"	3.64	80	empty.	$6\frac{1}{2}$	. .	$\frac{1}{181}$	[2] Men.	
19.	Do.	Do.	Do.	Do.	Do.	Do.	10 „	4' 35"	3.27	64	do.	do.	. .	$\frac{1}{328}$	Do.	
20.	Do.	Do.	Do.	Do	Do.	Do.	10 „	3' 52"	3.87	308	$21\frac{1}{2}$	27	. .	$\frac{1}{203}$	Men and horses.	There was no wind when the last two experiments were made.
21.	Do.	Do.	Do.	Do.	Do.	Do.	10 „	6' 8"	2.44	77	$21\frac{1}{2}$	27	. .	$\frac{1}{814}$	Men.	

The following are the particulars of the last four experiments, made on the Grand Junction Canal, at Paddington, by Messrs. Barlow, Chapman, Donkin, and Palmer.

EXPERIMENT I.—Empty barge; weight, $6\frac{1}{2}$ tons; force employed, 72 lbs.; fraction of the force to the whole effect, $\frac{1}{205}$; wind in favor.

Number of Stakes.	Time.	Time between the Stakes.	Velocity per hour in miles.
1	0' 29"	29"	3.104
2	1 7	28	3.214
3	1 34	27	3.333
4	2 0	26	3.461
5	2 24	24	3.750
6	2 49	25	3.600
7	3 13	24	3.750
8	3 39	26	3.461
9	4 3	24	3.750
10	4 28	25	3.660
11	4 54	25	3.600
12	5 15	22	4.090
18	5 41	26	3.461

EXPERIMENT II.—Empty barge; weight, $6\frac{1}{2}$ tons; force employed, 72 lbs.; fraction of the force to the whole effect, $\frac{1}{205}$; against wind.

Number of Stakes.	Time.	Time between the Stakes.	Velocity per hour, in miles.
12	0' 33"	33"	2.727
11	1 2	29	3.104
10	1 29	27	3.333
9	1 56	27	3.333
8	2 24	28	3.214
7	2 51	27	3.333
6	3 18	27	3.333
5	3 45	27	3.333
4	4 11	26	3.461
3	4 40	29	3.104
2	5 8	28	3.214
1	5 37	29	3.104

EXPERIMENT III.—Load, $21\frac{1}{2}$ tons, which, added to $6\frac{1}{2}$ tons, the weight of the barge, gives 28 tons, the whole effect; fraction of force to whole effect, $\frac{1}{203}$; force, 308 lbs.

Number of Stakes.	Time.	Time between the Stakes.	Velocity per hour, in miles.
1	' 38"	38"	2.395
2	1 3	25	3.600
3	1 $26\frac{1}{2}$	$23\frac{1}{2}$	3.829
4	1 $49\frac{1}{2}$	23	3.918
5	2 12	$22\frac{1}{2}$	4.000
6	2 $34\frac{1}{2}$	$22\frac{1}{2}$	4.000
7	2 $57\frac{1}{2}$	$23\frac{1}{2}$	3.829
8	3 21	$23\frac{1}{2}$	3.829
9	3 $44\frac{1}{2}$	$23\frac{1}{2}$	3.829
10	4 9	$24\frac{1}{2}$	3.673
11	4 32	23	3.918
12	4 56	24	3.750
13	5 19	23	3.918

EXPERIMENT IV.—Load, $2\frac{1}{2}$ tons + $6\frac{1}{2}$ tons = 28 tons, the whole effect; force employed, 77 lbs.; fraction of force to whole effect, $\frac{1}{811}$.

Number of Stakes.	Time.	Time between the Stakes.	Velocity per hour, in miles.
1	1′ 6″	1′ 6″	1.363
2	1 54	48	1.875
3	2 $34\frac{1}{2}$	40	2.222
4	3 13	$38\frac{1}{2}$	2.337
5	3 49	36	2.500
6	4 25	36	2.500
7	5 1	36	2.500
8	5 $37\frac{1}{2}$	$36\frac{1}{2}$	2.465
9	6 15	$37\frac{1}{2}$	2.400
10	6 $42\frac{1}{2}$	$37\frac{1}{2}$	2.400
11	7 30	$37\frac{1}{2}$	2.400
12	8 6	36	2.500
13	8 42	36	2.500

The weights with which the barges were loaded were those used for determining the gauge marks on the part of the Company.

The experiments on the Mersey and Irwell canal were made upon vessels that happened to arrive at the time without preference. The first was upon the packet which is used to convey passengers between Manchester and Runcorn, and is usually towed at the rate of $5\frac{1}{4}$ miles per hour.

Nos. 5, 6, 7, and 8 were made on the Ellesmere canal, with a boat built for the purpose, and which was of the same length as those commonly used, but exactly half their width

Nos. 9, 10, 11, 12, and 13, were made with one of the ordinary canal barges.

Nos. 14, 15, and 16, were made with two boats joined together end to end, and the curves, to the head of one and the stern of the other, so planked over as to form one boat of double the ordinary length.

No. 17, having been made by Mr. Bevan, I have no other information relating to it than the facts as given in the table.

Nos. 18, 19, 20, and 21, were tried under circumstances as favorable as are usually met with; the effect of the wind was, however, very apparent.

Every variation in the resistance through all the experiments was easily discernible when it amounted to six ounces, and sometimes less.

In conclusion, I think it necessary to remark, that in such experiments as these which have been described, the action of the wind, whether in favor or opposed to the motion of the vessel, should receive the nicest attention. The difficulty does not consist only in ascertaining the amount of the atmospheric action at any given time, but in making a due allowance for its variations during the time of one experiment: still weather should be chosen for the purpose, and the experiments should be made early in the morning, before any sensible wind has arisen.

TABLE OF THE DIMENSIONS OF THE BARGES USED ON THE GRAND JUNCTION CANAL.

Distance from the head of the barge.	Greatest width at the several distances.	Width inside at the several distances.	Depth below water.		Depth above water.		Girt at the several distances.
			on the one side.	on the other.	on the one side.	on the other.	
Feet.	Feet. In.	Feet. In.	Inches.	Inches.	Inches.	Inches.	Feet. In.
5	5 $3\frac{1}{2}$	1 10	...	...	35.3	36.0	10 $3\frac{1}{2}$
10	6 6	4 2	9.2	8.5	32.9	33.1	11 $10\frac{1}{2}$
15	6 $8\frac{1}{2}$	5 7	...	...	31.5	32.2	13 0
20	6 $7\frac{3}{4}$	5 11	9.6	8.4	31.5	32.3	13 $1\frac{1}{2}$
25	6 8	6 0	...	...	31.4	31.9	13 2
30	6 9	6 0	...	...	31.1	31.4	13 2
35	6 $8\frac{1}{4}$	6 0	...	...	30.0	31.4	13 2
40	6 8	6 0	9.8	8.9	31.1	31.7	13 2
45	6 $7\frac{1}{2}$	6 0	.1	...	31.0	31.8	13 $2\frac{1}{2}$
50	6 8	5 11	11.1	9.3	30.9	31.4	13 $2\frac{1}{4}$
55	6 9	5 1	...	...	31.4	31.8	12 9
60	...	4 2	9.7	9.0	32.9	33.1	11 3
65	...	1 10	...	..	36.8	37.3	9 7

69 feet the whole length, not including the rudder.

The above experiments were submitted to Peter Barlow, Esq., F. R. S., and the following are the deductions he made from them.

Report of Peter Barlow, Esq., F. R. S., on the Experiments of Henry R. Palmer, on the resistance of Barges on Canals, etc.

In order to reduce the law of resistances from the foregoing experiments, it is requisite that the comparison should be made between those on the same boat and under the same circumstances; for the resistance opposed to different boats will depend on their transverse sections, their draught of water, the section of the canal, and various other circumstances, which will prevent the deduction of any general law applicable to all cases.

Mr. Palmer states that the first four experiments on the Ellesmere canal, with a small boat, were made under particularly favorable circumstances of weather, &c. These therefore may be employed for deducing the law of the resistances, as it depends on velocity.

It is generally assumed, on the common theory of fluids, that the resistance varies as the square of the velocity, but it has been found that this law does not obtain in practice, and different experimenters have obtained different results, varying from the 2d to the $\frac{5}{2}$ power of the velocity. It will appear, however, from the following investigations, that in the case of loaded canal boats, it varies in a still higher ratio, viz., as the cube of the velocity very nearly, if not exactly. In order to make this comparison, it is only necessary to proceed as below, by saying,

$$V^m : v^m :: F : f.$$

using for V, v, F, f, the actual velocity and moving powers employed.

From this proportion is very easily obtained the theorem $m = \dfrac{\log F - \log f}{\log V - \log v}$;

and employing in this the velocities and forces given in the first four experiments, there is obtained the following results, comparing the experiment

1 to 3 . . . . $m = 3.2$
1 to 4 . . . . $m = 2.7$
2 to 3 . . . . $m = 3.0$
2 to 4 . . . . $m = 2.6$
Mean value of $m = 2.9$, or 3 nearly.

By comparing experiments 7 and 8, which are made under like circumstances and on the same boat, we find $m = 3.2$, and in the same way experiments 17 and 18 give nearly the same result, viz., $m = 3.0$, the general mean being $m = 3.0$

It is clear, therefore, that, whatever may be the deduction from theory, the actual resistance of canal boats varies very nearly as the cubes of the velocities; and, by adopting this law, the velocities due to any force and load may be computed from the velocity and resistance in any other case being given.

And as it will be seen by the experiments on the different railways, that at a mean, one lb. will draw along 180 lbs., and that a power of 1 to 200 is the greatest that the most perfect railway can ever be expected to attain; I have computed what velocity is attainable on a canal answering to those two cases, viz., when the moving force is $\frac{1}{180}$th part of the whole load moved. These results are given in the following table, omitting those made on empty boats and sea-going barges.

It is clear, therefore, that on a canal, when the moving power is $\frac{1}{200}$th of the whole load, including the barge, it may be taken forward at the rate of 4 miles per hour, and that when the force is $\frac{1}{180}$th, the rate of transfer will be $4\frac{1}{2}$ miles per hour. It is easy also, from what has now been stated, to compute the power on a canal, at different velocities: for example,

At 4 miles per hour, 1 lb. will draw	200 lbs.
$3\frac{3}{4}$	243
$3\frac{1}{2}$	299
$3\frac{1}{4}$	373
3	474
$2\frac{3}{4}$	615
$2\frac{1}{2}$	819
$2\frac{1}{4}$	1124
2	1600

Navigation, description of the barges, etc,	Authority.	Whole load including barge.	Moving force.	No. of lbs. drawn by 1 lb.	Rate in miles per hour	Computed rate when 1lb draws 180 lbs.	Computed rate when 1lb draws 200 lbs.	REMARKS.
		Tons.	lbs.					
Ellesmere boats, half the usual breadth; length 69 feet; breadth 3 feet 6 inches.	Palmer.	$14\frac{1}{2}$	168	193	4.60	4.70	4.54	
		$14\frac{1}{2}$	170	191	4.69	4.78	4.62	
		15	77	436	3.63	4.97	4.70	
		15	50	672	2.96	4.59	4.43	
Common boat.	Do.	30	50	1344	1.90	3.71	3.58	
Common boat, half load.	Do.	$19\frac{3}{4}$	79	500	2.94	4.29	4.12	The moving weights were 66 lbs. and 91 lbs; they are corrected for the effect of the wind.
		$19\frac{3}{4}$	78	567	2.80	4.10	3.96	
Common boat, full load.	Do.	$29\frac{3}{4}$	98	680	2.73	4.25	4.09	
		$29\frac{3}{4}$	175	381	3.27	4.19	4.05	
Two common boats, end to end.	Do.	39	164	532	2.80	4.01	3.87	
		39	172	507	2.58	3.64	3.51	
Do full load.	Do.	60	196	689	2.50	3.91	3.75	
Common boat.	Bevan.	31	80	863	2.45	4.13	4.08	
Common boat, full load.	Barlow, Donkin, &c.	27	308	203	3.87	4.02	3.88	
		27	77	814	2.44	4.04	3.90	
					Mean	4.22	4.06	

From the American Journal of Science and Arts, for April, 1837.

NOTICE OF THE ELECTRO-MAGNETIC MACHINE OF MR. THOMAS DAVENPORT, OF BRANDON, NEAR RUTLAND VERMONT.

Many years have passed since motion was first produced by galvanic power. The dry columns of De Luc and Zamboni caused the vibration of delicate pendulums and the ringing of small bells, for long periods of time, even several years without intermission.

In 1819–20, Prof. Oersted, of Copenhagen, discovered, that magnetism was evolved between the poles of a galvanic battery. Prof. Sweigger, of Halle, Germany, by his galvanic multiplier, succeeded in rendering the power manifest, when the galvanic battery was nothing more than two small wires, one of copper and the other of zinc, immersed in as much acidulated water as was contained in a wine glass. The power thus evolved was made to pass through many convolutions of insulated wire, and was thus augmented so as to deflect the magnetic needle sometimes even 90°. Prof. Moll, of Utretcht, by winding insulated wire around soft iron, imparted to it prodigious magnetic power, so that a horse shoe bar, thus provided, and connected with a galvanic battery, would lift over one hundred pounds. About the same time, Mr. Joseph Henry, of Albany, now Prof. Henry, of Princeton College, by a new method of winding the wire, obtained an almost incredible magnetic force, lifting six or seven hundred pounds, with a pint or two of liquid and a battery of corresponding size; nor did he desist, until, a short time after, he lifted thousands of pounds, by a battery of larger size, but still very small, (1830.)

This gentleman was not slow to apply his skill to the generation of motion, and a successful attempt of his is recorded in this Journal, Vol, xx. p, 340. A power was thus applied to the movement of a machine, by a beam suspended in the centre, which performed regular vibrations in the manner of a beam of a steam-engine. This is the original application from which have sprung, or at least to which have succeeded, several similar attempts, both in this country and in Europe. A galvanic machine was reported to the British Association in 1835, by Mr. McGauly, of Ireland, and he has renewed his statements of successful experiments at the late meeting at Bristol. Mr. Sturgeon, of Woolwich, England, also reports a galvanic machine as being in use on his premises for pumping water, and for other mechanical purposes.*

But, I believe that Mr. Davenport, named at the head of this notice, has been more successful than any other person in the discovery† of a galvanic machine of great simplicity and efficiency. During the last two or three years, much has been said of this discovery in the newspapers, and it is probable, that in a future number of this Journal, drawings, and an accurate description of the machine may be given. Having been recently invited to examine a working model, in two varieties of form, and to report the result, I shall now attempt nothing more than a general description, such as may render intelligible the account I am to give.

1. *The Rotary Machine, composed of revolving electro-magnets, with fixed permanent magnets.*

This machine was brought to New-Haven March 16, 1837, by Mr. Israel Slade, of Troy, N. Y., and by him set in motion for my examination. The moving part is composed of two iron bars placed horizontally, and crossing each other at right angles. They are both five and a half inches long, and they are terminated at each end by a segment of a circle made of soft iron; these segments are each three incher long in the chord line, and their position, as they are suspended upon the ends of the iron bars, is horizontal.

The iron cross is sustained by a vertical axis, standing with its pivot in a socket, and admitting of easy rotation. The iron cross bars are wound with copper wire, covered by cotton, and they are made to form, at pleasure, a proper connexion with a small circular battery, made of concentric cylinders of copper and zinc, which can be immersed in a quart of acidulated water. Two semicircles of strongly magnetized steel form an entire circle, interrupted only at the two opposite poles, and within this circle, which lies horizontally, the galvanized iron cross moves in such a manner that its iron segments revolve parallel and very near to the magnetic circle, and in the same plane. Its axis at its upper end, is fitted by a horizontal cog-wheel to another and larger vertical wheel, to whose horizontal axis, weight is attached and raised by the winding of a rope. As soon as the small battery, destined to generate the power, is properly connected with the machine, and duly excited by diluted acid, the motion begins, by the horizontal movement of the iron cross, with its circular segments of flangers. By the galvanic connection, these crosses and their connected segments are magnetized, acquiring north and south polarity at their opposite ends, and being thus subjected to the attracting and repelling force of the circular fixed magnets, a rapid horizontal movement is produced, at the rate of two hundred to three hundred revolutions in a minute, when the small battery was used, and over six hundred with a calorimotor of large size. The rope was wound up with a weight of fourteen pounds attached, and twenty-eight pounds were lifted from the floor. The movement is instantly stopped by breaking the connexion with the battery, and then reversed by simply interchanging the connexion of the wires of the battery with those of the machine, when it becomes equally rapid in the opposite direction.

The machine, as a philosophical instrument, operates with beautiful and surprising effect, and no reason can be discovered why the motion may not be indefinitely continued. It is easy to cause a very gradual flow of the impaired or exhausted acid liquid from, and of fresh acidulated water into, the receptacle of the battery, and whenever the metal of the latter is too much corroded to be any longer efficient, another battery may be instantly substituted, and that even before the connexion of the old battery is broken. As to the energy of the power, it becomes at once a most interesting inquiry, whether it admits of indefinite increase? To this inquiry it may be replied, that provided the magnetism of both the revolving cross and of the fixed circle can be indefinitely increased, then no reason appears why the energy of the power cannot also be indefinitely increased. Now, as magnets of the common kind, usually called permanent magnets, find their limits within, at most, the power of lifting a few hundred pounds, it is obvious

* Sturgeon's Annals of Electricity, Magnetism, &c. No. 1. Vol. 1. October, 1836.

† Mr. Davenport appears to have been strictly the inventor of a method of applying galvanism to produce rotary motion.

that the revolving galvanic magnet must, in its efficiency, be limited, by its relation to the fixed magnet. But it is an important fact, discovered by experience, that the latter is soon impaired in its power by the influence of the revolving galvanic magnet, which is easily made to surpass it in energy, and thus, as it were, to overpower it. It is obvious, therefore, that the fixed magnet, as well as the revolving, ought to be magnetized by galvanism, and then there is every reason to believe that the relative equality of the two, and of course their relative energy, may be permanently supported, and even carried to an extent much greater than has been hitherto attained.

2. *Rotating Machine, composed entirely of electro-magnets, both in its fixed and revolving members.*

A machine of this construction has been, this day, March 29, 1837, exhibited to me by Mr. Thomas Davenport himself, who came from New-York to New-Haven for that purpose.

It is the same machine that has been already described, except that the exterior fixed circle is now composed entirely of electro-magnets.

The entire apparatus is therefore constructed of soft unmagnetic iron, which being properly wound with insulated copper wire, is magnetized in an instant, by the power of a very small battery.

The machine is indeed the identical one used before, except that the exterior circle of permanent magnets is removed and in its place is arranged a circle of soft iron, divided into two portions to form the poles.

These semicircles are made of hoop iron, one inch in width, and one-eighth of an inch in thichness. They are wound with copper wire insulated by cotton—covering about ten inches in length on each semicircle and returning upon itself, by a double winding, so as to form two layers of wire, making on both semicircles about one thousand five hundred inches.

The iron was not wound over the entire length, of one of the steel semicircles; but both ends were left projecting, and being turned inward, were made to conform to the bend of the other part, as in the annexed figure, which is intended to represent one of

them; each end that is turned inward and not wound is about one-third of the length of the semicircle. These semicircles being thus fitted up, so as to become, at pleasure, galvanic magnets, were placed in the same machine that has been already described, and occupied the same place that the permanent steel magnets did before. The conducting wires were so arranged, that the same current that charged the magnets of the motive wheel, charged the stationary ones, placed around it, only one battery being used. It should be observed, that the stationary galvanic magnets thus substituted for the permanent steel ones, were only about half the weight of the steel magnets. This modification of the galvanic magnet, is not of course the best form for efficiency; this was used merely to try the principle, and this construction may be superseded by a different and more efficient one. But with this arrangement, and notwithstanding the imperfection of the mechanism of the machine—when the battery, requiring about one quart of diluted acid to immerse it, was attached, it lifted 16 lbs., very rapidly, and when the weight was removed, it performed more than 600 evolutions per minute.

So sensible was the machine to the magnetic power, that the immersion of the battery one inch into the acidulated water, was sufficient to give it rapid motion, which attained its maximum, when the battery was entirely immersed. It appeared to me that the machine had more energy with the electro-magnets, than with those that were permanent, for with the smallest battery, whose diameter was three inches and a half; its height five inches and a half, and the number of concentric cylinders three of copper and three of zinc, the instrument manifested as great power as it had done with the largest batteries, and even with a large calorimotor, when it was used with a permanent instead of a galvanic magnet. With the small battery and with none but electro or galvanic magnets, it revolved with so much energy as to produce a brisk breeze, and powerfully to shake a large table on which the apparatus stood.

Although the magnetization of both the stationary and revolving magnets was imparted by one and the same battery, the magnetic power was not immediately destroyed by breaking the connexion between the battery and the stationary magnet; for, when this was done, the machine still performed its revolutions with great, although diminished energy; in practice this might be important, as it would give time to make changes in the apparatus, without stopping the movement of the machine.

It has been stated by Dr. Ritchie, in a late number* of the London and Edinb. Phil. Magazine, that electro-magnets do not attract at so great a distance as permanent ones, and therefore are not well adapted for producing motion. On this point Mr. Davenport made the following experiment, of which I was not a witness, but to which I give full credit, as it was reported to me by Mr. Slade, in a letter dated New-York, March 24. 1837.

Mr. Davenport suspended a piece of soft iron with a long piece of twine and brought one pole of a highly charged steel magnet within the attracting distance, that is, the distance at which the iron was attracted to the magnet; by measurement, it was found that the steel magnet attracted the iron one inch and one-fourth. A galvanic magnet was next used of the same lifting power, and consequently of much less weight; the attracting distance of this magnet was found to be one inch and three-fourths, showing a material gain in favor of the galvanic magnet.—Mr. Slade inquires, "has Mr. Ritchie's magnet been so constructed as to give a favorable trial to this principle ?"* Mr. Davenport informs me that each increase in the number of wires has been attended with an increase of power.

* January, 1837.

Conclusions.

1. It appears then, from the facts stated above, that electro-magnetism is quite adequate to the generation of rotary motion.

2. That it is not necessary to employ permanent magnets in any part of the construction, and that electro-magnets are far preferable, not only for the moving but for the stationary parts of the machine.

3. That the power generated by electro-magnetism may be indefinitely prolonged, since, for exhausted acids, and corroded metals, fresh acids and batteries, kept always in readiness, may be substituted, even without stopping the movement.

4. That the power may be increased beyond any limit hitherto attained, and probably beyond any which can be *with certainty* assigned,—since, by inceasing all the members of the apparatus, due referrence being had to the relative proportionate weight, size, and form of the fixed and moveable parts—to the length of the insulated wires and the manner of winding them—and to the proper size and construction of the battery, as well as to the nature and strength of the acid or other exciting agent, and the manner of connecting the battery with the machine, it would appear certain, that the power must be increased in some ratio which experience must ascertain.

5. As electro-magnetism has been experimentally proved to be sufficient to raise and sustain several thousands of pounds, no reason can be discovered why, when the acting surfaces are, by skillful mechanism, brought as near as possible, without contact, the continued exertion of the power should not generate a continued rotary movement, of a degree of energy inferior indeed to that exerted in actual contact, but still nearly approximating to it.

6. As the power can be generated cheaply and certainly—as it can be continued indefinitely, as it has been very greatly increased by very simple means—as we have no knowledge of its limit, and may therefore presume on an indefinite augmentation of its energy, it is much to be desired, that the investigation should be prosecuted with zeal, *aided by correct scientific knowledge*, by *mechanical skill*, and by *ample funds*. It may therefore be reasonably hoped, that science and art, the handmaids of discovery, will both receive from this interesting research, a liberal reward.

Science has thus, most unexpectedly, placed in our hands a new power of great but unknown energy.

It does not evoke the winds from their caverns; nor give wings to water by the urgency of heat; nor drive to exhaustion the muscular power of animals; nor operate by complicated mechanism; nor accumulate hydraulic force by damming the vexed torrents; nor summon any other form of gravitating force; but, by the simplest means—the mere contact of metallic surfaces of small extent, with feeble chemical agents, a power every where diffused through nature, but generally concealed from our senses, is mysteriously evolved, and by circulation in

* This question I am not able to answer, as I have not seen any account of the apparatus or of the experiment, but only of the result.

insulated wires, it is still more mysteriously augmented, a thousand and a thousand fold, until it breaks forth with incredible energy: there is no appreciable interval between its first evolution and its full maturity, and the infant starts up a giant.

Nothing since the discovery of gravitation and of the structure of the celestial systems, is so wonderful as the power evolved by galvanism; whether we contemplate it in the muscular convulsions of animals, the chemical decompositions, the solar brightness of the galvanic light, the dissipating consuming heat, and, more than all, in the magnetic energy, which leaves far behind all previous artificial accumulations of this power, and reveals, as there is full reason to believe, the grand secret of terrestrial magnetism itself.

B. S.

New-Haven, March 31, 1837.

Claim of Thomas Davenport.

In the words of the patent, taken out, this invention "consists in applying magnetic and electro-magnetic power as a moving principle for machinery, in the manner described, or in any other substantially the same in principle."

"Mr. Davenport first saw a galvanic magnet in December, 1833, and from the wonderful effects produced by suspending a magnet of 150 lbs. from a small galvanic battery, he immediately inferred, without any knowledge of the theory or the experiments of others, that he could propel machinery by galvanic magnetism. He purchased the magnet and produced his first rotary motion in July, 1834. In July, 1835, he submitted his machine to Prof. Henry, of Princeton, New-Jersey, also without any knowledge of Prof. Henry's experiments in producing a vibratory motion. From this gentleman he received a certificate, testifying to the originality and importance of the invention."

Mr. Davenport is, by occupation, a blacksmith, with only a common education, but with uncommon intelligence; his age about thirty-five. Mr. Ransom Cook, of Saratoga Springs, is associated with Mr. Davenport, and has rendered essential service by the improvements he has made in the machine, and by his assistance in bringing the subject before the public in the most effectual way. Arrangements have been made to take out the patent in Europe.

P. S. The proprietors are constructing a machine of seven inches in diameter, and also one of two feet in diameter. Galvanic magnets will be used as the moving and stationary magnets of each.

ON THE PROCESS OF CARBONIZATION, OR MANUFACTURE OF CHARCOAL, AT GOERSDORF, IN SAXONY.

It having been suggested by M. Boult that a superior charcoal might be produced by filling the interstices of the pile with small charcoal, the refuse of former burnings, an experiment was made, which, after being several times repeated, gave the following results: 1st, an increase of produce, amounting to not less than four per cent. above that yielded by the ordinary process; 2nd, a much smaller quantity of dust and small coal, 3rd, scarcely any smoke; 4th, charcoal of a very equal and superior quality.

A pile prepared for carbonization at Goersdorf contained in general about thirty *schragen*, (318 cubic yards) of pine trees split in quarters, which yielded, including the small coal, from eighty-nine to ninety-two per cent. in bulk of charcoal. It was considered desirable to ascertain, whether by increasing the size of the pile, a more considerable product would be obtained.—A pile containing forty-nine schragen (520 cubic yards,) of cleft pine wood, gave in an experiment, during which the weather proved favorable, 89.94 per cent. of charcoal (including the small,) very sonorous, and of very good quality. A second trial of 69½ schragen (740 cubic yards,) of similar wood produced only 87.98 per cent. but the weather in this instance was unfavorable.

This experiment was repeated with seventy-one schragen (750 cubic yards,) the weather continuing fine throughout the process; the produce amounted to 94.87 per cent.; equal in quality to the former results. The average results of the adoption of this process at Goersdorf, will appear from the following table of the produce, from the commencement to the date of the latest improvements.

	Produce per cent.		Total produce per cent.
	Large.	Small.	
1821...	74.34	3.91	78.85
1822...	76 24	4.76	81.—
1823...	76.44	5.25	81.69
1824...	77.95	4.09	82.04
1825...	86.31	4.35	90.66
1826...	86 31	3·62	89.93
1827...	87.53	4.20	91.73

The increase observable in the produce of 1825, is to be attributed, principally to the care with which the operations were conducted, but it must be also remarked, that the removal of the pipe for collecting the acid formed in the process of carbonisation, may also have contributed beneficially to the results. M. Karsten in his *Voyage Metallurgique* states, that in Carinthia, the carbonization of pine wood is performed in large stacks, containing 20,000 cubic feet, and without the trees being previously split, yet the produce in bulk is computed at from seventy-one to eighty-six per cent. It is obvious, that there exists no analogy between these results and those obtained from the brushwood and billets of oak, beach, &c., by the common process of carbonization, which seldom yields more than from thirty-five to forty-five per cent.; it is, therefore, only necessary to call public attention to the fact, and it may naturally be expected that, in the present state of practical science, a subject of so much importance in metallurgy will be duly investigated.—[Lond. Quar. Mining Review.]

CONSUMPTION OF COAL IN GREAT BRITAIN.—The quantity of iron annually produced in Great Britain may be taken at 700,000 tons; and the quantity of coal required, at an average, to produce each ton of iron, including that used by engines, &c. may be estimated at 5½ tons; giving a total of 3,850,000 tons consumed in the making of iron. According to Mr. Kennedy, the quantity of coal consumed in the cotton manufacture, in 1817, was upwards of 500,000 tons, and the manufacture has since more than doubled; so that, allowing for greater economy, we may fairly estimate the consumption of coal in the cotton trade at 800,000 tons a year. Its consumption in the woollen, linen, and silk trades cannot be less than 500,000 tons. The smelting of the copper ores of Cornwall consume annually about 250,000 or 300,000 tons; and it is supposed that the brass and copper manufactures require nearly as much. In the salt-works of Cheshire, Worcestershire, &c. the consumption is probably not under, if it do not exceed, 300,000 tons. The consumption in lime works may, it is believed, be estimated at 500,000 tons. It would appear, therefore, that the total annual consumption of coal in Great Britain may be moderately estimated as follows:—

	Tons.
Domestic consumption, and smaller manufactures	15,000,000
Production of pig and bar iron	3,850,000
Cotton manufacture	800,000
Woollen, linen, silk, &c.	500,000
Copper smelting, brass manufactures, &c.	450,000
Salt-works	300,000
Lime-works	500,000
	21,350,000
Exports to Ireland	750,000
Ditto to colonies and foreign parts	600,000
Total	22.700,000

If we suppose that the above sum of 22,700,000 tons costs the consumer, on an average, 7*s*. a ton, it will be worth, in all, 7,955,000*l*. a year!—[M'Culloch's Account of the British Empire.]

From the Journal of the Franklin Institute.

A MODE OF ANALYSING GERMAN SILVER. BY JAS. C. BOOTH.

As the employment of this interesting compound is daily becoming more general, it becomes a point of some importance to the manufacturer to ascertain with some accuracy the composition of those kinds in the market, which are adjudged to possess superior qualities. For this purpose I have contrived a method of analysing them, which may be successfully practised by any one who possesses a little chemical knowledge. A small piece of about 20 grains is dissolved in nitro-muriatic acid with the assistance of a gentle heat, by which means the metals will be converted into chlorides. If the solution be filtered through a small paper-filter, and a white powder remain after washing with water, it is the chloride of silver, the presence of which metal in the compound is accidental and scarcely appreciable. The acidulated solution is then treated by sulphuretted hydrogen, which separates copper and a little arsenic. The sulphuret of copper is collected on a filter, treated with nitric acid in a gentle heat, till the sulphur appears whitish, then filtered, brought to boiling, precipitated with caustic potassa, filtered and weighed. 100 parts of this precipitate contains 79.83 of metallic copper. To the solution after filtering off the sulphuret of copper, a little nitric acid is added, and the whole heated in order to convert the protroxide into the peroxide of iron. Muriate of Ammonia is then added to the same and a small excess of ammonia, which precipitates only the peroxide of iron. This may be collected on a filter and weighed, 100 parts of it contain 69.34 of metallic iron. The solution is now to be treated with carbonate of soda and evaporated to dryness; the dry mass is treated with hot water, and the residue washed and dried. This powder, consisting of carbonic of zinc and nickel, is mixed with half its weight of saltpetre and ignited until the whole is nearly dry. It is transferred to a filter after being powdered in a small mortar, and is then washed two or three times with pure, but dilute, nitric acid, which dissolves the oxide of zinc, and leaves the *peroxide* of nickel. To the zinc solution carbonate of soda is added, the whole evaporated to dryness, treated with hot water, and the remainder after being dried and ignited is weighed, 100 parts contain 80.13 metallic zinc. The peroxide of nickel is dissolved in hydro-chloric acid, precipitated by caustic potassa, filtered off and weighed, 100 parts of it contain 78.71 metallic nickel.

The separation of nickel and zinc is ever attended with difficulty and some uncertainty, but it is rendered much more simple by the method which I propose, and which is not more inaccurate than others in use. Before weighing any of the above oxides, it is decidedly preferable to burn the filter after shaking off as much of the substance as possible into a platinum crucible, to add the ashes, and then substract their weight from that of the oxide.

THE FIRST RUSSIAN RAILWAY.—The locomotive carriages made in England for the Pawlosk Railways, do not appear to have answered *quite* so well at the place of their destination, as they are said to have done on experimental trips in the land of their birth. On the 22nd December last, some short journeys were performed on that part of the ine already completed, for the express purpose of demonstrating the practicability of Railway travelling in the very depth of a Russian winter. On this occasion, the velocity did not much exceed twenty miles an hour: a very satisfactory pace, especially under the circumstances, but still something under the "seventy-five miles an hour" rate *reported* to have been attained in England: on another day, the result was not even equal to this, which is attributed to the wind's blowing against the line of direction; perhaps, therefore, it blew the right way on the experimental trips, under the direction of the builder. On the 22nd December, the apparatus for removing the snow from before the wheels was tried, and proved quite successful; from recent experience at home, it would appear that any apparatus for that special purpose is quite unnecessary.

Agriculture, &c.

IMPROVING FRUIT TREES.

Among the illustrious benefactors of mankind, the name of Van Mons* seems destined to hold a conspicuous place. By almost incredible labor, perseverance, and constancy of purpose, through a long succession of years, he seems to have established a philosophical theory of improving or ameliorating fruit trees and other productions of nature, worthy of a place by the side of the wonderful discoveries and improvements in other branches of philosophy which characterize the age of Herschel, Sir Humphrey Davy, Cuvier, and a host of other distinguished contemporaries,—

"Whose names must honored live, till science dies."

From a long article in the Horticultural Register and Gardener's Magazine of June, 1836,—communicated by Hon. H. A. S. Dearborn,—we have compiled the following, which we think cannot fail of being interesting to a large portion of the members of the Essex Agricultural Society. A. N.

VAN MON'S THEORY OF AMELIORATING OR IMPROVING FRUIT TREES, BY RAISING SUCCESSIVE GENERATIONS FROM SEED.

So long as plants or trees remain in their natural situation, their seed always produce the same; but on changing their climate and territory some will vary more or less, and when they have once departed from their natural state, they never again return to it, but are removed more and more by successive generations.

The seed, for example, of the wild pear trees, in their native region, always reproduce their like at every age; that is, be the tree twenty or a thousand years old at the time the seed is taken from it, the fruit of its offspring trees will be precisely like that of the parent stock. But the seed of a dom sticated pear tree, that is, a tree which produces better, or at least a different kind of fruit from its wild ancestors, produces trees not only very different from itself and them, but this difference will be greater if the seed be taken from the young seedling's first or early fructification, than it will be if taken from the same tree after it has been many years in bearing.

To improve or ameliorate fruit trees, therefore, as expeditiously as possible, young seedlings should be forced into bearing as early as may be, and the seed first produced planted. Pursuing this method, Van Mons, notwithstanding the seed that he was obliged to use in his first experiments were obtained from ancient varieties, whose age, although uncertain, was much advanced, was enabled to reach, in forty two years, the fruit of the fifth generation of his pear trees, all of which was good and excellent. His first generation yielded their first fruit in from twelve to fifteen years, his second in from ten to twelve years, his third in from eight to ten years, his fourth in from six to eight years, and his fifth in six years, and in the eighth generation he obtained a few pear trees which fructified at the age of four years. He also found that three or four generations without interruption, from parent to son, and from twelve to fifteen consecutive years, were sufficient to obtain no other than excellent fruit from the stones of peaches, apricots, plums and cherries;—that to obtain none other than good apples, only four generations, and about twenty years, were required.

Such, briefly, according to Van Mons, is the philosophy of improving fruit trees.—But why, it may be asked, if fruit trees are capable of such rapid improvement, by reproduction from seed, do so few seedling trees among us produce good fruit? From the theory of Van Mons may be obtained a philosophic answer to this inquiry. Trees, like all other organized beings, have limited periods of youthful growth, maturity, and decay. Trees propagated by cuttings, scions, &c., are only the multiplication of individuals, and subject to the same great law of nature. Their age, however late they may have commenced an independent existence, must be considered the same as that of the parent stock, and when the full period of the natural life of the original tree shall have been completed, will cease to exist. Age alone, according to Van Mons, causes our fruit trees to deteriorate, and their seeds to degenerate. Seed, he says, which are yielded by the hundredth fructification of a domesticated pear of excellent quality, produce a great variety of trees, whose fruits, almost always detestable, are more or less near to a wild state. Seedling trees, with us, have generally been the offspring of old varieties; hence they have seldom produced good fruit. Whoever, therefore, may possess young seedlings which produced good fruit, would confer a great favor on the community by preserving the seed for planting. It has been ascertained that it is advantageous to collect the fruit a little before it is ripe, and leave it to become perfectly mellow and reach a state of decay, before extracting the seeds or stones for planting. The apple is said to deteriorate less rapidly, and to live longer than the pear.

The subject of deterioration naturally leads us to inquire how many years a variety of pear may live. Van Mons estimates that it may live from two to three hundred years. But I have remarked, he says, that the most excellent, beyond all others, least resist the ravages of old age, They cannot attain the age of half a century, without manifesting symptoms of decrepitude. The first of these symptoms is that of bearing less constantly and the fruit ripening later. The decay of the wood, and the loss of the beautiful form of the tree, and the alteration of the fruit, follow at much later periods. The varieties that have existed but half a century, do not suffer from canker at the ends of the branches, nor from diseases of the bark; the fruit does not crack, nor is it filled with a hard substance, covered with knots, nor insipid or dry.—These varieties can still be grafted on other trees, without their infirmities being augmented. It requires half a century more to render them worthless. It is painful to think that soon the St. Germain, the Beurre Gris, the Crassanne, the Colmar, and the

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* Professor of Chemistry at the University of Louvain, Belgium.

St. Michæls, must submit to this destruction. None of these varieties succeed any longer in Belgium, except when engrafted on a thorn, and as espaliers, trained against a wall; but this success is at the expense of their commendable qualities.

Van Mons does not attribute the deterioration of fruit trees to their multiplication by repeated engrafting, but contends that natural and grafted trees deteriorate in the same manner and with the same rapidity, in consequence merely of their age. He discovered in an old garden of the Capuchines, the parent tree of the Bergamote de la Pentacote, an old pear. All the trees grafted from it are affected with canker, in slightly moist land, and the fruit is small, cracks when growing in the open air, is covered with black spots, which communicate a bitter taste, and no longer succeeds, but when trained as an espalier along a wall. The parent tree was infected with all the evils found in those grafted from the same variety. He took suckers from the roots and scions at the same time, which he grafted on other stocks, and the trees produced by both were deteriorated in the same degree and manner as those which have been for a long time multiplied by the graft. Poiteau, the admirer and panegyrist of Van Mons, thinks, however, that this rapid deterioration of fruit trees may be somewhat delayed if scions be always taken from the most healthy individuals and inserted only into vigorous stocks.

Van Mon's method of raising fruit trees from the seed was as follows. He left the plants in the seed bed two years; he then took them up, preserved and transplanted only the most vigorous, at such a distance one from the other that they could thoroughly develope themselves and fructify. He planted them about ten feet apart, sufficiently near to force them to run up tall and form pyramidal tops, which he states hastens their fructification. While waiting for his trees to produce fruit, he studied their form and physiognomy, and from long continued observations established the following prognostics of what they may become, from their different exterior characteristics.

1. *Prognostics of a favorable augury.*—A good form, a smooth and slightly shining bark, a regular distribution of the branches in proportion to the height of the tree; annual shoots bent, striated, a little twisted, and breaking clear without splinters, thorns long and garnished with eyes or buds nearly their whole length; eyes or buds plump, not divergent red or grizzled; leaves smooth, of a mean size, crimped on the side of the middle nerve, borne on petioles (the stem of the leaf) rather long than short, the youngest in the spring remaining a long time directly against the bud, the others expanded, hollowed into a gutter from the bottom towards the top, but not their whole length.

2. *Bad prognostics.*—Branches and twigs confused, protruding like those of the hornbeam, thorns short without eyes; leaves averted from the bud, from their first appearing small round, terminating in a short point, guttered their whole length. These characteristics indicate small fruit, sweet, dry and late, fit only for baking.

3. *Prognostics of early fruit.*—Wood large, short; buds large and near,

4. *Prognostics of late fruit.*—Wood slim, branches well distributed, pendant, the shoots a little knotted, generally denote late delicious fruit; with leaves round, point short, stiff, of a deep green, borne on petioles of mean length, are analogous signs, but less sure.

Van Mons remarks, that among the new pears which he has obtained, there are some which were several years in taking a fixed form; that several did not assume one for from twelve to fifteen years, and that others never did. Our old varieties, without doubt, have been in the same situation, and he gives as an example of pears that have never assumed a determinate form, our Bon Cretien de Hiver. Still it is most easily recognized, notwithstanding the variation in its form and size.

TRANSACTIONS OF THE ESSEX AGRICULTURAL SOCIETY, MASS.

The Annual account of the "Transactions of the Essex Agricultural Society in Massachusetts" has just been published. It is a valuable document; and does honor to this society, which stands unsurpassed in the country for its spirited exertions in the cause of our improved husbandry; and for the zeal, ability, and intelligence with which its operations have been conducted. We have already laid before the readers of the New-York Farmer the sensible address of Nath'l. W. Hazen, Esq., which forms the first article in these Transactions.—This is followed by some remarks from Governor Everet on the same occasion, which are particularly entitled to attention; and which, though they contain some local allusions, we are happy in laying before our readers. Like every thing of the kind which proceeds from that distinguished gentleman, of whose talents, knowledge, eloquence, public spirit, and usefulness the Commonwealth has just reason to be proud, they are to the point; they are feeling, instructive, and patriotic; and the local allusions give them an increased interest.

REPORT—COMMITTEE OF ARRANGEMENTS.

When the discourse of Mr. Hazen was concluded, Dr. Nichols, of Danvers, addressed the Governor and audience through the following Report:—

The Committee of Arrangements ask leave to report:—That they have had the satisfaction of seeing their plans and provisions for the day carried into execution without loss of time, and in a manner equal to their expectations. As a whole, the exhibition has perhaps been inferior to some of the Shows in former years. This they are willing to attribute to the unfavorable season and the inclement weather of the morning, rather than to a want of interest in the Agricultural community in the objects of the Society. The utility of this Association they are happy to believe depends not so much on the cattle and things exhibited at their Shows, as on the opportunities these afford the Farmers of the County, to become acquainted with each other, for consultations on subjects peculiarly interesting to themselves, and for offering up their united adorations to Him who giveth seed time and harvest, and who alone can crown the labors of the husbandman with success.

This day has also been rendered unusually interesting by the presence of His Excellency the Governor of the Commonwealth. In extending to your Excellency an invitation to attend on this occasion, the Committee believe it to be peculiarly proper that an exhibition attained mainly by the bounty of the State should come under the supervision of its Chief Magistrate; and they felt confident that one so distinguished for performing with the strictest fidelity all the duties and proprieties of his exalted station, would be pleased to embrace the opportunity afforded him, to countenance and encourage one of the great interests of the Commonwealth by showing himself personally interested in the success of its Agricultural Societies, and by manifesting a disposition to become acquainted with the wants of the industrious yeomanry of which they are composed. And your presence here,—for which the Committee in behalf of the Society tender you their hearty thanks,—assures them that they have not mistaken your views or feelings in these particulars.

Per order of the Committee.

ANDREW NICHOLS.

REMARKS OF GOV. EVERETT.

After the Report of the Committee of Arrangements had been read, Governor EVERETT rose and made his acknowledgments to the Committee for the manner in which they had alluded to the circumstance of his being present. He expressed his gratification at the exhibition of the day, and his confidence that the bounty of the State was beneficially applied by the Essex Agricultural Society. He stated that the wish had been expressed that he should address the audience. He felt that in complying with the request he stepped beyond the line of usage on such occasions, but he trusted the responsibility of his doing so would be considered as resting with the Committee, by whom the wish had been expressed.

The Governor added that he felt additional embarrassment in following the orator, who, in his very able and interesting discourse, had anticipated many of the general remarks appropriate to such an occasion. His only effort could now be, to subjoin a few observations, so simple as to present themselves without research, and he hoped important enough to bear a repetition, should it happen, as was very probable, that they had been already made by the orator of the day.

After some remarks on the nature and objects of cattle shows, and their beneficial influence on the state of the husbandry of this part of the country, Governor Everett proceeded substantially as follows:

The benefit, which has accrued to our farmers from these exhibitions, cannot be estimated in dollars or cents, or measured by the figures employed to state an increase of agricultural products. A few more tons of hay from your meadows; a few more bushels of corn or potatoes from your tilled lands; a better stock of animals for the dairy, the fold, or the pen, would add something, it is true, to the public and private wealth of the community; but if nothing farther came of it, it would be a matter in which neither the patriot nor the christian could take a deep interest.

But when we consider, that the *class of husbandmen* is numerically *the largest* in the community; and that on their condition it has been found, in the experience of the whole world, that the social, political, and moral character of countries mainly depends, it follows as self-evident, that whatever improves the situation of the farmer feeds the life-springs of the national character. In proportion as our husbandmen prosper, they not only enjoy themselves a larger portion of the blessings of life; but society is kept in a healthy state, and they are enabled to make ampler provision for the education and establishment of their children, and thus leave behind them a posterity competent not only to preserve and assert, but to augment their heritage.

It will accordingly be found, that the great differences in the political condition of different countries coincide directly with the different tenure on which the land is held and cultivated. It is not that in one country the Government is administered by an elective President; in another by a limited monarchy; in another by an absolute despot. These things are not unimportant; because forms have a tendency to draw the substance after them. But a far more important question, in deciding the political condition of different countries is, *how is the land held?* The orator has told us what is the case in many parts of Europe but there are countries where the case is still worse. There are countries where the land, the whole of it, is claimed to be the property of an absolute despot,—rather a chief of brigands than a sovereign,—who once or twice a year sends out his armed hordes to scour the territory, to sweep together, without the shadow of law or pretence of right, whatever they can lay their hands on; leaving the wretched peasant little else than what he actually grasps with his teeth. Such is the system introduced into some parts of Hindostan, by their Mahometan conquerors, and it has had the effect of breaking down the civilization of countries once refined, learned, wealthy and prosperous, into a condition very little better than that of the North American savage. Contrast this with the system on which our lands are held and occupied, in pursuance of which as a general rule, it is *divided into small farms*, the property of those who till them, who have every inducement and facility to better their condition, and who feel themselves on an equality with their fellow citizens in every other pursuit. It is plain that over such a population no government could exist but one like that beneath which we live, in which the people are the direct source of power. Where this is the case, it is equally plain that whatever improves and raises the condition of husbandmen, tends directly to sustain and fortify the social fabric.

A very celebrated ancient poet exclaimed, "Oh, two happy farmers! did you but know your blessings." If this could be said of the farmers of Italy, at the close of the civil wars, subjects of an absolute prince, and a part of them only the owners of the land they tilled, it may well be repeated of the husbandmen of New-England, the proprietors of a soil, which furnishes a competence of all the good things of life, and the possessors of an *amount of blessings never surpassed*, if ever equalled. Not among the least of these privileges, is the rich birthright of patriotic recollections which has come down to us from our fathers, and of which no portion of the country has more to boast than the ancient county of Essex. It is no mere compliment, sir;—the county of Essex is a distinguished part of the State. It would be easy, within the limits of this single county, to find, in the history of other times, bright examples of all the traits of character and conduct which promote the prosperity and honor of nations, in peace and war. From the early contest with the Indians and French; from the time when the "Flower of Essex" fell at "Bloody Brook," down to the close of the revolution, the fathers and forefathers of those I have the honor to address, contributed a full share of the counsel and treasure, the valor and blood by which the cause of the country was directed, sustained, and carried through triumphant. Need I go beyond the limits of the town of Danvers? Is it not enough to recall the time, not beyond the memory I am sure of some whom I see before me, when a regiment of royal troops was here encamped, a sort of prætorian band to guard the residence of the royal Governor?—Need I do more than remind you of the morning of the 19th of April, 1775, when your sires, at the sound of the bell of yonder church, hastened together, a portion of them under the command of your venerable fellow citizens near me,* and rushed, rather than marched, to the field of danger, sixteen miles in four hours,—flying into the jaws of death as rapidly as fear commonly lends men wings to fly from it; and contributing,—this single town,—this one little town,—oh, prodigality of noble blood! one sixth of the entire loss of that eventful day. Need I, my friends, for the most touching recollections, go beyond the walls of yonder ancient church, consecrated, as it was, by the strange spectacle, (at the memory of which your tears were called forth afresh, on last year's return of the great anniversary,)—the sight of four of your brave sons wrapped in their bloody shrouds, the honorable wounds which they had received in their country's cause still freshly flowing? Could I before this audience, on such a theme, be wholly mute, would not the gray hairs of the veteran leader of that heroic band, who is now before me,† rebuke my silence, and put a tongue in every echo of this building, which would cry out and shame me!

Yes, fellow citizens, if any thing could make your native land, your homes, your firesides, more dear to you, it must be these recollections of the precious blood by which they were redeemed. If any thing was wanting to inspire you with a passionate attachment to the blessing you enjoy, it would be the thought of the inestimable price at which they were purchased.

Nor let us forget, if we have a patriotic ancestry to be proud of, and if we have privileges to enjoy, we have also incumbent duties to perform. The great principles of republican liberty are exposed to danger in peace as well as in war. Prosperity, not less than trial, may sap the foundation of the social fabric; and there is at all times less danger from a foreign foe, than from party passion, individual selfishness, and general apathy.

It will not, of course, be expected of me to enlarge upon the duties which devolve upon our husbandmen, with a view to guard against these dangers and perpetuate our institutions in their purity. I can but glance at the topic. But I may say, that the first and most important duty of the husbandman, is to endeavor to preserve and if it may be to strengthen, the broad foundation laid by our fathers in a deep religious principle. Surely there is no class of the community whose daily pursuits ought to furnish greater nourishment to the sense of religious things. The reflecting mind, it is true, beholds traces of a higher wisdom and goodness in every step of every walk of life; but the husbandman who drops a seemingly lifeless seed into the cold damp earth, there in great part to decay; who sees the vital germ in a few days pierce the clod, rise into the air, drink the sun's rays and the dews of heaven, shoot upwards and expand, array itself in glories beyond the royal vesture of Solomon, extract from the same common earth and air a thousand varieties of the green of the leaf, the rainbow hues of the petals, the juicy or the solid substance of the fruit, which is to form the food of man and his dependent animals. I say, the intelligent husbandman who beholds this, seems to step behind the veil which conceals the mysteries of creative power, and sit down (if I dare to speak) in the laboratory of Omnipotence.

Connected with the cultivation of the religious principle, and the natural fruit of it, we look to our husbandmen for a high *moral sense*. The worst feature in the degradation of many foreign countries, is the moral condition of those who till the soil, showing itself in the extreme of intemperance and the kindred vices. No man can fully understand this, who has not witnessed it. In the general moral character of our population, we are warranted in saying, that it might serve as an example to the world. I do not think that out of New-England (and I repeat only a remark, which, within a few weeks I have heard several times from persons coming from other parts of the country,) you could assemble a concourse giving so much proof of sobriety, thrift, and industry, as is brought together in this town to-day, and might be assembled, on a similar occasion, in any town in Massachusetts. We look to our

* General Gideon Foster.

† General Foster.

husbandmen, by precept and example to sustain, and if possible elevate, this sound state of morals in the community.

Lastly, that I may say a single word on a subject on which the orator has preceded me. It is a great and just boast of the pilgrims and their descendants, that they made early and ample provision for education. Farmers of Essex, hold fast to that boast. I had rather for the appearance, if I must choose between them, see the country dotted all over, at its cross roads with its plain little village schoolhouses, than have the high places of a few large towns crowned with the most splendid fabrics of Grecian and Roman art. I had rather for the strength and defence of the country,—if I must choose between them,—see the roads that lead to those schoolhouses thronged with the children of both sexes, saluting the traveller as he passes, in the good old New-England way, with their little curtesy or nod, than gaze upon regiments of mercenary troops parading upon the ramparts of impregnable fortresses.—Ay, for the honor of the thing, I had rather have it said of me, that I was by choice, the humblest citizen of the State making the best provision for the education of all its children, and that I had the heart to appreciate this blessing, that sit on a throne of ivory and gold, the monarch of an empire on which the sun never sets. Husbandmen, sow the seed of instruction, in your sons' and daughters' minds. It will grow up and bear fruit, though the driving storm scatter the blossoms of spring, or untimely frost overtake the hopes of autumn. Plant the germ of truth in the infant understandings of your children—save, stint, spare, scrape,—do any thing but steal,—in order to nourish that growth; and it is little, nothing to say, that it will flourish when your grave stones, crumbled into dust, shall mingle with the dust they covered—it will flourish, when that overarching heaven shall pass away like a scroll, and the eternal sun, which lightens it, shall set in blood!

Then follow the Reports of several committees and the annunciation of the successful competitors for the Premiums on the Dairy, on Milch Cows, on Domestic Manufactures, on Cider, on Ploughing, on Bulls, Working Men, Steers, and Calves, on Fruits and Flowers, and on Horses — These are followed by a valuable communication from Van Mons in improving Fruit Trees translated for the Horticultural Register by Gen. H. A. S. Dearborn, a gentleman distinguished for his scientific and practical skill in Horticulture; and to whose intelligence and public spirit the Horticultural and Agricultural Public are longly indebted. All these purposes are deserving of attention.

DAIRY. Ebenezer King, the gentleman who received the highest Premium for his June butter, states "that he presents thirty nine pounds and three quarters made in June; also fourteen pounds made two weeks since: and seven pounds made during the last week (dated Sept. 28th,) the produce of one cow. The cow has given at a milking twenty-six pounds, her feed has been principally ordinary pasture; occasionally she has had three pints of corn meal per day. Her milk has set twenty four hours, when the cream has been separated; has been churned once a week; the butter milk pressed out; and the butter kept in strong pickle."

We subjoin to this account that of Daniel P. King, Esq., on the same subject, a successful competitor, and in all respects, one of the best farmers in the county.

"The Stone jar marked 1, contains about thirty pounds of butter, made in the last week of June from the produce of six cows; they had common pasture feed; only the milk stood in tin pans in a cool cellar thirty-six hours; the cream was then separated, and placed in pots on the cellar floor; in warm weather fine salt is stirred in the cream to prevent its souring. When the butter is taken from the churn, the butter milk is pressed out, it is partially salted and remains in the cellar till the next day, when more salt is added; and it is again worked over; the quantity of salt used is about one oz. to the pound. The butter in the jar has been covered with a pickle, made of rock salt, boiled, and carefully skimmed."

The produce of four cows, as given by Jacob Osgood, of Andover, is thus stated.

New Milk Cheese from the 9th of July, to the 10th of September,	435 lbs.
Butter from 1st of June, to the 9th of July, and 17 days in September,	145 "
Amount of 6 meal cheese made during the time of making butter,	294 "

The cow of Daniel Putnam, which received the first Premium as a milch cow, of native stock, from the amount of her produce, certainly deserved a premium.

"This cow calved May 21. The calf was sold June 20th for $7.62½. During the thirty days that the calf sucked, there were made from her milk 17 lbs. butter. From June 20th to Sept. 26th (14 weeks she gave 3370 lbs. of milk, making a fraction more than 34 lbs. and 6 oz. per day. The greatest quantity on any one day was 45 lbs. or 17 quarts and 1 pint—for the weight of a quart of her milk is 2 lbs. 9 oz. The greatest quantity in one week was 288 lbs. The quantity of butter made in the same fourteen weeks was 139 lbs. The greatest amount in one week was 12 lbs. 2 oz. The cow has had good keeping. In addition to the pasture she has been frequently fed with fresh mown grass and corn stalks. She had about four quarts of cob meal (corn ground on the cob) per day, through the summer."

The Report on Domestic Manufactures gives a long list of premiums, fifty-two of which seemed to have been bestowed, and we have no doubt most justly upon the five seamstresses and knitters of Essex county, for beautiful and useful specimens of their patient handicraft; and presents to those in pursuit of that most useful commodity, an industrious wife, a pretty emphatic recommendation of the fair daughters of this favored district, long distinguished for the intelligence and patriotism of its men; and the virtue and industry of its women. Of this county, the poet may say emphatically

"There is the noblest growth our realms supply;
And souls are ripened in a northern sky."

From the New-England Farmer.

THIRD ANNUAL REPORT OF THE MANAGERS OF THE BOSTON ASYLUM AND FARM SCHOOL.

The managers of the above institution respectfully submit to the corporation the following report:—

The present board of managers was elected in the month of June last, and this report commences with that period.

The objects of the institution are presumed to be well understood. To rescue from the ills and the temptations of poverty and neglect, those who have been left without a parent's care; to reclaim from moral exposure those who are treading the paths of danger; to "place the solitary in families;" to give to those who know nothing of the ties or influence of home, some taste and fondness for a local habitation, at the least; and to offer to those, whose only training would otherwise have been in the walks of vice, if not of crime, the greatest blessing which New-England can bestow upon her most favored sons, a good education, are some of the purposes for which the Asylum and Farm School was endowed. Under the blessing of God, success has thus far attended the exertions which have been made to accomplish these objects. From the monthly reports of the superintendent, and from the personal examination of the establishment on Thompson's Island, the board of managers are satisfied that there has been much improvement in the character of the boys who have been committed to the charge of the institution. In the last report of the superintendent, 62 boys are placed in the highest or first grade, 40 in the second, 4 in the third, and 1 in the fourth.

The number of boys on the island at the time of the last report, was 92; since that time 18 boys have been admitted, and three withdrawn. The number on the 1st of January, 1837, was 107; all of whom, as well as all other persons connected with the establishment on the island, were in good health, and there has been no death at the institution since the last report was made. The occupations and employment of the boys vary with the season. In spring, summer and autumn, the larger boys, in classes, work upon the garden and farm, of whose labor they perform a large part The younger boys have small gardens of their own, which afford them recreation when released from school. In the winter season most of them attend school, where they are instructed in the learning usually taught in our common schools, and some of them assist in making clothes and mending shoes. The winter evenings are occupied with the study of geography, and the use of globes; botany, and practical agriculture; lecturing on different subjects, singing and reading.—The superintendent states that "every boy in the institution is required to be present during the evening exercises, if he is able, which are very pleasing to them, and which we all enjoy very much."

A large number of mulberry trees have been planted upon the island, and there are many silk worms at the establishment. It is contemplated to improve the advantages of the location in the production of raw silk for manufacture.

As to the success of the boys in the farming operations, Capt. Chandler, the superintendent, says, "they have succeeded far beyond my expectations; I think they have done more work, and done it better, than the boys of their age who have been regularly brought up to the business in the country generally do." And as to the comfort and contentedness of the boys. he says, "they are all comfortably clad with woollen clothes, shoes, stockings and caps, and appear to be as happy in their present situation as boys generally are under the paternal roof. They appreciate their advantages, and most of them are grateful to the benefactors of the institution and their friends for placing them here. The boys are well supplied with books, and keep them in excellent order; our library contains between 4 and 500 volumns of well selected books. I have also an agricultural library containing about 30 volumns, to which the boys have access." Opportunities are occasionally offered to the friends of the boys at the institution, of visiting them on the island in the summer months.

The school is under the immediate charge of Mr. George B. Hyde, and he as well as the superintendent and all engaged in the establishment, are believed to merit the continuance of the confidence which his hitherto been reposed in them.

During the past summer, several parties of ladies and gentlemen, at the request of the board of managers, visited Thompson's Island. At these visits there have been many persons present, and an examination of the boys in their different studies has been accompanied by some remarks on the objects and prospects of the institution.—Among these who have thus visited the island, have been many strangers, who have always expressed their interest and pleasure in its objects and condition.

And how should it be otherwise than an object of interest; an institution designed to rescue the destitute orphan boys of our city from vice and ruin; to withdraw them from scenes and associates, whose contaminating influence would quickly destroy the perceptions of conscience, and leave them, deprived of that monitor, to pursue the impulses of passions which inevitably destroy their victims. Many are the worthy objects of the charitable institutions among us; our hospitals relieve the sufferings of the sick, and restore them to health and usefulness; they are a blessing which may be required by all of us, and we would not detract from their deserts. But we conceive that an institution which is to rescue immortal beings from the stain of sin, which could hardly otherwise be avoided, which is intended to have an influence on the youthful mind, and lead it to an understanding of its own capacities, responsibilities and hopes, deserves the fostering care of an enlightened, benevolent community, as much as those associations whose aim is to cure the diseases of the body, or to restore the wanderings of intellect. Such an institution as the Asylum and Farm School, is in true accordance with the spirit of the pilgrims; it carries into effect the first objects of their solicitude, the education of the young—of that young whose talents would otherwise be employed to violate the peace and virtue of society.

It will be seen by the report of the finance committee, that the expenses of the institution for the year ending January 1, 1837, have amounted to $6,100, while the receipts for the same time have amounted to 3,500, leaving a deficiency of $2,600. To meet this excess of expenditure over income, and to prevent its recurrence, it will be necessary to appeal to the liberality of the public. The board of managers had intended to have made that appeal in the autumn of the past year; but the condition of the financial affairs of this community induced them to defer it. They would recommend the subject to their successors as one requiring their attention when a suitable time shall have arrived for its execution, with the confidence that the appeal will be cheerfully and promptly answered.

For the managers.

WILLIAM GRAY.

COOKING POTATOES.—This is no inconsiderable art; and I have some suspicion that Cobbett's ignorance of the best way of doing this may have been one reason of his antipathy to the use of this esculent. The direction given by one writer is, never to put your potatoes into cold but boiling water; and keep it boiling until the potatoes are done or sufficiently boiled; then pour off the water as soon as possible; if a little salt be thrown into the water when boiling, the better." We will add a better mode than this, which has been so thoroughly and successfully tested, that we believe it cannot fail to be approved: Select the potatoes you design for dinner the day previous; pare them and throw them into cold water and let them stand three or four hours; then, at a proper time before dinner, put them into boiling water; and when they have sufficiently boiled, turn off all the water, leave off the cover and hang them over the fire to dry. When the steam has passed off they will then be in the best possible condition for eating. By this mode, potatoes even of a watery and inferior quality, become mealy and good. H. C.

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone.

The work contracted for must be finished by the 1st day of July, 1838

Persons desirous of obtaining work are requested to apply at the office of the undersigned in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, Jr.
Chief Engineer Jas. Riv. & Ka. Co.

P. S.—The valley of James River above Richmond is healthy.

16—10t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August nex, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered — The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.— The entire length of the line of the Sel a and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 14 1y

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N. Y. A Ra lroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rohester, Jan. 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings o every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROB'T. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—1f

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleeckerstreet, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.
16—6t.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

									lbs.	
350	tons	2¼	by	⅝,	15 ft in length,	weighing			$4\frac{68}{100}$	per ft.
280	"	2	"	½,	"	"		"	$3\frac{50}{100}$	"
70	"	1½	"	½,	"	"		"	2½	"
80	"	1½	"	¼,	"	"		"	$1\frac{25}{100}$	"
90	"	1	"	¼,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½ 3, 3¼, 3½, 3½, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front st.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

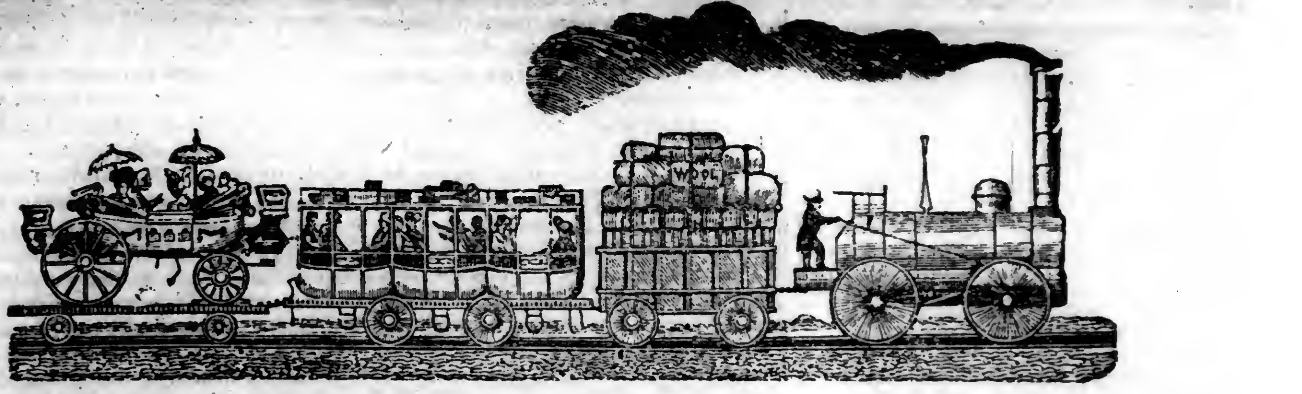
Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Stylo, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N.
51tf



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, MAY 27, 1837. VOLUME VI.—No. 21.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MAY 27, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America.*

☞ SUBSCRIBERS IN THIS CITY, who change their residence on the 1st of May, will please give notice at the office, 30 Wall-street, *Basement Story.* It is desirable that the notice should specify their late and future residence.

RAILROADS—*Their value tested by these hard times.*—The present pecuniary difficulties have tested thoroughly public confidence in the value of *stocks.* It will have been remarked by most of those who have noticed the course of events that the stock of those Railroads in successful operation, has been less depressed by the scarcity of money than *any other* kind of stock in market. It is true that the stocks of *unfinished* roads have been considerably depressed, yet not more than *Bank* Stocks, which had been deemed by many the best kind of investment. *This important fact*, in relation to Railroad Stocks, should be fully understood by this community which is so deeply interested in the success of Railroads Every person interested in the success of any particular road, or in the *system generally* should understand fully, and impress upon his neighbor, that *judiciously* located Railroads will not only pay a good dividend on his investments *in the road*, but it will, at the same time, greatly enhance the value of his real estate if he has any. Such works produce a *general increase* in the value of property. They are public benefits. *They benefit all.*

CENTRAL RAILROAD—GEORGIA.—The Editor of the *Savannah Georgian* thus announces the opening of this important road.

We enjoyed the pleasure yesterday afternoon of a ride on the Railroad for a few miles from the vicinity of the city. In two or three weeks, perhaps in less time, our citizens will have the gratification of a ride for *nine* miles on the Road, destined to be the link between the waters of the vast Atlantic and the mighty river of the West. Our columns being occupied by the effusions of native genius, which are ever hailed with emotions of pleasure, we must deny ourself the pleasure of dwelling on this first trip of the second Locomotive which has coursed its way on our native soil, and the first on a road which is ere long to bind the sons of Yamacraw in fraternal union with the Western sons of Georgia, Tennessee, and other States.

We must offer the same reason as our apology for omitting to acknowledge this morning, a beautiful present from the garden of one of Flora's devotees.

Could we print by steam, we would expend oceans of ink in the praise of our Railroad Engine, and the Roses and Lilies which bloom before us

We are authorized to inform our readers that the Engine will be in motion this afternoon at *three o'clock*, for the accommodation of the public.

CUBA.—*Railroads and Steam Navigation.*—The railroad from Havana to Bambano, (on the South Coast of the Island,) is in operation for five miles, and five leagues will be completed by the first of June. This is the first work of the kind in Cuba. There are several others projected, to wit:—from Carderas to Soledad de Benba; from Matanzas to Guanaja; from Guanaja to Porto Principe, and from thence to the South Coast. Steamboat navigation along the coast is increasing. Three fine boats regularly ply between Havana and Matanzas. One between Havana and Carderas, touching at Matanzas, and lately the steamer Yumuri left Havana for Guanaja, the port of Porto Principe, to touch at Mantanzas, Carderas, and San Juan de los Remedios, being the first regular packet on this line. These and all similar improvements receive the largest portion of their impulse from the liberal enterprising spirit of his Excellency Governor Tacon, who in consequence of the successful result of his late expedition against St. Jaga de Cuba, has lately received three military orders, one of which is Marquis de la Union de Cuba, as a testimony of the approbation of the government. The estimation in which the military hold their chief, the Governor-General, will be manifested by a grand dinner and ball, on the 4th inst., to be given to him by voluntary subscription, and to which the private citizens will be invited.—[N. Y. Express.]

LOUISVILLE, CINCINNATI AND CHARLESTON RAILROAD.—Major M'Neill, the Chief Engineer of this Company, arrived in this city a few days since, and after having made the necessary arrangements with the President, left here this morning for the mountains, where, after ascertaining from Capt Williams the present state of the surveys, he will proceed to make a personal examination of the whole line, and give such directions to the operations of the Engineers, as may, in his opinion, be best calculated to advance the work. It is hoped that by the time the necessary explanations and surveys shall be completed, the embarrassments under which the country now labors, may be so far removed, as to offer no serious obstacle to the progress of this great work.—[Charleston Mercury.]

RAILWAYS IN LONDON.—The extension of the Birmingham Railway, from the originally intended terminus at Camden-town to Eusten-grove, near the New-road, is progressing rapidly, and the scaffolding is erected for the stupendous portico, which is to be composed of six columns, of the enormous height of forty feet, and proportionable thickness! The railway crosses the Hampstead-road and Park-street (leading to the east gate of the Regent's-park,) in an excavation of the depth of from twenty to thirty feet, although, at no great distance, it is carried over the Regent's canal at a height sufficient to allow the passage of barges below. The London Grand Junction Railway, which is to leave the Birmingham at its original terminus, and carry on the line to the verge of the City, has also been commenced with considerable spirit, nearly at the back of Messrs. Cubit's, the contractor, in Gray's-Inn road. It is, at that part, at least, to be carried on arches, after the fashion of the Greenwich Railway, and very little progress can be made in the line either way, from the present site of operations, without pulling down houses and buildings of very modern erection. Its course will, in general, follow that of the *celebrated* River Fleet, whose channel, which within a short time saw "the light of day" in that vicinity, is now covered over there, as well as in most other parts watered by its "translucent streams."

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

XXII. AN ABSTRACT ACCOUNT OF COALS USED IN COKE OVENS AND RETORTS, AND COKE PRODUCED FROM ONE YEAR'S WORK AT THE IPSWICH GAS WORKS. COMMUNICATED BY WM. CUBITT, ESQ., F. R. S., &C. V. P. INST. C. E.

The coke ovens from which the following statement is made are worked with a daily charge of 20 bushels of coals, which are burned off in 24 hours.

Each oven, by means of its spare heat, keeps at a constant working state 6 retorts for making coal gas, which retorts are charged with 10 bushels of coals three times per day in a general way.

The coke produced from the ovens is the best possible quality for iron founders and maltsters, and is sold at 28*s*. per chaldron of 36 bushels.

The coke produced from the retorts is used by some persons for drying malt, but principally for common fires, and is sold at 21*s* per chaldron.

The coals which are found to yield the greatest heat in converting into coke in the ovens, and at the same time leaving the best coke, are *Pitt's Tanfield Moor*, fitted only by H. Clayton, of Newcastle.

The waste heat from these coke ovens keeps the retorts at a constant red heat through an entire coating of fire-bricks, varying from 8 to 3 inches in thickness, according to the distance from the end of the coke oven.

1825.	Coals used in Ovens.		Coke produced.		Coals used in Retorts.		Coke produced.	
	Ch.	Bu.	Ch.	Bu.	Ch.	Bu.	Ch.	Bu
January,	31	32	36	9	37	18	55	16
February,	28	20	29	27	27	18	40	34
March,	27	10	31	15	25	0	37	4
April,	16	24	19	7	16	18	24	15
May,	15	15	17	35	7	24	11	16½
June,	15	6	17	24	6	0	5	32½
July,	15	18	18	1	7	6	10	27
August.	24	4	28	0	8	17	12	22
September,	30	0	34	29	27	0	39	16
October,	33	4	38	22	30	20	45	25
November,	34	18	40	18	35	2	51	32
December,	41	4	46	6	45	20	70	0
	313	11	358	13	273	35	405	24

EXPERIMENTS TO SHOW THE WEIGHT OF COKE PRODUCED FROM BOTH COKE OVENS AND RETORTS WITH A GIVEN WEIGHT OF COALS.

	Measure of Coals.		Weight of Coals.			Weight of Cinders.			Measure of Cinders.	
COKE OVEN EXPERIMENTS.	Ch.	Bu.	Cwt.	qrs.	lbs	Cwt.	qrs.	lbs.	Ch.	Bu.
1st Experiment in Ovens with TM coals	0	20	13	3	11½	8	0	22	0	22½
2d ditto ditto with same coals	0	20	13	2	18	8	0	20	0	22½
RETORT EXPERIMENTS.										
1st experiment in 6 Retorts with small coals,	0	10	6	0	0	4	3	5	0	12
2d ditto in 6 Retorts with TM coals	0	10	6	2	15	4	3	20	0	14

XXIII. REMARKS ON HERM GRANITE, BY FREDERICK C. LUKIS, ESQ., OF GUERNSEY, IN REPLY TO ENQUIRIES FROM THE PRESIDENT; WITH SOME EXPERIMENTS MADE BY THE LATTER ON THE WEAR OF DIFFERENT GRANITES. COMMUNICATED BY THE PRESIDENT.

ALSO, EXPERIMENTS ON THE FORCE REQUIRED TO FRACTURE AND CRUSH STONES; MADE UNDER THE DIRECTION OF MESSRS. BRAMAH AND SONS, FOR B. WYATT, ESQ., ARCHITECT. COMMUNICATED BY MR. WM. FREEMAN, A. INST. C. E.

1. OF THE DURABILITY OF HERM STONE FOR BUILDINGS EXPOSED TO AIR?

The Herm granite (sienite) as compared with Peterhead and Moorstone from Devon to Cornwall, is a highly crystallized intermixture of felspar, quartz, and hornblende, with a small quantity of black mica; the first of these ingredients hard and sometimes transparent in a greater degree than that found in other British granites,—the contact of the other substances perfect. It resists the effect of exposure to air, and does not easily disintegrate from the mass when mica does not prevail, but as this last is usually scarce in Guernsey granites, the mass is not deteriorated by its presence as in the Brittany granites, where it abounds, decomposes, stains, and pervades the felspar, and finally destroys the adhesion of the component parts:—*vide* the interior columns of St. Peter's Port church, which is built of it for an instance. The quartz is in a smaller quantity, and somewhat darker than the felspar in colour; the grains are not large, but uniformly mixed with the other ingredients. The hornblende, which appears to supply the place of mica, is hard and crystalized in small prisms, rarely accompanied by chlorite; its dark color gives the greyish tone to this granite, or when abundant forms the *blue* granite of the Vale parish. This substance is essentially superior to mica in the formation and durability of granites for strength and resistance; consequently its presence occasions more labor in working or facing the block, and its specific gravity is increased. The mica is inferior in quantity to the hornblende, and usually dispersed in small flakes in the mass;—it may, with chlorite, be considered rare.

2. Do air and water alternately cause any, and what symptoms of decay?

The compact nature of a close grained granite, such as the Vale and Herm stone, having the felspar highly crystalized and free from stained cracks, seems well calculated to resist the effect of air and water.—When the exterior *bruised* surface of a block has been blown off, I do not know a stone better disposed to resist decay:—if the surface blocks of the island are now examined after the lapse of ages, it will be found to have resisted the gradual disintegration of time in a superior degree, when compared with *large grained* or *porphyritic* granite; when exposed to water and air there is no change beyond the polish resulting from *friction* of the elements. Among the symptoms of decay, disintegration prevails generally among granites, usually commencing with the decomposition of the mica; its exfoliating deranges the cohesion of the grains, and it may be considered then to be the more frequent mode of decay. Desquamation is rare with the well defined granites of Guernsey and Herm, and in buildings I know no instance of its existence.

3. What the greatest age of building, or experience of the above?

The churches of the Vale and St. Sampson, although much of the materials are

French and Alderney, bear many proofs of the remarks made in the last answer; these erections date A. D. 1100—1150. The ancient buildings of decided Herm and Vale stone must be sought for among the old houses in the northern parishes, where they not only encounter the effect of air and water (rain,) but the sea air and burning rays of the sun. Disintegration alone appears going on by slow degrees, but in no case affecting the interior of the stone, and so gradual and general as not to deface the the building materially; indeed, the oldest proofs taken from door-posts, lintels, and arches, have scarcely lost their original sharpness or sculpture. The pier of St. Peter's Port and bridge of St. Sampson's may also be mentioned.

The shore rocks in like manner do not show any material change of surface by wearing; where the force of the tide is strongest, a slight smoothness alone may be observed on the exterior particles, and in many instances each substance possesses this polish *without being levelled down to a face.*

Vale stone on the northern point of Guernsey produces a finer grained sienite than Herm, more hornblende in it, and specific gravity greater. The Herm is somewhat larger grained, but equally good for every erection where durability is the chief point. The *Cat-au roque* stone in the western part of Guernsey must be considered of a different structure to the above: it is a fair and good stone and appears to last well; its schistose texture must ally it to the gneiss series, and I do not know its counterpart in Britain. In color it is much the same as the blue granites, the felspar is brilliant and the hornblende prisms are well defined; there is more chlorite in it and it is easier to work.

TABLE SHOWING THE RESULT OF EXPERIMENTS MADE UNDER THE DIRECTION OF MR. WALKER, ON THE WEAR OF DIFFERENT STONES IN THE TRAMWAY ON THE COMMERCIAL ROAD, LONDON, FROM 27TH MARCH, 1830, TO 24TH AUGUST, 1831, BEING A PERIOD OF SEVENTEEN MONTHS.

Name of stone.	Sup. area in ft	Original weight	Loss of weight by wear.	Loss per sup. foot.	Relative losses.
		cwt. qrs. lbs.	lbs.	lbs.	
Guernsey	4.734	7 1 12.75	4.50	0.951	1.000
Herm	5.256	7 3 24.25	5.50	1.048	1.102
Budle	6.336	9 0 15.75	7.75	1.223	1.286
Peterhead (blue)	3.484	4 1 7.50	6.25	1.795	1.887
Heytor.	4.313	5 0 15.25	8.25	1.915	2.014
Aberdeen (red)	5.375	7 2 11.50	11.50	2.139	2.249
Dartmoor	4.500	6 2 25.00	12.50	2.778	2.921
Aberdeen (blue)	4.823	6 2 16.00	14.75	3.058	3.216

The Commercial Road stoneway, on which these experiments were made, consists of two parallel lines of rectangular tramstones, 18 inches wide by a foot deep, and jointed to each other end wise, for the wheels to travel on, with a common street pavement between for the horses. The tramstones subjected to experiment were laid in the gateway of the Limehouse turnpike, so as of necessity to be exposed to all the heavy traffic *from* the East and West India Docks. A similar set of experiments had previously been made in the same place, but for a shorter period, (little more than four months,) with however not very different results, as the following figures corresponding with the column of "*relative losses*" in the foregoing table will show.

Guernsey	1.000	Peterhead (blue)	1.725
Budle	1.040	Aberdeen (red)	2.413
Herm	1.156	Aberdeen (blue)	2.821

All the above stones are granites except the Budle, which is a species of whin from Northumberland, and they were all new pieces in each series of experiments.

EXPERIMENTS MADE WITH MESSRS. JOSEPH BRAHAM AND SONS' HYDRO-MECHANICAL PRESS ON VARIOUS SPECIMENS OF STONE.

The following experiments were made with a 12 inch press, the pump one inch diameter, and the lever 10 to 1;—the mechanical advantage therefore $144 \times 10 = 1440$ to 1. The weights on the lever were added by 7 lbs. at a time;—each addition therefore equivalent to $1440 \times 7 = 10,080$ lbs or $4\frac{1}{2}$ tons.

In consequence of the smallness of the specimens, the press was filled with blocks to the required height, and with these the surplus effect of the lever was $4\frac{1}{2}$ lbs. at 10 to 1, which strictly should be added to the pressure, but as the friction of the apparatus is equal to the effect of the lever, it is dispensed with in the calculation.

The column containing the pressure per square inch required to produce a fracture, gives the true value of the stone, as the weight that does so would possibly completely destroy the stone if allowed to remain on for a length of time. It should also be observed, that from the exceedingly short time allowed for the experiments, the results are probably too high.

DESCRIPTION OF STONE.		Weight of each specimen. lbs.	oz.	Dimensions. Lineal Inches.	Surface exposed to pressure. Sup. Ins.	Pressure required to fracture stone. Total to each specimen. Tons.	Per sup. inch of surface. Tons.	Average per sup. inch. Tons.	Pressure required to crush stone. Total to each specimen. Tons.	Per sup. inch of surface. Tons.	Average per sup. inch. Tons.
Granites...	Herm...........	6	6	$4 \times 4 \times 4$	16	80.0	5.00	4.77	116.0	7.25	4.66
		6	6	$4 \times 4 \times 4$	16	72.5	4.53		96.4	6.03	
	Aberdeen (blue).	5	0	$4 \times 4\frac{1}{4} \times 3$	17	81.0	4.76	4.13	85.5	5.03	4.64
		5	$1\frac{1}{2}$	$4 \times 4\frac{1}{2}$ 3	18	63.0	3.50		76.5	4.25	
	Heytor..........	4	7	$4 \times 4 \times 3$	16	67.5	4.22	3.94	103.5	6.47	6.19
		4	8	$4 \times 4 \times 3$	16	58.5	3.66		94.5	5.91	
	Dartmoor.........	4	10	$4 \times 4 \times 3$	16	67.5	4.22	3.52	103.5	6.47	5.46
		4	8	$4 \times 4 \times 3$	16	45.0	2.81		72.0	4.50	
	Peterhead (red).	5	5	$4\frac{1}{2} \times 4 \times 3\frac{1}{8}$	18	58.5	3.25	2.88	94.5	5.25	4.88
		4	12	$4\frac{1}{2} \times 4 \times 3$	18	45.0	2.50		81.0	4.50	
	Peterhead (blue-grey)...........	5	$3\frac{1}{2}$	$4\frac{1}{2} \times 4\frac{1}{8} \times 3\frac{1}{8}$	18.6	58.5	3.14	2.86	85.5	4.60	4.36
		5	4	$4\frac{1}{2} \times 3\frac{7}{8} \times 3\frac{1}{8}$	17.5	45.0	2.57		72.0	4.11	
	Penryn...........	5	7	$4\frac{5}{8} \times 4 \times 3$	18.5	63.0	3.41	2.58	72.0	3.90	3.45
		5	4	$4\frac{1}{2} \times 4 \times 3\frac{1}{8}$	18	31.5	1.75		54.0	3.00	
Marbles...	Ravaccioni........	5	10	$4\frac{1}{2} \times 4 \times 3\frac{1}{8}$	18	78.5	4.35	3.55	83.0	4.61	4.30
		5	9	$4\frac{1}{2} \times 4 \times 3$	18	49.5	2.75		72.0	4.00	
	Veined...........	5	6	$4\frac{1}{2} \times 4 \times 3$	18	45.0	2.50	2.12	85.5	4.75	4.13
		5	9	$4\frac{1}{2} \times 5 \times 3$	18	31.5	1.75		63.0	3.50	
Gritstones.	Yorkshire (Cromwell bottom)..	12	8	$5\frac{1}{2} \times 5 \times 5\frac{1}{8}$	27.5	81.0	2.95	2.87	121.5	4.42	3.94
		12	$5\frac{1}{2}$	$5 \times 5 \times 5\frac{1}{2}$	27.5	76.5	2.78		95.5	3.47	
	Craigleith	11	10	$5 \times 5 \times 5\frac{1}{8}$	25	63.0	2.52	1.89	85.5	3.42	2.97
		11	6	$5 \times 6 \times 5$	55	31.5	1.26		63.0	2.52	
	Humbie...........	17	10	$6 \times 6 \times 6$	36	72.0	2.00	1.69	81.0	2.25	2.00
		17	3	$6 \times 6 \times 6$	36	49.5	1.37		67.5	1.87	
	Whitby...........	16	10	$6 \times 6 \times 6$	36	36.0	1.00	1.00	40.5	1.12	1.00
		15	12	$6 \times 6 \times 6$	36	36.0	1.00		36.0	1.00	
Valentia slate* (laminæ vertical)		......		$3 \times 3 \times 3$	9	30.4	3.38	3.38	47.6	5.29	5.29

* A few experiments were also made with inch cubes of this slate, placed on their natural beds, the results of which were 5.44 and 5.88 tons respectively, or, on the average, 5 14 tons per square inch of exposed surface, to crush the stone. A trial on a similar small cube with the laminae vertical, gave 5.98 tons as the corresponding result. The specific gravity of Valentia slate appears to coincide very nearly with that given by Kirwam for Welsh slate.

GAUDALOUPE.—It appears that the volcano on the island of Gaudaloupe is just now in a state of great activity, which has been preceded by ten years of earthquakes, and ejection of lava and volcanic cinders. The eruption began on the 3d of December, at 2 o'clock in the afternoon, with a noise like that of a torrent falling over high rocks. The usual accompaniements attended it, and several mouths or cracks are opened, from one of which have issued fragments of rock, weighing from forty to fifty pounds.—[Athenaeum.]

Ceremony of opening a Russian Railway.—A letter from St. Petersburgh. of Nov. 21st, says,—"The first Iron railroad in Russia was opened on the 18th. The travelling steam engine, built by M. Hackworth, having got finished, was prepared for the occasion, but was not permitted to commence until religiously consecrated.—At eleven o'clock, A. M., a friar with his attendants, made their appearance at the station at which the train was to start, bringing with them a table, three wax candles, a dish full of holy water, and a golden cross. After being clothed with their priestly garments, they began to chant, and the priests crossed themselves and various parts of the engine, then took the birch and threw the holy water on the engine, and the crowd of spectators which had assembled to witness the scene. The chief priest then prayed that the emperor and family might be preserved, that the engine might be fortunate and do much good; this, after pronouncing the benediction concluded the ceremony, which lasted about three quarters of an hour. The candles were then removed, and the engine commenced with a train of carriages, and proceeded from Paulowsk to Kowzmino and back, much to the satisfaction of the spectators, and the Grand Duke, who rode on the train during the journey. The Emperor's attention was attracted by the magnificent appearance of the iron horse, and he was much gratified with the success which had attended their first attempt at this new mode of conveyance."

From the Baltimore Farmer and Gardener.

A NEW MOTIVE POWER.

Baltimore, April 8, 1837.

Mr. Roberts—When I stated to you the fact of an intimate acquaintance of mine having constructed a machine of almost unlimited propelling power on the Hydrostatic principle, you were so much pleased with the account as to request a communication from me for insertion in your periodical; with that request I cheerfully comply.

The inventor of this wonderful and useful machine is Mr. Theophilus Corbyne, an eminent vetinarian—a native of Scotland, and now residing in Pittsburg, Pa., who while practising his profession, has for the last seven years employed his leisure hours on this subject and has now the satisfaction of seeing his plan matured by having constructed one of twelve horse power, which comes fully up to his most sanguine expectations

This machine he calls Corbyne's Hydrostatic Propelling Machine. In its construction it is too simple to admit of improvement, and as no steam nor heat of any kind is used in its operation, there can be no explosion, therefore in its use life is safe; and should any part break, it is by its simple construction, admirable of speedy repair.

It is applicable to the plough,* and all propelling purposes, and as such it must supersede the use of steam.

A machine of 600 horse power can be worked by one man, and neither its weight or the room required, will be more than one tenth of the steam engine.

We of the present age, entered on a new era when Fulton brought forth his extended scheme in the application of steam to the propelling of boats on water—in which smoke and vapor supplied the place of canvass. The same age is now bringing forth another era in a more useful and extended scale of operation in this discovery of my friend, who is a philosopher and philanthropist in every sense of those terms

Although our profession has for several years made us intimately acquainted, visiting each other, and conversing freely, for mutual benefit in our profession—yet true philosopher like, he never intimated to me that he was studying the subject, until on his way to Washington, he called on me and showed the model, which is now in the Patent Office.

With my respects, I am, yours, truly,

John Haslam.

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* The inventor is fully under the impression that a plough constructed on the principles of his machine, will be competent to plough 100 acres of ground a day.

From the London Mechanics' Magazine.

New Steam-boiler.—Sir,—Having discovered a means of generating steam by a system at once exceedingly powerful, safe, of comparatively light weight and small size, I beg to call the attention of the scientific readers and others of your Journal to its astonishing power; and to state, that I am desirous of relinquishing wholly, or in part, my interest in its use. A 60-horse power-boiler will measure 2 feet 6 inches long by 1 foot diameter, and will weigh under 2 cwt.; a 600-horse power will measure 6 feet long by 4 feet diameter, and will weigh under a ton. Incredible as these results may appear, they are quite certain, and rest upon well-known principles; and is, therefore, for locomotive-engines and steam-navigation particularly, highly valuable.

I am, Sir,
Your obedient servant,
G. L. Smartt.

Enfield.

Bridge Burned.—On Thursday afternoon the Railroad Bridge across the North Ana River, on the road from Richmond to Fredericksburgh, Virginia, caught fire, and the wood work was entirely burned. This accident will cause no suspension in the travelling on the road.

IMPORTANT EXPERIMENTS WITH CANAL BOATS AT HIGH VELOCITIES.

We extract from the *Edinburgh Advertiser* the annexed account of some experiments, which prove that high velocities are attainable by properly constructed vessels, upon canals, or narrow waters, without raising a great wave, and consequently injuring the banks;—

"We regard the experiments described below as extremely important. If the result is correctly stated, and if no counteracting disadvantages has escaped notice, we think these experiments may be said to have added a million sterling to the value of canal property in Great Britain, since they must, at no distant period, add fifty or a hundred thousand pounds to the annual dividends. Nothing can be more paradoxical or startling in appearance than this result; and yet our knowledge of the many unexpected truths in mechanical science which experiment has brought to light, will not permit us to reject it as incredible.—It is this:—*that the surge generated in a canal by the motion of a boat, and which is so destructive to the banks, in moderately rapid motion* (such as four or five miles an hour,) *ceases altogether when a high velocity is employed.* It is true the vessels were of a particular construction, but this is immaterial. A boat sixty feet long and six feet wide, is capable of being extremely serviceable, both for the conveyance of goods and passengers; and if a boat be safely and conveniently dragged at the rate of nine or ten miles an hour upon our canals, passengers by this species of conveyance will then be upon a level, as to speed, with those who travel per mail. The great recommendations of canal carriage at present are, its cheapness, and the liberty of locomotion which passengers enjoy. Its leading disadvantage is its slowness; and this is now felt more and more, when our stage coaches are touching a speed of ten miles an hour, which will soon be doubled on our railways. We have not technical skill enough to know what a gig-boat is; but we infer from the other particulars stated, that it must be flat-bottomed in the cross section, pretty well curved upwards at stem and stern, and very light. With this form, the quicker it is moved, the less water it will draw. At a very high velocity, it will merely skim the water as it were; the displacement of the fluid will reach only a few inches down; and this circumstance, with the quick motion of the boat, causing a readjustment of the equilibrium of the water equally rapid, the necessary time will be wanting for the motion to propagate itself beyond the narrow zone of water which immediately encompasses the boat. Such is our hypothesis, supposing the fact to be as stated. We have a strong impression however, that the result depends chiefly on the form of the boat, and that a much greater depth than five feet will be no material disadvantage except where the canal is extremely narrow.

"Some months ago, by the suggestion of Mr. William Houston, of Johnstone, the committee of management of the Ardrossan and Paisley canal were induced to make certain experiments for ascertaining the rate of velocity at which a light gig-boat might be propelled along that canal. The experiments were made with a gig rowing boat of about thirty feet in length, constructed by Mr. Hunter, boat-builder, Brown-street, Glasgow; and this boat with ten men on board, was drawn along the Ardrossan and Paisley canal, in the space of less than ten minutes, without raising any surge or commotion on the water—the force employed being one horse, rode by a canal driver. No account of this trial has ever been given to the public, but it was so satisfactory as to induce the committee of the Ardrossan canal to contract with Mr. Wood, of Port-Glasgow, for a gig-shaped passage-boat, sixty feet in length, and five in breadth, fitted to carry from thirty-six to forty passengers. In the month of April last, a number of experiments were made in the Forth and Clyde canal with two gig-boats fixed together, constructed by Mr. Hunter, and thus forming what is called a twin-boat. The object of these trials was to ascertain the rate of speed at which vessels might be propelled along that canal, and the effect of a light double or twin, boat, in giving that degree of steadiness which it was apprehended would be so much wanting in a light single boat. A statement of these experiments on the Forth and Clyde canal has already appeared in the newspapers, and the only fact therein mentioned, which it seems necessary to repeat here, is the remarkable circumstance, that the quicker the boats were propelled through the water, the less appearance there was of surge or waves on the sides of the canal. The result of the experiments was so satisfactory, that a twin boat of a gig shape, sixty feet in length, and nine feet broad, was built by Mr. Hunter, Brown-street, Glasgow, and launched in the Forth and Clyde canal, in the course of the following month.

"The single gig-shaped passage boat contracted for by the Ardrossan canal committee, was launched at Port-Glasgow, on Wednesday, the 2nd of June, and she was towed up to the Broomilaw, and thence carried to Port-Eglington the day following; and on Friday, the 4th of June, a trial, of which the following is an account, took place. The boat is sixty feet long, four feet six inches breadth of beam, and drew on an average, including a deep keel, ten inches when light:—

"From the great hurry in which this trial was made, it was done under many disadvantages. The boat started from Port-Eglington for Paisley, a few minutes after one o'clock, with twenty persons on board, and the distance from Port-Eglington to Paisley being seven miles, was accomplished in one hour and seven minutes. The rider was ordered to start and proceed the first mile or so at a very moderate pace but even at this moderate pace the wave raised in front of the boat was very considerable. A high wave was seen on the canal preceding the boat, about eighty or ninety feet in front, and in some cases farther, and causing an overflow at the bridges and in the narrow parts of the canal. The surge or the cutting wave behind the boat was, however, comparatively slight, and except, the curves, would not have caused much injury to the canal banks. The horse was very much exhausted when he got to Paisley though by no means so exhausted as he was about the middle of the journey, having sensibly recovered after the first four or five miles.

"Two post horses were hired there; and lighter towing lines being attached to the boat, it started again, on its return to Glasgow, with twenty-four persons on board, four of whom were boys, and arrived at Glasgow, a distance of seven miles, in forty-five minutes. The greatest speed attained during the journey, was two miles in eleven minutes. During this voyage the surge behind was entirely got quit of, even at the curves, where it was reduced to nothing; and there was no front wave except at the bridges. It appeared only at the bridges, and just as the boat was about to enter under the bridge, and disappeared as the stern of the boat cleared the bridge. *The quicker the boat went the more entire was the disappearance of all waves and surge*, except where the water escaped in the centre of the canal, and met in two very noisy and rapid currents from each side of the boat at the rudder. This noise and rush of water was so great behind as to induce persons on board to look round expecting to see a great wave or surge on the banks of the canal, but on the banks there was hardly a ripple. The two rapid noisy currents seemed to be completely spent and exhausted by the shock of their concourse behind the boat. Here, therefore, there was no room to doubt the correctness of the reports of the Forth and Clyde canal experiments. It was not merely to be said, that the greater the speed the less the surge or wave, but it was demonstrated that, *at a high rate of speed surge and wave were done away with altogether.* Unluckily, there was no dynamometer attached to the rope, so as to ascertain whether, contrary to all theory, the strain or pull was not, equally with the wave, and the tugging labor of the two horses, lessened instead of increased, by the accelerated rate at which they drew the boat. There can be no doubt, however, that with one trained horse properly attached, the distance could be done in a period under forty minutes.—Contrary to expectation, Mr. Wood's boat was quite steady in the water, and by no means crank. It may be proper to mention that the Ardrossan canal is throughout very narrow; at the bridges, and many other places it is only nine feet broad. It has a great number of turns, and many of them very sudden.—[Mining Journal.]

From the London Mechanics' Magazine.

TUNNELS.

REPORT ON THE PRIMROSE-HILL TUNNEL ON THE LONDON AND BIRMINGHAM RAILWAY. BY JOHN PARIS, M. D., THOMAS WATSON M. D., CANTAB., WM. LAWRENCE, ESQ., AND R. PHILLIPS, ESQ.

We, the undersigned, visited together, on the 20th February, 1837, the Tunnel now in progress under Primrose-hill, with the view of ascertaining the probable effect of such Tunnels upon the health and feelings of those who may traverse them.

The Tunnel is carried through clay, and is lined with brickwork. Its dimensions, as described to us, are as follows: height 22 feet, width 22 feet, length 3,750 feet. It is ventilated by five shafts, from 6 to 8 feet in diameter, their depth being 35 to 55 feet.

The experiment was made under unfavorable circumstances. The western extremity of the Tunnel being only partially open, the ventilation is less perfect than it will be when the work is completed. The steam of the locomotive engine also was suffered to escape for twenty minutes, while the carriages were stationary near the end of the Tunnel; even during our stay near the unfinished end of the Tunnel, where the engine remained stationary, although the cloud caused by the steam was visible near the roof, the air for many feet above our heads remained clear, and apparently unaffected by steam or effluvia of any kind; neither was there any damp or cold perceptible.

We found the atmosphere of the Tunnel dry, and of an agreeable temperature, and free from smell or perceptible effluvia of any kind; the lamps of the carriages were lighted; and, in our transit inwards and back again to the mouth of the Tunnel, the sensation experienced was precisely that of travelling in a coach by night, between the walls of a narrow street. The noise did not prevent easy conversation, nor appear to be much greater in the Tunnel than in the open air.

Judging from this experiment, and knowing the ease and certainty with which thorough ventilation may be effected, we are decidedly of opinion that the dangers incurred in passing through well-constructed Tunnels are no greater than those incurred in ordinary travelling upon an open railway or upon a turnpike-road; and that the apprehensions which have been expressed that such Tunnels are likely to prove detrimental to the health, or inconvenient to the feelings of those who may go through them, are perfectly futile and groundless.

JOHN PARIS, M. D.
THOMAS WATSON, M. D., CANTAB.,
Physician to the Middlesex Hospital, and Professor of Medicine at King's College.
WM. LAWRENCE,
Surgeon of St. Bartholomew's Hospital.
RD. PHILLIPS,
Lecturer on Chemistry at St. Thomas's Hospital.
London, Feb. 21, 1837.

From the London Mechanics' Magazine.

EFFECT OF HIGHLY-HEATED METALS ON THE GENERATION OF STEAM—COLORED WATER.

Sir,—My attention having been drawn to the very curious inquiry, which is detailed by Mr. Tomlinson, of Salisbury, in your Number of January 28th, I would beg to make a few remarks thereon.

It appears from the results of Mr. T.'s experiments, as also from his extracts from Pouillet, Baudremont, and Laurent, that a globule of water, when contained in a metallic vessel, evaporates in a shorter time, if the vessel be at or about 212 degrees, than if it have a higher temperature. This is very remarkable, and far removed from the common ideas on the subject; but I cannot assent to Mr. T.'s explanation, so far as regards the existence of a stratum or bed of steam between the vessel and the water.

We all know that the specific gravity of steam is less than that of air, and infinitely less than that of water. On what principle, then, can a portion of steam exist *beneath* the water? Let us take the analogy of any fluid whatever, and see how far it will bear out the objection.

If we have a vessel of water in process of heating over a common fire, the first formation of steam takes place at the bottom. This *ascends* to a higher stratum of water, and is then condensed and imparts its caloric to the watery particles with which it is immediately surrounded. It is this which so rapidly heats water, for the *conducting* power of water is exceedingly limited.

We constantly observe that the rapidity with which the bubbles of vapor rise to the surface is proportionate to the heat of the water. Now, let us apply this to the case of the heated crucible. Mr. Tomlinson supposes the existence of a stratum of steam under the globule of water, which retards the transmission of heat from the metal to the water; but why should not the law of specific gravity remain in force at high temperature? Why should not the steam—its expansive tendency being still more increased by its high tension—why should it not have the power of darting upwards through the watery globule, in order to gain the level of a lighter atmosphere? We must recollect that the steam is formed from the globule itself, at the lower part of it; and ought, if it exist at all, to ascend to the upper part of the globule, just as the steam-bubbles in a common kettle of water do.

I feel more inclined, of the two opinions, to choose that which attributes the slow evaporation of the globules of water to the rapid passage of heat through it. Extraordinary as such a hypothesis may at first appear, yet we have analogies in physical science which aid such a conception

A pane of glass, broken by a pistol bullet, is not so much shattered as when broken by a stone moving with perhaps not one-tenth the velocity. If a card be balanced horizontally on the end of the finger, and a shilling placed on it, and if the card be struck sharply on the edge, it will slide away from under the shilling, leaving the latter on the finger; but if it be struck more softly, both card and shilling will fall.*

It would appear that *transparency* consists in a perfect facility in the progress of light, through the pores of any substance. Now, if we suppose that heat is *material*, we may conjecture that the calorific tension, when the vessel is highly heated, is sufficient to overcome the reluctant conducting power of water, and that it darts through the latter by virtue of the velocity acquired by such tension.

I do not wish to give this opinion the air of a theory, but there is one remark of M. Laurent's, quoted by Mr. Tomlinson, which I should much wish to see the basis of a series of experiments; he says that when he used colored water instead of transparent, the water evaporated much more rapidly.

Now, to those readers of your excellent Journal who have facilities of making such experiments, I would beg to observe, that it would be very desirable to know whether a given quantity of water, at a given temperature, evaporates in a shorter time when *colored* or *black*, than when transparent.

Black we know to result from the absorption of all light and colors from that of some of the rays. Now should we find that blackened water absorbs more heat, or absorbs heat more quickly, than transparent water, it would permit some evidence of the analogy between light and heat, and would also assist us in determining whether the rays of heat from an excessively heated vessel do really pass through the water too rapidly to impart much of their influence to it during the passage.

Professor Leslie made some very accurate experiments on the comparative absorptive power of different substances for heat, but I am not aware whether they extended to water differently colored.

Whether metals and water become, at a high temperature, electrically excited with the same kind of electricity, and so repel each other, we cannot at present say; but should such turn out to be the fact, it might furnish us with a reason why the globules of water appear not to be in contact with the heated metal: but be this as it may, it would assist us in the solution of this interesting question, if we could determine whether the same apparent repulsion exists between the metal and *colored* or *blackened* water, as between it and pure colorless water.

At all events, I can scarcely subscribe to Mr. Tomlinson's opinion, that a bed of *steam* exists between the water and the globule.

Your obedient servant,

D.

From the London Mechanics' Magazine.

ON A PECULIAR VOLTAIC CONDITION OF IRON, FIRST NOTICED BY PROFESSOR SCHOENBEIN, OF BALE.

Sir,—The facts contained in the present communication, are not to be understood as laying claim to originality in their leading principles; some of the experiments, however, that I shall have occasion to describe, have never been made, or at any rate, I have never seen any account of them by any one else, and the whole are so extraordinary, and will, in my opinion, eventually throw such light on the rationale of Voltaic action, that I think you will not object to give them publicity through the medium of your Journal. In the *London and Edinburgh Philosophical Magazine*, vols. ix. and x., may be found the original papers of Professor Schoenbein and Dr. Farady. All the experiments there described, I have attentively gone through, and I shall merely give here such an abstract of them as may be necessary to set the matter clearly before your readers.

Ex. 1.—When iron wire, $\frac{1}{20}$th of an inch in diameter, was immersed in nitric acid, specific gravity 1.379, it was attacked with violence; but when surrounded, or even touched in the acid by a piece of platina wire, action was instantly stopped. The platina was then removed, and the wire remained for any length of time in the acid without any action, and as bright as silver. If it was now taken out, wiped, and again immersed, violent action immediately took place for a moment, but it soon (generally) was again quiescent.

Ex. 2.—If, when the wire was in violent action, it was touched by a piece of platina, the effervescence instantly ceased, but again commenced when the platina was removed. Bringing the two metals a second time into contact effectually stopped the action. If the wire was in a very violent state of effervescence, it was not for some time protected by the platina.

Ex. 3.—If a wire made thus inactive by platina, was touched in the acid by a piece of zinc, or a common iron wire, it was thrown into action: but an iron wire having the smallest piece of platina attached to it, did not throw it into action, being itself inactive. If the platina was now slipped off, and either wire touched once with a common wire, both were instantly thrown into violent action.

Ex. 4.—When the acid was disturbed with an equal bulk of water, platina did not preserve iron wire from its action, even when coiled thickly round it; it appeared, indeed, rather to quicken the action. But though it did not preserve it under these circumstances, it did under others which I shall notice presently.

Ex. 5.—Half a wire, four inches long, was heated to dull redness, the blue tinge extended through three inches when the wire was cold, and these three inches were quite inactive in acid specific gravity 1·379, the other inch was active; when the heated end was made bright by filing, it was rendered active, showing the former inactivity to be owing to the superficial coating of oxide.

Ex. 6.—When a wire made indifferent to nitric acid by platina was immersed in the acid, and another common wire dipped into the same vessel, the latter was of course active; but when the wires were made to touch at their parts *above* the liquid, action was excited in the indifferent wire.

Ex. 7.—A common wire was made to touch an indifferent one, and both dipped into the acid, the *indifferent* one going in *first*. By this means, the common wire was made indifferent, not being in the slightest degree acted on by the acid; the second wire rendered indifferent a third, the third a fourth, and so on. This experiment succeeds best with wire that has been made indifferent by platina, but with care it will answer equally well with wire that has been made indifferent in the fire; the conditions appearing to be perfect con-

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* The acknowledgment of such a principle is conveyed in the story of the Turkish headsman, who was so dexterous in the use of his scymeter, that he could cut through the neck of a culprit *without disturbing the head*, when he moved his scymetar with great swiftness.

tact, and gradual immersion. When these wires were taken out of the acid and wiped, they always returned to the active state, but were again made indifferent by repeating the process.

Ex. 8—A wire, polished very bright, was protected by platina, and immersed in a solution of nitrate of copper, and nitric acid, which acted very strongly on common iron, copper being deposited on the metal: the protected wire *remained, however, bright.* After remaining a few seconds the platina was removed, the iron instantly became as common iron, but when the platina was allowed to remain in contact an hour or two, and then removed, the wire was left in the peculiar state, exhibiting the curious phenomena of a piece of polished iron being quite inactive in a solution of nitrate of copper and nitric acid. The wire thus inactive, on being touched by a piece of common wire was instantaneously rendered active, undergoing rapid solution, and becoming covered with a crust of copper.

Ex. 9.—A piece of iron was protected by a piece of platina, and immersed in nitric acid; the platina was then withdrawn, the iron remaining in the peculiar state. A piece of common iron was then bent into a fork, and slipped down the inactive wire into the acid, by which it was itself rendered inactive. Now if another piece of iron was made to touch the fork *before* being introduced into the acid, it was rendered itself inactive; but if it was first thrown into action, and then made to touch either end of the fork, it threw all the wires into action. This is rather different from the result obtained by Professor Schoenbein. He describes that end of the fork that was touched, being *alone* thrown into action, the other remaining in the peculiar state as long as the first wire was kept in contact with the bend, but when that was removed both ends became active. The Professor's experiment was made with an oxydised wire. I found it difficult to reduce the fork to the peculiar state with such a wire, but when I accomplished it the phenomena were similar to those just described. I should much wish this experiment to be tried by others as I am at a loss to understand whence this disaccordance should arise.

Ex. 10.—When an active wire was connected with one of the cups of a galvanometer, and a platina wire with the other cup, and both wires dipped into nitric acid, momentary action took place, and an electrical current was shown to pass from the iron to the platina through the fluid, the latter metal becoming positive, but the action soon ceased, the platina protecting the iron, though not in actual contact with it; when chemical action was stopped, the electrical current was stopped also.

Ex. 11.—When the iron wire was connected *first* with the galvanometer, and the circuit completed by putting it into the acid, the platina wire having been previously arranged, no action, either chemical or electrical, took place. The same was the case if a wire, having been previously made inactive, was substituted for the platina. Now when platina was used, the moment the circuit was closed, bubbles of gas made their appearance on the platina, and if an iron wire was used, having a small piece of platina foil or wire attached to it, the bubbles formed on all parts of the foil, but none made their appearance on the iron. If then the platina foil was removed, the bubbles made their appearance on the iron, which sometimes also went slightly into action.

Ex. 12.—When two cups were employed, being connected by a compound platina and iron wire, all the phenomena which took place in a single glass were observed, and the platina or inactive iron in one glass, exerted a protecting influence on the iron in the other, provided the communication was first made through the galvanometer; a touch from a common wire also threw the iron into action, producing a strong electrical current. The same was the case with three or four glasses connected by a compound wire.

Ex. 13.—When the acid was diluted, so as to have a specific gravity 1·204, platina, as was before observed, could not protect iron from its action; neither when connected with the galvanometer did it, if the iron was dipped in the acid first; but if it was first connected with the galvanometer, and then put into the acid, no action whatever took place in any length of time; on removing the platina, action sometimes took place; it always commenced when the inactive wire was once touched in the acid with an active wire, or with a piece of copper. The wire, thus made inactive, did not possess the power of rendering other wire inactive, but was always thrown into action itself. When a piece of common iron was substituted for the platina, whether it was connected with the galvanometer first or not, the wire in this case acted as platina to the second.

Ex. 14.—When two cups were employed, and connected by a bent piece of wire, and so arranged that the iron wire should be active, on removing the connecting wire, and taking a fresh piece, if it was dipped first into the cup containing the iron, and the other end brought into the platina cup, *that end was in the peculiar state,* and there was no passage for the electrical current, the needle of the galvanometer being quiescent; but when it was put into an active state the electrical current passed. Now here we have the iron made inactive *without any metallic communication with the platina,* and when inactive it is found incapable of conveying a current of Voltaic electricity; an inactive wire could not, in this experiment, be substituted for the platina. This latter most remarkable, and, as I believe, at present, inexplicable fact, has, as far as I know, never before been noticed, but that it is true, any one may in a few minutes convince himself. I have often left the whole arrangement undisturbed for hours, and still, at the end of that time, the end of the connecting wire in the platina cup has been *perfectly bright,* and the needle of the galvanometer stationary in its usual position; but on touching it once with a common wire, it has been thrown instantaneously into action, and then the electrical current has passed, the needle being strongly deflected. I am, at present, occupied in further researches, and I hope something satisfactory in explanation of this dark subject will soon transpire.

I am, Sir,
Your obedient servant,

Near Bath, March 15, 1837.

From the London Mechanics' Magazine.

MR. SIEVIER'S PATENT CAOUTCHOUC CORDAGE.

Sir,—In consequence of a letter which appeared in your valuable journal respecting Mr. Siever's "patent rope," and the strictures thereon by your correspondent Many-points, I was induced to procure a piece of the said rope from the Company's establishment at Tottenham, prepared and manufactured according to the directions given in the specification by the patentee; it measured 4 feet 6 inches long, and was ¾ths of an inch in diameter, composed of 12 strands, each strand had a slip of India-rubber in its centre. This was placed in the garden in a northerly aspect, and allowed to remain exposed for two nights and days to a frosty atmosphere, uncovered, the thermometer being at the time at 29°. When removed early on the third morning from its Siberian situation, it was found to be pliable and elastic, and its length was the same.

A similar piece was immersed in a butt of cold water, and allowed to remain for ten days; at the expiration of the above time it was removed, and its elasticity, pliability, strength, and length, were found to be the same as when first put into the water. Caoutchouc, or India-rubber, by itself becomes very hard when exposed to the atmospheric air, or when immersed in cold water for any time; but this change does not take place when it is interlaced or combined in any way with good hempen thread—the rigidity is prevented, its elasticity is preserved, and its pliability remains. Perhaps Many points was not aware of this fact.

Hoping the above brief statement of facts will satisfy Many-points, as well as your numerous readers,

I am, Mr. Editor,
Yours respectfully,
NAUTICUS.

March 28, 1837.

From the London Mechanics' Magazine.

PRACTICAL REMARKS ON KEEPING BEES.

Sir,—Having been requested by some person desirous of keeping bees, to give, through the medium of the *Mechanics' Magazine,* my opinion as to the best method of managing these useful insects, I beg to solicit the favor of the following observations being inserted.

I have kept bees nearly twenty years, and practised various plans with a view to gain the greatest produce in honey and wax with the least trouble, but more particularly with a view to the preserving the lives of the bees, and feel confident that the story-fying system, which I believe Wildman practised, is the best. I tried for six or eight years the plan Mr. Nutt advocated, which, by-the-bye, is as old as any of the plans known, but without meeting with any thing like the success of the common cottage hive. A strong stock in the latter had produced me an early swarm and cast, the swarm producing in a good season upwards of forty pounds of honey, and the cast fifteen pounds, the stock being kept five or six years. The honey thus procured is always of good color, and fit for sale; and when after six seasons the parent stock is destroyed, the honey, being dark, may be used to make meed, or sweeten wine with, a strong swarm being kept to supply its place. This plan requires the destruction of the bees, and is therefore censured as inhuman; but to me is not more so than destroying beavers and cats for their skins, or catching fish to manure the land with; the consumer never considering how produce is procured, and should, therefore be considered the most culpable, if such acts are breaches of humanity. The hives I now prefer are flat, having wooden tops fixed on with wires. The inside should be twelve or thirteen inches clear, and about seven inches high, the top having a centre hole, and three or four others round it near the outside, each hole being two or three inches diameter, and fitted with nice bungs. If no swarms are wanted, a large glass, or small straw hive, may be put on the top about the end of March, or a small glass to each hole, previously pulling out the bungs, gently turning them round first, each glass having a bit of paper pasted on it, stating its weight when empty; such glasses being kept from the light, by an empty hive being placed over them. Every ten or twelve days they should be examined, and when filled may be removed, and others put on, as long as the season permits. If a stock is weak, a new swarm or a cast may be put on the top of it, and the entrance closed till eight or nine o'clock the following night. These stocks may be preserved seven or eight years, but should be kept in a house or shed; and when the winter begins, the bungs having been replaced, should be covered over with sacking or other warm articles. Glasses may be put on a swarm immediately after hiving them, removing them in three or four weeks, to enable the bees to procure enough for the winter. The boards above mentioned should be made of pine plank, half an inch thick. The bottom boards should be made of the same, one inch or one inch and a half thick, having a piece projecting for the bees to light upon. By pursuing this plan, any number of stocks may be kept with but little trouble, and the bees saved; but the placing the glasses on empty hive early, is essentially necessary.

I am, Sir,
Your obedient servant,
G. L. Smartt.

Enfield, Feb. 10, 1837.

ON CEMENTS.

A patent was granted to John Henry Cassell, of Mill-wall, for his invention of a cement or combination of materials applicable to purposes for which cement, stone, brick, or other similar substances, may or can be used.—[Sealed April 19, 1834.]

This invention consists in cementing or combining the materials for making roads, and for constructing docks, water courses, foundations, and other similar works, by the aid of coal or other mineral tar, wood tar, and resinous matters, or the products of tar, in the manner hereafter described; and thus producing a mass, which may be formed or moulded into any figure, which, when cold, will be exceedingly hard, and be serviceable for the purpose of cement, stone, or brick, in constructing any such like works or buildings, as before mentioned. But in order that this invention may be perfectly understood and carried into effect, it may be necessary to describe the methods used by the Patentee for combining such materials together, and applying them to the aforesaid purposes. A quantity of tar, such as is produced by the distillation of coal, shale, or wood, is first taken, and by further distillation the aqueous parts are separated therefrom, and thus the tar or resinous substance is reduced to the consistency of treacle; this is called the first product, the tar or resinous substance being in a thick and adhesive condition when cold. In order to produce the second product, the distillation is carried on still farther, and by this means the essential oil is obtained; and for the third product, the process of distillation is carried on, till the substance becomes so adhesive, that a small portion being removed from the still may be drawn out into threads and when cold, becomes brittle; and for the fourth product, the distillation is carried on still farther, till the substance becomes extremely hard, and will not soften by heat, either of the sun, or any artificial heat. The apparatus or still which is used for this purpose, is similar to that which is called a pitch still, which is well known, and forms no part of this invention, nor does the process of distillation for separating the tar into three products; that is to say, first, tar deprived of the aqueous parts, and reduced to a thick adhesive condition when cold. Secondly, the essential oil. Thirdly, the adhesive tar, or product hereof, which when cold, is hard; and fourthly, the substance not acted on by the heat of the sun. It may be desirable here to remark, that coal tar is preferred, in consequence of cheapness.

The Patentee then proceeds to describe the combining of these products with other materials, in forming a cement or combination in the making of roads, docks, water-courses, and such like works. We will first describe the method pursued in applying this invention to the making of roads, or in repairing them. Having laid out the road, and made the necessary drains for preventing the lodgment of water below the road, the surface is prepared by beating or rolling, in order to compress the earth, particularly when the surface is composed of loose earth, and, by raking, bring the surface to the required figure, that is, with such slopes as may have been determined upon, and make the same as even as possible. The surface is then saturated with the essential oil, (the second product,) in thin layers, allowing time for it to subside. The oil put on in this manner will quickly penetrate the ground: the second operation is then commenced, which consists of spreading over the surface of the earth so prepared a thin coating of the first product, perhaps one-fourth of an inch thick, then let the same be ignited, and permit it to burn a short time. Dry sand, or fine dry earth, or slag, or cinder, or a combination of these, should then be sifted on the tar and oil, to the depth of about half an inch, which will instantly put out the flame. The ground should then be rolled, in order to cement the tar and sand together; and, in order to facilitate the operation, it is found desirable to have a frame of iron, or other material, about three feet square, which is successively placed over the surface of the ground, and thus complete portions of the surface at each operation. By this means, it will be evident that a thin cemented layer or surface will be produced on the road. In some instances, one, two, or more layers of this description may be made on the road, depending on the extent of trafic to which it is to be subjected; but it will be desirable to remark, that the essential oil is only used previous to the first layer. Having thus prepared the under surface of the road, the Patentee proceeds to describe in what manner the same is finished; and observes, that the finishing materially depends on the description of materials, which may be readily obtained at the place where the road or other work is being constructed, such as broken granite, flint, slag, gravel, or any other hard material suitable for the surface of a road. It should be observed that the same should be broken somewhat small, say not larger than three inches, and one-third of the third product should be taken to two thirds of sand, and boil and mix them together; then pour such mixture over the broken materials to the desired depth, which running into the space between the stones, forms a very hard and solid mass when it cools. When the said fourth product is in a melted state, any of the materials, such as sand, stone, &c., may be mixed in an open vessel, in the proportion of one-third of the fourth product to three of stone, sand, &c., by weight, and mix them well together; and when so mixed, the composition is spread over the surface of the road from one to four inches deep, or more if it is thought necessary, the road being prepared as before described; this is then rolled so that as even a surface as possible will be produced; by which means a hard surface will be formed, which will wear exceedingly well, and produce a cheap and lasting road. Or where it is desired that the upper surface should be formed of larger stones, or other material, such as broken granite, flint, slag, or other substances, of a size such as is generally used in making what are called Macadamized roads, frames or moulds may be used from twelve to forty-eight inches square, open at top and bottom, like a brick mould; pack in them a number of such broken pieces of material, and then run in a quantity of the fourth product in a melted state, and then fill up the interstices between the stones or other materials, making the upper surface as even as possible. These materials, when left in the moulds till they are cold, will be strongly cemented together, and be ready to form the upper surface of the road, they should be put on in the following manner; having prepared the road, as above described by the essential oil, with the first product, and the sand or fine earth, a coat of the third product of the tar should be spread over to about the thickness of one inch;

then, while the third product is warm, cover the road with the moulded materials, placing that part which was uppermost in the act of moulding, on the surface of the road prepared as above, and by rolling or pressing cause the moulded parts to adhere firmly together, by this means, rather a rough surface will be produced, suitable to the tread of a horse. The first preparation is also used to cover good Macademized or other roads, which firmly cements every stone into its place, prevents the wheels from ploughing up the roads, the water from softening the sub-strata, and preventing mud and dust from rising. The third product is also used, when in a melted state, to pour between the joints of street pavement, in the manner that grouting is now performed: this will cement every stone together, and so prevent water from getting beneath the stones to the sub-soil, or rising therefrom. If the sub-stratum is of a soft substance, or the street is required to be very durable, the ground is first prepared, as described in the first process: the paving stones are then saturated with essential oil, and the third product is then run between the joints of the stones or bricks that are required for foundations. The resin of wood is used for making stone and cast figures, that are required to be of a yellow color; sand of the required color is added, as in the fourth process. In some instances, instead of moulding such larger pieces of flint stone, or other material, sand, or fine earth, is mixed with the fourth product when in a hot and melted state, and the composition is moulded, as above described: such materials being very suitable for foot paths, water-cisterns, pipes, and a variety of other useful purposes.

Having thus described the nature of the invention, as applied to roads, the Patentee proceeds to describe its application to canals docks, water-courses, and such like works. The earth being excavated, and the slopes of the banks made to the intended figure, the next process is to beat the surface of the earth; and in order to render the same as compact as possible, it is saturated with the essential oil, as before described; then a thin layer of the first product of the tar is run over and ignited; after that, sand, or any other dry earth or material, is sifted over, as above described. Three layers of these cemented materials will be sufficient when applied to the usual slopes for canals and water-courses, and will offer a compact and close surface to the water; which will protect the banks from the prejudicial washing to which they are otherwise subject, and consequently be of great utility when quick travelling is required, or when the canal boats are propelled by machinery. In forming the embankments of docks or quays requiring steep or perpendicular walls, a much stronger facing is required, depending on the depth of the water they are to support, and also the description of ground behind.

The Patentee proceeds to state that a framing of wood is usually constructed to the desired thickness; and having previously made a good base or foundation of a combination of the fourth product of the tar, with broken stones, or other rough hard materials and sand or earth, he continues melting and mixing quantities of the fourth product of tar with broken stones and sand, in the proportion of about one of the fourth product to three of the stones and sand, or other material, and successively throws them into the frame, and levels and beats such concrete mixture, till the frame is quite full to the surface of the intended finish of the wall, which is usually made to lay on the surface of the earth. It would be advisable to remark, that between each quantity of the material thus put into the frame, it is found desirable to spread over a thin coat of the first product of the tar, and ignite the same, in order that the surface of the last quantity should be in a melted state, to receive the next quantity of the material. It will be evident, from the above description, that piles, and also land-ties, may be built in the walls, in order to give additional strength to them; and that where frames or moulds are used, they are washed over with a covering of white-wash or of clay, by which means the composition does not adhere to them.

The Patentee concludes by saying, that having thus described the nature of his invention, and the manner in which the same is performed, he would have it understood that he does not claim any of the materials separately; and it will be evident that the means of carrying the same into effect, may be varied to suit the particular object to which the invention is to be applied: but he would have it understood, that what he claims as his invention, is the cementing or combining the materials for making and mending roads, and for constructing docks, water-courses, water-tanks, pipes, and such like work, by the aid of tar and resinous substances, or the products thereof, as above described.—[Lond. Jour. Arts and Sciences.]

From the Mechanics' Magazine.

AN IMPROVEMENT IN THE CONSTRUCTION OF CHIMNEYS.

I have thought that an improvement would be made in the construction of chimneys, by building the flues circular instead of square. By a plan which I shall describe, the inside of the flues might be made much smoother with less trouble than the square ones are now made, and might be carried up with less variation in the size.

My plan is, to mould brick clay into pieces about 24 or 30 inches long (or any length most convenient in using,) about two inches thick, and shaped like half of a hollow cylinder, divided from end to end. When the fire-place is built, the flue should be brought to its size in a circular form, sufficiently large for the free passage of the smoke. The outside of the chimney being carried up a few courses, two of the half tubes are to be put on as a continuation of the flue, with mortar under the ends on which they stand, and between the edges which come together. They will thus form a circular tube, which should be of the same diameter as the flue where they are put on. Where the flue bends, it will be necessary to cut the ends of the pieces, so that they will make an angle, when put together, in the same manner as the joints of a stove pipe. When the tops of the pieces come even with the outside course of bricks, they might be tied by thin pieces of iron plate, such as are used for binding the fronts of walls to the inside work. The advantages of this plan, I think, are, the flue has a shape which I believe is considered the best for carrying smoke; the inside is smoother than the square ones usually are, and it therefore presents fewer impediments to the passage of the smoke; the chimney might be cleaned easier than the square ones, for a circular brush passed up and down, by means of a rope, would sweep well and quick, and the chimney-sweep might thus be spared his labor inside of the flue. I should think the expense would not be more than that of the square flue, after the brick-maker had got the necessary tools, and had had some practice in the manufacture of the flue pieces.

If you or any of your readers are disposed to examine this plan, and show its defects, or improve it in any way, I shall be glad to read their opinions in your next, or as soon as convenient. A. H. W.

ON THE CALCINATION OF ORES.

A most simple method for effecting this process is practised at the Iron works in Staffordshire, as well as at some of those in Scotland and Wales. It consists in spreading the ironstone intended for calcination over a bed of coal about a foot in thickness, adding occasionally a layer of small coal, until a heap is raised about eight or ten feet in height, and fourteen or fifteen in diameter; the fire is then lighed, and the operation left to itself without any further attention. The open fires vary, however, in their form. Another, and more economical mode is used in South Wales, by which the refuse coal and coke are consumed in ovens or kilns, constructed for the purpose.

The form of the interior is, usually, a reversed cone or pyramid; those which approach to an oval being also held in much esteem. The oven, or kiln, being first charged with coal and ironstone, but not entirely filling it, when the fire begins to reach the upper part, small coal is thrown on alternately with the ores, until the kiln is filled. The lower part is then drawn out and left to cool, as in lime burning; the kiln is recharged, and the process continued indefinitely.

In Wales it is generally contrived to erect the blast furnaces on the side of a hill and the calcining ovens are built on a terrace surrounding it, to the height of the furnace mouth: the time for the operation is regulated so as to keep a supply only to the quantity required for smelting. At Newcastle-on-Tyne a similar method is practised, but the fuel consists of small coke

At Bradford the ovens are rectangular, and about twenty-five feet in depth, fourteen long, and five wide, in the upper part; towards the middle it takes the form of a truncated pyramid, whose base is about twenty inches diameter: small coke is used here also: at other works in the same vicinity the ovens are of a similar shape to the furnaces, and about fifteen feet in height.—These dimensions are, however, exceedingly variable, both in different counties, and sometimes in the same establishment.

At Pouldice, in Cornwall, the tin ores are roasted, to facilitate the subsequent separation by washing. The furnaces for this purpose have a fire place about one foot by four feet, on the same level as the part destined for the ores, and only separated from it by a course of bricks placed flat, the furnace bed is about nine feet six inches by eight feet; the height of the roof one foot; its course nearly horizontal. In the front of the arch, near the door, is a vent, which, after rising vertically, takes a course nearly horizontal, and discharges itself at the distance of a quarter of a mile into a large chimney, the upper part is formed of flat stones, which are easily removed for the purpose of clearing out the arsenic accumulated on its sides, which is sold for 10s per ton: on the outside of the furnace is, also, a projecting or forge chimney, rising about fifteen feet. Similar precautions, favorable to the health of the workman, are in use in all the tin works throughout England, which have not yet been introduced into Germany. The charge of this furnace is six cwt., requiring $1\frac{1}{2}$ bushels of charcoal to each roasting; this is, however variable, as well as the duration of the process, according to the nature of the mineral acted upon.—[Lond. Quar. Mining Review.]

MEMOIR ON THE CALCINATION OF COKE.

Abridged from the Report, by Messrs. Perdonnet and Leon Coste, in the Annales des Mines.

Coke is obtained in England by two distinct processes; in the open air, and by means of ovens constructed for the purpose. The former is the method usually adopted, the latter being applied almost exclusively to the small coal or slack. In the vicinity of Dudley, in Staffordshire, all the coke is made in the open air; the process consists in forming a small conical chimney, with bricks placed in such a manner as to leave spaces between them, these openings are larger in the lower than in the upper courses, the usual height is about four feet six inches, surmounted by a cylinder of one foot. The coal is then disposed around the chimney, the largest lumps being placed first to form the base of a cone, after which more is thrown on the heap, until the top is above the level of the brick work; the whole surface is then covered with slack, with the exception of the lowest part of the heap, to about one foot high, the fire is then lighted in the chimney at a certain period of the operation the remaining part is also covered with slack, and when the carbonization is judged to be complete the fire is extinguished, by throwing on a sufficient quantity of water and dispersing the materials of the heap.

The dimensions of the coke heaps vary considerably, they are most commonly fourteen or sixteen feet in diameter, and contain about twelve ton of coal. From the time of lighting the pile the operation is completed in seven days, three for the calcination and four for the extinction and subsequent cooling of the mass.

It would appear that a method so simple as this would be invariable in the results nevertheless the contrary is the fact, much depending on the attention and judgment of the burner or superintendant. A ton of coal usually yields twelve cwt. of coke, or sixty per cent. sometimes ten cwt. or fifty per cent. from the same materials. In South Wales both methods are practised. but the coke is not calcined with so much attention as in Staffordshire, the process differs in the heap being made in the form of a long bank four to six feet in breadth. and about three feet high, the large coals in the middle, and the fire being lighted either at one end or at several parts of the heap. At Pontypool and Abergaveny the coke is calcined in the open air; the coal in some parts of this district bears a resemblance to charcoal, in converting it into coke great care is taken to preserve this entire, the operation is completed in five days. In the neighborhood of Merthyr Tidvill the process is conducted in the open air, and although very little care seems to be given to its progress, yet a considerable quantity of coke is produced, the coal being generally dry and giving but little smoke. At Plymouth works six tons of coal yield five tons of coke; at Dowlay 720 lbs. of coal yield from 450 to 500 lbs. of coke; at Pen-y-Darran the operation lasts only three days, the increase in bulk being also very considerable, three tons of coal producing twelve barrows of coke, each containing seventeen cubic feet, or above one-fourth part more than previous to calcination.

At Neath Abbey the carbonization is more rapid than in any other place, it being finished in nine hours, producing rather less than sixty per cent. of coke. In Scotland calcination in the open air is generally adopted; formerly the heaps were burned without much attention being paid to their progress, but the Staffordshire mode has been used latterly with great advantage, the heaps consisting of eighteen tons of coal, well covered with slack, kept burning three or four days, and four or five days more being allowed for the cooling of the mass, the loss in weight is about fifty per cent.; the old method occupied only five days, but the loss amounted to from sixty to sixty-six per cent. The coke is of very unequal quality, some parts being very heavy and others light and porous. In Yorkshire the coal is arranged in long banks six feet wide by two and a half high, with square vertical chimneys, eight or nine inches in diameter, formed with large coals, at about the distance of six feet from each other throughout the length; the loss is about fifty per cent. in weight.

Calcination in ovens is considered to produce a heavier coke than the open calcination; the process varies but little, being in all cases performed in ovens of a circular or oval form, with a low arch surmounted with a small chimney, the furnace has two doors or openings opposite to each other, sliding in a groove and raised by a lever, they are usually of cast iron, the dimension of the furnace about twelve feet by six; height of the arch in the centre five feet, at the door twenty-one inches; the chimney rises three feet externally and about nine inches in diameter. At Neath Abbey the furnaces are smaller; the chimney is eighteen inches externally, and only one door, but in this case a hole is made in the opposite side to facilitate the clearing out of the coke. From the small coal carbonized in this manner the produce is about sixty per cent. while the same quantity of coal in the open air yields but fifty per cent. the coke from the furnace being so much more dense. At Swansea, by the same process, the produce is about fifty-four per cent.

In the vicinity of Glasgow a circular oven with one door is in use, the diameter is nine feet, height of the arch six feet.—The coke is drawn out every twenty-four hours; the ordinary charge, one ton and a half of coal, rising about two and a half feet in the oven, the loss is from fifty to sixty per cent. On Saturdays the charge is increased to two tons, and is not withdrawn until the Monday. At the Lymington works, near Newcastle-upon-Tyne, all the coke is made in ovens, the usual charge is one chaldron of about two and a half tons, the operation lasts forty-eight hours, and the average loss thirty-nine per cent. The coke is screened to the diameter of about one inch, for smelting in the high furnace, the smaller portion being employed in roasting the ores. At Bradford, in Yorkshire, the method is similar to Newcastle, but the furnaces are smaller, the charge being only about one ton, the loss is about forty per cent. It is difficult to decide to which process a preference ought to be given, the loss is less in the ovens, but they require more space, more attendants, and more expense, while the open carbonization is considered to yield coke better adapted for smelting in the high furnace.—[Lond. Quar. Mining Review.]

Agriculture, &c.

From the New-York Farmer.

The following article was designed for the May number, but it did not reach us until that number had been forwarded to subscribers. In relation to the *hoe* referred to, we shall be pleased to show a sample of them at this office.

BURLINGTON, N. J., WEEDING HOE. This instrument, which is an improvement of the hoe, passing by the several names of "French or Dutch Weeding Hoe, Shuffle, and Lazy-back," was invented about twenty years since, by Mr. Nathan Stowell, of this place, and has within a few years past, been introduced into the gardens of Horace Binney and Charles Chauncey, Esqrs., Henry Carey, Haverford School, and many others, and is highly approved of wherever known. Setts of these hoes may, probably, be procured of Geo. Thorburn, No. 11 John-st., New-York, who has been furnished with a sett as samples for any good smith to imitate. In making them, care should be taken to punch rivet-holes through the sawplate *without heating it*, so as to retain the temper of the plate. Both this hoe, and the Burlington hand "Weeding Fork," are worthy the attention of Gardeners.

T. C.

Burlington, N. J.

From the New-York Farmer.

We are truly obliged to M for this continuation of the subject commenced in our last. His views, opinions and experience, are entitled to high respect.

MANAGEMENT OF SHEEP.—No. II.

MESSRS. EDITORS,—With your approbation I will resume the above subject, commenced in your last number. In that communication I endeavored to establish the first, and most prominent advantage, derived from adequate protection afforded to sheep during the winter season, viz., *the saving of life*. I shall comment further on this head, and mention other advantages, founded upon my own experience, although fully confirmed by the experience of thousands before me. I arrogate to myself no claim whatever for any new discoveries. but merely have followed the lights which others have discovered and set up: my object is, only, to bear testimony to the correct bearings of those lights, and assure all my agricultural brethren that they will invariably lead to the harbor of *true interest*. I know to well, from my observations, that the proclamation of a truth, and that sounded but once, is like the fall of a solitary drop of water upon the rock,—it is only by its thousand repetitions that an impression is made. Having this in view, it serves as my only foundation for hope that my reflections, trite as they are, yet having the merit of being based upon facts, will not be altogether passed by like the idle wind. We have indeed fearful and gloomy times upon us already, and a dull prospect of immediate amendment, and it therefore behoves every farmer to be awake and diligent in every department of his calling. Our duty is to practice economy; not simply that economy which, according to common acceptation, consists in saving shillings and pence, but adopts all wise and salutary means for saving our stock from premature death.

In my former communication, I stated that the severe winter of 35 and 36 caused a destruction of sheep in this quarter which was unprecedented,—that many with flocks similar in size to my own, lost hundreds upon hundreds, while my own loss, in consequence of being well provided with shelters. was only 38 out of 1500.—that previous winters, and when my flocks were exposed, my loss varied from 50 to 150. As the foddering season is over, (truly a long one has it been,) and my sheep turned upon the fields, I will state the result of last winter's operations. Of lambs, having wintered nearly 500. I have not lost one. They were grained from the time they were put in winter quarters to the 25th ultimo; and here I will with pride state the fact, that for the number, as regards uniformity of size, and good flesh, their equal will hardly be found in the state Of grown sheep, out of 1300, 17 have died, six or eight of which was from old age This, a thorough and critical wool-grower will not allow is good management, in permitting *old sheep* to die on my hands. I admit it; and my practice is, to select in the fall all inclining to old age and poverty, and put them by themselves, and in the spring or early in the summer, make sale of the flock with their lambs. The few of this description which died, were reserved last year on account of their fineness of fleece, and a wish to retain their lambs.

But, this inquiry will perhaps suggest itself to some sceptical readers of your Journal, whose self-sufficiency causes them to regard their own mode of management superior to every one else, and who perhaps think sheltering of sheep, among other things, mere *fudge*, viz.. whether my sheep were not in better flesh at the beginning of winter before the last, when so many of my neighbors lost their hundreds upon hundreds, while my own loss was less than forty? and further, were mine not naturally more hardy? I answer, that I saw parts of several of the flocks mentioned, late in the fall, and then they were fully equal in flesh to my own; and also, that they are the same grade of sheep, and therefore no material difference of constitution. I call my own flock *Saxons*; but some of your readers, will better understand their grade, by naming the price I have obtained for their wool. It has been purchased in Boston for the Middlesex Company the last three years: the two last clips I received a little less than 75 cents per pound. So it must be the legitimate conclusion, drawn from all the facts I have stated above, and in my former communication, that in *saving of life*, my success is almost entirely to be ascribed to sheltering.

I will now briefly speak of another advantage, or rather consequence, resulting from protection of sheep; viz., *the prevention of disease*. I know it is difficult to get at facts to prove this; but your readers perhaps can gather the proofs of my position, as I have satisfactorily done, by reasoning from analogy,—from "man to brute." Will not exposure to the rude storms of winter and spring have a tendency to engender disease?—and if not active disease, wil. it not so affect the constitution that it is liable to curtail several years of their existence? Every candid and experienced wool-grower will answer in the affirmative. I leave, however, what is in some measure speculation, and turn to facts—for facts are truly stubborn, and I like them the better for it.

If there be any who doubt that sheltering of sheep will perfect and improve the quality, I will suggest a cheap method by which it can be thoroughly tested. Select in the fall two sheep of equal quality, as regards wool; jacket one of them, as it is called, by covering the body of the animal with an oiled or painted canvass, in order that it be impervious to rain, and let it be kept on, until shearing. Allow the other to go at large, without jacket or shelter, and the result, after comparing the two fleeces, will clearly establish the point in question. But the improvement of fleece is too important to be passed over lightly: I will, therefore, having my Invoices at hand, give the result as stapled in the Middlesex Manufactory at Lowel, exhibiting the clips of '35 and '36. It will be remembered I stated, that, the winter of '34 and '35 my sheep were not sheltered. I sheared about 200 more in '36 than in '35, and those I disposed of during the interim of the clips, consisted, mostly of sheep inclined to age and not altogether my coarsest.

Clip of 1835.				Clip of 1836.		
3	lbs.	Wool	extra.	12	lbs.	Extra.
62½	"	"	prime	186	"	prime
743	"	"	1st	1470	"	1st
1092	"	"	2d	1169	"	2d
1058	"	"	3d	879	"	3d
260	"	"	4th	199	"	4th
72	"	"	5th	37	"	5th
12	"	"	6th	9	"	6th

By a comparison of the above, it will be observed, that the stapling of the last clip shows a considerable increase of the higher qualities, and from what is above stated it is clearly proved that the difference is mainly to be ascribed to warm shelters.

But want of time urges me to close this communication. I hope I have sufficiently demonstrated to the sceptical portion of your readers the great importance of protecting their sheep from the inclemency of winter. If their own interests, together with what I have represented, based as it is upon experience, will not convince, as well as arouse to action, I know not what will.

May 2d, 1837. M.

Lansing, Tompkins Co., N. Y.

From the New-York Farmer.

HOVELS FOR SHEEP.—Our worthy friend M has favored us with another article on sheep-husbandry. It is a subject well worthy of more general attention than has been usually given to it; and we shall not, *willingly* waive any claim which we may *have* made, or which we may hereafter *make*, upon M, in relation to this, or any other *agricultural* subject, though we shall not hand the drafts to the "District Attorney," even if not *honored*.

HOVELS FOR SHEEP.—No. III.

The reason, doubtless, why many neglect to provide shelters for their sheep during winter, is generally to be attributed to the expense. To all those who neglect thi important matter on this account, I will sug gest a simple and economical mode of building them. When securing hay, if stacked out, build two pens, for the reception of the bottom of the stacks, four and a half feet high, and place them about thirty-five feet apart, in, or nearly, an east and west line. Then take two poles of sufficient length to reach from pen to pen, and rest the ends on the top of each pen; the centre of the poles to be supported by crotches, and well secured in the ground. A sufficient number of rails or poles will then be required to sup port the straw, which will be necessary for a covering; a plentiful supply of which should be used in order to absorb rain, and prevent leakage. I will also suggest, that the straw ought to be secured by placing a few rails on the top of it, otherwise violent winds will displace it. The rear of the hovel, which of course should be the north side, can be made of boards, and must be perfectly tight; if it is not, snow when drifting will be certain to find its way in, and often occasion the trouble of removing it. If boards can not be readily obtained for the back, racks, made of rails or poles, and stuffed with straw, will answer quite as well, and perhaps rather better, inasmuch, if they are well made, the hovel will be warmer.

I also recommend the erection of several racks, to be filled with straw, called "wind breakers." I will not mention where they ought to stand, as practical farmers know pretty well the point a northwester is apt to bite hardest. Old and partly rotted straw will answer all the above purposes the better. The size of the hovel, as described, is calculated for 100 sheep. M.

Lansing, Tompkins Co. N. Y.

Although not designed for publication, we give the annexed P. S. for the benefit of all concerned.

P. S. I now will mention some mistakes which your '*devil*' made in printing my first communication, which I beg you to correct in your next No. I am a great friend to order, and like things done just right.

You make me say "*created* board fences"—it should be "*erected* board fences"—and following on as printed, "this however *it* the fact"—should be "*is* the fact"—and "*in* the saving of hay"—should be "*is*" &c. And towards the conclusion—printed "*get* so absolutely neglectful"—should be "*yet* so" &c.,—"will not m *preparatory* remarks" &c.,—should be *prefatory*"—"these are the very kind of farmers referred to who *regret* all experiments" &c,—should be "*reject*" &c.—there are some others too small to notice, the first and last are the only ones necessary to correct.

I am afraid, as the more busy season with farmers is at hand, that all your drafts, that is, *monthly* drafts will not be *accepted.* But I have the great cause of agriculture so much at heart, and so much desire its prosperity, that I am willing to cont ibute my feeble efforts tow rds its promotion, either by verbal or written, reflec ions drawn from the great well of experience and truth.

M.

From the Quarterly Journal of Agriculture.

STUDIES IN THE SCIENCE AND PRACTICE OF AGRICULTURE, AS CONNECTED WITH PHYSICS.

Chance may do much in the discovery of facts, and the invention of means, as when Mr. Nutt discovered the only range of temperature at which bees swarm, and the idle boy, by tying a string to the valve of the steam-engine, invented an ingenious mode of making it work without his continual assistance. Yet it often requires much sagacity to turn to beneficial or practical account such discoveries as are made by accident or chance observation, and even men of the highest talent frequently fail in this. Dr. Lister, the celebrated English naturalist, states certain facts with regard to fossil shells that would almost induce a belief of his having had more than a glimpse of some of the most important doctrines of modern geology. These facts, it does not appear that he followed up to any general induction, which was done almost a century after his time, without, it is believed, any hint having been derived from his statement. Lord Kames, in his very clever book, the "*Gentleman Farmer,*" by a chance remark, most distinctly shows that he was on the very brink of anticipating the important discovery of the excrementitious discharges of plants into the soil, recently proved beyond all question by the experiments of M. Macaire of Geneva.*

Chance observations, however, though they should be of the greatest importance, are frequently lost, sometimes for want of being recorded, and sometimes from the observer's being incompetent to see their various bearings. Mr. Nutt might have contented himself with merely announcing, in some scientific journal, his having discovered that bees will not swarm except at a particular degree of temperature, without applying it practically, as he has done, to increase the population of the hives by always preventing artificially the natural process of swarming.

Lord Kames, on the other hand, only mentions it as probable, from the analogy of animals, that plants *may* discharge something similar to excrementitious matter, without following up the idea experimentally, to prove or disprove the fact.

A more extraordinary instance may be given from the science of optics, as bearing upon practical subjects in agriculture, in a manner which could scarcely have been imagined by the most fanciful speculator. About a hundred and fifty years ago, the Dutch philosopher Huygens, in his observations on Iceland spar, discovered a remarkable property of the rays of light transmitted through it,—a property which led Sir Isaac Newton to suppose each ray to have four sides or quarters causing it to be disposed in a particular manner. Here the matter rested till it was taken up by M. Malus, whose attention was attracted to the subject by one of those rare accidents which a common observer would have passed unheeded, but which, to a master mind like his, was productive of brilliant results. In 1808, while this philosopher was viewing with a doubly-refracting prism, a fine sunset reflected from the palace of the Luxembourg, on turning the prism slowly round, he was surprised to see a very great difference in the intensity of the two images, that which was most refracted being alternately changed from brightness to obscurity at each fourth part of a turning, or as opticians would say, at each quadrant of a revolution. From that period, Malus, Dr. Brewster, Fresnel, Arago, Biot, and others, have discovered facts "so singular and various," in the words of Sir J. Herschel, "that, to one who has only studied the subject of physical optics under its ordinary relations, it is like entering into a new world, so splendid as to render it one of the most delightful branches of experimental inquiry; and so fertile in the views it lays open of the constitution of natural bodies, as to place it in the very first rank of the sciences."

Some general idea of this may be given to the unscientific reader by stating, that when a ray of light from the sun is reflected from a piece of glass, polished metal, or other such substance, it will pass freely through any transparent body, or may be reflected from another surface, even when we turn round the body. But if a ray of light be reflected from plate glass at an angle of 57°, it is rendered altogether incapable of being reflected from the surface of another piece of glass, when turned in certain positions, though it may be reflected in other positions: and further, this ray will not pass through transparent substances turned in certain positions, though, when these are turned in other positions, it will freely pass through. Hence, it has been inferred, that the different sides of the rays of such light, as imagined by Newton, must have different properties in relation to the surface on which they are received, termed in optics the *plane of incidence*, and hence this sort of light is termed *polarized* light, on account of the sides of the rays being supposed to have, somewhat like a magnet, different *poles*. It is necessary to say, that the existence of such *sides* or *poles* is only conjectural, and not proved; but this does not in any way affect the results of the observation of facts connected with the phenomena.

One other property of this polarized light requires to be stated here. When reflected from a surface, the polarized ray is sometimes observed to go to the right, sometimes to the left, and sometimes more and sometimes less decidedly, on account of the nature of the substance used in the experiment.

Now, it is but natural for the agricultural reader, who has accompanied us thus far, to ask, What can all this minute observation and experiment on the rays of light and their polarization have to do with agriculture? Before we have done, we have no doubt that we shall most amply prove, not its mere theoretical, but its strictly practical importance; so that the reader may himself prove the correctness thereof in a very short period.

We are indebted in part for the facts to M. Biot, of the French Academy of Sciences, himself one of the most successful experimenters in the new science of polarization. Taking advantage of the

* Quarterly Journal of Agriculture.

tests afforded by substances polarizing light to the right or to the left, M. Biot instituted a series of experiments and observations for detecting the intimate constituents of certain vegetable substances, where chemical analysis failed, or at best was only imperfect or uncertain. From his researches by means of polarization, and those of M. Raspail with the microscope (another application of optics), we are now enabled to ascertain two kinds of facts of the highest importance to agriculturists, namely, *first*, What constitutes the nutritive principles of the food of animals; *secondly*, What constitutes the nutritive principles of the food of plants. The second is not yet quite so distinctly brought out as the first; but M. Biot, we are glad to learn, is continuing his researches. We shall now endeavor to give some account of the important discoveries in question.

Nutritive Principles of Animal Food contained in Grain and Roots.—Towards the end of the 17th century, the illustrious Dutch observer Leeuwenhoeck, in his microscopical researches, examined, among other things, portions of wheat flour, which we now know to consist of a various mixture of starch, gluten, oil, resin, sugar, and gum; and by one of those happy chances already exemplified, was led to make a shrewd conjecture respecting the real constitution of flour made from grain. In the wheat flour he found globules (*globuli farinarii*), each, as he supposed, furnished with a vessel, by which the plastic matter passes in order to produce other globules, —an optical illusion, as has since been shown; but in subsequently studying those globules, he shrewdly asks whether they be not enclosed, as in the case of seeds, in some sort of membrane. "I then," he adds, "used my utmost endeavors to discover the internal hidden make of the globules of meal, wherein, at length, to my great satisfaction, I succeeded."* He describes the grains of wheat as principally composed of those minute globules which are singly transparent, and he closely compacted within a kind of membranes, so exquisitely thin and transparent, that in some places their texture is not to be discerned. M. Biot has said, that Leeuwenhoeck observed the grain of fecula (rather farina) to be composed of a vesicle and a soluble substance, which is its nutritive part, since nothing but the shells or husks are met with in the dung of animals.

Now these observations of Leeuwenhoeck were lost sight of, as that of Huygens had been relative to the polarization of light, till, eight or ten years ago, the subject was taken up by M. Raspail, apparently without being aware of what Leeuwenhoeck had published, and he has so simplified the views of the constituents of the nutritive principles contained in farinaceous substances, as to render them, when conjoined with the researches of Biot, Persoz, Pelouze, and others, of the highest interest to scientific agriculturists.

It may be remarked, in passing, that M. Raspail* endeavors to show that Leeuwenhoeck's observations afforded not even a glimpse of his own discoveries, and that M. Biot has misunderstood or misrepresented his meaning. In the quotation from Leeuwenhoeck above, however, which we have given in Hoole's excellent translation, it will be seen that M. Raspail himself has not translated unbiassedly. Hook was dead before Raspail's discovery. From the experiments of M. de Saussure, it was believed that he had procured the chemical basis of starch, which he termed *amedine*. This amedine may be procured by boiling starch in a large quantity of water, throwing it on a double filter; and by boiling again the matter remaining on the filter, filtering again, and drying the residue The substance thus obtained, after repeated washings and dryings, is in irregular white, or yellowish-white fragments, very friable, and without taste or smell. M. Saussure said this formed with potass a non viscid solution, was insoluble in water below the temperature of 140°, and did not form a jelly with boiling water. But M. Raspail shows, that what was supposed to be a solution in water at 140°, is only a suspension. Saussure failed most signally in discovering the nutritive basis of starch, which he ought to have sought for, not on the filter, but in the liquid which had passed through the filter.

Berzelius is no less in error than Saussure, when he states, as quoted by M. Raspail (*Chimie Organique*), that starch or fecula is composed of small crystals, which partly dissolve in water at an ordinary temperature. On the contrary, the microscope shows, that starch or fecula is composed of shining white smooth globules, quite insoluble in cold water, even when immersed for any length of time.

The globules of starch, indeed, consist of an envelope or shell and a kernel, if it may be so called, of a substance very different,—the chief discovery of M. Raspail, which serves to explain the errors and discrepancies of previous observers; for the envelope is altogether insoluble in cold as well as in boiling-water, and it is only what we shall for the present term the kernel is at all soluble. The partial solubility, therefore, observed by Berzelius, must have arisen from the accidental rupture of some of the envelopes by which means the water could obtain admission to the kernels.

Accordingly, when Berzelius states that starch is dissolved into a mucilaginous liquid by boiling water; Thenard, that fecula combines easily with boiling-water, forming a hydrate popularly termed starch; and Despretz, that, when fecula is mixed with boiling-water, it becomes soluble, and does not recover its insolubility in cold water, when evaporated to dryness,—they all speak vaguely, and in part incorrectly, from not knowing the discovery of Raspail already mentioned. The kernel contained in the globular envelope of fecula, consists of a gum-like matter, which, by the evaporation of its watery parts, becomes hard on exposure to the air. When immersed in water at 122°, the envelope, which is unaffected by cold water, expands, and in boiling-water it bursts, while the kernel is dissolved in the water. When the water is in large quantity, the envelopes detached from their kernels, and now ten times their original size, having free motion, subside; but when the quantity of water is small, they become mutually entangled, form jelly-like strata or layers, and render the water thick,—being what is termed starch in the laundry (*empois*).

M. Raspail, from numerous experiments, concludes, that each grain of fecula is an organized globule, formed in the interior of living vegetable cells, such as in those of a grain of wheat, or of the tuber of a potatoe; that the enveloping membrane of the kernel is incapable of being dissolved in cold water, spirits of wine, ether, or the acids, but expanding in proportion to the degree of heat, and in boiling-water bursting on one side of the globule; and that after boiling in a large quantity of water, the burst and detached envelopes fall to the bottom in the form of snow-white flakes, leaving the liquid above them as limpid as water.

With respect to the kernel contained within the envelopes, M. Raspail concludes, that if the limpid liquid be cautiously poured off, the addition of spirits of wine, the concentrated acids, or tincture of galls will coagulate it, but it will not coagulate by heat; that it acquires a blue color by adding iodine, a property it possesses in common with the envelopes, but it loses this property by being spread out thinly on a porcelain plate and dried, differing in that case in no respect from gum; and that it does not lose its characters on being dried by a moderate heat, which causes it more to resemble gum with a glass-like fracture, a splintery texture, and a shining surface.

We have M. Raspail's authority, then, for considering the kernel within the envelopes in starch as resembling gum, if not identical with it in physical and chemical characters, and hence we might be led to believe that the nutritive or soluble part is gum, or of the nature of gum. At this stage of the inquiry, however, M. Biot, along with M. Persoz, took up the subject, and succeeded so far in discovering a distinct and very remarkable difference from gum. Accordingly, on isolating the kernel portion of the parsnip root by boiling to burst the envelopes, precipitating by alcohol, purifying by repeated washings with alcohol, and then dissolving it in water in order to observe in what manner it polarized light, it was found that it turned the planes of polarization with more energy towards the right than any substance yet known; while all gums, and the sugar of grapes, turn the planes of polarization towards the left. Cane sugar, indeed, turns the planes of polarization towards the right, but not with the same energy as the kernels of starch. The latter, therefore, MM. Biot and Persoz term *dextrine*, and we shall adopt the term notwithstanding M. Raspail objects to it, till one more appropriate be proposed. The soluble portion accordingly of starch, or the farinaceous matter of grain and roots, is dextrine, which is always contained in a globular envelope, composed of membranes that are incapable of being dissolved in water even when boiling. By means of this

* Hoole's Select Works of Leeuwenhoeck, p. 179.

* Chimie Organique, *sub fin.*

singular and unexpected test of turning the planes of polarization towards the right of the observer, the nutritive qualities of all vegetable substances can be examined, and many of them have been so examined by M. Biot, as we shall presently see. Amongst other vegetable productions, M. Biot examined the juice of the carrot, taken from the white variety, by cold pressure. He divided this into two parts, one part being filtered through white paper without being heated; and another, after being similarly filtered, was brought for an instant to the boiling point. The result was most important in a practical point of view; the part which had been brought to a boiling produced a rotation towards the right exactly double of that which had not been heated, and its absolute intensity corresponded to the proportion of four per cent. of cane-sugar, as deduced from previous observation.

"The liquor," continues M. Biot, "treated with alcohol, gave a considerable precipitate, which was instantly redissolved in water, as is the case with dextrine, and this appears to me to explain sufficiently the sudden increase of the rotation after the boiling." It will follow that even a slight boiling doubles the nutritive quality of carrots, a fact known indeed from other experiments, but only in a vague manner, without any philosophical data to explain it by.

The juice of the turnip exhibited similar phenomena. When it was procured by simple pressure and filtered through paper, the portion which passed the filter exercised no ration that could be appreciated; but on boiling it with the pulp, a liquid was obtained, which turned the planes of polarization towards the right, indicating cane-sugar, as found in the turnip by chemical analysis.

In the juice of the beet-root, so interesting on account of the increasing manufacture of sugar from it, M. Pelouze, a young but able chemist, having found no grape-sugar, or such as is incapable of crystallization, and only cane or crystallizable sugar, M. Biot undertook experiments to investigate the subject still farther. Taking the fresh juice of the beet-root, he repeatedly measured with the greatest care the intensity of rotation which it communicated to polarized light, which he found to vary from 10° to 12° 6′, according to the difference of individual roots, or different parts of the same root, indicating from 11 to 14 per cent. of cane-sugar. The crown and the sides of the root being less mature than the centre, appeared to him to be less rich in the proportion of nine to ten. As the beet root on which the experiments were made had been taken from a field very liberally manured, the large proportion of saccharine matter, indicated by the intensity of the rotation, confirmed the remark of M. Pelouze, that the richness of the manure did not diminish the constituent quantity of sugar, though it renders it more difficult to preserve the roots. M. Biot seems to think that the large proportion of sugar might likewise be partly accounted for by the summer having been dry and hot. There did not appear to be any dextrine, for the white precipitate, perfectly soluble in water, and not coagulable by heat, did not affect the planes of polarization at all, and consequently this precipitate was neither albumen, gum, nor dextrine.

Dextrine was procured by MM. Biot and Persoz from laundry starch (*empois*) by acids cold or hot, strong or diluted, by potass, or by hot water, any one of which will rupture the envelopes, and set free the dextrine. Water alone, however, as M Raspail proved, and MM. Biot and Persoz verified, will not completely rupture all the envelopes of fecula, or at least extract all the dextrine, unless the boiling is continued for a long time with considerable quantities of water; because the unbroken globules of fecula are apt to be held together in clots by the gum-like matter disengaged from the broken ones, and in this manner are partly protected from the full influence of the heat.

The dextrine thus obtained by any of the foregoing agents is uniformly the same, being completely decomposable by heat, while it can be analyzed into water, hydrogen, and carbonic acid gas, but no nitrogen has been found in it. When treated with yeast it undergoes the vinous fermentation, while acids change it into a saccharine syrup; but, when tried by the rotatory polarization of light, this syrup has a greater power in turning the planes towards the right than the sugar of starch in the proportion of ten to three.

Varieties in the unburst Globules.—Before the application of heat or any other agent to rupture the envelopes of the globules and set free the soluble dextrine, the globules themselves afford interesting objects of investigation, as will appear from the following important statement of M. Raspail. He tells us, (*Chimie Organique*, 134,) that in the Paris market he seldom found any wheat flour not to a certain extent mixed with potato starch, by which mixture the fraudulent dealer gains as much as 25 per cent. The potato starch has scarcely any effect on the appearance of the flour, and it requires experience and skill to detect it by the naked eye, unless the quantity of starch be considerable, when the crystalline appearance of the flour gives room for suspicion. The fraud, however, is readily detected by the microscope, and M. Raspail says he could thus discover the starch if it constituted only 1 per cent. of the flour. In examining suspected flour, it is always more easy to pronounce that it is adulterated than to tell in what the adulteration consists. The dimension and form of the globules, as given by M. Raspail, are the chief means by which such examinations can be made, and we think that no extensive dealer ought to neglect making himself thoroughly acquainted with these. He has only to furnish himself with a common microscope and a micrometer or glass plate divided by very minute lines like a foot-rule, and by laying a grain or more of flour on the micrometer, and examining it with his microscope to see how many lines it covers, he will be enabled at once to tell the quality and kind of the flour in question. Micrometers divided so as to measure the $\frac{1}{10,000}$th part of an inch may be employed.

Potato.—The globules containing dextrine in this root acquire a larger size than any hitherto examined, being usually of from the $\frac{15}{10,000}$th to the $\frac{1}{1000}$th part of an inch, or even the $\frac{42}{10,000}$th part of an inch. When fresh they exhibit on the surface concentric wrinkles which disappear on drying. The form of these globules when large is oval; when small more spherical, the former being slightly contracted and bluntly triangular.

Wheat.—The largest globules rarely exceed the $\frac{2}{1000}$th part of an inch, or about half the size of the largest potato globules. They are of a round or spherical shape, and are much smaller when taken from half ripened wheat.

Barley.—The globules of barley are similar in appearance to those of wheat, but are much smaller, rarely exceeding the $\frac{28}{100,000}$th part of an inch.

Oats.—The globules of oats are oval and yellowish, being from the $\frac{276}{100,000}$th to the $\frac{118}{100,000}$th of an inch in diameter. The innumerable minute hairs of this grain give the meal a sort of cottony appearance to the naked eye.

Rye.—These globules are about the $\frac{2}{1000}$th part of an inch in diameter, of a flat form, somewhat sharp on the edge, and marked with a black cross or three black rays forming a central star, which gives a black color to rye flour.

Arrow Root.—The genuine arrow-root from Brazil may be distinguished from the starch of potatoes by boiling, which only produces in arrow-root an enlargement of the globules to four times their original diameter, because, as M Raspail thinks, they are exposed to heat in the original Brazilian preparation, while the globules of the potato expand to twenty or thirty times their original diameter.

The largest globules of genuine arrow-root do not exceed the $\frac{16}{10,000}$th part of an inch, and, like those of rye, exhibit through their translucid surface black lines like a star, or sometimes like the letter T. Potato starch is better than the genuine arrow-root.

Buckwheat.—The globules are yellow, and seldom appear so large as the $\frac{4}{10,000}$th part of an inch.

Maize.—Few of the globules attain the size of the $\frac{28}{100,000}$th part of an inch. The dried fecula is usually injured by grinding, being folded, wrinkled, and more or less rounded. When taken from the half ripe milky grain, they are smooth, entire, and quite round. Hence the dextrine of maize is obtained in greater proportion from the half-ripe seeds; and hence also the small proportion of starch found by the usual modes of chemical analysis, though it actually exist in the grain.

Peas.—The globules of peas are of the same form as those of the potato, with an unequal surface, and the largest are about the $\frac{2}{1000}$th part of an inch.

Beans.—The globules are of the same size as those of peas, but differ from being egg-oblong, or kidney-shaped, sometimes appearing as if a smaller grain were enclosed in the interior.

Other globules were examined and measured by M. Raspail, but these are the most interesting for our present purpose; and, before proceeding farther, it is indispensable to impress upon the attention of the reader,

1*st*, That the globules constituting meal, flour, and starch, whether contained in grain or roots, are incapable of affording any nourishment as animal food till they are broken.

2*d*, That no mechanical method of breaking or grinding is more than partially efficient.

3*d*, That the most efficient methods of breaking the globules is by heat, by fermentation, or by the chemical agency of acids or alkalies.

4*th*, That the dextrine, which is the kernel, as it were, of each globule, is alone soluble, and therefore alone nutritive.

5*th*, That the shells of the globules, when reduced to fragments by mechanism or heat, are insoluble, and therefore not nutritive.

6*th*, That, though the fragments of these shells are not nutritive, they are indispensable to digestion, either from their distending the stomach and bowels, or from some other cause not understood, it having been proved by experiment that concentrated nourishment, such as cane-sugar, essence of beef, or osmazome, cannot long sustain life without some mixture of coarser and less nutritive food.

7*th*, That the economical preparation of all food containing globules of fecula consists in perfectly breaking the shells, and rendering the dextrine contained in them soluble and digestible, while the fragments of the shells are at the same time rendered more bulky, so as the more readily to fill the stomach.

We hope these principles have been here put in intelligible and unequivocal language, so that they may not be misunderstood, seeing that they are of the very highest practical importance in preparing the food of all live-stock as well as of our own. But lest some of our readers of the old school, who are apt to reject most novelties as theoretical, should refuse to admit the truth of the deductions, it may be well to corroborate the results from actual experiments made by those who were ignorant of the very existence of the globules described by M. Raspail or the dextrine of M. Biot.

(To be continued in our next.)

INFERIORITY OF ENGLISH TO CHINA INK.—The directors of the Bengal bank lately refused payment for a number of bank notes, in consequence of their containing no signature. It appeared that they belonged to a Hindoo, who had kept them in a copper box. He asserted that they originally possessed the signatures of the director, comptroller, cashier, &c., but that they had been effaced. The notes on which the signatures had been written with China ink remained uneffaced, but all the writing with English ink had completely disappeared. Mr. Princep, in order to determine the question, placed a paper covered with writing in English ink between two plates of copper. After a short space of time he found that the copper had decomposed the ink, and that the writing was completely effaced. He concluded that the account of the Hindoo was correct, and that the bank ought not to refuse payment.—[Rec. Gen. Science.]

* Asiat. Society Journal, and L'Institut, 182, 368.

CULTIVATION OF FILBERTS.—Sir, in consideration of the periodical return of the season for trying the merits of the suggestion I inserted in your number 183, just 10 years ago for improving the crop of filberts, and as I have reason to believe from my own and other's subsequent experience, that my idea is well founded, you will perhaps allow the re-appearance of the following:—"In countries where figs are cultivated to the greatest perfection, particularly in Italy and Greece, a great augmentation, both in the size and number of the figs, is obtained by placing on the top of the tree a branch of the wild fig-tree (*Caprificus*), upon which have appeared male-flowered figs, which are the first to come forth. I have often thought, that the crop of filberts might be both ameliorated and increased, by a somewhat analogous application of a branch of the common hazle, when covered with the 'cat-kins' or flowers. This is just the time to try the experiment." I hope that some of your correspondents who have the opportunity, will try and report upon the experiment. Besides the increase of the pollen, it may have an effect like the recurring to the original stock by grafting or seed, as with apples and some other fruit-trees. Filbert-trees are often deficient in male flowers.—Yours, &c., F. MACERONI.

THE IMPORTANCE OF TIME KEEPING.—The topography of watch-making, at home and abroad, would present a vast number of curious and interesting facts.—In consequence of the minute subdivision of labor in this trade, it is said that there are only three places in the United Kingdom where a complete watch can be manufactured,—London, Liverpool and Coventry. The business has been introduced at the latter place entirely since the year 1800, and the number of persons employed in it there is now supposed to equal the number in the metropolis.

ANALYSIS OF IRON ORES.—Berzelius states the following to be a rapid mode of analysing these ores. He boils them with chloride of copper slightly acidulated with muriatic acid, then on boiling the residue with carbonate of soda, washing the result, drying and weighing, its weight indicates that of the barbon.*—[Rec. Gen. Science.]

* L'Institut, 170.

Advertisements.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its engravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone.

The work contracted for must be finished by the 1st day of July, 1838

Persons desirous of obtaining work are requested to apply at the office of the undersigned, in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, Jr.
Chief Engineer Jas. Riv. & Ka. Co.

P. S—The valley of James River above Richmond is healthy.

16—10t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 14 1y

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of this kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakihill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOOD N BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rochester, Jan 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tt

TO RAILROAD CONTRACTORS.

PROPOSALS will be received at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drawings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.
16—6t.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2½ by	⅝, 15 ft in length,	weighing				$4\frac{68}{100}$	per ft.
280 "	2 "	½,	"	"	"		$3\frac{56}{100}$	"
70 "	1¾ "	½,	"	"	"		2½	"
80 "	1½ "	⅜,	"	"	"		$1\frac{25}{100}$	"
90 "	1 "	⅜,	"	"	"		⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front st.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—yt H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

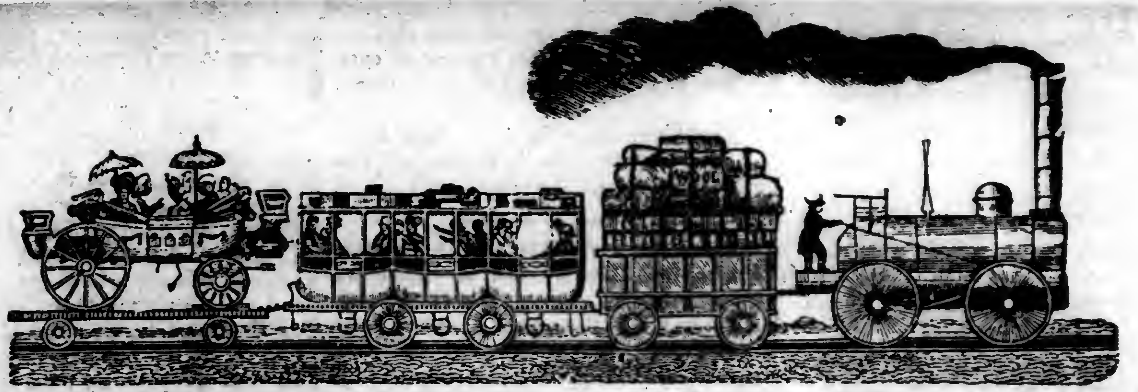
Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron, Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N. Y. 51tf



AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK; AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, JUNE 3, 1837. VOLUME VI—No. 22.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JUNE 3, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America*.

☞ SUBSCRIBERS IN THIS CITY, who change their residence on the 1st of May, will please give notice at the office, 30 Wall-street, *Basement Story*. It is desirable that the notice should specify their late and future residence.

MECHANICS' FAIR IN BOSTON, MASS.—We give the following notice of the Board of Managers of the MASSACHUSETTS CHARITABLE MECHANICS' ASSOCIATION, for their First Annual Fair, to be held in September next. We are gratified to see that the Mechanics' of Boston are not to be outdone by other cities, in the establishment of such institutions for the benefit of industrious and enterprising Mechanics. We anticipate a splendid exhibition of New-England ingenuity, industry and skill.

MECHANICS' FAIR.

Notice to Mechanics, Artisans, Manufacturers, &c.—The undersigned give notice that the first Annual FAIR of the Massachusetts Charitable Mechanics' Association will be held in the city of Boston, in September next, commencing on Monday the 18th, and continuing at least three days.

The Association have placed at the disposal of the Board of Managers, the sum of Five Thousand Dollars, to enable them to conduct the Fair upon a liberal scale; and they hope to be able to render satisfaction to all who may feel disposed to offer articles for exhibition.

Medals or Diplomas will be awarded to the owners of all articles that may be deemed worthy of such distinction; and the Managers intend that the strictest impartiality and fairness shall be observed in the distribution of Premiums.

The Managers, in furtherance of the object they have in view, invite contributions of articles from every department of industry; of choice specimens of American ingenuity and skill; rare and valuable domestic productions, natural or artificial; the delicate and beautiful handiwork of females; useful labor-saving machines, implements of husbandry, and new models of machinery, in all their varieties.

Judges will be appointed to examine all articles offered, and the managers will award a gold or silver medal, or a diploma, to all articles that may be pronounced by the judges worthy of reward.

Articles intended for exhibition, must be delivered on or before Wednesday, September 13th.

Arrangements will be made to exhibit, *in operation*, any working models that may be offered, which will render the exhibition useful and interesting, and the managers respectfully invite contributions in this branch. A careful and competent superintendent will be appointed to take chare of all models sent for this purpose.

Board of Managers.

Stephen Fairbanks, Jos. T. Buckingham,
John Rayner, James Clark,

William Adams,	Henry W. Dutton,
Uriel Crocker,	George Darracott,
Gardner Greenleaf,	Wm. S. Pendleton,
James L. Homer,	Charles A. Wells,
James Barry,	Henry Bailey,
Joseph Tilden,	Jonas Chickering,
Ephraim Harrington,	Henry H. Barton,
Joseph Lewis,	Thomas Boyd,
Walter Frost,	Wm. Uunderwood,
Thomas J. Shelton,	George G. Smith,
John G. Rogers.	

P. S. For any further information address JAMES L. HOMER, Corresponding Secretary, Boston.

Boston, March 24, 1837. m28–ts1

☞ Should any subscriber receive his account, by any means, *incorrectly made out*, he will confer a *special favor* by returning the account, with a *copy* at full length of his *last receipt*. The *name* signed to the receipt, with *all* the *dates*, are important to correct the books.

This request is made in consequence of the detection of several errors which occurred in consequence of the destruction of our office by the great fire, and the omission of a few names by collectors.

POSTPONEMENT.—The time for receiving proposals for laying the rails on the Railroad between Wrightsville and York, has been postponed until the 27th of June.—Those papers requested to copy the advertisement will make the correction and give it three additional weekly insertions.—[Star and Banner.]

The Rideau Canal has been in full operation since the 4th inst., and the Company's Steamboats are running full trips. On Saturday afternoon, the Rideau arrived with two barges in tow, all laden with goods, and with a large number of passengers, mechanics and laborers from Bytown and the neighborhood.—[Kingston (U. C.) Herald.]

COMPLIMENT TO AMERICAN GENIUS.—Our mechanic Avery's simplified steam engine, exhibited in full and successful operation at the last New-York Fair, and since admirably applied to various mills in the interior is highly extolled by the learned Dr. Lardner, and is to be reported upon at the French Institute, by the illustrious astronomer Arago. What will they say of the total abandonment of fuel and steam in Davenport's Electro-magnectic Rotary machine?—[N. Y. Star.]

INTERNAL IMPROVEMENT CONVENTION.—We are glad to perceive that the people generally approve of the proposed Convention. Delegates have been appointed in many of the counties. We hope to see all the counties represented. It is an important subject, and no plan can be more effectual in concentrating public sentiment in favor of a judicious system, than that of a Convention, in which the interest of every section of the State can be fully represented.

The Convention is to be held in this place on the *first Monday in June*.—[Tuscaloosa (Alabama) Intelligencer.]

IMPORTANT TO RAIL ROAD SUBSCRIBERS.—On Tuesday last an action was brought in the city of Detroit by *John Prince*, Esq. (President of the Niagara and Detroit Rivers Railroad Company) against *Robert Bolton*, Esq. late of Sandwich, U. C. but then living in Detroit, to recover the sum of $31,25, being his first instalment of 2½ per cent. on 50 shares taken by him in the above stock.

Mr. Bolton employed Messrs. O'Keefe and Churchman, counsellors at law, to defend the action; and they resisted the demand upon several grounds, and especially on an alleged *want of consideration*, and *because the scrip had not been delivered or tendered to their client*.

Mr. Prince conducted the case in behalf of the Company, and answered the objections raised by the defendant's counsel.

The jury retired, and in about a quarter of an hour returned with a verdict for the plaintiff for *the full amount*, which carried costs also.

This case establishes a precedent which renders the subscribers to railroad stock liable to be sued at law for the amount of their subscriptions.—[Detroit Courier.]

RAILROADS AT THE SOUTH.—We find the following article from a Georgia paper called the "Federal Union" in the "Georgean." It evinces a spirit and a proper sense of the advantages of internal improvements, which does credit to the Editor. We are always happy to meet with *such* advocates of the system, which *more than any other*, will continue in existence *the* FEDERAL UNION of which we as a people have been so justly proud.

The remarks of the Editor in relation to the opposition of men in "high places" to the public works of Georgia, will apply as well to other States as to Georgia—and we regret that it is so. *Opposition* however fortunately cannot *prevent* the success of such works as the *New-York and Erie*, the *Baltimore and Ohio*, the *James River and Kanawha*, the *Charleston and Cincinnati*, and the Georgia, *Western and Atlantic* Improvements. The PEOPLE require them and they will be accomplished in due time. Will the Editor of the "Federal Union" exchange with us?

From the Federal Union.

WESTERN AND ATLANTIC RAILROAD.

It gives us much pleasure to state, that Colonel Long, the Chief Civil Engineer of the State, arrived in this city on Saturday evening last, and is now making preparations to proceed immediately to make a reconnoisance of the country from the Chattahoochee to the Tennessee River, preparatory to the instrumental survey of the route for this great State work, which will be commenced so soon as the necessary instruments shall arrive. The Governor has been very fortunate in the selection of Col. Long, because having formerly passed through the country from Athens to the Tennessee River, on both sides of the Lookout Mountain, in discharge of his duty as a member of the Corps of Topographical Engineers, he has acquired much knowledge of the Topography of the route where the road will probably pass, and will therefore be able to proceed with the surveys much faster than one who does not possess this information.

There can be no doubt now, that the work of internal improvement in Georgia, will be prosecuted with energy and despatch, and that before the fall, a considerable portion of the road from the Tennessee to the Chattahoochee, will be located—under contract—and partly performed.

This important road, designed to connect the great west with the Southern Atlantic sea coast through the territory of Georgia, is a work that will be productive of more benefit, and reflect more honor on the State than any thing she has heretofore attempted.

The enlarged and liberal views of the members of the last legislature, manifested in the act for the construction of this road, and in the distribution through the Central Bank, of the surplus revenue to the people, are worthy of all praise. Yet strange to tell, there are men, and some too, who fill high places, who openly denounce both these acts, thus exerting their influence against the best interest of the State. But the people will not heed such advisers. The spirit of internal improvement is aroused, and Georgia though late to begin, will not linger in the glorious race she has commenced.—Her best and most intelligent citizens are united in this policy,—thay do not doubt the most brilliant results. They look confidently forward to the day in which Georgia will be traversed from the sea to the mountains in railroad cars, travelling at the rate of 20 miles or upwards in an hour. Then will the voice of revilling be hushed and those who now oppose this enterprise be laughed to scorn. The pressure of the times but urges us onwards in this important matter, and unless we greatly err the people will be but the more confirmed in the necessity of bringing all their energies to its aid.

We are proud to say that his Excellency, Governor Schley, has been very active and zealous in the cause of internal improvement not only in his exertions to procure the passage of the law pledging the funds of the State for the construction of this road, during the last session, but in procuring competent persons to execute that law, and we understand that he intends as soon as he can, consistently with the discharge of his official duties at the seat of Government to repair to the line of the road and aid as far as may be in his power to expedite the work.

THE RAILROAD.—By the time our paper is issued the whole line of the railroad from Michigan City to Laporte will have been run.

Through the persevering labors of Gen. Orr, all the relinquishments have been made both in the city and through the interior. and the necessary depots and tracks within the city located. Great credit is also due to that gentleman, as well as to Col. Stewart, and Gen. Brown, for the able, efficient, and zealous manner in which they have performed the arduous duties intrusted to them Nor ought we to suffer the opportunity to pass without congratulating the public and the stockholders on the unanimity and good feeling which have prevailed among all parties. The relinquishments have been made in that generous spirit of enterprise and noble impulse which has ever characterized our section of the country, and which is always ready to second any efforts made or projected for the general good. Independent of this it may not be invidious to advert to what has been done within the immediate limits of our city. The Michigan city Company, through their trustees, Col. Teall, and Wm. H. Goodhue, Esq., the West Addition Company through their agent, Willys Peck, Esq., and James Forrester, Esq., whose lands corner together at the most eligible spot, have donated to the Railroad Company, for its general and manufacturing depot, a quantity of land amounting to upwards of fifteen acres—the present value of which may be estimated by those even at a distance, when informed that it lies almost in the heart of the city. This general depot will be reached by an arm branching off upon eight streets.

Nor is this all. The Railroad is designed to pass down Wabash street, on which it reaches the Lake, by a double track in the centre of that street. A depot also, for the passenger cars, is to be constructed in the centre of Wabash street, between eighth and ninth, of a spacious and convenient size, for which the requisite ground has also been donated, and so as to leave the street, at this point, one hundred and forty feet wide, none of this valuable property costing the Railroad Company a solitary dollar.

Probably no section of the country could be pointed out presenting fewer obstructions for laying a railroad than this. The undulations are few and slight, and that useful, and in most places, indispensable tool, a pick-axe, will not need handling the whole distance. By an advertisement in another column, it will be seen, that the grading will be let out, at public out-cry, on the 14th of next month, and we know there are enterprising men enough in this country to undertake and carry it through without delay. We hope to have it in our power shortly to lay the Charter before our readers.—[Michigan City Gaz.]

EXTRAORDINARY DRAUGHT BY ONE HORSE.

The following extraordinary feat of a draft horse has been recorded. Soon after the completion of the Surrey Iron Railway, and when it was open for the conveyance of goods from Wandsworth to Merstham, a bet was made, that a common horse could draw thirty-six tons for six miles along this road, and that he should commence his labor with a dead pull, as well as turn it round the occasional windings of the road. A number of persons assembled near Merstham to witness the performance. Twelve wagons loaded with stones, each wagon weighing three tons, were linked together, and a horse taken from a timber team of Mr. Harwood was hooked to the first wagon. He started from near the Fox public house, and drew this immense weight with apparent ease, to near the turnpike at Croydon, a distance of six miles, in one hour and forty-one minutes. In the course of his journey, he was stopped four times, in order to show that it was not by the acquired impetus that he performed the task. After each stoppage, a chain of four wagons was added to the train, with which the same horse set off again without difficulty, even after about fifty men had mounted them.—[Far. Mag.]

CANAL BOAT PERFORMANCE.—The Providence Journal states that the Canal Boat William Wirt, for Worcester, laden with 560 bushels salt, and 100 barrels of flour, (27 tons,) went over the dam, ten feet, at the 'Sinking Fund,' on Saturday, at 12 o'-without the slightes damage to boat or cargo, or the lest blame to any one.

From the New-York Farmer.

STATISTICS OF GREAT BRITAIN.

STATISTICS OF THE BRITISH EMPIRE.—A highly valuable work on this subject has been recently given to the public by James McQueen, and dedicated to the Duke of Wellington. We infer from this circumstance that its authority may be relied upon; and we believe that many of its details, especially as far as they relate to agriculture, come within the province of this work; and will be interesting and instructive to our readers. Statistical facts are always valuable; but we do not think in this country sufficiently appreciated. They alone enable us to form any think like an exact opinion of the actual condition of a country, its actual wants, its actual capacities and improvements. They are extremely useful to the age in which they are given; and they remain as most important documents of reference to all succeeding periods. With respect to many matters of national policy and legislation, they are the only safe grounds of action; and the most serious mistakes have been made for a want of this knowledge. In many subjects of statistical detail, perfect accuracy is not attainable. Changes are perpetually occurring, and allowance for these changes, in the shape of what sailors call 'dead reckoning,' must be made. But even a tolerable approximation to the truth is infinitely better than mere vague guesses or conjecture. The extreme difficulty and labor requisite in procuring such details can be but very imperfectly estimated by those who have made no experiments of this kind; the difficulty of superintending the press in such cases, so as to insure accuracy, is not inconsiderable; extreme candor is to be shown and the highest credit is due to those who busy themselves in this severe and humble labor; and present the results to the public eye with all the accuracy which extreme diligence an pains taking can secure. This work, though compressed into a thin octavo, could not have been executed in the manner it has been done, without application to numerous, various, difficult and distant sources of information. We shall make such few extracts from it as may be most likely to command attention.

The rents of land in England, vary from 20*s*. to 3*l*. sterling per acre. In Scotland, from 20*s*. to 7*l*. per acre. The latter very high rents are in the finely cultivated districts of Mid Lothian, and probably in the neighborhood of city markets. The average rent is put at 25*s*. to the acre. Rent in Ireland, on land manured for a crop, is 9*l*.; not manured 2*l*. to 3*l*. The average rent in Ireland is put down at 23*s*. per acre. Land in Ireland sold for thirty years, we should rather say leased, is calculated to yield 3½ per cent. Rent of sheep pasture in Scotland, is from 3*s*. to 6*s*. per acre. The wear and tear of horses is estimated at one-tenth; so that there is a complete absorption of this species of capital once in ten years. This fact, if well established, has a most important bearing upon the question of the comparative expediency of employing horses or oxen for farming purposes; the former a deteriorating, the latter when properly managed, an improving capital. This single circumstance of difference will not however by any means decide the question. Many other matters are to be taken into the account, and at present we forbear a judgment.

HORSES.—The whole number of horses now owned (1832) in Great Britain 1.412,-797. Add for Ireland one half more 706,-398. Total. Great Britain and Ireland 2.119,705. We have in a note some other details. The number of horses in the Prussian provinces was in 1825—Horses 1.202,-642. Colts, 199,706. Total, 1.402,348. The number of horses in France is stated to be 2.400,000. The estimated value of riding and carriage horses in England, is 40*l*. each—of horses for agricultural purposes, 25*l*. each. Total value, £60,630,130 sterling—a considerable capital to be literally *worked up* once in ten years.

BLACK CATTLE.—The number of Black Cattle in the United Kingdom is estimated at 15.000,000. According to the agricultural report of 1833, the value of cows bought, is from 13*l.* to 15*l.*—and of oxen, working, 14*l.* to 16*l.*, and of those sold from 18*l.* to 20*l.* The wear and tear, or loss in cattle annually, is reckoned as in horses, about one-tenth. The absolute loss of one-tenth of black cattle, by disease or accident, so as to be worthless, excepting for their hides, as of horses, in a year, must, if so understood, be a great overstatement. The total number of cattle and calves slaughtered in London in the year 1834–5, was 177,000. The average weight of the cattle was 880 lbs. each. The number slaughtered in Liverpool, Manchester, Leeds, Sheffield and Birmingham, according to the Agricultural Report of 1821, was yearly 47,859 cattle, 668 lbs. each; and 52,448 calves at 90 lbs. each. The number killed in Ireland to procure salt-beef must be great, when it is known that reduced as that salt-beef trade is, still the quantity exported to all foreign parts was in 1825, 73,135 barrels, or 219,305 cwts., equal to at least 30,000 of the heaviest oxen alluded to. The Kyloe breed of cattle in the West Highlands are very numerous; thousands of these cattle are fed, and fattened, and slaughtered yearly in every part of Scotland and England; their price is very high; three years old, 13 to 14 guineas each in 1816. The total number, classes, and value of black cattle, thus: Bulls, young and old, 500,000. Cows, do., 7,000,000. Oxen, &c. fattened to kill, 2,000,000. Oxen growing up for fatting 4,000,000. Oxen, used to work, 500,000. Cattle to supply wastage, 1,400,000. Total, 15,400,000. The total value, which, at 14*l.* per head, we think must be an over-estimate, is set down at £215,600,000.

A note here, in giving the modes of keep in some places, states that in Jutland a cow yields from 64 to 84 lbs. of butter; in Holland, the same; in Zealand, less milk given to calves, 84 lbs. do. A horse has weekly 84 lbs. of straw, 56 lbs. of hay; 88 lbs. of barley or 96 lbs. of oats. A cow of middle size daily 8 lbs. of straw and 8 lbs. of hay during the 220 days she is in the stall. When fed with potatoes, must have 52 lbs. per day, but with this, less straw and hay. From seven to ten sheep consume as much as one cow during 180 days they are housed. The number of black cattle in the United States in 1827, was estimated at 14,000,000. By what means this estimate was formed, I am unable to say.

Poultry and Rabbits.—"The amount of capital vested in these two species of agricultural stock is of no mean importance, and much more considerable than is generally thought. According to the Times newspaper, Nov. 20, 1835, the consumption of poultry in London for the year was about 80,000*l.*, and rabbits 14,000*l.* On the same scale for the kingdom, the value of the former would be nearly 1,000,000*l.*, and the latter in number 168,000, and the value 54000*l.* The skin of the rabbit is very valuable, being double the value of the carcase. At Dunfries' February fair, 30,000 rabbit-skins have been sold. In Feverham, rabbits and pigeons are very numerous. In the district of Brundon, Suffolk, are 350 pigeon houses; here also 40,000 rabbits are produced yearly. The Agricultural Committee of 1833, sets down the produce of pigs and poultry on a farm of 100 acres at 20*l.* annually; this, taking the farms wholly arable at 490,000, gives 9,800,000*l.* yearly, which sum, even on this scale, must be more than doubled, for the poultry, &c., raised by sheep farmers, and all other classes, who keep poultry; also it must be taken into the account that the above produce, at 20*l.*, is exclusive of the value consumed on the farms, &c., which, say one-fourth, would give for pigs and poultry, a consumption annually of about 25,000,000*l.*, leaving for poultry about 2,500,000*l.*; and admitting that stock is in the proportion of four-fifths to the produce, we have a capital of 9,000,000*l.* or 10,000,000*l.* invested in poultry, rabbits, &c., which, great as it is, is probably very near the truth. When we look at the immense number of eggs, brought from Ireland (50 tons of eggs and 10 tons of live and dead poultry being shipped from Dublin alone in one day) and 66,000,000 eggs, imported from France for London alone; and this immense number, a trifle certainly to what are produced in this country, we shall cease to wonder at the large capital here stated to be invested in poultry of all kinds. The quantity of eggs imported into Liverpool from Ireland in 1832 was 4097 crates, value 81,940*l.*, which at 6*d.* per dozen, gives 3,777,600 dozens, and the number 39,331,200. The number imported into Glasgow from Ireland, in 1835, by the Custom-House entries, was 19,321 cwts.; at nine to a pound gives 17,459,568. In 1833, the import has increased to 7,857 crates, or upwards of 70,000,000." Of sheep and swine, we shall give further details on a future occasion.

Produce of one Seed.—Extract from proceedings at a late meeting of the Northamptonshire Farming Society in England:

Mr. Hillyard then produced his bag of turnip seed, for which a great scramble took place amidst much laughter. He observed that one of the advantages of these turnips was, that they would not run to top, if allowed to stand till late in the year. He had seen turnips in April run to top until they resembled a painter's brush. As an evidence that they were well worth attending to, he would mention that some time ago, he was walking over a turnip field in a distant county, when he perceived that the turnips were exactly the same sort as those he was now showing. Upon mentioning the fact to the owner, he confirmed it, adding that his son had obtained *one of the seeds* handed round by him after the dinner of the society; that he had sown it; and liked it so much that he preserved the produce; and had now his farm stocked from that insignificant origin.—[B. Farmer's Magazine, Oct., 1836.

Death of Rev. Henry Berry.—By a late number of the British Farmer's Magazine, we have the painful annunciation of the death of the Rev. Henry Berry, for some time the editor of that useful publication.—He died on the 24th August last. He was eminently distinguished as a scientific and practical farmer; for the zealous aid which he was always ready to lend to the farming interests; and particularly for his able defence of, and his long and distinguished success in improving the breed of improved Durham Short Horns. The death of such a friend of agriculture is a serious public loss.

H. C.

From the Journal of the Franklin Institute.

NEW PATENT LAW.

We have now the pleasure of presenting to the public the Law for the restoration of the Records and Models of the Patent Office, which will be found, also, to contain various provisions tending to secure the rights of bona fide inventors. For whatever there is of good in this law, and we think that there is much that is so, the public are indebted to the indefatigable exertions of the Hon. John Ruggles, of the Senate of the United States, who has devoted himself to this subject with equal zeal and success, from the inception of the bill, to its final signature by the President, at the moment before his term of office expired.

AN ACT,

In addition to the act to promote the progress of science and useful arts.

And be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person who may be in possession of, or in any way interested in, any patent for an invention, discovery, or improvement, issued prior to the fifteenth day of December, in the year of our Lord one thousand eight hundred and thirty-six; or in an assignment of any patent, or interest therein, executed and recorded prior to the said fifteenth day of December, may, without charge, on presentation or transmission thereof to the Commissioner of Patents, have the same recorded anew in the Patent

Office, together with the descriptions, specifications of claim, and drawings annexed or belonging to the same; and it shall be the duty of the Commissioner to cause the same, or any authenticated copy of the original record, specification, or drawing which he may obtain, to be transcribed and copied into books of record to be kept for that purpose; and wherever a drawing was not originally annexed to the patent and referred to in the specification, any drawing produced as a delineation of the invention, being verified by oath in such manner as the Commissioner shall require, may be transmitted and placed on file or copied as aforesaid, together with the certificate of the oath; or such drawings may be made in the office, under the direction of the Commissioner, in conformity with the specification. And it shall be the duty of the Commissioner to take such measures as may be advised and determined by the Board of Commissioners provided for in the fourth section of this act, to obtain the patents, specifications, and copies aforesaid, for the purpose of being so transcribed and recorded. And it shall be the duty of each of the several clerks of the Judicial Courts of the United States, to transmit, as soon as may be, to the Commissioner of the Patent Office, a statement of all the authenticated copies of patents, descriptions, specifications, and drawings of inventions and discoveries made and executed prior to the aforesaid fifteenth day of December, which may be found on the files of his office; and also to make out and transmit to said Commissioner, for record as aforesaid, a certified copy of every such patent, description, specification, or drawing, which shall be specially required by said Commissioner.

Sec. 2. *And be it further enacted,* That copies of such record and drawings, certified by the Commissioner, or, in his absence, by the chief clerk, shall be prima facie evidence of the particulars of the invention and of the patent granted therefor, in any judicial court of the United States, in all cases where copies of the original record or specifications and drawings would be evidence without proof of the loss of such originals; and no patent issued prior to the aforesaid fifteenth day of December shall after the first day of June next, be received in evidence in any of the said courts in behalf of the patentee or other person who shall be in possession of the same, unless it shall have been so recorded anew, and a drawing of the invention, if separate from the patent, verified as aforesaid, deposited in the Patent Office; nor shall any written assignment of any such patent, executed and recorded prior to the said fifteenth day of December, be received in evidence in any of the said courts in behalf of the assignee or other person in possession thereof, until it shall have been so recorded anew.

Sec. 3. *And be it further enacted,* That whenever it shall appear to the Commissioner that any patent was destroyed by the burning of the Patent Office building on the aforesaid fifteenth day of December, or was otherwise lost prior thereto, it shall be his duty, on application therefor by the patentee or other person interested therein, to issue a new patent for the same invention or discovery, bearing the date of the original patent, with his certificate thereon that it was made and issued pursuant to the provisions of the third section of this act, and shall enter the same of record: *Provided however,* That before such patent shall be issued, the applicant therefor shall deposite in the Patent Office a duplicate, as near as may be, of the original model, drawings, and description, with specification of the invention or discovery, verified by oath, as shall be required by the Commissioner; and such patent and copies of such drawings and descriptions, duly certified, shall be admissable as evidence in any judicial court of the United States, and shall protect the rights of the patentee, his administrators, heirs, and assigns, to the extent only in which they would have been protected by the original patent and specification.

Sec. 4. *And be it further enacted,* That it shall be the duty of the Commissioner to procure a duplicate of such of the models destroyed by fire on the aforesaid fifteenth day of December, as were most valuable and interesting, and whose preservation would be important to the public; and such as would be necessary to facilitate the just discharge of the duties imposed by law on the Commissioner in issuing patents, and to protect the rights of the public and of patentees in patented inventions and improvements: *Provided,* That a duplicate of such models may be obtained at a reasonable expense: *And provided, also,* That the whole amount of expenditure for this purpose shall not exceed the sum of one hundred thousand dollars. And there shall be a temporary board of Commissioner, to be composed of the Commissioner of the Patent Office and two other persons to be appointed by the President, whose duty it shall be to consider and determine upon the best and most judicious mode of obtaining models of suitable construction; and, also, to consider and determine what models may be procured in pursuance of, and in accordance with, the provisions and limitations in this section contained. And said commissioners may make and establish all such regulations, terms, and conditions, not inconsistent with law, as in their opinion, may be proper and necessary to carry the provisions of this section into effect, according to its true intent.

Sec. 5. *And be it further enacted,* That whenever a patent shall be returned for correction and re-issue under the thirteenth section of the act to which this is additional, and the patentee shall desire several patents to be issued for distinct and separate parts of the thing patented, he shall first pay, in manner and in addition to the sum provided by that act, the sum of thirty dollars for each additional patent so to be issued: *Provided, however,* That no patent made prior to the aforesaid fifteenth day of December, shall be corrected and re-issued until a duplicate of the model and drawing of the thing as originally invented, verified by oath as shall be required by the Commissioner, shall be deposited in the Patent Office. Nor shall any addition of an improvement be made to any patent heretofore granted, nor any new patent be issued for an improvement made in any machine, manufacture, or process, to the original inventor, assignee, or possessor of a patent therefor, nor any disclaimer be admitted to record, until a duplicate model and drawing of the thing originally intended, verified as aforesaid, shall have been deposited in the Patent Office, if the Commissioner shall require the same; nor shall any patent be granted for an invention, improvement, or discovery, the model or drawing of which shall have been lost, until another model and drawing, if required by the Commissioner, shall, in like manner, be deposited in the Patent Office; and in all such cases, as well as in those which may arise under the third section of this act, the question of compensation for such models and drawings, shall be subject to the judgment and decision of the Commissioners provided for in the fourth section, under the same limitations and restrictions, as are therein prescribed.

Sec. 6. *And be it further enacted,* That any patent hereafter to be issued, may be made and issued to the assignee or assignees of the inventor or discoverer, the assignment thereof being first entered of record, and the application therefor being duly made, and the specification duly sworn to by the inventor. And in all cases hereafter, the applicant for a patent shall be held to furnish duplicate drawings, whenever the case admits of drawings, one of which to be deposited in the office, and the other to be annexed to the patent, and considered a part of the specification.

Sec. 7. *And be it further enacted,* That, whenever any patentee shall have, through inadvertence, accident or mistake, made his specification of claim too broad, claiming more than that of which he was the original or first inventor, some material and substantial part of the thing patented being truly and justly his own, any such patentee, his administrators, executors, and assigns, whether of the whole or of a sectional interest therein, may make disclaimer of such parts of the thing patented, as the disclaimant shall not claim to hold by virtue of the patent or assignment, stating therein the extent of his interest in such patent; which disclaimer shall be in writing, attested by one or more witnesses, and recorded in the Patent Office, on payment by the person disclaiming, in manner as other patent duties are required by law to be paid, of the sum of ten dollars. And such disclaimer shall thereafter be taken and considered as a part of the original specification, to the extent of the interest which shall be possessed in the patent or right secured thereby, by the disclaimant, and by those claiming by or under him subsequent to the record thereof. But no such disclaimer shall affect any action pending at the time of its being filed, except so far as may relate to the question of unreasonable neglect or delay in filing the same.

Sec. 8. *And be it further enacted,* That, whenever application shall be made to the Commissioner for any addition of a newly discovered improvement to be made to an existing patent, or whenever a patent shall be returned for correction and re-issue, the specification of claim annexed to every such patent shall be subject to revision and restriction, in t e same manner as are original applications for patents; the Commissioner shall not add any such improvement to the patent in one case, nor grant the reissue in the other case, until the applicant shall have entered a disclaimer, or altered his specification of claim in accordance with the decision of the Commissioner; and in all such cases, the applicant if dissatisfied with such decision, shall have the same remedy and be entitled to the benefit of the same privileges and proceedings as are provided applicationsoriginal case of by law in the for patents.

SEC. 9. *And be it further enacted*, Any thing in the fifteenth section of the act of which this is additional to the contrary notwithstanding, That, whenever by mistake, accident, or inadvertence, and without any wilful default or intent to defraud or mislead the public, any patentee shall have in his specification claimed to be the original and first inventor or discoverer of any material or substantial part of the thing patented, of which he was not the first and original inventor, and shall have no legal or just right to claim the same, in every such case the patent shall be deemed good and valid for so much of the invention or discovery as shall be truly and bona fide his own, provided it shall be a material and substantial part of the thing patented, and be definitely distinguishable from the other parts so claimed without right as aforesaid. And every such patentee, his executors, administrators, and assigns, whether of a whole or a sectional interest therein, shall be entitled to maintain a suit at law or in equity on such patent for any infringement of such part of the invention or discovery as shall be bona fide his own as aforesaid, notwithstanding the specification may embrace more than he shall have any legal right to claim. But, in every such case in which a judgment or verdict shall be rendered for the plaintiff, he shall not be entitled to recover costs against the defendant, unless he shall have entered at the Patent Office, prior to the commencement of the suit, a disclaimer of all that part of the thing patented which was so claimed without right: *Provided, however*, That no person bringing any such suit shall be entitled to the benefits of the provisions contained in this section who shall have unreasonably neglected or delayed to enter at the Patent Office, a disclaimer as aforesaid.

SEC. 10. *And be it further enacted*, That the Commissioner is hereby authorized and empowered to appoint agents in not exceeding twenty of the principal cities or towns in the United States, as may best accommodate the different sections of the country, for the purpose of receiving and forwarding to the Patent Office all such models, specimens of ingredients and manufactures, as shall be intended to be patented or deposited therein, the transportation of the same to be chargeable to the patent fund.

SEC. 11. *And be it further enacted*, That, instead of one examining clerk, as provided by the second section of the act to which this is additional, there shall be appointed, in manner therein provided, two examining clerks, each to receive an annual salary of fifteen hundred dollars; and also an additional copying clerk, at an annual salary of eight hundred dollars. And the Commissioner is also authorized to employ, from time to time, as many temporary clerks as may be necessary to execute the copying and draughting required by the first section of this act, and to examine and compare the records with the originals, who shall receive not exceeding seven cents for every page of one hundred words, and for drawings, and comparison of records with originals, such reasonable compensation as shall be agreed upon or prescribed by the Commissioner.

SEC. 12. *And be it further enacted*, That, whenever the application of any foreigner for a patent shall be rejected and withdrawn for wnta of novelty in the invention, pursuant to the seventh section of the act to which this is additional, the certificate thereof of the Commissioner shall be a sufficient warrant to the Treasurer to pay back to such applicant two-thirds of the duty he shall have paid into the Treasury on account of such application.

SEC. 13. *And be it further enacted*, That, in all cases in which an oath is required by this act, or by the act to which this is additional, if the person of whom it is required shall be conscientiously scrupulous of taking an oath, affirmation may be substituted therefor.

SEC. 14. *And be it further enacted*, That all monies paid into the Treasury of the United States for patents and for fees for copies furnished by the Superintendent of the Patent Office prior to the passage of the act to which this is additional, shall be carried to the credit of the patent fund created by said act; and the monies constituting said fund shall be, and the same are hereby, appropriated for the payment of the salaries of the officers and clerks provided for by said act, and all other expenses of the Patent Office, including all the expenditures provided for by this act; and also, for such other puposes as are or may be hereafter specially provided for by law. And the Commissioner is hereby authorized to draw upon said fund, from time to time, for such sums as shall be necessary to carry into effect the provisions of this act, governed, however, by the several limitations herein contained. And it shall be his duty to lay before Congress, in the month of January, annually, a detailed statement of the expenditures and payments by him made from said fund.

And it shall also be his duty to lay before Congress, in the month of January, annually, a list of all patents which shall have been granted during the preceding year, designating, under proper heads, the subjects of such patents, and furnishing an alphabetical list of the patentees, with their places of residence; and he shall also furnish a list of all patents which shall have become public property during the same period; together with such other information of the state and condition of the Patent Office, as may be useful to Congress or to the Public.

Approved, March 3d. 1837.

From the New-York Farmer.

POPPY SEED OIL.—Many of our readers will probably recollect that we published a communication in the January No. of the Farmer on the subject of *Poppy Seed Oil*. The facts set forth in that communication attracted the attention of some of our readers, who take a deep interest in the introduction of new branches of industry; and we, at their request, applied to the writer of the communication referred to for more particular information in relation to the mode of cultivation; and we are now gratified to be able to publish the following communication from a gentleman whose statements may be fully relied upon. For this very interesting communication, and the capsules containing some of the seed, which we shall plant with great care, he will please to accept of our thanks, and the numbers of the Farmer which we forward to him. We shall look with much interest for further communications on this subject from the same pen, and also in relation to the cultivation of *Madder*. If convenient we should be much obliged to Mr. Bishop, at a suitable time, for a few seeds, or roots of the Madder to plant.

For the New-York Farmer.

MR. MINOR.—Dear Sir: Your letter of the 10th inst. to E. S. Scripture, has been handed me, with a request to answer your several inquiries in relation to the cultivation of the Poppy and Madder. You inquire, 1st. What kind of Poppy is best? 2d. What kind of soil is the best? 3d. How do you plant or sow it? 4th. At what time should it be planted or sowed? 5th. How much seed to the acre? 6th. How do you cultivate it? 7th. How do you gather it? &c., &c. As I have some practical knowledge of its cultivation, I cheerfully answer the above inquiries, so far as my experience and information enable me to do. In answer to the first inquiry, I send you some of the seed capsules, containing the seed. This species of the Poppy, having imperforate seed capsuls, appears altogether the best adapted for cultivation for obtaining seed, as you will readily perceive, on examination, as the perforate, or open seed capsules, would render the gathering of the crop tedious and expensive.

2d. This species of the Poppy has a very general adaptation to all the different soils usually met with in this State. Yet when cultivated as a field crop, for the purpose of obtaining oil from the seed, it should have a warm dry soil,—either sand and loam, or loamy gravel. Planted on a deep, moist, and very rich soil, it continues to shoot up lateral branches which bud and blossom until killed by very severe frosts. Under such circumstances, we can never have that perfect and simultaneous maturity of the bolls which is necessary to obtain a good crop of seed. This difficulty, however, can be obviated in a great measure, if not entirely, by the method of sowing and cultivation mentioned in answering your 3d inquiry.

3d. Sow the seed in drills, eight inches apart, and four inches in the drill, with as light a covering as practicable. If the weather be damp and rainy immediately after sowing, the seed will vegetate in a few days. The objections to sowing broad cast are, that much of the seed is covered too deep if the common harrow is used, and that so small a portion of it has an equal covering of earth, the crop will never be uniformly ripened. Those seeds having a deep covering either not vegetating at all, or so late in the season that some part of the crop will be fit for harvesting, while another is in blossom, and another with the bud in embryo. This was the case with a field sowed broad-cast, on a deep rich alluvial soil, and was never harvested, winter setting in while a portion of the crop was in blossom, and another in the bud. I have a hand drill, of different construction from any I have examined. It sows the poppy seed with the most perfect accuracy, dropping just one or two seeds at a time. I may, at some future period, send you a drawing of it. Another objection to sowing broad-cast is, the utter impossibility of making a uniform distribution of seed. If however this method *is* practised, the seed should be sown just before rain, having the surface of the field made as smooth and level as may be, and no covering attempted.

4th. Sow the seed as early in the season as a good preparation of the soil can be made.

5th. An acre, with the distances before mentioned, will contain 196,020 plants, and unless there be an unnecessary waste of seed, one pint will prove sufficient for an acre.

6th. The growth of the plant will be so rapid as not to require, or even admit, of much cultivation. The plants should be thinned out when small, and all luxuriant weeds removed that would interfere with, or check their growth. The poppy is very hardy,—not liable to be destroyed by any insects, or injured by early frosts.

7th. Reap it as you do wheat, and bind in bundles. Thresh it upon the barn floor, (which should be very tight,) in the same manner as wheat, and separate the seed from the broken capsule and stalks with a wire seive.

The oil may be extracted in the same manner as from flax seed—and the roller and plate used in the first operation upon flax seed is well adapted for poppy seed After it has passed through the rollers, a portion of the oil may be taken out for table use—and the cake then broken up, and ground under the stone in the same manner as flax seed—and, after heating in the cylinder, the remainder of the oil may be expressed. The cold expressed oil is very valuable for many purposes. The genuine Macassar oil for improving and beautifying the human hair is the oil of poppy seed. The article is often counterfeited at present, by substituting fine olive oil for the poppy. This deception may be detected in cold weather—the olive oil loosing entirely its fluidity, while the poppy oil is not in the least affected by the most intense degrees of cold.

The quantity of seed an acre of land will produce, must depend very much on the soil and cultivation. If the plants stand singly upon a good soil the distances above mentioned, each one will produce from 4 to 7 heads, or seed capsules, averaging throughout the field 5 to every plant, making 980.100 to the acre. Of those I raised last season, 12 often produced one gill of seed—but this was measured before it was *quite* dry—so that in estimating the average quantity, we will say 25 heads to the gill. This calculation would give the enormous quantity of 150 bushels of seed to the acre.

The experiment has not been made on an acre of ground, which it must be acknowledged is the fairest way of testing the productiveness of *any* crop - but it will be found *practically true*, that an acre of good land, well fitted, will produce 196,020 poppy plants, of vigorous growth, averaging 5 seed capsules each—and in proof of the quantity of seed they contain, you have but to examine those I send you. I shall be able to furnish you with the results of further experiments, as early as the coming October, and will send you some of the seed capsules entire—that you may distribute them among your friends if they are not supplied. In concluding my remarks, for the present, I will say, that, although the enormous quantity of 150 bushels of seed to the acre, will not often, if ever, be realized by the cultivator, owing to negligence and inattention—yet one half the quantity will render this business one of the most profitable branches of agriculture—the value of the seed being at present not less than $2.50 per bushel. In regard to Madder—I have an acre under cultivation, and have availed myself of most of the practical knowledge of our farmers in this region on this subject. I must defer any communication on this subject for a few weeks—probably until after the first *laying* or *soiling*, as I anticipate some innovations upon the customs of our farmers in this matter.

L. Bishop.

Sauquoit, Oneida Co., May 4, 1837.

From the Scientific and Literary Journal.

PRECIOUS STONES.

Gems, or precious stones, as they are frequently called, are for the most part transparent, and have a vitreous or glassy appearance. Their different colors are occasioned by metallic oxydes of various kinds with which they are impregnated. Some writers have classed them by their colors, but this is a very uncertain mode, since different gems have not unfrequently the same color, and in many cases, the same gems are of different colors. The usual distinction of gems into oriental and occidental is also liable to error, since the best gems, from whatever part of the world they are brought, are always called oriental. The most estimable of all the species are the diamond, ruby, emerald, and sapphire. The amethyst, topaz, and aqua marine are considered of nearly equal value with each other; and the garnet is the cheapest of precious stones.

The ancients engraved upon several kinds of gems, but they appear to have been ignorant of the art of cutting the diamond, the ruby, and the sapphire, which were too hard for them to operate upon. The emerald and the opal were too highly esteemed as precious stones to have often found their way into the hands of engravers. The garnet was often engraved upon, and there are many master-pieces of the art in chalcedony and cornelian. Onyx and sardonyx were employed for that species of engraving in relief called cameos; and in many instances, it is pleasing to observe with what dexterity the ancient artists availed themselves of the different colors in the alternate zones to express the different parts and shades of their figures.

DIAMONDS.

The diamond, or adamant of the ancients, which, by universal consent, has been placed at the head of the mineral kingdom, is the hardest of all bodies, and, when pure, is perfectly transparent, like crystal, but infinitely more brilliant.

The best are brought from the East Indies; and the principal mines are those of Raolconda and Coulour, in the province of Golconda; and that of Soumelpour, or Goual, in Bengal. At Raolconda they are found in deep crevices of the rocks. Persons, by means of long iron rods, with hooks at the ends, draw out from these crevices the loose contents, and afterwards wash them in tubs, for the purpose of discovering the diamond.

As soon as all the earthy particles have been washed away, the gravel-like matter that remains is raked together, the stones are thrown out, and what diamonds happen to be present are found among the refuse that is left.

In order to ascertain whether a stone which has been found be really a diamond, the workmen have a mode of placing it upon a hard substance, and striking it with a hammer. If it resist the blow, or seperate into leaves, it must be a diamond; but, in the latter case, the discovery is made at an immense expense, since by thus diminishing the size, its value must also, of course, be greatly diminished.

When the diamond is rubbed, it will attract bits of straw, feathers, hairs, and other small objects; and if exposed to the rays of the sun, and immediately taken into a dark place, will appear luminous.

CHRYSOLITE.

Chrysolite is the softest of all the gems, and usually of yellowish green color, though sometimes it is grass green, or bluish green, but with a tinge of brown.

Though scarcely harder than glass, and consequently inferior to most other gems in lustre, these stones are not unfrequently used in jewelry, particularly for necklaces and ornaments for the hair; and when well matched in color, and properly polished, their effect is very good. They are, however, too soft for ring stones.

This stone is imported from the Levant, and is said to be found in Upper Egypt.

GARNET.

This stone is found abundantly in many mountains of different parts of the world. But those of the hardest and best quality are brought from Bohemia, where there are regular mines of garnets; and a great number of persons are there employed in collecting, cutting and boring them. The boring is performed by means of an instrument, having a diamond at its extremity, which is rapidly turned by a bow.

Garnets vary much in size, some of them being upwards of an inch in diameter, and others not larger than a pin's head. Generally speaking, they are stones of inferior value.

In comparison with the ruby, those even of finest quality have a very sombre appearance. The kinds most esteemed are such as have a clear and intense red color, or a rich violet or purplish tinge. The latter are called *Syrian garnets*, not from the country of that name, as is usually supposed, but from the word *soranus* which signifies a *red stone*,

The best garnets are cut, in the manner of other precious stones, and set upon a foil of the same color; but some are cut into beads, and strung for necklaces.

SAPPHIRE.

The oriental sapphire is a gem of blue color, the shades of which vary, from a full and deep tint to a nearly colorless appearance.

We are chiefly indebted for the sapphire to the East Indies and the island of Ceylon. where it is found among the sand of the rivers.

In hardness the sapphire ranks next to the ruby, and in value it is about equal to the emerald. In the Museum of Natural History at Paris, there is a sapphire which weighs upwards of sixty-six carats, and which was placed there from the wardrobe of the crown.

It is said that sapphires lose their color in the fire, and that, after having been subjected to heat, they are so hard and transparent as sometimes to be sold for diamonds.

RUBY.

Oriental ruby is a precious stone of very intense and bright red color, occasionally varied with blue, and sometimes partically colored.

The ruby is imported into this country from the East Indies, though seldom in a rough state, since the stones are almost always first cut by the Indians for the purpose of ascertaining their value. They are said to be found in the sand of certain streams near the town of Sirian, the capital of Pegu; and with sapphires in the sand of the rivers of Ceylon.

The hardness of this stone is such that the ancients do not appear to have possessed the art of cutting it; and in the improvements which have of late been made in the construction of time-keepers, no stones have been found sufficiently hard for jewelling the holes, except the ruby and the diamond.

AMETHYST.

The amethyst was a gem well known to the ancient Greeks and Romans, and held by them in great esteem. Its name is derived from the Greek language, and implies a power of preventing intoxication, which, originating no doubt in the resemblance of its color to that of wine, and the absurd doctrine of sympathies, it was believed by the ancients to possess They ascribe to it many other virtues equally surprising and equally absurd, particularly that the wearing of it would expel melancholy, procure the confidence and friendship of princes, render people happy, and even dispel storms of wind and hail. The ancients frequently engraved upon the amethyst; and their favorite subject was the representation of Bacchus and his followers.

Persons accustomed to make imitations of the precious stones find the amethis one of the easiest to be counterfeited.

TOPAZ.

The topaz is a gem usually of a wine yellow color, but sometimes orange, pink, blue, and even colorless like rock crystal.

The word topaz is derived from an island in the Red Sea, where the ancients found a stone, but very different from ours, which they denominated topaz. The best, are of deep color, which are imported from Brazil; and the most brilliant are supposed to be those of Saxony; but the latter are generally of very pale color. This species of gem is also found in Siberia and other countries. It is often defective in transparency, and sometimes even opaque.

It is a somewhat singular circumstance, that if the topaz of Saxony be gradually exposed to a strong heat in a crucible, it will become white; and, on the contrary, that the Brazilian topazes by the same process become red or pink. The latter are not unfrequently sold, as natural stones of this color, by the name of *pink topazes* and *Brazilian rubies*.

The *blue topaz* is a rare Brazilian gem, which varies in size from one or two carats to two or three ounces. The *white topaz* is perfectly colorless. This stone, which generally occurs of small size, is in considerable estimation In Brazil. It is usually employed in circular ear-rings, or for the purpose of being set round yellow topazes.

EMERALD.

The emerald is a well known gem of pure green color. By the ancients it was in great request, particularly for engraving upon. They are said to have procured it from Ethiopia and Egypt. The most intensely colored and valuable emeralds that we are acquainted with are brought from Peru.

The emerald is one of the softest of the precious stones; and is almost exclusively indebted for its value to its charming color. The brilliant purple of the ruby, the golden yellow of the topaz, the celestial blue of the sapphire, are all pleasing tints; but the green of the emerald is so lovely, that the eve, after glancing over all the others, finds delight in resting upon this.

The largest emerald that has been mentioned, is one said to have been possessed by the inhabitants of the Valley of Manta in Peru, at the time when the Spaniards first arrived there. It is recorded to have been as big as an ostrich's egg, and to have been worshipped by the Peruvians, under the name of the Goddess, or Mother of Emeralds. They brought smaller ones as offerings to it, which the priests distinguished by the appellation of daughters. Many fine emeralds are stated to have been formerly bequeathed to different monasteries on the continent; but the greater part of them are said to have been sold by the monks, and to have had their place supplied with colored glass imitations. These stones are seldom seen of large size, and at the same time entirely free from flaws.

The emerald, if heated to a certain degree, assumes a blue color; but it recovers its own proper tint when cold. When the heat is carried much beyond this, it melts into an opaque colored mass.

AQUA MARINE.

The beryl, or aqua marine, is a light or mountain green variety of the emerald, sometimes straw colored, bluish, yellow, or even white.

These stones are of such frequent occurrence, even in large pieces, perfectly clear and free from flaws, and in general so soft, and have so little the brilliancy of other gems, that they are generally considered of very inferior value. The most beautiful kinds are brought from Dauria, on the frontiers of China, from Siberia, and from Brazil.

TOURMALINE.

The tourmaline is a stone belonging to the same family as the emerald, and generally of a smoky blackish color, though it is sometimes green, red, blue, or brown.—When not very thick, it is transparent.

This stone was first made known in Europe about the beginning of the last century, by the Dutch merchants, who brought it from the island of Ceylon, where it is principally found. When strongly heated, it becomes electric; one of the summits of the crystal negatively, and the other positively. An early writer by whom it is mentioned, says that "it has the property not only of attracting ashes from the warm or burning coals, but that it also repels them again, which is very amusing: for as soon as a small quantity of ashes leap upon it, and appears as if endeavoring to writhe themselves by force into the stone, they in a little time spring from it again, as if to make a new attempt. It was on this account that the Dutch called it the ashes drawer."

When laid on the table, the tourmaline appears dark and opaque; but when held against the light, it has generally a pale brownish hue. It is sometimes cut, polished and worn as a gem; but on account of the muddiness of its colors, is not in general much esteemed. Those persons who wear tourmalines set in rings, consider them more as objects of curiosity than of elegance: they show them as small electrical instruments, which it is only necessary to expose for a little while to the heat of a fire, to make them attract and repel light bodies, to the amusement of all who are unacquainted with their qualities.

CORNELIAN.

Cornelian is another kind of agate, usually of a red or flesh color, though sometimes white, orange or yellow.

On several of the British shores, cornelians are found with other pebbles; but the most beautiful and valuable kinds are imported from the East Indies. These are sometimes so large as to measure nearly three inches in diameter. The kinds principally in request are those of pure white and bright red color; and jewellers have the art of changing the color of the yellow varieties to red, by heat.

No stone is so much in request for seals, as the cornelian: it is likewise cut into beads for necklaces, and stones for ear-rings; into crosses, bracelets, and other trinkets, which in India form a considerable branch of traffic.

ONYX.

Onyx is a kind of agate, marked alternately with white and black, or white and brown. Its name is derived from the Greek language, and has been given on account of its resemblance in color to the whitish band at the base of the human nail. The distinction which appears to be made betwixt **onyx** and **sardonyx**, arises from the colors of the former being arranged either concentrically, or in a somewhat confused manner, and those of the latter in regular stripes or bands.

Both these kinds are highly esteemed by lapidaries, for the formation of vases, snuff-boxes, and trinkets of various kinds. Of the sardonyx the ancients made those beautiful cameos, many of which still ornament our cabinets.

The onyx is imported from the East Indies, Siberia, Germany, and Portugal.

OPALS.

Opals are a semi-transparent kind of stones, which have a milky cast, and when held betwixt the eye and the light, exhibit a changeable appearance of color.

There are in Hungary some quarries or mines from which, about four centuries ago, opals were obtained in such abundance, that upwards of three hundred persons were employed in them. These quarries still produce opals, some of which are so valuable as to pass in commerce under the appellation of *oriental opals*, whilst others are so poor as to be of no value whatever to the jeweller. Opals are also found in other parts of Europe, and in the island of Sumatra, and several parts of the East Indies.

Few precious stones are more beautiful than opals. Their elegant play of colors, brilliant blue, green, red and yellow, variously modified, have procured for them a distinguished rank among the gems. Notwithstanding this, they are but ill suited to the purposes of jewelry, on account of their softness, their great frangibility, and their sometimes splitting on a change of temperature. By the Turks they are so peculiarly esteemed, that a fine opal of moderate size has been sometimes sold at the price of a diamond. The esteem in which they were held among the ancients Romans was such, that Nonius, the Roman senator, is stated to have preferred banishment to parting with a favorite opal which Mark Anthony was anxious to possess.

In the abbey of St. Denys, near Paris, there was formerly a curious ancient opal, which was green on the outside, and when viewed against the light, exhibited a fine ruby color.

In the purchasing of opals, great caution is requisite, since fine glass pastes have not unfrequently been substituted for them, and so'd at enormous prices.

Hydrophane, or *oculus mundi*, is a kind of opal, the distinguishing characteristics of which is, that it gradually becomes transparent by immersion in water. It is either of a whitish brown, yellowish, green, milky grey, or yellow color, and opaque. The name of *oculus mundi* has been given to these stones from an internal spark, or luminous spot, which changes its position according to the direction in which they are held to the light. The countries in which they are chiefly found are Hungary and Iceland.

The phenomena of their becoming transparent in water, is supposed to be occasioned by that fluid soaking through their whole substance, in the same manner as the transparency of paper is occasioned by the immersing it in oil. When taken out of the water, these stones, as they dry, become again opaque.—[Bingley's Useful Knowledge.]

New lamp.—A lamp of a new construction, which describes a circle of light of about thirty feet in diameter, of the apparent intensity of sunshine, showing the objects within its sphere as distinctly as on the table of a camera obscura, has been erected at the head of the inclined plane in St. Leonard's depot. Its object is to enable the engine-man to a distinct view of the inclined ropes during the night, and this has been fully attained. The lamp consists of an Argand burner, placed in the focus of a large speculum, of a peculiar form, by which the whole light is distributed just on the space where it is required. It is computed that the light on the above space is equal to that of twenty-five or thirty similar burners in common lamps. A lamp of this kind we have no doubt would be useful for other purposes. It appears to us that the largest assembly-rooms might be brilliantly lighted by one placed at each end of the room, and one would be sufficient to light the stage of a theatre. The cost of this one is said to be about £200 but we understand it saves an annual expense of about half that sum. The inventor is a Mr. Rankin, and he names it the conoidal lamp, probably because the light is thrown from it in the form of a cone.—[Caledonian Mercury.]

Galvanism.—Dr. Charles G. Page, of Salem, Mass., has lately made the valuable discovery that iron, lead, or any metal, may be substituted for the expensive article of copper in galvanic batteries, whereby the cost of this apparatus will be diminished by about one-half. In order that a battery of this construction should equal one of copper and zinc, it is necessary that the exciting liquid should be some acid, holding the oxide of copper in solution, such as the nitrate or sulphate of copper. A solution of blue vitriol or the sulphate of copper, is preferable from its cheapness. A small plate of lead and zinc, each the size of a cent, immersed in a wine glass of the above solution, will give bright sparks, strong shocks, and produce decompositions when connected with a spiral coil of copper ribon three hundred and twenty feet long, which is, for convenience, now generally called a dynamic multiplier. The superior action of such batteries appears to be owing to the greater readiness with which copper deposits upon another metal than itself. He has further found that a tolerably good battery may be made of one metal only, viz. zinc, provided one of the plates much exceeds the other in size, and the sulphate of copper be used as the exciting liquid. To construct a battery of this description, a number of narrow strips of sheet zinc, arranged in the form of a cylinder, are immersed in a cylinder of zinc containing a solution of the sulphate or nitrate of copper; the zinc strips answering merely for conductors.

Among other discoveries lately made by Dr. Page in relation to this subject, we notice the production of sparks and shocks from a thermo-electric apparatus, consisting of a pair of bismuth and antimony plates heated by a spirit lamp. This condition has hitherto been wanting to establish fully the identity of thermo-electric, with common galvanic currents.

Fall of Fishes from the Atmosphere in India; by M Prinsep.—The fact that fishes fall from the atmosphere in the rainy season, however incredible it may appear, has been so frequently attested by credible witnesses that it can scarcely be doubted. As for myself, my credulity is compelled to yield to the discovery I made one day of a small fish, in my pluviometer, which was situated on an isolated pile of stones about five feet high in my garden at Benares. A note from M. Cameron informs me that a rain of fishes occurred on the 19th of February, 1830 near Feridpoor. This fact was asserted before a magistrate, by many ocular witnesses, and it was their concurring testimony that towards noon of the above mentioned day, the sky was obscured, the rain commenced to fall, and shortly after, fishes of various sizes fell from the atmosphere. A large number were collected by several witnesses; some were found destitute of a head, and commenced to putrefy; others were entire and fresh, but no one dared to eat them.—[Bib. Universelle, No. 3, Mars, 1836.]

Agriculture, &c.

Beet Sugar Manufactory.—We have published occasionally statements in relation to the Beet culture for the manufacture of Sugar; but seldom any thing in relation to the manufacture of the Sugar. We therefore now give a concise description of that process. We give it for the purpose of dispelling the idea, which many entertain, that the process of manufacture is a complicated and difficult one; when in truth it is about as simple as the manufacture of *Maple* Sugar.

[From the Silk Culturist.

PROCESS OF MAKING BEET SUGAR.

The attention of the public having been some time drawn to the manufacture of sugar from the beet, and having repeatedly recommended its cultivation to farmers as a profitable crop, we have felt ourselves under an obligation to give them the details of the process by which it is extracted. We have, therefore, examined the best authorities on the subject, and consulted several gentlemen of some practical knowledge and experience in the business, and the result of our investigation is that the process is altogether more simple and less expensive than has generally been supposed. In describing the various processes in the manufacture, we have carefully avoided the use of chemical terms, and substituted language which we hope will be understood by every reader.

There are several varieties of the beet which yield sugar; but the Silesian beet is recommended as the best and most productive. This beet will come to maturity in all parts of the United States, up to the 45th degree of latitude. The soil most congenial to its growth is a light sandy loam, of good depth, and if free from stones, the better. Probably no country in the world is better adapted to the growth of this roo than the alluvial meadows on the Connecticut and other rivers of New England. The cultivation, however, need not be confined to valleys, as in most of the hill towns, lands may be found well adapted to its growth. The land is prepared for the seed by deep ploughing and pulverizing the surface. This is best accomplished by ploughing in the fall, and leaving the land in furrows through the winter. In the spring, the land should be cross ploughed and harrowed, and, if the soil be light, it will be prepared to receive the seed. The seed may be sown as early as the season will admit, broad-cast, or in drills; but ultimately the plants should be from 12 to 18 inches apart. They should be hoed and kept free of weeds—at the second hoeing they should be thinned out, and but one plant left in the hill—the surplus plants may be transplanted to vacant places in the field.

In the extraction of the sugar, the beets must first be cleaned by washing or scraping with a knife, and care be taken that all decayed parts be cut off. They must then be passed through the rasper and be reduced to a pulp—the finer they are rasped the better, as it facilitates expressing the juice. The pulp must then be put into cloth bags, and have the juice pressed out by a screw press. In France they use the hydraulic press; but a cider, or other press, will answer the purpose, and be attended with much less expense. As decomposition commences soon after the beet is out of the ground, and progresses rapidly, no time should be lost in converting them into sugar.

After the juice is expressed, and before it is converted into sugar, it must undergo four distinct and different processes. 1. Defecation. 2. Evaporation. 3. Clarification. 4. Concentration.

Defecation.

The composition of the beet juice does not differ essentially from that of the cane—it combines with the saccharine matter small quantities of malic or acetic acid, wax and mucilage, which must be extracted before evaporation is commenced. The first process, therefore, is to purify the juice, which must be done by neutralizing the acid, decomposing the wax, and coagulating the mucilage, and hence is called defecation. All this may be done by heating and mixing with it the milk of lime in about the proportion of 46 grains troy weight to the gallon. The milk of lime is prepared by slaking quicklime with hot water, and reducing it to the consistence of cream. The juice must be heated to about 160 degrees of Fahrenheit, and the milk of lime poured into it and thoroughly mixed by stirring with a stick. After it is intimately mixed, the stirring must be stopped, and the mixture suffered to rest for a short time. It must then be heated to the boiling point, which will throw the impurities upon the surface in the form of scum, when the boiling must be stopped. When the juice has become clear it must be drawn off from below, by means of a cock, or the scum must be skimmed off from the top—care being taken in either case to effect a complete separation.

Evaporation.

The next process in the manufacture is to dissipate the water, which is done by "boiling away," as it is commonly called, but in technical language, evaporation. If in the process of defecation an excess of lime has been used it should be extracted. This may be done by a mixture of sulphuric acid and water, in the proportion of one of the former to forty-four of the latter. This mixture, put in contact with the lime causes an effervescence, by which the lime is thrown off, and the cessation of which is a sure evidence that the lime is neutralized. Some manufactures say that a small portion of lime should be allowed to remain, and others that the whole should be neutralized. As practical men differ on this point, we may safely conclude it is not very material.

The juice is boiled down till it is reduced to about one-fifth or one-sixth of its original quantity. For this purpose pans or kettles may be used; but it will be seen that those vessels which present the greatest surface to the fire, and give the least depth to the juice, will best facilitate evaporation. As the water evaporates, flaky substances will separate from the juice and collect in a white foam on the surface, which must be skimmed off as it appears. To promote their separation, the boiling is commenced with a moderate fire, which is subsequently increased as they disappear. Sometimes the white of eggs beaten, or a little blood, is added for the same purpose. During the boiling, the juice will rise in froth and flow over the top of the pan, unless prevented by occasionally throwing in a small quantity of some fatty substance. Butter is commonly used, but tallow, lard, &c. will answer the same purpose. It not only causes an immediate subsidence, but hastens evaporation.

Clarification.

After being defecated and evaporated, the juice is yet in a degree impure, and the object of the next process is to separate it from its remaining impurities, and hence is called clarification. This consists in filtering it through animal charcoal granulated [burnt bones broken to grains,] and is performed in the following manner. Tubs, or vats in the form of those used for leaching ashes are made of wood or metal, and furnished with a cock inserted near the bottom. The size of the vats is immaterial; but those of the following dimensions will be found most convenient—2 feet 8 inches deep—1 foot 8 inches diameter at the top, and 11 inches at the bottom. They may be four sided or round; but those made of staves and hooped with iron hoops we should think the cheapest, and on some accounts the best.

A strainer standing on legs, and covered with coarse cloth, must first be placed in the bottom of the vat and filled with the charcoal—about 100 pounds will be necessary for a vat of the above dimensions. The charcoal must then be covered with another strainer and cloth, and the vat filled with evaporated juice, or, as it is then called, sirup. After standing long enough to leach through the charcoal, the cock must be turned and the sirup be slowly drawn off, and the vat re-filled as fast as it is emptied. The charcoal must be changed twice a day; but it may be washed and reburnt, and, thus prepared, it will answer for another filtration. This may be repeated until it is consumed.

Concentration.

The next process is to solidify the sirup, and hence is called concentration. To accomplish this it must be again evaporated until it is brought into a proper state for crystalization. As it is important that evaporation should cease as soon as it art rives at this point, Chaptal gives the following rules for ascertaining the fact. "1. Plunge a skimmer into the boiling sirup, and upon withdrawing it, pass the thumb of the right hand over its surface, mould the sirup which adheres to the thumb, between that and the fore-finger, till the temperature be the same as that of the skin—then separate the thumb and finger suddenly—if the boiling be not completed, no thread will be formed between the two; if there be a filament, the boiling is well advanced; and the process is completed as soon after as the filament breaks short, and the upper part, having the semi-transparency of horn, curls itself into a spiral. 2. The second mode of judging of the completion of the process is by observing the time when the sirup ceases to moisten the sides of the boiler, and then blowing forcibly into a skimmer which has just been immersed in it—if bubbles escape through the holes of the skimmer which ascend into the air in the same manner as soap bubbles do, the liquor is considered to be sufficiently boiled."

When the concentration arrives at this point, the sirup must be taken from the boiler and poured into large pans, for the purpose of cooling. The pans must be placed in the air, and the sirup occasionally stirred during the process of cooling, which will be completed in about two hours. On examination, the bottom and sides of the pan will be found covered with a thick bed of crystals, having but little consistence; on the surface of the sirup, a crust will also be formed. To promote crystalization, or, as it is more properly called, graining, a thin bed of brown sugar is sometimes put upon the bottom of the cooling pan, in order to make a nucleus about which the crystalized matter may gather.

After the sirup is cooled and crystalized, or grained, all that remains is to separate the sugar from the molasses, and it is fit for domestic consumption or market. To effect the separation, moulds, as they are called, must be prepared in the form of defecating vats, with the lower end drawn to a point, or so near a point as to leave a hole of three-fourths of an inch in diameter. These may be made of wood, metal or earthware, and their capacity may be regulated according to the convenience of the manufacturer. Those used in the sugar factories in France usually are large enough to contain five or six gallons They are also used in the refining process. Before using them, if of wood, they must be soaked several hours in water, and dried a short time before they are filled with sirup. Thus prepared, and with a cork in the hole at the point, they must be filled, or nearly filled, with crystalized sirup, and secured in an upright position, over a pan or tub of sufficient size to receive the quanity of molasses it contains. After standing from 12 to 36 hours, according to circumstances, the cork is withdrawn and the molasses permitted to drain off. It will at first drain off rapidly; but soon cease to flow in any considerable quantity. To hasten its separation from the sugar, which takes place slowly, the mass must be pierced with an iron spear, by thrusting it into the hole at the point, which will give it vent and cause it to drain off. This operation must be repeated as often as is necessary, and until all the molasses is extracted.

After having remained long enough to have the molasses run off, the sugar is detached from the sides of the mould with a knife, the moulds are set on the floor in a reversed position and left for two or three hours—when, by lifting from the floor and giving it a shake, the loaf will separate from the mould by force of its own weight. The head of the loaf will retain a degree of moisture and a portion of molasses, and, consequently, should be cut off, and thrown into the juice intended or the next clarification. The molasses, also, when a sufficient quantity is on hand, should be again concentrated in order to obtain all the crystalizable sugar it contains. By the foregoing processes the beet is converted into brown sugar, the kind which is consumed in the largest quantities in most families. In the manufacture of loaf, or lump sugar, there is another process called "refining;" but being foreign to our present purpose, we omit it.

From the Quarterly Journal of Agriculture.

STUDIES IN THE SCIENCE AND PRACTICE OF AGRICULTURE, AS CONNECTED WITH PHYSICS.

(Continued from page 335.)

Experiments on Feeding.—Some of the most instructive experiments upon the feeding of farm-stock with different materials, were made by an intelligent foreign agriculturist, M. Mathieu de Dombasles, and published in a work little known in this country, the *Annales de Roville*. The experiments usually made on this subject have been conducted upon the principle of continuing one species of food, such as hay or carrots, for a given time; but M. de Dombasles reflecting that it is neither natural nor agreeable to any animal to be confined for a length of time to the same species of food, adopted a different method. He separated into several groups the cattle on which he designed to experiment, and brought those in each group as nearly as possible to a given weight, by feeding them with an exactly weighed proportion of common articles of food, diversified to suit their taste. When he had proceeded so far, he then began to take away from their diversified food a known portion of one of them, such as lucern hay, (*luz rne seche*,) replacing it by some sort of root, such as carrots, gradually increased or diminished, so that each individual in the group came up to and sustained the weight it had stood at before the change. The comparison of the quantities thus ascertained by trial to be equivalent, gave the practical proportions of their nutritive properties, under the conditions thus associated.

The results thus obtained by M de Dombasles by trials with sheep, appeared to place carrots very far below the rank usually assigned to them as food for sheep by farmers on the Continent, and even as food for horses when substituted for grain. But it is important to remark, that M. de Dombasles gave the carrots in a raw state to his sheep and consequently from their stomachs being unable in the process of digestion to cause the globules in the carrot containing the dextrine to burst, they derived little nutriment from a substance which is undoubtedly very nutritive when the dextrine is developed by boiling. The intelligent farmers in Belgium, who seem to be almost a century before other parts of Europe in improvement, never, it is said, give any roots to their live stock without boiling.

The digestion of food is in all animals partly a chemical and partly a mechanical process, and varies much in different animals, even when they feed on similar aliment, for example, the rabbit, the horse, and the game-cock, when fed upon oats or barley. The horse, and even the rabbit, when fed on oats, swallow many grains without crushing them with their teeth, and their stomachs not being endowed with the power of digesting solid uncrushed grain, it is voided whole, and so little changed as frequently to be capable of germinating. In the case of the game-cock, again, and all gallinaceous fowls which feed on grain, it is uniformly swallowed whole, their bills not being adapted for bruising it like the teeth of the horse, nor for shelling it like the linnets and sparrows. But the gizzard of these fowls has not only sufficient power to crush oats and barley, but even, as Spallanzani proved, to reduce glass to powder; yet with all this power, so very much greater than the digestive powers of the horse, poultry cannot, as will immediately be proved, completely extract the dextrine from grain, unless assisted to do so by artificial means, besides their powers of digestion. The celebrated M. Reaumur undertook a series of experiments on raw and on boiled grain in feeding, which though made long before the discovery of dextrine, strongly corroborate the views of MM. Raspail and Biot, the more so, indeed, from M. Reaumur's non-acquaintance with the principle.

The farmers in France who keep poultry, have long been in the habit of cooking the grain given to fowls which they intend to fatten, boiling it in water till it is soft enough to be easily bruised between the fingers, the heat causing it to swell till the mealy portion of the grain splits the chaffy envelope, and this they term bursting. It is therefore the popular opinion, that boiled grain is more nutritive and fattening than raw grain, an opinion founded, however, upon vague notions, which M. Reaumur endeavored to base upon precise calculation.

Boiling of Grain.—For this purpose M. Reaumur caused about four measures (each $1\frac{1}{3}$ pint English or $\frac{4}{5}$ths of a chopin Scotch) of each of the six common sorts of grain, to be boiled till they were well burst, (which may be fairly taken to mean that two-thirds of the dextrine was set free,) and he found that the increase of bulk in each sort was as under:—

Four measures of oats, after being boiled to bursting, filled	7	measures.
Four measures of barley, after being boiled to bursting, filled	10	...
Four measures of buckwheat or brank, after being boiled to bursting, filled	14	...
Four measures of maize, after		

being boiled to bursting, filled above 13 ...
Four measures of wheat, after being boiled to bursting, filled little more than 10 ...
Four measures of rye, after being boiled to bursting, filled nearly 15 ...

Rice swells considerably more than any of the preceding, but was not measured.

In order to ascertain whether the boiling altered the preference of poultry for any of the particular sorts, M. Reaumur made experiments, varied in every possible way.—The fowls were furnished with two, three, four, five, and six different sorts, sometimes all the compartments of a feeding-box being filled with burst grain, each division differing from another, and sometimes each sort of grain filled two of the divisions, one having nothing but boiled, and another nothing but dry unboiled grain.

All that could be inferred from these repeated experiments was, that the greater number of fowls prefer boiled to raw grain, though there are many of them which show a preference to the raw grain on certain days, and no permanency could be discovered in the preference shown for any sort of burst grain. Some fowls, for instance, which one day preferred boiled wheat, would on other days, make choice of buckwheat or maize, oats or barley, and sometimes though more seldom, even of rye; but rye, either boiled or raw, is their least favorite sort of grain.

It follows as an important practical conclusion from such experiments, that we may make choice of the sort of grain which happens to be cheapest to feed poultry, without much if any disadvantage, always excepting rye, when other sorts are to be had on reasonable terms.

It required experiments of a different kind to prove whether there is any economy, or the contrary, in feeding poultry with boiled grain, and this was readily ascertained by finding first how much dry grain sufficed one or more fowls, and then boiling the same quantity and trying how much of that would in like manner be sufficient. The experiments which, for this purpose, M. Reaumur made with the different sorts of grain, were as follows:—

Rye.—Although, as we have seen, rye is very considerably increased in bulk by boiling, so far from being more sufficing, it becomes less so; for fowls will eat rather more of it when it is boiled than when it is raw and dry. Seven hens and a cock, which consumed only three-fourths of a measure of dry rye in one day, ate in the same time three measures of the boiled grain. Consequently, as three measures of boiled rye are equivalent to four-fifths of dry, it would cost one-twentieth more to feed fowls with boiled than with dry rye, four-fifths being one-twentieth more than three-fourths.—The globules of rye are almost the same size, according to M. Raspail, with the globules of wheat.

Oats.—It appears, that although oats are increased by boiling nearly one-half, they are not, any more than rye, rendered more sufficing as food; for the fowls, which, in two days, would have eaten four measures of dry oats, consumed in the same time several measures of the boiled grain. Consequently, so far as fowls are concerned it is no saving to boil oats; though this does not prove that the same holds with regard to horses whose power of digestion are so inferior to those of fowls.

Buckwheat or Brank.—This grain is increased by boiling still more than oats, since four measures, when well boiled, swell to fourteen. Notwithstanding, there is little advantage obtained by boiling it for fowls, as they will consume the fourteen measures of the boiled grain nearly in the same time which the four measures of the dry grain would have sufficed them.

Maize or Indian Corn.—This grain is more profitable as food for poultry when boiled than when raw; for the fowls which would have eaten a measure and a quarter of dry maize, consumed only three measures of the boiled grain, and these three are not equivalent to one measure of dry maize. But it is worth remarking, that the fowls experimented upon continued only for two days able to get through three measures a day of the boiled maize. After this time, they either lost their appetite or came to dislike the food, since they could not then eat quite two measures of the boiled grain.—Now calculating that they had continued to eat even as much as three measures of boiled maize a day, there would be a saving of more than one-fifth; and if they were satisfied with two measures, the advantage would be much more considerable, inasmuch as this would not be equivalent to two-thirds of a measure of the dry grain. The saving in this case would be one-third and one-fifth, that is eight-fifteenths or more than one-half.

Barley.—This grain also was found upon trial to be much more economical when given to poultry boiled than raw. Fowls, which would have consumed two measures of the dry barley a day, got through only three measures daily of the boiled grain.—Now, as ten measures of boiled barley are produced from four measures of dry, three measures are, therefore, equivalent to no more than six-fifths of a measure of dry.—The expense consequently in dry barley, is to that of boiled as ten-fifths to six-fifths, that is, as ten to six or as five to three, showing a saving of two-fifths by feeding poultry with boiled instead of dry barley. This result is, no doubt, owing to the more effectual bursting of the grains of fecula, and setting free the dextrine contained in them.

Wheat.—The results of the experiments on boiling grain, given above, show that wheat increases in bulk about the same as barley; but the experiments made on feeding poultry were considerably different in their results, the saving not being nearly so much with boiled wheat as with boiled barley; for the same fowls, which consumed three measures of boiled barley in one day ate three measures of boiled wheat. Now, 3 measures of boiled wheat are not equivalent to 2 measures of dry wheat, but only to a measure and a half of dry wheat, the quantity consumed in one day by the same fowls. But as a measure of boiled wheat is equivalent to no more than two-fifths of a measure of the dry grain, the three measures eaten in one day are equivalent only to six-fifths of dry wheat, and therefore the proportion of what they consumed of dry wheat was to what they consumed of the boiled, as fifteen-tenths to twelve-tenths, or as five to four; hence there is a saving of one-fifth by feeding with boiled wheat, as there is of two-fifths with boiled barley.

It is clearly proved, then, by these interesting experiments, that there is in most cases a considerable saving by feeding with boiled grain. It would be well if some intelligent gentleman would undertake similar experiments on feeding horses and cattle with boiled or steamed grain or meal. The advantage of feeding with crushed grain instead of giving it unbroken has been very satisfactorily proved and acted upon by Captain Cheyne (*Quarterly Journal of Agriculture*, iii. 1024, and iv. 378,) and recommended by Mr. Dick and others. The steaming of potatoes is well known to be advantageous in feeding both horses and cows, and more particularly in causing hens to lay, and in fattening pigs. Why should not the various sorts of grain, such as peas and beans, and meal, such as barley meal, given for similar purposes, not be advantageously increased in their nutritive properties by the same means? The expense of fuel, though it ought to be taken into the account, must be small in comparison with the advantage, at least in districts where coal or other fuel is reasonable in price. In large concerns, also, the expense of fuel would of course be proportionally less when compared with the saving in food.

Bread-making.—The most complete method hitherto discovered, for bursting all the globules of fecula, is the usual process of making bread, or, as chemists term it, *panification*. This arises from the presence in wheat flour of a substance termed gluten, associated with the globules of fecula, and constituting in the unbroken grain its cellular texture of frame-work. It would lead us too far from our present object to go into the history of this important substance minutely, but it may be necessary to state that the gluten may be procured by kneading and washing a piece of dough, made with wheat flour, in a stream of water, till all the globules of fecula are washed out. The gluten thus obtained is a greyish mass, elastic, like Indian rubber, when moist, and incapable of being dissolved in water. It is these two properties which render it so important in bread-making.

When a loaf is put into the hot oven, the steam and gases expand within it, and raise up the elastic gluten into bladder like vesicles; and by this means expose the globules of fecula in the dough more uniformly to the heat than could be effected without such agency. In consequence of this they burst; and in a well baked loaf of bread not a single unburst globule of fecula can be found. On the Continent this is practically understood in the districts where they feed their horses chiefly on bread, as in most parts of Belgium, Prussia, and Switzerland. The bread thus given to horses is coarse, dark colored, and rather sour, from leaven being employed instead of yeast; but the partial fermentation caused by the leven must assist in bursting the globules, and setting free the dextrine from the action of the acid thus developed.

According to M. Raspail, and the fact has been stated by others, the more of other fecula we mix with good wheat flour, containing its due proportion of gluten, the less increase of weight does the bread acquire For example, six pounds of flour will produce eight pounds of bread; but if three pounds of potato-starch be mixed with three pounds of wheat flour, instead of eight pounds of bread, there will only be six pounds. He explains the circumstance from the globules of fecula while unbroken not imbibing water, but being only moistened by its adhering to them; while the gluten sucks in water like a sponge, and the more it is kneaded the more water it will take up. The mixture, therefore, of other flour with that of wheat diminishes not only the weight but the nutritive materials in the bread.

Concluded in our next.

From the New-York Farmer.

AGRICULTURAL TOUR.

No. 4.

Tonawanda is a small stream flowing into the River Niagara about twelve miles above the Falls. It is dammed at its mouth and is used for several miles as part of the Erie Canal. A considerable village is growing up at the mouth of the river, nearly opposite to Whitehaven on Grand Island; and the timber from Grand Island, destined for the New-York and Boston shipyards is here admitted into the Grand Canal. The railroad between Buffalo and Niagara Falls passes through the village; and in future passengers in the Canal packets will probably disembark here and take the cars to Buffalo by which means a distance, which by water occupies about three hours will be passed over in less than an hour, 3 quarters of an hour will ordinarily be deemed sufficient; a great and most valuable gain to travellers. The river Niagara, at the entrance of the Tonawanda into it, presents deep water and a secure anchorage for large vessels, which may be employed in navigating the Lakes; but the difficulty of reaching the Lake against a strong current and some difficult rapids, excepting under peculiarly favorable winds or very strong power of steam may be thought to present strong obstacles to its use and improvement as a port of shipment. These however, will be easily overcome by steam power; and availing of the ship canal at Black Rock. This and Whitehaven, must from the facility of procuring the best of timber in the immediate vicinity, offer a most favorable situation for the building of vessels. The village is destined to extraordinary prosperity from its advantageous situation and the great improvements now in progress. The land in the vicinity of Tonawanda is of an excellent description. As far as the backwater of the creek extends, a distance of three or four miles, this circumstance is prejudicial; the cultivation in some places being necessarily hindered, and the general healthiness of the country has been supposed to be affected. The latter circumstance however is becoming obviated by clearance and cultivation. But when the land is not so affected the soil is eminently favorable to wheat, oats, potatoes, and grass. Indian corn is sometimes cultivated with success but it cannot be considered a safe crop. The soil is improved by cultivation. The whole country is of calcareous formation: loam resting upon limestone and intermixed with limestone, gravel, which in the form of a carbonate is seen intermixed abundantly with the soil in small grains. These being brought to the air by the plough become decomposed; and the soil in this way acquires constantly increased blackness and fertility. Pease are a favorite and very productive crop. On visiting one of the best farms in the neighborhood of the creek, the farmer informed me that his crop of wheat usually averaged from twenty-five to thirty bushels per acre; of pease thirty bushels; of grass one and a half to two tons per acre. He uses no manure for his land excepting that he has spread some on his grass land; and he showed me a field which with the exception of three intermediate years, had been in wheat thirteen years without a diminution of the crop. I have perfect confidence in the honor of the gentleman who made these statements, but possibly there may be some little unintentional overstatement; as it almost always happens, where crops are not matter of exact measurement, but of estimate or conjecture merely, there is a tendency to overstate. A crop of wheat certainly without very careful cultivation, averaging from twenty-five to thirty bushels is quite large. The aftermath in the fields was short; and by no means a fair test of what the land is capable of being made to do. The farming in most parts of this country was inferior and slovenly; and the regular introduction of clover, with all the grain crops and the ploughing it in, would produce a most favorable and extraordinary change in their condition. Speculation however, is so rife, other means of procuring money seem to promise so much quicker returns; and labor is indeed so difficult to be procured, and withal so expensive and troublesome, that mere cultivation, it is to be feared, will continue to be regarded as a secondary interest. The passage of the Canal through this country, and the multitude of canal boats, which seem to pass and repass in an almost uninterrupted succession, afford a ready and cash market for all the produce of their farms.—Their wants even then are but imperfectly supplied. The growth of the country here is in many places magnificent—oak. black-walnut, maple, whitewood and elm, of the largest description. Most of the wood, which is cut here, is sent to Buffalo, or sold at the Steam Saw Mill on Grand Island.—Much of that which is suitable for timber is sawed at the same establishment for this purpose.

The ride from Black Rock to the Niagara Falls, by the side of the Niagara River, is extremely beautiful; the expanse of water, the several fine islands skirted with rich foliage to the waters edge, and the excitement of an approach to the Falls, which it is not easy to suppress, though you may have visited them repeatedly, render this jaunt exceedingly interesting and delightful. The ride for some miles below the Falls towards Lake Ontario increases in picturesque effect; and presents many points of view, embracing the Falls themselves, the wonderful passage of this torrent through its walls of natural masonry, which it would seem, must have occupied centuries, not to erect, but to excavate and widen, the compression of the torrent before it branches into the whirlpool, where owing to the narrowness of the passage, and the velocity with which it is forced onward, the central ridge of waters like the roof of a barn is elevated at least ten feet above the edge of the waters at the shore; the whirlpool itself, and afterwards the whole course of the river until it enters into Lake Ontario, which is seen distinctly from the high grounds, and lastly the magnificent and glittering expanse of the Lake itself, present a succession of views unrivalled and enchanting.

The land on the shores of the Niagara River from Tonawanda to a distance of three miles below the Falls as far as my ride extended, is similar to what I have already described excepting that in some places the clayey portions predominate much more here than in others. A good deal of this land has been a long time cleared and the stumps removed. It is much of it of a very fine character for wheat. A highly intelligent gentleman of the village at the Falls, who accompanied me, showed me a field which with the exception of one year had been for thirty years in succession in wheat, without manure and without any apparent diminution of its fertility. Twenty to twenty-five bushels of wheat are considered an average yield; thirty are often obtained. The first ploughing is generally shallow; afterwards deeper ploughing improves the soil. Plaister and clover have not yet been tried Improvements are in progress and a spirit of enterprize awakened, united with intelligence, from which the best effects will result; and which must soon put a different aspect on the whole face of this splendid country; for which in respect to picturesque scenery, nature has lavished her gifts in prodigal and almost unrivalled profusion.

Opposite Tonawanda, and lying along in the river for a distance of about nine miles, is Grand Island, a magnificent tract of land of an average width of four miles, and containing about eighteen thousand acres.—The Northern extremity is in sight of the the rapids of the Great Falls, though steam vessels and others cross far below it from the American side to Chippeway on the Canada shore. A small portion of the Island is at present cleared; and the remainder is covered with a noble growth of the most valuable white oak timber, black walnut, and other wood. The surface of the Island presents few inequalities and the highest point is but few feet above the river, in the middle of which it is situated; and which furnishes deep and excellent ship channels on either side. The soil is excellent, where it has been brought into cultivation; some of it being alluvial and the rest a rich loam with an intermixture in greater or less measure of clay; suitable for wheat, oats, grass, and succulent vegetables; and if the beet cultivation for sugar should be pursued to any extent, eminently adapted to that product. It is likewise extremely well suited for dairying and grazing. The land hitherto being held in common, and the objects of the company being mainly the getting of ship timber to market, small attention has been given to agricultural operations and improvements. I was much gratified here in looking at the barn above 100 feet in length erected by Lewis F. Allen, Esq., near the village of White-haven for the keeping of the numerous ox-teams employed in the saw mill at that establishment. The barn is entered lengthwise, and the great floor extends through the whole. The mows for hay are on each side of the floor; and leantos, or close sheds are projected from each side of the barn for the whole length, which furnish stables for the cattle. The whole is well contrived considering the flat situation in which it stands; and the teams and every thing connected with the establishment, in excellent and farmer-like condition. I shall forbear a more particular account of it, as I hope at a future time to receive it from Mr. Allen's own pen.

H. C.

From the New-York Farmer.

AGRICULTURAL TOUR, No. 5.

To Lewis F. Allen, Esq. of Buffalo, well known as eminent, among the intelligent and spirited agriculturists in New-York, I am much indebted for various polite attentions, and much agricultural information. Mr. Allen is spiritedly engaged in endeavors to improve the live stock of the country; and I had the pleasure of seeing in his possession several very fine animals of the improved Durham Snorthorns, which certainly did great credit to his management, and his skill in their selection. I will not undertake to describe them particularly, as I hope that he will himself in due season favor the public with his success and opinions in this matter. The samples of this stock in his possession are of high pedigree and fine promise; and I am particularly anxious that by some continued and exact observations he should determine the dairy properties of his cows. He thinks highly of them in this respect; but in a matter which can be easily tested, we want accurate experiments and observations. Of his improved breed of swine, I can speak in the highest terms. They are not of the largest class, but their extraordinary thrift and admirable forms place them among the best that have fallen under my notice.

Mr. Allen is the general superintendent of the establishment at White-Haven. The saw mill at this place is an interesting object of curiosity. It is one hundred and fifty feet square; it drives six gangs of saws, and two single saws by a steam engine of one hundred horse-power. Eighteen cords of wood are required per day for supplying the engine. Besides the timber on the island large quantities of pine are brought from Canada and sawed at the mill. Their fine timber is in quick demand at Buffalo, and in the vicinity, and their oak timber is exported to the Atlantic States. The frames of several large vessels of from 400 to 700 tons have been sent to the sea-board.

Accounts of the city of Buffalo, have within a few years been so much before the public, that I shall do nothing more than to express my admiration of the rapid growth: the increase of population and the rise in the value of property, of this Queen of the West. She is destined to still farther increase; and looking back upon her almost magical advances for the last few years, it is not easy to conjecture the limits to which her business may hereafter be carried. The land in the immediate neighborhood of Buffalo is not under cultivation: and compared with the demand and the intrinsic resources of the country, the meagre and inferior condition of her meat, vegetable, and fruit market is matter of just surprise. It seems impossible that it should long remain so; and the universal complaints on this subject, and the erection of large and handsome market houses will undoubtedly contribute to its improvement. The floating character of the population has undoubtedly retarded these improvements; the fever of speculation, which has been more violent in no place, has directed the attention to more exciting and engrossing objects, and the extraordinary, and to those, who have not witnessed it, the almost incredible influx of strangers, emigrants, and adventurers has extended the demand beyond the present ability to supply.

A large tract of land in the immediate neighborhood, eighteen miles in length and seven in breadth, is held by the Seneca Indians. This great tract containing, 49,000 acres, as seen from the road which passes through it, embraces much land of the very best character. At present not much of the land is cultivated; and though there are some striking exceptions, the cultivation is in most cases very imperfect and slovenly. In some instances we saw tidy frame houses, neat enclosures, and the front yards ornamented with flowers. The Indians seem every where to be an indolent and improvident race, and unwilling to do more than procure a bare subsistance. Their wants in general are few, and their endurance under hardship and privation well known. Their appearance is in general squalid and disgusting. They are constantly to be seen in the streets of Buffalo, where they bring their baskets, their ornamental work, their reticules, moccasins, and slippers made of leather and inwrought with beads, to sell; and likewise berries and herbs. They stand about the streets, and stroll from one place to another gazing in stupid inanity. They are harmless and not giving to quarelling, but do not always understand, at least are not always wise observers of that great distinction in civil society, of *meum* and *tuum*. The men are a fine tall race, muscular and well proportioned; the women short, and in general extremely ugly; though in this matter they do not fall very far below the lowest class of Swiss and German women, who are to be seen constantly about the streets.

These Indians are entirely in the power of the State; and in my opinion ought to have been treated precisely like ignorant and helpless children. The State should maintain among them competent guardians and agents; and should compel them by fine, if it were practicable, and if other inducements failed, to clear, sow, build, enclose, and render their lands productive, and their condition comfortable, under a perfect assurance that the tenure of their improvements should be secure, and they should enjoy the fruits of their labor; instead of encouraging them, as is obviously too often the policy, in idleness, wretchedness, and vice, in order that they may become easily in the end, dispossessed of their territory or their race itself be extinguished. One great bar to the improvement of their condition arises undoubtedly from the custom prevailing among them, by which all the improvements made by any one, with all his personal property of every description, instead of giving at his death, by his will, to his squaw or children, in that event reverts to the tribe; and is scattered among the community. The great principle of accumulation, the right of property, and the power of controling and transmitting that property according to our pleasure at death, though principles violently assailed in these days of Agrarianism, and often in their operation productive of apparently unequal and unfortunate results, are notwithstanding, of the highest moment to the virtue of individuals, and the general welfare of the community.

There are some agricultural improvements in the vicinity of Buffalo, on the farm of Hiram Pratt, Esq., which are capital, and deserve particular notice. His farm lies on the shores of the Lake, and an extensive tract of bog, which was constantly filled with water from the Lake, has been drained; the waters in a great degree excluded, drains cut in various directions with perfect neatness and by skilful hands, the bushes and stumps extracted, and a meadow of a hundred acres extent, brought into grass; and presenting, I must admit, the most successful and beautiful improvement that my eye has ever rested upon. The process has occupied but a short time and, compared with the value and productiveness of the redeemed land, has been executed at small expense; and at an outlay, which will be immediately returned four fold. The growth of the second crop of grass upon it, which was all that the season permitted me to see, was most luxuriant; and the land is brought into condition for other crops to be cultivated with advantage. I have had only to regret, that Mr. Pratt's unusual engagements at the time, prevented his giving me that detailed account of the process and expenditures, which I should have been glad to lay before the readers of the New-York Farmer. The almost unsurpassed fertility of this deep alluvion, when the waters are taken from it, and the immediate vicinity of a quick market for all the produce, which can be gathered from it, would justify almost any expenditure for the redemption of this land. The process is still going on, and large adjoining tracts are to be cleared, drained, and subdued.

The trees on the uncleared lands bordering the turnpike, and from four to eight miles from Buffalo, in height and diameter surpass any thing that I ever witnessed. They are chiefly elm, white oak and white wood intermixed; and are of most singular beauty and magnificence. Similar remarks apply to many of the forests of this western world; and those of us, who have been accustomed only to the stented growth of more northern and less fertile soils, may be allowed to express our surprise, may I not add the enthusiasm of our admiration, coupled with deep humility, when standing among these mighty and untouched forests; and looking up to the spreading tops of these magnificent plants, these noble tenants of the soil, who have survived the storms and decays of centuries.

I am unwilling to quit Buffalo, without alluding to, I will not say the tide, but the torrent, the rushing flood of emigration, pouring itself westward. During a protracted stay of several weeks at Buffalo, it seemed "to cease not," day or night. Two, three, and sometimes five steamboats left Buffalo daily, for the upper shores of the Lake, beside other vessels; and all of them carrying their hundreds and hundreds. I have been often asked since my return, if these were not principally foreigners. I can only answers that of those whom I saw there was but a small sprinkling of Irish, and comparatively few Swiss and Germans. The great majority were New-Yorkers and New-England men. of the best class of yeomanry; respectable in manners and appearance, and of substantial condition and equipments. Such a population, especially migrating as is often the case in companies, and I may say villages, are not compelled to pass through the *chrysalis* state; but commence immediately with all the advantages and improvements of an advanced condition of society.

H. C.

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John Wilkinson, St. Andrews, N. B., 1st January, 1838.
R. J. Kennett, (2 copies,) London, England, July 1, 1837.

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone

The work contracted for must be finished by the 1st day of July, 1838

Persons desirous of obtaining work are requested to apply at the office of the undersigned in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, Jr.
Chief Engineer Jas. Riv. & Ka. Co.

P. S—The valley of James River above Richmond is healthy.

16—10t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

, The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

, All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

, Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 14 1y

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridg is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rohester, Jan. 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames'	superior back-strap Shovels	
150	do	do	plain do
150	do	do	caststeel Shovels & Spades
150	do	do	Gold-mining Shovels
100	do	do	plated Spades
50	do	do	socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine those Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.
16—6t.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2½ by	⅝,	15 ft in length,	weighing			$4\frac{88}{100}$	per ft.
280 "	2 "	½,	"	"		"	$3\frac{50}{100}$	"
70 "	1½ "	½,	"	"		"	2½	"
80 "	1¼ "	⅜,	"	"		"	$1\frac{25}{100}$	"
90 "	1 "	⅜,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front st.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
New-York, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size. Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

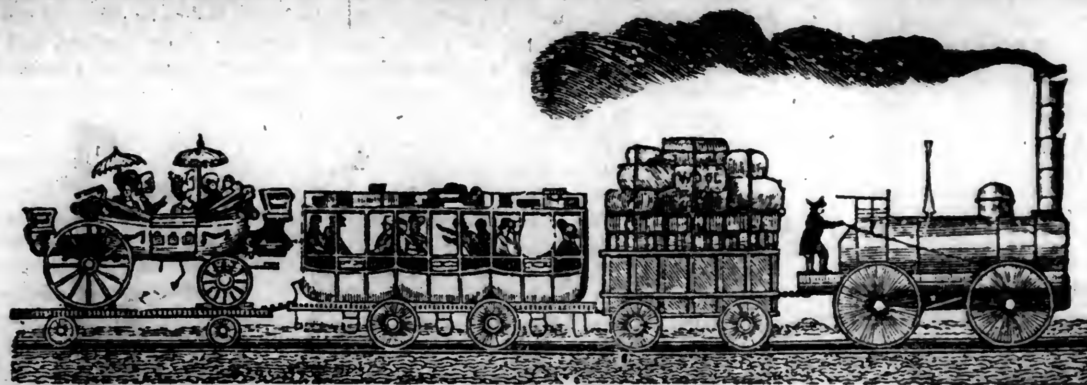
Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron, Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N. Y.
51tf



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, { EDITORS AND PRORIETORS.] SATURDAY, JUNE 10, 1837. VOLUME VI.—No. 23.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, JUNE 10, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America*.

McADAM ROADS—*Indiana Improvements* We extract the following from a letter received from a gentleman in Indiana, in relation to the public works of that State.—This road is constructed at the expense of the State. We are doubly obliged to Mr. Frazer, the writer, for his communication It is one of the most *interesting* which has come to hand of late—as it furnishes us at the same time with *useful information—four new subscribers and cash fifteen Dollars—a rare* combination, and amount of good fortune, these hard times.

This Road when finished from New-Albany to Vincennes will be about 104 miles long. Forty-one miles of said road (the distance from New-Albany to this place) are now under contract for graduation and bridging. The whole number of laborers now engaged in the construction of it between said points, amounts to 956 persons. The payments on estimate to the contractors for the month of April, amounted to $16.450.00. The plan of construction in every respect is similar to that of the Cumberland road, in this State and in Ohio. The maximum grade on this road is $\frac{1}{1636}$ or 3½ degrees, and the minimum grade for the ditches is $\frac{1}{344}$ or 10 minutes. The country between New-Albany and Vincennes is undulating, abounding with limestone of superior quality for metalling, and also with a great abundance of fine timber for bridging. I have rounded all the angles on this road with curves, none of which have a less radius than 600 feet. The whole cost of the graduation and bridging between this place and New-Albany, when finished will be $207,921 71—giving an average per mile of $5071 26.

The following statement shows the number of miles there are of 3½ degrees grade, of 3 degrees grade, of 2½ degrees grade, and of 2 degrees grade and under, between New-Albany and this place.

GRADES.

Of 3½ degrees.	Of 3 degrees.	Of 2½ degrees.	Of 2 degrees and under.	Total distance.
miles.	miles	miles.	miles.	miles.
7.23	1.32	3.33	29.62	41 50

I am sir, very respectfully,
Your obedient servant,
JNO. FRAZER.
Engineer New-Albany and Vincennes McAdamized Turnpike Road.

REVOLUTIONARY DOCUMENT.—The following is a copy of a document found among the papers of a Revolutionary officers now no more, who took an active part in the stirring scenes of that period. It appears to be a statement of the proceedings and expenses—*in continental money*, the currency of that day—of establishing the claim of Messrs ———, ——— & ———, to certain goods which were seized at Woodbury, N. J., on the 11th of August, 1780. It is an interesting document, exhibiting the great depreciation of the currency of the days in which our fathers fought and bled for liberty.

"An Account of Cost and Expenses of the Seizure of the Goods belonging to ———, ——— & ———, at Woobury, N.J., 11th day August, 1780:

Going to Newark Mountain, for advice of the Attorney,	50 Dollars.
Cost of Jury,	67
Going to Elizabeth Town,	65
Horse Hire and Time,	120
To procure a Witness to go to Philadelphia,	8
The Expenses of going to Phia., Brunswick Ferry,	12
Brunswick all Night,	116
6 Mile Run,	63
Maidenhead,	54
Trenton Ferry and Way,	50
Bristol,	90
Neshamony Ferry,	16
10 miles from Phia.,	28

Phiadephia,	545
On Return Red Lion one night,	112
Neshamony Ferry,	16
Pens Manor,	36
Trenton Ferry,	45
Trenton,	30
Prince,	90
6 Mile Run,	116
Hire of Horses and Wagon at 210 Dols. per Day, 5 Days is	1050
The Evidences and my Time going to Philadelphia, 5 Days each, at 70 Dollars per Day,	700
To get White Matlacks Deposition,	16
To geting some Bills Proved at Elizabeth Town,	9
For the Evidences going to Elizabeth and attending the Trial,	140
Our own time in attending Trial,	214
Docts. Lester and Gallaudet, attending Trial one Day,	140
	4000 Dollars.

Which makes £1500."

Patent Rifle.—We have recently examined a patent rifle of improved construction, and superior workmanship. It is an invention of our ingenious citizen, Mr. Thomas M'Carty, who has sold the right to Mr. John Lamb, of Southport. The improvement divides itself into various items; 1st, the breech and barrel are united, by a joint that is opened by means of loosing a catch, and are held together by two stirrups, one on each side of the barrel, so that the breech may be folded over against it, and thus the piece carried in a trunk or chest; 2d, it has, as appendages, any desired number of iron tubes for cartridges, which may be charged at leisure, and carried at convenience—these can be placed in the barrel at the breech and discharged at the rate of ten to a minute, with ease: these tubes are made with a cone at the lower end, that fits into a niche in the barrel and projects to receive the percussion cap already fitted on, so that the piece can be loaded and fired as fast as the joint can be loosed, and the tubes exchanged—all which may be done with ease in any position; 3d, it is easily cleaned, if it should become foul, as there is no breech-pin, and the barrel, when the tube is out, has no obstruction; 4th, its construction is simple, and its cost, to the manufacturer, can not much exceed that of ordinary, well made rifles; 5th, it is perfectly safe, as it cannot possibly be fired until every thing is ready; and it need not be carried or left with a load in it; 6th, it can be used with as much certainty in wet weather as dry; 7th, it has no incumbrance of a ramrod and its appendages; 8th, there is no drawing loads, for if a tube should miss fire, it can be instantly replaced with another; 9th, it is pretty, light, cheap and so nicely made that the joint would not be detected by ordinary inspection. The same principle is applicable to fowling pieces, *two* of which have been made. This is the only rifle of the kind that has been completed. We should think the article would find a ready market among sportsmen, prove valuable to the manufacturer, and in war be of great importance. By the use of this invention, the ordinary laborious *drill* for loading rifles and muskets would be superseded entirely.—[Elmira Republican.]

TRANSACTIONS OF INSTITUTION OF CIVIL ENGINEERS.

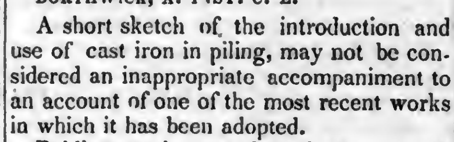
XXIV MEMOIR ON THE USE OF CAST IRON IN PILING, PARTICULARLY AT BRUNSWICK WHARF, BLACKWALL. BY MICHAEL A. BORTHWICK, A. INST. C. E.

A short sketch of the introduction and use of cast iron in piling, may not be considered an inappropriate accompaniment to an account of one of the most recent works in which it has been adopted.

Public attention was first drawn to such an application of iron by Mr. Ewart of Manchester, now of his Majesty's Dock-yard at Woolwich; but though this merit is certainly due to that ingenious gentleman, he had been, as it afterwards proved, anticipated in the idea by the late Mr.

Mr. Matthew's plan.

Mathews of Bridlington, who previously to the date of Mr. Ewart's patent, had used cast iron sheet piles in the foundations at the head of the north pier of that harbor. These piles were of different forms; the following is a cross section of one of, I believe, the most common, in which it will be seen the adjoining piles dovetail to each other, while in others, I have been informed, they merely overlap. Their length was about 8 or 9 feet, their width from 21 inches to 2 feet, and their thickness half an inch.



Mr. Ewart's plan.

In ignorance of Mr. Matthews's proceedings, Mr. Ewart, in the beginning of 1822, took out a patent for a new method of making coffer-dams, which he proposed to effect by employing plates of cast iron, held together by cramps fitted to dovetailed edges on the piles. A section of these piles, taken from some that have been used, is shown in the accompanying sketch. A detail in the mode in which it was proposed to combine them so as to form a coffer dam might be out of place, in a paper that has reference more to the use of iron piling for permanent purposes;—the plan, as described in the specification of the patent, is to be found in the Repertory of Arts, and an abstract of it in the London Journal of Arts and Sciences for the year 1822. The length of the piles is therein stated as intended to be from 10 to 15 feet, which is, I understand, about what they have generally been made, and for cases requiring a greater depth, a mode is described of lengthening the piles, by placing one above another, and securing the horizontal joints by means of dovetailed cramps.

Though on being apprised of what had been done at Burlington, Mr. Ewart did not defend his patent, his piles have been pretty extensively adopted, particularly by Mr. Mylne, of New River Head, London, and Mr. Hartly, Liverpool. Besides other operations in the important public work under his charge, the former gentleman used the piles, soon after their invention, with complete success, in a coffer-dam of considerable size, constructed in the River Thames for the purpose of putting in a suction pipe opposite the New River Company's establishment at Broken Wharf. They have also been used with advantage by Mr. Hartley, in founding the pier heads of the basin of George's Dock, and various parts of the walls of some of the other docks at Liverpool, as also in putting in the foundations of the south river-wall.

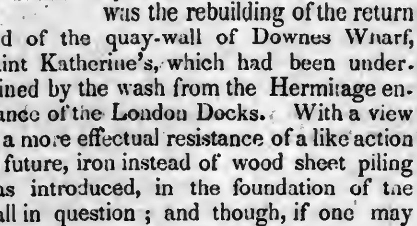
Looking at the dovetailed form of these piles, one would, I think, have been inclined to anticipate difficulty in driving them, but this does not seem to have been met with to any extent in practice, at least in coffer-dams, the original object of the invention. On this point I have pleasure in being able to quote some observations of Mr. John B. Hartley, which contain the results of the Liverpool experience:—"Considerable care," he writes, "is required in keeping the piles in a vertical position, as they are apt to shrink every blow and drive slanting. They require to be driven between two heavy balks of timber to keep them in a straight line, as they expose very little section to the blow of the ram, and are so sharp that they are easily driven out of a right line. There is another very necessary precaution to be taken, which is the keeping of the fall in the same line as the pile;—otherwise the ram descending on the pile and not striking it fairly, all parts equally, the chances are that, if in a pretty stiff stratum, the head breaks off in shivers, and the pile must be drawn, which is sometimes no easy matter." He concludes by saying, "these piles are on the whole the most useful tools you can use for their purpose (coffer-damming). I believe they have had as extensive a trial at the Liverpool Docks as any where else, and certainly with success. They have generally been driven with the ringing or hand engine and rams of 3 or 4 cwt., a front and back pile being driven at the same time by one ram."

In the work at broken Wharf, the practice was to insert the piles and cramps all round the dam first, and drive them a moderate distance into the ground—then to pass the engine repeatedly round and send them down gradually, instead of driving them home at once; and Mr. Mylne has mentioned to me that while this was in progress, the piles being at the time but slightly driven, he was somewhat alarmed one morning at finding that the run of the water had elevated one end of the dam considerably above the other. The dovetails however held good, and proper precautions being taken, the return of the tide put all right again, without at all crippling the work, the movement having been regular all over the dam. I ought to add that these dams are still used in the works on the New River, four setts being generally kept in hand, and that the ringing engine is always employed, and the above stated method of driving followed.

I have perhaps dwelt longer on Mr. Ewart's project than I should otherwise have done, from a feeling that from his labors has sprung much that has followed in the way of iron piling; and besides it may be observed, the remarks as to driving are not entirely limited in their application to this particular description of pile. The next work that occurs was executed

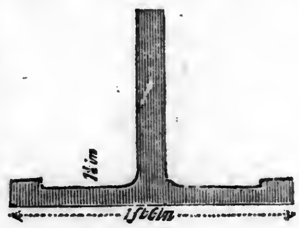
Mr. Ewart's plan modified.

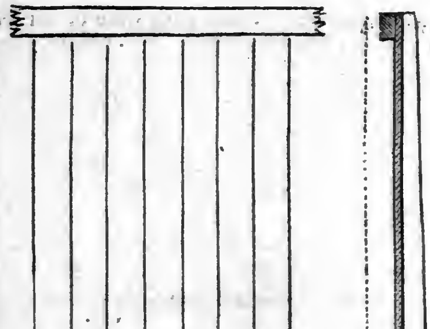
by Mr. Walker, in 1824; this was the rebuilding of the return end of the quay-wall of Downes Wharf, Saint Katherine's, which had been undermined by the wash from the Hermitage entrance of the London Docks. With a view to a more effectual resistance of a like action in future, iron instead of wood sheet piling was introduced, in the foundation of the wall in question; and though, if one may judge from the specification of the patent, no application of his plan of so permanent a nature seems to have been contemplated by Mr. Ewart, the work was begun according to it, but it was afterwards modified at the request of the contractor, so as to give the section of pile shown in the following, the flanch being in front or outside. Although as has been already seen, the piles in their original form may be easily enough driven in some cases, it was found impossible to get them down in a regular line to the depth required in the present instance, through the hard material that had to be penetrated, and by which in fact they were surrounded and pressed for nearly their whole length of 14 feet.



Mr. Cubitt's plan.

A work on a much larger scale than any yet mentioned now presents itself,—the wharfing at the sea entrance of the Norwich and Lowestoft navigation. In this Mr. Cubitt has adopted sheet piling exclusively without the intervention of main or guide piles; the form and section will be seen by the accompanying sketches, which it is almost unnecessary to observe are not drawn to the same scale, the transverse section being considerably enlarged beyond the other two. The piles are all 30 feet long; their weight is about a ton and a half each. The back flanch which is shown at the deepest on the cross section, tapers gradually to about 6 inches at top, where the angles are blocked in to form a head for driving, and is diminished at the lower end by steps or *sets-off* of parallel width with square ends, instead of a straight or curving line, as the latter shape was found to have a tendency to press the pile forward, whereas by the plan adopted, it drove as fairly as if the flanch had been continued its full width to the foot of the pile. The driving was all effected by means of crab engines with monkeys about as heavy as the piles, no more fall being allowed than was necessary to send them down, and the whole is secured by land-ties, two in height, at intervals of six feet. The entire length of wharfing thus constructed is about 2,000 feet.

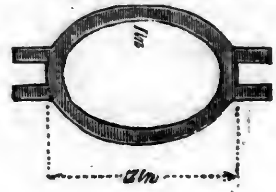




From the form of the pile, according to this plan, giving so thin an abutting surface, and the joints not being covered in any way, close and accurate driving seems essential to its efficacy, and the nature of the ground (sand mixed with shingle) would have made this a somewhat troublesome operation at Lowestoft, but for the plan that was taken to ensure precision. This consisted in riveting close to the lower end of the pile about to be driven, a pair of strong wrought iron cheeks, projecting beyond the edge about two or three inches, which clasping the pile already driven, served as a guide or groove to keep the piles flush, however thin the edge,* and the tendency to turn out or in at the heel was counteracted after a few trials by giving a greater or less bevel to the front or back face. With these appliances the piling was pretty closely driven, and the work which was completed in 1832, has been found fully to answer the object of supporting the sides of the cut from Lake Lothing to the sea against the effects of the very ingenious and powerful sluicing apparatus provided in the lock at that place.

Mr. Sibley's plan.

About a year later than the above, Mr. Sibley constructed an iron wharfing on the Lea Cut at Limehouse on an opposite principle, sheet piling being in this case altogether discarded, and the work consisting of flat plates let down in grooves on the sides of guide piles of an



elliptical form according to the section opposite, driven at distances of 10 feet. These piles are 20 feet long, weigh about $1\frac{1}{4}$ ton each, and are 9 feet apart; they are hollow throughout, to enable a passage for them to be bored in the soil by means of an augur passed through them, and so ease the driving, and are filled with concrete; each pile is land-tied, and the plates extend to within 6 feet of the point. A similar wharfing, but on a larger scale, has since been made on each side of the Thames, adjoining New London Bridge; that on the City side rather an extensive work, the piles in it being 43 feet long, (cast in two unequal lengths with a *spigot* and *faucet* joint,) of a cylindrical form, 12 inches diameter, and of metal $1\frac{1}{2}$ inch thick, and each pile being secured by two tiers of ties of 2 inch square iron carried 70 or 80 feet back, to resist the great depth of filling up or backing.

The plan just described seems well enough adapted for situations where any great increase of depth is not likely to take place.

The absolute depth is not so important, though where this is considerable, it may be questionable whether a heavy wharf would not be the better for the protection of a continuous row of piling at foot;—the strong land-tying necessary in the last mentioned work seems to point to this.

Brunswick wharf.

I now come to the quay wall constructed in 1833—4 by Messrs. Walker and Burges on the River Thames, in front of the East India Docks at Blackwall, and since named Brunswick Wharf. The object of this work was to afford accommodation for the largest class

* This plan has, I believe, been followed by Mr. Cubbitt in driving timber piling also, in cases requiring nicety of work.

of steam-vessels at all times of tide, for which the old quay, even had it not been in a state of decay, was not adapted from the shallowness of the water in front of it. To effect this, the first idea was to run out two or three jetties from the wharf, but this was soon abandoned, and a new river-wall resolved on; and advantage was taken of the occasion to improve the line of frontage by an extension into the river, under the sanction of the Navigation Committee of the Port of London, varying from a point at the east end to about 25 feet at the other extremity. The use of iron in the work was, I have understood, suggested by Mr. Cotton, deputy chairman at the time, and for many years an active member of the most respectable and liberal body then in the direction of the East India Dock Company, and the adoption of the proposal was facilitated by the circumstance which probably led in the first instance to its being made, namely, the low price of the material at the period, the contract being little more than £7 per ton delivered in the Thames.

In the accompanying drawing, plate No. XII, an attempt is made to show the mode of construction that was followed, so as to avoid the necessity for much written detail. The first operation was to dig a trench two yards deep in the intended line, and this was immediately followed by the driving of the timber guide piles. The deepening in front, which to give the required depth of 10 feet at low water, was as much as 12 feet, was not done until near the conclusion of the work;—to have effected it in the first instance would, without any countervailing advantage, except some saving in the driving, have been attended with the double expense of removing the ground forming the original bottom between the old and new lines of wharfing, and afterwards refilling the void so left by a material that would require time to make it of equal solidity; and even if this had been otherwise, such an attempt would have endangered the old wall, or rather would have been fatal to it. The permanent piling was next begun, the main piles being driven first at intervals of 7 feet, and the intermediate spaces or *bays* then filled in, working always from right to left, towards which the *drafts* of the sheet piles were pointed. The ground is a coarse gravel, with a stratum of hard Blackwall rock occurring in places, and some trouble was occasionally experienced from its tendency to turn the piles from the proper direction, but due attention being paid to the form of the points, the driving was on the whole effected pretty regularly, but few of the bays requiring closing piles specially made for them, so that the work may be said to be nearly *iron and iron* from end to end;—at the same time, the vertical joints of the piling being all covered, as will be noticed presently, any slight imperfection in this respect is no serious detriment to the work as a whole.

The main piles are in two pieces, the lower end of the upper one being formed so as to fit into a socket on the top of the under length, and the joining made good by means of a strong screw-bolt;—the only object of this was to insure a supply of truer castings, and lessen the difficulty of transporting such unwieldy masses from Northumberland and Staffordshire to London.* Each sheet pile is secured at the top by two bolts to the uppermost wale of the woodwork behind, and the edge of the end ones of each bay, it will be observed, pass behind the adjoining main pile, while the other joints are overlapped by the *bosses* with which all the sheet piles except the *closers* are furnished on one side. Besides adding to the perfection and security of the work by breaking the joints, so that the water, (if it penetrate, as with even the best pile-driving it will,) cannot draw the backing from its place, these projections appear to me to relieve the appearance of the otherwise too uniform face; and a like effect is produced by the horizontal fillets on the lower edges of the plates above, which also mask the joints. These plates, filling up the spaces over the sheet piling, are bolted to the main piles and to each other in the manner shown, and the joints stopped with iron cement. Where the mooring rings come, the plates are cast concave, with a hole perforated in the middle to allow a bolt to pass through, and this bolt is secured, as well as the land-ties from the main piles, to the old wharf, which was not otherwise disturbed, or to needle piles driven adjoining it. The backing consists of a concrete of lime and gravel, in the proportion of one to ten, extending down to the solid bottom. The coping with the water channel in its rear is of Devonshire granite; the water is conveyed from the channel at intervals by pipes extending from gratings in the bottom in a slanting line to the lowermost plate, and discharging themselves immediately above the sheet piling.

* The Birtley Iron Company, Newcastle-on-Tyne, were the contractors for the iron work, but a portion was supplied by the Horsley Iron Company. Mr. M'Intosh, of Bloomsbury Square, had the contract for driving the piles and fixing the work.

(To be Continued.)

TELEGRAPHS.—The House of Representatives of the United States, at their late session, Feb. 3, 1837, passed a resolve.

"That the Secretary of the Treasury be requested to report to the House of Representatives, at its next session, upon the propriety of establishing a system of telegraphs for the United States.

In compliance with this resolution, the Secretary, the Hon. Levi Woodbury, has issued a circular, with the view of obtaining information in regard to "the propriety of establishing a system of telegraphs for the United States," and invites the collectors, commanders of revenue cutters, and others to furnish the Department of State with their opinions upon the subject, especially by pointing out the manner, and the various particulars, in which the system may be rendered most useful to the Government of the United States, and the public generally. It would be desirable, to present a detailed statement as to the proper points for the location, and distance of the stations from each other, with general rules for the regulation of the system, together with an opinion as to the propriety of connecting it with any existing department of the Government, and some definite idea of the rapidity with which intelligence could, ordinarily, and, also, in urgent cases, be communicated between different places. An estimate of the probable expense of establishing and supporting telegraphs, upon the most approved system, for any given distance, during any specified period, is also desired. Information and opinions are also asked as to the practicability of uniting with a system of telegraphs for communication in clear weather and in the day time, another for communication in fogs, by cannon or otherwise, and in the night, by the same mode, or by rockets and fires, and returns are asked by the 1st of October, 1837.

As the subject is one of high importance to national and individual welfare, especially in a country of such vast extent and diversity of interests and physical features as the United States, we trust that the call of the House of Representatives and of the Hon. Secretary will meet with prompt attention and full replies.—[American Jour. of Science and Arts.]

NATURE OF DIFFERENT CEMENTS.—(Berzelius's Jahresbericht, etc. xivth. year, 1st number.)

Fuchs has studied the nature of different species of mortars, and demonstrated that their solidification depends on the formation of silicate of lime, and sometimes also of silicate of alumine. These silicates retain some water and assume the firmness of stone, whilst the hydrate of lime in excess unites by degrees with carbonic acid; and consequently solidified mortar may be considered a compound of carbonate of lime and of a zeolite. *Opal, pumice stone, obsidian* and *pitch stone* pulverized, form with hydrate of lime a good cement. But only the surface of each grain of *quartz* or *sand*, is transformed into a hydrated silicate, and though this is sufficient to unite the mass, solidification does not take place so promptly. The mass becomes the more solid, the more finely the quartz is pulverized. If the pulverized quartz be mingled with one-fourth part of lime, and after thoroughly calcining the mixture, it be pulverized and mixed with one-fifth part of lime, it forms a hydraulic cement which becomes so hard as to be susceptible of a polish. Feldspar hardens slowly, and with lime only after five months; but if calcined with a little lime it is much improved.—Common potter's clay, which is absolutely worthless in its natural state, affords with lime, when calcined, provided it contains but little iron, a cement which readily hardens.

Fuchs having discovered that *steatite*, which had been subjected to a red heat, could not be made to unite with lime, and thence concluding that magnesia has a strong affinity for silicic acid, attempted to employ calcined dolomite, in the place of ordinary lime, and found that it surpassed it, both as a material for ordinary mortar, and also for a hydraulic cement. He obtained a good mortar with this last material and calcined marl

Fire Bricks.—Mr. Isaac Doolittle, superintendant of Iron Works at Bennington, Vermont, has, from materials found in that vicinity, manufactured fire bricks, which have stood a blast of five months, and being recently examined appeared so little worn that the furnace has again been put in blast.

This discovery appears of serious importance. We have seen specimens of the sand, which is purely siliceous—of the clay, which is of the porcelain family, and of the brick and a crucible made from these materials, all of which appear to be excellent.

In the furnaces they substitute blocks and bricks formed of these materials for fire stones in the construction of hearths, and of tymps for blast furnaces. Heretofore hearth-stones have been obtained from Stafford, Connecticut, but these materials appear preferable to either for durability and cheapness.

Important Process.—A new process has been discovered at Strasburg, by means of which a crystallized sugar is produced in twelve hours from beet-root, and which does not require any further refining. The invention is the more curious, as neither any acids or chemical agency is employed in this remarkable operation, and the use of animal black is entirely dispensed with. It has also the advantage of saving 24 per cent. in the consumption of fuel. The new process is applicable in all the manufactories of sugar, with the exception of those upon the principle of dessication of the beet-root. The inventor is M. Edward Stohic, who, though not more than twenty-four years of age, is already highly distinguished for his experiments in chemistry and his works in polite literature.

From the American Journal of Science and Arts.

EXPERIMENTS ON THE ADHESION OF IRON SPIKES OF VARIOUS FORMS, WHEN DRIVEN INTO DIFFERENT SPECIES OF TIMBER; BY WALTER R. JOHNSON, PROFESSOR OF MECHANICS AND NATURAL PHILOSOPHY IN THE FRANKLIN INSTITUTE, PHILADELPHIA.

In reference to railroad constructions, bridge-building, and several other useful applications in civil engineering, as well as in naval architecture, the adhesion of spikes, bolts and nails of various forms becomes an object of much practical importance. In regard to railroads, this matter is worthy of more attention than might at first sight be supposed. Owing to the high price of iron, the flat rail is often unavoidably adopted in preference to the edge rail; and whenever the speed of a train descending by gravity, or impelled with great velocity by the moving power, is to be suddenly checked by the brake, the friction of the periphery of the wheel on the rail, tends to drive the latter lengthwise, and thus to force all the spikes with which it is fastened into closer contact with the ends of the fibers which have been cut in driving them. If this partial or total dragging of the wheels along the rails take place, sometimes in one direction, and sometimes in the other, the spikes must be subjected to alternate impulses on opposite sides. Indeed, whenever the motive power depends on friction for its efficacy, as in the case of the common locomotive engine, there is a constant succession of these two opposite dragging forces, the engine constantly tending by its driving wheels to urge the rail backwards, and the train by an equal but more extensively distributed action tending to urge forward all the rails over which it is at the same moment passing. So decided is this influence, that on a railroad where the transportation is all in one direction, and where the cars descend by gravity, I have seen rails entirely detached, or remaining loosely connected but by a single spike, while others clearly indicated by the inclined position of their upper faces or heads, that they were pressed into an oblique or leaning position in the wooden sill.

This single case may serve to show the importance of attending to the character of the spikes used in similar constructions.

To determine some of the points relating to the forms of spikes, and the kind of timber into which they are driven, the following experiments were undertaken. They serve to show the relative economy of each form of spike, as well as its fitness for the purpose intended. The mode of executing the experiments was, to drive each spike to a certain distance above its cutting edge, into the edge of a piece of plank or scantling, and by means of a suitable apparatus, adapted to that purpose, to draw it out by a direct longitudinal strain. The machine employed for this purpose was the same as that which has been used for testing the strength of iron and copper, in experiments on the tenacity of materials employed in steam boilers. A strong band or strap of iron, connected with the weighing beam of that machine, held the piece of plank, and a clamped pincers, with a suitable jaw, for taking hold of the head and projecting part of the spike, was attached to the opposite part of the machine, which being tightened by a strong screw held the spike firmly, while the application of weights upon the long arm of the lever drew the timber away, and released the spike. Care was taken to cause the strain to pass through the axis of the spike, and, by a very gradual application of weights, to avoid surpassing that force which was just sufficient for its extraction.

The first experiment was upon one of Burden's patent square spikes, with a cutting edge, intended to be in all cases placed across the grain of the timber. This spike was .375 of an inch square, and was driven into a sound plank of seasoned New-Jersey yellow pine, $3\frac{3}{8}$ inches. The force required to extract it was 2052 lbs., and the exact weight of the part driven into the wood was 866 grains troy.

The second trial was upon a flanched, grooved and swelled spike, having the grooves between two projecting wings or flanches, on the same sides as the faces of the cutting edge. The other two sides were planes, continuing to the head. A cross section of this spike, taken $1\frac{3}{4}$ inches above its edge or point, had the form of fig. 1. At $\frac{8}{10}$ of an inch, that is, where the flanches project least from the edge, or where the swell between them comes nearest to forming a perfect square, the form is

Fig. 1.

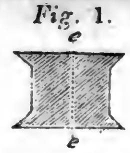
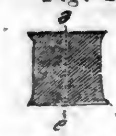


Fig. 2.



as shown in fig. 2; the dotted line *e e*, in each figure, representing the direction of the cutting edge. Towards the head of this spike, the flanching and grooving is suppressed, and the form becomes a square. This experiment was made on the same piece of Jersey yellow pine as the first, and the weight required for extracting the spike was 1596 lbs. The weight of the part driven in was $708\frac{1}{4}$ grains. The cutting edge was irregular; the distance to which it was driven, was $3\frac{3}{8}$ inches, as the first trial. To know the relative value of the two forms of spikes, we have but to divide the weight required for the extraction of each by the number of grains in the part which had been buried in the wood; thus, $2052 \div 866 = 2.37$, and $1596 \div 708.25 = 2.112$. Hence the plain spike had an advantage over the swelled and grooved one, in about the proportion 23 to 21. It should be mentioned also, that the plain spike was drawn out by a very gradual addition of force, whereas the force of 1596 lbs, drew the grooved spike immediately after its application. In the first trial, an attempt was made to detect any yielding or gradual retreat of the spike, before the final start, but none was observed.

The third and fourth experiments were made with the same spikes respectively as the first and second; but instead of yellow pine, the timber employed was thoroughly seasoned white oak.

The plain spike driven $3\frac{3}{8}$ inches into that timber, required for its extraction a force of 3,910 lbs., and, as before, exhibited no signs of movement until the instant of starting, when it suddenly came out about one $\frac{1}{4}$ of an inch, or as far as the range of motion and the elasticity of the machine would permit.

The flanched, swelled and grooved spike, driven $3\frac{3}{8}$ inches into another part of the same piece of plank, from which the plain one had been extracted, was drawn out with a force of 3,791 lbs. A slow motion to the extent of $\frac{1}{25}$ or $\frac{1}{20}$ of an inch was, in this trial, perceived to precede the starting of the spike; and was accompanied by a gradual protrusion of the fibres of the timber immediately around the iron. In these experiments, though the plain spike bore the greater absolute weights, yet when the weight of metal is considered, it is seen that the relative values of the two are 4.515 in the plain, and 5.354 in the grooved form. The various circumstances of the four preceding experiments are seen at a single view in the following table.

Hence it appears, that in yellow pine the grooved and swelled form was about 5 per cent. less advantageous than the plain; while in the seasoned oak the former was $18\frac{1}{2}$ per cent. superior to the latter. It is apparent that the advantage of seasoned oak over seasoned yellow pine for retaining spikes, is, by a comparison of experiments 1 and 3, as 1 to 1.9; and by a comparison

TABLE I.

No. of Experiments.	Description of spike used.	Kind and condition of timber.	Breadth of spike. Inch.	Thickness of spike. Inch	Depth to which it was driven. Inch.	Weight in grains fo part driven in.	Force required to extract it in lbs. avoirdupois.	Ratio of extracting force to weight of spike.	Date.	REMARKS.
1	Burden's. plain sq. spike.	Seasoned Jersey yellow pine.	.375	.375	3.375	866	2052	2.368	1835 Oct. 27.	Force gradually applied, no motion previous to the starting.
2	Flanched, grooved and swelled.	Seasoned Jersey yellow pine.	.375	.300	3.375	708	1596	2.254	"	Force applied at once.
3	Burden's plain.	Seasoned white oak.	.375	.375	3.375	866	3910	4.515	"	Started suddenly.
4	Grooved and swelled.	Seasoned white oak.	.375	.300	3.375	708	3791	5.354	"	Fibres protruded $\frac{1}{20}$ inch before spikes drew out.

of 2 and 4, it is as 1 to 2.37. In the preceding experiments the spikes were driven into the timber and immediately drawn out again. In the second series, the spikes were driven into their respective pieces of timber, and then soaked for a few days in water. The pieces into which the different spikes were driven, were as nearly alike as it was practicable to obtain them, being always cut from the same plank, avoiding knots, cracks, &c. The following table contains a view of the experiments after soaking the timber.

TABLE II.

Timber soaked after the spikes were driven.

No. of experiments.	Kind of spike used.	Kind and condition of timber.	Breadth of spike. Inch	Thickness of spike. Inch	Depth to which it was driven. In. h	Weight in grains of the part inserted.	Force to extract the spike in lbs.	Ratio of the extracting force to the wt. of spike.	Date.
1	Swelled and grooved.	Chestnut unseasoned.	.375	.300	3.5	806.	1710.	2.121	1835 DEC. 3
2	"	Yellow pine seasoned.	.375	.300	3.5	806.	1668.	2.069	"
3	"	Hemlock partly seasoned.	.375	.300	3.5	806.	1738.	2.156	"
4	"	White oak seasoned.	.375	.300	3.5	806.	3373.	4.184	"
5	"	Locust partly seasoned.	.375	.300	3.5	806.	4902.	6.081	"
6	Swelled and grooved, the swell filed away.	Chestnut unseasoned.	.390	.300	3.5	759.	1852.5	2.440	"
7	"	Seasoned yellow pine.	.390	.300	3.5	759.	1767.	2.328	"
8	"	Hemlock partly seasoned.	.390	.300	3.5	759.	1296.8	1.576	"
9	Plain spike, filed lengthwise.	Chestnut unseasoned.	.400	.394	3.625	933.5	1790.	1.810	"
10	"	Hemlock partly seasoned.	.400	.394	3.5	933.5	1638.75	1.755	"
11	"	Locust partly seasoned.	.400	.394	3.5	933.5	3990.	4.167	"
12	"	"	400	.394	3.5	933 5	4332.	4.640	"
13	Grooved and notched, or serrated.	White oak.	.392	.315	3.675	759.	2622.	3.454	"
14	Burdens's patent.	"	.339	.329	3.625	639.	2152.	3.367	"

REMARKS.

Experiment No. 1.—In this and the four following, the thickness of the spike is that at the bottom of the grooves.

Experiment No. 4.—The oak used in this experiment was firmer than that employed in the first series.

Experiment No. 5.—The timber had been slightly split by the driving of this spike.

Experiment No. 6.—The flanches remained after filing out the swelled part of the original form.

Experiment No. 12.—Timber slightly split in driving the spike.

The first five of the preceding experiments show that with a spike of given form and driven a certain distance into different timbers, the order of retentiveness, beginning with the highest, is as follows: 1, locust; 2, white oak; 3, hemlock; 4, unseasoned chestnut; 5, yellow pine. From the 6th, 7th, and 8th experiments, we see that chestnut is still above yellow pine, but that hemlock is inferior to both. By the 9th and 10th, it also appears that hemlock is still to be placed below chestnut. Comparing the 1st experiment in this table with the 6th, and the 2nd with the 7th, we perceive that the swell towards the point of the spike, was so far from being an advantage to it, that it in fact rendered the spike less retentive than when that swelled part had been removed; so that, even could this form have been produced without any increase in the weight of the spike, it would still have been less advantageous than the simple groove without the swell; but when it is considered that the swell added 47 grs. (=836−759) to the weight, it is evident that the groove alone has a decided advantage over the other form. By the trials in unseasoned chestnut, (Nos. 1 and 6.) this advantage is 15 per cent.: thus $\frac{2440-2121}{2121}=15$; and by those on yel. pine, (Nos. 2 and 7,) it is $\frac{2328-2069}{2069}=12.5$ per cent. In fact, after the ends of the fibres have once been thrust apart by the thick part of the swell, it is evident that when they come opposite to the cavity above the swell they must lose some portion of their power to press the spike and produce the retaining force of friction; this force must then depend for its production on the action of those fibres of the wood which are opposite to the swelled portion, or between it and the point of the spikes.

In the next series of experiments, it was attempted to ascertain the relation between forms more diversified than had hitherto been employed.

As it is evident that the total retentiveness of the wood must depend, in a considerable degree, upon the number of fibres which are longitudinally compressed by the spike, it was inferred, that on the area of the two faces, which in driving the spike are placed against the ends of the fibres, must in a great measure depend the retention of the spike. In this series, four kinds of wood and ten forms of spikes were employed.

A comparison of the results given in the following table, will show what order those forms would possess among themselves, in point of retentiveness, as well as the advantages of the respective species of timber into which they were severally driven.

TABLE III.

Spikes of various forms—timber of different kinds.

No. of Experiments.	Kind of spike used.	Kind and condition of timber.	Breadth of spike.	Thickness of spike.	Area of two faces.	Depth to which driven.	Weight of part inserted.	Force to extract spike.	Ratio of force to weight of spike.	Date.
			Inch.	Inch	Sq. in.	Inch.	Grs.	Lbs.		
1	Straight square.	Chestnut unseaso'd	.405	.402	2.83	3.5	942	1995	2.116	1835. Dec. 4.
2	Burden's patent.	"	.373	.384	2.64	3.5	866	1873	2.162	Dec. 8.
3	Broad flat.	"	.539	.288	3.77	3.5	898	2394	2.663	Dec. 4.
4	Narrow flat.	"	.390	.253	2.73	3.5	566	2223	3.927	Dec. 8.
5	Straight square.	White oak thoroug'ly seasoned.	.405	.402	2.83	3.5	942	3990	4.129	Dec. 7.
6	Broad flat.	"	.539	.288	3.77	3.5	898	5130	5.712	"
7	Narrow flat.	"	.390	.253	2.73	3.5	566	3990	7.049	"
8	Burden's patent.	"	.373	.384	2.64	3.5	866	3905	4.509	"
9	Cylindrical with cutting edge.	"	.485	Diam.		3.5	1211	3876	3.200	"
10	Grooved and swelled.	"	.375	.375	2.60	3.5	806	3727	4.624	"
11	Grooved but not swelled.	"	.375	.375	.260	3.5	759	4247	5.662	"
12	Grooved, and bottom of grooves serrated.	"	.375	.375	.260	2.5	500	2650	5.300	"
13	Square.	Locust seasoned 3 years	.405	.402	2.83	3.5	942	5967	6.334	Dec. 8.
14	Broad flat.	"	.539	.285	3.77	3.5	898	7040	7.839	"
15	Narrow flat.	"	.390	.253	2.73	3.5	566	5273	9.316	"
16	Cylindrical, pointed with 15 grooves filed longitudinally from the point upward.	Ash seasoned.	.500	Diam.		3.5	929	2052	2.208	1836. Jan. 4.
17	"	"	.500	"		3.5	929	2309	2.507	"
18	Plain cylindrical, pointed, scale not removed.	"	.500	"		3.5	1015	2451	2.414	"

REMARKS.

Experiment No. 10.—The measure in this and the two following cases were taken outside the flanches.

Experiment No. 12.—The weight of the part inserted is given by estimation in this experiment.

Experiment No. 16.—In this and the two following experiments, the spikes were driven into the timber in the direction of the length of the fibres.

The above table furnishes three sets of comparisons for deducing the relative retaining powers of green chestnut, thoroughly seasoned oak, and equally seasoned locust. Thus the weight which in those three cases drew the square spike from chestnut, was 1995; and that which extracted the broad flat one 2394; and that which drew the narrow flat one from the same timber was 2223. The sum of these is 6612. The sum of the three numbers for the same three spikes used with oak, was by experiments 5, 6, and 7, 13110; and the sum of the three locust, by experiments 13, 14, and 15, is 18280; these three numbers have to each other the relation of 1, 2, and $2\frac{2}{3}$; from which we infer that oak is almost precisely *twice*, and locust $2\frac{2}{3}$ times as retentive as unseasoned chestnut. By comparing together the results of experiments 1 and 2, it will be seen that the weights required for extracting the two spikes respectively, are more nearly proportional to the breadth than to either the thicknesses, or the weights of the spikes. For the spike with a breadth of .405 inch and a thickness of .402, required 1995 lbs. for its removal, while that which had a breadth of .375 inch took 1873 lbs. Now .373 : 405 : : 1073 : 2033 for the calculated retentiveness, instead of 1995, as given by experiments;—a difference of only + 38 lbs. between the observed and calculated results. Calculating the retention by the *weights* of the respective spikes, we should have 866 : 942 : : 1873 : 2987, or a difference of 42 lbs. while using the thickness alone, we obtain .384 : 402 : : 1873 : 1960, a difference of an opposite kind of 35 lbs. from the observed result, the greater thickness yielding the less retentive power. This correspondence between the breadths and the extracting weights becomes still more apparent when we compare the third, and especially the fourth with the second experiment. Thus for the broad flat spike, (3d Ex.)—compared with experiment 2, we obtain

By breadths, .373 : 539 : : 1873 : 2701, instead of 2394, diff. + 307
" weights, .866 : 898 : : 1873 : 1942, " " " — 452
" thicknesses, .384 : 288 : : 1873 : 1379, " " " —1015

and for the thinner and lighter spike, (Ex. 4th.)—compared with the same,

By breadths, .373 : 390 : : 1873 : 1958, instead of 2223, observed diff. —265
" weights, .866 : 566 : : 1873 : 1224, " " " " —999
" thicknesses, .384 : 253 : : 1873 : 1234, " " " " —989

Nearly the same conclusions would result from a comparison of those trials, which were made on seasoned white oak and locust. Indeed, it appears that with a given breadth on the face of the spike, a diminution of thickness is sometimes a positive advantage to the retentiveness of the timber; for in white oak, the spike which had a breadth of only .390, required as much force to extract it, as one of which the breadth was .405, though the thickness of the former was but .253, while that of the latter was .402; and on chestnut, the thinner, narrower, and lighter spike, required absolutely more force to withdraw it than the other. This leads us to notice the different kinds of action of the respective spikes on timber of various kinds. In the softer and more spongy kinds of wood, the fibres instead of being forced backed longitudinally and condensed upon themselves, are, by driving a thick, and especially a rather obtusely pointed spike, folded in masses backward and downward so as to leave in certain parts the *faces* of the grains of the timber in contact with the surface of the metal.

That the view just presented is correct, seems also probable from what was observed in the case of the swelled spike. For while the grooved but unswelled one, driven into chestnut timber, (table II. Ex. 6,) required 1852 lbs. to extract it, the grooved and swelled spike, (Ex. 1, same table,) took but 1710 lbs. And in table III. Ex. 1[illegible], we find the swelled spike drawn from white oak by 3727 lbs. and the grooved but not swelled one, Ex. 12, requiring 4247. Hence it appears to be necessary, in order to obtain the greatest effect, that the fibres of the wood should press the face as nearly as possible in their longitudinal direction and with equal intensities throughout the whole length of the spike. Arranging the spikes according to the order of their ratios of retention to weight, as given by the experiments in table III, from five to twelve inclusive, we have the following:

1. Narrow flat spike, with a ratio of 7.049
2. Wide, " " " " 5.712
3. Grooved but not swelled, " " 5.662
4. Grooved and notched, " " 5.300
5. Grooved and swelled, " " 4.624

6. Burden's patent, " " 4.50[?]
7. Square hammered, " " 4.12[?]
8. Plain cylindrical, " " 3.20[?]

Experiments 16, 17, and 18, of the same table were made by driving the spikes whcih were cylindrical with conical points into the timber endwise of the grain. This method of comparing two forms, the one grooved and the other plain, was adopted on account of the extreme liability of the timber to be split by driving spikes of these forms *across* the direction of the fibres. It was observed that on drawing these spikes, the holes were almost perfectly square. This resulted from the position of the rings of annual growth and the greater elasticity in some directions than in others. It is probable that if the filed grooves in experiments 16 and 17 had been covered with a scale of oxide, as was the case with the plain spike used in experiment 18, the former would have given a result somewhat higher.

When holes are drilled into stone blocks and afterwards plugged with timber to receive spikes in fastening on the chairs of edge rails, the method of experimenting just described finds an application, and it is probable that in such cases the grooved cylinder with a conical grooved point, may prove advantageous.

A few experiments were made to determine the effect of driving to different depths, on the total amount of retention. For this purpose two different spikes were selected, viz., the square hand-wrought spike, the section of which was .405 × .402, and the wide flat one of which the section was .539 × .288. They were respectively driven to a certain depth into unseasoned chestnut, and then subjected to a force just sufficient to start them. This force was noted, and the spike was immediately driven down one inch deeper than before, and the force again applied. All my experiments proved that when a spike is once started, the force required for its final extraction is much less than that which produced the first movement. This is readily accounted for on the principle that as the wedge-shaped point was from half an inch to an inch in length; and as this, on the starting back of the spike a very little distance, became mostly relieved from the pressure of the fibres, all that part of the retention which had been due to the wedge-shaped portion of the spike was at once destroyed. The following table will show, however, that the mere starting of the spike with parallel faces does not essentially diminish the retention, when again driven into the timber to a greater depth than before. But when a bar of iron is spiked upon wood, if the spike be driven down until the bar compresses the wood to a great degree, the recoil of the latter may become so great as to start back the spike a short distance after the last blow has been given. In this case a great diminution in the useful effect will be the consequence. This shows that a limit may exist to the force which we should apply in urgigg down spikes or bolts destined to fasten materials together.

TABLE IV.

Spikes driven to different depths.

No. of the Experiment.	Form of spike.	Kind and condition of timber.	Breadth of spike.	Thickness of spike.	Area of the two faces pressing the ends of the fibres.	Depth to which spike was driven.	Weight of the part inserted.	Force to extract the spike.	Ratio of force to weight of spike.	Date.
					Sq. in.	Inches.	Grs.			
1	square not filed.	chestnut unseasoned.	.405	.402	.7695	1.9	483	1183	2.428	1835. Dec. 4.
2	" " "	"	"	"	1.1745	2.9	789	1995	2.528	"
3	" " "	"	"	"	1.5795	3.9	1095	2565	2.342	"
4	Broad flat.	"	.539	.288	.9702	1.8	442	1525	3.457	"
5	" "	"	"	"	1.5092	2.8	745	2594	3.482	"

By comparing experiments 1 and 4 together, it will be found that weight for weight the flat spike had when driven 1.8 inches, an advantage of 42.3 per cent. over the square one; and by a like comparison of experiments 2 and 5, it is evident the former had a superiority of 37.7 per cent. As the spike when driven in only 1.9 inches had a much less proportion of its parallel faces exposed to the reaction of the fibres and a greater proportion of the wedge-shaped point, it is reasonable to expect that the retention would not correspond precisely with the lengths inserted. It will be understood that when we speak of *cutting edges* and the wedge-shaped portion of spikes, whether square, flat, or cylindrical, the direction of the cutting edges is always across the fibre or grain of the timber. It must be evident that the wedge-shaped part may be so acute, as to correspond nearly with two parallel faces, in which case, the tendency to retreat from the lateral pressures is small; and the pressures themselves, increasing from the point upwards to where the spike is thickest, the total efficiency of a given length may be as great as that of an equal length of the parallel faces, and even greater, provided the thickness of the spike be so considerable as in driving it to produce much crushing and irregular folding of the fibres of the timber. If, on the other hand, the edge be very blunt, the tendency to recoil may be such as to diminish the adhesion, and in this case the effect of the wedge shape is negative. In the other it may be positive.*

The *first, second* and *third* experiments indicate, in the tenth column of the preceding table, that beyond a certain limit the ratio of *weight of metal* to extracting force begins to diminish, showing that it would be more economical to increase the number rather than the length of the spikes, for producing a given effect in fastening materials together. In this case, also, it will be perceived, that the adhesion has a much closer relation to the areas of the compressing faces of the spikes, than to their weights. For three of the experiments this ratio may be regarded as identical, and dividing, for each of the five experiments, the observed retention by the area of the two faces opposed to the ends of the fibres, we get a mean result, which proves that the absolute retaining power of unseasoned chestnut, on square or flat spikes of from 1.8 to 3.9 inches in length, is about 813 lbs. for every square inch of those faces which condense longitudinally the fibres of the timber.

* The following formula may represent the several experiments; $R = lf \pm c$, in which R is the observed retention; l = the length in inches of the part inserted; f = the force of retention on one inch of the parallel faces, and c = the differences between the retention of a parallel portion of the spike, and of an equal length of the converging faces near the point. The sign of ambiguity arises from the cause above explained.

Agriculture, &c.

Prejudice and conceit are the offsprings of ignorance, and the great barrier to agricultural improvement. An African prince threatened to take the life of a traveller, because he dared to assure him, that water became solid by freezing, in his country. Because he had not seen it, the prince deemed the traveller an impostor and a liar. A few years ago, the growth of a hundred bushels of corn on an acre was considered a fabulous tale by the mass of the farmers. They had not seen such a product, and they therefore did not believe in it. But such a product is now of so common occurrence, that few doubts its reality. Tell these men that they can double the products of their farms, by economizing and judiciously applying their manure;—that they can quadruple it, by this, by underdraining, by alternating crops, and by root culture—and they are as incredulous as the African prince, because they are ignorant of those natural laws which ever have governed the material world, and which ever will govern it. The savage laughs at and rejects the art of civilized life, for the same reason that the ignorant or indolent farmer scouts the idea of improving the condition of society by agricultural societies, agricultural schools and legislative bounties for agricultural improvement.—

They either do not know enough of natural science, to comprehend its utility in the ordinary business of life, or they are governed by a sordid, selfish, illiberal policy, which, could it be carried out, would shut out every ray of light, and smother every sentiment of patriotism, which should either thwart their views, or which would tend to elevate their fellows above their own limited standard in society. Some men seem to have an idea, that they are balanced in a scale; that as others can be made to sink, in the same proportion they shall rise, and vice versa. The first requisite to improvement, in any business, is the conviction, that we *can* learn; the next, that we *will* learn. And it perhaps is invariably true, that the more we *do* learn in useful knowledge, the more we become sensible of our comparative ignorance, and the more we are anxious to learn. This results not only from a wish to serve ourselves, and multiply our enjoyments, but from a sense of sacred duty to society.

Our national motto once was, "*millions or defence, but not a cent for tribute.*" A correspondent suggests the following parody, as suited to the action of the legislature upon the surplus fund:—"*Millions for the professions, but not a cent for the arts of productive labor.*"

If it is true, as is alleged, that some farmers in our legislature, are averse to giving any public monies to aid agricultural improvement, we do not hesitate to say the sentiment is unworthy of them; and that enlightened men will be apt to charge them with either ign rance or jealousy—ignorance of the value of rural improvement, and of their duty—or jealousy lest others may be enabled to surpass them—and their own profits and popularity be consequently lessened.

THE CONTRAST.—Massachusetts gives nothing from her public treasury to sustain her common schools, but she gives bountifully from her public treasury to sustain and encourage her agricultural socities, and is now about making an *agricultural* survey of her territory. Her schools are surpassed by none in the Union. New-York has given millions to her colleges, and millions to her common schools; but she clenches her purse with a convulsive gripe when she is asked to aid and encourage agricultural societies. If it is true, that wisdom lies between two extremes, these States might learn from each other.

FARMING IMPLEMENTS.—The State Agricultural Society have appointed a board of examiners, comprising men of science, and practical machinists and farmers, to meet semi-annually, to examine, and thoroughly to test (and to give certificates of merit,) all farm implements and machinery which may be offered for their in pection. We are glad to learn, that the gentlemen designated will attend to the duties of their appointment, and that notice will shortly be given of the time and place of their first meeting. This measure, if properly carried out, and we feel confident that it will be, cannot fail of producing a highly salutary influence upon our agriculture, and upon the general interest of the State. It will give general confidence in implements and machines which are truly meritorious, and to multiply them upon our farms; while on the other hand, it will tend to prevent imposture, and to save great expenditures for inventions which are comparatively worthless.

BROOKS' SILK SPINNER AND TWISTER, deserves a further notice from our hands, because we think it ranks among the most useful improvements of the day, and is calculated greatly to facilitate our progress in the silk business. Let it be remembered, that very little instruction is required to qualify a woman to use it; that it is equally adapted to the fabrication of sewing silk, twist, or to a thread for any required fabric, and that it produces all these, as far as we can judge, in a perfect manner. Now the question is, what will it earn, in a silk family, or a silk neighborhood? For now-a-days, *profit* is the great desideratum. In this matter, we shall speak on the authority of the patentee, a very unassuming, intelligent, and, we believe, honest member of the society of Friends, or Quakers. He says it is a moderate day's work to spin and twist half a bushel of cocoons into sewing silk, and that the fair average product of these cocoons would be 175 skeins of sewing silk, worth now, at wholesale price five cents the skein. The highest price of cocoons is $4 per bushel. Assuming these data, and basing our calculation upon five bushels of cocoons, which a family of girls may easily produce every year, let us see what would be the gain which would accrue to this family in five years, from the are of this machine.

The 25 bushels of cocoons would produce 8,750 skeins silk, worth five cents at wholesale,		$437 50
From which deduct the wages of a woman, 50 days, at 50 cents,	$25 00	
Add cost of machine,	35 00	
And it makes a total of		60 00
And leaves a profit of		$377 50
The highest price at which cocoons sell is $4 which would be for the 25 bushels,		100 00
		$277 50

Which shows a profit, in buying and using this machine, over selling the cocoons, in the small quantity of 25 bushels, of $277 50. This would require the labor of a women only ten days in a year, or fifty days in the five years. The remainder of the time, to any extent required, might be as profitably applied, in working up the cocoons of the neighborhood, of the town, or of the county; and the value of the machine would be yet but little impaired by these earnings! Every silk district should have one of Brooks' machines.

IMPORTANT REQUISITES IN A WIFE.

A knowledge of domestic duties is beyond all price to a woman. Every one of our sex ought to know how to sew, and knit and mend, and cook, and superintend a household. In every situation of life, high or low, this sort of knowledge is of great advantage. There is no necessity that the gaining of such information should interfere with intellectual acquirement, or even elegant accomplishment. A well regulated mind can find time to attend to all. When a girl is nine or ten years old, she should be accustomed to take some regular share in household duties, and to feel responsible for the manner in which her part is performed; such as her own mending, washing the cups and putting them in place, cleaning silver, or dusting and arranging the parlor. This should not be done occasionally, and neglected when ever she finds it convenient—she should consider it her department.—When older than twelve, girls should begin to take turns in superintending the household—making puddings, pies, cakes, &c. To learn effectually—they should actually do these things themselves, and stand by, and see others do them.—[Mrs. Child.]

A HEALTHFUL RECREATION.

Among the pleasant employments which seem peculiarly congenial to our sex, the culture of flowers stands conspicuous. The general superintendence of a garden has been repeatedly found favorable to health, by leading to frequent exercise in the open air, and that communing with nature which is equally refreshing to the heart. It was laboring with her own hands in her garden, that the mother of Washington was found by the youthful Marquis La Fayette, when he sought her blessing as he was about to commit himself to the ocean, and return to his native clime. The tending of flowers has ever appeared to me a fitting care for the young and beautiful. They then dwell as it were, among their own emblems, and many a voice of wisdom breathes on the ear from those brief blossoms, to which they apportion the dew and the sun-beam.—[Mrs. Sigourney.]

From the Quarterly Journal of Agriculture.

STUDIES IN THE SCIENCE AND PRACTICE OF AGRICULTURE, AS CONNECTED WITH PHYSICS.

(Continued from page 419.)

Nutritive Principles of the Food of Plants.—It is stated in most elementary books, that the chief food of plants consists of carbonic acid gas diffused in water, together with potass and some other matters apparently not well understood. But a plain agriculturist not acquainted with science will very naturally ask how this is proved. By burning plants, indeed, he knows that charcoal (*carbon*) and potass may be produced; but in that case these are in a very different state from the one in which they exist in the growing plant. M. Lassaigne, the able Professor of Chemistry at Alfort, devised the ingenious experiment of analyzing the chemical constituents of seeds before and after germinating, and in this way arrived at one method of proof of the facts just stated; yet the plain farmer who might have witnessed such analysis would readily make a similar objection to it with that of procuring charcoal and potass by burning, namely, that it was an artificial process, and therefore calculated to change the state of the substances discovered.

In order to elucidate these points, confessedly difficult and obscure, M. Biot undertook the investigation, by applying his newly discovered and powerful test of the rotary polarization of light. Before giving any details of M. Biot's experiments, however, it may be well to state the views of M. Raspail respecting the imbibition and flow of the sap, these being rather novel as well as probable.

Circulation of the Sap.—All growing vegetable textures are composed of cells, every where closed, containing a fluid, which is in continual motion so long as the temperature is above 32° Fahr. The cells adhere to one another, or rather are fixed to one another by a sort of root or pedicle (***hilum,***) often too minute for observation; and it is this, and the globules of the cell, which being lengthened out and expanded in the progress of growth, give origin to new parts, or to the enlargement of old ones.

The circulation of the fluid in the cells, originally discovered by Corti in the *Chara*, cannot be observed when the cells are opaque or the fluid transparent; but an idea may be formed of it by filling a tube with spirits of wine, having some raspings of cork in it, and holding it in the hand, when the heat of the hand will cause a current to rise from the bottom up one side of the tube, and the cold at the top abstracting the heat from the particles as they rise, will cause an opposite current to descend on the other side. The difference of the vegetable circulation from this experimental one, consists in its being caused by a living principle, and not heat, though a certain temperature is indispensable. M. Raspail terms the operation of this principle in circulating the sap, ***aspiration*** (meaning by this something like suction or attraction,) and ***expiration*** (meaning something like expulsion or repulsion,) the sides of all the cells of growing plants alternately aspiring and expiring, or attracting and repelling fluids.

The membranes of plants, as well as the cells composing them, aspire and expire fluids; and when these membranes form a tube with branches more or less composed of net-work or reticulations, the fluid forms one continuous current in every part of the tube.

The stems and branches of all plants are formed of cells, which, from having been originally globular, expand by growth; and by the pressure of other cells expanding around them, take a wedge like shape, the thin portion forming their point of attachment or pedicle (*hilum.*) The membranes thus formed may be conceived to sheath each other, the inner sheaths being inserted by their wedge-point (***hilum***) into the sides of the outer ones. These mutually sheathing membranes besides are traversed both across and lengthways by a net-work of vascular canals, and consequently the fluid transmitted by each wedge point must necessarily rise along the side next to the part above the wedge-point, falling down the opposite side, and again rising along the part below the wedge-point, or the contrary. At the same time a portion of the fluid is transmitted to the wedge-point of the next enclosed sheathing membrane, where the circulation will take a similar direction.

The flow of the sap from the cut ends of a plant may thus be explained; for on each cut surface there will be alternately one-half of a sheathing membrane, the fluid in which was rising up, and another half in which it was falling down.

The branches are always inserted by the wedge-points (***hila***) of their component sheathing membranes into the trunk or stem, and, consequently, the circulation of the fluid at the junction is the same as that just explained.

The sheathing membranes of the root, it must be remarked, do not terminate in the outer sheathing membrane or burso of the stem, but penetrate to one of the inner ones, and hence the rising sap, as yet not organized, is conveyed to an inner sheath.

The strong attractive power of the tips of the root fibres, through which alone the liquid food of plants is transmitted, may be seen when roots have been forced to grow between stones; for the tips will be found to adhere more or less firmly to the stones, while the other parts of the root are loose and free. In the same way particles of earth will generally be found adhering to the tips of the root-fibres, having been attracted by the suction or aspiration of the spongiole. (***Chimie Organique.*** 811, &c.)

Changes in the Sap.—The preceding are the views of M. Raspail, which further researches may either confirm or refute. The following are a small portion of the interesting experiments and observations of M. Biot on the sap and its changes, and these, it may be remarked, wear more the air of fact, and look less theoretical, than Raspail's statements.

M. Biot first proposed to himself to ascertain, by means of circular polarization, the presence of the gummy or saccharine principles in the sap of trees, and to trace these principles as connected with the nourishment of the young buds in spring. Some of the facts which he discovered were very remarkable.

He pierced with holes, sloping slightly downwards, several species of trees, early in February,—the almond, the birch, the hornbeam, the maple, the ash, the lilac, the mulberry, the walnut, the elm, the poplar, the plane, the willow, the elder, the sycamore, the lime, and the vine,—fitting into each hole a dry reed, with the inserted extremity cut sloping, and scarcely penetrating deeper than the bark. The other extremity entered a small phial, suspended by a bit of wire, and luted with a mixture of oil and wax, immiscible in water. The flowing sap was collected in these phials, and when any evaporation of the water portion occurred from the temperature of the tree being higher than the air, it was condensed within the phial. He was not contented with experimenting on one tree of a species, but selected several of the same sort in various positions and exposures; and he also fixed on the same tree a considerable number of phials, at various heights from the ground.

In the birch he both discovered that the sugar in the sap is not cane but grape sugar, and also that the sap actually flows progressively from the root to the summit, the flow varying with exterior physical causes, which serve to modify it. The walnut, the sycamore, and the maple, did not in February show any flow of sap; and M. Biot took advantage of their state of rest to examine their interior by having a number of trees of these species cut down on purpose. It was remarkable that the interior of the birch trees was found to be without moisture, and even quite dry, while the walnut and sycamore trees were distinctly soaked (***imbibe***) with moisture from the inner surface of the bark to near the central pit. On being pressed, also, the moisture could be squeezed out, and the oozing was most distinct between each of the circles constituting the annual rings of wood. All this was observed while there was no flow from the reeds into the phials except in the birch.

The walnut trees began to give a few drops about the 11th of February, in the phials placed about seven inches from the ground. The sap thus collected was not fermentable grape-sugar, like that of the birch, but crystallizable cane-sugar, for it gave a strong polarization towards the right, while that of the birch was towards the left. The run into this lower phial, after continuing abundant for several days, began to diminish towards the end of February, and at length it ceased altogether. The phial immediately above it, about a yard from the ground, also gave a very small quantity, while all the other phials on the same tree, to the number of eighteen, remained quite dry.

What appeared most singular was, that this individual walnut-tree was known to be rather a late one, while another very large one at a hundred paces distant, known to be about fifteen days earlier, gave no trace of sap in fifteen phials which M. Biot had attached to it. He began, accordingly, to suppose that this early walnut, as well as the sycamores and maples, had been pierced too late, and that the spring flow of their sap was over; or rather that, in the then state of the atmosphere, they evaporated as much sap as they received from their roots. The flow, of course, would not again take place unless the evaporation should be checked by the occurrence of cold weather. This actually did occur, the thermometer falling to one degree below zero, followed by a sharp dry frost, when the maple, sycamore, and walnut trees began to flow, continuing thus till the 16th of March, when the flow began to diminish. M. Biot says, the effect of the cold on the birch tree was very different, but gives no details.

M. Biot distinctly proved that the sap near the root is less dense, and less rich in saccharine matter, than higher up in the trunk or branches, a fact previously stated by Mr. T. A. Knight, but explained by him to arise from the sap in spring mingling with the condensed nutriment deposited in the roots the preceding autumn. M. Biot thinks differently, believing it to arise from the watery portion of the sap being in its ascent either diffused through the cellular substance, or evaporated, or both; and he proved, that though the sap collected in the phials at different heights from the same tree was more dense and rich the higher it was procured, the portions of wood and bark containing the sap gave exactly the same proportions of saccharine or nutritive matter at all heights. M. Biot farther discovered, that the swelling and opening buds (at least of the lilac) have the power of decomposing the sugar of the sap, and of appropriating the carbon contained in it, in the same way as he proved the seed-leaves of corn to decompose the feculla contained in the grain, and change its dextrine into the sugar which nourishes them.

Observations on the Growth and Nutrition of Corn.—M. Biot, finding that the slow growth of trees was not so well adapted to some of his experiments as the quick growth of annual plants, made choice of wheat and rye for observation. It has long been known to physiologists, that, in the process of germination, the farinaceous matter (now known to consist of globules of dextrine in their envelopes) is changed into sugar, which serves for the nourishment of the young plant up to the period when its seed-leaves and primary roots make their appearance. But when the supply of nourishment contained in the seed has been exhausted, the young plant must depend on other sources to maintain its growth; and hitherto it had not been experimentally determined what these other sources of nourishment really are, what modifications they undergo in the various parts of the plant, nor in what manner the different portions are transmitted to the nascent seed in the ear to nourish and mature it.

It is important, in all such inquiries, to distinguish the solid parts, which constitute the frame-work of the plant, from juices or soluble materials, which, constantly formed, destroyed, and renewed, are carried into all the vegetable texture for its nourishment. The first, or solid materials, can be examined by chemical analysis after a plant is dead and dried, but it is different with the other parts or liquids examined by M. Biot.

Rye.—He made his first observations, the 3d of May, on plants of rye already in the ear, but not yet in bloom, the period of blooming being still at some distance. He treated the roots, the stems, and the ears, each separately, with water, submitting them to the proofs of circular polarization, and then he treated the watery extracts, condensed but not to dryness, with spirits of wine; submitting to the proofs of polarization the precipitates as well as the substances not precipitated from the liquids. In a word, he tried, by adding to each the yeast of beer, whether they were susceptible of fermentation, again examining whether their rotation was diminished, increased, or changed in direction.

The matter from the roots gave traces of an exceedingly feeble rotation towards the left, but when it was observed, M. Biot had not discovered that a mixture of cane and grape-sugar would, in a manner, neutralize the right and left rotation. The stem indicated a proportion of grape-sugar turning to the left, and of cane-sugar turning to the right, as well as gum precipitated by spirits of wine, and turning to the left with a force similar to gum. Twelve days afterwards, the 15th of May, while the ear was still far from blooming, the stem presented a mixture of the three substances, but with a considerably larger proportion of cane-sugar, proved by rotation towards the right before being fermented.

The matter from the ear on the 3d of May, and before blooming, gave very different results from the matter of the stem; for M. Biot could not detect it in any sugar, either grape or cane, but only sugar of starch, of which fermentation enfeebled the circular power, without changing its direction. The precipitates also formed by spirits of wine, instead of having the characters of gum as those of the stem, showed only flakes similar to the envelopes of dextrine in the mature grain. These results accord with the observations of M. Raspail, who ascertained that, before blooming, the grains of fecula in corn are extremely small, and that their soluble matter is gradually absorbed by the seed organ (*ovarium,*) which it serves to nourish. M. Biot, as yet, found no dextrine.

After blooming, the composition of the ear was found to be very different. The 15th of June, the young grains of rye taken from the ear, already contained globules of fecula containing dextrine, along with some sugar of starch, but no trace of cane nor grape sugar. It follows, M. Biot infers, that the cane-sugar, the grape-sugar, the gum, which are contained in the stem and leaves of rye, are changed in their nature on passing the neck of the ear (*le collet des epis*), supplying materials for nourishing the young grain, which forms it into dextrine and its envelopes.

Wheat—In his observations on wheat, M. Biot was more particular than in the case of the rye to keep separate the different parts of the plant, and, in consequence, discovered differences of composition, which he could not have beforehand imagined.

The 19th of May, he took young plants of wheat whose ears had not issued from their sheath or hose, he carefully separated the sheathing leaves from the cylindrical stem, and treated the two separately with water, alcohol, and fermentation.—The stems like those of rye presented three carbonaceous substances, namely, grape sugar, cane-sugar, and gum; but subsequent observation showed, that the proportions of these three substances varied much during the progress of vegetation. The 20th of May, the cane-sugar evidently predominated; but the 4th of June, when the ears began to bloom, the stems gave a rotation towards the left, and afterwards preserved this rotation, showing that the cane-sugar had become much less abundant *in the stem.*

The leaves gave very different results; for though they contained three substances the cane-sugar was proportionably much greater than the grape sugar, the contrary of what was found in the stem; and instead of the third substance being gum turning to the left, it produced a rotation towards the right, appearing in fact to be dextrine. The leaves of wheat continue to preserve the same composition till they begin to grow yellow and wither, an effect that uniformly commences at the tip of a leaf, and on the leaf nearest the root; but after this, scarcely a trace of sugar or dextrine can be found in them, all, it would appear, having gradually passed into the stem to nourish the ear, in the same way as the carbonaceous materials of the leaves of trees descend under the layers of the inner bark and pulp wood (*alburnum,*) to nourish the young cylinder of wood and bark, which, similar to a hollow stem of wheat, is annually formed, and moulds itself upon the old frame-work of the wood.

In wheat, therefore, as well as in rye, the base of the stems can derive nourishment partly from the leaves and partly from the soil, and the summit of the stem can draw nourishment from its own leaves, as well as suck up the sap from below; but the ear, when it issues from the sheath appears to exercise on the proper juices of the top of the plant a powerful absorption, causing them to rise rapidly in proportion as they are furnished by the base of the stem.

The 4th June, M. Biot took plants of wheat in full bloom, and depriving the stems of their leaves, parted them into halves, the tops in one parcel and the basis in another. The extracts from the base, when examined by polarization, indicated almost twice as much sugar as the extracts of the tops of equal density; and at the same time he found, that the saccharine principles abounded in the ears of the wheat, in the form of cane-sugar and sugar of starch, together with a substance similar to, if not identical with, dextrine.

Ripening of Corn, and Ploughing of Green Crops for Manure.—In proportion, it has just been shown, as the fecundated ear increases in magnitude, the leaves near the root begin to grow yellow and dry in consequence of the stem drawing from them the carbonaceous materials which they contain. As the growth advances, the base of the stem becomes yellow and dry in its turn, while the upper part remains green, and continues to nourish the ear.

These beautiful researches of M. Biot afford interesting expanations of several agricultural practices hitherto not well understood, at least in a scientific point of view. For example, when the base of the stem begins to become yellow and dry, if the corn be then cut down, though the grain is not ripe, it will continue to be nourished at the expense of the green matter in the upper part of the stem, almost, if not quite as well, as if it had remained uncut, and will thus ripen well; while having been thus cut down early, much loss from shaking is prevented, besides the chance of loss by *lodging* from heavy rain and wind. M. Biot's experiments, from his well-known high character for rigid accuracy, are therefore well calculated to give farmers confidence in cutting down their corn, as soon as the lower leaves and the lower part of the stems are yellow and dry, though the upper parts be green.*

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*It is a good practice to cut down every kind of grain before it is fully ripe in the grain or the straw, and that for the reasons just enumerated in the text. But, as M. Biot's observations and common practice do not exactly agree as to the symptoms which determine the time of cutting, it is

Again, as the leaves and stems of plants while green, contain sugar and other carbonaceous materials for nourishing the seeds and bringing them to maturity, it follows that, if they are in this state ploughed down into the soil, they must greatly enrich it with all the products ready prepared for the nourishment of plants.

It has been proved, indeed, by other experiments previous to those of M. Biot that the leaves and all the green parts of plants, decompose the carbonic acid gas of the air, appropriating the carbon and setting free the oxygen; and hence it has been inferred, that the carbon thus derived contributes to form their mass of sugar and gum, additional to the sap absorbed from the soil by their roots. This view is corroborated by the difference which M. Biot has shown between the composition of the leaves of wheat and the stem, which is more especially supplied from the soil. If, then, a portion of the solid frame-work of plants is derived from the air in the form of carbon, the ploughing down of green crops for the purposes of manure, gives to the soil more than the plants, while growing, had extracted from it.

We may well conclude with M. Biot that "every positive determination in science is susceptible of progress and of useful application, though these may be distant. A microscopical observation, or an optical property, which at first appears only curious and abstract, may thus in time become important to agriculturists and manufacturers."

as well to notice the difference. In a *fine season*, farmers cut down when they find the neck of the straw immediately under the ear free of juice, when twisted round between the finger and thumb; and do not wait until "the lower part of the stems are yellow and dry," because they find in such a season the straw *to die from the ear downwards*. This fact, we conceive, does not miligate against M. Biot's *theory*, for as the absorbing power of the ear at the top of the stem is always powerful, it must be the more powerful the nearer the ear approaches maturity, and, of course, the part of the stem nearest the ear should first become dry. In a bad season, on the other hand, the lower part of the stem first becomes yellow and dry, after which, of course the crop is not allowed to stand; for, in such a season, the ear never becomes mature, having, of course, less absorptive power, whilst the vitality of the root is early destroyed by the combined effects of bad weather and ungenial state of the soil —EDITOR.

From the Maine Farmer.

USE OF THE ROLLER——RAISING POTATOES, &C.

Mr. Holmes:—The first knowledge I had of the roller I obtained from the N E Farmer, some years since. Being always desirous to try "new things," if they promise utility, and especially if they cost but little, I set about constructing one. As I could procure neither *stone* nor *cast iron*, and was too *poor* to do it, if they had been within my reach, I took a "junk" out of a hemlock log, about six feet in length—inserted gudgeons in the centre at each end, on which was hung a sort of frame, with a tongue like a sled.

With this machine, I went over my wheat ground, breaking every "lump," and sinking every small stone, and left the field in excellent order for the scythe.

Nor is this all the benefit derived from rolling. By pressing the soil closely round the grain, much more of it will vegetate than with the usual management—and in case of drouth, the ground will not "dry up" so quickly. As to making the ground heavy, (as some fear it will) I think it has about the same effect, with respect to that, as the hand of the housewife has, in being passed over the surface of the "brown loaf," before committing it to the oven.

Much has been said in the Farmer upon raising potatoes—each writer has rather a better method than *the others*. I am well satisfied with the method I have adopted, which is, to select a piece of grass ground, (the smoother the better) and cart on a large dressing of green barn manure, at my leisure. When ready to prepare for planting, I spread the manure evenly as possible, but no more in a day than I can turn under—turn the sod, flat and roll well immediately—then harrow length-wise of the furrows with a light harrow, till the interstices between them are filled—next mark off the rows with a small plough or chain, and plant on the surface with a covering of about two inches. I have practiced hilling lightly, but think I shall omit it altogether this year. I stir the ground well with the Cultivator.

Some of the advantages of this mode of culture I conceive to be the following:—The ground not being ploughed till late, the grass gets a good start, and being covered, together with the unfermented manure, ferments, and forms a *hot bed* which brings forward the crop surprisingly, and continues to afford nourishment in abundance, till it comes to maturity. The rolling prevents the furrows from being torn up by the harrow, and the filling of the crevices between the furrows prevents the possibility of any grass or weeds growing from the manure, and you have a clean field, if the soil is free from foul seeds, in fine order for a crop of wheat the next spring. I have pursued the same course with my corn for three years past, with the addition of a light top dressing of old manure, and I have never had better success

Farming begins to *look up* in this section of the State, and with the bounty on wheat, and the present pinching scarcity of provisions, in view, I think, with the blessing of a bountiful Providence, we shall be better supplied for the future.

HORACE WILDER.

North Dixmont, April, 1837.

From the Maine Farmer.

"A CENT'S WORTH OF SAUCE SAVES A SHILLING'S WORTH OF MEAT."

Mr. Holmes:—I sometimes scribble a little for the Farmer, and I hope when you think that the public or farmers are not interested, you will oblige me by throwing my communications under your table.—The Legislature have very wisely given an impulse to the raising of breadstuffs—the staff of life, so called—in Maine.—Though I hope considerable money will be taken from the Treasury for the premiums proposed—all can see that if more wheat be raised, more money will be saved in the State to replenish the Treasury—I am nevertheless convinced that Farmers do not pay attention enough to their Gardens, and the raising of beans, peas, and the various other varieties of sauce.

Does a cent's worth of sauce save a shilling's worth of meat? No doubt it does,—and I add that good sauce saves bread too. Beans, for instance, are a hearty sauce. One remarked to me recently, that "dear as beans are at present, they are the cheapest sauce in my family, for they save bread and meat too." I wish farmers would raise more of them, and attend more to the varieties. Sauce is also more healthy or wholesome than many things which we eat.

A LOVER OF GOOD THINGS.

Correspondence of the Springfield Repub. and Jour.

BOSTON, March 6.

The Faneul Hall Market attracts the attention of strangers. In many respects it has not its equal in the Union. It is 536 feet long, 50 feet wide, two stories high, and wholly built of granite. The centre of the building is wider and higher, being 74 feet by 55, with a dome. In the second story of the centre, is a spacious Hall, called Quincy Hall, in honor of John Quincy, Esq., who, as Mayor of Boston, contributed so much to the execution of the noble enterprise. The principle entrances are at the east and west ends—the west end fronting Faneuil Hall. This grand structure was commenced in August, 1824, and with the improvements on eaah side of the street opposite, was completed in about two years. The Market cost about $1,000,000. The greater part of the land on which the Market stands, as well as the beautiful row of stores on each side of the street opposite, has been reclaimed from the sea, by filling in with earth at different times. Many acres in other business parts of the city, have been made in the same way. The interior of the Market is divided into 128 stalls; 14 for mutton, lamb, veal and poultry; 2 for poultry and venison; 19 for pork, lamb, butter and poultry; 45 for beef; 4 for butter and cheese; 19 for vegetables, and 20 for fish. The second story of the Market is used as a depository for wood—and the Stores on South and North Market streets are built of corresponding architecture to the market. It is said there is no market in the Union which is so uniformly stocked in variety as this. Besides the usual assortments of meats and vegetables, here may be had all sorts of nuts and fruits. It is a sight for an epicure. One would think to see the great quantities of every kind of food, that there was no danger of famine. At the east end, on the outside, is a large open stall, where a thousand funny articles, books, songs, matches, &c. are offered for sale. This is brilliantly lighted in the evening. The market is most thronged of a Saturday evening, As I entered the west end, and looked down the long avenue of more than 500 feet, with a row of lamps on each side, it seemed like an endless gallery of "fat things," with a dense crowd of buyers the whole distance. As I forced my way through, I saw a number of poor men and women looking wishfully upon the fine beef, poultry, and butter, and seeming to say, I wish my money was equal to my desires.

FARMERS' WORK.

Bacon.—About Christmas, if the weather be coldish, is a good time to kill. If the weather be very mild, you may wait a little longer; for the hog cannot be too fat. The day before killing, he should have no food. To kill a hog nicely, is so much of a business, that it is better to pay a shilling for having it done, than to stab and hack and tear the carcase about. There are two ways of going to work to make bacon; in the one you take off the hair by scalding.—This is the practice in most parts of England, and all over America. But the Hampshire way, and best way, is to burn the hair off. There is a great deal of difference in the consequences. The first method slackens the skin, opens all the pores of it, makes it loose and flabby by drawing out the roots of the hair. The second tightens the skin in every part, contracts all the sinews and the veins in the skin, and makes the flitch a solider thing, and the skin a better protection to the meat. The taste of the meat is very different from that of a scalded hog; and to this chiefly it was that the Hampshire bacon owed its reputation for its excellence. As the hair is to be burnt off, it must be dry, and care must be taken, that the hog be kept on dry litter of some sort, the day previous to killing. When killed he is laid upon a narrow bed of straw, not wider than his carcase, and only two or three inches thick. He is then covered all over thinly with straw, to which, according as the wind may be, the fire is put at one end.—As the straw burns, it burns the hair. It requires two or three coverings and burnings, and care is taken, that the skin be not, in any part, burnt or parched. When the hair is all burnt off close, the hog is scraped clean, but never touched with water. The upper side being finished, the hog is turned over, and the other side is treated in like manner. This work should always be done before day-light; for in the day-light, you cannot so nicely discover whether the hair be sufficiently burnt off. The light of the fire is weakened by that of the day. Besides, it makes the boys get up very early for once at any rate, and that is something; for boys always like a bonfire.—[Cobbett's Economy.]

From the New-York Cultivator.

DUTTON CORN.

NORTHAMPTON, Jan. 18th, 1837.

JUDGE BUEL—DEAR SIR—The following is a method of culture, and result of the seed corn purchased of you last autumn, which, if you think proper, you are at liberty to give a place in the Cultivator. The variety is the twelve rowed early Dutton, or Buel corn and is the best with which I am acquainted particularly for latitudes north of 40°. on account of its early maturity, which is, I should say, two weeks earlier than the common or eight rowed kind. Out of several acres of the latter, planted the last season, I had not a bushel of sound corn, it being destroyed by the early frosts, while the Dutton was ripened and harvested on the 20th September, and did not give more than two per cent. of soft corn. In the preparation of, the method of culture, &c., I pursued the course frequently recommended by you; but was, through the whole process, exceedingly annoyed in contending with old prejudices and practices of laborers and others, who often rebelled, and were disposed to place themselves conservators over me, in spite of all resistance on my part. If their prophecies were to prove true, my corn would have been seven times blasted. Grave doubts were expressed as to the advantage of the roller, and in the preparation of the seed, (*see Cultivator, vol.* 1, *p.* 37.) "whoever heard of rolling corn in *hot* tar? It will be scalded, ruined, and never come up." It *all* came up, however, and why? Because being of the early variety, it was well ripened, the preceding backward season, the reverse of which was much complained of in the common kind. Then, again, "it was too thick—depend upon it, sir, when you come to look for ears, you will find nothing but stalks; two feet and a half! four stalks in a hill! it is entirely too much—it will cover the ground and you will get nothing." As to smooth hoeing, or without hills, it was a thing they had "strong doubts about."—The cultivator, however, was allowed to be "a grand thing," and clean weeding presented no objections; here of course was a long respite, and I was allowed quietly to enjoy the pleasant anticipation of a good crop. It so happened that my corn was not hid in a corner. but grew in an open field, was subject to the inspection of many a passer by, and I was much gratified by the frequent remark,—"what a fine piece of corn!" But when the harvesting came, the objector says, "you have done wrong in cutting it up, it is better to top it," and again, "you are entirely too early, it will not harden." The fact is, however, it got thoroughly hard, and brighter or better corn I never saw; it was cut the 20th September, husked and weighed the 10th November. The piece of ground measured one acre and five and a half rods, and yielded eight thousand seven hundred and eleven and a half pounds, (which, at 75 lbs. the bushel, allowed by the agricultural society,) gave one hundred and twelve and a half bushels to the acre; also, four heavy two horse loads of well cured corn stalks, worth more than a ton of the best hay.

PREPARATION OF THE GROUND, MANURE, &c.

I have a fine lot, containing six acres, lying east, and in full view from my house, slightly undulating and gently sloping, on which two or three years ago, I commenced farming in miniature, on the rotation system, that I might judge of the comparative profit of good systematic culture, (by some laughed at as a book of knowledge,) compared with the slovenly and parsimonious habit, too often persevered in, and I am so far much pleased with the result; it speaks loud in favor of good husbandry. I am well satisfied, too, that you must feed your land if you would be fed yourself, This lot has for many years, (50 or more, for aught I know,) been undisturbed by the plough, from the erroneous opinion that good grass land should remain for the scythe only. The soil is mostly a warm sandy loam; some part of it, however, is low and wet; this I have overcome by thorough draining. (On this subject I may hereafter have something to say.)

I prepared by deep ploughing last fall, a part of the above lot, carted and spread upon it the 10th of May, 35 loads of long unfermented stable dung to the acre, making five heaps to the load, dropped at five yards distance each way; this, after being carefully spread, was passed over with a heavy roller, and afterwards well harrowed, planted the 15th of May, and ashed as it made its appearance above ground.

ESTIMATE OF EXPENCES, &c.

Dr.—		
To ploughing with two yoke of cattle, $1\frac{1}{2}$ days, at $3,		$4 50
Rolling and harrowing $1\frac{1}{4}$ days, single team, at $2,		3 00
Seed corn,		1 00
Preparing seed corn with tar, &c.		25
Planting two days, at $1,		2 00
Three hoeings, two days each, at $1.		6 00
Horse and man $1\frac{1}{4}$ days, with cultivator, $1 50,		2 25
Cutting and binding two days, at $1,		2 00
Picking and husking seven days, at $1,		7 00
38 loads manure, at $1,	$38 00	
Carting and spreading, at 25 cents,	9 50	
	$47 50	
Deduct two-thirds for the succeeding crops in the rotation,	31 61	
		15 89
20 bushels ashes, at $12\frac{1}{2}$ cents,		2 50
Spreading 1 day, at $1,		1 00
Interest on land, valued at $150		9 00
		$56 39
Cr.—		
By $62\frac{1}{2}$ bushels corn, at $1 50,		$93 75
50 bushels seed do. at $2,		100 00
2 do. soft do. at 50 cents,		1 00
4 loads stalks,		15 00
		$209 75
Deduct expenses,		56 39
Profit,		$153 36

I have not had experience enough to know which is the most preferable, to plough old sward land in the fall, and spread the manure on the surface the following spring, or to spread the manure in the spring before ploughing, and then turn it in. I think much may depend on the season, in the first practice; if the season should be dry, may not a good deal be dissipated by the winds? and again, if it should be wet, may not the roots reap a greater advantage, than if it lay beneath the turf? I will thank you for your views on the subject.*

Although I used my own teams, and hired my labor by the month, at 12 to $14, yet in consequence of rainy weather, broken days, &c., I think it but right to charge the fair price of labor by the day, both for man and team. In estimates of this kind, the labor is frequently charged per day at the average of the price per month, which makes quite a different result. The estimate of corn, at $1 50, may appear to many overrated, nevertheless, it is a fact, that corn of an inferior quality is selling with us at that price.

Yours, very respectfully,
H. G. Bowers.

N. B. Since writing the above, it occurred to me that, although in the preparation of seed corn, tar is recommended chiefly, as a protection against birds, it may also have another very important effect, (thereby saving a replanting in consequence of wet weather,) in providing a coat, impervious to the superabundant water, until the sun shall, by its genial warmth, cause the germ to disengage itself from its confinement.

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* *Old* sward, for corn land, is best ploughed in the fall, and if long manure is at command, it may be buried in the operation. It will undergo but slight if any fermentation before ploughing, and the soil will imbibe what it gives off of nutriment. A clover lay is best ploughed early in May, having the manure previously spread. If, in the first, manure is not at command, we would recommend that the plough be set deep, and that the manure be buried in the spring, immediately preceding planting, by a superficial furrow, which shall leave the sod as much as possible undisturbed.—[Conductor.]

From the Farmer and Gardener.

CULTURE OF RUTA BAGA.

Mr. James M. Lawton, in a communication in the Cultivator, gives the following rules for the preparation of the soil, and the culture of the Ruta Baga. The conclusions at which he arrives are the result of many years experience and close observation.

1. The land, he says properly adapted to the nature of the plant, is a strong loam.

1. The land should be ploughed early in the spring, in order that the sward, if it have one, may rot by the 10th of June.

3. The land should be made perfectly mellow and smooth, and a good coat of manure, that is fine, say sheep or barn manure should be put on.

4. Throw the land into ridges 24 inches apart, with a small horse plough.

5. Roll down the ridges by a light roller, or other instruments; make a light furrow, say an inch deep, drill in the seed on or about the 15th of June: the seed should be 10 inches apart in the drill, and when the plants come up, all but one plant should be pulled up.

6. Dress the plants three times in a season, that is, keep the weeds out, and the earth stirred about the plants; as they are first breaking the ground they must be powdered with plaster of Paris,—and twice afterwards also—when they receive the two last hoeings.

Mr. Lawton further adds, that he has found the above rules, when closely followed, never to fail in producing a good crop; that last year he raised from 90 rods, that is from half an acre and 10 perches of land, 605 bushels of sound, close grained Ruta baga turnips, on land a distance from the house and barn, on which, never to his knowledge, a spoonful of manure had been placed until within a few days of the time he put the seed in the ground. This product was equal to 1075⅗ bushels per acre. The success of Mr. Lawton should surely serve to stimulate every farmer and planter to at least appropriate an acre or two to the culture of this excellent and hardy root. Unlike the other members of the turnip family, it preserve through the hardest winter in the field, if the precaution be taken to throw a furrow up against the rows just as the hard frosts set in, and may be drawn thence for use, as occasion may suit. They are also more firm in meat, and more nutritious than any other turnip. Horses and cows fed upon them do not scour as when kept on the other varieties.

HORTICULTURAL SOCIETY OF PENNSYLVANIA—LIBERAL PREMIUM.

We have been favored with a copy of the advertisement of this society offering premiums for "*culinary* vegetables, fruits, and flowers, for 1837," and on looking over them we are gratified to find that its members are influenced by feelings of enlarged liberality.

We comply with their request to publish the subjoined, with pleasure; the generous spirit which animates the institution is to be seen in this noble effort to preserve one of the most delicious of fruits, from its most deadly enemy, and we sincerely hope that the pecuniary stimulant they offer will serve to urge the nursery men and horticulturists of our country, to turn their attention seriously towards the discovery of the preventive in question.

BLIGHT IN PEAR TREES.

The Pennsylvania Horticultural Society, anxious to promote the discovery of preventive for the disease usually termed *blight* in Pear Trees, offers a premium of FIVE HUNDRED DOLLARS, to be paid the person who shall discover and make public an effectual means of preventing its attack. The premium not to be awarded until after the expiration of three years from the publication of the preventive, nor until the Society shall be fully satisfied of its efficacy. Communications on the subject may be addressed per mail to David Landreth, Cor. Secretary, Philada.

From the New-England Farmer.

Manure.—Stable and barn-yard manure is rendered of little value by long exposure to the air, sun and wet weather. Indeed, every moment of such exposure takes away from such manure some part of its fertilizing principles. The following remarks on the waste of manure by exposure, have been given in the N. E. Farmer, vol. v. page 342, but may be new to some of our more recent subscribers.

"He who is within the sphere of the scent of a dung-hill," says the celebrated Arthur Young, "smells that which his crop would have eaten, if he would have permitted it. Instead of manuring the land, he manures the atmosphere; and before his dung-hill is finished he has manured another parish, perhaps another county." Stable and barn-yard manure should be kept as carefully from the sun and rain as grass, which has been cut for hay. When cattle have been yarded over night, it will be well to throw their manure into heaps, and cover them with a little loam or marsh mud, previously prepared for that purpose.

"Earth is a powerful absorber of all the gasses which arise from putrefaction. But a layer of common soil along the top of a fermenting dung-hill from 12 to 18 inches thick, and allow it to remain there while the process is carrying on with activity, and afterwards separate it carefully from the heap, and it will have been impregnated with the most fertilizing virtues. The composts, which of late have attracted so universal attention, and occupied so large a space in all agricultural publications, originated in the discovery of this absorbing power of the earth, and in the application of it to the most beneficial purposes. A skilful agriculturist would no more think of allowing a violent fermentation to be going on in this dung-hill, unmixed with earth, or other matter to fix and secure the gaseous aliments, than the distiller would suffer his apparatus to be set at work, without surmounting his still with the worm to cool and condense the rarified spirits, which ascend in evaporation. In both the most precious matter is that which assumes the aeriform state; and to behold it escaping with indifference, is a demonstration of the most profound ignorance."—[Letters of Agricola.]

Infusion of Walnut Leaves to destroy Insects.—It appears by a communication to the London Horticultural Society, by Sir Charles M. L. Monck, Bart., that worms which infested plants in pots, were destroyed by a pint of an infusion of walnut leaves given to each pot. The worms quickly emerged from the mould to the surface, and were removed. This treatment was repeated the following week, when a few more worms were extracted; the plants, which had been sickly, after this application resumed their health and blossomed strongly. This success induced Sir Charles to try the experiment on orange trees, and other plants in pots, and it was attended with equal success. He thinks that the infusion is beneficial, not only in destroying worms, but that it acts also as a manure. The infusion is made by pouring boiling water on fresh walnut leaves; which having stood till cold is ready for use.

Forsyth recommends a decoction of walnut leaves as an antidote to insects, and a decoction of elder leaves is also said to answer the same purpose.

POTATOES.—In Prussia the Potatoe is cultivated with peculiar success;—as the stalk grows, the earth is heaped up, leaving only three leaves at the top; roots are thus greatly increased, and the produce is said to be astonishing.

FAT OXEN.—Messrs. Hillman and Thayer, of this town, slaughtered a pair of oxen last week, from the stall of Mr. George Cook, which presented as fine specimens of beef as we ever witnessed. We saw a hind quarter as it lay in the butchers' cart, and it appeared to be almost a complete mass of fat. The fat on the rounds was apparently two or three inches thick. Our stomach yearned, as may well be supposed, for a good cut from the tender loin, but we were compelled to turn disappointed away, for the price was fourteen cents a pound. These oxen weighed 4,385 on the hoof, and after they were dressed, 3,190 pounds. The butchers paid ten dollars the hundred pounds.—[Hampshire Gazette.]

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone.

The work contracted for must be finished by the 1st day of July, 1838

Persons desirous of obtaining work are requested to apply at the office of the undersigned, in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, Jr.
Chief Engineer Jas. Riv. & Ka. Co.

P. S.—The valley of James River above Richmond is healthy.

16—10t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered.—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer.
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 14 1y

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rochester, Jan 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.
16—6t.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

					lbs.	
350 tons	2¼ by ⅝,	15 ft in length,	weighing		$4\frac{68}{100}$	per ft.
280 "	2 " ½,	"	"	"	$3\frac{50}{100}$	"
70 "	1½ " ½,	"	"	"	2½	"
80 "	1½ " ¼,	"	"	"	$1\frac{25}{100}$	"
90 "	1 " ¼,	"	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and ston block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front st.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

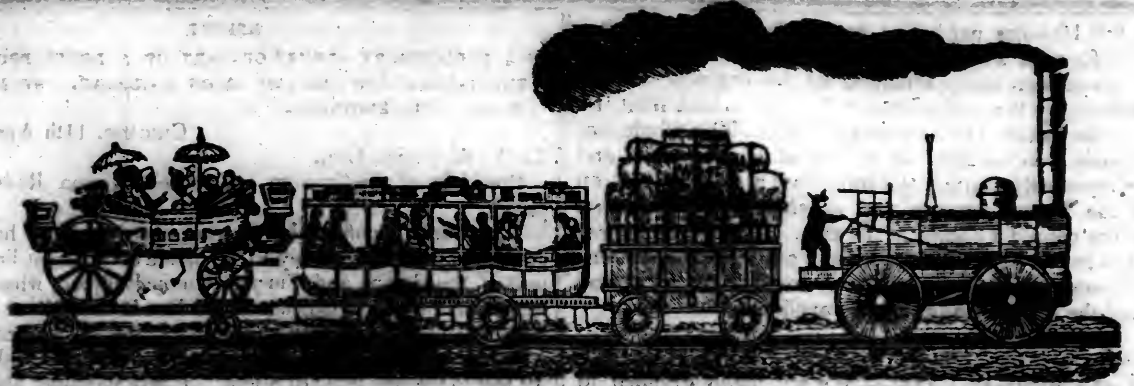
Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N. Y.
51tf



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, JUNE 17, 1837. [VOLUME VI.—No. 24.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JUNE 17, 1837.

TO RAILROAD OR MANUFACTURING COMPANIES.

We ask attention to the following advertisement. The gentleman referred to will be found an acquisition to any company that requires the aid of a superintendant, professing skill, experience and character—and we shall take great pleasure in being the medium of communication to him from those who may desire information.—[Eds. R. R. Jour. and M. Mag.]

TURNPIKE, NORTHWESTERN, VA.—Extract from a letter dated Clarksburgh, Va, June 1st.—In reply to the question of the writer of the letter, "whether we will receive *Virginia Bank Notes*, for what is due" us, we reply unhesitatingly, YES, and glad to get them. We receive *any thing* in the character of Bank Notes current where the Periodicals are received—although we *prefer* such Notes as have the *least discount here*—and we are sure that our subscribers will always send us that if they can obtain it.—[Eds. Railroad Journal.]

"The only public improvement in this section of the State, is the Virginia North-western Turnpike, now in progress of construction. It commences at Winchester, Virginia, and terminates at Parkusburg on the Ohio river, a distance of 226 miles, one half of which is completed, as are likewise the bridges over the South Branch of Potomac, and Middle Island rivers.—Those across the North Branch, Cheat, Tygart's valley river, and the West-fork of the Monongahela are rapidly progressing."

NORRIS' LOCOMOTIVES.—The following extract from the Philadelphia National Gazette of Saturday last, will prove as gratifying to our readers as it has been to us. We have ascertained that the statements therein made are perfectly correct. Mr. Norris' engines challenge competition with any others.

We have understood that recently in addition to its own train of 33 burden cars, one of his engines took 18 passenger cars, making in all 51 loaded cars which were drawn around curves of 400 feet radius, the whole train occupying nearly a semi-circle—and this over a road never intended for locomotive power, and racked by the daily wear and tear of an immense travel.

Mr. Norris has made several engines for the Portage road, where one of them is constantly employed upon a long grade of 54 feet to the mile in descending, which, with a load of more than 100 tons it was able to stop in time to save the life of a man who had fallen upon the track.

We have been furnished by a friend with the following particulars, from Mr. Phleger, the engineer, of the performance of a locomotive engine, recently constructed for the State, at the manufactory of Mr. Norris, at Bush-hill. The engine left Columbia with a train of 31 cars, and after attaching five more, at several depots on the road, making a total load of 172 tons in 36 cars, proceeded to Philadelphia. With this great load of 172 tons, it passed up the Gap grade of 40 feet rise per mile, at a speed of full 10 miles per hour; and on the grade of 32 feet rise per mile for nine successive miles, a speed of 25 miles per hour could have been easily attained, but the engineer was deterred therefrom, by the regulations of the road, which limit the speed of burthen trains to 10 miles per hour. The whole distance, 82 miles, was travelled in the usual running time, and the engine repeatedly started the train from a *state of rest*, on several of the highest grades and in short curves, without slackening the coupling chains of the cars. This performance, it is said, has never been equalled by any other locomotive engine of the same weight, nine tons, in Europe or America, and is considered the regular daily rate of travelling.

ILLINOIS AND MICHIGAN CANAL.—We are highly gratified to learn that this important work is progressing, notwithstanding the extreme scarcity of money. The Chicago American, says,—

Contracts, to the amount of about one million of dollars, were made by the Commissioners on Saturday last, and at about sixty thousand dollars *less* than the estimated prices. Laborers to almost any number can now find employment on the different sections of the line, and receive high prices. *Several thousands are wanted immediately.*

DETROIT AND ST. JOSEPH RAILROAD.—We are happy to have it in our power to say that the Board of Internal Improvement are determined to complete the first thirty miles of this work by the 1st of September next. An additional number of hands are about to be employed upon it, and no pains will be spared to render it fit for use as far as Ypsilanti or Ann Arbor by the time above mentioned. One of the locomotives intended for it is now at Buffalo, and will be received here in a few days.—[Detroit Jour.]

☞ The following gentlemen were yesterday re-elected Directors of the New-Jersey Railroad and Transportation Company for the ensuing year, viz:—

John S. Darcy, W. W. Woolsey, E. Townsend, R. S. Colt, A. Day, A. Lee, G. P. Molleson, G. L. Schuyler, J. P. Jackson.

At a subsequent meeting of the Board, the following officers were unanimously re-elected for the ensuing year. JOHN S. DARCY, President; JOHN WORTHINGTON, Treasurer; JOHN P. JACKSON, Secretary; and WILLIAM PENNINGTON, Attorney and Counsellor of the Board.—[Newark Daily Adv. June 1.]

CHICAGO AND GALENA RAILROAD.—We copy from the Chicago American of May 27th, the report of JAMES SEYMOUR, Esq. Chief Engineer, formerly on the New-York and Erie Railroad.

CHICAGO only five years since, was not even a village, now she is a CITY, with her Mayor and Board of Aldermen, and will in less than five years more, be the center of an immense business. With a steamboat canal to the Illinois, Mississippi and Ohio rivers. With *one* railroad reaching her from the *east*, and *another* connecting her with the Upper Mississippi, whilst its branches will penetrate every part of the State. Chicago must become all that her sanguine friends have predicted. *It cannot be otherwise.* The Chicago American says, that

The first Report of *James Seymour, Esq.*, Chief Engineer on this Road, will be found in our columns to-day. It will, we have no doubt, attract great attention, both at home and abroad. This work will form the *last* link in the chain of railroads (all of which will soon, be completed) connecting the Atlantic with the Mississippi—the East with the great West. The charter of this company is of immense value, as it secures them the privilege of making *latteral* roads in any direction; and contains no restrictions as to the rates of toll which the company may tax. The country, too, through which the road will pass is very favorable, being flat and smooth, and requiring little more than laying down the rails to make the road complete. With such advantages, what can prevent the company from "going ahead" and reaping a rich reward for the outlay.

REPORT

ON A PRELIMINARY SURVEY OF PART OF A ROUTE PROPOSED FOR THE GALENA AND CHICAGO UNION RAILROAD. BY JAMES SEYMOUR, CIVIL ENGINEER.

CHICAGO, 11th April, 1837.

To T. W. Smith, Esq.,
President of the Chicago and Galena Union Railroad Company.

DEAR SIR: Conformably to your instructions, I have caused an exploration and survey to be made of different lines for that part of the Galena and Chicago Union Railroad, which is to extend from the city of Chicago to the Des Plaines River, and herewith submit to you a map and profile of the work, each drawn on a horizontal scale of 500 feet to an inch,—vertical scale of profile 40 feet to the one tenth of a foot. I have carefully and minutely examined the lines in the field, and inspected the Estimate, Map, and Profile made in the office; and am satisfied, that of the four lines that have been traced, the best has been selected.

The length of the line is 9¾ miles, and the total cost of grading for a double track, and building a single one with the necessary turn outs, $72,952.

The estimate based upon the plan proposed, I have no doubt, is sufficiently liberal to meet all contingencies, and to construct the work within the amount specified. For more minute particulars, I would refer you to the report of my assistant, Mr. P. H. OGILVIE, who conducted the survey. It is estimated, that part of the embankment is to be taken from ditches cast on both sides of the road throughout; the ditching serves the double purpose of keeping the road-bed dry, and draining the prairie.

The embankment estimated for that part of the road where piling is required, may at present be dispensed with, provided it be not deemed necessary to drain the prairie. Should both these suggestions respecting embankment and draining be disapproved of, and it be proposed to grade, at present for a single track only, then $15,000 may with safety be deducted from the estimate.

In either case, should the whole be constructed by one contractor, or firm—responsible men, it may be done for at least $12,000 less than the estimate, by adopting the following plan, viz:

1st. Erecting a steam saw mill, at the Des Plaines River, for the purpose of sawing the cross-ties, rails, longitudinal sills, and wedges, and preparing them for the work.

2d. Commencing the road at the Des Plaines River.

3d. Procuring a small locomotive engine, and railroad car, to convey the timbers to their destination, as fast as the wooden superstructure progresses; the same engine to be used in driving piles; all of which may be done previous to placing the iron bars on the road, the whole distance of which is so perfectly straight. In this way the wooden superstructure may be completed from the Des Plains River to the south branch of the Chicago River where the iron bars can be shipped, and put on board the car for distribution along the line.

Nevertheless, I would recommend grading for a double track, for the following reason, viz: The company's interest to assume the privilege of the Act amended and passed in their favor, 4th March, 1837, and thereby to extend a branch of the road south of west, to connect with the Central Railroad to Galena, and another branch north of west, to cross the Du Page, Fox and Rock rivers; thence entering the valley of the Peckatonica, traverse the mineral region, in the direction of Galena; thus securing to the company the vast avails of travel and freight to be attracted in traversing the rich and fertile regions of the west, and forming a most important link in the grand projected scheme of connecting the Atlantic with the Mississippi—a scheme, the completion of which will induce thousands to visit us, and scatter their wealth and influence throughout the country.

As far as I am acquainted with the face of the country between the Des Plaines and Fox rivers, it is mostly uniform, higher, and much drier, than it is east, for which reason, the construction of either or both branches of the Road, will be attended with much less expense per mile, than that part of the work herewith rendered.

I have made no reconnoissance, personally, of the country a far west as Rock River, but from the best information I can obtain from intelligent men, a similar uniformity of surface and dry prairie prevail in the direction of either branch proposed—thus affording to the company the facility of constructing a cheap and permanent railroad west to that river.

There are no tangible data, wherefrom to venture an opinion, as to the probable amount that may be derived from the contemplated work, until explorations, surveys, and estimates of cost be made for either branch proposed, or that of a middle route to the Rock River.

GENERAL REMARKS.

Vast is the latitude of the charter granted to the Company, and pregnant with advantages; especially the 6th section, empowering the company to place the main line of road wherever their interest may direct, and constructing such lateral branches as they may think proper, to give effect to that interest—together with the unlimited power of fixing and regulating the tolls upon each and every one of these routes. I know of no project where capital may be more safely invested, or where there is a greater prospect of a large and speedy return.

By the Company's selecting valuable lands, and judiciously fixing on important points, the road may, soon after completion, with proper management, be made to pay the cost of constrnction, as it progresses from piace to place.

Your charter invests you with the privilege of extending the Road to the earstern boundary of the State, forming a connecting link of a chain of railroads now in progress through Indiana, Ohio, and part of Pennsylvania, thence to Buffalo, in the State of New-York—thus opening a direct communication with this State and Pennsylvania, whose lakes, canals, and railroads, now in use for the transfer of freight and passengers, together with the immense transport of merchandise and influx of emigrants by way of Lakes Erie, Huron and Michigan, render the completion of the work in question, an all important operation. All of which is respectfully submitted by,

Dear sir, your ob't servant,

JAMES SEYMOUR.

From the London Mechanics' Magazine.

HOLLOW CYLINDROIDAL RAIL FOR RAILWAYS.

Fig. 1.

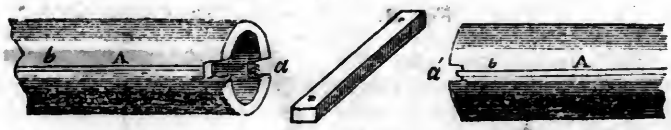


Fig. 2.

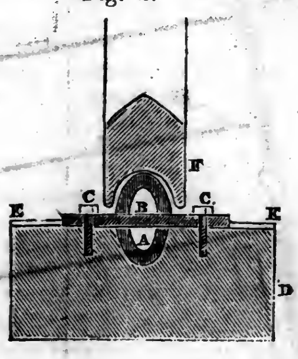


Fig. 4.

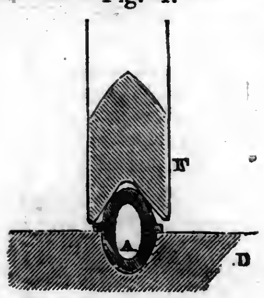
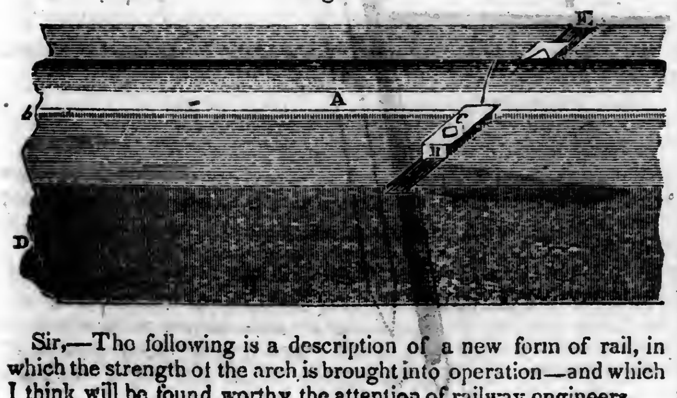


Fig. 3.



Sir,—The following is a description of a new form of rail, in which the strength of the arch is brought into operation—and which I think will be found worthy the attention of railway engineers.

Fig. 1 is a perspective representation of the disjointed ends of two rails, AA, with the cross-bar B, which, entering the nothces *aa*, binds them firmly to the longitudinal timbers D.

Fig. 2 is a transverse section of the rail, &c., showing its eliptical shape, with the proposed form of tire (F) for the wheels of the carriages, and the mode of securing the rails—nearly one-half being buried in the timbers D.

Fig. 3 is a perspective view of the whole when put together.

The timbers are proposed to be of Kyanized oak, and laid in concrete; the two lines of each track being truly parallel, and connected throughout by ties. The longitudinal groove, in which the rails lie, should be cut out by machinery, a perfect fit being thereby ensured.

The advantages anticipated for this arrangement are—

1st. Greater ease and smoothness of motion to the carriages. Gravity would keep the wheels in a perfectly straight line. By this mode also of connecting the rails and timbers, lateral disconnection of the bearing surfaces would be rendered impossible, and all jolting in consequence avoided. A rib, *b b*, is proposed to be formed on each side of the rail, for further security, as well as to prevent wet insinuating itself between the rails and timbers.—The groove E E, in which the cross bars slide, will also diminish the strain upon the screws *c c*, caused by the action of the propelling wheels.

(With all deference to the experience of Mr. Vignoles, whose system of continuous timbers I have here adopted, I would ask, if the oft-repeated rapid rolling of a mass of iron, six or eight ton in weight, would not soon loosen rails that are merely nailed or screwed on to their bearings, without at all entering the wood?)

2nd. Greater strength of rail from the same weight of iron.—The lower half being firmly bedded in oak, the upper presents an arch to the incumbent pressure.

3rd. A more convenient (and, as above shown, a firmer) method of fixing the rails. In order to remove a rail for repair, it would be merely necessary to withdraw four large screws, and knock out two bars, when it might be lifted out.

4th. Economy in wear. When it has become no longer safe to use a rail in its original position, the simple operation of reversing it would present a new surface as firmly fixed as the first. A bar rail, if formed with this view, would obviously not be held so securely in its second position; it might probably therefore be found advisable, to make the bearing portions of the tube somewhat thicker than the rest.

Should it be objected that the narrow bearing surfaces would induce rapid destruction of the wheels, I reply, that the weight of the engines (the heaviest load, calculating *per wheel*) might probably be lessened. On the present plan a considerable weight of engine is necessary to give cohesion between the propelling wheels and rails: this I propose to effect by the form of tire represented in fig. 4, which would also give additional safety at high velocities, by diminishing the liability of the train to get off the tracks. (What has become of that beautiful little engine, the "Novelty?" I trust Messrs. Braithwaite have not abandoned the idea of bringing so elegant a construction into use.)

Probably cast iron might be the cheapest, as it would be the firmest material for hollow rails; but they might be rolled out with a core, in the mode used for gun barrels.

Another advantage of this system, not immediately connected with the subject, has since occurred to me. Various schemes have been proposed for the rapid communication of intelligence between distant places—some of them not a little expensive.—Here is a speaking-pipe ready made; for, were such a plan really feasible, some other mode of fixing the rails might be adopted, which would not interrupt the transmission of distant sounds.

London, 16th March, 1837. J. R.

P. S.—I would add a word on the subject of cost, though having no *practical* knowledge, I can give no very satisfactory account. It appeared to me, that on this plan the rails need not be longer than six feet. If cast then, the greatest addition to the expense would be the additional weight of metal. But as my rails will admit of being turned, when worn, they cannot fairly be compared with others, weight for weight. Perhaps some company might think it worth while to *try* how much substance would be necessary for this form of rail, for without experiment no correct idea can be formed on this point.

IRON WHARFING AT EAST INDIA DOCKS, BLACKWALL.

Plate 12.

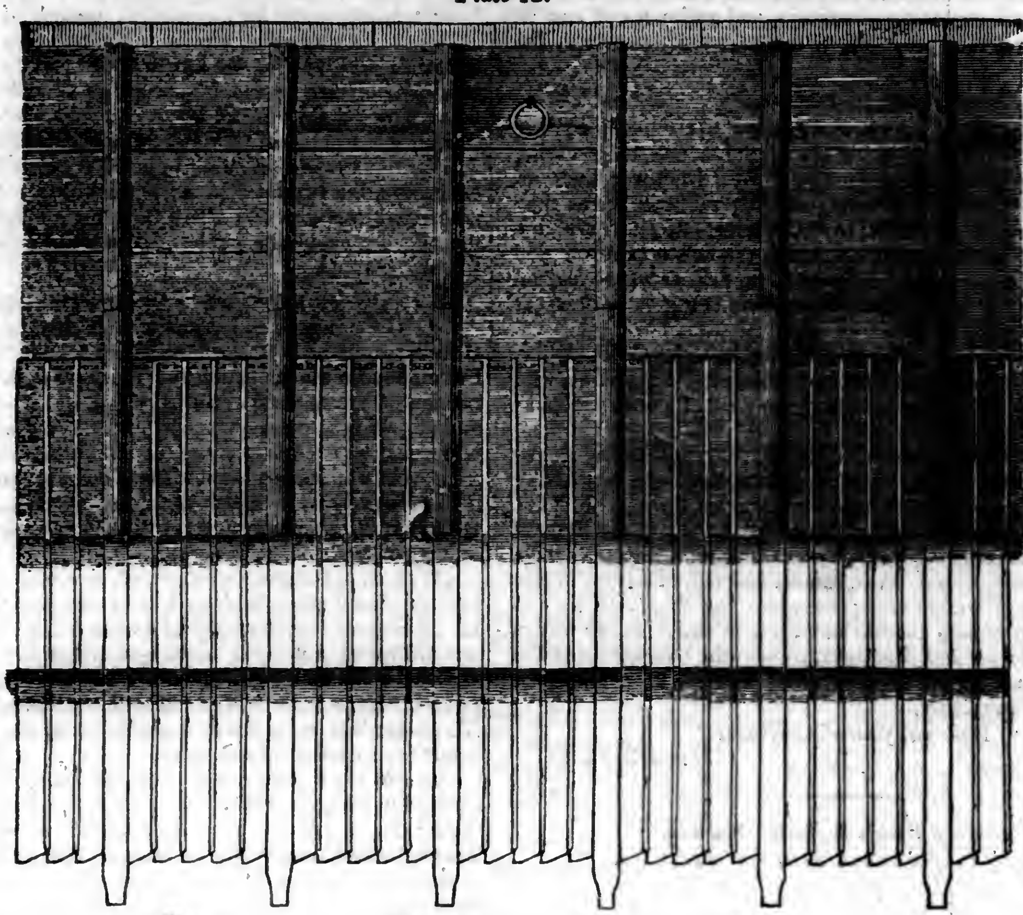


Fig. 1. Elevation. *Fig.* 2.

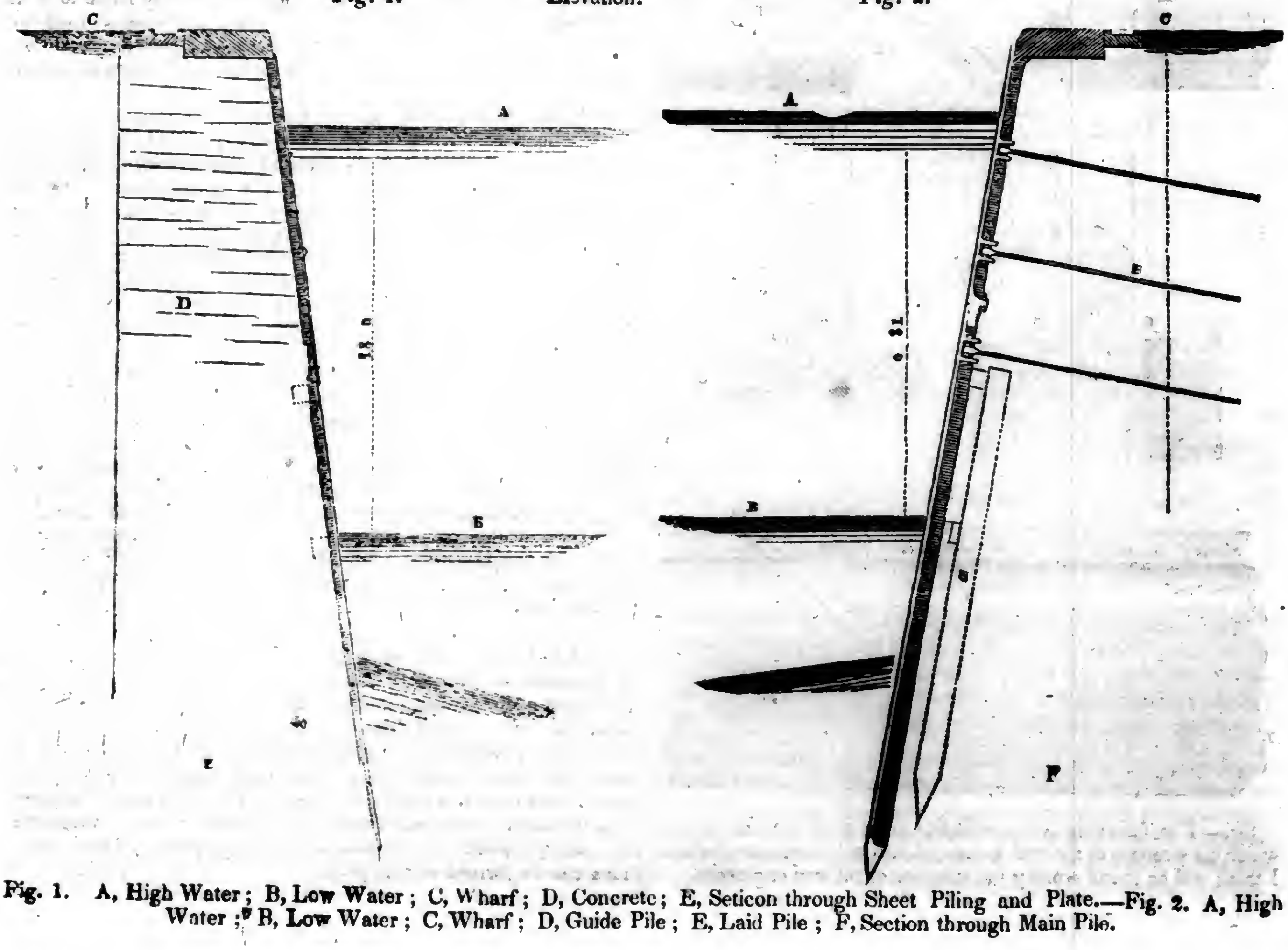
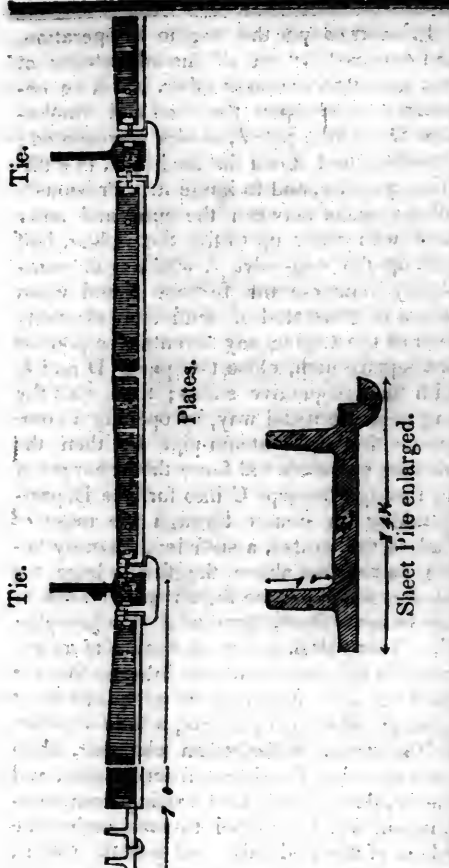


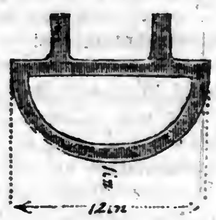
Fig. 1. A, High Water; B, Low Water; C, Wharf; D, Concrete; E, Seticon through Sheet Piling and Plate.—Fig. 2. A, High Water; B, Low Water; C, Wharf; D, Guide Pile; E, Laid Pile; F, Section through Main Pile.



XXIV MEMOIR ON THE USE OF CAST IRON IN PILING, PARTICULARLY AT BRUNSWICK WHARF, BLACKWALL. BY MICHAEL A. BORTHWICK, A. INST. C. E.

Concluded.

The main piles were originally proposed to be hollow in section, according to the sketch following; but this was given up on further consideration of the uncertainty of procuring sound castings of the intended form, and of the greater liability to break afterwards from a blow sidewise. The solid form shown on the plate was therefore adopted, according to which the lower lengths weighed about 28 cwt.; and that this was not too much was shown by the circumstance of several of the piles, particularly the early ones, breaking in the testing or driving, and showing in the fracture the danger of even a slight defect. The greater care



subsequently taken at the foundry, and probably also greater experience in driving, made accidents of this kind of rarer occurrence in the later stages of the work; and it may be mentioned as no bad proof of the care of all parties, that of upwards of six hundred piles, including both descriptions, only sixteen broke in driving, seven being of one sort, and nine of the other:—the failure was in five cases attributed to strains in driving, and to imperfections of casting in the other eleven. The sheet piles, which bear a considerable resemblance in their general outline to those used at Downes Wharf ten years before, were proposed to be an inch thick, but it was found necessary to increase this dimension, and some of them were as much as $1\frac{1}{4}$ inch; the average, however, was not above $1\frac{1}{8}$ inch, and the weight of each pile 17 cwt. The length of the wharf is about 720 feet, and the whole weight of iron used upwards of 900 tons.

The crab engine was employed invariably, the heads of the piles being covered with a slip of $\frac{3}{4}$ inch elm, to distribute the force of the blow equally over the iron, and prevent jarring. The monkeys used weighed from 13 to 15 cwt. each, and it was found necessary to limit the fall to a height of 3 feet 6 inches, and sometimes less, when the resistance proved more than usually great and the pile showed a tendency to turn from its straightforward course. The driving throughout was very hard, more especially at the west end, where the sheet piles in four bays could not be forced to the full depth, the space above being in two of them made up with two plates in height, and in the other two admitting only one, instead of three as in the rest of the work. Driving was the only means resorted to, or indeed practicable in the gravelly soil that prevailed. Had the bottom been clay or other similar substance, the plan of boring to receive the points, that has been followed elsewhere, might probably have been partially adopted in the main piles with advantage; but I should say, certainly not to the extent of depending mainly upon it for getting the piles home to their places.

I cannot quit the subject of the Brunswick wharf without stating that his avocations alone have prevented Mr. George Bidder's association with me in the account of a work, the execution of which he had, under Messrs. Walker and Burges, the charge of superintending. Though rejoicing at the cause, I cannot help regretting the circumstance in the present instance, as such co-operation on the part of my friend would, I feel, have given this paper an interest and a value it has now but little claim to. I take this opportunity also of acknowledging my obligation to several of the gentlemen above named in connection with the previous use of iron piling, whose kindness has enabled me to make the preliminary review much fuller than I had at one time any expectation of having the power to do.

Effects of water on iron.

It remains for me only, in conclusion, to advert to a consideration that ought not to be lost sight of in deciding upon the eligibility of cast iron wharfing,—I mean the action of water upon it. I do not recollect any observations made so as to enable a practical inference to be drawn from them; but the importance of the subject seems to claim attention, and possibly even this notice may be the means of inducing it from those who have the opportunity. The investigation belongs perhaps rather to chemistry than engineering, but notwithstanding the practical turn some of the most distinguished cultivators of that science have given their researches, little I believe has yet been done to explain the present question. How iron is affected by water in its various states, and in what manner the action on *wrought* differs from that on *cast* iron, are interesting points, still, so far as my information goes, to be determined; and they are not likely to be so in a satisfactory manner, until some one competent to the task calls a series of well conducted experiments in aid, as every day shows more clearly the uncertainty of analogical reasoning, however apparently strict, on such subjects. But whatever the *modus operandi* between cause and effect, that decomposition of the metal, more or less rapid, gradually goes on from the action of water, seems to admit of no doubt. Professor Faraday, in a letter to Captain Brown, says, "Cast iron is certainly liable to great injury from constant immersion in salt water, and I think you would find few, if any exceptions, provided the water and the iron are in contact."* And the *saline principle*, to use a somewhat antiquated form of expression, though a great accelerator of the process, does not appear to be altogether an essential to it;† at least, I know a case that happened in a part of the River Thames where the water cannot be said to be more than brackish at any time, and indeed is generally quite fresh, in which cast iron, after being immersed for little more than 20 years, was on being withdrawn from the water, found so soft as to yield to the penknife; and the original surface of the iron referred to,—it was the socket-plate to the heel-post of a lock-gate,—had not been submitted to the tool, in which case it is well known the water would have operated with much greater effect.

But though I have thought it well to glance at the above case occurring in water, always except on rare occasions fresh, the sea is no doubt in practice the invader whose inroads are most alarming. Instances might easily be cited in proof of the ravages

* *Description of a Bronze or Cast-iron Columnal Lighthouse, &c., by Captain Brown, R. N.*

† The difference between sea and other water, in operating with the Galvanic battery, is much less considerable than that between the latter and distilled, but it is between *salt* and *fresh* that the practical question lies in the present case.

committed by that active enemy, though not perhaps noted so circumstantially as is desirable, but I am unwilling to lengthen this communication further, and shall therefore confine myself to a passing allusion to the example on a large scale, and after long trial, furnished by the state of the guns taken from the wreck of the Royal George, as described at at a late meeting of the Institution;* and to a similar instance mentioned by Berzelius, in a passage which I quote at length, not so much however in confirmation of so well established a fact as the eventual decomposition of cast iron by the action of water, as for the properties mentioned of the substance into which the metal is resolved. The extract is as follows:

"Quand la fonte reste long-temps sous l'eau, elle est decompose'e; l'acide carbonique contenu dans l'eau dissout le fer et l'entraine; il reste une masse grise qui resemble a la plombagine. Lorsqu'on retira de l'eau, il y a quelques anne'es, les canons d'un vaisseau, qui avait coule' a fond cinquante ans auparavant, aux environs de Carlscrona, on les trouva au tiers converti en une pareille masse poreuse; a peine e'taient ils a l'air depuis un quart d'heure, qu'ils commence'rent a s'e'chauffer tellement, que l'eau qui y restait encore s'e'chappa sous forme de vapeur, et qu'il fut impossible d'y toucher. Depuis, Macculloch a observe'† que le corps analogue a la plombagine qui se forme ainsi prese'nte toujours ce phe'monene, et quo ce corps s'e'chauffe presque jusqu'au rouge, en absorbant de l'oxygene. On ne sait pas pre'cisement ce qui se passe dans ce cas." *Traite' de Chimie*, Tom. III. p. 273.

* *Min. of Convers*, Vol. V., No. 12.

†The observation referred to by Berzelius in the above, occurs in *Macculloch's Western Isles of Scotland*, (I think in the account of the island of Mull,) where an explanation of the phenomenon was first attempted, though, if on such a subject I may "hint a doubt," not to my mind quite a satisfactory one. A more perfect solution will probably be furnished by whoever availing himself of the powerful means of chemical analysis now possessed, may undertake such an investigation of the whole question of the action of water on iron as I have ventured to allude to in the text.

From the Journal of the American Institute.

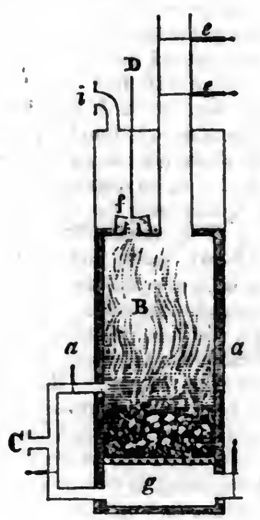
BENNET'S STEAM ENGINE.

A model of an engine, constructed upon the principles of those which are to be employed in propelling Capt. Coob's steamer between this and Liverpool, has been at the Repository of the Institute for several weeks past. A throng of visitors have constantly surrounded it. Between the hours of eleven and one, Mr. Bennet has attended, and explained its operations. It has undergone the scrutiny of great numbers of scientific professors, ingenious and experienced mechanics and engineers, citizens and strangers

Mr. B. by request, has kindly given all the explanations requisite to a perfect understanding of its operations, and answered the ten thousand questions that have been propounded, with a clearness, simplicity, and patience, that is highly creditable. He has invited objections, that he might have an opportunity to meet them, and if found to be serious, that seasonable remedies might be provided. The examinations have resulted in a general conviction that the world is about to realize a new improvement, not inferior to that of Watt and Bolton—an improvement that will effect a new era in ocean navigation, and bring all parts of the world in approximation to each other. A voyage to Liverpool, it is believed, may, by the power of this engine, be accomplished in ten days, with one-tenth of the fuel heretofore required.

We have requested Mr. Bennet to give a minute description, accompanied with a drawing, which, we hope, will enable the readers of the Journal who have not visited the Repository, to comprehend what to us was incomprehensible, till we examined the model, and heard the explanation, how the fire and the water could be brought and continued in actual contact with each other, and, rapidly generating the steam, still kept in control, and its potency safely directed to propel the car or the ship.

The following is the description which Capt. B. has been so obliging as to prepare for us.



"The engine for the Liverpool packet, is a double horizontal high pressure engine, thirty-five inch cylinder, six feet stroke, with two blowing cylinders, of half the capacity, worked by the piston-rod of the steam cylinder passing through the lower or extreme head, and into the blowing cylinders; consequently, both will be of the same motion. Pipes C, with the necessary valves attached to the blowing cylinders, convey the air to the steam generator, whose outer case (*a a*) is four feet diameter, and twelve feet high, and the inner case, or furnace B, is three and a half feet diameter, and nine feet high.—Smoke and feed-pipe D, is constructed with two slides, (*e e*,) which closes the pipe perfectly tight when thrust into it; their uses will hereafter be explained; *f* is a cap-valve in the steam chamber, placed over a short pipe or nozzle on the upper head of the furnace, and fitted to its seat perfectly tight, with a rod extending through the upper head of the outer case; *g* is the ash-pit below the grate; *h* an opening into the ash-pit, with a slide to close it tight, when necessary.

In order to put the engine in operation, and successfully use all the advantages of this generator over any other, it will be necessary to set open the feed and smoke-pipe D, and the pipe *h*, as now represented; introduce fuel down the feed-pipe, in sufficient quantity, and to ignite it. Previously fill the space between the outer and inner case with water up to the dotted line, half way up the cap-valve *f*, which will completely immerse the furnace; and when steam is generated of sufficient elasticity to start the engine, say seventy-five pounds per square inch, close the pipes D and *h*, with their respective slides; then start the engine in the usual way, by opening a communication with steam-pipe *i*; then the blowing cylinders will force their charges of air through the pipe C into furnace B, partly taking its course through the mass of fuel on the grates, a sufficient quantity being introduced above the fuel to burn the smoke, which can be regulated by slides in the branch pipes, terminating the air-pipe C. You will discover that there is no escape for the air thus forced into the furnace until its elasticity is, by the continued blast from the blowing cylinders, a little superior to the steam in the steam chamber, when the cap-valve *f* will rise from its seat, and the air, flame, and gases arising from combustion, will be forced to pass under the edges of the said valve out into the water; and in this process, all the heat generated will be imparted to the water, without the possibility of escaping otherwise.

"By the repeated experiments I have heretofore made, I find that one foot of air blown into the furnace to promote combustion, by the expansion it undergoes, and by the addition of the gases and steam, is augmented in bulk at least five times its original size, or, to speak briefly, there is five times as much compound steam, as air, forced into the furnace; consequently, it will take one fifth part of the power of the steam to operate the bellows, plus the friction, or this is nearly the power; but I forbear at present, nor is it necessary, to speak at large on that subject in this paper.

"By a careful examination it will be seen that the pressure of steam will wholly depend upon the proportion of the size of the blowing cylinder to the steam cylinder. In my engine now building, the blowing cylinders each contain twenty cubic feet, the steam cylinders each forty feet; but the steam being cut off when the piston has made but one half its entire stroke, which reduces its size, as a measure to deal out the steam, to exactly the size of the blowing cylinder—the measure of the air forced in by the blowing cylinders being augmented, by passing through the generator, to five times its bulk, has to be forced into a space in the steam cylinder of just its original bulk; it will, therefore, exert a force equal to five atmospheres, which will be sixty pounds to the square inch above the atmospheric pressure.

"This force, per inch, will not be exerted during the whole length of the stroke of the piston, but only half way, or to where the steam is cut off; and at the end, its elastic force is reduced to about twenty pounds, which will make the average pressure fifty pounds per square inch, and the piston contains 962 square inches, which multiplied by 50, will produce 48,100 lbs. the whole average force the piston moves with. It is calculated to have the engine make thirty-five double strokes per minute; hence, the piston will move 420 feet per same time, which multiplied by 48,100, produces, 20,202,000 pounds; the weight that the piston would lift one foot high per minute, divided by 33,000, being what a horse power is estimated at, gives 612 horse power for each steam cylinder. But the power abstracted to operate the blowing cylinders, and overcome the friction, I allow nearly equal to the power of one of the cylinders; therefore I estimate the power of the engine at 612 horse power.

"The amount of fuel consumed, will depend upon the amount of air forced into the furnace by the blowing cylinders, and my two blowing cylinders, at every revolution, would force in 80 feet, if there were no leak either in piston or valves, and no space between said piston and valves for the air to compress in, and not be wholly forced out; therefore, probably not more than 75 feet will be expelled each revolution of the engine; and as it takes all the oxygen contained in 175 feet of atmospheric air to burn one pound of carbon, and 525 feet to burn one pound of hydrogen, I am of opinion, that to allow 225 feet to be necessary to burn one pound of fuel, will not be allowing too much; and, as before stated, 75 feet will be forced into the furnace at each revolution, it will therefore take three revolutions to burn one pound; and as a cord of yellow pine weighs about 2,100 pounds, it will take 6,300 revolutions to burn one cord, which, divided by 35, the motion of the engine per minute, will give three hours for each cord—which, compared with the engine of the steamer Erie, on the Hudson, of little less or nearly the same power, (600 horse power,) will consume forty cords in ten hours, or twelve cords in the same time my engine will one cord."

WHITNEY'S TUNNEL.—This is a very convenient article. It is made something in the ordinary form, though not quite so bevelling, and has a flat bottom, into which the nozzle is inserted. The tunnel has several ridges at certain distances round its body to designate different measures, as a gill, half pint, pint, quart, and 2 quarts. There is also a valve on the top of the nozzle, which is pressed close to its place by the liquid in the tunnel, so that it may be used as a measure of either of the above mentioned sizes. This valve is so arranged as to be opened by a slight pressure on a thumb piece—which lets the whole, or any portion of the liquid escape, as may be desired. By this arrangement this article serves as a measure of different dimensions, and also as a tunnel, and will be found a very convenient article. It may be seen at the American Institute, 187 Broadway.

INCLINED PLANE, AND MODE OF ASCENDING BY LOCOMOTIVE POWER. ALDRICH'S PLAN.—We have recently examined the model of a *Railway* and *Car*, constructed by Mr. E. F. Aldrich.

The rails are, except on the planes, like other rails; at the planes there are side posts, with rails on their top, so arranged as to receive upon its surface a small wheel with cogs, or pins on the *outer* end of the *Journals* of the driving wheels. This upper rail receive the small wheel whilst the large one rests upon the main rails, but as it advances, the upper rail has a little more elevation by which the main wheel is raised from its bearing, and the whole load resting on the hind wheel, rests upon the small wheels on the outer end of the Journal. By this arrangement the velocity is of course greatly diminished, and the power increased. On the periphery of the small wheels are short pins, or cogs, which work into corresponding holes or cogs on the *upper* rail, which carries the load forward, even when the inclination is too great for adhesion. There is attached to the center of the axle a bar, or rod of iron which we supposed to be designed for arresting its progress in descending—but having no description or explanation, we cannot tell precisely what it is for.

This model may be seen at the American Institute.

We are happy to learn that the Rev. H Colman, has been selected to the important station as below.

APPOINTMENTS BY THE GOVERNOR.

Henry Colman of Boston, to be Commissioner for making an Agricultural Survey of the State, and Edward Hitchcock, of Amherst, to be Commissioner for making a further Geological Survey of the State, severally under Resolves of April 12, 1837.

NEW LOCOMOTIVE POWER.

An advertisement appears in our paper this morning, on a subject which cannot fail to arrest the attention of all who feel an interest in the internal improvements of the country, apart from the novelty of the movement. The invention is entitled to a fair examination, from the immense advantages which must accrue to the public, in case the new and ingenious locomotive power shall stand the test of experience.

We find the above paragraph in the Philadelphia U. S. Gazette—but not the advertisement referred to. We should like to know more of this power.—[Eds. Mechanics' Mag. and Railroad Journal.]

REVOLUTIONARY DOCUMENT.—The following is a copy of a document found among the papers of a Revolutionary officers now no more, who took an active part in the stirring scenes of that period. It appears to be a statement of the proceedings and expenses —*in continental money*, the currency of that day—of establishing the claim of Messrs ———, ——— & ———, to certain goods which were seized at Woodbury, N. J., on the 11th of August, 1780. It is an interesting document, exhibiting the great depreciation of the currency of the days in which our fathers fought and bled for liberty.

"An Account of Cost and Expenses of the Seizure of the Goods belonging to ———, ——— & ———, at Woobury, N. J., 11th day August, 1780:

Going to Newark Mountain, for advice of the Attorney,	50 Dollars.
Cost of Jury,	67
Going to Elizabeth Town,	65
Horse Hire and Time,	120
To procure a Witness to go to Philadelphia,	8
The Expenses of going to Phia., Brunswick Ferry,	12
Brunswick all Night,	116
6 Mile Run,	60
Maidenhead,	54
Trenton Ferry and Way,	50
Bristol,	90
Neshamony Ferry,	16
10 miles from Phia.,	23
Philadelphia,	545
On Return Red Lion one night,	112
Neshamony Ferry,	16
Pens Manor,	36
Trenton Ferry,	45
Trenton,	30
Prince,	90
6 Mile Run,	116
Hire of Horses and Wagon at 210 Dols. per Day, 5 Days is	1050
The Evidences and my Time going to Philadelphia, 5 Days each, at 70 Dollars per Day,	700
To get White Matlacks Deposition,	
To getting some Bills Proved at Elizabeth Town,	9
For the Evidences going to Elizabeth and attending the Trial,	140
Our own time in attending Trial,	214
Docts. Lester and Gallaudet, attending Trial one Day,	140
	4000 Dollars.

Which makes £1500."

CONVENTION.—The proceedings of the AMERICAN Institute, of which the following is a copy, in relation to "a *General Convention from all the productive portion of our country*," are worthy of, and should receive from every friend of his country, immediate attention, and deep consideration. We are at present, in the midst of a calamity which has prostrated thousands, and will reduce thousands of others from competence, to indigence; and it therefore becomes the duty of those who can trace the evil to its source, to counsel together, and if possible to devise and recommend a remedy. It cannot be otherwise than that good will result from such assemblage of intelligent practical men, from all parts of the country; the more so as it is designed to be composed alike of all parties, and yet *not* to be in *any* way political.

We ask for the circular, an attentive perusal, and trust that it will meet with advocates, and immediate action in every State in the Union.

AT A MEETING OF THE AMERICAN INSTITUTE OF THE CITY OF NEW-YORK, HELD AT CLINTON HALL, IN SAID CITY, ON THE 18TH DAY OF MAY, 1837,—IT WAS

Resolved, 1st. That the present condition of our commercial community generally is that of the most painful embarrassment, and that the distress is rapidly extending to all the other occupations and departments of productive industry, and that thousands of our most industrious and useful citizens have been dismissed by their employers, and their wages, the sole reliance for their daily food, their clothing and habitations, have within a few days been entirely cut off.

2d. That it is of vital importance, that the causes of this wide-spread distress should be early and fully uuderstood, so that remedies, as far as practicable, may be provided for existing evils, and preventives to guard against future evils.

3d. That, in the opinion of this Institute, the multitude of discordant views promulgated, in relation to the causes of our present disastrous condition, have led to popular errors, that have in a measure turned the public mind from the accumulating debt in favor of foreign nations, which the repeal of countervailing protective duties has swelled against us, which is now pressing on our banks, and incapacitating them from administering relief to their suffering customers.

4th. That the only way to correct the public mind, and restore confidence, regularity, and prosperity, is by the dissemination of correct knowledge among the people, as to the prominent causes of our embarrassment, and by producing a general concert of action in applying suitable remedies.

5th. *It was also Resolved*, That a General Convention of representatives from all the productive portions of our country, without distinction of parties, for the purpose of a full and candid exchange of sentiments, and a thorough investigation of cause and effect, and concert in action, would greatly conduce to a favorable state of things, and, it is hoped, hereafter may prevent the recurrence of those evils with which we are now visited; and that it be recommended, that the said convention be held at Philadelphia in the State of Pennsylvania, on the first Tuesday of August, 1837, at 10 o'clock A. M., and that it consist of business men, selected from the productive classes, and that they continue, by adjournment, to meet until the desired object be attained.

6th. *It was further Resolved*, That, as the American Institute was incorporated to encourage agriculture, commerce, manufactures, and the arts, in this State and the United States, it is peculiarly appropriate, that it should recommend and forward such measures as are calculated to advance the great interests of industry, and produce a sound and healthy state of things; and especially on occasions like the present, when the banks acknowledge their inability to supply the requisite circulating medium, and every occupation is experiencing the most intense suffering.

7th. *It was finally Resolved*, That, in order to render this convention effective, and procure a full representation of business men, delegates be invited from all the States —the cotton growing as well as the grain growing, manufacturing, and commercial—from cities, counties, towns, and agricultural societies, incorporated manufacturing and mechanic associations, as well as railroad and canal companies, and that a committee be appointed, on behalf of this Institute, to consult with the friends of national industry, and solicit the concurrence of all those friendly to the foregoing objects; and that meetings be held at an early day, to elect delegates to respond to this recommendation; and that suitable papers be prepared and published, in order to give publicity to the convention and its objects, and to impress on all interested the necessity of general attendance, concert, and co-operation.

JAMES TALLMADGE, *President.*
EDWIN WILLIAMS, *Recording Sec.*
T. B. WAKEMAN, *Corresponding Sec.*

☞ Editors of newspapers, &c., friendly to the cause of national industry, throughout the United States, will oblige the Institute by giving the foregoing one or more insertions.

From the New-York Farmer.

GENTLEMEN,—In answer to the article in No. 6 of the Farmer, on the management of Bees, I will give you the result of a long experience on the subject. I consider the plan of Mr. Hebert, French economist, decidedly the best. His hives are composed of several, 10 or 12 parts, of about one and a half inches each in width, placed side by side, and confined by two rods, with keys to hold them together. The following description will probably be more intelligible. Take a common hive and divide the top and sides into 8, 10, 12 or *more* parts of 1½ inches in width, and with a saw cut it into as many parts—then these parts are to be placed together, and confined by pieces of board across two sides, with keys on each end to confine the parts together. The advantage of this hive will be found in the facility with which it can be increased or reduced in size. Its internal arrangement is such, that the bees build their comb in strata, which never exceeds 1½ inch in thickness, to correspond very nearly with these divisions of the hive, by which the hive may be divided, and additional parts put to each, thereby making *two* swarms, or the swarm may be enlarged to almost any extent, or you may, at your pleasure, take one or two parts from the side, or centre, of the hive, with as many strata of comb for use, with very little injury to the remaining part of the comb; replacing an equal, or any other number of parts of the hive.

By this process very few bees are destroyed, it is therefore entitled to consideration with every humane and reasonable person; notwithstanding the writer referred to, Mr. G. L. Smartt, considers it no inhumanity to destroy this useful little insect; or not more so than to destroy beavers, or cats for their fur, or fish for manure. This is by no means a fair comparison, as those can only be useful when dead, and therefore the order of things justifies the act, whereas bees *can easily* be preserved, and will, with proper care produce the *value of a good beaver skin every year.* With this hive, which opens like a book, you may take from it any proportion of its contents you please, and preserve the bees for further use.—When you desire to take away a part of the honey, seperate the hive, and to that part in which the queen is attach the new part, or parts, of the hive, and leave the part to be removed exposed to the light for a short time and the bees will soon seek the queen, leaving the part to be removed nearly deserted, and in a day or two, they will be quietly at work in filling the vacant part. This operation should always be performed two months before the close of the working season. You may also change bees from one hive to another if you desire, by taking off the outside of each and putting the hives together, closing up the entrance and drumming on that in which the bees *are*, which will drive them into the empty hive. Their progress can be readily ascertained by listening at the hive.

These operations to be performed after sunset, or before sunrise.

A CLOSE OBSERVER OF BEES.

CITY AND COUNTRY LIFE.

We copy the following article from the "New-York Daily Express" because there is *much truth in it.* It is too true that agriculture is not *justly* estimated—Parents who have accumulated a fortune by cultivating the soil, prefer to make any thing but *farmers* of their sons. This should not be so. *Educate them well*, and then use all proper means to induce them to cultivate the soil—with education and such habits they are prepared for any station to which they may be called in the service of their country. They know the *value* of liberty, property, and independence, and will always be safe agents to employ to discharge public trusts.

From the New-York Daily Express.

LIFE IN THE COUNTRY AND CITY.

The poets of old Rome sang in loud strains the praises of the country, and happy was that Roman who had his farm, his garden, or villa, around the base of Soracte, or on the shores of the beautiful Baiae.—Cicero was a farmer, as well as a statesman and an orator. All the illustrious men of Rome delighted in quitting the Forum, the Campus Martius, and the walls of "the Mother of Empires," to pass the summer solstice in the cool groves, with nymphs and satyrs,—or, in the season of the harvest, to rejoice with the bacchanals, and to see them frolic in the games. Even so in England, and the Continent of Europe now. London, the mistress of modern times, as Rome was of the olden, is deserted of much of its population in summer and autumn. The possession of land is the passport to gentility in Europe. The great Metternich boasts of his famous vineyard on the Rhine. A landed estate is the first aim of nobility in England. Titles, there come from land. Hence agriculture is the work of science and of art, and as much knowledge and art are demanded to cultivate and to lay out the park, to adorn it with trees and with fountains, as to fill the gallery, or the studio, or the niche of the palace.

How happens it then that in *our part* of our country—it is not so in the South,—that agriculture is avoided, as much as it can well be,—that the son flies off from the fields to the counter, the daughter to the city or the factory—all panting to exchange the free glorious air of Heaven for the dusty, noisy, crowded thoroughfare, say of Wall-street, Pearl-street, or the Bowery? Whence comes the passion for cities, and of herding together? Whence that madness that makes the workingman cherish the cellar or the garret, for himself and his children, when he can live better and wealthier even on the borders of the wilderness, with sky enough over his head, earth enough under his feet,—with the green grass to trample over, and the proud trees for a shade?

There is a belief in our country,—it exists no where else,—that agriculture is a vulgar occupation, demanding no taste, no genius, and nothing but the turning of the sod, and the levelling of the trees. How false is this. Why, the Vatican, in its way, is not more beautiful,—with the choice works of ancient and modern art in it,—a Belvidere Apollo here, and a Raphael fresco there,—than an English park in *its* way,—where a landscape is *worked out* as a picture has been,—a tree shaped to fit this view, and a hedge designed to aid that,—now perhaps a fountain, or a waterfall, anon a herd of deer,—it may be a hill created by industry, or a little river, with the gods and goddesses presiding over, fitted to run in the line that beauty is demanding,—and all harmonizing with Nature, as taste and genius and science have aided in adorning it. Even the cottage of the laboring Englishman—with his front door so neat,—the roses, and ivy and woodbine creeping over and adorning it, and the well-trimmed hedge in its front, is a jewel upon the face of the earth, and taste has made it so, for Nature has done but little for her father land. The idea then is preposterous, that the highest effort cannot as well be expended in adorning the surface of the earth, as in chisseling out the rough block of marble, or in putting colors on the canvas to speak. All art is but subsidary to agriculture. The Vatican, and the galleries of the Roman capital, and of Naples and Florence, have been made up from the Roman villas,—from the ruins of the Tevoli of Adrian—the Tusculum of Cicero, or the gardens of Sallust.

We know not why it is, but so it is, there is in the northern States a most unconquerable aversion to agriculture, and the consequence is, with New-England in particular, that a farming people are fed from abroad, by the agriculture of other States, or of foreign nations. The multitude seem more to love the throng—the city,—the tinkling of money in the shop of the broker, or the rustle of silk and calico in the shop of the dealer, than the notes of the sweet songster of the woods, the rich beauty of the trees, or the inviting verdure of spring and summer. One reason is, that we have no farmers, such as the farmers of England, of Holland, or of Lombardy, who embellish Nature, and make their homes more delightful than the loftiest palaces of the town. Our men of wealth in the country, who have sons to educate, prefer to manufacture them into third-rate lawyers, fourth-rate parsons, and sixth-rate doctors, rather than to bring them up in the way that should teach them to raise a double crop from the same acre of land, or to introduce some new product, which should double the available means they now have.

As a farming people, the means of creating wealth from landed estates are not yet half developed. There is no reason on earth why this should not be a vine growing country, and yet it is not! There is no reason why the Old World should find us in silks, and yet it does. So varied is our soil, our climate, and so extended our line of latitude, from the rocky and frozen regions of the river St. John, to the sandy Sabine, that we have all the capacities for doing every thing for ourselves; and yet at this moment, we are oppressed, and overburthened with a prodigious foreign debt. The cotton planters make money. Why may not the hemp growers? The sugar planters make money; and why not the stock growers of even the Green Mountains? *Science* is what is wanted first, and then art and taste will come as handmaids. Educate then your boys in college, if you choose—a good education hurts no man—but make Farmers of them afterwards, if you wish them to be happy and wealthy.

Wall street is a big-sounding place in the history of our time now. We live there some twenty hours in a day, and therefore know something about it. When the Wall street Banks suspend specie payment, the whole Union follow the example. When the Wall street Banks expand, the hearts of the people are made glad. Wall street is the money throne of the United States of America Its bankers are the money princes of the day. States of the Union have their destinies settled there—and Wall street tells them whether they shall have railroads or not, canals or not, money or not; for the Rothchilds of Wall-street make and unmake empires here at will. But Wall street, the Thread Needle street of the New World, is a vile place at best. The street is so dusty, and dirty, so filled up with old bricks, and stones, that respiration even is difficult in it; and a lusty old tree, which has long felt that it was not at home in such a street as this, is sickening and dying away daily in this busy thorough-fare of man. When the clerks within it go home, many of them lie down in boarding houses in rooms no bigger than the coffins of the ancients, and when the money makers of the day reach their families, they are harrassed and agitated by excitement, trembling lest a packet ship should bring them the news of the shipwreck of their fortunes, or some convulsion blast all their hopes. Now in what is this Wall street to be compared with some beautiful river or lake of the country. Not twenty of these men of wealth have a garden as large as the pea-patch of the Farmer. Not one of them who, on a warm summer day, does not envy the Farmer, who has his green grass, his garden, his trees to look at, and above all, his pure air to breathe, and his pure water to drink.

The true art of living is the Roman life, or the life of the English of the present day,—the mingling of the country and the town,—the country for summer, and the city for winter,—with its books, its libraries, its excitement, and the collision of mind with mind. Say not the farmer cannot afford a residence in the city in the winter, for with economy he can. He needs no big palace for himself and family there; let him live as the French do in Paris—in some one story of some large house, with a kitchen and all its appurtenances,—and not in a princely habitation. Economy, a judicious expenditure of money,—prudence and skill will make a little go far. That wealth is the great object of life, particularly in a country where "wealth is" NO "sign of merit," is one of the most delusive and ruinous ideas of the day. All of *matter* that we can gather together, it has been well said, will but give us our bread and clothes,—but there is a double means of living upon the resources of man's own mind, upon taste, upon science and the arts, —when books answer for companions, and when with them, a man can throw himself into every country, and every circle of the habitable globe,—now in the saloons of the European prince, now with the Arab in the desert, and anon with the Indian in his wilderness,—reading instruction in every spear of grass he walks over,—every stone his foot-fall strikes,—in every star above him, and the whole atmosphere, in and around him. To live, and *how* to live, *what* is living are topics we should like to discuss, if we can ever find room and time.

"NOTHING IS BENEATH THE ATTENTION OF A GREAT MAN."

This short sentence is inscribed over the door of the small building in Holland, which was once the workshop of Peter the Great; and furnishes more than volumes of common description and history could do, an insight into the character of the man who raised the Muscovites from the deepest barbarism to the rank of civilization, and laid the foundation of an empire, the extent of which the world seems as yet little able to comprehend.

One of the most fatal errors to which men are subject is the disposition to treat small things with contemptuous indifference; forgetting that great things are but an aggregate of small ones, and that discoveries and events of the greatest importance to the world, can be traced to things most insignificant in themselves. Nothing more truly marks an original mind, and stamps its possessor as a truly great man, than the seizure of circumstances which would pass unnoticed by the great multitude, and by subjecting them to the powerful analysis of his reasoning powers, deducing inferences of the greatest practical results.

The power of the loadstone to attract iron, has been known from time immemorial; accident discovered the fact that a magnetized needle would indicate the north; but for a long time this truth was productive of no results. In the hands of Flavia Gioja of Amalfi, it produced the mariner's compass, an instrument which has changed the whole course of commerce, and opened America and Australia to the rest of the world. To mention only one of the things that the use of the compass in maritime discovery had led to—it has given the potato to Europe, and thus trebled the means of subsistence as well as doubled the population.

We owe the Galvanic or Voltaic battery, one of the most powerful instruments in advancing science the world has yet seen, to Madame Galvani's noticing the contraction of the muscles of a skinned frog accidentally touched by a person on whom her husband was at the moment making some experiments in electricity. The experiments of Galvani and Volta were followed up by Davy, Hare and Silliman, and effects which have astonished and instructed the world, have been the result. The dry galvanic pile in the hands of the discoverer, De Luc, was nothing more than a scientific plaything. Singer of London, a mechanic of genius, saw the pile, and applied the power thus generated to move the machinery of a watch; and one constructed by him has now run more than 16 years without winding or loss of motion.

A chemist was at work in his laboratory preparing a powder for a certain purpose. A spark fell into this composition and it exploded; and from that day gunpowder was discovered. Some may question the utility of this discovery, but we do not. Gunpowder has materially aided the miner, the founder and the chemist; but more than all, it has given internal order and tranquility to the kingdoms of Europe, by knocking down those strong holds of feudal barbarism and cruelty, the castles of a haughty and domineering nobility, and placing the weak, so far as regards protection by law, and security to person and property, on a level with the highest.

A German peasant carved letters on the back of the beech tree, and with them stamped characters on paper for the amusement of his children. Nothing more was thought of them; but from them Faust conceived and executed moveable type; and printing, an art that perhaps has exercised a greater influence on the destiny of mankind than any other, thus had a beginning.

Galileo was in a church at Florence, where a drowsy Dominican was holding forth on the merits of the Virgin, and the miracles of the Holy Church; things about which the philosopher cared very little. The principal lamp of the church had been left suspended in such a manner that it swung to and fro in the slightest breath and caught the eye of the philosopher. The regularity of its oscillations struck him, and the idea of employing such vibrations to measure time occurred. Galileo left the church and returned to his study, and in a short time the first pendulum ever made was swinging.

Some children playing with glasses of a Dutch spectacle maker, accidentally placed two so that the steeple of a church appeared much nearer and turned bottom upwards From this small beginning was produced the telescope; an instrument which more than any other, has enlarged the boundaries of the universe, and given to man more exalted ideas of that Being who spake all these worlds into existence.

About one hundred and fifty years ago, an old man might have been seen in his study, apparently amusing himself by witnessing the escape of steam from an old wine bottle, and then checking it by instantaneously plunging it into the cold water. There are multitudes who would sneer at an observer of nature who could stoop to notice such a trifle; yet this expansion and condensation of steam in the wine bottle, and the train of thoughts which it suggested, in the hands of the Marquis of Worcester, gave birth to the steam engine, the most valuable present science has ever made to the arts. These very men who are now filled with delight and astonishment when they behold the beautiful steam boat majestically ploughing the waves, or the steam car whirling its train of carriages over the railroad with almost the rapidity of thought, would be the first to look and speak with contempt on the train of small causes that led to such important results.

But perhaps the example of Newton, more than any other, conclusively proves that there is in the whole circle of nature, nothing trifling to a great mind. Thousands had seen apples fall from the trees to the earth; yet no one had ever asked the question whether the cause that caused the apple to fall to the earth extended to the moon?—yet this question and its solution was the key that has unlocked the mechanism of the universe, and given to man powers and ideas, which could otherwise never have existed.

The great truth these examples inculcate is this—that there is nothing trifling in nature, nothing that is not worthy of attention and reflection, nothing that does not form part of the great chain of cause and effect, and consequently capable of leading to the most valuable and interesting events. There is a feeling abroad, that it forms no part of the business of the tiller of the soil to think. This is not true, and the position should be exploded at once. It is scarcely possible for a man to be more favorably situated for an observation of nature than the farmer. His business is with the soil he treads upon, with its various constituents and their ever varying proportions—with the green earth and its covering of grapes and plants, its flowers, while over the head is stretched the broad o'erarching sky, inviting him to useful reflection, and urging him to "look through nature up to nature's God."—[Genesee Far.]

Agriculture, &c.

TROPICAL FIBROUS PLANTS.

It is with pleasure we lay before the readers of the New-York Farmer the following communication from Dr. Perrine, late U. S. Consul at Campeche. His long silence made us apprehensive that he might have fallen a victim to his zealous and continued efforts to introduce into this country the fibrous and unestimated plants of southern Mexico. His devotion and sacrifices appear to throw around the object he has in view a sacredness that renders further "neglect and delay" unhallowed. We hope and trust, that ere long his anticipations will be fully realized, as they long since deserved.

Dr. Perrine's object is to acclimate in Florida the fibrous plants of southern Mexico. These plants produce materials for ropes and cordage; but from the miserable culture and rude manufacture in that country, Dr. P. has been led to infer a vast source of national wealth, if introduced into the southern section of the Union. He accordingly has had the subject brought before Congress several times; but the momentous concerns of party politics have been too engrossing for him to obtain any positive action. State Legislators, and Agricultural and other associations, in various parts of the country, have strongly recommended the undertaking. Dr. P. has devoted money, and much of his time, and made sacrifices of health, in procuring plants and specimens of the hemp, and in distributing them in various parts of the country. For acclimating the valuable plants of the globe in our extended country, it has been suggested that there should be three national gardens,—one in the Northern, one in the Middle, and one in the most Southern States. To aid in the establishment of a national experimental garden in Florida has been Dr. P.'s request of the General Government. A grant of a tract of the unoccupied, and almost valueless, portion of Florida, the assistance of a Government vessel in importing the plants; and an appropriation of a small amount of money, would accompiish the object, and add vastly to individual and national prosperity; and it is to be hoped that Congress will at its ensuing session give this subject that attention to which it is so eminently entitled.

We shall, at all times, be ready to aid Dr Perrine, and others who may take an interest in the subject, through the columns of our publications, or by any other means in our power.

To the Editor of the New-York Farmer.

Model Farm of the Agricultural So. of La., Parish of St. James, about 60 miles above New-Orleans, 13th April 1837, 8 o'clock, P. M.

Dear Sir:—After ten days confinement to bed by a fresh attack of my ancient disease of the liver, I have this moment risen to attempt a communication to you. After waiting at Campeche in vain the arrival of my successor in office, during eighteen months, sustained by the lingering hope that one of our naval vessels would call to receive and transport to Florida a cargo of at least the fibrous leaved plants of Yucatan, I became convinced that our government would not aid, either my arduous endeavors to promote the utility of American Consulates in Mexico, or my still more persevering exertions to acclimate tropical plants in the United States. Hence, on the 28th of January I embarked in the schr. Pocahontas, *with the Archives of the Consulate*; on the 8th of February the schr. struck and stuck on a mud bank, off the S. W. Pass of the Mississipi; and on the 11th I alone arrived at New-Orleans. During the ensuing month it rained more than half the time, day and night, and the streets were literally miry with mud, yet so rapid was the evaporation in the intervals that two to three or four sunny days at fartherest sufficed to fill the air with dust.

My health was so bad on my departure from Campeche that the master of the vessel expressed to the owner his apprehensions that I would not live to reach New-Orleans, and the bad weather of New-Orleans was certainly not calculated to improve my condition; yet such was the magical effect of breathing once more the air of "freedom's only home," that within the month my weight considerably increased, and my appearance was so much bettered as to excite the remarks of my friends. During this period there were two meetings of the Agricultual Society, at which I assisted, and exhibited specimens of the plants and products of Yucatan. The results were highly satisfactory to me. Two resolutions introduced by the worthy President, Ex-Governor Roman, were unanimously passed, one requesting the publication of my correspondence and the other my agency in obtaining plants at the expense of the Society. Several members of the Society were also members of the Legislature, and one of them Dr. Brashear, I believe, on the 11th February, introduced a resolution in my favor which was unanimously passed by both houses of the Legislature. This resolution with an explanatory preface, instructs the Senators and requests the Representatives of La. in Congress "to procure the passage of said Bill into a law under such conditions as may comport with the public good." I cannot conceive what possible opposition can be made to the law, especially since Gen. Scott has officially declared that the granting of Florida lands to volunteers would be a *fraud*. Indeed I have never anticipated any rational objections to the Bill; but what I have suffered by so long, and what I still fear, is *neglect* and *delay*. There is not probably another man in the United States who would accept the land as a gift, if he were obliged to occupy it, particularly after the unfavorable impressions of soil and climate created by the late Seminole war; but I still persist in my opinion that the tropical temperature of the Southern district of Florida will counterbalance the defects of its surface: and if the facts and arguments I can offer, with a township of miry marshes and arid sands, will not suffice to attract associates and capital, to plant and populate it, why I shall continue on hereafter, as I have gone on ten years heretofore, *unaided and alone*, as I am determined to locate my family there for life.

14th—11 A. M. The exertion of writing the foregoing, cost me a bad night and morning, yet it is so painful to be lying in bed, preyed upon by pestering thoughts, that I have got up again to continue this letter. It was agreed that I should proceed to this Farm, to ascertain the condition of the tropical plants, which I had sent to the Agricultural Society during the last four years; and on the 19th March I left New-Orleans and arrived here the same night. I found in the *List* signed by the manager, C. Dumont, last fall, the following *names*. Hæmatoxylon Campechanum 2 plants, Piscidia Erythrina, 5 plants, Crescentia cujete, 1, C. pepino 1, Melia sempervirens, several (plusieurs) Ficus indica, 4, Agaves 9, Bromelia ananas, 2, B. karatta, 2. I went into the garden and found a frame shed about 12 feet broad, 15 feet long, and 7 feet high on one side, and nine on the other. A single layer of thin cypress boards constitues the weather boarding and roofing. On the south side there are three rows of small window glass extending the whole length, and on the west side a similar arrangement about half the breadth not exceeding the surface of a common window. You may infer from this description how little protection from cold could be afforded to plants during the excessively cold days and nights which visit Louisiana every winter. Indeed, it has become here a general opinion that both the winter and summer of this State have been gradually getting colder during many years. Notwithstanding all these discouraging circumstances, I found that all the woody plants had continued to increase in height and diameter during two or three years. The Logwood, the Habi, (P. E. Campeche Teak) the 2 species of Calabash tree (C c and p.) had grown to a very encouraging degree; but imagine my regret when I found that the branches and trunks of each were now dead! These had all been left in shallow boxes of earth, had outgrown the capacity for nourishing them, and this fact alone would account for their perishing independently of other neglect, or of cold. It nevertheless appears that the *roots* are still alive, and that if proper care be taken of them, their acclimation will be ensured.

The Ficus indica planted on the border of the central path of the garden is also killed in the trunk, and has been cut off at the level of the ground. The roots however appear to be vigorous, and will hereafter bear so great a proportion to the stems as to sustain the heat and life of the latter. Plants like human beings must pay the price of acclamation. They must suffer from sickness during their seasoning to maintain their health afterwards in their new residence. Many *individuals*, both of the vegetable and animal race, must even die during the process of acclamation in their adopted or adoptive country, but the *species* of both will be preserved. But the Meliasemperviseus has exceeded my expectations. Although the seeds had been planted very close in a shallow box at least 50 within 25 square inches, so that they sprung up as thick as wheat, the height of 18 to 30 inches, and had been left in the open air all winter entirely neglected, yet the stems on my arrival, the 20th of March, were already putting out leaves! I insisted in having them immediately transplanted to the border along the fence of the garden; without my knowledge half their lengths were chopped off; three weeks of dry weather succeeded, and yet they did not loose a single leaf! It has now been raining the greater part of the last four days and nights, and at this moment I went to the garden and ascertained that not a single plant has been damaged in any way. I doubt not that it will soon overrun all our South-western and Southern States like its brother the Pride of China, (M. Azedarach) under its Campeche name of *Paraiso* or Paradise tree. As this is the only one of the aforesaid tropical trees which has been here produced from the seed, does it not afford encouragement to believe that such of the others as can be propagated by seed might have succeeded as well. I brought with me a considerable quantity of the seeds of the Meliasempervisens, and have distributed many in New-Orleans, and to planters up the river, and confidently anticipate its extensive propagation.

But how unfortunate it is for the first propagators of plants, that various very valuable species cannot be reproduced by seeds. He only who like myself, has been many years endeavoring to transport, transplant, and transacclimate living plants, can form an adequate conception of the difficulties and disappointments which lie in his way. Although the Fecus indica appears to be disseminated by birds, yet I have not ascertained that man has been able to reproduce it from the minute seeds of its minute fruit. The Crescentia eugete, or Calabash tree has seeds enough in the pulp of the shell, so useful for domestic utensils, yet it is always propagated in Yucatan, by shoots from its roots. Even admitting that when these trees get acclimated in a civilized country, the propagation by seed can be affected; very few persons would have patience enough, to wait so long as would be required in that way to re-produce their useful trees. It is hence, especially important, to select the best possible location for living plants, imported from tropical climates. That the damage done to the Logwood, and the Campechy Teak,* and the wild Fig, and the Calabash tree, does not discourage me, results from the fact, that these living plants sent from Campeachy, have in the model farm a bad location, both as regards exposure and soil.

*By the by, when I use the term Campeachy Teak, I don't mean to express that it is a species of the Tectona, but adopt the language of the sailors, who thereby convey the idea that it is an equivalent of the Teakwood, of the East Indies, and much superior in durability, even to our live oak. In Jamacia it is said to be called Jamacia *dogwood*, a still more unappropriate name.

This Logwood is a *Swamptree*, and should have been planted here in the cypress swamps. The Habi,* is a native of arid sandy and limestone soils, and should have been planted in the Pine woods. Both being forest trees, should have the protection of forests at least, during the process of their acclimation. The wild Fig appears to delight in the most sterile soils, and will flourish in the crevices of barren rocks. Indeed it will take root in the cracks of stone walls and fences, and its swelling roots, will at the same time, force apart and fasten portions of the stony mass in which they grow. In the suburbs of Campeche, the lots are surrounded by walls which are made rather of mortar and stone, than of stone and mortar, but the latter is so excellent, that it becomes as hard as the lime stones themselves, which are laid on it. It is hence of course easy to form pillars and columns resembling solid pieces of stone or marble. On one side of a gate way, there was a stout square pillar, on the top of which was a pyramidal head with a groove at the base. In this groove a young wild fig was growing, and its roots had removed the pyramidal summit at least a foot beyond the centre of gravity of its base! and there they held it fast and firm!! and thus it has remained several years!!! Sometimes I have seen it growing out of the top of a palm tree! and at others I have seen the top of a palm tree *apparently* growing out of a wild fig tree!! The explanation is easy. The minature fruit, about the size of a raspberry, is voided by the birds on wall on other trees, and there adheres and grows, extracting mostly its nutriment from the air. When germinated on the top of a palm tree, it sends down aerial roots, which twine round the trunk of the palm as they gradually descend to the ground, so as to cover finally the whole trunk, and appear to convert it into a wild fig tree! When growing by itself after it has reached so great a size that its branches are disproportionately large to its roots, it sends down aerial roots from the lower sides of its heaviest branches in a direct line to the earth. This process being repeated, and these downward shoots being rooted, they both serve as props to support the tree against the unruly winds, and as pumps to suck up nourishment from the unwilling earth. In the course of ages it thus becomes a forest; and such is the history of the celebrated Banyan tree of the East Indies. But I am running away from my principal subject, and my sickness must plead my excuse for my desultory style. At all events, you will perceive that the wet muddy soil of the banks of the Mississippi is not naturally adopted to the growth of the Fecus indica, and much less to its acclimation.

* The Campeachy name of the Piseidia. erythrina, or rather Pampeacheana, and which I shall use hereafter instead of Campeachy Teak.

From what I have written you will perceive that I am decidedly of opinion that the pinewoods of Louisiana are decidely superior to its river banks for the acclimation of tropical plants. Indeed I may declare that as the intermediate domestication of tropical plants is essential to promote the gradual acclimation of tropical plants in all the S. and S. W. States, so in these states, the intermediate transplantation of tropical plants in their pinewoods, is highly important to promote their success in the other sections of the same states.

The very important fact should also be always kept in mind, that independently of the protection of the evergreen woods, nearly all valuable plants of the tropics, yet to be introduced, *demand the most sterile soil.* Mr. McCarty of New-Orleans, showed me a plant in his garden, which he had brought from the pinewoods, where it grows rapidly into a beautiful tree, but which remained in a stunted state, under his fostering care. He attributed its failure to the wetness and coldness of the soil alone, but I would add to its excessive richness, because you know that all the alluvial banks of the Mississippi are loaded with vegetable and animal remains The soil on the banks is of course exceedingly fertile for such marsh plants as delight in decomposing, or organized matter, and hence the Sugar Cane could not find a better soil, but even for this the subsoil is too much charged with water. You know of course that the dead are buried above the earth, on account of the fresh water below it which is spread all over a vast extent of the State like an underground sea. As the process of living vegetation is never suspended in evergreens, its activity in every season, generates a notable degree of heat by means of which they elevate the temperature of the freezing winds, whose force they, at the same time, mechanically arrest and thus afford a double protection to the other plants which seek their shelter.

When I began, I did not expect to write three pages, and yet I find myself in the middle of the fourth page, without having said a word on my most favorite topic—*fibrous leaved plants.*

To be Continued.

Limestone, *Ground* but *not burned* for agricultural purposes. The following paper, on the use of *Lime Stone, ground* instead of *burned*, for agricultural purposes, was read before the Lyceum of Natural History of New-York, by Wm. Partridge, Esq. The facts therein set forth, are highly important, and are worthy of being tested by those who have limestone on their farms. We ask for this subject, the attention of our readers; and of those who have heretofore tested, or may hereafter test, the theory by experiment, to furnish us a statement of the result for publication. We shall also be much obliged to Mr. Partridge for a continuation of his favors.

TO THE PRESIDENT OF THE LYCEUM OF NATURAL HISTORY.

SIR,—In a conversation I had with you on board a steamboat on the North river, sometime during the summer of 1835, relative to lime, as applied agriculturally, I mentioned the advantage of using it generally in a ground state, as plaister is now used, instead of burning it. You informed me, subsequently, that your farmer had applied some on your land in a state of powder, and found it decidedly beneficial. I then promised to send you my written opinion on the subject, and I now beg leave to fulfil that promise, with an apology for delaying it so many months.

It is well known, to every intelligent agriculturalist, that soils covering limestone rocks are the most productive of any on the globe. I know of but one exception, when thelime stone is too highly charged with magnesian earth. Our country affords many facts in proof of this assertion. I shall refer to two locations as all sufficient for my purpose. The state ot Kentucky has a bed of lime stone running underneath its whole surface, and its natural soil has been produced, and is still producing by the abrasion of those rocks. The superior productive powers of the soil of that State is well known to every intelligent farmer in our extensive country, and is spoken of in terms of admiration by Europeans. That part of Pennsylvania extending from the Lehigh Water Gap to Easton, is a limestone country, and affords another instance of its highly productive powers.

In England, the soil deposited in valleys at the foot of limestone hills, are equally productive. The valley running from the city of Bristol, to the city of Worcester, is of this description, and there is no soil more productive in Great Britain. There are more than twenty spurs of hills bounding that valley, each containing large bodies of limestone rock, and the springs flowing from them, are so charged with limestone, as to incrust every thing lying in them. When the springs issue from the rocks high up the hills, they are much used for irrigating the higher lands, and the beneficial effects are visible to every observer.

Lime, in the state of Chalk, is also used very generally on land near to the Chalk Mountains in England.

The lower part of this State abounds in primitive limestone, and the preceding observations were made with a view to apply the facts to rectify a material error committed, as I conceive, by the farmers in using it on their land. They burn the limestone at considerable expense, and in that state use it for agricultural purposes. I would suggest, as a far better general application, that the limestone be merely ground, and in that state applied to the land. As this may be a new mode of application, I shall endeavor to show wherein it is preferable to the present.

I have been frequently informed by farmers who use burnt lime on their land, that they keep it some months before using, and that then the good effects are not observable the first year. We have only to ascertain what these facts prove, and the whole mystery will be instantly solved. In burning limestone two materials essential to agricultural productiveness are driven off, its water and its carbonic gas. In its natural state it is a carbonated hydrate, when burnt it is caustic lime (oxide of caleium,) made so by the heat driving off its water and carbonic gas. Why does the farmer delay putting it on his land, but for the simple reason that it is too caustic for vegetation. Why does it require to lie in the soil one year before producing any visible fertilizing effect? it is for nothing more than to give it time to return again to a state of carbonated hydrate, the same condition it was in before burning.

I have said that limestone merely ground is the best general mode of applying it to agricultural purposes, there are some exceptions to this rule. When a soil contains "hard roots, dry fibres, or other inert vegetable matter, a strong decomposing action will take place between burnt lime, and the vegetable matter, rendering that which was before comparatively inert, nutrative." Where this is the case, it would be well for the farmer to use one third burnt lime, and two thirds of ground limestone, or any other proportion he may find most efficacious. For stiff heavy soils use the limestone coarsely powdered, for in this state, after being well ploughed and harrowed, so as to mix thoroughly with the soil, it would so lighten it as to enable the sun and air to penetrate to the roots of its vegetation, thereby rendering the future crops more productive. For lighter soils it cannot be ground too fine. Our primitive limestone rocks are peculiarly well calculated for this purpose, as the particles are held together by a loose aggregation, and therefore easily reduced to small pieces, or to a fine powder, at the option of the operator.

The question was asked, by a writer in a late New-York Farmer, "if it be possible that ground limestone can answer the purpose of plaister of Paris." I should say that it can, and it may be, eventually, a better purpose. The fertilizing property of plaister depends mainly, if not altogether on its hydratic property, that is, on its power to attract moisture during the night, and imparting it gradually to the plants during the day. The carbonate of lime possesses the same property in a considerable degree. I have never heard of these two limestones being analized, for the purpose of developing their comparative powers of absorbing moisture from the atmosphere, and their facilities of giving out thei moisture at atmospheric temperatures. To have this accurately performed, would be a desideratum with agriculturalists.

We know that soils formed by the abrasion of limestone rocks are of the most fruitful description, we see its productive powers when land is irrigated with water holding limestone in solution, and with equal effect in the state of Chalk. Science has developed the properties on which this productiveness depend, and if our farmers would suit their appliances scientifically, we should not now be receiving a supply of agricultural products from Europe.

WILLIAM PARTRIDGE.

SHORT HORNED DURHAM BULL "ESSEX."

We saw on Saturday last, the fine Durham Bull Essex, raised by Gorham Parsons, Esq., of Brighton, Massachusetts, but now the property of Col. Ralph Watson, of East Windsor, Connecticut.

The following is a description of him with his pedigree.

The thorough bred Durham improved short horn BULL, by sire and dam is from the most celebrated stock ever imported from England—was bred with great care by Gorham Parsons, Esq., of Brighton, Mass. He is a beautiful red roan, and red and white speckled, red neck, white face, upright short and small horns, red and white mottled legs, white throat, red hams, fine straight legs, fine bone, and altogether a very superior animal, was dropped in Byfield, on Fatherland farm, May 10th, 1833, and weighed May 11th, 1837, in ordinary flesh, 1578 lbs. His form, muscle, bone, &c., are such as Farmers, Darymen and Butchers admire and consider essential to make a perfect and profitable animal.

PEDIGREE.

Essex was got by Young Admiral from

old Violet, old Violet was from the imported cow Bountiful, that took the first premium of 75 dollars at the Cattle Show in Brighton, in 1817, her sire Cornelius Coolage of Boston celebrated Bull Celebs, which he imported from England to improve the stock of cattle in the county of Essex, Young Admiral was got by Admiral, a fine bull sent from England to Mass. by Admiral Coffin. to improve the breed of cattle in his native State, Young Admirals dam was the fine full blood Durham Cow Rose.

RALPH WATSON
East Windsor, Conn. May 22d, 1837.

POTATOES.—In Prussia the Potatoe is cultivated with peculiar success;—as the stalk grows, the earth is heaped up, leaving only three leaves at the top; roots are thus greatly increased, and the produce is said to be astonishing.

From the Maine Farmer.

VALUABLE IMPROVEMENT.

PITTS' GRAIN SEPARATOR AND CLEANSER.

Every thing which shall facilitate the labor of the Farmer and enable him to do more at a less expense, we look upon as a valuable improvement, and never refrain from giving as early notice of it to our readers as possible, that they may put themselves in a way to profit by it, or at any rate, not remain in ignorance of it.

In accordance with this practice we would ask the attention of our readers to the communication below, respecting a machine, invented by the Messrs. Pitts', of Winthrop, for threshing, separating the grain from the straw and foul stuff, and winnowing it in a most clean and perfect manner.

The Inventors are favorably known to the public by several important improvements which they have made in machinery of different kinds. It will be recollected that a premium has been awarded them by the Kennebec Agricultural Society for their machine for threshing and cleansing grain. Since then they have been busily engaged in improving and perfecting their invention, until at length they have produced one which we think is all that can be asked for. The machine is made up of the thresher, which is of the usual form,—a belt so constructed as to separate the grain from the straw, and to pass the straw forward and throw it off of the machine,—a winnower or fanner, with its sieves of different degrees of fineness to separate foul seeds from the wheat,—a reservoir for the cleaned grain, and another for the light stuff or tailings. An apparatus is attached if desired, for returning the last the winnower again for a second cleansing. The fan is so constructed that the wind may be regulated so as to give any quantity, from a *zephyr* to a *tornado*. The machine is simple in its construction, and occupies a space about eight feet long, three and a half high and two wide, and the expense is probably from sixty to seventy-five dollars according to the style and finish.—This includes the threshing machine.

Having seen the machine in operation, and examined every part of it; and having critically watched every movement with a view to detect any faults which might render it unavailable, we are constrained to say that we could find nothing which could lead us to doubt its utility, and we therefore embrace the opportunity to advise our friends of the facts, in order that they may be aware of the existence of so important an auxiliary in the wheat business and govern themselves accordingly.

This machine will be exceedingly well adapted to the practice of the Southern and Western States where they are in the habit of threshing grain in the open air, and as it can be done without the loss of a kernel.

IMPORTANT IMPROVEMENT IN THRESHING AND CLEANSING GRAIN.

An improvement in the mode of threshing and cleansing Grain has been effected by Messsrs. J. A. & H. A. Pitts, of Winthrop, Maine, which we think exceeeds any thing that we have heretofore seen or heard of.—The improvement consists in adding apparatus of a simple kind to the common threshing machine whereby the straw is separated from the grain and the grain winnowed from the chaff and foul seeds in a complete and expeditious manner, all by one operation of the machine. We had the pleasure of witnessing the operation of this machine on the 8th. It was propelled by one horse.

The Grain was threshed perfectly clean, and winnowed or cleaned far better than we have ever seen it by any common hand winnowing machine. No grain was found passing over with the straw, or scattered out from any part where it should not. We congratulate the Agricultural community in having the prospect of so efficient an aid to the wheat or grain culture, and cheerfully recommend it to the attention of the farmers of the United States as a valuable improvement.

PELEG BENSON, Jr.	BENJAMIN STEVENS,
SAM'L BENJAMIN,	M. B. SEARS,
PELEG BARKER,	A. S. RICHMOND,
DANIEL CARR,	WM. HENRY LORD,
DAVID STANLEY,	SAM'L. WOOD, JR.
G. A. BENSON,	JOS. A. MELCALF.

The following remarks we copy from the Augusta Banner. It seems that we are not alone in the opinions which we have expressed in regard to the Messrs. Pitts' Separator.

THRESHING, SEPARATING AND WINNOWING MACHINE.—I was very much gratified while at Winthrop, in beholding the operation of a Machine bearing the above title. It is the invention of the Messrs. PITTS' of Winthrop, who are the Patentees. These gentlemen are well known as the inventors of several instruments, one of which is the *Stone Cutter*, which bids fair to be of much advantage in hewing stone. The Threshing, Separating and Winnowing Machine will probably be of as much real utility as any of their inventions. As yet, it has not been introduced finally to the public, but must claim the approbation of popular opinion. It performs with the utmost ease what by many has been considered an impossibility, completing effectually the different operations of threshing out the grain, seperating it from the straw, and winnowing it from the chaff. As such it is at once perceived, that it will not only be highly useful, but must be exceedingly valuable to farmers. Its intrinsic excellencies are its perfect simplicity, its great power, the great quantity of labor it performs in a limited period of time, and the velocity and thoroughness with which it prepares the grain for the operation of the mill. It combines every desirable principle for the purposes for which it is designed and commends itself at once to the notice of grain growers. It can be moved either by horse power, water power or steam power. Further particulars will readily be furnished on application to Capt. John A. Pitts, Winthrop, Maine.

D. J. M.

THE CROPS IN INDIANA.—The following extract is from the Madison (Indiana) Courier & Enquirer of 6th May, a well conducted journal, of which we have No. 6.—We welcome it to our table, and wish its publishers all success.

Since our last went to press, we have conversed with several farmers, who inform us that the wheat crops, although at present suffering for want of rain, look better than they did this time last year, and that unless injured in its growth by a continuance of the present unfavorable weather, promise a fair yield. The present prospect for oats is rather unfavorable. Although the ground generally has for some time been prepared, but few farmers have ventured to plant corn, and those few, it is conjectured, will be compelled to re-plant, the seed having rotted in the ground. It is high time this invaluable grain was in the ground, and we sincerely hope that we may soon have sufficient rain to prepare the earth to receive it.

Vegetables of every kind are exceedingly backward, owing to the same cause.—This however, is no news to our market-going friends.

There is at present every prospect of an abundance of fruit of every kind. The dry weather has been rather favorable to them than otherwise. A few of the peaches have been destroyed, but more than a sufficient quantity still remain.

We had scarcely finished writing the above paragraph late last evening, when we were blessed with a refreshing shower.

From the Farmer and Gardener.

CULTURE OF RUTA BAGA.

Mr. James M. Lawton, in a communication in the Cultivator, gives the following rules for the preparation of the soil, and the culture of the Ruta Baga. The conclusions at which he arrives are the result of many years experience and close observation.

1. The land, he says properly adapted to the nature of the plant, is a strong loam.

2. The land should be ploughed early in the spring, in order that the sward, if it have one, may rot by the 10th of June.

3. The land should be made perfectly mellow and smooth, and a good coat of

manure, that is fine, say sheep or barn manure should be put on.

4. Throw the land into ridges 24 inches apart, with a small horse plough.

5. Roll down the ridges by a light roller, or other instrument; make a light furrow, say an inch deep, drill in the seed on or about the 15th of June: the seed should be 10 inches apart in the drill, and when the plants come up, all but one plant should be pulled up.

6. Dress the plants three times in a season, that is, keep the weeds out, and the earth stirred about the plants; as they are first breaking the ground they must be powdered with plaster of Paris,—and twice afterwards also—when they receive the two last hoeings.

Mr. Lawton further adds, that he has found the above rules, when closely followed, never to fail in producing a good crop; that last year he raised from 90 rods, that is from half an acre and 10 perches of land, 605 bushels of sound, close-grained Ruta baga turnips, on land a distance from the house and barn, on which, never to his knowledge, a spoonful of manure had been placed until within a few days of the time he put the seed in the ground. This product was equal to 1075½ bushels per acre The success of Mr. Lawton should surely serve to stimulate every farmer and planter to at least appropriate an acre or two to the culture of this excellent and hardy root. Unlike the other members of the turnip family, it preserve through the hardest winter in the field, if the precaution be taken to throw a furrow up against the rows just as the hard frosts set in, and may be drawn thence for use, as occasion may suit. They are also more firm in meat, and more nutritious than any other turnip. Horses and cows fed upon them do not scour as when kept on the other varieties.

LIST OF SUBSCRIBERS to the **Railroad Journal**, that have paid, (CONTINUED.)

J. M. Price, City, N. Y. Jan. 1, 1838
A. Brocklebank, City, Jan. 1, 1838
J. E. Thompson, Augusta, Geo. To Oct. 1, 1838, Instead Jan. 1, 1838
Geo. Gillingham, Baltimore, Md. Jan. 1, 1837
W. R. Cunningham, Greensboro, Geo. June 1, 1837
J. Myers, Attleboro, Mass. June 1, 1838
Capt. W. Turnbull, Washington, D. C. Jan. 1, 1838
T. W. Smith, Georgetown, D. C. Jan. 1, 1838
Benj. Hallowell, Georgetown, D. C. Jan. 1838
Holt Wilson, Portsmouth, Va. Jan. 1, 1838
Ogden Mallory, Sandusky City, Ohio, Jan. 1, 1838
Giles C. Smith, Paolia, Inda. Jan. 1, 1838
J. Fraser, " " Jan. 1, 1838
Canal and Railroad Co. Charleston, S. C., Jan. 1, 1838
Wm. Henry, Stroudsburg, Pa. Jan. 1, 1838
Wm. Williams, Athens, Geo. Jan. 1, 1838
M. P. Henny, Philadelphia, Pa. Feb. 1, 1836.
Wm. Jerome, Kane P. O. Ill. May 1, 1838
Lt. A. G. Blanchard, Fort Jessup, La. July 1, 1838

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone.

The work contracted for must be finished by the 1st day of July, 1838.

Persons desirous of obtaining work are requested to apply at the office of the undersigned, in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, JR.
Chief Engineer Jas. Riv. & Ka. Co.

P. S.—The valley of James River above Richmond is healthy.

16—10t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

₊ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

₊ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

₊ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered — The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.— The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country.

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer.
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 14 ly

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rochester, Jan. 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order. IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER.
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON;

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.
16—6t.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

						lbs.	
350 tons	2½ by	½,	15 ft in length,	weighing		$4\frac{68}{100}$	per ft.
280 "	2 "	½,	"	"	"	$3\frac{50}{100}$	"
70 "	1½ "	½,	"	"	"	2½	"
80 "	1¼ "	⅜,	"	"	"	$1\frac{25}{100}$	"
90 "	1 "	⅜,	"	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front st.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

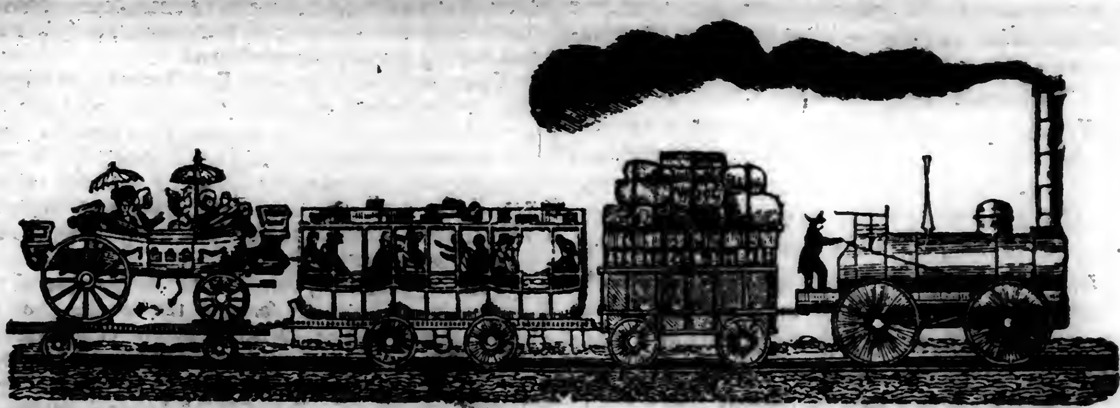
Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR,
Patterson, New-Jersey, or 60 Wall street, N. Y. 51tf



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, JUNE 24, 1837. [VOLUME VI.—No. 25.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JUNE 24, 1837.

Hudson and Berkshire Railroad.—At an election for Directors of the Hudson and Berkshire Railroad, held on the 5th inst., the following gentlemen were elected, viz:

James Mellen,	William A. Dean,
Elihu Gifford,	Robert A. Barnard,
Rufus Reed,	Oliver Wiswall,
Goverheur Kemble,	Silas Sprague,
Samuel Anable,	Ambrose L. Jordan,
Robert McKinstry,	Seneca Butts,
John Power.	

We are gratified to learn, as we do, from the following extract from a letter that this road is ready for the rails.

"Our road is all graded, except 1½ miles, and that portion far advanced. The road would have been in operation this season, had not these fearful times prevented."

☞ It was by no means *intended* as "partiality," that the report in relation to this road was not published, if it was received, of which we have no recollection.

We give the following communication of "A Merchant," in relation to the important proposition of the New-York and Erie Railroad Company, to the Common Council—and cordially approve of his suggestion for the call of a meeting of citizens for some evening of this week, for the purpose of laying the subject before them, and of eliciting an expression of opinion from those who are to be most effected by it. That such an expression of opinion would be highly favorable we cannot doubt, and of course satisfactory to the *people's representatives*, the Common Council.

We do not entertain a doubt, as to the result of the proposition ; as, to doubt its success, would be to doubt the intelligence, and enlightened forcast of the gentlemen who compose that body.

To the Editors of the Railroad Journal.

Gentlemen.—I perceive by the Times of this morning that a very important proposition was made to the Common Council on Monday evening last, by the *New-York and Erie Railroad Company*.

It will be seen, by referring to the memorial of the President and Secretary, in behalf of the Railroad Company, that they ask the Corporation of New-York, to aid the Company, either by *subscription* to its stock, or by *loan;* and offer in return to employ at least 3000 laborers from this city, if the Corporation will place them along the line of the road by the first of August. This is a measure of great importance to this city, in more than one point of view.

It will in the first place relieve the city from an enormous burthen, by employing many who are now, or must soon be, supported by the city.

It will enable hundreds of industrious, and honest men, to earn a living, instead of being degraded, in their *own* estimation by the *necessity of asking charity*.

It will contribute largely to the prevention of vice and crime, by removing from the city hundreds of families who must either *beg, steal* or *starve*—and it is therefore a measure, the adoption of which is urged alike by *humanity* and self-interest. In addition to these important reasons it will contribute largely to the progress of a work in which this city has a deep and lasting interest. It will, beyond all question. ensure and hasten the early completion of the New York and Erie Railroad, a work, second only—*if even second*—in importance to *this city*, to the Erie Canal.

With these views, gentlemen, of the importance of the proposition. as a matter of policy and pecuniary interest to the city, I cannot refrain from requesting you to urge the subject upon the Common Council, and also upon the citizens at large, as one on which there should be *no diversity of opinion*.

Would it not be well to call a public meeting of the citizens at large, for Saturday evening, that the subject may be publicly discussed, and properly understood, in time for the next meeting of the Common Council?

Truly yours,

A Merchant.

New-York and Erie Railroad.—We desire to call the attention of our readers, *especially in this city*, to the following memorial of the New-York and Erie Railroad Company, which we copy from the N. Y. American, together with the remarks of the Editor of that paper. The proposed measure, will, if adopted, contribute largely to the consumation of two important objects, viz: the progress of this important work, and the relief of the city from a heavy expense, for the support of hundreds of men, who are, or *will* be, without labor, and of course without the means of support; it therefore becomes the duty of every friend of humanity, and of internal improvement, to give to the measure a cordial efficient support.

NEW-YORK AND ERIE RAILROAD.

The following memorial, presented to the Common Council last evening, seems to us amazingly well calculated to effect two good objects: that of finding employment for several thousand laborers, who, or many of whom, may otherwise become a charge to this city; and that of aiding a great national undertaking, in the success of which this city again has a very deep interest, and which, without some such plan, must languish at least for the present.

As a matter merely of economical calculation, we take it, that our tax-payers would gain by such an arrangement as is proposed, viz.; that the Corporation shall advance its credit to the New-York and Erie Railroad Company, on condition of their giving employment to 3,000 men; the wages thus paid, while providing a fund that would supercede all necessity of, or claim for, eleemosynary relief from this city on the part of such large numbers, would, in effect, be like seed sown in the ground, and re-produce threefold benefits, to the city, to the counties through which the road runs, and to the laborers themselves.

Nor would any advance of city funds be required, for the credit of the Corporation would call them forth readily from capitalists.

Altogether, the proposition strikes us as one to which the Common Council will do wisely in acceeding.

To the Mayor, Aldermen, and Commonalty, of the City of New-York.

The New-York and Erie Railroad Company respectfully reresent:

That they have completed the surveys of sections of their road between this city and Lake Erie, exceeding in the aggregate 250 miles in length, all which are now ready for actual construction.

Your memorialists had designed to prosecute the work vigorously during the present season, and could have done so with much advantage, labor being cheap, and provisions abundant; they regret, however, to state that the merchants of this city, whose subscriptions had principally supported the enterprise, have suffered so severely in the present prostration of credit and commerce, that your memorialists will be unable, unless they shall secure public aid, to continue their operations during the present year.

It is believed that the city of New-York ought in its incorporate capacity, to exert any legitimate authority it may possess to expedite the progress of this work of improvement, destined as it is to promote so materially the prosperity of all classes of its inhabitants. The question, however how far the public authorities shall follow the example already set by other cities of the Union, in subscribing to the stock of works of improvement designed to protect and extend their commerce, your memorialists do not propose at this time to agitate; and they now present the subject to the consideration of the Common Council, principally because an opportunity at this time presents itself by which the city can effectually aid the enterprise, and at the same time accomplish other objects with which the municipal interests are more directly and peculiarly concerned.

The large numbers of our laboring population thrown out of employment by the commercial disasters which have overtaken the city, are constantly increasing by the influx of destitute emigrants; and it is obvious, that their support through the approaching winter, unless prompt measures can be adopted to remove them from the city, must impose a heavy burthen upon the tax paying portion of our citizens.

Upon the New-York and Erie Railroad leading through the most healthful and desirable portions of the State, this class of our inhabitants might be immediately employed; and it is confidently believed that the city could hardly fail to gain, in a pecuniary point of view, by assisting in their removal, and in furnishing such pecuniary aid to your memorialists as should enable them at once to afford to these laborers sufficient and steady employment.

Your memorialists, therefore, for the purpose of presenting a proposition in a definite form for the consideration of the Common Council, hereby offer, that if the city authorities, by the 1st of August next, will furnish, at convenient points on the railroad to be agreed on, any number not exceeding 3,000 able bodied laborers, the Company will afford to them immediate employment, and at fair rates of wages, subject only to such regulations as may be necessary to secure their faithful services; provided, that the city shall authorize either a temporary loan to the Company, or a subscription to its capital stock, for an amount sufficient to cover the expenditure necessary to carry this proposition into effect.

James G. King, President
New-York and Erie Railroad Company.
T. J. Waters, Secretary
New-York and Erie Railroad Company.

New York, June 19, 1837.

Wilmington and Susquehanna Railroad.—We are happy to learn from the enterprising builder of the Principio Bridge, John Jones, Esq., that it will be finished by the end of next week.—This is the only obstacle of importance in the completion of the road, and we have no hesitation in saying that it will be ready for use by the 4th of July, between this city and Baltimore.—[Del. Gazette.]

From the London Mechanics' Magazine.

SALUBRITY OF RAILWAY TUNNELS. REPORTS ON THE TUNNEL ON THE LEEDS AND SELBY RAILWAY.

REPORT OF DR. DAVY, AND DR. ROTHMAN.

After careful inquiry, and an examination of this Tunnel, we are of opinion that it has no injurious influence on the health of the passengers. We have come to this conclusion from finding:—1st. That the air in the Tunnel at the time of passing is not appreciably vitiated. Chemically examined, its composition appears to be the same as that of the atmosphere, even after repeated transits of the locomotive engines.

2nd. That the temperature of the air in the Tunnel, though more uniform than that of the external air, does not vary so much from it as might have been expected. In the warmest weather in which observations have been made, the air of the middle of the Tunnel was only 8 deg. lower than that of the atmosphere, the latter being 70 deg. In February, the greatest difference we found was also 8 deg. the atmosphere then being at 56 deg. We were assured that, during the severest weather of the last winter, the temperature of the Tunnel never fell to the freezing point.

3rd. That the humidity of the air in the Tunnel, judging from the new experiments which we have been able to make, will be more uniform than the temperature. That it will generally be somewhat greater than that of the external air, but never sufficiently so to cause the precipitation of aqueous vapor in the carriages, or on the persons of passengers.

4th. That we have not been able to detect, in any part of the Tunnel, traces of acid, or other irritating or noxious effluvia.

The Tunnel, at present is passed through in darkness, which, though not dangerous, is to many persons unpleasant. This seems to require correction, and it is understood to be in contemplation to attach lamps to the carriages.

The noise made by the engine and train of carriages did not seem to us much greater in the Tunnel than in the open air, nor to form any reasonable ground for complaint. Annexed to this Report is a certificate by Dr. Williamson, a high medical authority in Leeds, generally in accordance with the opinions above expressed. He has even arrived at the conclusion, which we see no reason to doubt, that travelling on the Railway if often beneficial to persons in delicate health, particularly in certain cases of slight pulmonarary disease.

The Tunnel in question is situated very near the terminus of the Railway in the town of Leeds. It is 700 yards in length, 17 feet high, and 22 broad. Its direction is nearly east and west. The inclination of the floor is 1 in 300. It has three shafts at irregular distances, which now se ve the purpose of ventilation. The westernmost is somewhat the deepest; the depth of this is 23 yards, measured to the floor of the Tunnel. The Tunnel is bricked throughout its whole extent. It is traversed by 20 engines daily, and on an average by 350 passengers. The average time of passing is about a minute and a quarter. The steam is generated by coke of the best quality, under a pressure of 56 lb., with regard to our sensations in passing through the Tunnel, with the windows of the carriage purposely left down, we experienced nothing unpleasant, either from smoke, vapor, or currents of air. The temperature in the carriage was agreeable, and every thing felt dry.

We would conclude by observing, that the opinions we have expressed of this Tunnel we hold to be applicable to all other Tunnels, the circumstances of which are similar; and to Tunnels of greater length, if they are higher and have a sufficient number of shafts to secure an adequate ventilation.

JOHN DAVY, M. D. F. R. S.
Assistant Inspector of Army Hospitals.
R. W. ROTHMAN, M. A. & L. M.
Fell. Trin. Coll. Camb.

London, 21st February, 1837.

DR. WILLIAMSON'S REPORT.

In reference to the effects of the transit through the Tunnel of the Leeds and Selby Railroad on the health of passengers, I have to state, that in the whole of my experience, both in private practice and in my official connexion with the infirmary, and with the other Medical Institutions of this town, I have never seen a case in which I could ascribe injurious results to that circumstance. I have, indeed, frequently recommended delicate persons to make excursions on the Railroad for the benefit of their health, and have known very decided advantage to accrue from such excursions to persons even laboring under the slighter forms of pulmonary irritation.

I conceive that the vaper, smoke, and gaseous results of combustion can never exist in such proportions as materially to deteriorate the air; and that there is no degree of humidity or deleterious emanation, peculiar to the Tunnel, which can be appreciably detrimental to animal life.

I believe that persons of irritable bronchial membrane may respire in the air of the Tunnel for a considerable period without feeling the slighest inconvenience or sustaining any injury.

(Signed) JAMES WILLIAMSON,
Senior Physician of Leeds General Infirmary, and Lecturer on the Practice of Physic in the Leeds Medical School.

Leeds, 19th February, 1837.

ADHESION OF RAILROAD SPIKES.—We conclude in this number the very important article of Prof. W. R. JOHNSON, from the Journal of the *Franklin* Institute, (it was commenced from the Journal of Science, in which however, we did not find all the engravings,) "*On the Adhesion of Iron Spikes of various forms, etc.*" To Railroad Companies the writer has performed a very acceptable service, and we take great pleasure in giving it publity in this Journal—and shall always be gratified to give such articles a *first* place in its columns.

Continued from Page 360.

The accompanying figures represent the appearances of timber as developed by splitting the specimens, through the axis of the cavities, left by the spikes when withdrawn.

Figures of Timber.

Fig. 1. Fig. 2.

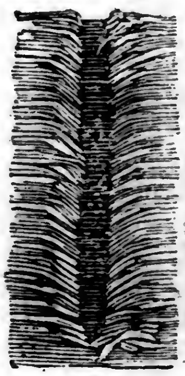


Fig. 3. Fig. 4.

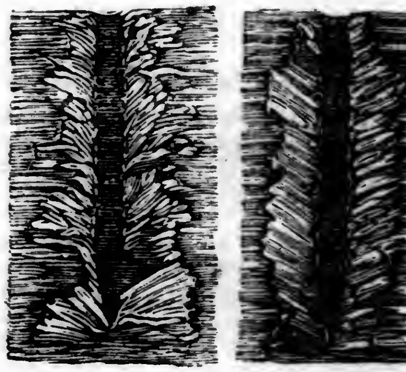


Fig. 1—Is that presented by the locust timber, mentioned in Table II, Experiment 11, in which the weight required to extract the spike was 3990 lbs. The upper part of the figure exhibits the rising up of the timber just as the spike starts. In every case this effect was found, on examining the timber, to have been of very limited extent.

Fig. 2—Represents the grain of chestnut timber as effected in experiment 3, Table III, with the broad flat spike, and other trials. At the point of inflection downwards the grain appears to be not only bent but often actually broken off.

Fig. 3—Exhibits the appearance of a specimen of hemlock timber, used in experiment with the straight grooved spike, (Fig. 4 of spikes) in which the weight required to extract it was but 1296 lbs.—See Table II, Experiment 8th.

Fig. 4—Conveys an idea of the manner in which a defective specimen of pitch pine was affected by a spike. The force required to draw this spike was so trifling that it was not thought worth recording in the tables.

Figures of Spikes.

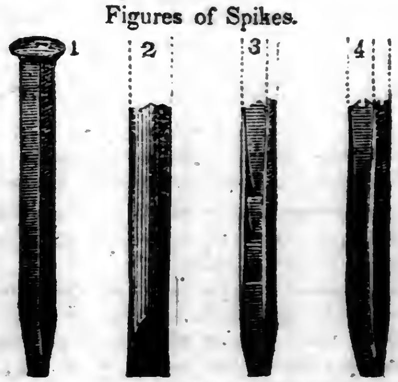


Fig. 1—is a square spike .405 of an inch wide on each face,—referred to in Table III, Experiments 1, 5, and 13.

Fig. 2—is a cylindrical spike .485 inch in diameter, sharpened to a cutting edge—see Table III, Experiment 9.

Fig. 3—is the grooved and notched spike, serrated in the bottoms of the grooves on the two faces,—Table III, Experiment 12.

Fig. 4—is a spike with plane grooves on the faces, extending from the upper part of the bevel to the height of about 3½ inches.

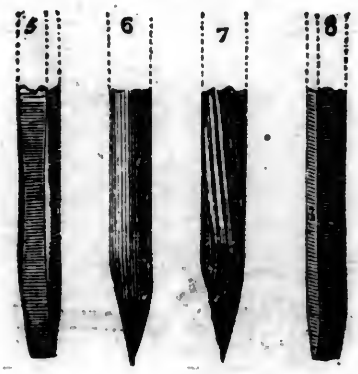


Fig. 5—is a grooved and swelled spike, that is, having the groove deeper at the distance of two inches from the point, than it is at one inch from it. At the former the depth of each groove is .066 inch.

Fig. 6—is a cylindrical spike .5 inch in diameter, tapered to a point.

Fig. 7—is a spike of the same diameter as the preceeding, but having 15 spiral grooves proceeding from the point upward.

Fig. 8—is a flat spike .390 inch in breadth, and .253 inch in thickness. See Table III, Experiments 4, 7, and 15.

NOTE.—The only series of experiments analogous to those above detailed, which has fallen under the notice of the writer was made in 1824,* by Mr. B. Bevan, on the adhesion of sprigs, brads and nails, when driven into timber longitudinally and transversely. His operations were extended to several kinds of timber, viz:—Norway deal, dry oak, elm, dry beech, and green sycamore.

He employed some nails of a very minute size of which 4560 were required to make a pound averdupois. One of these required 22 lbs. to extract it, when driven .4 of an inch into pine board. From this size he advanced by several gradations to the sixpenny wrought nail, of which 73 make a pound averdupois.—Of the latter he drove one to the depth of one inch successively into pine, elm, dry oak, dry beech, and green sycamore, and found the forces required for its extraction to be as follows:

For Pine,	187 lbs.
Elm,	327
Oak,	507
Beech,	667
Sycamore,	312

Mr. Bevan examined, to some extent, the difference between driving a nail by percussion with a hammer of known weight and range of fall, and forcing it into the wood by simple pressure.—This curious inquiry did not for obvious reasons, enter into the plan of the writer of this article. Mr. B. found that to force a sixpenny nail into pine 1 inch, it took a pressure of 235 lbs.; to extract it, 187; to force it in 1½ inch 400; to extract it 327;
" 2 inches 610; " 530.

* See Gill's Technical Repository, vol. V., p 248.

From the New-York Mechanics' Magazine

DAVENPORTS' ELECTRO-MAGNETIC MACHINE.

Of all the means hitherto discovered for propelling machinery, nothing exceeds in simplicity, permanency, and perhaps in power, that lately applied by Mr. Davenport.

The great, but unknown powers of electro-magnetism, is now arousing atention throughout the scientific world; and what is to be the result of its surprising energies time alone will determine. It may be affirmed, that nothing since the time of Newton appears more wonderful, than the application of this latent principle to the useful arts. If capable of increase to an unlimited extent, as Prof. Silliman contends, the inventions of Watts and of Fulton, will soon be thrown into the shade; but of this we have our doubts, the authority of the Professor and many others to the contrary, notwithstanding. Should we, after a careful investigation of the machine, find ourselves mistaken, we shall be prepared to say, that nothing within the history of man, has ever proposed those great and genial advantages to mankind that Davenports' machine does;—nothing half so safe, so cheap and so efficient. We could see through the vista of years, and point to the almost innumerable purposes to which this astonishing power will be applied in the various pursuits of life. Steam will, of course, remain uninvoked, and the winds will be suffered to pass by unheeded. A new and hitherto unappreciated agent, will be called into activity, and wonderful will be its potency and advantage.

Though now working miracles in matters of science, yet even these will be neglected or forgotten in its ultimate triumph as a motive power. No one will dare to assign limits to its prospective utility. The quiet and unobserved energies of this principle, will all at once be waked from its eternal sleep, and aroused to the most intense action.

The ingenuity of man, after science awakened us to a sense of its active properties, has not long permitted it to exert its influence alone in hidden phenomena, but, as in the case of Mr. Davenports application, it has been brought to the traces and it is now about to put forth its strength in behalf of man, and to work submissively for the gratification of his innumerable wants.

Although the nature, and many of the phenomena of Electro-Magnetism, were long since known, and although the developement of its properties, has steadily progressed for some years past, yet it remained for Mr. Davenport, a Vermont blacksmith, to harness it to the useful arts, and to show to the world how cheap, how safe, and how uniting are its powers. It appears that this ingenious mechanic, first saw a galvanic magnet, about three years since, when struck with astonishment by the power which it exhibited in sustaining a weight of 150 lbs. on being attached to a galvanic battery, he at once drew the inference, yankee-like, that it might be adapted to useful purposes, in the propulsion of machinery. He purchased the magnet, poor as he was, though not without obtaining, even in this incipient step, the assistance of his friends. Various and interesting were the progressive advancements of this unread yeoman, in the production of his designs, and the ultimate production of a rotary motion. In this, however, he succeeded, and the first model was for sometime exhibited among the curious. More recently, models have been made and exhibited in this city, where stock in the patent right, is now offered for sale. The patent is about to be taken out, also in Europe; and, if we are to give credit to report, the stock is rapidly selling off.

Improvements have repeatedly been made in the mode of generating this power; and it may be presumed that others may yet be made, so as to increase it without additional expense, and without a corresponding increase in size. The models we have seen are about 8 inches in diameter: they make more than 600 revolutions in the minute, and raise 16 lbs. at the rate of 1 foot in that time. A model is now making of a still larger size, which will more fairly test the question, whether the power can be increased *ad in finitum.* Experiments are also making with fixed and galvanic magnets, in order to determine their relative powers, etc.

It is but proper to add that Prof. Henry, of Princeton College, was the first who applied this power to the movement of machinery by means of a beam, like that of a walking beam of a steam engine, but Mr. D. was alone in producing by this agent a rotary motion.

The former gentleman also succeeded, by a method of galvanic arrangement, peculiarly his own, in exciting a power far beyond that it had been known to possess. Justice, therefore, demands that to these individuals should be awarded the meed of praise which the world may hereafter give the earliest discoverers in this branch of philosophy: though we are aware that numerous experiments have been made of late in Europe to test the applicability and power of this natural agent, as yet, however, without success. L. D. C.

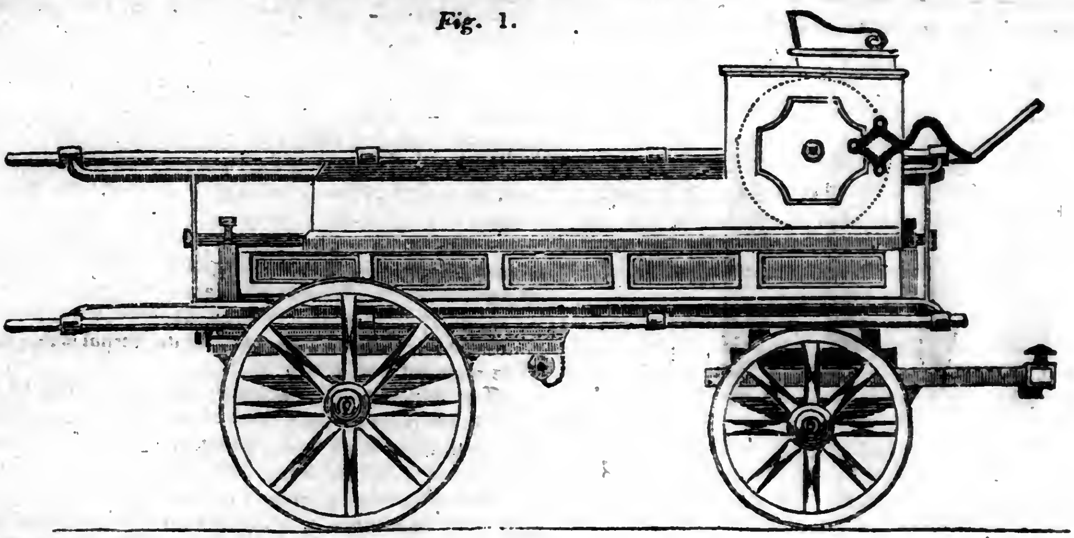
From the London Mechanics' Magazine.

BADDELEY'S HOSE-REEL FOR FIRE ENGINES.

SIR,—Every contrivance, calculated to save time, and in some measure to supercede skilled labor, is at all times valuable, but especially so when adapted to emergent occasions—as, for instance, when applied to such objects as the extinction of fires.

BADDELEY'S HOSE-REEL FOR FIRE-ENGINES.

Fig. 1.



The present form of fire-engines is so convenient, and so exceeding compact, that it is only in the minor details of its arrangements, that there is any room for the exercise of ingenuity.

In addition to the several minor improvements, which I have from time to time suggested, I have now to submit another, intended to simplify and facilitate the application of this useful machine to its intended purpose.

As fire-engines are now built, the leather hose is stowed away very conveniently in separate lengths (six lengths and a half being the usual compliment,) in the fore part of the engine. In London and some other places, where the firemen, from continual practice, become amazingly expert in the management of all their apparatus, six, seven, eight, or even a still greater number of lengths of hose, are got out and joined up with astonishing rapidity. It sometimes happens, however, even with the most experienced firemen, when short-handed, that some loss of time occurs in performing this necessary operation. When no regular firemen are employed, as in the case of engines belonging to parishes—to public or private establishments, &c., where only one individual is acquainted with, and has himself to perform the several preparatory evolutions, or entrust their performance to strangers altogether unpractised in matters of this sort—the getting out and joining of any consiberable quantity of hose is a work of much time and labor.

The drawings herewith sent, exhibit a little invention, which I have termed a *hose-reel;* it is intended to have wound upon it a quantity of leather hose already screwed together, so that on arriving at a fire, the engineer has only to take the branch-pipe in one hand, and the end screw of the hose in the other, and run off to any point from which the fire can be successfully opposed; a sufficient length of hose being run out, the next joint is screwed and attached to the engine, which may immediately commence working. The speed with which an engine can thus be brought to bear upon the flames, at some considerable distance, is very great; one joint has to be unmade and another made, when all that is necessary is performed. Whereas, at present, perhaps five or six lengths would have to be taken out of the engine, carried forward, and as many joints made before the engine could be set to work—to say nothing of the uncertainty as to the quantity required, or of the imperfect manner in which the joints are made when done hastily, amid the confusion which always prevails, and perhaps by persons unaccustomed to the office. By using the reel all twisting of the hose is effectually obviated—the joints having been previously made are all perfect, and the connecting screws are preserved from much of the injury to which they are at present exposed.

Fig. 1. is a side elevation of a fire-engine of the most approved construction, furnished with the hose-reel, which occupies a space enlarged for the purpose above the cistern and under the driver's seat—the extent and position of the reel being shown by the dotted circle. Fig. 2. is a front representation of the hose-box, by which it will be seen that there is an oblong flap or door, fastened in any convenient manner, with an aperture of such a size as to hold firmly the male screw of the hose. Fig. 3. is a side view of the same, with the hose in the act of being drawn out. A small roller is placed upon the flap for the hose to run in and out upon, the flap being supported horizontally by chains on either side. Fig. 4. shows the construction of the reel; it consist of a hollow spindle *a*, and two circular sides *b b*, of thin sheet iron, the spindle runs in two brass collars in the sides of the hose-box, and at each end there are two square eyes for the insertion of the handles *e f*, by which the hose is wound upon the reel. In winding up the hose, two men stand one on either pocket, another one in front guides the hose backwards and forwards from end to end of spindle. The female screw is in the first instance hitched upon the forked notch *c*, which holds it fast, and on turning round the handles the hose is wound upon the reel. There is a pall and ratchet (not shown in the drawing) which prevents the hose from unwinding in travelling, &c. On reaching a fire the ratchet is thrown back, and a sufficient quantity of hose drawn out, which is then disconnected from the remainder and attached to the engine. There is room in the engine for stowing away two or three extra lengths of hose, which, on an extraordinary occasion can be joined to the great length if required; but a reel of sufficient dimensions, to carry hose enough for ordinary purposes, can be obtained without inconveniently extending the shape, or injuring the appearance of the engine. Yours respectfully, WM. BADDELEY.

Fig. 2.

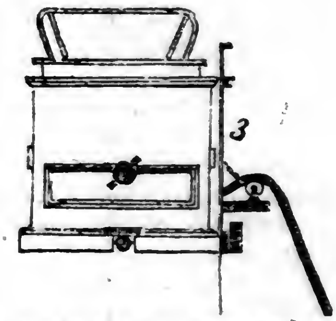
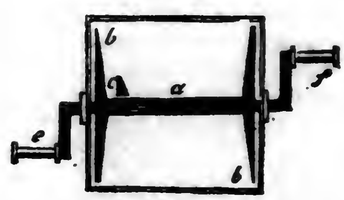


Fig. 4.



ITEMS,

The Detroit Journal says, that the acting Commissioner of the Detroit and St. Joseph Railroad advertises for 600 laborers, to whom liberal wages will be paid. They are to be employed on the part of the road between this city and Ann Arbor.

THE CONEWAGO.

It has already been stated, that the Harrisburg and Lancaster Railroad, is passable by locomotive power, the whole distance, excepting about 2½ miles. The journey between Harrisburg and Philadelphia is now made in about 10 hours, allowing of frequent stoppages, and without occasioning weariness.

There is one point on this road worth a day's ride to see; it is where the track crosses the Conewago river. In coming down, the road winds along the Conewago hills, presenting scenes of wild beauty rarely met. The track is here very far above the level of the stream, and as the land commences sloping, the earth is thrown up for the road, and when the abutments of the bridge are reached, passengers look down the wild ravine, hundreds of feet below—the long train, just resting on the verge of the fearful precipice—makes the dizzy gazer feel as if he was about to topple down the fearful height. At the bridge, tall hickory trees tower up from below, but do not approach the upward distance of the bridge; while the stream dashing and foaming over its bed of rocks, scarcely sends upwards to such a height, the noise of its course. There may be other railroads as much elevated, but we have seen none that presented so much wildness, and strongly marked scenery, as does the Harrisburg and Lancaster Railroad at that height.—[U. S. Gazette, May 30.]

From the Journal of the Franklin Institute.

IMPROVEMENT ON THE WING GUDGEON.

Sir—My attention was drawn a few days ago, to one of my water wheel (wing) Gudgeons. From some cause or other the neck of one got twisted off, and in looking to it, I thought I could make an improvement upon it. If you think it worth the trouble, and I am sure it will, you can publish it in your valuable work.—What I claim is an additional neck, exactly on the opposite side of the common wing gudgeon. It can be put into the shaft without the least inconvenience, and when the outer one is worn, or broken off, it can be turned and then you have a new one. This will save a great deal of time, particularly in establishments distant from a furnace, and nineteen-twentieths of the cost as the additional neck, when made in the first instance, will not be fifty cents. Yours, &c.

Virginia Mills, Buckingham Co., Va. Edward Sims.

The following statement should teach a salutary lesson. The changes of a day are often wonderful.

Reverse of Fortune.—A subscription has been opened at Paris for the benefit of Richard Lenoir, once, it is stated, the first manufacturer in France, now an old man of 74, ill and destitute. He once possessed forty manufactories in different parts of France, and employed 10,648 workmen. "My property," he says, in his memoirs, the first volume of which has been lately published, "was, on the 22d of April, 1814, about eight millions of francs (or near £320,000.) "On the 24th I was a ruined man." The only cause of this reverse, he states to have been the sudden suppression of the duties on cotton by an ordonnance of that date made by the Count d'Artois, since Charles X., then Lieutenant General.—[London Mechanics' Mag.]

From the New-York Mechanics' Magazine.

MICROSCOPIC CHEMISTRY.

An important, but simple, arrangement of lenses, for the purpose of observing the phenomena of chemical action, has late been brought into use, which will be found, in the hands of chemists, to develope interesting facts in the process of analysis.

It will open a new and boundless field for enquiry.

Since this useful Microscope has been successfully applied a Micrometer has been added for measuring the angles of the minutest crystals.

A work has recently appeared on this subject in Paris, from M. Raspail, entitled, "*Nouvel Systeme de Chimic organique fonde sur des methodes nouvelles d'observation,*" which should be in the possesion of all chemists. The observations made with this instrument may, and undoubtedly will, lead to the discovery of unknown laws of chemical arrangement between the element of fluids.—Remarkable changes are observable during the process of chrystalization; and, in the arrangement of molecules of coloring matter, the phenomena are very curious. Very curious results are also perceived on the application of the galvanic pile to chemical substances under this Microscope. The experiments which we have noticed on the arrangement of the positive and negative veins of the battery to a drop of fluid exhibited highly pleasing effects. L. D. C.

Ancient Colors.—In the *Courier* Greek newspaper, No. 65 of the date of the 7th of February, an interesting account is given of some archicological researches, recently carried on with much success at Athens. Amongst other discoveries two old paintings have been found in the Propylæa, fragments of the colors of which have been handed down to the chemist Landerer, for the purpose of investigation. As it is stated, however, that these painting are on windows it seems doubtful, though the Greek *Courier* speaks of them as ancient, whether they in reality belong to a higher antiquity than that of the middle ages, in which it is well known that the painters of the Byzantine school, mantained a high reputation all over Europe, which in our own days some German cities have made an attempt to revive. Should this be the case, no fresh information as to the composition of colors can be expected from their analysis; but if they actually belong to classic antiquity, the investigation will lead to very interesting results.—[London Mechanics' Magazine.]

Preservation of Animal Substances.—M. Gannal, o Paris, has discovered that the substances most efficacious for the preservation of bodies deprived of life are the salts of alumina; and he recommends the acetate of alumina as, of all, the best adapted for this purpose. By means of this substance, a dead body may be preserved for a length of time as effectually as if embalmed in the manner of the ancient Egyptians, and at a very trifling expense. The aluminous fluid may be introduced by the aorta, or still better, by the caroted artery, and any disication produced may be counteracted by the simple agency of a layer of varnish. It is anticipated that this discovery, from its simple and economical nature, will produce an important change in all processes to which it is capable of being applied. The preservation of specimens of natural history for museums, may be henceforth effected with a great saving of labor and cost, and the study of anatomy which could not till now be carried on in summer, and even in winter was attended with serious risk of health, may be pursued in perfect safety and at all seasons of the year.—[London Mechanics' Magazine.]

Sheffield.—The entire consumption of coal in this town amounts annually to 515,000 tons, the whole of which is taken from collieries in the immediate vicinity of the town.—[Min. Jour.]

COATING WHICH PREVENTS THE FORMATION OF TUBERCULOUS EXCRESCENCES IN CASTING IRON PIPES USED AS CONDUITS FOR WATER.

The cast iron pipes which convey water to the city of Grenoble, became so obstructed by the formation of concretions of oxide of iron as to lessen the discharge of water to nearly one half in the course of seven years. This diminished diameter of the pipes appeared to remain afterwards, and for a considerable time stationary, but as no dependence could be placed upon this cessation of the cause of obstruction, it became a matter of great importance to devise the means of preventing its further progress.

M. M. Gruymard and Vicat, engineers en chef, propose an interior coating of hydraulic lime. Two years trial have satisfied them that hydraulic mortar of a suitable consistency and applied to the thickness of about $\frac{1}{16}$ of an inch is, of all easy applications, the cheapest and best. It adheres readily to cast iron and prevents all oxidation and consequent production of tubercules.—When the pipes are long, the mortar is applied with a maulkin or swab.—[Jour. de Pharm.]

NOTE ON RADIANT HEAT.—BY H. F. TALBOT, ESQ., F. R. S.

M. Melloni says (in the Number of this Journal for December last, vol. vii. p. 475,) that

"For a long time the immediate transmission of terrestrial radiant heat by transparent substances, both solid and liquid, has been denied, and the opinion has become prevalent that we see in experiments of this kind only an affect of the heat absorbed by the body submitted to the calorific radiation."

This "prevalent opinion" he has shown to be erroneous, but by experiments which are too delicate to be repeated with facility. As a popular illustration of the fact, therefore, seems to be wanted, I subjoin the following rude but convincing experiment.

Let a poker be heated bright red hot, and having thrown open a window, approach the poker quickly to the *outside* of a pane, and the hand to the *inside*. A strong heat is felt at the instant, which ceases as soon as the poker is withdrawn, and may be again renewed, and made to cease as quickly as before. Now, every body knows that if a piece of glass is so much warmed as to convey this impression of heat to the hand, it will retain some part of that heat for a minute or more; but in this experiment the heat vanishes in a moment. It is not, therefore, heated glass which we feel, but heat which has come through the glass, in a free or radiant state.—[L. & E. Phil. Mag. March.]

ON THE SYMMETRIZING POWER OF THE EYE.—BY THE REV J. G. MACIVAR, A. M.

Let the surface of a glass mirror be sprinkled over with some powder, as, for instance, with flower from a dredging-box. This done, on looking perpendicularly down upon the reflecting surface at the distance of distinct vision from it (unless the eye be too long-sighted,) the powder will appear, not irregularly scattered, as it really is, but symmetrically distributed in two systems of beautiful radiations, having the pupils of the eyes for their centres.

The phænomenon is sufficiently remarkable to strike even those who are not otherwise curious in such matters. It may be observed, however, that as every eye cannot catch it at once, it is better to commence by using one eye only, as this gives only one system of radiations, which, being more simple, is more easily observed. If this phænomenon has not been already attended to (and I do not recollect to have seen it noticed anywhere,) it is, I think, well worthy of investigation. Some facts are, indeed, immediately obvious respecting it. Thus, as to the region in which the physical part of the phænomenon takes place, it plainly appears that it is not either the humors or retina, as is generally supposed in reference to other phænomena of the same order, but a more deeply seated part of the apparatus of vision. For if it were any of these anterior parts, or even the retina itself, the centre of the radiant system would certainly change its place when the eye was made to wander over the mirror. In point of fact, however, that centre does not change place except when the whole head is moved, in which case it does so proportionally.

I ascribe the phænomenon to a peculiar mode of action in the nervous part of the apparatus of vision, proper to it as an elastic tissue, in virtue of which it tends, like the tissues and media experimented on by Chladni, Savar, Faraday, and others. and doubtless all elastic tissues and media, to distribute all motions impressed upon it in symmetrical systems; a view of the matter having very interesting bearings upon the principles of taste,—during the investigation of which it was that this experiment first occurred to me,—and one calculated to explain several seemingly unaccountable phænomena as to the distribution of sensibility in the retina.—[L. & E. Phil. Mag. Jour. Sci.]

Johnfield by Dundee, Oct. 14.

From the London Mechanics' Magazine.

COWELL'S WINDOW SASH SUSPENDERS.

Sir,—In your number of Saturday last, I was much pleased to find that Mr. Cowell's improvement in window sashes has been introduced to your notice.

On the announcement of his plan, I had all the windows of my residence here, as well as those of a house in the city, fitted up on his principle, and am so well satisfied, that I wish publicly to bear testimony to its utility; the expense, as you state, is a mere trifle, but the importance of the object it embraces is very great, that of saving human life.

I will only further observe, that my female servant, after shifting them once or twice, manages them with the greatest ease and facility. I mention this, because some of my friends have imagined it to be a much more formidable undertaking for a female than it really is.

I am, Sir, yours respectfully,

J. W. Cox.

9, Gibson-square, Islington, 29th March, 1837.

DYNAMOMETRIC CHECK.—A committee of the French Institute, composed of Messieurs Arago, Dulong, and Poncelet, has gone through a series of experiments on the "dynamometric (or power measuring) check," an instrument invented by Prony, and lately improved by M. de Saint Leger, mining engineer at Rouen, for the purpose of measuring with accuracy the power of steam-engines and the quantity of fuel they consume. A large party of members of the Institute and the Chamber of Deputies, of professors, engineers, &c. was present at the investigation, which took place on the 10th of March at the machine manufactory of M. Pauweis at Paris. The object of the experiments was to ascertain the practical exactness of the apparatus, and for this purpose a steam-engine of twelve horse power of M. Pauweis manufacture was made use of. The result appeared to be perfectly satisfactory, and the scientific world now waits, with some interest. the report of the committee of the Institute. This new invention may, perhaps, supply M. Arago with less disputable grounds for claiming for his countrymen a share in the honor of improving the steam-engine, than he has been able to supply in his two disingenerously national essays on the subject in the French *Annuaire* for 1828 and 1837.—[London Mechanics' Mag.]

From the New-York Mechanics' Magazine

GENTLEMEN—In your last number, I was much pleased with an account, and engraving of the new and much talked of Boiler of Mr Bennett. Can you inform me when the public will be made acquainted with the facts in relation to the experiment which has been so long in progress in this city? If I recollect, the boat was to have been long since completed. *Rumor*—a *famous tattler*, I am well aware, and not to be credited—has reported a failure; Is it so? Please answer this question in your next, and oblige one who is always willing to defer judgement on new inventions, until *fairly tested* by their *friends*, and not their *enemies*, and idle gossips.

A CONSTANT READER.

"A constant reader" evinces the true spirit—a spirit of kindness and liberality, which every intelligent and reasonable reader will entertain towards such men as MR. BENNET and MR. DAVENPORT. It is not to be supposed that great and important improvements in the Steam Boiler and Engine can be *perfected* by one experiment. If Mr. Bennet succeeds in his efforts, he will do infinitely more to benefit *others*, than *himself*; however great may be *his* reward, the community will derive the greatest benefit from his labors.

This argument does not, unfortunately, weigh a feather with such *patriots* as would rather have their *prophecies* of *failure* verified, than that the greatest improvements of the age should be perfected. We will endeavor to give some information in our next number, in relation to this matter.

GLASS ROAD.—Among the novelties announced for the approaching season at Tivoli, the Parisian Vauxhall, is a Glass-road, on which passengers are to travel, at a rate which would carry them over as much space in three minutes as on ordinary roads they could travel in an hour. The invention is probably a first cousin to the Russian mountains, so popular at the same gardens some years ago.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

XXV. AN ELEMENTARY ILLUSTRATION OF THE PRINCIPLE OF TENSION AND THE RESISTANCE OF BODIES TO BEING TORN ASUNDER IN THE DIRECTION OF THEIR LENGTH. BY THE LATE T. TREDGOLD, M. INST. C. E.

Writers on mechanics have usually stated that the resistance which a body offers to being torn asunder in the direction of its length is proportional to the area of its section, but without showing that there are certain conditions necessary to obtain results in proportion. The object of this paper is to show in a plain and simple manner, the conditions necessary to render the resistance proportional to the area, and that there are few instances where the rule will be found true in practice.

If a weight be suspended by a small filament or thread of any species of matter, there can be no doubt that the strain at any point is equal to the weight suspended by the section at that point; and when the weight is sufficient to tear the filament as under such weight may be considered the measure of its cohesion.

Fig. 1.

Fig. 2.

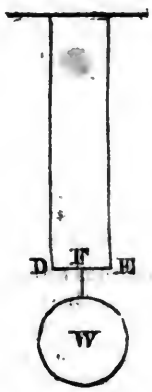


Fig. 1. Thus the weight W may be considered the measure of the cohesion of a filament at C; neglecting the weight of the portion C B of the filament for the sake of simplifying the reasoning.

Let us now suppose that two threads of exactly equal strength are applied at a given distance apart, to support a weight.

Fig. 2. Thus the weight W may be supported by two threads or filaments by means of a bar D E.

The filaments in this case being supposed to be of equal strength it is obvious that the stress on them ought to be equal, otherwise only that one which has the greatest stress on it will bear its proporion of the breaking weight.

And in order that the stress on both filaments may be epual, it is evident that the point F, from which the weight is suspended, should be exactly in the middle between the filaments. For if the point F be nearer to the filament E than to D, then E will be most strained, and consequently break before the other.

The proportion of the strain is easily found by the properties of the lever. Call the force necessary to pull one of the filaments asunder P, and we have,

$$DF : DE :: P : W; \text{ whence } \frac{DE \times P}{DF} = W.$$

This is the greatest weight the two filaments will support, because when the weight pulls one apart the other will break of course. But if both filaments were equally strained the equation would be $2P = W$, and this can happen only when $DE = 2DF$, or when F bisects E D.

If the point F be only one sixth out of the centre of the bar then $\frac{6 \times P}{4} = 1\frac{1}{2}P = W$. Hence, the filament A D will be exerting only half its power when B E breaks.

Even in this stage of the inquiry we can see how important it is that the links of the chains should be formed so as to have the centre of tension in the centre between the sides of the link. But when we have to consider the extension of the material, as well as the difference of stress, the variation will be found more considerable.

The extension of a substance is nearly, if not accurately, as the strain upon it.

Fig. 3. Let a body be suspended by a pin at R, and suspend a weight by another pin at S, so that a line drawn through the supporting points may not be in the middle of the width A B; but nearer to B than A.

Here the solid parts below the line B A perform the same office as the lever or bar, in fig. 2, and the strain will be greater at B than at A, and the extension will also be greater, and in the same proportion as the strain; and in consequence of the lengthening of the side B, the bar will become curved.

Fig. 3.

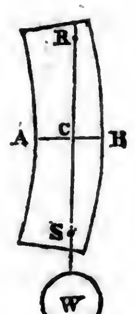


Fig. 4.

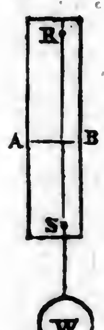
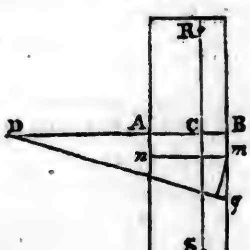


Fig. 4. Represents the curved state of the bar. The curvature it acquires will be such that the resistance of the part A C is equal to the resistance of the part C B; and till this equilibrium of resistance takes place, the bar will continue to curve.

Fig. 5.



The distance of the neutral point may be found by different methods, but a diagram on the bar will best illustrate this point. Let Bm. and An, Fig. 5, be two equal portions of the surface of the bar in its natural state, and Pg, Ae, the length of the same portions where the bar is strained by the weight W. The lines drawn through A B, and eg, must meet in a point wherever the stress on the parts is not equal; and the point thus determined is called the neutral point.

To find the neutral point put D C, its distance from the direction of the straining force, equal z; and D B, its distance from the extended surface of the bar equal a; make $CB = y$, and $AC = x$.

Since the extension is proportional to the strain, we shall have,

$$a : \overline{z - x} :: f : \frac{f(z-x)}{a} =$$

the force of a filament at the distance x from C; its force at B being f. And suppose the section to be a rectangle of the breadth b; we have $\frac{fb(z-x)\dot{x}}{a}$ = the fluxion of the force of any filament $b\dot{x}$; and its effect is as the leverage x, therefore the fluent of $\frac{fb(z-x)x\dot{x}}{a}$ = the resistance of the part AC of the bar, or $\frac{fbx^2(3z-2x)}{6a}$ = the resistance of A C, In like manner it will be found that the resistance of BC, is $\frac{fby^2(3z+2y)}{6a}$.

Now, in order that there may be an equilibrium of resistance, we must have

$$\frac{fby^2(3z+2y)}{6a} = \frac{fbx^2(3z-2x)}{6a}.$$

or,

$$y^2(3z+2y) = x^2(3z-2x).$$

Whence we find the distance of the neutral axis,

$$z = \frac{2(x^3+y^3)}{3(x^2-y^2)}.$$

If d be the whole depth A B, then $x = d - y$ and,

$$z = \frac{2(d^2-3dy+3y^2)}{3(d-2y)}.$$

Consequently $a = z + y = \frac{2d^2-3dy}{3(d-2y)}$ = the distance of the neutral axis from the point B.

The distance of the neutral point being found, the solution becomes easy. Thus, let f be the cohesive force of a square inch, d = the depth, b = the breadth, and a = the distance of the neutral axis from the extended side.

The force of a filament bd will be fbd, at the extended side; and its force in any other part will be,

$$a : a - d :: fbd : \frac{fb(a-d)d}{a}.$$

The fluent of $\frac{fb(a-d)\dot{d}}{a}$ is,

$\frac{f\,b\,d\,(2\,a - d)}{2\,a} = W =$ the weight the bar will support.

But we found that $a = \frac{2\,d^2 - 3\,d\,y}{3\,(d - 2\,y)}$; hence substituting this value of a, we have,

$$\frac{f\,b\,d^2}{4\,d - 6\,y} = W.$$

That is, a bar strained in the direction of its length, the weight it will support is equal to the breadth multiplied by the square of the depth, and by the cohesion of a square inch in lbs.; divided by four times, the depth added to six times the distance of the direction of the straining force from the nearest side of the bar; the quotient thus obtained expresses the weight it would support in lbs.; and the dimensions are all supposed to be taken in inches.

If the distance of the direction of the straining force be half the depth, then

$$y = \tfrac{1}{2}\,d \text{ and } \frac{f\,b\,d}{4\,d - 6\,y} = f\,b\,d = W.$$

But if $y = \frac{1}{3}\,d$, then $\frac{f\,b\,d^2}{4\,d - 6\,y} = \frac{f\,b\,d}{2} = W$; which shows that by this variation of the direction of the straining force, half the strength of the bar is lost.

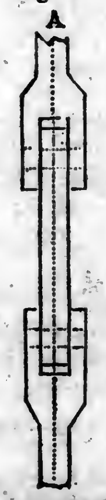
In the same manner the investigation may be extended to other forms, but the subject having been already treated by a different process of reasoning, and also by a different notation, in the second edition of my book on the Strength of Iron, I will not proceed further with analysis, but confine myself to a few practical conclusions.

In making a joint to resist tension, the surface in contact should be so formed as to render it certain that the direction of the tensile force may be exactly, or at least very nearly, in the centre of the bars that have to resist it.

In all the calculations of the magnitude of bars, &c., to resist tension, the greatest possible variation in the direction of the straining force should be calculated upon, and the dimensions determined accordingly.

Fig. 6.

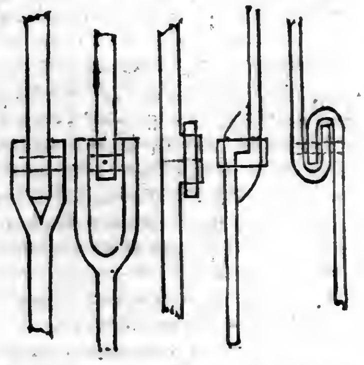
Fig. 7.



If the connections of a bar, to resist tension, be made as in fig. 6, it is very difficult to get them fitted so perfectly as to cause the direction of the tensile force to be in the centre of the bar.

A connection by a piece in the middle, as fig. 7, is more certain to effect the object of limiting the variation of the direction of the standing force, as will be obvious from the figure, and the joint should be fitted so as to bear at A the centre of the direction.

Figs. 8. 9. 10. 11. 12.



The like remarks apply to joints in long ties, joints of the forms shown in fig. 8 and 9, are very common, and very good forms for a connecting joint.

I have, however, not unfrequently seen joints in ties formed as in figs. 10, 11, 12, where the line of strain is at or beyond the side of the bar, and such a tie would obviously bend till the strain on its parts would become very unequal.

The same conclusions are obtained by considering the forces to be pressive, instead of tensile, with the exception that the strain increases the curvature when a curved bar is compressed, while it diminishes it when the bar is extended. Hence it is of still greater importance to attend to the variation from the centre of magnitude of the resisting body in cases where it is to sustain pressure.

This difficult subject, for so it has been considered by an eminent authority, whom I shall presently quote, is capable of an easy popular illustration with regard to pressure.

When a pressure is on the centre of the block which supports it, and the block is a material of equal texture, then all the parts must offer an equal resistance to the pressure, there being no reason why one part in the bounding surface of the block should take a greater or less strain, all being similarly affected.

But if the pressure be nearer to one side of the block than the other, the resistance becomes obviously unequal. If an elastic body be employed in the experiment, the inequality of compression is decidedly shown; but what body is there which has not some degree of elasticity? or what is worse, allows of compression without restoration of figure when the pressure is removed?

The consequence of a pressure being at a distance from the centre of the supporting surface does not simply depend on the distance, but also on the degree of compression it produces, for the form of the support, whether it be a column, a pillar, or a wall, will alter till there is an equal resistance on each side of the line of pressure, if it does not totally fail.

These considerations will explain many circumstances which occur in practice, where walls, piers, and arches undergo changes of form, which have always been familiar to practical men under the name of settlements.

The first person who remarked the deficiency of ordinary theories in regard to inequality of resistance was Dr. Robison, in his article on the strength of materials; he was more conversant with theory than practice, but his remarks have some interest.— Speaking of Euler's theory of columns, he says, "It leads to the greatest mistakes, and "has rendered the whole false and useless. "It would be just if the column were of ma"terials which are incompressible. But it is "evident, from what has been said above, "that by the compression of the parts, the "real fulcrum of the lever shifts away from "the point C (fig. 5,) so much the more as "the compression is greater. In the great "compressions of loaded columes, and the "almost unmeasurable compressions of the "truss beams in the centres of bridges, and "other cases of chief importance, the fulcrum "is shifted far over towards (D,) so that very "few fibres resist the fracture by their co"hesion; and these few have a very feeble "energy or momentum, on acconnt of the "short arm of the lever by which they act. "This is a most important consideration in "carpentry, yet it makes no element of Eu"ler's theory. It will now be asked (he "continues) what shall be substituted in "place of this erroneous theory? what is "the true proportion of the strength of col"umns? We acknowledge our inability to "give a satisfactory answer. Such can be "obtained only by a previous knowledge of "the proportion between the extensions and "compressions produced by equal forces, by "the knowledge of the absolute compres"sions producible by a given force, and by a "knowledge of the degree of that derange"ment of parts which is termed crippling. "These circumstances are but imperfectly "known to us, and their lies before us a wide "field of experimental inquiry."

Such was Dr. Robison's view of the subject, but the question did not long remain in that state. Our celebrated countryman, Dr. Thomas Young, soon discovered the hroper mode of investigation, which was published in 1807, and yet, strange as it may peem, the popular writers on mechanics in shis country, as well as on the continent, either have not seen, or do not comprehend, the brief but elegant demonstration Dr. Young has given. We can attribute it only to the difficulty of following the inquiries of that able philosopher without a most extensive knowledge of mathematics and of nature.

From the Journal of the American Institute.

CAPTAIN CRAM'S PILE-DRIVING AND SAWING MACHINE.

It would greatly surprise our fellow citizens, if one half of the benefits which our Institute has conferred could be traced out, and presented to their view. We think they would experience a fresh gratification that their patronage and favor, which is the vital principle of its existence, has been bestowed upon it. By means of the American Institute, Capt. Cram, one of its ingenious members was introduced and recommended to the Commissioners of the New-Orleans and Nashville Railroad, as mentioned in a former number. It was necessary for them to lay their course through swamps and low grounds in many instances heavily timbered.

The following, from the New-Orleans *Advertiser*, of January last, will show the opinion in that quarter of the benefits of invention, and the mechanical arts, in their application to this undertaking. When Capt. Cram was introduced to the commissioners, he was out of employ, and his means of support for himself and family almost exhausted. He has since become independent, and he has benefited his employers hundreds of thousands, if not millions of dollars. We have frequently heard him spoken of as having produced a new era in southern internal improvement.

Below is the extract from the publication referred to.

"We are indebted to James W. Breedlove, Esq., for the very interesting and descriptive letter that follows, obligingly copied by him for our use, as he states it to have come into his hands by accident. As we have ever been willing to make our columns subservient to the promotion of works tending to benefit and develope the resources of our country, by laying before the public our own views and opinions, or giving publicity to the apt suggestions of others conversant with the subjects which they undertook to explain or discuss, we cannot now hesitate in laying before our readers the clear and lucid views taken by this writer; feeling satisfied that any thing having a bearing on a matter of such vital importance as the New-Orleans and Nashville Railroad, will be perused by them with avidity, and weighed with proper deliberation."

New-York Statistical Society.—A statistical society has been recently incorporated by the Legislature of the State for the city of New-York. Its capital stock is fifty thousand dollars, in shares of two hundred and fifty dollars each; the society to commence operations when the whole sum shall have been subscribed and five thousand dollars paid in. It may hold real estate convenient for the transaction of its business, provided the income does not exceed five thousand dollars.

The society is modelled upon the plan of that of London, incorporated in 1834.

All opinions are excluded—facts only being its object, and as far as possible, those that can be arranged in a numerical and tabular form. The subject was divided by the British Association at Cambridge, into 1. Economical—2. Political—3. Medical—and 4. Moral and Intellectual Statistics. The class of

Economical Statistics comprehends, 1st the statistics of the natural productions and the agriculture of nations; 2ndly, of manufactures; 3dly, of commerce and currency; 4thly, of the distribution of wealth, or all facts relating to rent, wages, profits, etc.

Political Statistics furnish three subdivisions, 1st, the facts relating to the elements of political institutions, the number of electors, jurors, etc.; 2dly, legal statistics; 3dly, the statistics of finance and of national expenditure, and of civil and military establishments.

Medical Statistics, strictly so called, will require at least two subdivisions, and the great subject of population, although it might be classed elsewhere, yet touches medical statistics on so many points, that it would be placed most conveniently, perhaps in this division, and would constitute a third subdivision.

Moral and Intellectual Statistics comprehend, 1st, the statistics of literature; 2dly, of education; 3dly, of religious instruction and ecclesiastical institutions; 4thly, of crime. Although fourteen subdivisions have now been enumerated, it is probable more will be required.

It will, of course, be one prominent object of the society to form a statistical library, as rapidly as its funds will admit.

The gentlemen incorporated by the New-York act, are James Tallmadge, James M. Matthews, Edwin Williams, Talman J. Waters, William Minot Mitchell, Samuel Cowdrey, and their associates, and the board of trust, for the present season, is composed of the same gentlemen, with the addition of Livingston Livingston, George Bacon, Benjamin D. Silliman, John W. Francis, Timothy Dewey, Reuben Ellis, and Jonathan Amory, with power to perpetuate the succession.

The subject of statistical societies for the United States, was recommended in this Journal, Vol. xxxi. p. 186, by Mr. Sanderson, as the representative of the Statistical Society of Paris, with which we have interchanged publications and correspondence ever since its institution. Although from the pressure of other duties we have been obliged to decline taking an active part in this subject, we are much gratified to find that it has been brought forward under the best auspices. The subject is one of extreme importance to the United States, in every view that can be taken of it—political, social, moral, economical, commercial: accurate facts, digested and arranged, so that the proper deductions shall of course flow from them, are no where so much needed as in the United States, because we are still in the forming stage of society—because our interests are immensely diversified, and because in this republic, beyond any nation that exists, or that ever did exist—man, in high intelligence, is in a state of the greatest activity, with the most numerous and powerful excitements and with the feeblest restraints. Political economy must be founded wholly upon statistics, and there is no way to obtain correct results but by a patient collection of facts.

Our abled statistical writers, Seybert and Pitkin, would have derived immense advantages from the labors of such a society, and we hope to see its operations and influence become co-extensive with the nation. It is obvious that the subject admits, on this occasion, of cogent and ample illustration, from which we are precluded by the want of time and space.

Valuable Invention.—It is remarkable that an invention far more valuable to all who travel upon the seas, lakes, and rivers of this great commercial country, and more important, on the score of humanity, than any other devised by human ingenuity, should remain in comparative oblivion and neglect. We allude to that beautiful preparation of *pulverized cork*, for seamen's and passengers' mattrasses and beds. Will it be believed that a mattrass made of this material, weighing only twenty-five pounds cannot be sunk by the weight of seven men? and that one or two persons might float on it in the midst of the ocean, with as great security from drowning, as if he were on board a ship? Yet such is a fact, as demonstrated by experiment. The beds, cushions, &c., made of this preparation of cork, are more elastic, soft and comfortable than those of the best hair, and have the superior advantage of never becoming matted. Every ship and steamboat should immediately substitute them for all others, and even passengers going to sea should purchase one.—[New Era.]

Animal Electricity; by MM. Linari and Matteucci.—The five helices employed by M. Linari, contained five hundred and seventy-seven metres of copper wire. Two had the ordinary form; the three remaining were composed of the wire wound spirally in a plane, and had a square perimeter. Through one of these helices was passed a cylinder of iron, 0m 635 long, and 0m 31 in diameter. This system of helices was connected and terminated by two plates of silver, provided each with an insolating handle. The circuit was interrupted by cutting the wire between the last helix and one of the plates of silver, in order to insert the extremities of the wire into a vessel of mercury and thus amalgamate them.

The experiment was performed as follows: the torpedo wiped dry, was placed on a plate of glass, with one of the pieces of silver upon his back and the other on his belly. The animal was then irritated by striking him with one of the plates on his tail and gills, and was thus induced to discharge himself. After several trials, M. Linari succeeded in obtaining a spark, which appeared between the mercury and the wire. By touching together the amalgamated wires out of the mercury, he succeeded in obtaining a succession of brilliant sparks. He observed no difference in the capabilities of torpedoes of different sizes to produce this result. A small one four inches in diameter afforded a long succession of bright sparks.

The decomposition of acidulated water, and a durable magnetization of a steel needle were invariably obtained by M. Linari.

M. Mateucci employed in his experiments similar apparatus to that of Linari, containing however only three hundred metres of wire, of which he made two double helices. One of these helices was 0m 44 in length, and had a diameter of 0m 05m; the other was 0m 72 metres in length, and 0m 03 in diameter, and was wound on a horse shoe. In the interior of the two helices was placed a cylindrical bar of soft iron. With this arrangement, completed as above described, Matteucci succeeded without fail in obtaining a bright spark. One of the helices wound on a horse shoe sufficed to produce the same successful result.

Matteucci attempted to obtain the electric spark by means of two plates of brass, with short wires attached and inserted into mercury. But, notwithstanding the employment of every means which could insure success, he failed in obtaining any effect except the shock. He therefore infers since the spark is not obtained with a very short wire, and on the contrary is easily obtained with the above described helices, that the spark is produced where the discharge ceases, in which case the current, *by induction*, adds to the primitive current.

He has also ascertained, by means of a delicate galvanometer, that the current passes from the back to the venter, and that the back may be considered the positive pole and the venter the negative.—The discharge is effected in the same manner by the two organs situated on the sides of the torpedo, and the current is produced in the same directions when one of the needles of the galvanometer touches the ventral part of the left organ and back part of the right, or inversely. The deviation in the galvanometer is augmented if the two needles of platinum are put in contact with two metallic plates placed on the two sides of the fish, instead of a direct application of the needles. A discharge can almost invariably be produced by forcibly curving the torpedo, making the venter the interior of the curve. A removal of the skin of the animal diminishes the deviation, but does not entirely prevent it. If the outer of the three nervous cords which proceed from the brain to the electric organs are cut, the electric discharge may still continue. It ceases immediately on cutting the intermediate one.

These experiments were tried with thirty-six individuals, which M. Matteucci obtained during a long residence at Cesenatico.—[L'Institut, No. 167. July, 1836.]

COMPLIMENT TO AMERICAN GENIUS.—Our mechanic Avery's simplified steam engine, exhibited in full and successful operation at the last New-York Fair, and since admirably applied to various mills in the interior is highly extolled by the learned Dr. Lardner, and is to be reported upon at the French Institute, by the illustrious astronomer Arago. What will they say of the total abandonment of fuel and steam in Davenport's Electro-magnectic Rotary machine ?—[N. Y. Star.]

FACTS *for consideration*, and they should cause serious reflection.—[Eds. Mechanics' Mag. Railroad Journal, and N. Y. Farmer.]

Eight years ago we had a United States Bank of $35,000,000 capital, *twenty million of specie* in the country, and a currency equal to any in the world.

The United States Bank has been vetoed, the deposites removed into the "pet banks," and now, with *eighty millions of specie* in the country, we have either no currency at all, or *one of the very worst in the world !*

Eight years ago a man could travel through the United States and Canada with bills of the United States Bank, and without having to pay *one* per cent discount.

Now, the pet and other bank bills are from *five* to *ten* per cent. discount, even in the States to which they belong.

Eight years ago, with twenty million of specie in the country, they were at par, and all the banks paid for their notes in specie. Now, none of the banks pay it, and one *hundred and ten dollars* of the best bank paper must be given for one hundred dollars in specie.

Eight years ago we had specie for change; now we have thousands of tickets called "*shin plasters*," or no change at all.

Eight years ago, business, commerce, and trade all went on smoothly and prosperously. Now, business is broken up, trade destroyed, and bankruptcy, distress, and poverty, staring people in the face.

Eight years ago, the expenses of Government were thirteen millions of dollars. Now, they are over thirty-two millions of dollars.

Agriculture, &c.

ROSE BUGS.—The best antidote against the rose bug, and the small yellow bug, that has yet come under my inspection, is *slacked lime* applied with a dredging box, while the fruits or plants are wet with dew. If the fruits or plants be wet with a weak solution of gum arabic previously to the application of lime, it will remain on them much longer, and no injury will be sustained by it. If applied to young cucumber plants, the seed leaves must be carefully turned up, wet, and the lime applied as aforesaid. The lime used has been nicely slacked with a little water, one year, for the purposes of the garden. Perhaps it would be equally as well if slacked immediately before its application.

It was found that if rose bugs while on plants be thoroughly wet with very strong soap suds, (one gill of strong soap to one quart of water) they soon die. This strength did not injure the plants on which it was tried. This experiment was made when the bugs were on the decline, and whether the mixture would have the same effect in the beginning of their race, while in their utmost vigor, or prevent from preying on the plants wet with it, further experiments may determine. It is needless to say any thing in this paper, as to the fertilizing power of this application or that of lime.—[Dr. R. Green, Mansfield, Mass.]

ENGRAFTING GRAPE VINES.—A friend of the editor says that he has succeeded in grafting foreign grapes on native stocks, and thinks that notices on that subject may be useful. In the N. E. Farmer, vol. vii. p. 329, are some directions relative to this improvement, which were, originally, communicated to John Prince, Esq. by Brig Gen. Armistead, from which the following are extracted:

"I picked out four *native* vines, [in the month of March] and headed them down as low as the turf, and after going through the common process of inserting the graft, I bound them with woolen yarn, and covered them with common grafting clay, and to make the process doubly sure, I cut large sods and enclosed the grafts completely, and covered them in this way about four inches, leaving two eyes exposed. The experiment proved the utility of thus preserving them from sun and air, for three out of four took, and on the head of the largest vine, I put two grafts, both of which survived, which made it equal as if all had taken. The result of the first year was, that the grafts averaged a growth of from nine to twelve feet. The second year they bore many bunches of grapes. The third year my mother wrote me that they had gathered upwards of two barrels from my four vines. The succeeding year the neighborhood was in part supplied, and from others following the example, no failure of fine fruit has, I believe, existed in that neighborhood."

We believe it is not yet too late to graft grape vines, and wild stocks to engraft on may be found in woods, &c., in many parts of the country.

From the New-York Farmer.

We commend to our readers the following communication. It is from the pen of a practical farmer of great experience—from one who has long practiced what he recommends, and profited thereby—we ask for it not only an attentive perusal by our patrons, but also an extensive *re-publication* by those Editors with whom we *exchange*. Of the writer we ask frequent communications of the same kind.

Messrs. Minor & Schaeffer—During a long life I have never witnessed a period wherein the necessity of agricultural improvement was so imperious as at present. In an extensive fertile country it is wonderful to behold the inhabitants importing their bread stuffs and other forage—and for no other reason but for lack of industrious and skillful cultivation—thus we see a little Seagirt Island three thousand miles distant supplying the people of a fertile continent with those productions which our farmers ought to produce to supply them. This demonstrates what may be done by the powerful machinery of industry, knowledge, and skill, united. On viewing our present condition, I feel a blush of shame for myself, and my country – every acre of our soil, with no more labor, might produce double its present yield if all was done perfectly right. I say unto you my brother farmers we must do better. Listen for a moment to the voice of more than sixty years experience. Many good periodical works on agriculture are now extant—buy some one of them,–plain common sense will direct us to those articles that apply to our business. The New-York Farmer is a work I have prefered—it contains generally much useful information for us. Industry must lead the way, for this will produce knowledge, and knowledge will produce skill—and these three sublime atributes if kept in exercise would soon renovate the condition of our country, and this not only ought—but must be done—or otherwise hunger and shame will await us. I have only time at present for one general remark. Infinitely mote may be done by contracting your cultivated acres and tilling them higher and to greater perfection. The time in arable and in grass culture should be short, say two years, or never exceed three ; use plenty of grass seed,—white clover is one of the best. If a life already protracted and health shall be sustained, I shall be happy to confer with you again.

THE OLD MAN.

AGRICULTURE.

One effect which it is supposed the present state of times will have, may be looked upon as decidedly advantageous, and that is now in the greater attention which it is probable will be given to agricultural pursuits. The fertile, uncultivated lands, with which portions of our country abound, have been too much overlooked, and we presume will be more carefully looked after. The life of a farmer has more attractions, by far, and more solid, substantial comforts than the multitude seem willing to concede Too many have, of late years, left its quiet and healthful pursuits, to crowd into the already over crowded cities ; forsaking with most perverted tastes, the green fields and fine atmosphere of the country, for the dust and noise, and confined air, that is found in streets and alleys. We think attention will be now strongly turned to the cultivation of the soil, by thousands whom the embarrassments of the times have deprived of employment and as a consequence, provisions of every kind, will be more abundant and cheaper. It is time the current should set the other way, and if the distress under which the whole country now suffers, has the tendency to divert labor into its more appropriate channels, we may find that even this affliction has not been without its advantage.—[U. S. Gazette.]

THE CROPS.—The coming season bids fair to be one of the most productive ever known. The agriculturists have been taught a useful lesson, by the experience of the past year, and there probably was never so much ground put under cultivation in the United States, at any one time, as there has been this spring. Our exchange papers from every quarter, brings us cheering accounts of the state of the crops, and all anticipate a rich harvest.—This is really good news. The past year has been one of dire disaster in almost every respect, and the scarcity and high price of provisions, has intensely aggravated the other evils ; but a couple of fruitful years will go far towards repairing all our losses.—[Buffalo Com. Adv.]

We are pleased to learn from almost every part of the country, that the wheat fields are in a very flourishing condition and bid fair to yield a good crop.—[Minors Journal, Pottsville, Pa.]

NEW METHOD OF PROPAGATING APPLE TREES.—A new plan for increasing plantatations of apple trees, has lately been carried into extensive practice by the horticulturits of Bohemia. Neither seeds nor grafting are required. The process is to take shoots from the choicest sorts, insert them in a potato, and plunge both into the ground, leaving but an inch or two of the shoot above the surface. The potato nourishes the shoot, while it pushes out roots, and the shoot gradually grows up and becomes a beautiful tree, bearing the best fruit without requiring to be grafted.

Whatever may be the success of the undertaking, its novelty is at least an inducement to give it a fair trial.

From the New-York Farmer.

ANIMAL MANURE,—NIGHT SOIL, &C.

NEW-YORK, May 12th, 1837.

Gentlemen—Agriculture is the source of the wealth of nations ; the most enlightened governments have always given it encouragement, knowing that the earth pays generously a man's labor ; therefore one is right to ask how it is that your country, which is productive enough to subsist, not only the American continent, but Europe also, is under the necessity of importing every year, so many thousand bushels of grain ? This is a state of things by no means creditable to the country—but the surprise is still greater when you come to consider the high price of the first necessaries of life ; especially of vegetables in your markets. The population of Paris and London are much larger than that of New-York, and yet the markets are more abundantly supplied with all those kinds of provisions, and at a much lower price. Is it the cause in the high price of, or rent paid for, land in the vicinity of New-York ? or is it in the carelessness of cultivation, want of management,or ignorance of the use of *cheap* and *powerful* manure ? The larger the city, the more abundant is the manure produced, *if it is well managed*—and properly attended to.

Allow me, Gentlemen to ask you what becomes of the cleaning of streets, and of the night soil ?

In what state is the first article given to the farmer, and at what rate ?

How do they manage in your city for the *second* article so much sought for in French, English, German, and Chinese husbandry ?

What kind of animal manure do they make use of here, beside the bone manure, so costly after all ?

Do they employ, or understand the value of, the manure known by the name of *Poudrette*, which is considered by all cultivators in Europe and China, as the most powerful manure used, when well prepared, by a *disinfecting* process, which *removes* the offensive effluvia of its unprepared state ?

If any of your readers will furnish you with a statement in relation to its use and management in this country, for my benefit, I shall take pleasure in furnishing you with some interesting facts in relation to its use in France and Germany, for the benefit of agriculturists in the vicinity of New-York, and other large cities of the United States.

I am sir, very respectfully,

B.

The subject of *Animal Manure* has attracted considerable attention of late. We some time since received the preceding communication from a scientific foreigner, which induced us to make enquiry on one of the important subjects to which he alludes, and in reply we have received from a valued correspondent, the following important communication. It contains useful information to many of our readers ; and will be the means, we hope, of inducing our correspondent B. to resume the subject in a way which may add another to our present means of improving the soil—a pursuit, in these trying times, to which *thousands* are resorting, who have heretofore viewed it as degrading. *Degrading! Agriculture* degrading? Who *is*, if the skilful cultivator of the soil is *not*, NATURES NOBLEMAN ? And he, who discovers a *new* or applies successfully any previously discovered, but *unapplied*, process of improving the soil, so as to cause "two blades of grass to grow where one only grew before," is entitled to more gratitude and consideration, from his countrymen, and the world at large, than the successful conqueror of an hundred battles—who conquers to oppress.

The pursuit of agriculture is becoming more justly appreciated—and this feeling will gain ground precisely in proportion to the introduction of improved modes of cultivation—it therefore becomes the imperative duty of every friend to the cause to give it the aid of his experience and observation.

We hope soon to be able to publish many interesting facts on the subject.

BOSTON, MAY, 1837.

D. K. MINOR,

DEAR SIR,—In answer to the inquiries in your late letter, I am happy to give you the best information which I can obtain.

"Night soil" is deemed one of the most powerful manures that can be used; and my own experience in its use, which has been considerable, confirms this opinion. It is much used in China, where it is mixed with marl; in this way freed from its offensive odor, and made an article of common traffic and distant transportation. By what process this is done I have no information. In Holland it is thrown into their large urine cisterns, where the urine of their cattle is preserved; and these mixed with rape cake (after the oil has been expressed) and other refuse substances, and carried out in the spring in a liquid state into the fields. In Paris it is dried in some way, and converted into a powder; and this powder, or "poudrette" as it is called, is very extensively used in the vegetable gardens round the city. In the neighborhood of London it is dried, in some way, and packed and transported as a powder. In this vicinity it has been extensively used; and is obtained and transported in a crude state in large covered and water-tight wagons. The city has a superintendent of privies. The citizens, who wish their vaults cleansed apply to him. He contracts with certain individuals at a certain rate per cubic foot. The city likewise contract with certain farmers to be ready with a wagon to receive the contents. The owner pays for the emptying; and I believe the farmer is either paid for the transportation, or has the manure delivered into his wagon free from all expense. The carts are not allowed to enter the city until after ten o'clock in the evening; and obliged to leave it before sunrise. The farmers pay their men something extra for this night labor, over their usual wages. The farmers deposite it in a shallow hole dug in the ground, and mix enough loam with it to absorb all the urine, and make it easy for them to handle it in the spring.

The farmers deem it excellent for grass grounds spread broadcast; and excellent for all vegetables, excepting potatoes, and particularly for vines, squashes, cucumbers, melons, &c., and especially for corn. The objection to its use for potatoes is, that it causes them to run too much to top; whether this is well founded or not I do not know. It has been said by some persons that its effects are very transient, but, as well as I can learn, this opinion is *without foundation*, and its efficacy is as durable as of any manure. Many persons advise to the free intermixture of quick lime with it. This will destroy its offensive qualities; but there is no doubt that, while it destroys the offensive odor, it *also* destroys its efficiency. This I believe is the effect of the intermixture of quick lime with any animal manures. In the country, where it was easy to get access to the back of the privy, I had a moveable shutter, and a large pile of loam always placed near, and during the season when frost and snow did not prevent, was accustomed to throw frequently among the manure enough of the loam to render the deposite inoffensive and absorb all the liquids. By this method I found no difficulty, whenever it was necessary, in removing the contents.

The facility of obtaining this manure in New-York must be immense. Its transportation by water, provided it can be removed in a desiccated state, to the shores of Long-Island, cannot be difficult; and indeed up the Hudson; but I do not know what plan to recommend, to put it into a portable state. I should be very glad to be informed; and you may command any farther information which I can give you.

Respectfully yours, H. COLMAN.

THE SEASON AND CROPS.—For about three weeks, the weather has been cold and wet. On Tuesday week there was frost, and on Monday the 29th inst. another severe one. The blossoms of the apple began to appear a week since, but have made but little progress since. Our gardens are very backward, and spring grain is not sufficiently advanced to warrant an opinion as to its promise. Wheat has improved very much since the rains set in, and there is now a fair prospect of full three fourths of a crop—at least in this vicinity. So far as we may judge by the newspaper accounts, this part of the State is as well advanced as any other. The season below the Highlands has not started vegetation much if any before ours, and the ice in Lake Erie has retarded it at the west considerably behind the usual period.—[Onondaga Standard, May 31.]

From the Journal of the American Institute.

HINTS ON THE CULTIVATION OF THE MULBERRY, WITH SOME GENERAL OBSERVATIONS ON THE PRODUCTION OF SILK, BY LEWIS TINELLI, DOCTOR OF CIVIL LAW IN THE UNIVERSITY OF PAVIA, AND FORMERLY PROPRIETOR AND DIRECTOR OF A FILATURE OF SILK IN LOMBARDY.

Mr. Tinelli adverts to the peculiar situation of the northern States, and the necessity of their providing a staple of export.—We advert to his remarks, not because they are new, but as the impartial suggestions of an intelligent foreigner, who has made America his country, and who looks upon our condition as it actually is.

"When," says he, "we look at the table of imports and exports of different merchandise in the ports of the United States, we are struck with the lamentable fact, that the northern States, with a widely extended and very fertile territory, are not only without any considerable staple of export, but even do not always produce enough for their own consumption.

"The example of the year just passed, is a proof of this assertion. Where, then, are the elements of prosperity for these States, and the foundation of their commercial wealth? Can they consist in the profits of that foreign commerce which is carried on at our various marts with all parts of the world, or in the present productions of the soil? Certainly not. The resources of foreign commerce are too subject to variation, to secure the permanent riches of a nation spread over so vast a surface, and possessing so immense a territory for cultivation. * * *

"Looking at the actual state of things, the real relations existing between the north and the south, and casting our views forward into the future, it might be allowable to doubt, whether the productions of the southern States will always serve to employ profitably the extended speculations of the north; and whether the northern States will not be obliged to seek in their own resources of agriculture, a supplement at least to the commerce in cotton, rice, and tobacco."

On the uses of the mulberry, we quote as follows:

"All the different parts of the mulberry are useful, and good for some purpose or rather. Its leaves form the only food that experience has found appropriate to nourish the silk worm (phalana bombyx of Linnæus.) The leaves of a second growth serve, at the close of autumn, as an excellent nourishment for cattle and sheep; it being understood, however, that the second gathering ought not to be made till the vegetation of the plant has entirely ceased, and the sap has began to descend from the branches. The body, and larger limbs, not only make excellent firewood, but may also be converted into boards, of a beautiful, yellowish color, and finely clouded, for the use of the cabinet maker; the fibrous epidermis of the young branches, that are often cut, either for the purpose of engrafting, or of pruning, and directing the shape of the tree, if macerated in lime and water, may be made into paper, that is extremely delicate and shining, and is properly called silk paper. The young mulberry trees take the most beautiful forms that it may please the hand of man to give them; and thus this plant, so rich in its produce, furnishes also an elegant ornament in parks, or gardens, and in the avenues to villas and country houses."

Frequent attempts have been made to find a substitute for the mulberry, as food for the silk worms, but the experiments have failed; many other plants have nourished them for a few days, after which it has caused their death, or affected them with distempers.

"Experience has not only shown that the silk worm has no other aliment proper to its nature than the mulberry leaf, but it is also ascertained to be extremely hurtful to this delicate insect to change the quality of the leaf, as inexperienced persons, in rearing them, are too apt to do. The cocoons produced by worms uniformly fed with the same kind of leaf, are always more beautiful, finer, richer in silk, and of a more delicate tissue."

With regard to the constituent elements, we extract:

"It is not doubtful, in my opinion, that silk is only an extract from the substances which nourish the insect that spins them, and upon the quality of the aliment depends the quality of the silk.—

This opinion seems to me to be supported by the observations on species of mulberry recently discovered by Professor Bafrau Delille, of Montpelier, in France, which he calls *morus nervosa*. It is said, in fact, that the transparent edges are formed by the extravasated gummy and resinous matter of which the silk is constituted, and that the worm that is fed with this sort of leaf gives a silk of finer quality and greater quantity. It has always been seen that an immense service could be rendered to the seropedic art, if we could ascertain, by an exact and thorough analysis, what is the actual composition of silk. Unhappily, this precise knowledge is yet wanting. Berthollet, Fourcroy, and Chaptal, have declared that silk has much analogy with the tissue of horn, and that by distillation, they have obtained from it carbonate of ammonia, and a large portion of oil. Roard, in his excellent Memoir, addressed to the National Institute at Paris, (see volume xxix. Decreusage des Soies,) on this subject, gives an analysis conformable to the observations of the three chemists above named. He demonstrates that the yellow silk contains:

"A. Of gum, 24 or 25 per cent.

"B. Of coloring matter, which is a resinous substance, nearly solid at 12 degrees of the centigrade thermometer, and entirely liquid at 30 degrees, its proportion is 55 to 60 per cent.

"C. Wax, which melts at between 75 and 80 degrees, is insoluble in water, and dissolves easily in the alkalies, or in soap.

"It appears the wax forms the exterior varnish of the silk; it is found in the yellow as well as the white, and forms 1-200 or 1-250 of their weight.

"D. A volatile oil, having a strong and disagreeable odor.—By itself, it resembles the essential oil of anise, or of any other vegetable matter. Brigman has also stated that silk is of an intermediate nature, between vegetable and animal, which corresponds with the qualities discovered by the other chemists."

As to the climate and soil best adapted to the mulberry, Mr. T. remarks as follows:

"Hills, are beyond doubt, the best situation for this tree. They are, so to speak, so many large *espaliers*, where the greatest brightness of the sun's rays is united with the influence of fresh air. Mulberries so situated give, if not the greatest quantity, certainly the best quality of leaves; above all, when the soil is moderately light, and tolerably moistened by exhalations from a neighboring lake or river. The small stones that are commonly mingled with the soil in such situations, are very useful in keeping the ground loose, and thus facilitating the growth of the roots, while reflecting the rays of the sun. They contribute to secure that degree of warmth which is essential to the formation of the sap in all young trees.

"The action and influence of the air easily penetrate into these light soils, spreading and developing the more fully the delicate principles of vegetation. Strong and clayey soils are much less fit for the mulberry. The strata of clay, by their hardness, obstruct the percolation of the rain drops, and cause an excessive wetness, occasionally very hurtful to the roots of this tree. Nevertheless, we may sometimes see superb plantations of the mulberry, in a luxuriant state of vegetation upon the great plains composed of alluvial land, or of the tertiary formation.

"It is certain, that in plains the growth of the mulberry is more rapid, and its leaves will be more abundant; but the worms nourished with such leaves, will give a silk that is less strong, coarser, and less in quantity. An exposure to the south, or to the east, is generally the best. The north and north-east winds are injurious to these trees; but the vicinity of lakes and rivers, is always a certain element of prosperity for mulberry plantations."

It seems to be admitted, that the various species of mulberry, if propagated by seed, do not give precisely the same kind of tree; engrafting is, therefore, resorted to by skilful culturists. Scarcely fifteen or twenty per cent. of the *morus multicaulis* seed preserve their characteristics.

The multiplication of the mulberry, by cuttings and by seed, we give at length:

"All species of mulberry may be multiplied by means of cuttings—taking the most vigorous shoots of one year's growth, cut in pieces of five or six inches in length. These cuttings are planted in a nursery-ground, which is well dug, and dressed with well prepared manure, at the distance of two feet from each other. The ground ought to be watered for fifteen or twenty days after the planting, and every possible care should be taken to guard the young plants from the heat of the sun, by means of straw or boards, with which a temporary covering should be made. It is also very necessary to give attention that the cuttings are taken from the trees when the sap is already in circulation, and vegetation is in full vigor. This method of multiplying the tree is, however, only followed in the smaller agricultural establishments.

"Besides that at least one half of the cuttings, which are planted in a nursery-ground, do not take root, and, in a few days become quite dried up and dead—it is a fact, that cuttings furnish always very feeble trees, that do not last long, even in soils that are humid, or often watered, where they prosper best. But the morus multicaulis, which abounds more in moisture, and has a softer wood, is more easily multiplied by cuttings. This is, indeed, the only means of propagating them, without changing their species. The trials made heretofore of this tree, are not of sufficient duration to ascertain whether the plants formed with cuttings will attain the same size. The seed of the mulberry ought to be taken from those trees that are in perfect health, neither too young nor too old, and let care be taken not to strip the tree of its leaves the same year. It is also a good plan to mix the seeds with fine sand, a little moist, about two hours before planting them.

"The ground in which they are sowed, should be of a light and sandy soil; and to be as much as possible permeable to the young roots; to the atmospheric gases; to rain and to warmth; it should be dug to the depth of eighteen inches. After the seeds are buried in the earth, it is necessary to press and beat the surface lightly. If the ground is rather dry, it ought to be watered frequently; but, above all, it is requisite often, and with the greatest care and gentleness, to stir up the earth, clearing it from all parasite plants, which would impede the growth of the young trees. This work requires considerable patience and can be best done by a careful and industrious woman. The best manure is ashes and sheep-dung, well dissolved.

"If the nursery-ground has been well attended to, during the first year, the little mulberry trees may be taken up, in order to be replanted, either in another nursery, in order to become large trees, or in the field, to make hedges of low stature. But if it is preferred to leave them longer than the spring, in order that they may gain greater strength, it is useful to cut these stems close off to the ground. The new growth will acquire additional vigor from this operation, and there will be obtained, the second year, a mulberry tree four or five feet high, and sometimes even more.

"I tried, about ten years since, the effect of sowing in one of my fields that was well cultivated, and of a good soil, the mulberry seed separately, one by one, in the very places where I desired to have a hedge-row, and also trees of full size. I took great care to keep the ground free from all sort of grass near the young trees as they sprung up, and to have the soil loosened often. The result surpassed my hopes. At the end of three years, my hedge was five feet high, and very rich in branches and leaves. Those of the plants that I desired to become large trees, commenced in the fifth year to afford me leaves, and they had already attained to a noble height. * * *

"The best manure is dung not too much decomposed, for these plantations; but care must be taken, that the dung does not come into actual contact with the roots, which should be entirely surrounded with good mould. Small pieces of wood or straw, the sweepings of a woollen factory, or woollen rags, and all such like materials, are excellent manure for all plantations of the mulberry. But *sheep* dung is the best of all, especially for cold lands. * * *

(To be continued.)

From the Genesee Farmer.

Stock in the Winter.—What is the expense of keeping stock through the Winter? is a question frequently asked, and the correct solution of which is of consequence to the farmer. I have paid some attention to the subject, and am willing to allow my opinion to be laid before your readers. My hay has been cut and secured in such a manner that its quantity could be estimated with tolerable accuracy, and the manner of its distribution rather more than guessed at. My horses have eat rather more than 2 tons each; oxen will eat about the same; cows a ton and a half; sheep require a ton to eight, or twelve ton to a hundred; and calves will make way with about half a ton each. This I am aware is more than has been usually allowed, but I am confident it will be found rather under than over the quantity required where hay alone is used, and it is desired to bring the stock through in good order. Farmers by the use of other fodder, such as corn-stalks, straw, &c., greatly reduce the quantity of hay fed, and where the materials are cut, a still further saving is effected. If horses are worked constantly during the winter, they must have at least thirty dollars worth of oats to a span, in addition to the hay. I am convinced that horses pay the least profit of any animal whatever in proportion to the cost of raising, and should be pleased to see sheep and cattle taking the place of those droves of straggling worthless colts that swarm on many farms. First rate horses will always command a good price; as the means of keeping at present are, ordinary horses are worse than nothing. Animals with us must be fed from the first of November to the middle of April or later, and those which are the most valuable in every respect should alone be selected by the farmer, as the subject of such expense. Let every one count the cost of his different animals, and determine for himself.

Advertisements.

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, JULY 1, 1837. [VOLUME VI.—No. 26.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JULY 1, 1837.

HIWASSE RAILROAD.—The following extract from a letter, dated Athens, Tenn., June 15th, furnishes renewed evidence of the spirit with which the people of the south and west, prosecute their works of Internal Improvement—we need not say how much pleasure such notices afford us, nor how deeply we regret the delay which is caused by the present depression of business, upon our own great works. The times *must mend*, and the works *must proceed*.

The 40 miles of the Hiwassee Railroad, extending from the Tennessee River to the Hiwassee at Calhoun, have been let out to good responsible contractors, at prices which ensure their completion, at a cost less than my estimate. The surveys have been extended to near Knoxville, a further distance of 30 miles, with a result equally as favorable as the portion let out.

☞ The *re-publication* of the "Transaction of the Institution of Civil Engineers," has caused delay in noticing several Railroad reports which have been received at different times. We shall endeavor to give them attention soon.

To the Editors of the Railroad Journal.

We give place to the following communication, in relation to "Aldrich's Locomotive for ascending inclined planes," without stationary power, to prevent any misapprehension from the imperfect notice of it in a recent number.

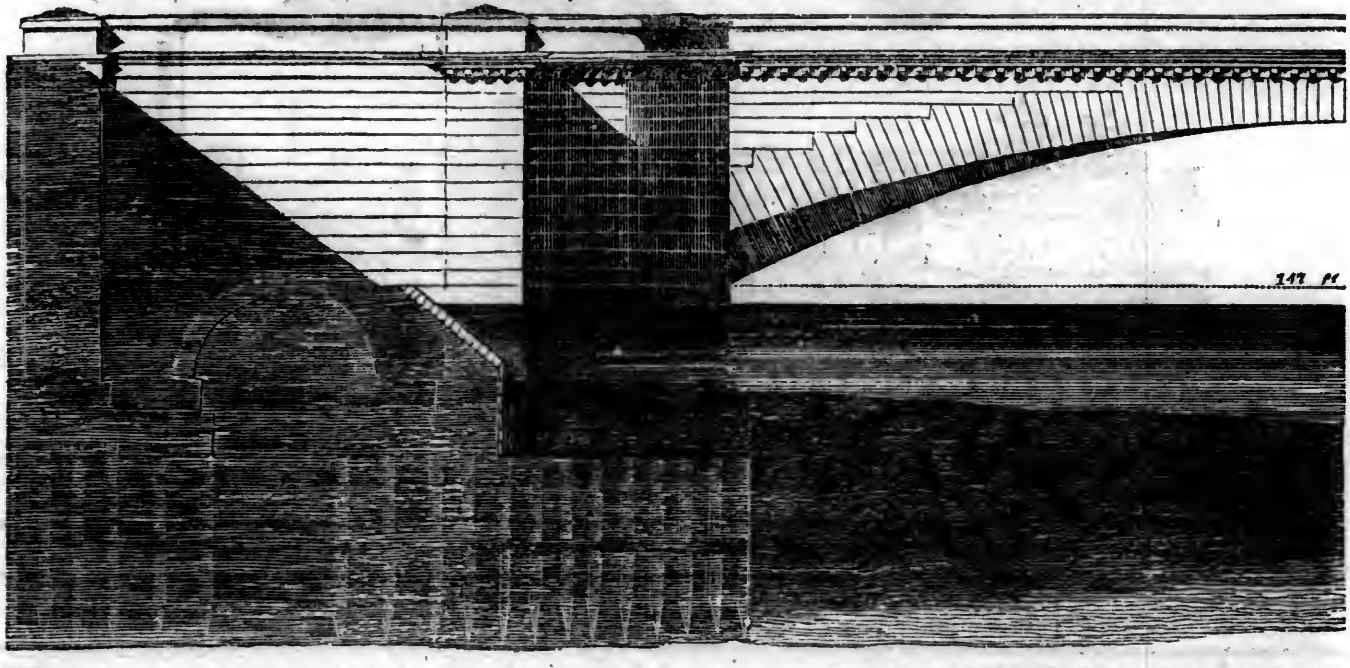
On my return to the city a few days since, I observed in your Magazine of June 8th, a notice of my model, or mode of ascending and descending inclined planes upon Railroads, with a Locomotive Engine. I had come to the conclusion to say no more about my improvements (in the manner of gazetting) until they were thoroughly tested upon a large scale. But as you have been kind enough to notice a model of mine, which is at the American Institute, which is a very imperfect one, it may have a bad, instead of a good effect. The model which you saw, does not by any means contain all my improvements; the bar in the centre of the axle of the driving wheels which you supposed to be for the purpose of regulating the velocity in descending, is no part of my improvements, it was placed there for the purpose of ascertaining the power requisite to overcome the gravity of loads upon different angles of inclination, running upon different sized wheels, the lever to which the power was applied, remaining the same on all the elevations. It is unnecessary for me at the present time, to go into a regular specification of my improvements, but I will merely state what they are intended to obviate, and what to overcome, in the present mode of constructing Railroads, it is intended in all cases to do away with stationary power, and in some cases to run up an inclination instead of running around.

It would in many cases, require more power and time to overcome the extra friction on the length of the curvature around an elevation, than it would to overcome the gravity upon the inclination, many have examined my late models, and think they will succeed, but the only way to settle such matters is, to test them upon a large scale, or put them into actual use, which I am in hopes soon to accomplish.

Respectfully,
your ob't. serv't.,
E. F. ALDRICH.

STATE IMPROVEMENTS.—The Ravenna Star announces that Governor Vance has subscribed *four hundred and fifty thousand dollars* on behalf of the State, to the stock of the Pennsylvania and Ohio Canal Company. The money is to be borrowed on the credit of the State. The counties of Portage and Trumbull are expected to invest their surplus in a loan to the State for this purpose. The Bank of Muskingum has loaned $50,000 to the contractors on the canal at Zanesville, until the State can procure funds to continue that work.—[Scioto, Ohio Tribunal.]

Plate 13. BRIDGE ERECTED OVER THE



XXVI. DETAILS OF THE CONSTRUCTION OF A STONE BRIDGE ERECTED OVER THE DORA RIPARIA, NEAR TURIN, BY CHEVALIER MOSCA, ENGINEER AND ARCHITECT TO THE KING OF SARDINIA, &C. &C. DRAWN UP AND COMMUNICATED BY MR. B ALBANO, A. INST. C. E.

This bridge which may be characterized as the boldest work of the kind, is erected within the suburbs of Turin, over the Dora Riparia, a river ordinarily shallow, but liable to heavy floods, during which it becomes extremely rapid, owing to the great declivity of its bed.

It consists of a single large arch of granite, (of which the elevation is shown in Plate XIII.*) resting on solid abutments of the same materials; its line of direction is in continuation of the axis of the main road which crosses the Alps from France, called the road of Italy, and it has an unvarying surface level throughout its own length.

The foundation of the abutments are laid upon piles headed with cross sills, on which rest the first courses of stone with offsets: over these are placed five other horizontal courses, from the uppermost of which the arch springs, being a segment of a circle, having a span of 147.63836 feet, and a versed sine of 18.04468 feet. These proportions, which correspond to an arc of 54° 56′ 45″ 26‴, render it, I believe, the flattest arch of this form yet constructed in Europe.

The lightness of appearance derived from the flatness of the arch is much increased by the introduction of two *ugnature*, or cornes de vaches, (as the French call them,) which rising from the third course above the springs of the principal arch, form a second one of a somewhat larger span, (as represented in the Plate,) tangential to the first at the intrados of the key-stone, and having a versed sine of 12.1391 feet.

The sides of the abutments are of a convex form, and thus acting towards their bases as cut-waters, give, in conjunction with the ugnature, a more free and open passage for the descent of the stream in time of floods, whilst their upper parts add elegance to the wings of the structure and increase the width of the approaches: these last are bounded on each side by an advanced body of wall adorned at the salient angle by a pilaster, and terminating at the other end on the banks of the river, thus making the total length of the bridge between these extreme points 300 feet.

The arch is composed of 93 wedges, of which 91, including the key-stone, are of equal thickness,—as seen in Plates XIII. and Fig. 1, XV., whilst the remaining two at the springs are larger; their thickness being determined by the radius which meets the upper or apparent arch at the point where it springs from the convex part of the abutment. The key-stone is 4.9212 feet deep.

Upon the courses of the abutment from which the *ugnature* spring rest ten other horizontal courses, the upper surface of the last or superior one being level with the extrados of the key-stone, immediately surmounting which is a plain cornice with modillions cut in the solid stone, similar to those round the Temple of *Marte Vendicatore* at Rome,* (as seen in the cross section of the cornice, Fig. 4, XV.) This cornice is continued beyond the pilasters of the abutments in a plain band without modillions.

The upper line of the cornice marks externally the level of the footpath and centre of roadway; above this is a solid plain parapet rising perpendicularly from its base, and terminated by a corona; its total height being 3 feet 4 inches.

The roadway over the arch is 40 feet wide between the parapets: of this width each of the footpaths occupies about five feet, and the carriage-way 30 feet; but over the abutments the width is increased to 88 feet by their convex form, and at the approaches the roadway between the parapets of the advanced body of the walls is 144 feet wide forming at each end of the bridge a *piazzetta* or open ornamental approach.

The style of the architecture and the nature of the materials give to this bridge a noble and simple grandeur, and a character quite unique; and as a work of art it surpasses all structures formed on similar principles, and is far superior to the bridge of Rialto, built by Michael Angelo, which, though only having a span of 98.6 feet and 23 feet rise, was when erected and long after reckoned a masterpiece of work on account of its flatness.

If I may be allowed to express an opinion, the general architectural appearance of the bridge over the Dora would have been improved, if a simple projecting base had been given to each of the pilasters of the abutments, with its summit forming a line a little above the water level. By this addition a better proportion would have been maintained between the width and height of the pilasters, and a more strict accordance with the cornice that surmounts them. This method is now generally employed, with the best effect, in every great work of the kind, and particularly in this country, which possess some of the most magnificent structures of the same nature, particularly over the river Thames.

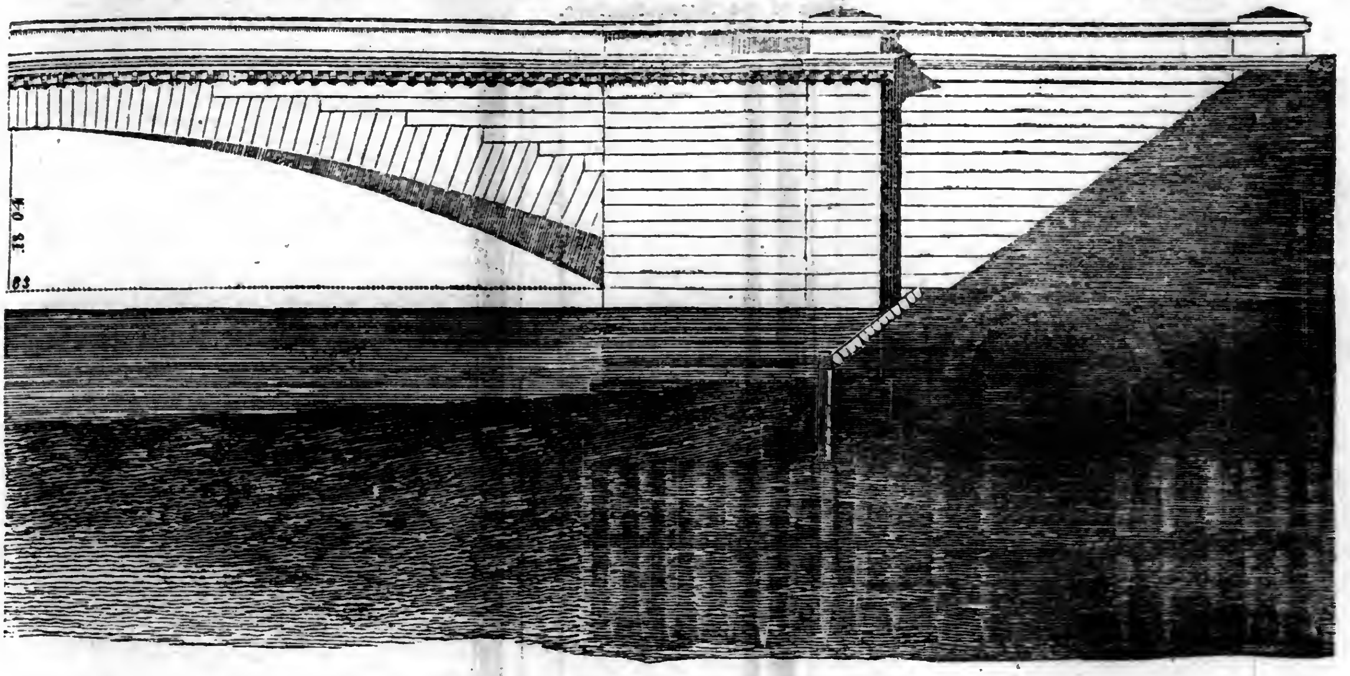
I shall now proceed to examine the particular reasons, which determined the engineer to propose and adopt such a structure, as well as to explain the accurate nature of the processes which he employed for the construction of a work, in which the boldness of the design is equalled, if not exceeded, by the excellence of the execution.

In planning the proposed bridge, the engineer had to keep in view the following points: 1st, That it was to be erected over a river of considerable width, and during floods, to which it was subject, of great velocity; 2d, That it was to correspond in its proportions with the main road over the Alps, one of the great thoroughfares into Italy; and 3dly, That it was to adorn the

* It will be observed that, in order to give the engravings of full size, we have been frequently obliged to give them in two parts, and on different, but contiguous pages.

* See Palladio, Book IV. Chap. VII. Ed. Lond. 1738.

DORA, NEAR TURIN. *Plate* 13.



approaches to a capital city of considerable magnitude and beauty.

The nature of the river and the oblique direction of its bed, relative to the axis of the main road at the entrance of the town, were the first difficulties to be surmounted, and the engineer at once conceived the necessity of making a new branch road through the suburbs, and of constructing the bridge of a single arch. He perceived the impediments and bad effects that an oblique bridge of three small arches would produce, having the piers also oblique to the stream, or even one of a single arch of larger span in a very oblique direction; he felt convinced too that the art, although not of recent origin in Italy*, does not afford to this day proper means of executing such a work satisfactory on a very large scale.

Nor could he adopt the plan of an arch perpendicular to the axis of the stream, without deviating from the straight line of the branch road which he has already projected from the centre of the town, which was designed to cross the suburbs, pass over the bridge, and continue on the opposite bank; nor without also being obliged to form such angles as would endanger the safety of travelling vehicles.

He could not therefore adopt any other scheme than the one described, convinced, that where solidity, beauty, and convenience in a work of public utility are alike required no secondary consideration ought ever to influence any one who undertakes the direction of such a national enterprise, in which are involved the reputation both of the artist and his country.

The required section of the water way having been first established, an arch of the span above mentioned was resolved on, having its elevation restricted to that of the level of the main road. Every part of the structure was then projected on the soundest calculations of strength, and all the directions to be observed during the execution of the work were specified, so that it might be completed in the most accurate and satisfactory manner, and with the strictest economy both of time and money.

Preparatory to laying the foundations of the abutments on the shore, dams were constructed in front of their position, which being first drained by an artificial channel, the soil within them was excavated to 6.71 feet beneath low water mark, and the surface reduced to a perfect horizontal level: piles of oak, 12 inches thick, varying from 30 to 40 feet in length, and each furnished with an iron shoe of about 16 lbs., weight, were then placed from 3 to 4 feet from centre to centre, as shown in Plate XIV., and driven vertically through the strata, after which their heads were cut in a horizontal plane. These piles were driven by a rigging pile engine, having a monkey weighing 8 cwt., worked by 25 to 30 men, and thus 200 men were employed at the same time on each bank of the river. The depth of the foundations of each abutment is 40 feet, with a counterfort at the sides 20 feet by 10,—as shown in Plate XIV., and Fig. Plate XV., taken at the level of the springing of the arch.

Piles were also driven in for the foundations of the circular parts of the abutments and of the advanced body of wall forming the approaches, in which a space of 18 feet diameter was left for the construction of an arch,—as shown in Plate XIV.

Sills of oak 12 inches by 10 were then laid down upon the piles in transverse and longitudinal directions, as shown in Plate XIV., and spiked down to them: all the spaces between the transverse sills were then filled with broken ballast immersed in moderately liquid cement of lime and ceroso*, in the proportion of about equal parts in weight: this mass filled all the interstices left between the sills, and rose to a level with their tops.

Upon this was then laid the first course of the foundation, consisting of granite blocks 1 foot nine inches in thickness, on which were continued three similar courses with two offsets of one foot, and over these were placed five other horizontal courses, each two feet high, constituting the face of the abutments, and the uppermost forming the resting points of the spring of the arch, lastly, seven other horizontal courses were superadded at the circular and rectangular portions of the sides.

At this stage the masonry work was stopped, and left to settle for a whole season, in order to take the consistency necessary for sustaining the lateral thrust of the intended arch.

In the meantime, for the purpose of ascertaining with great accuracy, the cut of the voussoirs, or arch stones, and the disposition of the timber forming the centres, and to facilitate the work in all its details, a platform of about 5,000 square feet was laid down, its surface being perfectly plane and level; and upon this was drawn the projected segment of the arch, together with that of another arch for the construction of the centres, of which the versed sine was 18.9015 feet. The arcs of these segments were drawn by means of points determined on the platform by dividing the respective chords into small equal parts, and finding the length of their corresponding ordinates by calculated tables. Thus was avoided the inaccuracy liable to arise from

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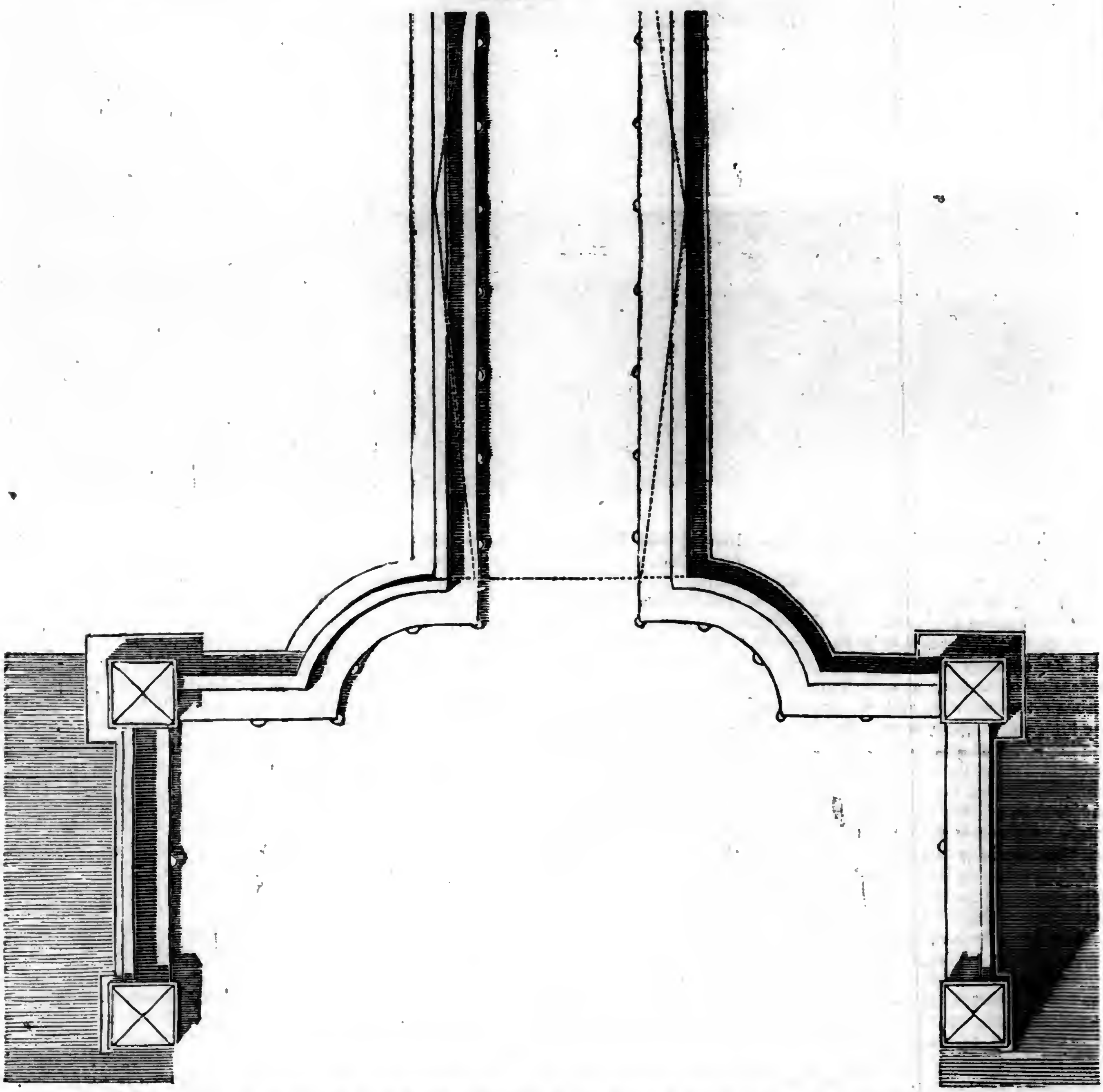
*The art appears to have been known there as early as 1530, when Nicolo, called "Il Tribolo," erected a bridge of this kind over the river Mugnone, near Porta Sangallo, at Florence, on the main road to Bologna. See Vasari, Vol. XI. p. 308, edizione di Milano, 1811.

* Ceroso is formed of tiles baked, pounded up in a mill, then passed through fine sieves, and just before using well mixed with lime in the proportion above mentioned.

PLAN OF THE BRIDG ERECTED OVER THE DORA.

Plan of the Superstructure.

***Plate* 14.**



the very great length of the radius had they been described from a centre.

The centres of the two arches being determined, the disposition of the timber to be adopted for the centering was drawn on the platform in full size, and from these tracings all the timbers were prepared and shaped; the requisite operations for placing the different pieces forming a rib being facilitated by circular wooden rollers of equal diameter which, moving on the platform, sustained the timbers at a certain height above it.

When the timbers had been thus adjusted exactly over the lines drawn on the platform, each was conveyed to its destined place, and fixed to its position by proper mortices and tenons; and while twenty carpenters were thus employed in constructing a rib, twelve others were putting up one already finished and requiring no farther alteration. Thus was completed in 45 days the whole workmanship and fixing of the centering, consisting of 10 equal ribs, each rib being composed of three courses of timber, bound at the joints by straps and keys of iron.

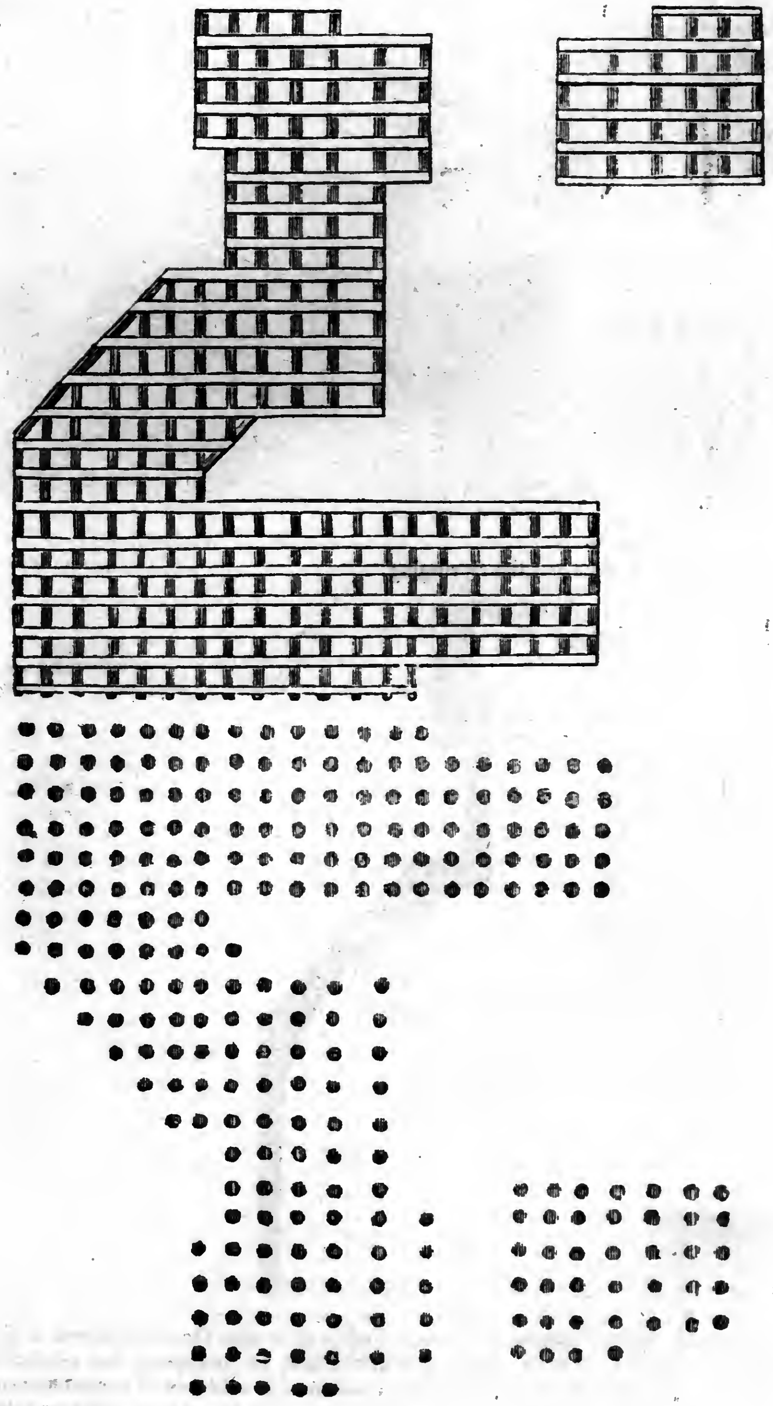
Two timbers were then placed upright close to the abutments, and three piles were driven into the ground in the middle of the river and crossed by three horizontal ties; the two upper ones supporting stays which strengthened the ribs. The ribs were bound together by twenty horizontal double timbers, fixed by proper plates, straps, and bolts; which with all other particulars will be best understood by reference to the first Figure of Plate XV.

Upon the platform was drawn also, by means of the tables before mentioned, the segment forming the exterior arch, and those horizontal courses of the abutments with which the voussoirs are connected; and in order to obtain the greatest precision in the cut of the wedges composing the two faces of the arch, which wedges harmonize angularly with the horizontal courses, and at the same time to verify their position on being placed, two tables were calculated, in one of which was noted,—first, the exact dimension of the principal arch;—secondly, the abscisses measured on its chord;—thirdly, the corresponding ordinates;—and fourthly, the tangents at the extrados of the keystone. The other table contained the same particulars calculated expressly for the face of the exterior or upper arch.

On the tracing of the arch drawn on the platform were constructed the wood models for cutting the stones, but as the wedges at the imposts and the intersections of the *ugnature* with the convex part of the abut-

Plate 14.

PLAN OF THE FOUNDATIONS.



ments were to form part of the horizontal courses of the abutments, the models for those could not so well be determined in this manner; these wedges were therefore formed upon a special model made for the purpose, upon a scale of 1 to 33½. In cutting the voussoirs a small temporary prism was left projecting on the lower face of each, as seen in Fig. 1, Plate XV., so that when placed in their position, the base of this prism was the only part of the stone that came in contact with the centering on which it rested.

In laying the body of the arch, the engineer deviated from the usual practice of setting up a service bridge or gangway upon the ribs composing the centering, but had small bridges constructed on each side and independent of it, though connected with each other. These bridges were of a width only sufficient to admit of the stones being moved along them, and the flooring of each being formed in two inclined planes tangents to the curve and meeting at the centre, the stones were dragged on rollers by means of capstans acting at the highest point of the service bridge, till each stone attained the level at which it was to be laid, and then was suspended by the following mechanism, and placed in its final position.

On the side next the centering of each of the service bridges, vertical timbers were erected at convenient distances, and supported by inclined props or stays, all the props on one service bridge being connected with the corresponding opposite ones on the other by strong horizontal beams that crossed the width of the bridge. Upon these last were laid longitudinal timbers, which served to sustain a moveable beam, that could be adjusted and fixed in a position to be over the place at which each wedge had to be ultimately laid. Pulley blocks were then attached to this beam so that they could run along it, and by means of ropes and a corresponding apparatus of punks, &c., the wedges were lifted up by a capstain situated behind each abutment.—With such a mechanical power acting from the extremity of the bridge, two masons only on the centres, assisted by a few workmen and laborers acting at the capstans, were able to place, in one day's work, about nine wedges, weighing upon an average 5 tons each, and the whole 651 wedges composing the arch, and weighing together 3250 tons, were placed in the space of 75 days. It should be observed, that the course of the keystone is formed of seven wedges, as seen in Fig. 2, Plate XV., the two outer ones being not less than 8 feet in thickness. Near one-third of the whole number of wedges weighed about 8 tons each, and those composing the first course at the springs, from 15 to 18 tons; and the whole of these enormous blocks were placed without the smallest accident to the workmen employed, or injury to the blocks themselves.

Theory shows, and it has been proved by trial on a small experimental arch, as well as by observation on the subsidence of arches of limited dimensions built by Perronet and other scientific men, that in this kind of structure the settling down takes

[*Plate* 15.

Fig. 1.

Half the Longitudinal Section and Centres.

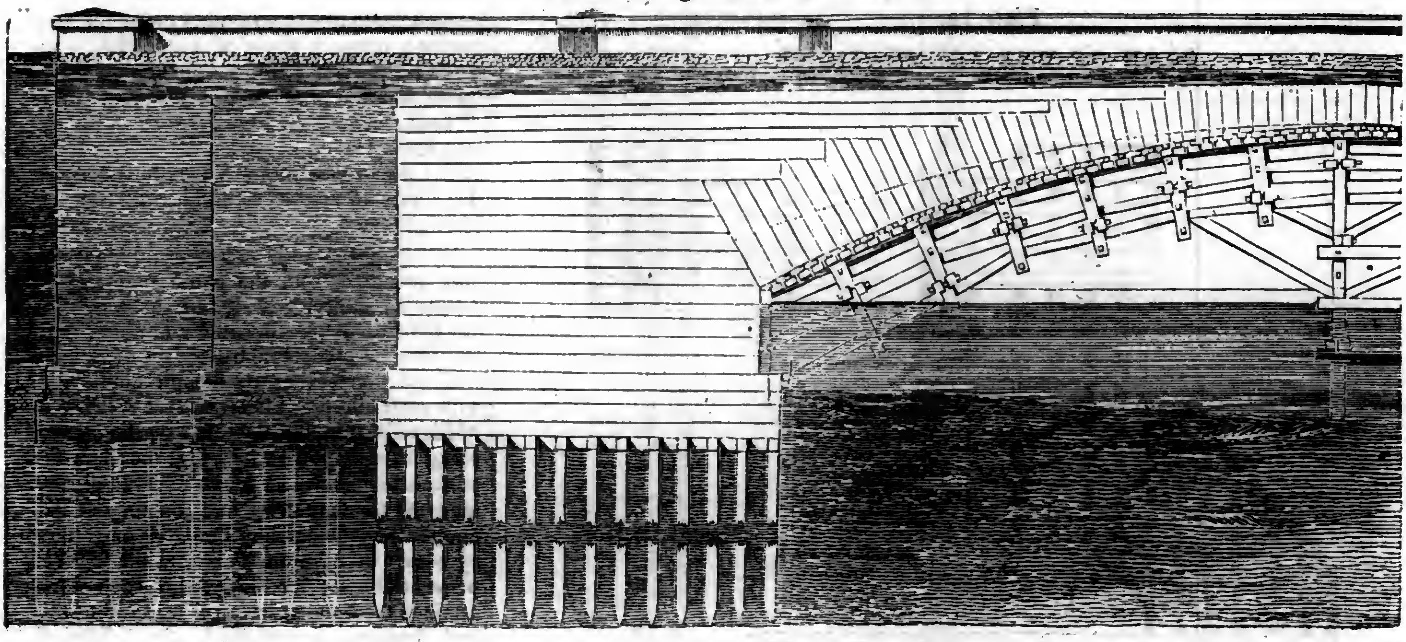
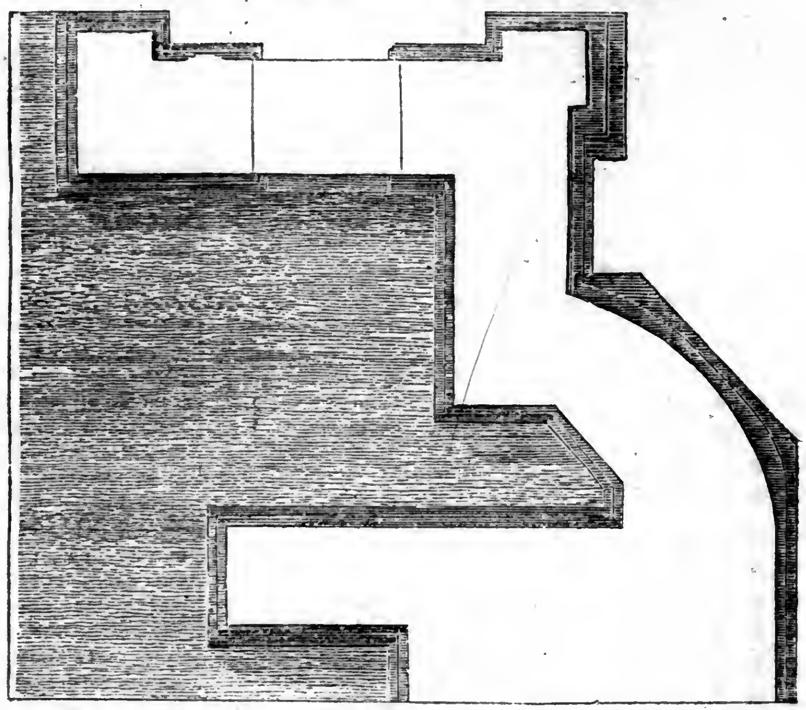


Fig. 3.

Plan of the Abutments taken at the Springing.



place by the descent of the parts about the centre of the arch, and the pressing of the joints of the wedges at the intrados near the springs and at the intrados near the keystone, and consequently if the general pressure that must ensue on removing the centres, and in the subsequent settlement is not properly guarded against, it will chip off the edges of the voussoirs, and might very probably be followed by accidents of a far more serious and fatal nature. The engineer Boistard, to avoid those inconveniences in building the bridge of Nemours*, which is only 72.30 feet span, and 7.20 feet rise, had the wedges or arch stones cut somewhat smaller than they would have been, had the intended segments been divided by the determined number of wedges. He supposed that in removing the centres the voussoirs would not come quite close to each other, and directed them to be so placed that the intervals between the joints should vary in the direction of the intrados according to the terms of a decreasing progression from the spring to the key, and consequently in an inverse progression in the direction of the extrados.

But the engineer Mosca, in planning the bridge over the Dora, supposed, and with truth, that on removing the centering, the voussoirs should come completely in contact, and consequently he directed them to be cut exactly equal to an arch of the span of 147 63836 feet, and a versed sine of 18.04468 feet, and in the framing of it, as we have already mentioned, an arch was adopted for the centering, of the same span, but with a versed sine of 18.9015 feet, and decreasing proportionally to the springs where it intersects with the real segment. He directed also that the joints, instead of being on the projection of the radius to the centre of the arch, as is too generally the

* Buzani Antologia di Firenze.

Plate 15.

Fig. 2.

Half the Transverse Section taken through Centre.

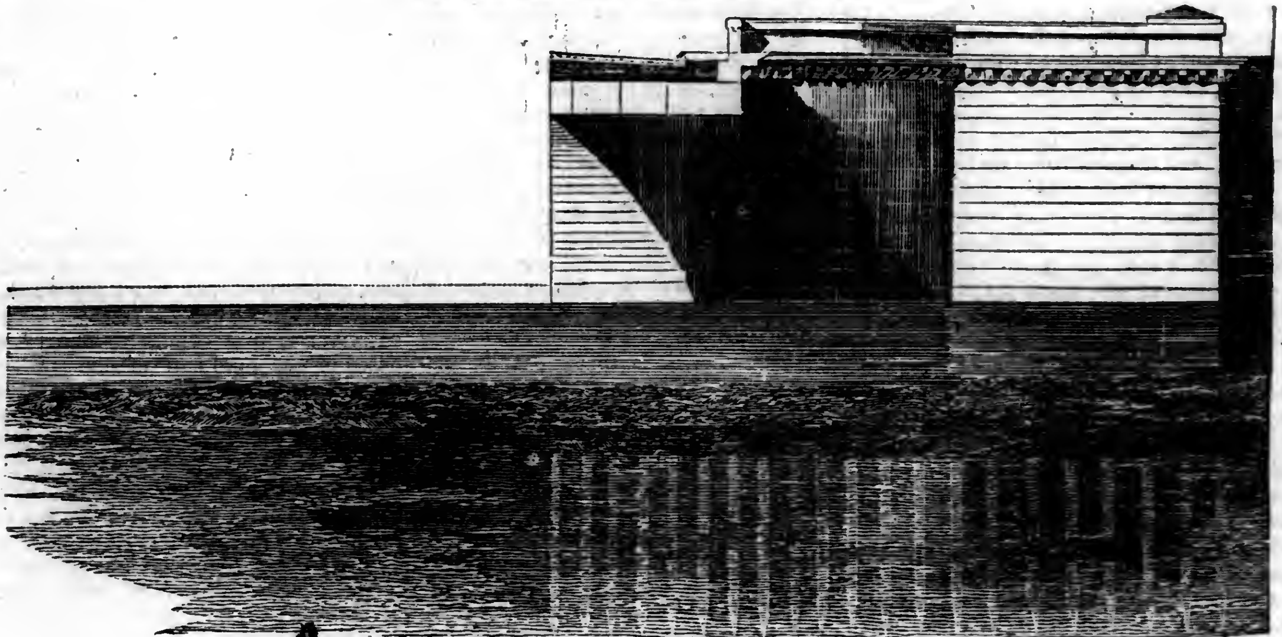
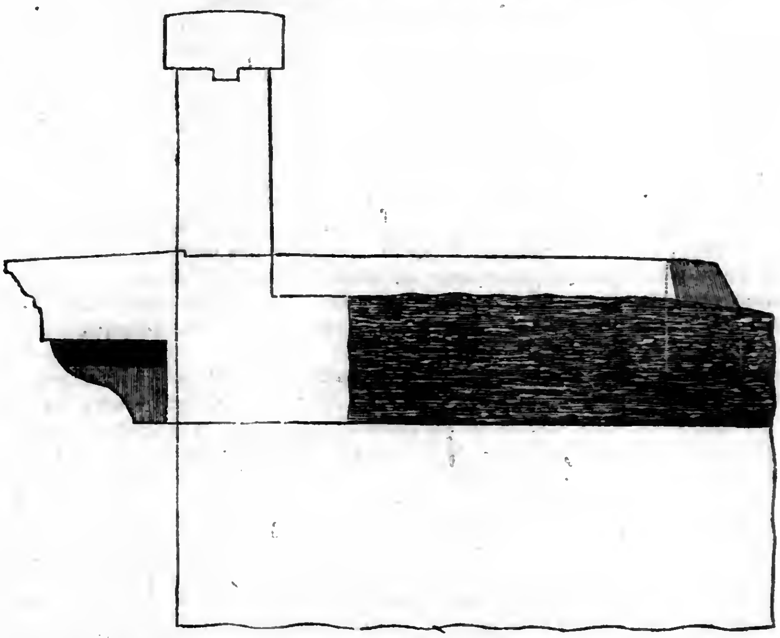


Fig. 4.

Enlarged Section of Cornice and Parapet.



case, should be so placed as to have the faces of contact of those near the springs diverging between themselves at the intrados in a decreasing progression proceeding from the impost, and of those near the centre diverging at the extrados in a similar progression proceeding from the key-stone. It is proper to state, that as the difference between the real arch and that adopted for the centres, was not of sufficient magnitude to enable the workmen, in so great a number of wedges, to establish the spaces between the joints according to the calculated progressions, in terms that they could physically appreciate during the erection, the engineer adopted the practical means of dividing the arch into three parts, and directed that in the lower, the joints should diverge near the intrados, that the voussoirs should be placed parallel in the second, and that in the last or upper they should diverge towards the extrados.

During the operations on the platform, the cutting of the arch stones, framing the service bridges and centres, with the superstructure of timbers for lifting and setting the voussoirs, the masonry of the abutments acquired the necessary consistency, and it was then judged proper to proceed with the construction of the arch.

In order to be able to rectify the position of the wedges by means of the calculated tables, an horizontal beam was placed below the arch in a steady position, independent of the centres, upon which were marked the abscisses; and the ordinates of the arch were designated upon two vertical timbers, established like the horizontal one, in an independent and steady position near the abutments.

The placing of the arch-stones was then begun, and carried on in the manner before mentioned, and with all necessary precautions; and besides those generally employed, the following peculiar process was put into practice.

The courses at the spring of the arch were first set; these were connected by crochets to each other, and to those of the face of the circular sides of the abutments which rise above the spring of the principal arch of the faces, viz. up to the twelfth horizontal course; they were then cut and disposed in such a manner as to form the required angles at the *ugnalure*, and at the meeting of the convex surface of the abutments with the face of the arch. After each course had been placed with the greatest nicety, their exact positions were verified by means of the abscisses, and the corresponding ordinates marked out on the horizontal and perpendicular timbers, and the inclination of each was properly ascertained. The next proceeding was to place the remaining courses of wedges; and in order to obtain with the greatest exactness the divergence of the joints between each voussoir, and to hold them in their required positions till the lowering of the centres, small plates of lead of a thickness determined by the terms of the fixed progressions were placed between those towards the impost at the intrados, and those towards the key-stone at the extrados, and the exact position of each was verified by means of the practical method established for finding the ordinates. With respect to those voussoirs forming the centre part of the arch, they being somewhat smaller than those of the faces, and of various lengths, small iron wedges were introduced between the joints to hold them in their desired diverging positions instead of the leaden ones. The work of setting the arch-stones being completed with the prescribed accuracy, and the final position of each voussoir being progressively rectified according to the detailed directions, the intervals left between the wedges were filled with a moderately liquid cement of lime and clean sand, mixed in equal parts, which was retained by a slight stuffing of tow, introduced at the lowest part of the aperture of each joint; the iron wedges were then taken away, and in order to ascertain the depression which would take place in the arch on removing the centres, another ingenious yet very simple and precise method was adopted.

A horizontal line was drawn over the total length of each face of the arch, forming a tangent at the intrados of the key-stone, and on each side of the key-stone an oblique line was drawn, starting from a common point at the centre, and tangential to the faces of the exterior arch forming the *ugnature*.

By means of those three lines drawn on each face of the arch, the least motion of the wedges, or voussoirs, would have been observed and determined, upon referring them to the established points of level near the impost of the arch.

Besides all these precautions, the engineer before removing the centres, directed that the cement should be scraped off all the joints of the arch-stones at the extrados as well as at the intrados to the depth of three centimetres, to prevent, in the settling of the arch, any chipping off the angles of the faces of the voussoirs: these spaces were again filled at the conclusion of the work.

All these operations being completed, and twenty days having elapsed from that on which the arch had been keyed, the lowering of the centres was begun. On removing the check pieces, the 240 wedges supporting the centres commenced with an almost simultaneous movement gliding down uniformly and insensibly, by the effects of the gravity of the arch-stones and centres; and this motion was checked and repeated at intervals, until the arch was left in equilibrium; and thus the arch-stones, elevated 18.9015 feet at the key, descended with the greatest regularity to 18.40 feet in the space of five days, that being the time employed in removing the centres, and a beautiful curve was preserved, leaving at this period the difference of 4⅝ inches between the existing arch and the projected one. The engineer, having proved the perfect accuracy of the work and the solidity of the arch, and wishing, moreover, to give it the greatest degree of settlement of which it was capable, and of obtaining a mass absolutely stable, that would enable him to work its spandrill walls, cornice, parapet, &c., in a perfect level line, directed the arch-stone to be loaded with a mass, formed by a cube of ballast of 1854 metres and weighing about 3000 tons, which was disposed symmetrically over it, and was much beyond what the arch when completed, with all the additional stone-work and its greatest occasional loads, would ever have to sustain. This weight was left upon the arch for the space of four months, and the sinking under it amounted only to 1⅝ inch (4 centimetres,) leaving the difference in rise above the projected segment 2⅛ inches (about 7 centimetres.)

After this trial, continued through such a space of time, the arch still kept its perfect curve, and not the least alteration was observable in any part of the structure. The engineer, now considering his arch solidly settled, and in a state for continuing the works for its completion, directed the placing of the horizontal courses to be proceeded with, viz.:—those of the face or spandril, which join the extrados of the voussoirs of the arch, and those to complete the abutments, which were terminated by an inclined plane of 1 in 35, starting from the extrados of the key stone towards them,—as shown in Fig. 1, Plate XV.

As soon as these operations were terminated it was verified that the upper side of the last course of the faces of the bridge was perfectly level with the extrados of the key stone, throughout the whole length of the bridge and approaches.

The blocks of the cornice were then placed in a horizontal position, and the whole surface of the arch-stones, abutments, and counterforts were covered with a stratum of bituminous cement of the thickness of 0.15 metres, well beaten till it became very hard; then upon this another stratum of 7 centimetres was laid, mixed with fine gravel, and beaten smooth without the least crack; by this coating of cement the filtration of rainwater was completely prevented. This operation finished, the space up to the level of the road was filled in regular and even strata; and when the whole was well settled and reduced to the prescribed form, blocks for the foot-path were laid down with a very slight inclination towards the roadway, and defended by truncated conical stones, as seen in the superstructure of the bridge in Plate XIV., and the paving was put down, consisting of a stratum of sand and gravel, of the mean thickness of 15 centimetres, and covered with a stratum of sand of 0.05 centimetres; then were put up the blocks forming the parapet and its crown—as shown in the cross section of the cornice, &c., in Fig. 4, Plate XV.

It is to be observed that no blocks less than from 8 to 9 feet in length were employed for the cornice and parapet, and some of those used in the latter at the abutments were as large as from 36 to 40 feet in length.

When every thing was thus completed, the most minute defects were corrected, and all parts of the structure were minutely dressed; the cement of all the joints of each face, and every part of the bridge exposed to view, was scraped off to the depth of 3 centimetres, and washed with lime; afterwards, all those parts which had been scraped were filled with a cement expressly prepared, composed of one third part of fine powder of marble, one third of fine powder of the same granite used in the bridge, and one third of lime, with a very small quantity of iron filings well mixed and rubbed together, till it had acquired a sufficient consistency. As soon as this cement was put into the joints, the masons were directed to apply a straight edge to them, with a groove cut in it just the width of the joints, which were of two millimetres in breadth, and through this groove to rub over the cement with an iron point till it became as hard as the stone itself.

In concluding the description of this work I should mention particularly, that all the blocks of the arch-stones, the face of the wall and the approaches, comprising the cornice, bands, foot-path, parapet and crown, are of the best Alpine granite, of the quarry called Del Malanaggio, near Pinerolo; and the faces exposed to view being finely dressed, every other face of contact of each outer block employed was dressed to equal fineness over three-fourths of its surface. A small quantity of granite from the quarry of Cumiana, was also used, but only as backing, in the foundations and abutments*. The first kind of granite is the best, and is susceptible not only of being dressed very finely, but also of being used in very small and delicate work, and takes besides a very high polish; the second kind is harder but more brittle, and contains many particles of iron, on account of which its surface, when exposed to the atmosphere, becomes spotted, which gives it a very disagreeable appearance, as may be observed in the bridge near Turin over the Po.

Finally, I have to state that this bridge was constructed in the space of four years†, under the immediate direction of the Chevalier Mosca, principal engineer, well seconded by

* Cubic specimens of these granites are deposited in the Institution of Civil Engineers with their faces dressed to the same degrees of fineness as the stones employed in the work.

† The above four years was the actual time employed in building this bridge; for the work was abandoned by the contractor about three years from its commencement, and after the lapse of some time, was taken up solely by the engineer and assistants; and brought to a termination very satisfactory, combined with the greatest possible economy; the bridge, comprising the approaches, having cost the Sardinian government the sum of £56,000.

his able assistants, and with much perfection and nicety, that to this day not the least settling has taken place in any part of the abutments or arch, nor the smallest crack, or chipping of the angles of the voussoirs or of any other block; and as the whole face of this work has been finely dressed, it appears now to the most experienced and practised eye a single solid mass of granite.

Indeed it is considered a noble structure and a perfect piece of workmanship by all professional men who have seen it, whether natives or foreigners.

It may be concluded from the foregoing observations, that the results obtained in the construction of this bridge are entirely conformable to those experienced arches of limited dimensions, and thence that it may be freely asserted, that the theory of the equilibrium of flat arches remains no longer doubtful, and that a sure process for their construction has been satisfactorily ascertained.

It must be cheering to the friends of Railroads to know, that of the numerous stocks in market, none have been less affected by the present depressed state of business, than the stocks of Railroads in successful operation.

The following report of the Directors of the Utica and Schenectady Railroad, will be found interesting to many of our readers.

UTICA AND SCHENECTADY RAILROAD.—The Albany Evening Journal says:

"The Directors of this Road, at their last Meeting, declared in a dividend of 7 per cent. on the $1,600,000 and at the same time made a call of $5 on each share, or $100,000, payable on the first of August."

From a circular recently published by the Company, we gather the following details. The *receipts* have been, for instalments, on stock, $1,599,750, of which $100,000 have been paid out of the income of the road; for interest on deposites, $5,574 41; —miscellaneous receipts, $999 17; INCOME OF ROAD $247,938 41, to which may be added moneys actually received but not passed to the credit of the Treusurer, $9,754 12, making in all $257,692 29; money borrowed, $32,095 12. Total receipts $1,841,356 86.

The *expenditures* have been 1st, on account of construction of the road $1,708,894 04, the items of which are land for roadway $282,588 60, buildings $71,639 07, grading road $561,787 59 Superstructure $515,733 57, outfit of Engines and cars $122,771 58, Engineering and superintendence $69,381,51, amount paid for Mohawk turnpike road $62,500, incidental $157,137 40, and stock on hand $2,334 72:—2d. Transportation account for nine months, ending 31st May last, $77,753,08, Dividend paid $104,709 75;—making the total payments for the Company $1,891,356 87.

The estimated annual income of the Utica and Schenectady Railroad Company is as follows:

From actual results ascertained from ten months operations on the Road, it appears that the gross receipts for the transportations of passengers during that period has been	$557,692.20
Add for the receipts of the remaining two months of the present year estimated to be in the aggregate the same as for the last two months, say	62,307.71
Total amount of receipts for the present year ascertained for ten months and estimated for two,	320,000.00
Assuming the receipts on the Road for transportation of passengers to be the same for any ordinary year hereafter as for the present current year, they will amount to the above sum of	320,000.00
Add for carrying the Mail of the United States, estimated according to its weight as stipulated in contract with Post Master General, say	20,000.00
Total estimated gross receipt of Road for an ordinary year,	$340,000,00
Deduct for estimated expenses	140,000
Leaving estimated net annual income to be divided among stockholders,	200,000.00

The estimate above made does not include any thing for future increase of travel on the Road, nor does it allow any thing for a contingent decrease, unless the deduction of $10,000 a year for contingencies be considered as such an allowance. Many persons believe that the increase of travel hereafter, will produce enough to renew the perishable part of the road, as often as it will require renewal if so, the dividend of profits will be greater than above estimated.

SARATOGA AND WASHINGTON RAILROAD.—At a meeting of the stockholders of the Saratoga and Washington Railroad Company, held in the village of Waterford on the 5th inst., the following gentlemen were elected directors for the ensuing year: —John Townsend, Erastus Corning, Thomas W. Olcott, Lewis Benedict, John L. Graham, George D. Strong, David Codwise, Le Grand Cannon, Richard P. Hart, Stephen Warren, Gideon M. Davison, Thomas J. Marvin, Roswell Weston, John H. Boyd, John B. Borst.—[Troy Budget.]

THE MORRIS AND ESSEX RAILROAD, we are gratified to learn, is steadily progressing towards completion. The Jerseyman mentions that the whole line is completed to within one mile of the public square in Morristown and the contractors are busily engaged in laying the timbers and rails—all of which are on the ground. The Company hope to open the road to the public on the 15th September next.

THE LONG ISLAND RAILROAD.—Fare reduced.—A trip may be made to Hempstead all the way for five shillings. The fare to the Court house opposite Hempstead is 3s 6d.

As the warm weather increases there will be a great increase of travel on Long Island. All the variety of incident to render summer delightful may be found in the different villages. Sites may be found airy and cool, with delightful prospects—sportsmen may beat the forest or tread the marsh for game—for fishing there are great advantages, and as the fare of the Railroad is reduced we have no doubt many will take an occasional excursion at least as far as Hicksville. This place has a large public hotel, two stores, and other buildings. It takes its name from its founder, Mr. Valentine Hicks, the present President of the Railroad Company.

Hicksville forms the present termination of the road, and it may be some time before it progresses further eastward.

Whose is the fault of its discontinuance at the present spot, and of the inability of the Company to proceed further is yet to be discovered.

As citizens of Long Island we trust the means may be found to render the work of more extensive utility.

From the New-York Mechanics' Magazine

ELECTRO-MAGNETIC MACHINE.

We have been not a little surprised by an article on this subject in the May No. of the Journal of the American Institute, and which we herewith give to our readers.

It will be found very difficult to reconcile the announcement that the article "comes from one of the best informed and most experienced men in the community," with the article itself, showing, as it does, gross ignorance in regard to some of the plainest facts and principles of science.

Indeed were it not for the authority given by this announcement, and operating upon the minds of those who have not paid much attention to this subject, we should not have noticed a collection of errors and misrepresentations, sneeringly aimed at Prof. Siliman as well as the inventors of the machine in question.

The writer, in the first place, endeavors to prove that the *vacuum* existing between the surfaces greatly increases the apparent power of the magnet itself. Now this argument does not hold good in the case of the large electro-magnets constructed by Messrs. Cooke and Davenport, (if indeed it does in any other.) for they prefer a slightly *curved surface* for the armature.

The objection as to the "serious mechanical difficulty," to be encountered in performing a rotary motion near to the magnets without touching them, proves at once that the writer either has not seen the machine, or that he does not understand the laws of mechanics.

The several conclusions of Prof. Silliman, are said by the writer to be *examined* by him. To the first conclusion, viz: that electro-magnetism is adequate to produce a rotary motion, the following rejoinder is made: "So is the slightest breeze acting upon the boy's windmill, yet its power is of no value." This is what "one of the best informed and most experienced men in the community" calls an *examination* of the conclusion of Prof. Silliman. We would beg leave to ask, what becomes of the power of the slightest breeze when acting upon the *man's* windmill, is it of no value?

The second conclusion is *examined* by the following question: "What proof have we that the machine will not become permanently magnetised, and come to a stand still?"

Now this question again places the writer in a dilemna—ignorance, or misrepresentation, are the only alternatives. In the first place the revolving magnets are neutralized, by having their poles reversed 300, or as many times as there are revolutions per minute. Besides the material used is soft iron, and loses its magnetic property the instant communication with the battery is cut off.

The third conclusion is *examined* by a quibbling comparison between the renewal of acid and battery, and the supply of fuel to the steam engine. In the steam engine both fuel and water are consumed, and the bare assertion, that the cost of fuel for a steam engine and materials for a galvanic machine, will be equal, is no proof of the fact, while observation, so far, shows that it is not a fact.

The *examination* of the fourth conclusion contains a very pretty piece of advice to Prof. Silliman, in which he is told to wait till "experience" shall warrant him in asserting that the power may be greatly increased, &c. We suppose the experience of "one of the best informed and most *experienced* men in the community" is meant. Long life to the worthy man if he waits such an event.

In several places, the fact that several thousand pounds were "sustained" and not "raised," is hurled at Prof. Silliman with force enough to destroy him and the machine, if said fact had any weight, which, fortunately for the cause of science, it has not. In the instance alluded to, the weight was a dead mass, while in this machine the attraction and repulsion of two magnets is constantly operating. Besides, if a small machine, in which the interval between the stationary and revolving magnets is proportionably very great, can raise 24 lbs. one foot in one minute, may we not expect a very useful power in a larger one, especially when we know that the power of an electro-magnet increases in a much greater ratio than the size of the apparatus.

We must apologise for having detained our readers so long over such a bundle of absurdities,—but we cannot quietly witness an attempt to cast ridicule upon scientific experiments, or upon so bright an ornament to the cause of science as Prof. Silliman,—though we are, perhaps, giving more notoriety to the nameless author of it than he deserves.

Notwithstanding the laughable assertion that the writer "does not go the full length with that distinguished philosopher" ! ! !—it must be evident to all having the slightest knowledge of the subject, that he is ignorant to a great degree of the principles of the sciences of the construction of the machine, and of the courtesy and politeness (to say nothing of modesty) usually practised among scientific *gentlemen*—however much his attainments in some other line may entitle him to the distinctive appellation of "one of the best informed and most experienced men in the community.

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ELECTRO-MAGNETIC MACHINE.

We copy the following article from the Journal of the American Institute.

The following communication comes from one of the best informed and most experienced men in this community. Although he does not go to the full length with that distinguished philosopher, Professor Silliman, whose researches and writings have done so much honor to himself and his country, still our correspondent is disposed to award to him high praise for the benefits his labors have accomplished in science and the arts.

If the electro-magnetic machine fails when put in competition with steam, as a rotary motive power, the experiments made for that purpose may, notwithstanding, conduce to other discoveries of hitherto hidden agencies concealed in the loadstone, as important to the human race as that which points the needle. Mr. Davenport, it seems to be admitted, has found a new path, and gone ahead of others in his experiments. We hope he will push on, and ascertain where it leads. Every advance into the field of discovery extends the prospect, and facilitates other and greater discoveries. Every rational aid should be administered to Mr. D. by those who are in possession of the means, to enable him to prosecute his improvements to the full extent.—ED.

In the April number of the *American Journal of Science*, there is an article by the editor, Professor Silliman, giving a description of this machine, invented by Mr. Davenport, which is well calculated to mislead, by its specious assumptions. It is my purpose to examine some of the Professor's views, and compare them with well established facts, and see how far his opinions in this matter are entitled to consideration. The subtle elements which surround the earth are capable of various modifications, and when acted upon by sudden and violent changes of temperature, we witness astounding results. The production of steam, by the combination of the matter of heat with water, is among the most familiar and powerful changes produced by a new order, in position of these two elements.

The best arranged steam engines, in England, raise 625 tons one foot high, by the consumption of one pound of coal. It appears that the Professor had seen "*twenty-eight* pounds raised from the floor," by Mr. Davenport's machine. He says, that Professor Henry has succeeded in "*lifting thousands of pounds by a battery of very small size.*" If Professor S. will examine the facts, he will find he had been led into a great error when he supposed the *thousands of pounds* were *lifted*; they were only *sustained*, or held in contact with the magnet, and lifted by some other force.

In this case, the electric fluid produces a vacuum between the surfaces of the magnet and the body suspended; thus giving full effect to atmospheric pressure, on the surface of the weight or body suspended. Besides, there is no similarity in the two cases; in the one, the surfaces come in contact before any sensible effect is produced, and in the other, the surfaces must remain at certain distances from each other, to admit of free rotary motion; and here comes a serious mechanical difficulty, in the formation of these machines of great magnitude. Great nicety must be observed, to keep the moving electro-magnets from touching the permanent ones, and so *close*, that they shall not fall out of the sphere of attraction. The natural tendency of bodies is to a comparative state of rest. The electric fluid obeys the same law, however intensely it may act on the nerves of an enthusiast.

The Professor has arrived at six conclusions, after having seen, read, and reasoned about the "*electro-magnetic machine.*" These must be examined, and they are quoted for that purpose.

First. "It appears then, from the facts stated, (in the former part of the article,) that" "*electro-magnetism*" "is quite adequate to the generation of rotary motion."

So is the slightest breeze acting upon the boy's windmill, yet its power is of no value.

Second. "That it is not necessary to employ permanent magnets in any part of the construction, and their *electro-magnets* are far preferable, not only for the moving, but for the stationary parts of the machines."

What proof have we that the machine will not become permanently magnetized, and come to a stand still?

Third. "That the power generated by electro-magnetism may be indefinitely prolonged; since, for exhausted acids and corroded metals, fresh acids and batteries, kept always in readiness, may be substituted, even without stopping the movement."

So, by keeping a stock of coal on hand, and applying it to the generation of steam, the engine may be kept in motion.

Fourth. "That the power may be increased beyond any limit hitherto attained, and probably beyond any which can be *with certainty* assigned," &c., "it would appear certain that the power must be increased in some ratio which *experience* must ascertain."

When the Professor came to this conclusion, it is evident that he did not then possess sufficient information, and had not sufficient "*experience*" to enable him to give a rational opinion of the value of this new machine. Hence, as the editor of a scientific journal, he ought to have waited till "*experience*" had taught him the difference between the *suspension* and the *raising* of great or *small* weights, or the experiment had been fairly tested.

Fifth. "As *electro-magnetism* has been experimentally proved to be sufficient to *raise* and *sustain several thousand pounds*, no reason can be discovered why, when the acting surfaces are, by skilful mechanism, brought as near as possible, without contact, the continued exertion of the power should not generate a continued rotary movement, of a degree of energy *inferior indeed to that exerted in actual contact*, but still nearly approximating to it."

Now, this "*conclusion*" is sufficiently indefinite, and we are left to *conclude* what is really meant by it. We see that a continued rotary movement can be produced by "electro-magnetism," and we are left in the dark as to the amount of power generated, and the cost of its production; and are asked to believe that it is something very great, without being put in possession of any facts beyond that of "*twenty-eight pounds having been raised from the floor*," as the foundation of our faith.

Sixth, and last conclusion. "As the power can be generated *cheaply and certainly*—as it can be continued indefinitely—as it has been greatly increased by very simple means—as we have *no* knowledge of its limit, and may therefore *presume* on an *indefinite augmentation of its energy*, it is much to be desired, that the investigation should be prosecuted with zeal, *aided by correct scientific* knowledge, by *mechanical skill*, and by *ample funds*. It may therefore be reasonably hoped, that *science and art*, the handmaids of discovery, will both receive from this interesting research a liberal reward."

This last conclusion forcibly reminds us of the practices of our people the past few years, in the pursuit of wealth. They concluded that wealth could be "*greatly increased*" by very "*simple means*," and with *certainty*, and that it might be "*continued indefinitely*." To our dismay, we have just found out, that like many patented inventions, we had been speculating without "*correct scientific knowledge*," or "*ample funds*" to sustain us in the vain attempt.

We regret to find one who has made a football of pernicious scientific theories, and who, by the force of his facts and reasonnig, has overturned many untenable propositions, should have relaxed from his usual caution, and have virtually recommended the application of a power of "*unknown energy*," before having seen some useful effect produced by it.

The following communication from Mr. J. Perkins will be found highly interesting.

From the Journal of the Franklin Institute.

OBSERVATIONS ON THE DUTY PERFORMED BY THE CORNWALL STEAM ENGINES.—BY JACOB PERKINS, CIVIL ENGINEER. READ BEFORE THE INSTITUTION OF CIVIL ENGINEERS, LONDON, FEBRUARY, 16TH, 1836.

DEAR SIR—I herewith transmit for your examination, and for insertion in your Journal, should you think proper, a series of three papers, upon the duty performed by the Cornwall steam engines. Yours, &c. J. PERKINS.

The true cause of the gr at difference of duty performed by the Cornwall and the best Boulton & Watt engines, has been a matter of serious inquiry for the last fifteen or twenty years. But within the last two or three years the difference has been so astonishing as to induce many engineers to suppose that some part at least was owing to trickery.

If we do not admit the fact of the superiority of the Cornish engines, the cause will not soon be found. I must say that after much thought, investigatio , and experiment, I believe that the Cornwall Engines do at least three times the du y that the best low pressure, condensing, double stroke engines do; and I have no doubt that I see the reason of it.

Having, in the first place, visited the Cornwall Mining establishments to judge for myself, I very soon came to the conclusion, that the advantage which the Cornish single stroke engine has over the reciprocating double stroke engine is much more owing to the difference in the construction of the engines, than in that of their boilers. Very few engineers know the great value of using high steam expansively, and many of those who admit it, do not know how to apply it properly.

The repeated experiments which I have made have satisfied me that the single stroke engine is far better calculated for taking advantage of the valuable property which the expansion of high steam possesses than the double stroke engine. The loss from this cause is much greater than is generally believed In the first place, there should be no steam lost between the steam pipe and piston, which cannot be avoided in a double stroke engine. In the second place, at the end of the stroke the steam should be allowed to escape without any re-action, and this cannot take place, when the induction and eduction pipes are used at each end of the cylinder, as is the case with the double stroke engine.

If the induction pipe is large enough to allow the steam to escape freely so as to prevent loss by reaction, then the eduction pipe would be much too large for the induction pipe, and much high steam would be lost, without having the benefit of expansion. In fact, it is impossible to get the steam on and off soon enough in the double stroke. It is supposed by some that there is a loss by having the steam on one side of the piston only; it is, however, quite the reverse. It is very well known that the larger the piston the greater is the saving, particularly in the piston itself. To make the single stroke engine consume the same steam as a double stroke engine, the cylinder must be double the area.

If it should be said that much time and power is lost by not having the steam on the piston on the return stroke, it may be said in answer, that if only fifteen strokes are made in a minute, there would be but two seconds between the working strokes; and that the fly, when the fly is used, must be very light indeed to show any variation of speed. When worked in the Cornish fashion, without the fly, no power can be lost between the strokes.

I do not mean to say, that all the gain is to be attributed to the single stroke engine, there is undoubtedly much power saved by dispensing with the fly wheel, where the work to be done is pumping water. This is proved by the fact, that a single stroke, balance bob, low pressure, pumping engine will raise 33,000,000 lbs.; while the double stroke low pressure engine with a fly-wheel will raise but 22,000,000 lbs. The fly is a power which will not, like steam, wait to accommodate itself to the stubborn visinertia of the water, neither will it accommodate itself to the going off of the steam, consequently much power must be lost. When one watches the beautiful accommodating action of the Cornish pumping engine he will readily see, that there must be great loss in using the ponderous fly. When the steam is first let on to the piston, the pressure, although 40 lbs., to the square inch, it seems too little for its work, and appears to labor hard to get the water in motion, but at the end of the stroke, although the steam has expanded down to 10 lbs., to the inch, the work seems quite light. Here the expansive property of high steam is beautifully exemplified. To begin the lift 40 lbs., to the inch seems not enough, but when the stroke is ended, 10 lbs., seems more than is wanted. How is it with the condensing double stroke engine? Is not the power the same at the end of the stroke as at the beginning?

I cannot believe that the enormous quantity of 125,000,000 of water was raised one foot high with 84 lb., of coal without the assistance of a little air, which certainly can be used without being readily detected. To show how I learnt this singular fact, I must be allowed to relate a curious trick which was attempted to be passed off on me in America about forty years since. Two honest farmers, one day called cn me to see if I would join them in a patent of great importance; they stated that the discovery would prove that the law was erroneous which stated that water would rise only about 32 feet in a vacuum. I told them that it was contrary to what I had learnt and declined having any thing to do with it; they, however, would not be put off. They said that they had brought with them an exhausting pump, which had raised water 100 feet by rapid exhaustion, and that they would pay all the expenses of fitting it up, and that I could then see who was wrong. One of them averred that he was a ruined man if he had been deceived. I was so satisfied that he had been imposed upon that I readily agreed to test his pump. I had a leaden pipe attached to the double barreled exhausting pump, and the situation I had fixed upon happened to be 44 feet from the water to the pump. When the pump was put in action, it, to my great surprise, delivered the water at the pump spout. I then set myself to work to discover the cause, which was not ascertained until the third day; I observed that the water appeared full of air bubbles, it then struck me that air was allowed to mix with the water in minute portions, by which means the column of water became expanded? I then placed my ear close to the pipe and soon discovered a singing noise, and by clasping the tube with my hand the noise stopped and the water ceased to flow. Here was the trick; by examining the tube I found that it had been perforated with a small pin-hole unknown to me, which admitted just air enough to expand the column. I then charged the men with the imposition, one denied it, but the other looked pale, and acknowledged he had done it b ythe direction of the inventor, who said that it must be kept a secret, otherwise the invention would be infringed upon. They were now made to understand that they were duped, and were soon on their return home, minus 3000 dollars.

Having seen that a column of water might be expanded by admitting air under the lower clack, I was induced to inquire, while in Cornwall, of an Engineer, if he had ever known air to have been admitted under the clack; after expressing his surprise at my question he admitted that it was common, but that it was not acknowledged, since every one wished to have it appear that they had done as much duty as possible.

Since the quantity of water pumped was known by the number of strokes per day, and as the contents of each stroke was known by its length, and by the diameter of the plunger, if the air which the water contained was not allowed for, more work appeared to have been performed than had actually been done.

My friend stated that it had been found advantageous to allow air to be admitted in small portions, for it made the pump work more lively in consequence of the spring it gave to the column of water and caused less strain to the machinery, but that he never knew the air allowed for. Although this circumstance of admitting air to mix with water serves to lessen the amount raised, yet this cannot, I think, be more than 15 or 20 per cent., and I fully believe 90,000,000 lbs., have been raised one foot high by a bushel of coal.

The following statement of a series of experiments which were made at Saint Catherine's Dock about ten years since, with a high pressure single stroke expansive engine, I think conclusive.

Extract from the London Journal of Arts and Sciences, of July 1st, 1827.

PERKINS' NEW STEAM ENGINE.

"We have the pleasure of announcing that Mr. Perkins has at length, in a very satisfactory manner, proved the superiority of his newly constructed high pressure steam engine, by working it against two other steam engines upon the low pressure principle.

"This small engine, which we have several times mentioned in our present volume, has been within these few days set up at Saint Catherine's Dock, and employed in pumping water from the excavation.

"There have been four steam engines engaged in the prosecution of these works, two for excavation, and two for pumping out the water; Mr. Perkins' engine stands alongside a low pressure engine of sixteen horse power, which is determined by the area of its piston.

"The diameter of the piston, that is the bore of the steam cylinder, of the new high pressure safety engine is eight inches, and its stroke twenty inches. It was connected by gear to a beam that made sixteen vibrations per minute, and raised two alternating pump-buckets, the diameters of which are fourteen inches, and their strokes three feet three inches.

"We, the undersigned, certify that there are two low pressure steam engines employed night and day in discharging the water which flows into Saint Catherine's Dock from the land springs, &c., that one of them is a sixteen and the other a ten horse engine. We also certify that Mr. Perkins has recently put up a small high pressure steam engine, the diameter of whose piston is eight inches, its stroke twenty inches, and that we have seen this engine pump the same quantity of water from the docks which has heretofore been pumped by the other two.

JAMES LAMON,
PEARSON WOODWARD,
THOMAS BROWN.

"I, the undersigned, certify that I have superintended and put up Mr. Perkins' high pressure safety engine. I also certify that what is stated by the above Engineers is true, and that it was done with only 42 lbs. of coal per hour. Having been engaged 22 years in making and putting up engines, principally in Cornwall, it is not likely that I could be deceived as to the power and efficacy of this engine, and I conscientiously believe that two-thirds of the coals used in this country might be saved by the use of this engine. HENRY HORNBLOWER.

"I, the undersigned, carefully weighed the coals and placed them under Mr. Perkins' generator, that 42 lbs. weight of coal only was used per hour. I also certify that what is stated by the above Engineer respecting the work done is true.

WILLIAM HEARNE.

"Mr. Perkins is of opinion that the two low pressure engines could not have been worked up to their full power, although they used the full quantity of coals, three and a quarter bushels per hour; but admitting they worked at only two-thirds of the power, there would be a saving of about three-fourths of the coal consumed in low pressure engines, by the employment of Mr. Perkins' new principle."

In the above experiments the difference in favor of my single stroke high pressure expansive and condensing engine was quite as great as that which exists between the Cornish and the Boulton and Watt engines. Does not this prove that the enormous gain is chiefly owing to the great superiority that the single stroke, high pressure, expansive and condensing engine, has over the low pressure, double stroke, condensing engine?

Not long since John Taylor, Esq. published an account of a great improvement which had been recently made in Cornwall. He stated that a single stroke, high pressure, exhausting engine, had been converted into a rotary engine, and that it was greatly superior to the double stroke engine, so much so that it astonished every one who witnessed its power. I could not at first comprehend what he meant by converting a single stroke engine into a rotary one. I finally concluded that a fly-wheel must have been substituted for the accommodating balance bob used for pumping in Cornwall. This conjecture I have since found to be correct.

Whether the engine uses the steam on one or both sides of the piston, they are both undoubtedly reciprocating engines, and are called by that name.

That the single stroke engine, worked by high steam and expansively, is a very great improvement, the above mentioned experiment fully demonstrates. The fact is, that the higher the steam can be practically used, and the sooner it is cut off, the greater is the economy.

I should mention that at the time these experiments were made at Saint Catherine's Dock, I had not overcome all my practical difficulties, for the generators would fur up and then burn out. I, however, had no reason to despair, for although the cost of wear and tear of the generators was greater than the common boilers, yet the saving otherwise was far greater. I have, however, recently been so fortunate as to remove all objections, by a new modification of the generators. I have good reason to believe that a voyage might be made to India and back without finding the boiler in the least foul, or perceptibly fire-worn.

I have not a doubt that two single stroke, high pressure, expanding engines, might be used to great advantage in steamboats, and that the time is not distant when it will be more economical for merchantmen to navigate by steam than by wind. It will undoubtedly be said by some that the power so applied would be too unequal. If a more equal, or rather continuous, power is wanted, why do not the barge-men of the men-of-wars gig, have some of their oars always in the water.

I have often been asked, why I did not follow up the patent, If I was satisfied that there was no fallacy in the result of my experiments. My answer has been, that very soon after I had completed those experiments my monied partner failed and died, and his creditors put the patent in chancery, where it now remains, and I was obliged to turn my attention to other means to obtain a living.

When this experimental engine was worked with steam at a pressure of between 300 and 400 lbs. to the inch, I believe the induction valve was not opened more than about $\frac{1}{16}$ part of the stroke, if so, the annexed diagram will show the great gain.

Let Figure 1* represent a steam cylinder divided into 16 parts. Let the steam at 200 lbs. per inch be admitted at the dead point. Now fill the first division, No. 1, then let the steam be cut off and it will at that point be 200 lbs. to the inch, next let it expand to No. 2, it will then be at 100 lbs. the mean will be 150. Again let it expand to double its space and it will occupy two of the divisions and leave off at 50, the mean 75 lbs., which amount to another 150 lbs. In expanding to 4, it will leave off at 25 lbs., the mean $37\frac{1}{2}$, the 4 divisions at $37\frac{1}{2}$ will give 150 lbs. more; after expanding down to 16 it will be only $12\frac{1}{2}$.

If the steam had been let into the cylinder at $12\frac{1}{2}$ lbs. per inch and continued so until the cylinder was filled with steam at that pressure, then the work done would be equal to 200 lbs. amounting to just the same weight of steam when at 200 lbs. to the inch in the first division, although the piston had made only $\frac{1}{16}$ of its stroke, the other $\frac{15}{16}$ of the stroke which was acting expansively, was clear profit.

It will be seen by diagram, Fig. 2* that although the steam on the piston is but $\frac{1}{16}$ part of the stroke, yet it was acting $\frac{1}{6}$ of the time; but what is the difference in the virtue of the two? it is as 800 to 200. This I do not say is mathematically correct, but I believe it to be near enough to give a pretty correct idea of the great practical advantage of using steam expansively if properly applied. Great credit is due to Hornblower, Trevethick, Wolf, and Evans the fathers of high steam. They elicited the spark which has since thrown such a lustre over the science of steam.

If I have done anything in the advancement of high steam, it is in consequence of witnessing the experiments of my countryman, Oliver Evans, the father of high steam in America.

The Editor has received the foregoing, from his friend, Mr. J. Perkins, together with two other papers upon the same subject, which will appear in the next number. He has also, from the same gentleman, some remarks upon steam engine explosions, controverting certain deductions made by the Committee of the Institute in their report upon that subject, which shall also appear, together with extracts from a letter which accompanied these papers, but which could not be prepared in time for this number. The letters and papers were delivered to the care of a gentleman, coming to this country, nearly twelve months since, but, from accidental causes, they have but just come to hand.

* Not forwarded, but see Vol. 4, p. 24, first series of this Journal.

Agriculture, &c.

From the Journal of the American Institute.

HINTS ON THE CULTIVATION OF THE MULBERRY, WITH SOME GENERAL OBSERVATIONS ON THE PRODUCTION OF SILK, BY LEWIS TINELLI, DOCTOR OF CIVIL LAW IN THE UNIVERSITY OF PAVIA, AND FORMERLY PROPRIETOR AND DIRECTOR OF A FILATURE OF SILK IN LOMBARDY.

Concluded.

"The young trees thus planted and manured, ought to be cut off, even with the ground, with an instrument having two cutting edges, and made in the form of pincers. At the end of a month the roots will have sent forth shoots, perhaps two feet high, if the season has been favorable, and rather wet. At this time, the diligent cultivator must watch to see that no parasite herbage grows among the mulberry plants; he will also give close attention to take off with his thumb the young buds that put forth along the stem, which ought to be clear and straight, in order to make a good tree at the age of three or four year. * * *

"When the seedlings of the nursery have acquired the thickness of an inch and a half in diameter, then is the time for taking them up, and transplanting them to their destined places in the fields. This operation is performed from the middle of March till the end of April; and requires considerable diligence, both in taking up the trees, so as not to spoil or damage the stem, and also in replanting them. It is necessary to cut carefully, with a well sharpened knife, all the branches of the young trees close to the stem, without, in so doing, inflicting any serious wound upon the tree. The stem should be cut to the height of about six feet. All the roots that have been a little injured, must be cut off. The trenches to receive these trees, vary from five to seven feet in width, according as the soil is more or less strong. In stiff and argillaceous ground, the trench ought to be larger, so that the roots, finding the earth soft and loosened, may the more easily extend themselves. If the trenches are prepared at the close of the previous autumn, they would be a great advantage. The depth should not exceed two feet, in order that the roots, not being too deeply buried, may feel the influence of the sun's rays. Horse dung, not too dry, and sheep dung, make the best manure.

"The cultivator will do well to put a stake, firmly driven into the ground, by the side of each tree recently planted, and tying the tree to it. The wind will thus have less power to disturb the tree, and draw the roots out of their proper places."

The engrafting by rings, is recommended, as giving strength to resist the winds:—choose a fine day in the beginning of May: select the shoots of the preceding year:—

"The branches from which the rings are to be taken, should be cut from the tree in the first fortnight of April, when the sap has ascended to the limbs, and to the very extremities of the branches. After having cut them off, it is the custom to bury them in sand, a little moistened, for fifteen days, in order to render the bark more flexible, and easier to be removed. The operation of inoculating is very easy, and may be learned with three hours exercise, after seeing it done by an able inoculator.

"During the whole year in which the inoculation has been performed, care is taken not to suffer any other shoots to grow than those which are inoculated, and which are intended to form the crown of the tree. All the other buds are gently rubbed off with the fingers. The following year, in the month of March, it is well done to cut the young engrafted branches, leaving three eyes between the place of inoculation and the extremity. This operation surprisingly concentrates the strength of the tree, which, the same spring, sends forth very flourishing branches.

"Generally, only three branches are left, which form, with their subaltern shoots, a fine crown or top to the tree. It is always useful to cut off the branches that have taken an ill direction, or become thorny, or too much weaken the plant. This ought, however, to be done only before the sap has recommenced its circulation; that is to say, between the beginning of February and the middle of March. At the same time all the little branches or extremities should be lopped off that have perished by the cold, or any other accident. Whenever a mulberry tree has become thorny, and languid in its vegetation—producing only yellowish leaves—not a moment should be lost in giving it a renewed strength, by pruning away all the branches, even the largest, close to the top of the trunk, which will be renewed by this operation, so as to put forth fine and vigorous shoots."

The culture of trees of low stature, are also recommended:

"This new method is now generally adopted in Italy, as the most advantageous under the circumstances. First, because the produce of the little mulberry is much earlier than that of the large ones; for in the third year they begin to gather the leaves from hedge rows, while six years are required before we can strip the large trees. Secondly, because the low trees, being more immediately affected by the warmth of the soil, commence to put forth their leaves fifteen days earlier than the large ones; which is certainly a very great advantage. Thirdly, the care of the low trees, and the gathering of the leaves, are left to children, which is a considerable saving of expense. The hedge rows, being also less exposed to the violence of the wind, and more within the effects of the manure, are less endangered by frost, and feel less sensibly the extremity of cold.

"The trees of low size, planted in hedge rows occupy the least possible space, while, at the same time, they supply a crop as perfect as those of greater height, and their leaves, extremely agreeable to the worm, furnish a silk of the first quality. For the purpose of making plantations of this kind, young trees of one year's growth are used. The hedges are planted in lines, extending the entire length of the field, and separated from each other by a space of six feet, in which it is usual to raise some other kind of produce, as Indian corn, potatoes, beans, turnips, &c. Each tree is planted at the distance of three feet from the rest; so that, in the space of an acre, or 43,560 square feet, it is practicably to raise two thousand four hundred and twenty of these small trees. They will yield, in their third year, at least two pounds of leaves each; and this quantity will be doubled annually, till the eight year, provided they are cultivated, attended to, and managed, as is requisite.

"Although the young trees, when planted, are furnished with very small roots, yet it is necessary to dig the trench, made to receive them, of considerable depth. It is usual to make it one foot and a half deep, and of the same breadth. When the little trees are set in the ground, the stems are cut so as to leave only three eyes above the ground. The branches from these eyes, are to be engrafted the following year, so as to give the leaves a perfect resemblance in their quality—an essential point which should never be left out of view, if we could wish to have a perfectly good produce.

"If the gathering of the leaves could be finished by the end of June, it would be very advantageous to the trees, because they would then have so much time, in the period of their second vegetation, to send forth fine branches for the next year's gathering. It is necessary, also, carefully to prune off all the smaller branches that have been broken or wounded, in the gathering of the leaves."

From Mr. T.'s remarks in his closing article, it would seem that what he has before stated, with respect to the most congenial soil for the mulberry, is not intended to apply to the *morus multicaulis*, inasmuch as he states, (p. 52,) that it does not require any particular soil as exclusively suitable to its growth—but prospers even in a wet soil, and puts forth its leaves sometimes earlier than other mulberries.

From the Journal of the American Institute.

SILK.—REPORT OF THE COMMITTEE ON AGRICULTURE TO THE LEGISLATURE OF OHIO.—PRESENTED BY MR. IHRIG.

The committee on agriculture, to whom has been referred the petitions of many citizens of this State, praying for the favorable interposition of the legislature to encourage the cultivation of silk, have had the subject under consideration, and now ask leave to report—

In commencing their investigation, your committee were induced to inquire into the fact, whether Ohio possessed any agricultural productions which, strictly considered, could be regarded as staple commodities, the permanent and continued cultivation of which would lead her to wealth and prosperity. We find on examination, that most countries of long established prosperity, have pursued the cultivation of some one leading article, which has lead its inhabitants to affluence and superiority. China cultivates her tea crop and her silk worms; Java her rice and her spices; Asia Minor, her olives; Turkey, her opium; France and Italy, their wines and silks; Spain, her wool and indigo; Ireland her flax; Russia, her hemp; and other countries of the old world, those various commodities which seem to be best adapted to their soils and climates. In the new world, Mexico is already famous for her cochineal, the West India Islands for their sugars and their fruits, and in our own happy land, many of these States are celebrated for their leading productions. Tobacco, cotton, coffee, hemp, and sugar, have already become staple commodities in our immediate vicinity. We are satisfied, that the production of these articles tend to increase those leading articles of food, which are so essential to the support of a population, and of consequence, that those States are the most wealthy who have introduced them. They form a sound basis for commercial prosperity. That nation or State who can exchange the greatest quantity of her produce for the money or produce of other countries, is most sure of a dense and wealthy population; and it is perhaps wisely ordained by Providence, that while the productions of other countries are made necessary to us for the full enjoyment of our comfort those nations are, in turn, obliged to depend upon us for some articles equally essential to them. In the mutual operation of supplying and of being supplied, lies the principle of commercial prosperity; and the greater the surplus produce to be exported from a country, the greater must be its wealth and prosperity. It therefore, becomes necessary to seek out and to adopt some leading article, suited to the soil and climate, valuable in itself, easy of production, and proper alike for home and foreign consumption. Your committee are grateful, that while this State is possessed of a mild and salubrious climate, and a fertile soil, it is surrounded by navigable waters, giving it immense commercial advantages; that it contains within itself almost unlimited sources of agricultural wealth; that there are very many of the boasted productions of foreign climes, which the hardy and virtuous yeomanry of Ohio may, by industry, produce from her genial soil; and they trust that the time is rapidly advancing, when their favorite State will no longer depend upon foreign countries for many of these commodities. They have, however, looked in vain through this State, for any great leading staple of production, other than those which are intended for food; and in the production of these articles, they cannot observe that Ohio possesses advantages, either of soil or climate, which will, in future time, render her eminently superior to her neighbors; but they believe that the time has now arrived, when many of her citizens, if properly and prudently supported by the legislature, may be induced to commence operations which will permanently establish some of them within your borders. The culture of silk, and of the sugar beet, which are the sources of national wealth in other countries, it is believed, may be successfully and profitably pursued here. Our soil has been found to be peculiarly adapted to the mulberry in all its varieties; and the silk worm, wherever it has been fed among us, has always produced an article equal to the produce of other lands. We consider it as settled, that we may produce silk, in any reasonable quantities, and of good quality, without interfering with any other of the branches of domestic industry.

The labor requisite to make the crop, is of that character which has of late become least available in our country, from the rapid introduction of machinery; and we are satisfied, that it is not the least pleasing and valuable feature of this business, that it may be attended to entirely by the females, children, and infirm persons of the State, while the farmer and his able-bodied laborers are attending to their ordinary avocations; and that thus, while all are enabled to do something towards the general welfare, each one is laying up for himself a comfortable independence.

Your committee are satisfied, that this article, when produced in large quantities among us, as it must sometimes be, will always find a ready and profitable market. The consumption of silk annually, is astonishing, and without inquiring as to the enormous quantities consumed in foreign countries, we think it only necessary to state, that the importation of manufactured silk goods into this country during the year 1835, exceeded the sum of $17,800,000, while the raw silk, prepared for the manufacturer, and which was the subject of trade to our merchants, was imported to the value of $10,000,000. This amount which is annually increasing, is taken from our country either in money or in produce, and might as readily be kept at home, if we should raise and manufacture our own articles. In addition to this domestic market, Europe offers a field of no mean importance. Great Britain, Russia, and the other northern powers, from the determined inhospitality of their climates, can produce no silk. England alone manufactures more than $30,000,000 worth of raw silk, raised in foreign countries, and it is stated on good authority, that more than 400,000 of her citizens derive their support from this source. Even France, which is, perhaps, the greatest silk producing district of the world, requires aid from foreign countries in the supply of the raw material, to an amount exceeding $5,000,000 annually.

It is found that the consumption of this valuable commodity is increasing every where, as well as in the United States, and it is stated that France, with her immense manufacturing capital and power, is unable to meet the demand of our market alone for the current year.

Your committee have been induced to inquire, whether the citizens of these western States, and of Ohio in particular, are able to compete to advantage in the markets of the eastern or Atlantic cities, with eastern agriculturists in the articles which they now raise. They are disposed to take it for granted, that the surplus productions of the west must, in time, seek a market in the east; and they look upon the construction of canals and railroads, by eastern capitalists, as a step to secure this golden prize. It is an unquestionable fact, that much of our land is more fertile than that of the east, and of consequence, that our crops are more abundant, yielding a greater return for the labor expended. But yet the articles produced are all of considerable bulk and weight; and to convey them to the east, will all the advantages of railroads and steamboats, must ever be attended with a burdensome expense, amounting almost to a prohibition of many of the most important of them. The eastern farmer, with his market at hand, can thus immediately convert his crop into money, and his inhospitable soil is, in fact, made to yield him a greater profit, although a smaller crop, than can be realized by the western farmer.

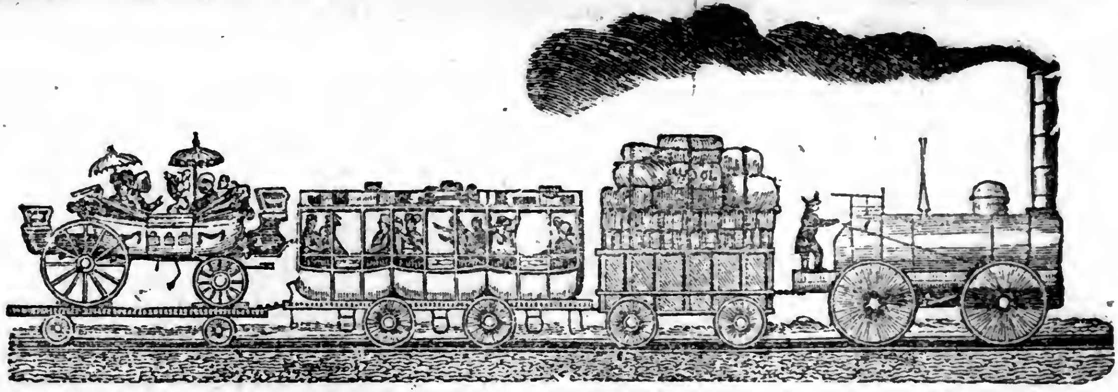
We are, however, satisfied that the farmers of this State can introduce crops, which are of themselves intrinsically valuable. small in bulk, and easy of transportation, on which the freight would be an unimportant item; and that then the farmer of Ohio, with his more fertile soil and greater crop, may compete successfully with the eastern agriculturist. In this view, they regard the culture of silk as eminently entitled to consideration; affording, as it does, a crop of great intrinsic value, and of easy conveyance. The expense of transporting flour to New-York, is one cent per pound, while the expense of conveying silk would be the same, the value of the one being diminished twelve and a half per cent. by transportation, the other one fourth per cent. in consequence of the great difference in their intrinsic value. In this view of the case, which we deem of much importance, the introduction of the silk culture is eminently worthy of consideration.

We are also of opinion, that the introduction of this crop would be further beneficial to the community, by calling into operation, within our borders, capital for manufacturing purposes, now seeking investment in other places. And that very considerable numbers of our population would thus find permanent and profitable employment.

We find that, in several States of this Union, this subject has been considered of so much importance, as to receive the favorable interposition of several legislatures; and that such aid has always resulted beneficially to those States, while it has been an incentive to those engaged in the business. Your committee. having in view the large number of petitions which are before them, and the very respectable list of signatures to these petitions, have been at a loss how to extend to this business any encouragement, except by proposing to the legislature a bill, offering to those engaging in the business, a small premium or bounty, for a limited time; and this they do the more willingly, as they are satisfied of the justice and propriety of the course, and because they find before them the example of other States, in which this system has become a fixed and determined policy. They are also induced to do so, because they find that investments in the silk culture, unlike most other kinds of agricultural business, cannot be made to yield an immediate return. Orchards must be planted, proper buildings erected, and other preliminaries attended to, necessarily requiring some few years of time before any adequate return can be anticipated, and this premium is, therefore, asked for by the petitioners, and recommended by your committee, as a small compensation to those who are willing thus to invest their means.

BUCKWHEAT.—Let no Farmer who has ground to spare, neglect to put in a few acres of this excellent grain; while its flour commands a ready sale and good price, its straw is among the best hay that he can give to his milch cows.

Advertisements.



AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] | SATURDAY, JULY 8, 1837. | VOLUME VI—No. 27.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JULY 8, 1837.

The following article from the Long Island Star, should be read by every young man who would be the architect of his own fortune.

THE CERTAIN REWARDS OF INDUSTRY.—We remember reading some time since, the memoirs of a certain bookseller, named *Lackington*, who lived in London. He was early apprenticed to a shoemaker, and industriously served out his apprenticeship. He pursued this vocation for some time afterwards, working at various places for a bare subsistance, and at length married a wife as poor as himself. They endured sickness and privation. At length Lackington, who had some penchant for bookselling, opened a shop in an obscure part of London, with a few books on divinity, and at the same time wrought at his trade. He made a few pounds, and gaining confidence, entered upon bookselling altogether. He continued to grow prosperous. His store at length became immense, he rode in his coach, and died exactly at the age of three score and ten.

The story of Lackington may be of much use to society.—It resembles in some points that of our countryman Franklin, but still Lackington was a very different man from the American philosopher. He never would have encountered any hazard in the pursuit of science. "His soul proud science never taught to stray." He kept plodding onward, in the accustomed rotine of his business, and leaves his history as an example of the benefits of quietly sticking to the shop.

Of late years with us, as with the olden nations, the pursuits of humble industry seem to have been despised. Many have been led to look to sudden means of obtaining wealth, and have turned from the beaten track of soil, to untrial but more attractive paths. Some have been lost and many bewildered, and those who are able to find their way back to the quiet duties of useful stations, will not soon be likely to violate the rules of prudence, for the sake of trying ambitious experiments.

Even in countries where aristocratic distinctions prevail, great respect is paid to men of substantial character, who can show that by labor, and patience, and self-denial, at the outset, they have at length conquered fortune and acquired the control of wealth. Such individuals, too, feel the comfort of that characteristic of mind which is called *independence*. They have wrought for themselves—they have risen by their own exertion—they sustain themselves upon their own wings. Such independence should be the common exertion.

It is becoming too general with the people of this country, to despise the occupations which require labor. Men would have their children tenth-rate professional men, or *mere nullities*, rather than turn their minds to useful trades. We need not enforce the principle, that it is better to encourage humble desires and more useful aspirations. If the mind, after the body has been disciplined and suited to habits of patient toil, rises, to a different and higher range of duties, the humility from which it arose, but adds to the pride and elevation of its soaring.

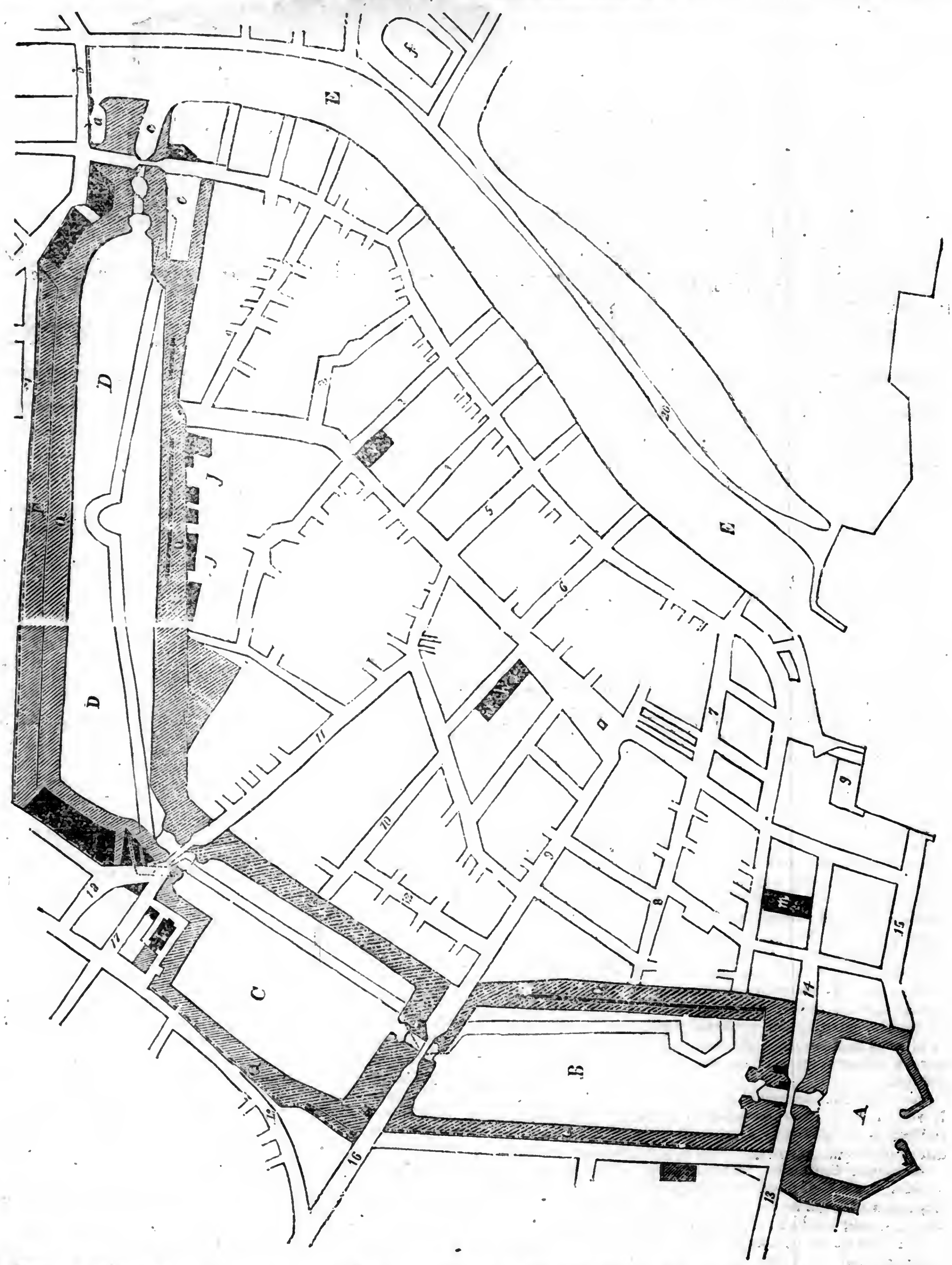
The great aim of every man should be, to render himself useful; and every man who has the steadfastness which will enable him to go perseveringly through the labor of a few years, may attain competency almost with the certainty of a mathematical demonstration. In order to follow out the plan, there must be a resistance of all temptation to turn aside, a ready submission to unavoidable disasters, a continual effort to build up and increase—in brief, an unyielding desire and effort to do one's duty to society, in the regular pursuit of a useful vocation.

We think it would be of benefit to many readers if a new edition of the life of Lackington, were published; for while the moral of his industry is very forcible, the moral of some of his errors is not less so. He suffered from being induced to act the politician—he felt the effects of time and spirit sacrificed at conventicles.

The life of FRANKLIN is one not less than his of *constant industry*, but it is characterized by the further efforts of mind and genius, which, without diverting him from his practical pursuits, enlarged the sphere of his usefulness.

PROFESSOR AZELIUS.—Professor Adam Azelius, the Nestor of scientific men in Sweden, died at Upsal, on the 30th of last January, aged 86 years. He was the last pupil of Linnæus, and was celebrated for his travels in Asia and Africa. His brothers, John and Peter, the first devoted to chemistry, and the second to medicine, are both distinguished for their talents, and have, for nearly half a century, occupied chairs in the University of Upsal.—[Athenæum.]

WET DOCKS AT KINGSTON-UPON-HULL.



A. Basin; B, Humber Dock; C, Junction Dock; D D, Old Dock; E E, the Old Harbor; F, Timber Yards; J J, Warehouses; Q Q Q Q Q. Quays; a, Dry Dock; b, New Bridge; d, Dock House; e, Bonding Dock; f, Pond; g, Ship Yard; h, Church; i, St. Mary's; 1, Salt House Lane; 2 George Yard; 3, Chapel Lane; 4, Bishop Lane; 5, Seale Lane; 6, Church Lane; 7, Blackfriars Gate; 8, Blanket Row; 9, Myron Gate; 10, Postern Gate; 11, Whitefriars Gate; 12, Dagger Lane, 13, New Road; 14, Wellington-street: 15, Nelson-st.; 16, Castle-st.; 17, Carr Lane; 18, Waterworks Lane; 19. Waterhouse Lane; 20, Garrison Road.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS

XXVII. AN ACCOUNT OF THE HARBOR AND DOCKS AT KINGSTON-UPON HULL. BY MR. TIMPERLEY, RESIDENT ENGINEER TO THE HULL DOCK COMPANY. COMMUNICATED BY THE PRESIDENT, JAMES WALKER, ESQ. F. R. S., L & E.

THE OLD HARBOR.

The river Hull, according to Mr. Tickell, the historian of the town, formerly discharged itself into the Humber between Drypool and Marfleet, and that part of the present river usually called the Old Harbor, was originally no more than an open drain cut by Lord Sayer of Sallon, for the purpose of draining the country.

This harbor, from the north bridge to its junction with the Humber, was the original and, previously to the construction of the docks, the only port for the town; its direction is nearly north and south, its length from the bridge to the end of the Garrison Jetty, 2940 feet, and the average width within the staiths, at high water of spring tides, 165 feet; the area is therefore about eleven acres, and the depth is 22 feet.

As trade and commerce increased, the harbor became insufficient to contain all the vessels that frequented the port, many of which were therefore obliged to receive and deliver their cargoes whilst lying in the roads, by means of craft, and so crowded was it at times, that even up to the period of the Junction Dock being made, ships have been known to be twenty tides or more in passing from the Humber to the Old dock. But the crowded state of the harbor, and the consequent delay in getting to and from the quays, were not the only inconveniences; for, from its being an open tideway, all vessels drawing more than four or five feet water grounded every tide; so that damage was frequently sustained, particularly by such as were sharply built and deeply laden. Complaints were also made by the officers of the Customs from time to time, of the great risk and difficulty in collecting the duties, whereby, it was stated, the revenue suffered very materially, and this ultimately led to the formation of the Old dock.

It should also be observed, that for some hours before low water, the current is so strong as to be unnavigable for vessels against the tide, and those passing with the stream are frequently injured; the fall or declivity from the outer end of the Old dock basin to the harbor mouth, at low water spring tides, being in general from four to five feet, and sometimes more, and the velocity of the ebb at such times from three to four miles an hour.

Before the Old dock was begun, transverse sections were taken of the harbor by Smeaton and Grundy, from which we find that the depth of water is now about the same as it was at that time, but the river is much narrower near its junction with the Humber; this diminution in the width has taken place since the Humber dock was made, from the free course of the tide, obstructed and retarded by the projection into river the of the quays and piers of the basin causing a great accumulation of mud upon the shore for a considerable distance, both above and below the entrance to the Humber dock: and the mouth of the harbor has not only been narrowed by these works, but has been extended further into the Humber, and a new direction considerably to the westward given to it.

The harbor is scoured entirely by its back waters, of which the principal supply in summer is from the river Hull, which extends into the East Riding about twenty miles, and is navigable for vessels of fifty tons' burden; but in winter, the drainage from the extensive level of the Holderness and the low land on the west side of the river, has been, for a long time, a very powerful auxiliary in maintaining the depth.

For the convenience of vessels entering, two dolphins have been erected upon the Humber, to the east of the harbor mouth, the last in consequence of this part of the beach sanding up, as before noticed; and there is a jetty or small pier with the necessary mooring posts, and two transport buoys a little to the south of the dolphins. In former times a chain was stretched across the entrance of the harbor, and a small charge made for all vessels passing in or out, but this restriction and impost have been discontinued for many years.

On each side of the harbor, for nearly its whole length, there are staiths or platforms, fifteen feet wide, for loading and delivering vessels; they are private property, and in order not to obstruct the free course of the tide, are (in pursuance of an act of parliament) formed of large piles driven firmly into the ground, upon which are laid transverse beams, covered with close planking. Cranes are fixed on these staiths, and on the town side there is an extensive range of private warehouses for sufferance goods.

Tides. The time of high water at Hull at the full and change of the moon, is six o'clock, but the highest tides are generally two or three days afterwards; the flow or rise of an average spring tide is about 21 feet at the harbor mouth, and 17 feet at the entrance to the Old dock; that of an average neap tide, 12 feet at the harbor mouth, and 9 feet opposite the Old dock entrance: but it may be observed, that the tides occasionally rise three to four feet higher, and sometimes, though rarely a little more, and ebb sometimes two feet or more, lower than stated above. It may be proper to notice also, that when there are many vessels in the harbor, the ebb is not so low by nearly a foot, as when it is clear of shipping. The tide flows about five hours at the harbor mouth, and four hours and a half at the entrance of the Old dock.

THE OLD DOCK.

In consequence of the confined state of the old harbor and other inconveniences already briefly noticed, application had been made to government a few years before obtaining the Act for making the Old dock, for a grant of part of the King's works near the Garrison, for the purpose of enlarging the harbor; but, as a legal quay formed no part of the scheme, it was opposed by the board of Customs, and nothing further was done. Some time after however, it was intimated to the Collector and Comptroller of Customs at the port, that if a dock and legal quay were not made at Hull, the business would be removed to some other port connected with the Humber disposed to conform to these regulations; and a memorial was in consequence presented by the merchants of Gainsborough, praying that a legal quay might be established at that place.

It was now evident that something must be done to preserve the trade of the port, and it was at length resolved that the wishes of government as to a dock and legal quay should be complied with; but there appears to have been great difficulty in obtaining an adequate subscription, and it was some time before this desirable object could be accomplished. The shareholders employed Mr. Grundy, the engineer, to furnish designs and an estimate for the work, which being approved of, and the necessary arrangements completed, application was made to parliament and an Act obtained in April, 1774, soon after which the work was begun.

At that period works of this kind were in their infancy, and we must not therefore look for the degree of perfection, either in design or execution, which has distinguished those of more recent times.

The Old dock, which appears to have been judiciously planned and laid out, is

Dimensions of dock. 1703 feet long, by 254 feet wide, so that the superficial content is nearly ten acres, and therefore capable of containing a hundred square rigged vessels; it was the largest dock in the kingdom at the time.

Excavation. According to the sections the excavation averaged about 15 feet, the bottom of the dock being 15 inches above the bed of the old harbor opposite the entrance. The soil, which was altogether alluvial, was deposited upon land chiefly on the north side, and partly purchased for the purpose, which being raised thereby about five feet, and afterwards sold by the Dock Company, is now the site of several principal streets.

Dock walls. Plan No. 2. The walls are founded upon piling of a novel description, but very inadequate to the purpose: the piles, which are 12 inches wide by 9 inches thick at the top tapering regularly to 3 inches at the bottom, are driven under the walls and counterforts, longitudinal sleepers, 12 inches wide by 6 inches deep, treenailed on the pile heads, and 3 inch transverse planking laid and spiked down on them: the whole is of fir timber, and laid perfectly level.

The walls are wholly of bricks, many of them made upon the spot, coped with Bramley-fall stone, 12 inches thick, and 3 feet wide. They were built and grouted with mortar made of Warmsworth lime and sand, part of which was fresh water sand, and the rest selected from the excavation; the brickwork, for 14 inches in depth, is at right angles to the face, the rest of the wall horizontal,—a mode of laying by no means to be recommended, as the front is thereby completely separated from the other part of the wall, and the bond, a most essential part of all building, thus entirely destroyed.

In front of the wall, at intervals of ten feet, oak fenders 9 inches wide, and projecting 7½ inches, are tenoned into three oak sills, 12 inches by 6 inches, built in the brickwork, and bolted and further secured to them by oak brackets spiked on each side.

From the insufficiency of the piling, and the foundation, which was only level with the bottom of the dock, not being low enough, the walls have subsided, and been forced forward in several places by the pressure of the earth behind; the greatest derangement is on the north side near the east end, noticed by Smeaton in his reports as being at that time 2 feet 8½ inches out of a straight line in a length of 187 yards, and found by recent measurement to be now 3 feet 10 inches out in 202 yards, or about a foot more than when examined by Smeaton shortly before the opening of the dock: the wall on the south side nearly opposite the above, for 103 yards in length, is also forced forward about 20 inches in the worst place: the rest of the dock walls are nearly as straight as when first built. This wall has given way at different times, (probably from the quays being overloaded,) and in several places eleven or twelve feet at top have been taken down and re built; piles have also been driven down in front of the wall, and a cap sill with transverse planking laid thereon, upon which the new wall has been erected; this has answered the purpose, and as a further security a mass of well rammed clay has been lately deposited at the foot of the weakest parts of the wall.

Lock and basin. The original lock was 200 feet in extreme length, and 36 feet 6 inches wide, by 24 feet 6 inches deep; there were six rows of grooved sheet piling 14 feet long across the lock, which was founded on 1245 bearing piles 12 feet long, of a similar description to those for the dock walls, and on these longitudinal and transverse beams were laid, and covered with 4 inch planking, so as to form a wooden floor, which was the customary mode of building at that time.

The lock walls were built with bricks, faced with Mexborough stone, from 10 inches to 3 feet, or, on an average, 18 inches deep in the bed, with occasional *through* stones to bind the work together; the hollow quoins and coping were of Bramley-fall stone, the faces of which were set in pozzuolana mortar, as also the front masonry: the gates were made of English oak, in an arched form, and but 12 inches thick, including the planking. There was only one clough or slice, 3 feet by 18 inches, in each gate, which did not give sufficient power to cleanse the lock and basin, without having recourse to a small lighter and drag to loosen and remove the mud whilst scouring.

There was a common wooden drawbridge on the Dutch plan, over the end of the lock.

The basin to this dock was originally 212 feet long, and 80 feet wide, with brick walls like the dock, but the wall on the north side, from some defect in the foundation, gave way before it was finished, and was in consequence never raised to its full height, a sort of timber platform being erected on it, which remained till the basin was rebuilt in 1815.

The foundations of the lock walls were also insufficiently piled, as appears from Smeatons Report, in which it is stated that, "respecting the walls of the lock they have the appearance of being well built; we, however, observe some small sets therein which we impute to the want of strength in the foundation timbers." He furthers says, "that the floor of the chamber had risen about three inches in the middle, and that of the platform to the gates from two to four inches."

In the course of seven or eight years after the lock was built, the walls had yielded so much as to require to be taken down about 12 feet from the top; one side was rebuilt in 1785, and the other the following year.

Quays. The quays are spacious and paved with pebbles from Spurn Point. A legal quay extends on the south side of this dock from the river Hull to Whitefriar-Gate Lock, a length of 1558 ft., and contains an area of 18,160 square yds., the superficial content of the whole quayage being about 29,000 square yards.

Moorings. The mooring posts to this dock were originally of oak, 15 to 18 inches diameter at the top, 2 or 3 feet above the quay, and 8 or 9 feet in the ground, with two oak land ties, each 20 feet long, the ends of which were secured by cross timbers, and two piles to each; the posts are 12 feet from the side of the dock, and 14 or fifteen yards asunder. A very high wind arising one night, soon after the dock was made, the ships moored in the evening on one side were found next morning on the other, having dragged several of the mooring posts along with them, a plain indication that these posts had not been very securely fixed. I understand that several of the posts were renewed about twenty years ago, but there are a great many of the original ones still standing, though the parts above ground are generally in a very dilapidated state, and much worn by the mooring ropes and chains. In taking up several of these we found them, excepting the sap and about an inch of the heart on the outside, very sound and good, to within two or three feet of the ground; but the land ties, though also of oak, being within two or three feet of the surface, were generally a good deal decayed; some few which were of elm were completely rotten. In most cases the decayed wooden moorings have been replaced by stone ones, either of Peterhead granite, or a sort of free stone from near Rotherham, about 2 feet 6 inches above ground, 18 to 20 inches diameter at top, and 15 to 17 inches at the surface: by being thus tapered downwards, they have been so weakened, as to be occasionally broken off by the shipping in very windy weather. The part of the stone in the ground is about 2 feet square, and 6 to 8 feet long, set upon oak plank, and secured by land ties similar to the wood posts.

Sheds, warehouses, and cranes. There are two sheds upon the legal quay 13 feet from the dock, 23 feet wide, and together 635 feet long, with doors at regular intervals on the south side, and small openings or shutters for the admission of light; the north side is quite open. The long shed was erected immediately after the opening of the dock; the other, several years later.

A little to the south of the sheds, on the extremity of the Company's land, stands a range of warehouses, 345 feet long, of irregular breadths, consisting of three floors besides the cellars, and comprising a space of about 2250 square yards. The cellars are all arched with brick, and there are six cranes to these warehouses, which being the only ones belonging to the Company, are now used indiscriminately for all the docks, a railroad being laid down nearly their whole length, for the conveyance of goods between the warehouses and the shipping in the different docks.

There are six wooden cranes to this dock, four on the south side, and two on the north; the latter are *well* cranes, very lofty, fixed about six feet from the side of the quay, and calculated to lift four or five tons: the others are of a lighter description, the jibs close to the dock, and supported by frame-work in the old fashioned way; one of these is worked by a tread-wheel.

Mud in dock. Various schemes had been suggested for cleansing the dock of the mud brought in by the tide; one was by making reservoirs in the fortifications of old town ditches, with the requisite sluices, by means of which the mud was to be scoured out at low water; another by cutting a canal to the Humber, from the west end of the dock, where sluices had been provided, and put down for the purpose, when it was proposed to divert the ebb tide from the river Hull along the dock, and through the sluices and canal into the Humber, and so produce a current sufficient, with a little manual assistance, to carry away the mud. Both of these schemes were however abandoned, and the plan of a horse dredging machine adopted; this work began about four years after the Old dock was completed, and continued until after the opening of the Junction dock. The machine was contained in a square and flat bottomed vessel 61 feet 6 inches long, 22 feet 6 inches wide, and drawing 4 feet water, it at first had only eleven buckets, calculated to work in 14 feet water, in which state it remained till 1814, when two buckets were added so as to work in 17 feet water, and in 1827 a further addition of four buckets was made, giving seventeen altogether, which enabled it to work in the highest spring tides. The machine was attended by three men, and worked by two horses, which did it at first with ease, but since the addition of the last four buckets, the work has been exceedingly hard.

There were generally six mud boats employed in this dock before the Humber dock was made; since which there have been only four, containing, when fully laden, about 180 tons, and usually filled in about six or seven hours; they are then taken down the old harbor and discharged in the Humber at about a hundred fathoms beyond low water mark, after which they are brought back into the dock, sometimes in three or four hours, but generally more.—The mud engine has been usually employed seven or eight months in the year, commencing work in April or May.

The quantity of mud raised prior to the

opening of the Junction dock, varied from 12,000 to 29,000 tons, and averaged 19,000 tons per annum; except for a few years before the rebuilding of the Old lock, when from the bad and leaky state of the gates, a greater supply of water was required for the dock, and the average yearly quantity was about 25,000 tons. As the Junction dock, and in part also the Humber dock, are now supplied from this source, a greater quantity of water flows through the Old dock, and the mud removed has of late been about 23,000 tons a year.

It may be observed, that the greatest quantity of mud is brought into the dock during spring tides, and particularly in dry seasons, when there is not much fresh water in the Hull; in neap tides, and during freshes in the river, very little mud comes in.

Town sewers. There are two sluices in this dock, for scouring the town sewers; both on the south side, one being opposite the end of Low-Gate, the other near the Whitefriar-Gate lock; they consist of a cast iron clough 3 feet 2 inches wide by 2 feet 11 inches high worked in a groove by means of a screw, with a conduit, also of cast iron, 3 feet wide by 2 feet 6 inches high, the bottom being about 9 feet below the dock coping.

Dock opened. By the Act of Parliament seven years were allowed for finishing this dock, but by great exertions the work was completed in four years, and the dock was opened on the 22d of September, 1778.

Rebuilding of lock and basin. The next improvement in the order of time, was the Humber dock; but as an important part of the work connected with the Old dock, namely, the entrance lock and basin, has since been completely rebuilt on an improved plan, it may be advisable to give a brief description thereof before proceeding to the Humber dock.

State of old work. This reconstruction became necessary in the early part of 1814, from the ruinous state in which the lock then was. The water being drawn out of the dock to within four or five feet of the bottom, a coffer dam formed at the outer end of the basin adjoining the harbor, and a temporary dam of clay three or four feet above the surface of the water, on the side next the dock, the lock and basin walls were taken down, and it was found that the stone facing was much decayed, the mortar almost entirely washed out of the joints, particularly above high water of neap tides, and the walls greatly defaced by the coal hooks and stowers used in passing vessels through the lock: below the level of neap tides the stone was in a better state of preservation, but from its softness was a little worn away by the shipping; the hollow quoins which had been forced forward were in a bad state, and caused a great quantity of water to be wasted. The piles, sleepers, and planking, in the bottom of the lock and foundations, were all perfectly sound; the nails and small spikes were much wasted, but a great many of the large spikes and bolts were so little corroded, that they were used again in the construction of the new lock; the foundations had however sunk, by which the upper part of the wall was brought forward, and the timbers of the floor were several inches higher in the middle than at the sides.

The gates, which, when new, were much too slight, had become actually dangerous, although there had been new head posts to them all: and when they were taken up, the mortices, tenons, and iron fastenings were so bad, that they literally dropped to pieces.

The basin walls and foundations were in much the same state as the lock; but the front piles were pressed down by the superincumbent weight, in some places 18 inches lower than the back ones, and the top of the wall bulged out in consequence. The ground in this part appears to have been particularly soft.

New lock. The ground having been cleared, the rebuilding of the lock was begun in May, 1814, from the design and under the direction of the late Mr. Rennie, Mr. George Miller being the company's resident engineer. This lock is 120 feet 9 inches long within the gates, 24 feet 6 inches high above the pointing sills, and 38 feet wide at the top, being 18 inches wider than the original lock: the foundation and walls are nearly the same as in the Humber dock lock, which will be more particularly described hereafter; but it should be observed that all the old piles remained to strengthen the foundation. The inverted arch is built with bricks set in pozzuolana mortar, as also the side walls, which are faced with Bramley fall stone, the first or lowest course being all headers 4 feet in the bed by 18 inches thick; the hollow quoins came from near Rotherham, and are set in the same mortar; the backing or body of the wall is brick work, with one entire *through* course and occasional *through* stones besides, set and grouted in common mortar; and the coping is of Brainley-fall stone, 4 feet wide by 15 inches thick, joined together with stone dowels. This lock appears substantially and well built.

Gates. The gates, except the planking which is $2\frac{1}{2}$ inch fir, are all of English oak, and are each 23 feet wide, 24 feet and 3 inches high above the pointing sill, 16 inches thick at the heel, and $14\frac{1}{2}$ inches at the head, including the close planking: there are ten bars or ribs of a curved form, the versed sine of which is 12 inches in the inside, tenoned into the head and heel posts, and further secured by wrought iron straps and screw bolts in the usual way: the two gate sluices of cast iron are 2 feet 6 inches square in the clear, and are worked by a wrought iron screw and brass nut, with bevel gear at top. The gates are moved by machinery on the sides of the lock, turning a cast iron roller, round which the chain revolves; these chains are all of $\frac{7}{8}$ inch iron, and are fixed from two to four feet above the bottom sill for shutting, and 7 feet for opening the gates, the latter operation being assisted by a counterbalance weight to prevent the chains from running off the roller. There are one horizontal and two vertical rollers fixed in the front of the lock walls about ten feet above the sill, with another large horizontal one at the foot of each wall, round which the chains turn in working the gates. A cast iron socket in the bottom of the heel post $3\frac{1}{2}$ inches diameter, by $1\frac{3}{4}$ inch deep, turns upon a cast iron pivot fixed on the platform; and a friction roller of brass (by which the gate moves on a cast iron segment in the bottom) 10 inches diameter by 4 inches wide, is fixed in a cast iron box or frame near the meeting post, with a wrought iron regulating rod reaching up to near the top of the gate, for adjusting the roller to the proper height. The gate is secured at top by means of a cast iron anchor with wrought iron collar in the common way.

From the frequent working of the gates the pivot and socket on which they turn at the bottom wear away, in which case the gates are occasionally lifted up a little by screws, and a piece of hard brass about an inch thick is nicely fitted into the socket, to restore the original height.

Balance bridge. The bridge over the lock is of cast iron, on the lifting principle, and 15 feet wide, the carriage way being 7 feet 6 inches, and the foot ways 3 feet 6 inches each; the whole length is 81 feet. The bridge consists of six ribs, $1\frac{1}{2}$ inch thick in the plain part, and 3 inches at the edge or flanch, 9 inches deep at the meeting or middle, increasing, though not regularly, towards the sides, and it turns on a cast iron shaft or main axis 8 inches square, with four round bearings working in plummer blocks, fixed in cast iron carriages, bolted to the masonry of the lock. When the bridge is to be opened, a cast iron flap, turning on an axis $4\frac{1}{2}$ inches square, is lifted by a lever, in order to give room for it to rise: this flap forms at the same time a guard or barrier against passengers, and after the bridge is lowered into its place it is let down and forms part of the roadway. The bridge is covered with 3 inch oak plank laid across and bolted to the ribs; in the carriage way the planks are, for preservation, overlaid with $1\frac{1}{2}$ inch fir or elm boards which are renewed from time to time, and the foot paths are covered with similar boards on oak joists, elevated about five inches above the carriage way, with a cast iron curb on each side, and wrought iron stanchions and chains as a fence on the outside. In lowering the bridge, when first erected, one of the outside ribs was broken by striking against the under side of the fixed planking at the outer end; this was repaired by bolting a cast iron plate to one side, and for greater security all the ribs were afterwards strengthened in the same manner. It will be understood, from the principle of this bridge, that as it is raised, the outer end descends into a quadrantal pit or cavity, which, to ensure proper working, it is essential should be kept clear of water. The machinery is similar to that of the Junction dock bridges, which will be more particularly described afterwards; one man *can* raise or lower each leaf in half a minute, but two men with the greatest ease.

From a small yielding of the walls, the bridges was forced from its bearings on both sides, by which the weight of the carriages passing over it was thrown upon the main shaft; this has lately been remidied by cramping wrought iron plates, ¾ inch thick, to the bearings of each rib. This bridge, the first of the kind erected in Hull, was cast and put up by Messrs. Ayden and Etwell, of the Shelf Iron Works near Bradford, and weighs, exclusive of the wood work, about eighty tons.

Basin. The entrance basin is 213 feet long by 80 feet 6 inches wide at the top, 71 feet at the bottom, and the same depth as the dock. The walls are of brick with a Bramley-fall stone coping, a *through* course 14 feet from the bottom, and oak fenders on the same plan as the Humber dock; the walls are supported at foot by means of brick inverted arches across the bottom 6 feet wide by 18 inches deep, with spaces ten feet wide between, and the whole is covered with earth to nearly the level of the lock sills.

Re-opened. This lock and basin were finished and re-opened on the 13th of November, 1815.

Lockage. With a rising tide, it is usual to begin locking when there is a depth of 6 to 7 feet on the sill, and when required, five pens can be made before the water is level inside and out; the gates are then all opened, and large ships passed at the top of the tide, after which they are again closed; but the penning is frequently resumed, until the water has fallen to about 7 feet on the sill, by which time five pens more have been made. Seven or eight hours a tide are thus occupied in locking; and when business presses, this is done during both tides. If there are many large vessels to pass, it is sometimes found necessary to draw off the water one or two feet, so that the surface on the two sides may become level sooner, and the gates continue longer open, of which advantage is also taken to pass craft without the labor and delay of lockage; but this practice is never resorted to, except in cases of necessity, as the deposite of mud in the dock is much increased by it, the water abstracted, which is comparatively pure from time having been allowed for subsidence, being replaced by the very muddy water of the tide. In busy times, the gates have also sometimes to be kept open for a short time after high water, and in neap tides doing so is unobjectionable, but in springs it ought to be avoided, as from there being then a considerable current through the lock, when the tide has begun to ebb, there is some difficulty and risk in shutting them.

State of dock walls. Before concluding this brief account of the Old dock, it may not be deemed irrelevant to point out the state of the walls and foundations, as found in executing the Junction Dock, when they were taken down, at the western extremity, as far as the north gates of the Whitefriar-Gate Lock.

The timber and planking of the foundations were perfectly sound, and the spikes also generally in a good state; but the oak fenders were decayed and a good deal bruised and worn away at the upper part by the vessels; new tops had been scarved to many, but the part of the fenders below an average tide, say eight or nine feet under the coping, as well as the sills and brackets for securing them, were generally sound, the sap and a little of the outside excepted.

The front of the wall for about the same depth had but an indifferent appearance, the bricks being in places much decayed and rubbed away by the vessels, and the mortar washed out of the joints; but below this the bricks were generally in a much better state, and the pointing nearly entire. It has been before observed that the mortar for this wall was made partly from sand dug out of the dock, which was far from being of the best quality; the interior of the wall was grouted, and not very sparingly, as in some places the mortar was found nearly as thick as the bricks. The mortar in the inside of the wall varied very much in quality according to circumstances; where the wall was solid and undisturbed, it was very hard, requiring picks, and in many places sledges and wedges, to take it down; but where the wall had given way or been otherwise disturbed, and cracks and cavities thus caused in the inside, the mortar was in general very soft. This was observed in a variety of places, and it was not uncommon to see the mortar in one part of the all exceedingly hard and good, and within a few inches from it, where the wall was open and the water had found its way, quite soft and bad, or but little harder than when first built. From this we see how essential it is, that building in water should have a substantial and immovable foundation, and that the walls should be completely solid and impervious, particularly where a good water lime cannot easily be obtained.

From the front of the wall not being properly bonded to the back, the parts are not only unconnected but in many places entirely separate, so that a rod may be thrust down many feet between them. It was observed also, that where the wall had given way, it was completely separated from the counterforts, to the extent, I understand, of one to two feet or more in the worst places, whereby the strength of the wall has been greatly reduced.

THE HUMBER DOCK.

Before the Act was obtained for making the Humber dock, the Old dock and harbor were found insufficient for the shipping and increased business of the port. This want of accommodation had been felt and complained of for some time, and various plans and schemes were proposed for the improvement of the port, all having in view increased dock and quay room. One proposal was to make another dock on the east side of the old harbor, and connected therewith by a suitable lock: another was to convert the harbor itself into a floating dock, by an entrance lock near the Humber and another lock near the north bridge; and to excavate a new channel for the river Hull from above the proposed dock, to the Humber, eastward of the Garrison: but fortunately for the port, neither of these plans was adopted.

The Dock Company, in order to obtain the best advice on a matter of so much importance, called in the able assistance of the late Mr. Rennie, who was afterwards joined with Mr. William Chapman, of Newcastle-upon-Tyne, on behalf of the Corporation of Hull. These gentlemen furnished the plans for this dock, and the work was carried on and completed under their joint direction: Mr. John Harrop, an old servant of the company, (who had done the carpenter's work of the Old dock,) was the resident engineer, and was assisted by Mr. George Miller, afterwards his successor.

The Act of parliament was passed in 1802, and the work was begun early in the following year.

Area of dock. The area of this dock is seven acres and a half, and will contain seventy square rigged vessels, with ample room for moving them; but there have been a hundred sea-going vessels, besides thirty or forty smaller craft, in it at one time.

Coffer dam. The coffer dam at the south end of the lock, for keeping out the tidal water during the execution of the works, was 280 feet span, and the versed sine 140 feet; it consisted of two concentric rows of close Danzig piling, 13 to 14 inches square, and 7 feet 6 inches apart, well bolted and braced together, with a trunk and shuttle in the middle at the bottom, the internal space being filled up with bricks laid in sand to above the level of high water. This dam was firmly and judiciously constructed, but having sometimes a perpendicular head of water of nearly thirty feet against it, showed signs of great weakness during an extraordinary high tide a little before the work was completed; being however promptly secured by shores and braces, no further damage ensued.

A steam-engine of six horse power was fixed upon the east side of the lock, and worked two 11 inch pumps, for keeping the works clear of water, and also at the same time, two 7 cwt. rams for driving the piles of the coffer dam.

Excavation. The excavation of the dock was 24 feet deep on an average, all in alluvial soil; the upper part for about five feet in depth was good clay, of which a great many bricks were made for the use of the works; and the rest of the soil was used to raise the ground and form the quay and road on the west side of the dock, and also the beach or shore of the Humber from the mouth of the old harbor to some distance above the dock; on part of this ground, several good streets have since been built. Notwithstanding the immediate contiguity of the dock to the Humber a fine fresh water spring was found in the excavation of the lock pit, which was so powerful, that the stopping of it was attended with considerable difficulty and expense. The bottom of this dock, for reasons not very obvious, is not so low by ten inches as the lock sills.

The site of the basin, being outside the coffer dam, and overflowed by the Humber every tide, was excavated by tide work. Part of the soil was removed by horse runs, to raise the ground near the lock, and the remainder conveyed away in ballast lighters, and discharged in the Humber.

To be Continued.

The substance described in the following paper promises to extend the usefulness of Caoutchouc, or India Rubber, which has already become one of the most useful materials of modern manufacture.

The remarkable property of dissolving copal and other substances used in painting and varnishing, will cause *Caoutchoucine* to become an article of constant employment, and its manufacture profitable to the maker and consumer. It is worthy of the earnest attention of practical and scientific men.

From the London Journal of Arts and Sciences.

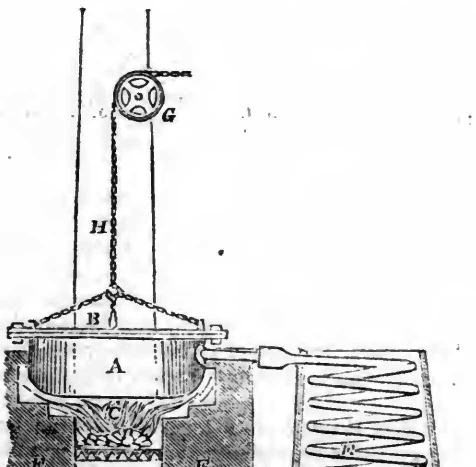
A SOLVENT NOT HITHERTO USED IN THE ARTS.

A patent was granted to William Henry Barnard, of the city of London, for his invention of "a solvent not hitherto used in the arts."—[Sealed 20th August, 1833.]

My invention consists in an essential oil or liquid, which I obtain by the distillation of a well known article of commerce, imported into this country from Para, Valparaiso, Sincapore, and other places, under the title of caoutchouc, or India rubber, which is to be performed in the following manner:

I take a mass of the said caoutchouc, or India rubber, as imported, and having cut it into small lumps, containing about two cubic inches each, (which I prefer,) I throw these lumps into a cast-iron still (which I find adapted to the purpose, and a diagram of which is annexed to, and forms part of, this my specification,) with a worm attached as in the figure:

A, is the still; B, the cover ground to a metallic fit, and held down with cramps and set screws; through the cover there is a hole with a plug ground to fit, to admit of a thermometer to take the temperature; C, the fire-place; D, Ash-pit, E, the worm-tub; F, the brick work of still; G, a roller and carriage, in conjunction with a crane, or other means, to raise the cover to take out the residue, and to charge the same; H, the chain.



I then apply heat to the still in the usual manner, which heat is increased until the thermometer ranges at 600 degrees of Fahrenheit, or thereabout. And as the thermometer ranges progressively upwards to 600 degrees Fahrenheit, a dark colored oil or liquid if distilled over, which I claim as my said invention; such liquid being a solvent of caoutchouc, and other resinous and oleaginous substances. When the thermometer reaches 600 degrees, or thereabouts, nothing is left in the still but dirt and charcoal.

I have found the operation of distillation to be facilitated by the addition of a portion of this oil, either previous or subsequent to rectification, as hereinafter mentioned, in the proportion of one-third oil to two-thirds caoutchouc, or thereabout.

I afterwards subject the dark colored liquid thus distilled over to the ordinary process of rectification, and thereby obtain fluids varying in specific gravity, of which the lightest hitherto has not been under .670 taking distilled water at 1,000; which fluid I also claim as my said invention.

At each rectification the color of the liquid becomes more bright and transparent, until at the specific gravity of .680, or thereabouts, it is colorless and highly volatile.

In the process of rectification (for the purpose of obtaining a larger product of the oil colorless,) I put about one-third water into the still. In each and every state the liquid is a solvent of caoutchouc, and several resinous and oleaginous substances, and also of other substances, and (such as copal) in combination with every strong alcohol.

Having experienced much difficulty in removing the dirt which adheres to the bottom of the still, I throw into the still lead and tin in a state of alloy (commonly called solder.) to the depth of about half an inch; and as this becomes fused, the dirt which lies on the surface of it is more easily removed.

Objections having been made to the smell of this liquid, I have found such smell removed by mixing and shaking up the liquid with nitro-muriatic acid, or chlorine, in the proportion of a quarter of a pint of the acid (of the usual commercial strength) to a gallon of the liquid.

And whereas I claim as my invention, the said solvent or liquid when first distilled over, and in each and every stage of its rectification.

The discovery of the chemical solvent, which forms the subject of the patent above described, has excited considerable interest in the philosophic world not only from its extensive usefulness as a new article of commerce, but also from two very extraordinary characteristics which it is found to possess viz.: that in a liquid state it has less specific gravity than any other liquid known to chemists, being considerably lighter than sulphuric æther, and in a state of vapor is heavier than the most ponderous of gasses.

The properties of this singular production are yet but in a small degree developed. Dr. Faraday, of the Royal Institution, and Dr. Hue, of St. Bartholomew's Hospital, have both directed their attention to the subject, and have given to the solvent the denomination of *caoutchoucine*, as the distilled product of *caoutchouc*, the elastic gum, known under the common name of India rubber.

This elastic gum is produced by a variety of trees, and is found in all countries at or near the Tropics. The Heavea Caoutchouc (whence the name) grows in South America; the Urceola Elastica in Sumatra; the Ficus Elastica and Ficus Indica (Banyan) in various parts of the East Indies; the Artocarpus Incisa (bread fruit-tree) in the West Indies—we have it also from Africa, but from a variety of trees Those above enumerated are clearly of totally different descriptions. some growing as climbing plants, some as forest trees. These trees yield the fluid in immense quantities; it is said, in some instances, as much as two thirds the weight of the boughs whence it is drawn, and when exhausted by repeated tappings renew the supply after a few months' rest.

Dr. Faraday stated the component parts of a quantity of the fluid he had analysed to be as follows:—

Caoutchouc.	,317.0
Albuminous matter,	19.0
Azotic, bitter coloring matter,	7.0
Wax,	1.3
Soluble substance,	29 0
Water, acid, &c.,	,563.7
	1000.0

Its elements—

Carbon,	0.812	8 proportions.
Hydrogen,	1.000	7 proportions.

There is not a particle of oxygen in the fluid after distillation, when in its most highly-rectified form, and it is capable of preserving potassium. It mixes readily with pure alcohol, but refuses to do so as soon as its specific gravity increases. We do not know at what exact weight a separation takes place, but imagine, from reported experiments, that at a specific gravity of 0.75, it will no longer unite with alcohol. This fluid is obtained at all the intermediate gravities between 0.68 and 0.88. Perhaps if these operations were conducted with very great nicety, and the caoutchouc could be procured, divested of all foreign matter and impurities, water, &c., we should obtain by distillation the precise weight of fluid for the weight of solid operated on.

Concluded in our next.

We give another portion from Dr. Perrine's interesting communicacion, and will give the remainder in our next.

From the New York Farmer.

TROPICAL FIBROUS PLANTS.

Continued from p. 330

I am however pleased to say, that their success has been as great as could be reasonably expected. As the Agaves and Brômelius prefer the most arid sand and sterile soils, it might have been rationally inferred that they would inevitably perish on the rich marshy banks of the Mississippi. I had sent from Campeche four distinct species of Agave, and though all planted in the open air are still alive at their roots, and two have leaves from two to two and a half feet above the ground. The growth of the latter, since I have been here, appears to be *greater in a given time* than in Yucatan. But what has pleased me still more is the discovery that there are various plants of a fibrous leaved species of Agave, which have been growing in this neighborhood several years. The Convent, or Young Ladies' School, is about four hundred yards from this farm, and near the Levee, in a yard a little distance south-west, is growing one Agave whose leaves even were not affected by the winter. At the garden of a respectable planter, Mr. Mather, about four miles below, are five Agaves which have been growing several years, and of which only a portion of the leaves were deprived of their vital powers last winter. I say deprived of their vital powers, because the word *kill* would be rather too strong, it would generally imply that they were destroyed, or rendered useless. But I believe that so far from it, the misfortune of having the leaves frozen may be turned into a benefit, as it renders their dressing much easier. I go farther, I believe it will render the fibres much whiter! Several of the leaves of my plants on this farm have become completely bleached.

This reminds me of a fact which occurred in New-York during my visit there in 1831–2. In the winter I was at the seed-store of Thorburn, and was told that he had an Agave from St. Domingo, in the back yard, which had been frozen and was cut down.—I went back and found the central cone of rolled up leaves, which were all of a beautiful *pearly white.* At that time I supposed that the whiteness depended on the exclusion of light, as exhibited in the internal layers of cabbage leave. I however paid a boy to carry the mass to Peales' Museum. The frozen cone was put in a cold spot behind the Museum, and the leaves were taken off day by day, as needed for my experiment. The cuticle would separate so easily that I could blow it up with a pipe stem; and was so impervious to air, that by stopping the hole it would remain inflated like a bladder. One long broad leaf, thus inflated, was hung up in the shop of the chemist George Chilton, who was asked what sort of a fish that was; and it indeed excited the curiosity of all who saw it. Of other leaves the fibers were exposed with the greatest facility, and they were left at the Museum for the inspection of the public. But it is getting dark—my head aches greatly—my thoughts become more and more confused. Farewell till tomorrow.

9 o'clock, P. M.

As I cannot sleep, I get up again and continue. The subject of fibrous leaved plants is too important to omit details, especially in the dearth of information to be obtained from books, and from the fact that what little is published contains so many errors that readers are rather prejudiced than benefitted by the perusal. Originally misled by Humboldt every body exclaims American Aloes or Agave Americana, whenever they see a mass of thick broad succulent sword shaped leaves, with thorns or prickles on the edges or at the points; and if they have read or heard what he wrote about it, in his Essay on New Spain, they conclude that they know all that can be known about this kind of plants. In many numbers of your Farmer I have endeavored to communicate additional and very important information. I have shown that the Maguey de *pulque*, or *the* Agave, which yields the celebrated drink of Mexico from its developing stalks, is only *one* of many species of the Agave: that Humboldt himself tacitly admits that fact, that he even confesses that the Maguey, whose juice is principally used for distilling the *Mezcal*, or ardent spirits, appears to be a different species. It is but natural to suppose that a plant which yields sap so abundantly, should be very succulent in its texture, and that as it peculiar function was to secrete juices, it would not estrange itself so far as to divide a part of its vital power in the labor of forming fibres. The inference is supported by the fact that the leaves of the true pulque Agave are nearly as brittle as the leaves of some true Aloes, and hence no doubt the popular name of American Aloe first originated from observing this internal analogy confirmative of its external appearance.—Indeed so few fibres, and so feeble, exist in the leaves of the drink producing Agave, *that they are eaten by cattle*, both in America and Europe. The very fibrous leaved specie of Agave are in a very different condition. The vital powers of the plant are not diminished by forming juices for secretion on *centreward*, but on the contrary are employed altogether outward in fabricating fibres longitudinally and parallelly throughout the leaves. I think it would try the strength of a very strong man to *break*, a crosswise, a full grown leaf of the really fibrous species, and that if cattle should eat and *swallow* such leaves, they might next be turned to pasture on mature hempstalks. For the purposes of this communication however, it may be advisable to omit all tedious botanical details, and to consent, that for the present, all the drink secreting Agaves shall be known under their Mexican generic names of Maguey, and under the botanical name of Agave Americana: and we will treat of the peculiarly fibrous leaved species under their Yucatan generic name of Honequen, and under the botanical name of Agave Sisalana.

We are now ready to proceed, premising still further that we must consider as *varieties* of the two agreed species, various Agaves, which are likely distinct *species* of two subdivisions of that genus. We have seen then that Humboldt admits that there is at least, one variety of the Maguey in Mexico dedicated to distillation of ardent spirits, which differs sensible in its appearance from the Maguey de pulque used exclusively to produce the fermented drink of that name. I now add that in Yucatan there is a third variety, which so much resembles the others, that it is there called Maguey *del pais*, (of the country,) and that the highland soldiers in the garrison at Campeche, have, in a few instances, made some bottles of *Pulque* from the juice, to please the appetites of their officers, who longed for a taste of their accustomed beverage. The product, however, was said to be much inferior in quality to the pulque made from the Maguey de pulque upon Mexico. Now mark the fact, that one of these Maguey de Yucatan is growing in the garden here; that its leaves were not all deprived of vitality by the winter; and that it is now vigorously pushing out both new leaves and the older ones, whose upper halves were nipped by the cold.

I have already given in the Farmer the history of four plants of the real Maguey de pulque, which were brought down from Mexico to Yucatan, and planted in a lot in the suburbs of Campeche.—These plants served me as a standard of comparison. The plants of the Maguey del pais, i. e., of Yucatan, resembled so much those of the true Maguey de pulque of Mexico, that I could not readily distinguish the differences when they were apart or so distant from each other that the eye could not rest on both at the same time.

When, however, brought close together, even an unpractised eye could discover that their general appearance was distinct, although it might be difficult to describe the difference in precise words. One striking circumstance was the relatively much greater *thickness* of the leaf of the real Maguey de pulque. In their internal structure too, a difference was readily seen. The fracture of the leaf of the true Maguey de pulque exhibited a more transparent gelatinous character, more nearly resembling the fracture of a leaf of the true Aloes; and although the fibres of the leaves of the Maguey de Yucatan are neither abundant nor good enough to be extracted for practical use, yet the fibres of the Maguey de pulque were still fewer, finer, and feebler.

Now mark also this fact, that one of these Maguey de pulque de Mexico is also growing in this garden, in as good a condition, if not better, than the Maguey de Yucatan. I may *possibly* be mistaken in comparing them at their present height; but I do not think so. They may both be the same variety; but I do not believe it. Climate may have already modified each; yet I am willing to let my discernment be tested by their future process.

Hence, at all events, we have at least a variety of *the* Agave Americana sent from the tropical climate and dry sterile soil of Yucatan, and growing in the cold climate and wet fertile soil of Louisiana.

(To be concluded in our next.)

From the London Mechanics' Magazine.

ON THE SHRINKAGE AND EXPANSION OF IRON IN THE PROCESS OF CASTING.

SIR,—A short time since I was favored with the loan of the 18th vol. of the *Philosophical Magazine*, on account of its first article, which treats at some length of a subject on which I have before addressed you; (see vols. xvi. and xvii. pp. 108 and 61) and although I agree with the author, Mr. David Musshet, as to most of the facts therein described, I differ essentially in the more material point, viz., that of accounting for them.

In his preamble, Mr. M. says, "When the object of experiment is exposed to a heat sufficient to fuse it, it then becomes subject to new laws as a fluid, and exhibits phenomena entirely different. By not taking the change of state, from that of a solid to that of a fluid, into account, some writers have given an *awkward and unsatisfactory account of the laws* which regulate iron in these two different states. Before I proceed to detail some experiments made upon the subject, I shall trace out the different states of shrinkage and expansion, as observed in cast iron. In doing this I shall divide shrinkage into two distinct operations: 1st, Shrinkage, properly so called, when a mass of iron *diminishes or shrinks within itself*, and would actually *displace a smaller quantity of water*, and when *no degree of heat short of fusion would make it occupy its former bulk or volume.*"

"2nd, Contraction, or that diminution of superficial measurement which any body undergoes by evolving its caloric." A unique division this, and very explicit—shrinkage diminishes a mass of iron, making it occupy less space, while contraction only lessens all its superficial dimensions!

"In casting pieces of ordnance we are enabled to judge of the conjoint effects of shrinkage, contraction, and expansion.—We shall suppose that a gun mould of any given length is filled with fluid cast iron, not subject to these laws; then the size and shape of the gun, when cold, would correspond to the dimensions of the mould. But finding that the piece of casting was considerably altered, that it had shrunk interiorly, was diminished in point of length, and had lessened its diameter, we must seek for a solution of these facts, in explanation of the causes respectively."

"Frst assuming, what shall be hereafter proved by direct experiment, that cast iron occupies less volume when fluid, tha- when solid; that in the act of the arrangement of the molecules towards consolidation, it occupies a *larger bulk than at any other period;* and that *when cold, and in proportion to the absence of the heat, so will the volume be diminished.*"

"1st, then, shrinkage appears to be dependent upon two causes; the gravitation of the fluid metal, and the expansion of the mould. The latter, I conceive, acts a very powerful part: the immense quantity of caloric combined with the iron, is in part easily and almost instantaneously communicated to the iron box; this creates a disposition to expand, in which it is greatly assisted by the great pressure of the fluid iron." I cannot possibly see what this disposition to expand, has to do with this division of his subject; but however the iron box may be *disposed to expand*, sand being a bad conductor, no actual expansion would take place (unless in some extreme cases) while the iron was in a fluid state; and unless the box would resist the pressure of the fluid metal under all circumstances it would be entirely useless. "That portion of the metal in contact with the interior of the mould is the first to lose its fluidity, and is acted upon, and forced to give way, in the same ratio of expansion, before the more subtle and denser fluid." This is downright nonsense, for the face of the casting is formed by the metal losing its fluidity in contact with every part of the mould, and if then forced to give way to the hydrostatic pressure of the more subtle and denser fluid, it must be in cracks and fisures, which of course would render the casting imperfect.

"2nd Expansion. Of the extent of this operation we may judge from the following facts:—All patterns of castings are made somewhat larger than the piece of goods is wished to be: in common cases $\frac{1}{8}$th of an inch to the foot is allowed, but in many cases the allowance will be $\frac{3}{16}$th of an inch." (A curious fact this to adduce as evidence of Mr, M.'s 2nd, or law of expansion.) "In the case of the gun, therefore, the mould would be plus the allowance upon the pattern, what space are gained by beating the pattern to loose it from the sand, and all the extra space acquired by the increased volume of the consolidating iron. These, taken collectively, may amount to $\frac{1}{4}$th or $\frac{5}{16}$ths *of an inch;* and so much less will the *diameter of the gun be found when cold*, to that it would have measured at climax of its expansion." So far we have no proof of this, but a positive statement that it may amount to half an inch in the diameter of the gun; now this expansion, taking place in the same ratio in every direction, must amount to three, or even four inches in its length! Now as cannon are cast in dry sand, I would ask, under such circumstances, what becomes of the iron box? As it cannot be expected to give way in the same ratio of expansion, nothing can prevent its being *burst, by this, Mr. M's. unaccountable law!*

"3rd, contraction immediately takes place on the metal ceasing to expand: to its effects are chargeable the reduction of the increased diameter of the gun, and which seems merely in consequence of the escape of the caloric."

Thus does this nice observer of the habitudes of metal, continue to heap contradiction on contradiction, not in the *clumsy awkward manner* that some writers would have done, but with a degree of neatness, freedom, and self satisfaction peculiarly his own. He first assumes, what we shall presently examine his proof of, viz., that *cast iron occupies less volume when fluid* than *when solid*; then, that a trifling loss of caloric produces shrinkage, which *diminishes the mass*, so that *no degree of heat short of fusion* would make it occupy its former bulk of volume. He then says, a further loss of caloric just sufficient to convert the fluid metal into a solid, causes a most startling degree of expansion, varying from a 50th to a 25th of its dimensions: and then again, by the dissipation of the remaining caloric, it not only loses this immense increase of volume, but also the usual allowance of $\frac{1}{8}$th or $\frac{3}{16}$ths of an inch to the foot on the pattern; at once proving, in my humble opinion, *that the simply evolving its caloric, reduces its volume less by this allowance, plus the loosening the pattern, than when in its fluid state!*

"To prove that cast iron is denser in the fluid state, several pieces of iron may be put into a ladle, and hot fluid iron poured upon them; they will immediately rise to the surface, and expose a considerable portion of their bulk above the surface of the liquid iron. *This buoyancy diminishes*; and as the pieces of metal approach more and more to the state of fusion that exists in the ladle, they gradually sink, till they disappear entirely under the surface; they then rapidly dissolve, and form a part of the fluid iron."

This to me, is any thing but sufficient proof of the superior density of iron in its fluid state for the known and acknowledged laws of expansion, are directly opposed to the gradually sinking of the solid pieces as they get hotter and hotter: but what a decided contradiction is this to Mr. M.'s great 2nd law; indeed he must have totally forgot it when he stated that the *pieces of solid metal sank and wholly disappeared below the surface of the denser metal, at the very climax of their expansion!* The solution of this phenomena must therefore still continue to *puzzle our judgment*, and perhaps *elude our sagacity* after all.

Now to the proof of his assumption. "That cast iron occupies a greater bulk or volume immediately after it passes into the state of a solid. If a shot mould is carefully separated at a certain period after filling, a metallic crust is formed, more or less thick, which is the natural progress of consolidation, but which is at present an envelope to a considerable portion of fluid contents. In this state the expansion in the shot and mould, is nearly the same; the former is easily extracted from the under and upper parts of the latter. In about two minutes after, however, the expansion of the shot is more rapid than that of the mould, and at this period is difficult to disengage. As the heat is communicated to the mould, its dimensions enlarge, and the extraction of the shot is attended with less violent efforts. The mould is always filled by the shot till cooling has so far taken place as to reduce the shot mould to its former diameter; beyond this, however the shot still continues to lessen its bulk, so that when cold, it will be found to have left its mould by nearly $\frac{1}{66}$th part of its diameter."

This proof is of equal value with the rest, depending entirely as it does, on the solitary fact of the shot sticking in the mould at a certain period after casting. Now it appears to me, that the shot, instead of *always filling* the mould, as above asserted, can only be said to do so at two definite periods: first, while every particle of the metal continues fluid; which will only be until the mould carries off so much heat as to reduce the fluid metal in immediate contact with it, to the *state of a solid*, and this operation is attended with a certain amount of contraction, as is fully proved by the shot at this moment freely leaving the mould; and second, at this moment expansion proceeds in opposite directions, for the mould begins to expand with the first increment of heat it exhibits, but until this heat is diffused throughout its whole mass, the expansion can only tend to lessen its internal dimensions: the caloric contained by the still fluid part, is at the same time given out, and is freely taken up by the crust with which it is enveloped, causing its expansion as a solid, in a ratio commensurate with its accession of heat. Another proof, if another be still wanting, of the contraction of iron on becoming solid, may be had, by breaking a common shot, when the centre of it will be found spongy, which could not be the case if any expansion had taken place.

I remain, Sir, Yours respectly,

TREBOR VALENTINE.

Derby, April 6th, 1837.

CEMENTS FOR CISTERNS, &c.—Common rosin 30 pounds, melt it and take off the scum, then add very fine yellow sand 45 lbs., Spanish Brown 2 lbs., mix the whole thoroughly with an iron shovel or other instrument.

DYNAMOMETRIC CHECK.—A committee of the French Institute, composed of Messieurs Arago, Dulong, and Poncelet, has gone through a series of experiments on the "dynamometric (or power measuring) check," an instrument invented by Prony, and lately improved by M. de Saint Leger, mining engineer at Rouen, for the purpose of measuring with accuracy the power of steam-engines and the quantity of fuel they consume. A large party of members of the Institute and the Chamber of Deputies, of professors, engineers, &c. was present at the investigation, which took place on the 10th of March at the machine manufactory of M. Pauweis at Paris. The object of the experiments was to ascertain the practical exactness of the apparatus, and for this purpose a steam-engine of twelve horse power of M. Pauwei's manufacture was made use of. The result appeared to be perfectly satisfactory, and the scientific world now waits, with some interest, the report of the committee of the Institute. This new invention may, perhaps, supply M. Arago with less disputable grounds for claiming for his countrymen a share in the honor of improving the steam-engine, than he has been able to supply in his two disingenerously national essays on the subject in the French *Annuaire* for 1828 and 1837.—[London Mechanics' Mag.]

Agriculture, &c.

From the New-York Farmer.

The following communication should be read, and practised upon, by every man in the Union who *keeps a sheep*. It establishes beyond controversey, the importance of sheltering them during winter—and furnishes the proof in a shape not to be questioned. Our readers will, we are sure, unite with us in an expression of thanks to the intelligent writer for what he *has* given us, and a request that he will pursue the subject, as his avocations will permit, until he shall have convinced the unbelieving, and effected a reform in this important branch of husbandry.

THE MANAGEMENT OF SHEEP.

No. III.

MESSRS. EDITORS.—I am happy that my communications are acceptable to you. I have not exhausted the above subject, and shall therefore continue it. But, if I had anticipated proceeding thus far, I would have endeavored to have treated the subject a little more methodically. However, farmers are not practised in arranging their thoughts for the press, and this, in a measure, must constitute my apology for any want of order or method. For all my facts and deductions, thus far, I have drawn solely upon my own experience; and what has fallen under personal observation, and for the present, shall continue to do so.

As my principal aim has been, to direct attention to the vast importance of protecting sheep during the winter, and having but one more point to dwell upon, I will so far recapitulate as to name the advantages resulting therefrom, and which my experience has fully confirmed, viz., *saving of life—prevention of disease—and the improvement of the quality of fleece.*

I am highly gratified in being able now to add one more, and especially in a pecuniary point of view, of the highest importance, viz:—*increased weight of fleece.*

All my sheerings previous to that of '36, my sheep have yielded, only, from 2 lb. 7½ to 2 lb. 9 oz. per head. This variation, I discovered, was to be attributed to no other cause than the difference of winter seasons, being colder or milder. When the latter, an increased weight of fleece was a certain consequence. The winter of '36 my sheep were duly protected, and the yield was an average of 2 lb. 10½ oz. per head, notwithstanding, 300 of the flock were yearlings, which, all wool growers are aware, on account of deficiency of size, yield but light fleeces. But this so much exceeded any former yield, I was well persuaded it was to be ascribed to *warm shelters.* I forbore, however, to mention this in my last communication, prefering to wait until the present clip was off, but fully confirmed in the belief that my hopes would be realized of an increased average weight beyond that of last year. I am happy to say, that my hopes were well founded, and have been more than confirmed. The number of my flock, sheared, amounted to 1751, and the entire product is 5082 lbs., making an average of over 2 lbs. 14 oz. per head. With all those, doubtless, who are inexperienced in growing of fine sheep, this may seem not an extraordinary yield;—but those who are, know that it is, and, that fine fleeces, and light, go hand in hand. At all events, taking into view, the *same number* of sheep, with the *same proportion* of *yearlings*, viz. 470, and the *quality of wool*, of which some judgement can be formed from the price it has commanded in the Boston market for cash, and stated in a former communication—I challenge any wool grower, either in the State or out of it, to go beyond it.

But, a few words here as regards the weight of fleece of Saxony sheep, in general, may be considered in connection, as apposite.

I have been informed by Maj. Grant, of Walpole, N. H. who has as fine, if not the very finest flock of Saxons in the United States, that the average weight of his clips is but 2½ lbs., and some years is scarcely beyond 2¼ lbs per head. As regards the flock of Mr. Grove, of Hoosack, which is exquisitely fine, it appears from a statement of his, that the average of his sheep is nearly, or full 3 lbs. Considering the quality of his wool, it is a most extraordinary product. But the system of management, of those gentlemen, is perfect. Their sheep are closely housed during winter, and if I mistake not, are not exposed *at all.* In this particular I differ from them;—a space of some 8 or 10 feet wide is always open to admit of mine going in, or out, at pleasure. I now call upon the doubtful and sceptical, to appeal to these gentlemen, and all others, whose system of management are similar, and ascertain what would now be the condition of their flocks if they had not been adequately protected, and also to decide the point I have endeavored to maintain, viz: whether protecting sheep will, or will not increase the weight of fleece. I will pledge myself to say a unanimous affirmative will be the answer.

But the allusion to the above gentleman, and the remarks connected, is only for the purpose of setting the inexperienced right in regard to the general weight of fleece of fine wooled sheep;—what has been written will answer as a reference, although rather a digression from my subject.

In order to save your readers any trouble, I will get at the *cream* of the advantage of sheltering sheep, so far as increase of fleece is concerned, by figuring out my own gains, and most sincerely do I hope the time will not be distant, when theirs will be likewise. With the same management of their flocks throughout the year, I will guarantee the result will be the same.

I have already stated that when my sheep were exposed, the highest average yield was 2 lbs. 9 oz.,—the winter of '36 my sheep were sheltered, and the yield per head of that year, was 2 lbs. 10½ oz. Here then was a gain in the aggregate of 141 lbs. producing the snug little sum, at the price sold at $104. But the present clip comes up to the purpose exactly; the average as stated is 2 lb. 14 oz., therefore giving an aggregate gain of 547 lbs., and peradventure my wool sells at prices of last year, would produce the sum of $400.

And now Messrs Editors, I have done with this branch of sheep husbandry. I have developed my private affairs not a little, in order to furnish proofs of the great advantages to be derived from affording adequate protection to sheep during the winter season. I have not only urged the importance of attending to the subject on the score of humanity, but leave it, scattering dollars and cents in the path I have marked out, which only needs to be followed, to find and gather up.

I shall endeavor in my next, to expose some of the sins of omission and commission in washing and shearing of sheep. M,

LANSING, TOMPKINS Co. N. Y.

CITY, STREET, AND FILTH POLICE,

We published in our last number, a communication and letter in relation to *Night Soil.* We have since received from the Editor of the Farmers' Register, EDMUND RUFFIN, Esq., in reply to a letter addressed to him for information on the subject, the following important article, which he was *then* preparing, for that valuable publication, which he has raised mainly by his own untiring efforts, and for which VIRGINIA is more indebted to him than she would be if he had lead armies to victory.

The present depressed state of every kind of business, and the importance of improving the agricultural condition of our country, has induced us to investigate the *value and mode of preparing* this rich and valuable manure—and it is our intention *to pursue the subject until a fair experiment is made of its value, as compared with the best manures now in use in this country*; and if possible to effect an entire change in the mode of disposing of the vast quantities now wasted, and worse than wasted, in *this* and *other* large cities,—we ask therefore, of those Editors with whom we exchange, and our readers especially, the favor of such information as they may possess, in relation to its *preparation* and *use.* Its general use in the vicinity of large cities, will certainly be productive of much good, in the *reduction* of the *price* of *vegetables*—but more especially in *cleanliness* and *health.* Every individual in community is more or less interested, either on the score of health, or economy, and we are sure that *reason* will take the place of *prejudice* in a matter of so much interest.

We have omitted No. 1, or the *first* of these valuable papers, not, however, from any want of concurrence in its reasoning, but for the purpose of coming directly to that part of the subject which relates more especially to *cities* and large *towns.*

From the forth-coming Number of the Farmers' Register.

No. II.

THE POLICE OF FILTH IN TOWNS, AND ITS BEARINGS ON COMFORT, DECENCY AND HEALTH.

The delightful season of opening summer has arrived, and the face of the earth, as formed by nature, and not deformed by man, is seen in its fairest aspect and brighest colors. Every thing shows life, in youth and beauty, and nothing yet exhibits its indications of decay. Every feature of the natural landscape, in every region however varied, is beautiful to the eye. The most barren and worthless of our lands, though the most wretched in appearance after cultivation, before being touched by man, are covered with magnificent forests. Nature has not made a scene that is displeasing to the eye; and even this granite region, barren and unsightly as much of it now is, was once one wide scene of universal beauty. It is man that wastes the beauties and blessings of nature, and deforms and defiles whatever he touches.

The opening of summer in our towns, presents a very different aspect, and is accompanied with very different associations. It is true, that some beautiful gardens are seen, in which the hand of man (or more generally of woman) has improved on nature, by bringing together, in numbers, nature's choicest ornaments. But these are exceptions to the general appearance. The broad sloppy flats, receptacles of collected rain water and oozes from hill-sides, which during winter and spring merely barred the way of walkers, or, at worst, gave them wet feet, and colds and pleurisies, now are drying up, without the Corporation being put to the cost of the small amount of ditching that would have kept the ground dry at all times. A "green mantle" overspreads the standing pools—and all will soon become a naked, ugly, and foul-scented mud. The thickly settled and commercial parts of towns may, perhaps, have nothing visible worse than men and merchandize, brick houses, and paved streets; but all the out-skirts and vacant places are full of abominations to cleanliness and health, and of offence to the nostrils as well as to the eyes. The commencement of warm weather gives activity to decomposition, and the soft air is redolent of its products: and in sundry different spots of every town, the effluvia arising from filthily kept yards, of stables and hog-styes, of privies—and sometimes the breezes tainted by a dead cat, or, if without the suburbs, by carrion of larger kind—are offered to our sense of smelling, in doses of various degrees of intensity, and in every variety of combination. We become accustomed by the habit of endurance to these, as to all other evils, and in time, are scarcely conscious of the magnitude of the nuisance. But its offensiveness is estimated at the true value, by visiters fresh from the pure air of the country.

Now approaches the time when the Police, and the Board of Health will begin to bestir themselves to abate nuisances of this kind, but in such a way as to effect no manner of benefit.—Their operations merely consist in moving decomposing matter, or its sources, from one spot to another, there to proceed as before—and by thus moving and dispersing filth, to hasten its decomposition still more, though rendering its products less evident by their being more widely diffused. But the total amount of the production of such effluvia is not the less in quantity, nor the less hurtful, because, by being more wide-spread, and diluted, and by contaminating more of the atmosphere, the scent is less concentrated and offensive. All the operations of the most industrious and zealous Board of Health do not lessen the amount of decomposition within the limits of a town, unless the putrescent matter is actually thrown into and floated away by a rapid river, or otherwise conveyed away to poison the air some where else, where there may be fewer people to breathe of it. Every removal, and exposure of new surfaces, serve, only to quicken the progress of decomposition.

It is not a little remarkable that this general state of filthiness is caused and maintained, in a great degree, by the fastidious or squeamish nicety of our people. It is almost universally considered that it is quite too dirty a business, too offensive to the imagination, as well as the senses, to use carrion and human excrement for manure. If this silly prejudice did not operate, and if proper economy were used to collect, preserve, and apply these rich and most decomposable substances, the profit which they would bring as manure, would far more than pay for the expense of the proper procedure to preserve the matters, and at the same time to maintain cleanliness. But it is not only that the contents of privies are suffered to accumulate, because of their being no profitable demand for them, (as exists in countries where the worth of manure is better understood,) but there is that want of accommodation in the number and situation of privies, which operates to the injury of comfort, of decency, and in many ases, directly as well as indirectly, to the injury of health. We are so exceedingly nice, or proud, that we desire to conceal the existence of such humiliating necessities of our nature; and no conveniences for the purpose are provided, and kept in proper order for public use: and the privation is a matter of extreme inconvenience to all decent visiters, to a town, who have not acquired a knowledge of, and a right to use, some such places. The same morbid feeling of shame, that prevents on the one side the accommodations being afforded, also prevents on the other any complaint of the want of them. But the ground for complaint does not the less exist—as every countrymen can testify, and even every townsman, when visiting another town than his own. So nice and squeamish are our people on such subjects, that to treat of it by word or writing, would be considered by very many as both ridiculous and offensive; and when one ventures still farther, as I shall do, to recommend modes of removing the nuisance, and converting it to profit, there is much ground to expect that nothing will be excited, except a sense of the ridiculous in some, and a feeling of disgust in others. But I have never been deterred from urging what was deemed highly expedient, by the dread of being laughed at, and as to exciting disgust, it is just what is desired, provided it can be directed against the habits which are held up to condemnation.

In large cities, necessity has compelled the adoption of means to get rid of excrementitious and other filth, by a general system of sewers, or subterranean passages, into which all such matters are thrown, and by the flowing of water through, in abundance, they are washed into the adjacent river. The sewers of some great cities have been constructed on a plan so vast, and at so much expense, and were so excellent in their operation, that they have been considered as not less worthy of admiration than their magnificent temples and palaces. If the only object was to cleanse the town, and there was sufficient command of water, and of money, there could be nothing to object to this plan. Certainly the expense of constructing the sewers would be an object tion not worth notice, when compared to the value of their intended effect. But if the system were not perfect, and the supply of water always abundant, the evil would be made so much the greater by being concealed from observation. There is another objection to this plan, in its contaminating and corrupting the waters of the rivers into which the sewers empty; and it may well be doubted whether water so defiled, does not itself throw off deleterous effluvia, and is not rendered more liable to cause decomposition in whatever decomposable matter it may reach: and thus that the waters are not only made to stink, but also to poison those who have destroyed their purity. But the greatest objection to this plan, is the utter destruction of so enormous an amount of rich manure, which if properly preserved and applied, would soon make rich and fruitful the poorest surrounding country.—And to properly accumulate and preserve all this manure, and prevent its being offensive to the senses, or injurious to health, might in most cases, (and certainly on all the eastern coast of the southern States,) be effected not only at less cost than by a proper system of sewers, but at less than the present wasteful and expensive system of employing laborers, under direction of the town police, and boards of health, so to stir up and move about the excrement, as to produce its most speedy decomposition, and total passing off into the air, and thereby to give the full benefit of its evolving effluvia to the nostrils of the towns-people.

The remedy is that which has been proposed in general terms in the preceding part of these observations, to provide *calcareous earth* (either marl, or whatever other form may be cheapest,) enough to cover every spot in the town, in which decomposable filth can accumulate; and this to be renewed from time to time, as needed. The calcareous matter would form a chemical compound with the putrescent, so as to preserve the latter from all waste, and from giving out any offensive odor; and once a year (when in situations not convenient at all times,) and in cold, weather, the accumulations might be removed to the country to be used as manure; and the richest as well as the most permanent manure in the world, this compound of animal and calcareous matter would be.

The object would be to *accumulate*, as much as possible, instead of *dispersing*, the most putrescent matters. And for this purpose, as well as to afford the general accommodations now so much required for comfort and for decency, and also for health, there should be large and well constructed privies erected in suitable situations, and at convenient distances apart, throughout the town, free for the use of all males without exception. The pits should be large and sufficiently deep, but accessible to carts, to bring marl, and to remove the contents.—At the expense of the town (as the whole system ought to be,) there should always be kept a heap of rich marl near to each pit, and a sprinkling, once or twice a day, over the excrement, would effectually secure it from wasting, or being offensive.—By such places of accommodation being furnished, and kept in the neatest condition by regular attendants, there might be, and would be abated many of the small private receptacles, which necessarily (as now managed) are more or less filthy nuisances. And the *buckets* which now are at night emptied on all vacant and forbidden spots, (and requiring the unceasing activity of the Police and Board of Health to attempt to prevent,) would be then emptied into these pits, with certainty, simply because they would offer the nearest and most convenient places of deposite. There would then be no inducement remaining for the defiling of every spot of vacant ground; and such places, instead of being abominations to the senses and the minds of all decent observers—and absolutely forbidden to the footsteps, and even to the distant view of modest women—would be clean and lovely grass plots, serving to refresh and relieve the eyes tired of seeing brick walls and stone pavements. I will touch but gently on the *moral* nuisance that exists in so many cases in every town, where these vacant spots, the only public places "of ease," are overlooked by the back windows of the houses of respectable families, the members of which, though at considerable distances, are nevertheless unavoidably subjected to witness indecent exposures, still more offensive to the mind than to the eye.

In addition to the public and general accommodations proposed, there should be a certain and sufficient quantity of marl carried at certain intervals of time, to every private lot, (unless the occupant took measures to provide himself with it,) to be used as wanted, for similar purposes. This would prevent, what is almost impossible now to avoid, there being offensive accumulations, or still more offensive removals and dispersions, of fœcal matter on private lots.

It would be impossible to approach the truth in estimating what would be the expense of such a system in any particular town, until it shall have been tried. But there can be no doubt but that the benefits would far overbalance the cost. Many expenses and evils, much worse to bear, and now continually encountered, would be, by these means, avoided. Such of these as bear on private individuals, I pass over without notice. For one item, the public would save all that part of the labors of their police, which is now most unprofitably devoted to this object.

But even if it is admitted that the means proposed would be as effectual as I imagine, in preserving cleanliness, and cutting off sources of disease—and that the compound formed is of all the supposed value as manure, still it may be objected that it would be long before prejudice and incredulity will be so removed as to make this manure an article of sale—and consequently, that all expectations of returns from sales must be visionary. Even if there should be no sales for two or three years and if the manure should be merely taken for the trouble of carrying it away, the expense would be well afforded as a mere matter of police. But two years' use would make manifest the value of this compound manure, and the demand and the price would afterwards gradually increase, until it would nearly or quite defray the whole expense of the plan.

But the town of Petersburg has at once the best possible customer for all that the plan would supply for some years, in the farm of the Poor House, belonging to, and cultivated at the expense of the town. To this land, now much putrescent manure is carried, removed by the Police from the town. But except in winter, or at the rare and short other periods when manure can be (or is) at once advantageously laid on the field, these supplies are heaped up for future use, and of course, rot away as rapidly as possible, and give ten times as much of their products to the air as to the soil. Besides—even if there was not necessarily this great waste from the decomposition of manure altogether putrescent, when moved and heaped in warm weather, there would be very little profit from its application. The lands lying over the belt of granite which passes through Virginia, and which forms the falls of the rivers flowing to the Atlantic, are, naturally, among the most destitute of lime, and consequently are among the poorest and the least capable of retaining putrescent manures when applied to them. Such are the lands surrounding and within a few miles of Richmond and Petersburg, and probably all the other towns at the falls of our rivers. Particular individuals, by lavish use of the cheap and rich manure of the public stables, have highly, though but for a short time, improved some of these lands, and reaped heavy crops, and, possibly, made great profits. But still the demand for such manure by the hungry, yet wasteful soil, is continual, and if it is not frequently repeated, the original poverty soon returns. But few persons have used these means, to much extent, and most neighboring residents are satisfied that the town manure is too costly to be carted to their farms.

Yet though the richest stable manure, (richest because it is principally of animal matter,) may be bought from the tavern and livery stables at $12\frac{1}{2}$ cents for the largest single horse loads' (20 to 25 bushels,) it mostly rots away in bulks in the stable yards, for want of regular purchasers even at that low price.—So it is however—from the little town manure carried to neighboring farms, the little permanency of effect of what is used, and the general impression that it is not worth using—it results that most of the lands, lying even within the short distance of a mile from the towns, are wretchedly poor, and yield but little for the support of the town, either in grain, grass, or garden vegetables for market. Indeed it may well be doubted, whether a large proportion of the population of the vicinity do not buy (or obtain otherwise) from the town, as much provision as they sell to it. This state of things has continued, with but little actual improvement, as long as these towns have stood; and it may safely be predicted, that unless calcareous manures are used to fix the otherwise fleeting value of the putrescent matters, that the general condition of things will never be much better. Is it not then strange, that with the neighboring farms so poverty stricken, the town markets should be badly supplied, and at high prices, with all the small articles of daily purchase and consumption, which, though small, make up the greater part of the comfort, and (at usual prices) cause the greater part of expense of living.

Just let the reader imagine what would be the difference in these respects, if the lands surrounding each town, for as much as six miles distance, were as rich as they well could be, and produced in abundance, clover and other grasses, a full supply of garden vegetables and other small articles for the daily markets, besides their large crops of grain and other staple products. The comforts of all the persons living in town, so far as they depend on food, would be greatly increased, while the expenses of living would be made less than at present—and yet the suppliers of the market would be better rewarded than by the present miserable system, because rich land and good farming can always undersell the poor and unproductive; and at a market generally well supplied is a more sure, and therefore a better place of sale, than where demand is irregular, and, of course, prices irregular, though often very high. It will be under such a state of improvement that market gardens and market farms will be profitably kept—and the towns will be abundantly supplied, and from their neighborhood, with milk, cream, butter, eggs, fowls, and fresh meats of fat young animals, as well as with vegetables. The surplus product of hay, grain, and other field crops, of such highly enriched districts, would make no small addition to the sales and the export trade of the towns, and would serve to increase their population, and thus furnish a still increased demand for the products of the neighboring lands. It is also probable, that if the fish, of the rivers which flow by towns, were not driven away by the filthiness of the water, that their numbers would be greater on account of the neighborhood of a town, (and the abundance of food thrown into the water,) instead of being reduced almost to nothing, as is notoriously the case. Even the shad, and other fish of passage, whose instinct strongly impels them to seek the higher waters of rivers, to deposite their spawn, are mostly deterred from passing through the flood of filthy water that a town supplies; and the people on the upper waters suffer thereby a privation, as do the townsmen by the driving to a distance the more fixed residents of our fresh water rivers.

It may however be reasonably objected, by those who have not studied the qualities of soils and manures, that too much value is counted on from the use of this proposed compound matter. It would be unnecessary here to repeat at length all the grounds on which that estimate is founded. For the amount of early and annual increase to be expected from marl on naturally poor soils, and for the permanency of its effects, I refer to the reasoning and the facts presented in the *Essay on calcareous Manures.* and also to the opinions of the hundreds of farmers in the lower Virginia who are now thus improving their lands. For the chemical power of calcareous earth in combining with, and preserving from waste, putrescent matters, I refer to the general reasoning on this head in the Essay, and the statements made in the first of these communications. As to the enriching value of human excrements, it is known in Europe and in China, that they are the richest of all. In England, it is stated in agricultural books, that two waggon loads is a sufficient dressing for an acre—probably because more at once would be hurtful to the crop.

In France, there are in operation regular establishments set up by private adventurers, for desiccating, and thus preparing for use, the products of the privies and public sewers of large cities; and sufficient profits are made to support these establishments, by selling the dried manure (*poudrette*) to the farmers. Its great richness, in small weight and bulk, makes it well suited for distant transportation, and extensive sale. From the accounts that I have read of these establishments, it may be inferred that much previous decomposition, waste of value, and extrication of offensive effluvia, must take place in the material, before it is brought to the desiccating establishment—and that both the previous and subsequent manual operations must be highly disagreeable and disgusting. Besides, the desiccation seems to be sought more by mechanical than by chemical means – and any dry pulverized earthly matter is used to absorb the fluid and make the mixture dry. There does not seem to be much choice in the earthy substances. Thus they propose gypsum, and burnt earth, and quicklime, as well as chalk, rubbish of demolished buildings, and coal and wood ashes. The first two of these substances, according to my views, would be of but little effect, acting as they do only mechanically; the quicklime, (which it seems is preferred,) would be decidedly injurious; and the mild calcareous character of the latter substances would render them, only proper for the desired results. The profit of this business in France alone, would be sufficient proof of the greater value of the far more simple, economical and effectual and cleanly plan which I recommend, and which is also perfectly in accordance with the chemical properties and action of the substances used in the compound. I annex the only known description of the French process, below, in the application for a patent by the inventor, Donat, and which was communicated, with the introductory comments, By the Board of Health of Philadelphia, to the Agricultural Society of Pennsylvania.

(To be continued.)

From the Journal of the American Institute.

We give the following tabular view of the import of foreign wheat, from the *Courier and Inquirer.* "A large portion was American bonded wheat returned to us, and to be perfect, the table should embrace it. It presents a curious question, whether those who have sent us the werewithal to prevent a famine in the land, are to be deprived of remittances in specie, should they have so ordered it, as is frequently the case for the purposes of commerce. A combined voyage, as the mercantile phrase is, is often made up; that is, a vessels starts from a given point in Europe, with a cargo of grain, or other articles that are supposed will command a ready sale. The consignees are ordered to invest the proceeds in dollars or doubloons, and to send her to Cuba or Rio, for a cargo of sugar or coffee. How is this to be done in the present state of affairs? Send the specie we cannot, and the voyage must be defeated, and probable loss instead of gain be the result. Every way in which we can turn the question, it presents difficulty and distress; our whole commercial system is out of joint, and our country, like a bad manager of his financial concerns, becoming in evil repute with foreign nations."

IMPORT OF FOREIGN WHEAT,
Into the City of New-York.

1835.	October,	From	England,	17,000 bushels.		
			Holland,	1,200—Total,		18,200
1836.	Feburary,	From	England,	34,000		
			Holland,	2,000	36,000	
	March,		England,		42,800	
	April,		"	33,000		
			Germany,	3,000		
			Austria,	3,000	39,000	
	May,		England,	17,500		
			France,	9,000		
			Holland,	4,500	31,000	
	June,		England,	8,800		
			Holland,	7,800	16.600	
	July,		"		8,200	
	August,		"		3,600	
	September,		England,	15,600		
			Germany,	1,600	17,200	
	October,		England,	44,700		
			Germany,	24,700	69,400	
	November,		England,	46,300		
			Russia,	3,600		
			Germany,	53,400		
			Holland,	6,500	109,800	
	December,		England,	62,500		
			Germany,	51,600		
			Austria	2,000		
			Italy,	1,500		
			Holland.	2,500	120,100	
Total import for 1836,						493.700
						511,900
1837.	January,	From	England	49,000		
			Germany,	75,100		
			Holland,	7,500		
			Denmark.	1,000	132,600	
	February,		Germany,	76,000		
			France,	25,200		
			Holland,	8,000		
			Russia,	22,000		
			Austria,	5,100		
			Italy,	7,600		
			England	32,900	176,500	
	March,		Germany,	85,200		
			England,	146,000		
			Holland,	90,600		
			France,	1,300		
			Italy,	84,800		
			Sicily,	5,400	413,300	
Up to the 19th April,			Russia,	14,000		
			England,	2,500		
			Italy,	59,100		
			Prussia,	8,000		
			Germany,	23,000		
			Holland,	28,400	135,000	
Total import to 19th April, 1837						854,000
						1,365,900

VALUE OF THE IMPORTS,
Of wheat, Potatoes, and Coal, from all parts of the world, for the last six years.

Year.	Wheat.	Potatoes.	Coal.
1830,	$492	$9,189	$204,773
1831,	685	7,818	108,25[illegible]
1832,	1,151	18,436	211,017
1833,	1,606	18,356	261,575
1834,	1,213	15,942	200,277
1835,	18,647	57,901	143,46
	$23,794	$127,642	$1,120,353
Average,	4,133 1/3	21,273 2/3	188,215 1/3

From the Farmer and Gardener.

TURNIP CULTURE.

An opinions prevails among many judicious thinking farmers, that if turnips are got in from the 20 of August to the 1st of September, that there will be time enough left to mature the crop. In the present changed state of our seasons, we believe that either of these periods, or any time between them is entirely too late, if it be desirable to grow a remunerating crop. To be sure, if the object of the culturist simply be to raise turnips for his own table use, it may be well to delay sowing thus late; for, of a certainty, the turnips so raised will be sweeter; but wherever *profit* forms the object of the crop, the seed ought to be sown from the 15th to the 25th of July, by which, besides getting a greatly increased product, time will be allowed to resow if failures, proceeding sometimes from defective seed, and at others, from destruction by the turnip fly or grass hoppers, should occur.

From the Maine Farmer.

QUESTIONS AND ANSWERS.

What is the average crop of Ruta Baga, to the acre, on land well manured and taken care of, in Maine?

Answer. 600 bushels—each bushel weighing 64 pounds, after being well cleared of tops, dirt, and small roots. Much greater crops have often been produced; say from one to two thousand bushels to the acre, or at that rate on smaller lots.

What are they worth, ton for ton, or pound for pound, for stock, compared with good English hay, corn, potatoes, apples, &c.?

A. When properly fed out, they may save hay, pound for pound; because if given in any considerable quantities, stock may be kept in good condition, if poor hay, or even straw be added.—They are worth more than potatoes in equal weight; and as much as apples, and less liable to decay. To keep a creature in decent flesh, with hay, five bushels of Ruta Baga are equal to a bushel of meal.

What kind of stock is it best and most profitable to feed them to?

A. All kinds: horses and swine not excepted. If they refuse them at first, let them become hungry, and they will soon eat them well. I have wintered swine on them, in a raw state. They are worth for them certainly as much as potatoes—and are most excellent for sheep.

What is the cost to raise them, per bushel, compared with potatoes.

A. Much less: as they yield much more on a given quantity of land; their seed and planting cost less; their hoeing more; and their leaves pay the harvesting.

Are they not more exhausting to the land than potatoes, or most other crops.

A. They are; as much more weight is taken from the soil than by most other crops. I think no one ought to object to having a large crop, because it takes more from the soil than an inferior one; but it should be known that Indian corn will not grow well the next year after a large crop of ruta baga, as each require from the soil similar qualities.

More hereafter, in relation to Ruta Baga, from A. B.

N. B. Sow from the first to the middle of June.

THE PROSPECTS OF THE CROPS.

It affords us much pleasure to be able to record the frequent notices, published in different parts of the country, of the promising appearance of the crops, notwithstanding the cold and backward season thus far.

"The Eastern (Pa.) Whig has information that the whea fields through Western Pennsylvania, promise an abundant yield."

The Northern Pennsylvanian says:

"Luzerne, Susquehanna, and Wayne Counties, never presented, since our recollection, so pleasing an aspect. Grain, Grass, and every pariety of vegetation, have assumed an appearance hitherto unprecedented, and should no unpropitious event transpire to blight the prospects of the Farmer, abundance will crown their efforts."

The Poughkeepsie Telegraph says:

"As every thing relating to the crops excites much interest we have taken some pains to enquire of our Farmers respecting that of corn, of which an uncommonly large quantity has been planted in this county. We understand that it has come up remarkably well, that with the exception of a few pieces, it is undisturbed by worms, and is very thriving. The start is good, and if the season continues favorable an abundant crop may be anticipated.—The grass, oats and barley, are also very promising, and the crop will be abundant."

The Onondaga Standard says:

"Within the past two weeks the face of nature has put on a more smiling aspect, and promises abundant returns to the cultivators of the soil. The change extends over the whole country, from every part of which we see lively hopes expressed of a plentiful harvest."

POUDRETTE, OR NIGHT SOIL MANURE.

Measures are now in progress, and in an *advanced* state, for the purpose of preparing this valuable manure—which has done so much to improve the Agriculture of *China, France and Belgium*, and in the vicinity of *London*.

There is a vast quantity of material to be had in, and about, this city; and there is *now* to be had, on very favorable terms, the necessary *experience* in its preparation.

The necessary capital to go into the business on a proper scale is partly provided—there is, however, yet an opportunity for a few subscribers.

Those who take an interest in the commencement of the business, to the amount of $500, will enjoy superior advantages in the use of the manure, which is esteemed *more valuable* than even *Lime, Plaster,* or *Bone Manure.*

Further information will be given on application at the office of the New-York Farmer, 30 Wall-street, Basement story.

Advertisements.

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone.

The work contracted for must be finished by the 1st day of July, 1838

Persons desirous of obtaining work are requested to apply at the office of the undersigned, in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, Jr.
Chief Engineer Jas. Riv. & Ka. Co.

P. S—The valley of James River above Richmond is healthy.

16—10t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered — The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.— The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country.

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 11 1y

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rochester, Jan. 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order. IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B—Also furnished to order, Shapes of every description, made from Salisbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.
16—6t.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2½ by	½,	15 ft in length,	weighing			$4\frac{68}{100}$	per ft.
280 "	2 "	½,	"	"		"	$3\frac{50}{100}$	"
70 "	1½ "	½,	"	"		"	2½	"
80 "	1½ "	¼,	"	"		"	$1\frac{25}{100}$	"
90 "	1 "	¼,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3¼, 3½, 3¾, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front st

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

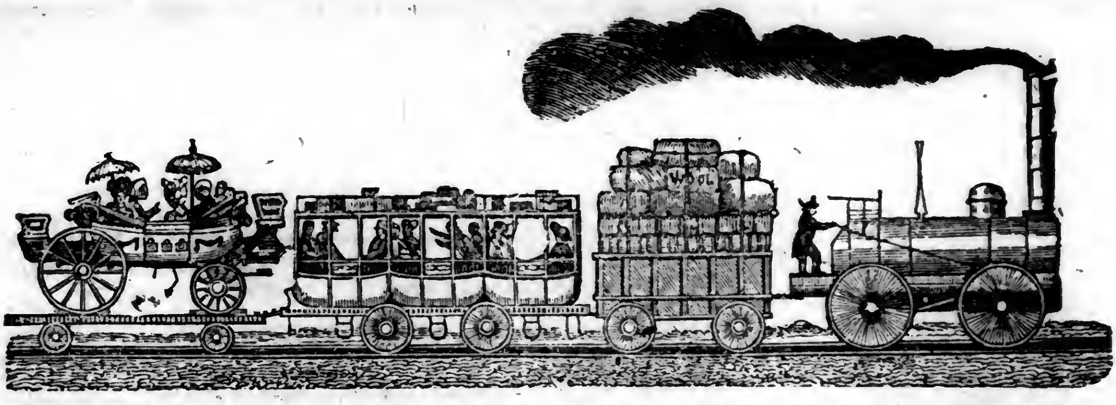
Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron, Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N.
51tf



AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, JULY 15, 1837. VOLUME VI—No. 28.

CONTENTS.

COMPLAINTS.—This is the *age* of complaints—*some* people complain because we send them a circular, a "*dunn*" as they call it, after sending the Journal several years, without payment, as though we could live on *Pi*,—others, a small number it is true, complain because we *omit* to send our bills when due, according to the terms, *in advance*—as they wished to discontinue it, but forget to what period they had paid—others complain that they do not get the work regularly—as though we were Amos Kendall—or not at all, having *removed*, and omitted to give us notice to change the direction of the Journal—indeed these are only a *few* of the complaints which reach us, in these times of "shin plasters," and depreciated currency, we *like* to have said "of *better currency*"—whilst we, in our turn, contribute our share to the general stock of grumbling, by saying that those who have so many causes of complaint against *us* and the *Journal* will soon have their troubles, on that subject at least, removed by *its natural death*, unless those who are indebted for it soon pay the amount due.

☞ The present list of payments, during the last four weeks, shows 35 names, amounting to about $175, whilst our bills for *labor* alone, to those employed, exceed that amount. Who then is to pay for *paper, ink, rent,*—and what is to us of equal importance, as hard as the times are,—for *bread* and *beef*, to keep our *locomotives* in operation? Do not complain gentlemen delinquents, if we do remind you of the scarcity of *fuel*, as without it, the best made *Locomotives* will not *traverse* the inclined planes with short curves of the present state of affairs.

Those only may complain, who, through accident or error, are not credited when they have paid, of which we regret to say, there are a few instances, by miscarriages of the mail, and the errors of collectors, clerks and editors.

There is, at all events, *one* class of friends of whom *we* shall not complain—viz., those who remit the amount due in the best currency they can obtain—as it rests with them to say whether the Journal *shall complete its present volume.*

The report alluded to in the following communication has remained with many others waiting its turn. Its very great length will prevent us from publishing the whole—the part relating to the mode of construction we shall give in our next number. It may be well to remark that the same plan has been proposed for several other roads.

To the Editors of the Railroad Journal.

GENTLEMEN.—A few days since, I met, accidentally, with a very extraordinary report on a railroad in Canada, called "The great western railroad," written by Mr. E. Johnson (not E. F. Johnson of the New-York and Erie Railroad.) Among other curious things, this report contains a new system of constructing railroads, the merits of which I propose to investigate "pour passer le temps" in these "piping times of peace."

The superstructure consists of vertical posts, 2 feet in diameter, placed 5 feet from center to center transversely of the road; and 10 feet from center to center longitudinally. On these posts are placed the ties, 15 inches diameter, and 9 feet long, notched as usual for the rails, which are 12 inches square, or large enough to square that size, with a strip 3 × 4 placed on their upper spuare, with its least dimensions vertical, on which the iron is laid, and both are then secured to the rail by seven inch spikes.

The ordinary wooden superstructure consists of continuous longitudinal sills, from 4 to 6 inches thick, and 10 to 12 wide, to these are spiked the cross-ties, 6 inches diameter, and 3 feet from center to center, rails 6 × 6 inches, and then the iron plate. This is the lightest and cheapest superstructure in use, where locomotives are required.

Now the stiffness of the superstructure, depends 1st. On the firmess with which the posts in the one case, and the sills in the other, resist the tendency of the train to press them into the ground; and 2d. On the deflexion occasioned by the weight of an engine acting in the one case, on a rail 12 × 12 and supported at intervals of 10 feet, and in the other, on a rail 6 × 6 supported at intervals of 3 feet. For, if the posts or sills are passed into the ground, the track will be out of adjustment, no matter what the stiffness of the rails may be, and, on the other hand, if the posts or sills rest on solid rock, and the rails bend between the ties, the firmness of the posts and sills avails us nothing.

The area of the ends of the posts may be averaged at 3 square feet each. These ends rest on the natural ground, and each post (or 3 feet of bearing surface) supports 10 feet of track. In the ordinary modes, the sill is continuous, and to each foot of track we have a foot, or nearly a foot, of bearing surface 3 times more than in the former case. This, however, is not all, for each post may, and will settle individually, occasioning sudden depressions in the road, whilst, with the continuous sill, this sinking must be gradual and comparatively easy. The effect of this cannot be directly estimated, but all practical men will see the superiority of a sill from 20 to 40 feet long, over detached sills of 3 feet in length, which are just equal to the posts. We have already seen, that the common superstructure has 3 times the area of bearing surface in the new, and, considering the want of connexion in the parts of the latter, we may safely say, that the foundation of the old plan is 5 times firmer than that of this improved system.

The comparative stiffness of the rails, can, however, be stated with accuracy. Deducting from each interval the diameter of the tie, we have in the one case, a beam 12 × 12 spanning a distance of 8.75 feet in the clear, in the other a beam 6 × 6 and a span of 2.5 feet in the clear. According to the principles demonstrated by Barlow, Tredgold, Dupin, etc, the relative stiffness will be, as 1 to 2.7 very nearly, or the common rail will be nearly 2¾ times stiffer than the new. With a rail 5 × 7 and bearings 2 feet in the clear, it will be very nearly 7 to 1 against Mr. Johnson's plan, yet I know from experience, that even these dimensions are barely sufficient to bear the action of 8 ton Engines.

Suppose the embankment to be 15 feet high, then for each 10 feet of road, we have 30 feet of posts. On the old place we should have 20 feet for sills, and 10 feet remaining for an intermediate tie—the sills would give 3 times the bearing surface of the posts, and the additional tie would increase the stiffness of the rail more than 3 times, and all this with the same quantity of materials. When the height is greater, the result is still more striking, for besides making the road many times stiffer, there will remain a surplus of timber.

Mr. Johnson will richly deserve the thanks of the Engineering world, should he ever produce as close an approximation to the great object of mechanical science, "a maximum of effect with a minimum of material," as he has to the converse of the proposition, in devising this most unique arrangement of timber. It is inferior to the common superstructure in every respect, and is a rude imitation of the plan adopted by Mr. H. Allen on the Charleston railroad, omitting however, one of the most important parts—a transverse sill *under* the posts.

Mr. Johnson is evidently under the impression, that the ground in its *natural* state (soil of course removed) offers the best foundation; whilst it is known to every Assistant in every regular corps in the United States, that the rails keep in adjustment, infinitely better on light embankment, than in cuttings or on the natural surface. The worst foundation on the old plan is therefore the best in this, or, in embankments on the new plan we have no better foundation than in cutting on the old and in cutting in the new plan the posts will go below the bottom of the ditch, the water will follow them down, and thus will be added a difficulty "sui generis," to the far too numerous ones already existing. All who have had experience in clay soils, know well how this will work.

A little experience will convince Mr. Johnson of the truth of these remarks. Should they in the mean time, meet the eye of the stockholders, and induce them to take professional advice *before* trying an "experiment," which will inevitably do for their railroads what "*the* glorious experiment" has done for our honor and prosperity, I feel very sure, they will ever bear in remembrance this communication, from

Your humble serv't. Q.

New-York, July 8th, 1837.

At a general meeting of the stockholders of the Richmond, Fredericksburg and Potomac Railroad Company, held at Richmond last week, Conway Robinson, Esq., was unanimously re-elected President of the Company. Mr. R. has tendered his resignation, but the stockholders "deemed his continuance as President of the Company, important to its best interests," and he was accordingly re-elected.

Boston and Providence Railroad.—The following gentlemen have been elected Directors of this Company, viz.: W. W. Woolsey, John F. Loring, J. W. Revere, Josiah Quincy, Jr., B. R. Nichols, C. H. Russel and F. Townsend.—Officers for the ensuing year: W. W. Woolsey, President, John F. Loring, Treasurer, B. R. Nichols, Clerk.

The Andover and Haverhill Railroad.—The receipts of this road to June 24th, amount to $25,907 00. The road will, in all probability, be finished to Haverhill in the month of August next.

The Western Railroad will be located on the Northern Route, by way of the Pontoosuc Turnpike, through Westfield, Chester, Hinsdale, Dalton, Pittsfield, &c.

Railroad.—Stock to the amount of $3,500 was subscribed on Monday last by the citizens of this place, for the purpose of constructing and continuing the Railroad from the upper town to its termination at the foot of Lagrange street. It is expected that the work will immediately commence.—[Toledo Gaz.]

Who, in 1830, anticipated the construction of such a road, in so short a time? Who now can duly estimate the amount?

One hundred and sixty-eight passengers left Toledo on Monday morning last in Railroad Cars, with much baggage, merchandise, etc.

Seven steamboats of the largest class arrived here yesterday, six of which came direct from Buffalo, and landed upwards of one thousand passengers. Most of these passengers left yesterday and this morning in the Railroad Cars.—[Toledo, Ohio, Gaz.]

THE WESTERN AND ATLANTIC RAILROAD.

The *Standard of Union* of 20th inst says—"We are much gratified at having it in our power to lay before our readers, extracts from several letters written by Col Long, the States Engineer, to the Governor, upon the subject of the contemplated Railroad from Tennessee to the Cattahooche.

From the opinions expressed by Col Long, in regard to the practicability of this great work, so far as he has examined the country through which it is destined to pass, every thing is encouraging, and no doubt remains upon our minds of its ultimate success.

We quote the following extracts from Col Long's letters that our readers may possess as early as practicable, correct information on the subject.

"Scudders, May 19th, 1837.

Dear Sir.—I have the satisfaction to apprise you, of my arrival at this place last evening, having succeeded in finding a route from the Chattahooche, thither, which I regard a very good one, vastly more favorable than any I expected to find between the two rivers."

"Allatoonee, May 28, 1837.

Since the date of my last, at Sandtown, I have traversed the country between that place and Campbellton, &c.

On my arrival here, I met Gen. Brisbane and Mr. Stockton who have carefully explored the country between the Chattahoochee and several sources of Little River, and report two routes practicable, both of which will require an instrumental survey, in order to determine their relative merits, &c."

Cassville, June 11, 1837.

During the last week, I have examined the country, by the following routes—viz: Cassville to Rome, thence via. Armuchy, &c., to Rossville—thence via. Taylors gap to Chatoogata gap—thence through the wilderness to Pigeon's Ferry—thence through the valley of the Oostenaula, and downward in the valley of the Conasee Creek; and thence in a direction towards Sally Hughes' Ferry.

My observations have confirmed me in the opinion before advanced, that we can find a route from the Chattahooche, to the Tennessee line, without exceeding an ascent or descent of 30 feet per mile."

"Three parties of Engineers will be in the field in a few days for the purpose of commencing instrumental examinations of various routes with a view to ascertain the most favorable, and from the known energy and capacity of Col. Long, and the ability of those associated with him, a speedy location of the road may be anticipated.

On the part of our Governor, every thing depending upon him has been promptly done, funds have been advanced, and every facility in his power, afforded, to advance the progress of this important undertaking."

From the Oswego Palladium.

UTICA AND SCHENECTADA RAILROAD COMPANY.

We find in a circular, recently published by the Directors of this Company, the following highly interesting information—at least, to those who take an interest in this description of public improvements. The success of this company and its handsome dividends, will no doubt stimulate our citizens, on the first favorable change of money matters, and price of provisions and labor, to finish, with as little delay as possible, the *Oswego and Utica Railroad*, by which, with the Lake, we shall be connected with the *Great Western Railroad*, through Canada, and which makes this route, to the north western Lakes, States and Territories, the shortest, cheapest and most expeditious, and will no doubt receive the patronage of the travel ing public. We understand, that Mr. *J. Dana Allen* has completed surveys on several lines from Oswego by Rome, to Utica, for a location of the O. & U. R. R. The distance is less than the present travelled mail route, (seventy five miles.) The grades, curves and distances on direct lines are equal to any R. R. in the United States. This road has an advantage and privilege over the Utica and Schenectada R R in its charter, viz: to carry freight. Besides this, it has another advantage over the U. and S. R. R.—the right of choice of routes. The land on the O. and U. R. R. is generally given, while the other Co., by reference to the document above mentioned, paid $283,588 20 for land, and $32,500 to the Mohawk Turnpike Co.—total, $345,088 60! It was limited to the north side of the Mohawk, and had many difficulties to encounter. The expenditures, on account of the construction of this road, to the 31st of May, were $1,708,894 04. The items of which, are first, for right of way, as above, $345,088 60; grading road, $561,787; superstructure, $115,733; engines and cars, $122,771; buildings $71,639; engineering and superintendence, $57,381; incidental expenses, $159,472. The income of the road during the last ten months, from the actual receipts from passengers, is $257,692 20. Add for receipts of the remaining two months, June and July, estimated to be in the aggregate, (the same as the last two months, April and May,) $62,307 71; total for the year, $319,999 91. Assuming the receipts of the road for transporting passengers only, to be the same for any ordinary year hereafter, as the present current year, they will amount to $320,000. Add for carrying the United States Mail, as stipulated in contract with the Post Master General, $20,000, and the gross receipts of this road for an ordinary year, is $340,0000. Deduct for estimated expenses, $140,000, leaving an annual income, to be divided among stockholders, of $200,000. This estimate does not include a cent for future increase of travel on this road, nor does it allow any thing for a contingent decrease, unless $10,000 per annum for contingencies be considered as such allowance. Many persons believe that the increase of travel hereafter will produce enough to renew the perishable part of the road, as often as it will require renewal; if so, the dividend of profits will be greater than the above estimate. The dividend declared for the last six months, is 7 per cent; and if we recollect right, it was for the four months previous—Sept., Oct., Nov., and Dec.—5 per cent. This certainly exhibits a flattering statement for Railroads, and will readily account for the improvement in value of *Railroad Stocks*, both in England and in this country.

Lime.—Lime is said to be an excellent remedy for burns or scalds: equal proportions of lime, water, and any kind of oil, made into a thin paste, and immediately applied and repeatedly moistened, will speedily remove the effect of a burn; and if applied later, even when the blister has risen, the remedy never fails. This paste has been known to stop effusions of blood, when almost every thing else has failed. Dry lime thrown into a flesh wound is always healing.

OUTLINES OF

PRACTICAL MECHANICS.

I.

OF MACHINES.

1. Machines, in their practical application, may be considered as tools interposed between a natural agent, or worker, and the task to be performed, in order to render that work capable of being executed which would have been difficult, if not impossible, without the aid of some such instrument.

2 We interpose machines between the agent and the work to be performed, for the following reasons, viz.:

(1.) To accommodate the direction of the moving power to the resistance;

Thus, when a man has a weight to raise to a considerable height, he may do it more convieniently by the aid of a single pulley, even if the weight be not greater than he can lift by his own unassisted strength.

(2.) To render an agent having a fixed and determinate velocity, efficacious in performing work with a given velocity:

Thus, water gives to a wheel, when working most advantageously, a particular velocity, while the work which is to be done is best performed with some other velocity. Machinery must therefore be interposed to convert the velocity of the wheel into that demanded by the work.

(3.) To enable a natural agent, having a given intensity, to overcome a force or obstacle, whose intensity of resistance is greater:

Thus, a man may wish to lift a stone, or other weight, so great that it cannot be moved by his own unaided strength. In this case, by laying a prop upon the ground, on which a strong bar of wood or iron is caused to rest, he constructs an extemporaneous lever, by the aid of which he can move what would otherwise have required the united strength of several men.

3. The machines which are used in practical mechanics may be either simple or compound. The simple machines are six in number, and are called the mechanic powers. Compound machines are made up of the mechanic powers, combined with each other in various ways, and modified in various manners. In these combinations there is not only a change in the intensity and in the direction of the forces, but the character of the motion may be changed also.

4. Of the lines which any point of a machine can describe, the simplest are the straight line and the circle. If the points continue to move onwards in the same straight line the motion is said to be *continuous rectilineal.* Of this we have no instance in the parts of machines themselves, but it is often found in prime movers.

If the points, after having described a straight line, return along that line to the place whence it first set out, the motion is said to be *reciprocating rectilineal.*

If the point describe an entire circle, turning continually in the same direction, the motion is said to be *continuous circular.*

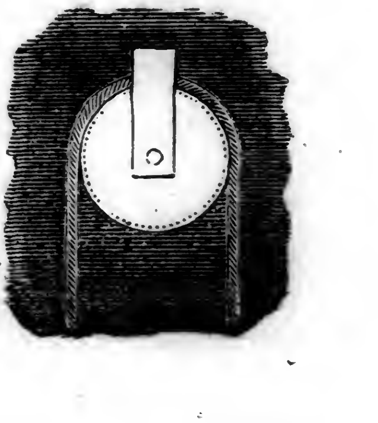
If the point move through an arc, or portion of a circle, and return along that arc to the place of beginning, the motion is said to be *reciprocating circular.*

5. Among these four kinds of motion, taken by pairs, ten possible combinations exist; but two of these never occur in practice. Machines have therefore been divided into eight series:

(1.) A continuous rectilineal motion may be converted into another of the same description, but different in direction.

Instance—a simple fixed pulley.

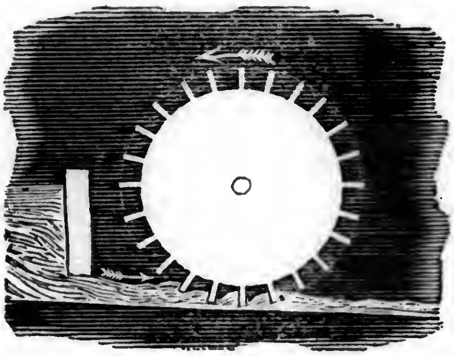
Fig. 1.



(2.) A continuous rectilineal may be converted in to a continuous circular motion, or a continuous circular motion into a continuous rectilineal motion.

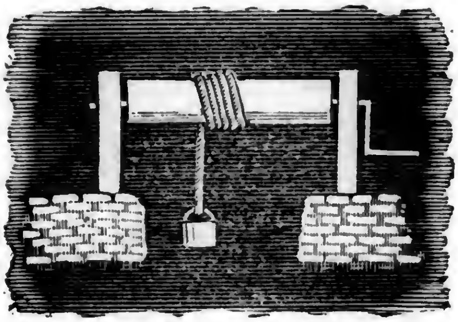
Instance 1— a water-wheel.

Fig. 2.



Instance 2—a well-diggers windlass.

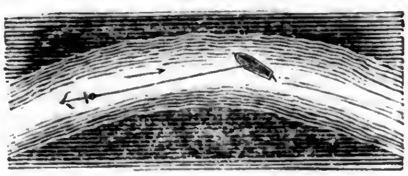
Fig. 3.



(3.) A continuous rectilineal motion may be converted into a reciprocating circular motion.

Instance—the machine used for crossing rivers, and known under the name of the flying bridge.

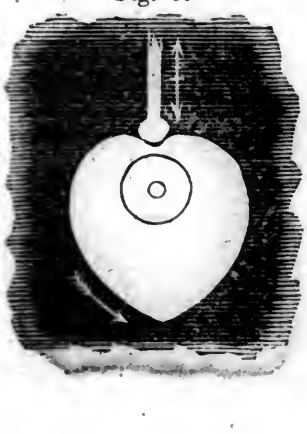
Fig. 4.



(4.) A continuous circular motion may be conuerted into a reciprocating rectilineal motion; or a reciprocating rectilineal motion into a continuous circular motion.

Instance 1—the heart wheel.

Fig. 5.

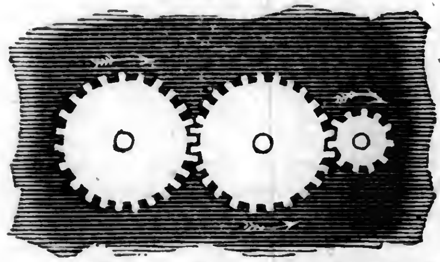


Instance 2—the crank of a horizontal steam engine.

(5.) A continuous circular motion may be converted into another of the same kind, but opposite in direction.

Instance—Toothed wheels and pinions.

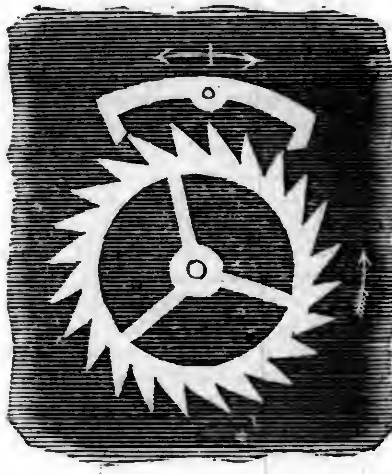
Fig. 6.



(6.) A continuous circular motion may be converted into a reciprocating circular motion; or a reciprocating into a continuous circular motion.

Instance 1—The scapement of a clock.

Fig. 7.



Instance 2—the crank of a spinning wheel.

(7.) An alternating rectilineal motion may be converted into an alternating circular motion; or an alternating circular in an alternating rectilineal motion.

Instance 1—The working beam of the usual form of steam engines.

Instance 2—The brake and rod of a pump.

(8.) An alternating circular motion may be converted into another of the same description but contrary in duration.

Instance—Toothed segments.

6. In every machine there are three motions which require to be particularly considered:

(1.) The motion of the moving power itself;

(2.) The motion of the parts of the machine which is immediately acted upon by the moving power. This is called the impelled point of the machine.

(3.) The motion of the part of the machine by which the work is performed, and which is called the working point.

7. The moving powers, or prime movers employed by mechanicians are all natural agents. The most important of these are:

(1.) The force of gravity, acting through descending weights;

(2.) The elasticity of springs;

(3.) The strength of men and animals;

(4.) Water;

(5.) Wind;

(6.) The force of the elastic vapour of water or steam.

In addition we use in a few instances the explosive energy of gunpowder. The attractions of electricity, magnetism, and affinity, are also capable of setting bodies in motion, and might therefore be applied to drive machines. But the sphere of action of these forces is so limited as to render it improbable that they can ever be applied to any useful purpose, with the exception of the electro-magnetic influence. Of this an application has recently been made which promises to be effectual.

There is also in the continually varying pressure of the atmosphere a source of power which might be applied in some few instances, and it has been used for winding up clocks. Before machines were invented, or while only those of the simpler descriptions were known, man could apply no other prime mover but his own strength. The introduction and improvement of complex machines has enabled him to call into his service the great natural agents, water, wind and steam.

8. As no motion can take place without the application of an adequate force, so no machine can act, unless driven by some natural agent. Neither can any machine long continue to work after the prime mover ceases to act. Hence, machines which shall keep up their own action, and which have been sought under the name of perpetual motion, are impossible.

9. The action of a prime mover depends not only on its own energy or intensity, but on the velocity with which it tends to cause the impelled point of a machine to move. The product of these two quantities is called momentum. The work done is also to be estimated by the quantity of resistance overcome in a given time, or by the momentum of the resistance.

Under the term resistance are included not only the useful work performed, but also friction, and all other retarding forces, such as the action of gravity, the resistance of the air, or other medium in which the motion is performed.

10. When the momentum of the prime mover exceeds that of the resistance, the machine is set in motion, and will move from a state of rest with accelerated velocity. If the prime mover be an attractive force, which acts with equal intensity upon a body whether it is at rest or in motion, the tendency to acceleration will continue. But if, as is more usually the case, the prime mover acts more forcibly upon bodies at rest than upon bodies in motion, the rate at which the impelled point of the machine is accelerated will diminish at each increase of its velocity. This diminution in the action of the accelerating force will continue until the momentum of the resistance becomes equal to that of the prime mover. The motion of the machine then becomes uniform or will vary only within certain limits. It is said to be in a state permanent working, and equilibrium exists among the moving and resisting forces.

This species of equilibrium, which occurs in the motion of a machine, is called dynamical.

11. When the prime mover is of such a nature as to act more forcibly upon a body at rest than upon a body in motion, a machine impelled by it may cease to do work from two causes; it may be loaded with such a resistance that it can no longer move; or it may move so fast as to receive no new impulse from the prime mover. Between these two states there will be a velocity of the impelled point with which the greatest possible quantity of work will be performed. This most advantageous velocity of the impelled point is, in most cases, one third of the greatest velocity of which the prime mover is capable; and the resistance which will be overcome at this velocity is four-ninths of that which will stop the motion of the machine altogether.

12. It is in most cases important, that the work of a machine shall be done with a motion of the utmost regularity. A tendency to irregularity may arise from two causes.

(1.) The prime mover may act unequally upon the impelled point of the machine, and yet vary within certain definite limits.

(2.) The prime mover may have a tendency to increase or diminish in its mean intensity and velocity, or the resistance may be subject to variation.

Each of these cases has its appropriate remedy. The first cause of irregularity may be counteracted by a fly wheel; the second by a governor.

13. A fly wheel is a heavy circular disk, usually of metal, to which a great velocity is given by the action of the prime mover, transmitted through the machine. This wheel like all other bodies, is possessed of inertia by which it resists the action of forces, tending to accelerate it, and tends to continue in motion when the action of the accelerating force ceases to act. When therefore the action of the prime mover is more than equal to the resistance, the fly wheel opposes its inertia, but still gradually acquires an increased velocity, and corresponding momentum. When the action of the accelerating force diminishes, or even ceases altogether, the fly wheel does not at once lose its velocity, but parts with it gradually, distributing through the other parts of the machine the excess of momentum it had previously acquired. Although a fly requires a part of the moving force to set it in motion, and thus in fact adds to the resistance, it notwithstanding frequently enables an irregular force to do work that it would otherwise be incapable of performing. Thus, although a man is capable of exerting a force equivalent to raising seventy pounds, yet when he turns a winch or crank, there is a part of the revolution, when his utmost force will balance no more than twenty-five pounds. If then the resistance exceed the latter quantity, he will not be able to make the crank perform an entire revolution, and consequently can do no work at all. If however a fly be applied to the crank, he will be capable of working throughout its whole revolution, with a force equivalent to the raising of a weight of thirty pounds.

The effect of a fly wheel, is proportioned to its weight, its diameter, and its velocity.

14. Some engines require no separate fly wheel, as they themselves, or some of their working parts may act in the manner of a fly. This is the case in the water wheel, which will regulate its own motion, and that of the machinery it drives.

The principle which is employed in the fly wheel, is also used for the purpose of accumulating the force derived from a long succession of impulses, and discharging it at once upon a given object.

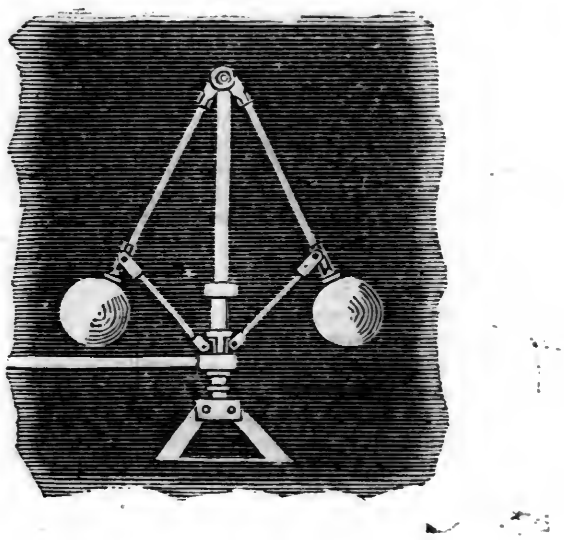
The most familiar instance of this application of the principle is to be found in the coining engine. This is a screw-press worked by a long lever, the two extremities of which are loaded with heavy weights. A rapid motion is given to this lever by the power of men, who abandon it a short time before the die is carried down to the coin. At the instant the die strikes the coin, the whole of the force which has been communicated to the weights is discharged, and thus a deep impression is produced.

15. When the intensity of the prime mover is subject to variations which are not confined within fixed limits, or when the machine may be required to perform very different quantities of work, the action of the prime mover itself is regulated by an apparatus called a governor.

A governor consists of two heavy balls suspended by means of bars from a vertical axis. Each of these bars is connected with the axis by a hinge. These bars form a part of a system of levers by which a collar may be made to move upon the vertical axis. The axis derives motion from the machine, by which a centrifugal force is communicated to the balls. This centrifugal force may acquire such intensity as to overcome the gravity of the balls. They will in consequence move onwards, and thus communicate motion, through the system of levers, to the collar upon the axis. When the velocity diminishes the balls fall inwards, and thus move the collar in an opposite direction. The collar acts upon an apparatus by which the intensity of the prime mover may be varied. Thus, in water wheels it opens or closes the shuttle by which water is admitted to the wheel; in steam engines, it works a valve by which the area of the steam pipe is increased or diminished.

One of the forms which the governor frequently assumes is represented in Fig. 8.

Fig. 8.



TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

AN ACCOUNT OF THE HARBOR AND DOCKS AT KINGSTON-UPON HULL.

Continued from p. 422.

Dock-walls, Plan No. 3. The foundations are all piled with a row of 6 inch grooved sheeting piles in front; the bearing piles are 9 inches, the counterfort piles 8 inches diameter. They were all driven with a ringing engine and a ram of nearly 4 cwt., worked by fifteen or sixteen men; these piles proved to be too short for so lofty a wall, where the ground in general is so soft and compressible. Longitudinal sleepers of half timber were bolted down upon the heads of the bearing piles, the sheeting piles spiked to an inner waling of the same scantling, and the whole covered with 4 inch transverse close planking, on which the wall was raised. The timber used was Memel or Danzig, excepting the piles, which are chiefly of Norway fir.

The dock walls are all of brick, with the exception of a stone *through* course at the bottom of the fenders, three courses of stone on the level of an average tide, and the coping. The mortar was made of Warmsworth blue lime, and sharp fresh water sand only; the lime, having been ground in its dry state in a mill worked by a steam engine, was mixed with two parts of sand, for the front work, and water having been added, the whole was ground again, and the mortar used immediately afterwards, whilst hot and fresh. The backing mortar was composed of one part of unslacked lime to three parts of sand, mixed and tempered in the usual way. The brickwork of the front and back was laid in mortar, the rest grouted every course; part of this wall being built a little before winter, the front mortar was affected by the frost, but the joints were afterwards raked out and pointed with pozzuolana mortar. The *through* course at the foot of the fenders is of Barnsley stone, 15 inches thick, those in which the fenders are fixed projecting a little from the face, and having a dove-tailed groove to receive each fender; the three courses above are also of Barnsley stone, the lowest being a *through* course: these stones are all properly squared and dressed and the front *bosted*. The coping is of Bramley-fall stone, 4 feet wide and 15 inches thick, squared and dressed, the front and top well bosted, the arris rounded off and the joints secured by stone dowels.

Before the walls were raised to their full height it was found that they had been forced forward on the east and west sides, near the middle, two feet from a straight line, carrying the foundation piling along with them. As a security, a quantity of earth, about ten feet high in the centre, diminishing gradually to six feet at each end, was immediately laid in front, where it still remains; a length of the upper part of each wall was also taken down and rebuilt in a straight line.—Some time after the dock was finished, the water having been drawn down to within thirteen feet of the bottom, for the purpose of making a level bed for the counter balance weight of the gate chains, the east wall again gave way a little, but the movement ceased on the rising of the tide. The circumstance operated as a warning not to draw the water so low in future.

All round the dock, to protect the walls, there are oak fenders 12 inches square, let 4 inches into the brickwork, and projecting 8 inches before the face, dove-tailed into stone corbels at foot, as before mentioned, and secured by oak ties with wrought iron fastenings near the top, which is covered with a cast iron cap. There are also two rows of horizontal fir fenders, 7 inches square, let into the upright ones by short tenons, with angle pieces to prevent vessels catching underneath or riding upon them, as the tide rises and falls.

Lock. The entrance lock is 158 feet long within the gates 42 feet wide at the top, and 31 feet high above the pointing sills, on which the average depth is 26 feet at high water of spring, and 20 feet at that of neap tides.

The foundation consists of four rows of bearing piles, 16 to 19 feet long, for each wall of the chamber, and two rows for the counterforts; on the heads of these, longitudinal sleepers of half timber are bolted, transverse sleepers of the same scantling placed on edge securely fixed to them, and the whole is covered with 4 inch close planking, the interstices being filled in solid with brickwork, on which the inverted arch and side walls are built. There are five rows of 6 inch grooved sheeting piles, 16 to 20 feet long, driven across each platform, the bearing piles for which are 3 to 4 feet apart each way, and carry longitudinal sleepers 12 inches square, with two courses of close transverse sleepers bolted thereon for 13 feet in length from the main sills, on which the pointing sills are fixed. The remainder of the platform is covered with 6 inch elm close planking, on which cast iron segments are laid for the gates to traverse upon. There is an apron or platform at the tail of this lock, about 50 feet in length, covered with 4 inch planking spiked to transverse sills, which are bolted down upon the heads of the bearing piles, with a row of six inch grooved sheeting piles at the outer end. The piles are of Norway timber, the sleepers and planking, except for the platforms, principally of Danzig fir, and the pointing and main sills of English oak.

The side walls are 6 feet 9 inches wide at top, and there are six counterforts on a side, each 6 feet square; besides the foundations for the bridge, which stand 9 feet higher than the rest. These walls and the invert are of brickwork, faced with Bramley-fall stone. The front was set in mortar composed of three parts of ground Warmsworth blue lime, two parts of ground pozzuolana, and five parts of sharp fresh water sand, properly mixed and screened, and well tempered; this work was done by men with beaters till the erection of the mill in which the mortar was afterwards ground wholly, and used immediately; the rest of the work was set and grouted in common mortar, composed of one part of unslacked Warmsworth lime to three parts of sharp fresh water sand, mixed and screened, and tempered in the usual way. The hollow quoins are of Dundee stone, well squared and dressed, set in pozzuolana mortar, with close beds and joints, the parts in which the gates turn being well rubbed to a smooth surface, so as to be water-tight; this very hard durable stone, being of a fine grit, does but little injury to the heel posts, and is therefore very proper for hollow quoins. The south wing walls are also faced with Dundee stone for a short length. The coping is of Bramley-fall stone, 4 feet wide, by 15 inches thick, jogg'ed together in the same manner as that of the dock walls.

Caisson. In the masonry at each end of the lock, there is a chase or groove 12 inches deep, 21 inches wide in the front, and 15 inches at the back, for receiving a caisson or floating gate, which was originally built as a preventer dam at the south end during the execution of the work, and was afterwards used to keep the tidal water out of the lock in repairing one of the gate chains; but having gone to decay, it has since been broken up. The keel was made to fit the stone groove so as to be water-tight, and about ten feet above the bottom, there was a cast iron cross cylinder, 2 feet diameter, communicating with the water on either side, by means of four apertures, 9 inches diameter, fitted with brass plugs worked by screws and rods, reaching to the deck, by which the water was admitted to sink the caisson in its place, and let out at low water when no longer wanted, so that, the plugs being inserted, the vessel rose by its own buoyancy the succeeding tide. This gate or vessel being very deep, and only 22 feet 6 inches in beam, was kept in a vertical position by about thirty tons of ballast.

Gates. The lock gates are all of English oak, except the planking, which is of fir; they are 31 feet 4 inches high above the pointing sills, and 25 feet 6 inches broad, measured in the curve line, the camber being $14\frac{3}{4}$ inches; the thickness is $16\frac{1}{2}$ inches at the heel, and $14\frac{1}{2}$ inches at the head, the 3 inch close planking included. Each gate originally consisted of twelve bars framed into the head and heel, and further secured by wrought iron straps and bolts; but a few years after they were put up, several of the lower bars being broken by the great pressure of the water and the heavy stroke of the sea in stormy weather, they were replaced by new ones, and several additional bars inserted, so that the gates are now a solid mass of timber (excepting the cloughs) for ten feet from the bottom. There are two cast iron sluices to every gate, each 3 feet square in the clear, worked by a wrought iron screw, with a sluice rod reaching to the top. The machinery for opening and shutting consists of a 6 inch pinion, working into a cog-wheel 4 feet diameter, on the axis of which is a cast iron roller 2 feet 9 inches long by $10\frac{1}{2}$ inches diameter, for the gate chain to wind on. The other parts of the gates and their appendages are so much like those of the Old dock lock, that it is deemed unnecessary to repeat the description.

Before the piers of the entrance basin were erected, the waves from the Humber sometimes forced open the outer gates a little notwithstanding the great pressure of water behind; and the violent concussion in shutting fractured the lower bars, as already mentioned, and would in all probability soon have destroyed the gates had they remained much longer exposed. Since the erection of the piers the swell is much diminished; but even now, with strong gales from the south, it is dangerous to attempt to open or shut the gates by the machinery, and at such times recourse is had to blocks and tackle provided for the purpose. When the gates are left open after high water also, the current out of this lock, in particular, is so strong as to require great caution in shutting them; this used to be done at such times by what is termed *back handling*, that is, the gate-men standing at the machinery for opening, keep a tight hand upon it, to prevent the gates from closing too forcibly; but recently a safer and more simple plan has been adopted, namely, by a rope hooked to each gate head, and taking a turn round the mooring posts on each side of the lock, by which the gates can be eased to with the greatest safety.

Bridge. Over the centre of this lock there is a swivel bridge, 12 feet 3 inches wide; it is 81 feet 9 inches long, and composed of two parts, which, meeting in the middle, form a segment of a circle.—The bridge consists of six cast iron ribs, about 2 inches thick in the plain part, and 2½ inches at the lower edge, connected together by cast iron braces, and planked with 2½ inch oak, which is protected by a covering of 1½ inch fir. The foot-paths, each 2 feet 8 inches wide, are slightly raised above the carriage way on oak joists, covered with fir boards, and have cast iron curbs next the road way; a wrought iron railing, 3 feet 7 inches high, runs along each side. On each side of the lock, in the stone coping of a large brick pier, there is firmly imbedded a cast iron circular plate, 11 feet 9 inches diameter by 6 inches wide, with a cross and pivot in the centre, also securely let into the masonry, and working in a socket underneath the bridge, with twenty conical collars, 6 inches wide, by 10¾ inches diameter at one end and 9¾ inches at the other, fitted in a frame, and revolving between the circular plate above mentioned and a similar plate in the under side of the bridge. The ends or meeting parts of the bridge are not described from the centre pivot or axis of motion, but from a point a little on one side thereof, whereby these parts, in shutting into a tongue and grooved joint, do not come into actual contact till the bridge is shut: it is then completely fast, being closely wedged to the abutments on each side and kept in place by two keys at the meeting, thus making the whole firm and secure. The machinery for opening and shutting the bridge, consists of two 8 inch bevel pinions, to one of which the handle is applied, and at the bottom of the vertical shaft of the other is fixed a 9 inch pinion, working into a spur wheel, 4 feet diameter, on the axis of which is another pinion, 12 inches diameter, which turns the bridge by means of a toothed segment at the outer end. One man can open or shut either part of the bridge with ease in half a minute. Messrs. Ayden and Etwell already named in the account of the Old dock, constructed this bridge also.

Basin walls. The walls of the entrance basin are so much like those of the dock, that a very brief description may suffice. They are ten feet wide at the bottom, by 6 feet at the top, fronted entirely with Bramley-fall stone, and having two *through* courses, and a stone coping, similar to the dock; the rest of the wall and counterforts of brickwork; the front masonry, and also the back of the walls, are set in pozzuolana mortar, the remainder in common mortar, of the same proportions and mixed as for the lock. There are three rows of stout piling, 16 to 18 feet long, under the walls, and a row of 6 inch grooved sheeting piles, 16 feet long, in front, with transverse sleepers, and close planking over all: the counterforts are piled and planked in the same way. There was also a quantity of Hessle-cliff stone rammed between the foundation timbers, and about two feet in width behind the walls. This wall, on the outside of the coffer-dam, was wholly executed in tide work.

Quays. The quays are paved with spurn pebbles; the east side, and the south up to the lock, form a legal quay upwards of 1000 feet long; the drainage is into the sewers by gratings every twenty-five yards.

Moorings. The mooring posts are about 10 yards apart, and 4 yards from the side of the dock; they are of wood, iron, and stone. The wooden ones are simply round oak trees, 18 inches diameter at the top, driven firmly into the ground by pile-engines, and having two shores, a little below the surface of the ground, abutting on the back of the wall, by which the strain of the shipping upon the posts is transferred to the wall; a plan that cannot be recommended. The iron posts (twelve pounder cannon) are 9 or 10 feet long the breech or lower end being let into a stone block, and secured thereto by wrought iron straps and bolts, and also built round with brickwork up to near the surface of the ground. I understand that some of these posts are secured by land ties, but in general there is only a large stone laid to the back of the coping, thus throwing the strain upon the wall, as noticed above, in the case of the wooden moorings. The stone posts are of Peterhead granite and Dundee sand stone, of similar dimensions, and secured in like manner, to those at the Old dock: but from their being too much tapered near the ground several have been broken by the heavy strain in windy weather.

Dolphins. There are four dolphins in this dock, each consisting of five piles, the centre one perpendicular and standing above the others, which are battering, and the whole secured together by two tiers of cross braces, and planked over on top and sides, for 11 feet. These dolphins were erected at the time the Junction lock was made, for the purpose of warping vessels in their passage to and from the dock, as well as for the more convenient moorings of ships on the west side of the Old dock.

Sheds and Cranes. A range of sheds 750 feet long 25 feet wide, and 15 feet from the side, extends along the legal quay on the east side of the dock: they are principally of fir timber, covered with weather boarding and enclosed with large doors on the east, but open on the west, except the bay ned at the south end, which is all enclosed, with large doors on each side. The roof is covered with blue slate, and the floor formed with 6 inch flags for a width of 15 feet, the rest being paved with spurn pebbles.

There are seven cast iron cranes to this lock, four on the east and three on the west side; the large one near the north west corner is a *well* crane, calculated to lift 10 tons; the vertical shaft is 5 feet 3 inches from the side of the dock, and its foot 15 feet below the coping, the jib is 19 feet 3 inches high to the under side of the pulley, and projects 22 feet. The other six cranes are all of the *pillar* kind, and calculated to lift 3 tons. The pillar is six feet high, and fixed at a distance of 5 feet from the dock, in a socket in the centre of a cast iron cross, securely bolted to the coping. The jib is 16 feet 6 inches high, projects 15 feet, and is moveable on the pillar by a pivot and socket at the top, and a cast iron collar faced with brass at the bottom.

There are four wooden cranes to the basin, three of them well cranes calculated to lift 3 or 4 tons, and the other, which has been recently put up, a pillar crane for 2 tons; the jibs of all project about 20 feet, or 13 feet beyond the basin wall. These cranes are principally used for steam packets.

Cleansing dock. This dock was not cleansed for three years and a half after it was opened, the dredging machine and mud boats not being completed until then: and such is the impurity of the water in the Humber, that during this time the mud had accumulated to the height of twelve feet at the south end of the dock, and three feet at the north, so that deeply laden vessels were prevented, at neap tides, from entering or going out.

Dredging machine. The dredging machine is worked by a steam-engine fixed on board a square flat bottomed vessel, 80 feet long, 20 feet wide, and drawing 5 feet water. The engine is 6 horse power, and works a 2 feet stroke forty strokes per minute, giving motion, by means of a bell crank, to four cog wheels, on the axis of the upper of which is a square tumbler, with one corresponding at the lower end of the bucket frame.—Round these the wrought iron buckets, 29 in number, revolve by an endless chain, and the mud is discharged over the upper tumbler into a spout leading into lighters lying alongside; the ladder turns on an axis at the upper end, and the lower end is raised or lowered through an opening in the middle of the boat, by a crab and tackling fixed directly over it, by which the buckets are adapted to the proper level for taking up the mud. The vessel is drawn to its work by means of a cable revolving round a roller attached to the engine, and from it by two men at a crab in the stern; there is also a contrivance for moving it sidewise when required. It is usual in inland navigations and canals, where the dredging machine has to pass through locks and bridges, to have the buckets in the middle of the vessel, as in the present instance; but in docks, harbors, &c., where there is no want of room, they are much better on the outside, as there is less waste in discharging the mud into the lighters, and there may be a double set of buckets, one on each side, if necessary.

Four men, including the engine keeper, are required to work this machine, and two more to attend the lighters. The work has for a short time been upwards of 2 tons per minute, (or twelve buckets of 4 cwt. each,) and where the mud is in plenty and there is no impediment, 60 tons per hour may easily be raised; but the ordinary work is about 45 tons an hour, or twelve boats containing from 500 to 550 tons per day of twelve to fifteen hours.

Mud boats. Plan. No. 4. The mud boats are flat bottomed and sharp at each end, and draw, when fully laden, about 4 feet water. Six of them, which were formerly used exclusively for the Old dock, are 48 feet long at top, 17 feet 6 inches wide in midships, by 5 feet 6 inches deep, and carry 40 tons on an average; the six Humber lock boats are rather larger, carrying 48 tons each. They are ceiled inside in a sloping direction like a hopper, with two trap doors in the bottom, through which the mud is discharged, the water rising in the boat to the same level as on the outside, but the cavity between the cealing and the bottom preserving the buoyancy.

When laden, these boats are linked together in pairs, six usually forming a set, which require ten or twelve men to work them; they generally go out of dock when the gates are all opened, a little before high water, and are warped 100 or 150 fathoms from the pier-head, where the mud is discharged; the empty boats then return to the dock, the time occupied being usually from two to three hours, according to the rapidity of the tide, and as the passage is more or less clear of shipping.

Quantity of mud. The quantity of mud taken out of this dock, was about 36,000 tons a year before the Junction dock was made; since then it has been about 30,000 tons, the diminution arising from the water being now in part supplied from the river Hull, which is much purer than the Humber,* and having also to flow through the Old and Junction docks, where a great part of the mud is deposited.

Scouring of basin. The tide-basin being connected with a river highly charged with mud, it was necessary to make provision for cleansing it. The head or north end of the basin, is partly scoured by water from the lock, conveyed 130 feet in two cast iron pipes laid close behind the wall, and 4 feet diameter next the lock, diminishing to 2 feet 6 inches at the outer end; these pipes are in 9 feet lengths, each 30 to 35 cwt., with flanches at the ends bolted together, and resting on a cap-sill, supported by two piles at each joint. To these mains, at equal distances, are connected ten 18 inch pipes on each side of the lock, which discharge themselves through the basin wall, about 5 feet above the level of the sills, on a wooden apron 40 feet wide, laid in front to prevent the foundations from being undermined. Two other mains, also 4 feet diameter, are connected with the dock, one at the south east, the other at the south west corner, terminating at the south-east and south-west corners of the basin respectively; their bottom being about two feet above the level of the lock sills, and aprons placed at the ends, similar to those at the head of the basin. These pipes were intended to scour away the mud along the inner sides of the piers, and also to assist in preserving a deep channel between the heads. There is a vertical cylinder, 4 feet 6 inches diameter, to each of the latter pipes, near the corner of the dock, with a cast iron sluice at bottom for opening and shutting; the sluices for the scouring pipes at the head of the basin are in the face of the lock wall, in the gate recesses; they are all worked by wrought iron screws with handles at the upper end of the sluice-rod. Several of the pipes from the dock to the basin, from being too slight, failed before the dock was opened, and were replaced, at great labor and expense, by new ones; others, which were less fractured, were repaired and strengthened by ribs in the inside.

To show the effect of these sluices, I would state that the four from the lock, and the small ones at the head of the basin only, when all open, lower the water in the Humber dock a foot in four minutes: the latter, with the two from the dock, are generally worked at low water, twice every spring-tide, and notwithstanding their great power, only scour out a narrow channel at each place, sufficient for the steam-packets and small craft to lie in; but being assisted by the sluices of the gates, the main channel from the lock into the Humber is effectually scoured, and maintained to nearly the depth of the sills. Over the rest of the basin the sluicing has no power whatever, and the mud deposited there has been removed by manual labor, at great expense; two mud lighters having been, till within the last two years, almost constantly employed upon it since the dock was opened.

It having occurred to the writer of this, that the water wasted in locking might be beneficially used in cleansing the basin, he recommended a new scouring pipe to be laid at the north east corner, on a much higher level than the other pipes for the purpose. A new 4 feet pipe was accordingly put down in the spring of 1831; from its junction with the old pipe to the outlet in front of the basin wall is 18 feet, and the bottom at the outer end is 10 feet 6 inches above the lock sill. There is a sluice, worked by a rack and pinion, at the top of a brick shaft or well, to stop the old pipe and divert the water through the new one, when in use; at other times, this sluice being drawn up, the water is discharged as before. At the outer end of the new pipe is a wooden spout, 18 feet long, turning on hinges in the wall, so as to be reared up against it when not in use, and to the end of this another spout, 85 feet long, is connected, which can be turned so as to scour in almost any direction. It should be observed, that the largest quantity of mud is deposited on this side of the basin, and that, before the making of this sluice, it had accumulated to a great height, and become so exceedingly hard and tenacious, that it was found necessary to remove it into the stream by workmen with spaddles. In this manner about 12,000 tons of mud were removed in eight weeks after the sluice was set to work. Since that time there has been only one man to attend the sluice abont three or four days every spring tide, except when clearing away the mud alongside the east wall and near the east pier, which cannot be done by the scouring power alone. The new sluice, when in full operation, lowers the water in the three docks about 6 inches an hour, and usually runs about three or four hours each tide.

Sewers. The sewers are all of brick, and are 3 feet wide by 4 feet high; that on the east side commences at the end of Myton-gate, at a depth of 8 feet 6 inches below the dock coping, and terminates at the north end of the basin 4 feet lower, the extremity being closed by a flap, opening outwards, to discharge the drainage water and shut out the tide. This sewer was formerly cleansed by manual labor, but is now scoured by a sluice constructed for the purpose on the east side of the Junction dock. The sewer on the west side discharges itself into one in Kingston-street, which leads to the general outfall into the Humber, at Limekiln Creek.

There is an iron sluice at the north east corner of the dock, 7 feet 6 inches below the coping, protected by a wooden door, worked by a screw, and having an iron conduit, 2 feet 6 inches wide by 2 feet high, leading from it to scour the town sewers.

Dock opened. The water was let in on the 3d of December, 1808, and the dock publicly opened for business, with due honors, on the 30th of June, 1809. The expense was defrayed by the Dock Company, and the Corporation and Trinity House jointly, the two latter contributing one moiety of the expense, and the Company the other, for which purpose sixty new shares were created, under the authority of an Act of Parliament.

Pier heads. Plans, No. 5, 6, and 7. The piers of the entrance basin were begun soon after the dock was opened: their construction will be better understood from the drawings than by description. They are wholly of fir, of the scantlings stated on the plan No. 7, and the filling up or hearting is of Hessle-cliff stone; the sheet piling on both sides was grooved. The passage between the heads is 105 feet at the top.

To be Continued.

VALUABLE INVENTION.—It is remarkable that an invention far more valuable to all who travel upon the seas, lakes, and rivers of this great commercial country, and more important, on the score of humanity, than any other devised by human ingenuity, should remain in comparative oblivion and neglect. We allude to that beautiful preparation of *pulverized cork*, for seamen's and passengers' mattrasses and beds. Will it be believed that a mattrass made of this material, weighing only twenty-five pounds cannot be sunk by the weight of seven men? and that one or two persons might float on it in the midst of the ocean, with as great security from drowning, as if he were on board a ship? Yet such is a fact, as demonstrated by experiment. The beds, cushions, &c., made of this preparation of cork, are more elastic, soft and comfortable than those of the best hair, and have the superior advantage of never becoming matted. Every ship and steamboat should immediately substitute them for all others, and even passengers going to sea should purchase one.—[New Era.]

*The respective quantities of deposit of the two rivers are found, by experience, to be nearly as one to three.

From the London Journal of Arts and Sciences.

A SOLVENT NOT HITHERTO USED IN THE ARTS.

Concluded.

The speedy evaporation of the caoutchoucine, of course, produces intense cold; it has been found to reduce the thermometer 10 degrees below zero of Fahrenheit, from 60 degrees above, in a minute and a quarter. At about 10 degrees above zero, a very remarkable concretion takes place resembling snow on the bulb of the thermometer, termed by Dr. Faraday the Bicarburet of Hydrogen; and it is believed that this is one of the new products alluded to, as discovered by Professor Mitscherlich.

Dr. Ure first exhibited this experiment, which may easily be repeated by tying round the bulb of the thermometer a piece of thin muslin, and blowing upon it with a pair of bellows while the fluid is dropped upon it.

If a current of hydrogen gas be made to pass through the higly rectified liquid, it will carry up with it a considerable portion, and become an illuminating gas of great brilliancy and beauty. This experiment was tried by Dr. Hue at the Hospital laboratory, and the combination of the two vapors remained perfect several days, though the application of greater cold might have caused them to separate.

If the hydrogen gas and the highly rectified fluid could be *cheaply* procured, a most excellent portable light would be the result; but the expense of both is at present a bar to such a plan.

This new material is a solvent for all the resinous gums, particularly for gum copal, which it dissolves without artificial heat, at the ordinary temperature of the atmosphere; a property possessed by no other solvent known; and hence it is particularly useful for making varnishes in general. It also mixes readily with oils, and will be found to be a valuable and cheap menstruum for liquefying oil paints; and, without in the slightest degree affecting the most delicate colors, will, from its ready evaporation, cause the paint to dry almost instantly.

Cocoa-nut oil, at the common temperature of the atmosphere, always assumes a concrete form; but a portion of this caoutchoucine mixed with it will cause the oil to become fluid, and to retain sufficient fluidity to burn in a common lamp with extraordinary brilliancy.

The importance and singularity of this new material has induced Dr. Faraday to bring it under the notice of the members of the Royal Institution, before whom, in a very interesting lecture, he explained and exhibited many of its properties; and we cannot better close our observations on this subject, than by giving a report of the Doctor's lecture.

The lecturer commenced by describing the process adopted by the patentee for decomposing caoutchouc, and converting it into the new spirit or material denominated caoutchoucine; and observed that those who are not acquainted with the very extensive works erected by Messrs. Enderby and Company, at Greenwich, in whom the patent right is vested, it may be interesting to know, that the preparation and manufacture of the New Zealand flax, for the production of ropes and cordage, has been a principal object of their exertions; and that in prosecuting this manufacture, in which they have spared neither talent nor expense, in order to render the ropes impervious to water, and preserve them from the destructive effects of damp by saturating the fibres in a solution of India rubber, they have been lead to the discovery which formed the chief subject of the lecture.

The great urbanity and freedom with which Messrs Enderby have shown this establishment to their numerous scientific visiters, is a feature so different from the usual calculating secresy of mercantile houses, that we deem it right to notice the circumstance as an omen of a more enlightened age, wherein all shall be willing to impart those seeds of knowledge and of truth, which, while they do not injure the parent tree, become the prolific source of benefit to the public at large.

After exhibiting living specimens of the plant from which the caoutchouc is manufactured, of the sap, which appeared like cream, and of the various forms in which the India rubber is imported, the Doctor alluded to its first introduction into commerce about 70 years ago, when it was sold by Mr. Narine, the mathematical instrument maker, of Cornhill, in cubical pieces of about half an inch square at 3*s*. each, which he recommended as a convenient means of destroying the traces of black lead pencils; whence it derived the name of India rubber, which it still retains.

Such a limited application of caoutchouc continued until within a very few years of the present time; but latterly it has been found available to a multitude of purposes connected with manufactures and the mechanical arts, so much so, that we learn the quantity now imported into this country exceeds the enormous sum of 200 tons per annum.*

Messrs. Enderby have at this time more than 100 tons actually in process of operation at their manufactory, where it is used, when melted with tar, for dressing or paying, as it is called, the ropes and cordage, manufactured by them from the New Zealand flax, and also for the distillation of the caoutchoucine spirit above alluded to, which is coming largely into use for the various purposes stated.

In the production of light about 1 quater of the caoutchoucine dissolves the cocoa-nut oil, and forms an excellent fluid for lamps, one of which (a French Argand) was exhibited on the lecture table, and burnt with peculiar brilliancy. Dr. Faraday then alluded to another application of this spirit to the lamps invented by Mr. Beale, who was present and exhibited their action. This lamp, which has been made the subject of a patent, we shall probably describe in our next.

After briefly adverting to the various important applications of caoutchouc by Messrs. Mac Intosh, Hancock, and others, to articles of domestic and surgical clothing, beautiful specimens of which were exhibited, Dr. Faraday proceeded to the more immediate object of the lecture; and in speaking of the composition of caoutchouc, particularly adverted to the extraordinary quantity of carbon contained in it; namely, 68 of carbon to 10 of hydrogen; forming what is termed a hydro-carbon. The lecturer then placed a very small quantity of the cream-like sap in a capsule over a spirit lamp, by which the caoutchouc was coagulated into a solid substance, and appeared in surprising quantity, more especially as the sap had already deposited an immense quantity of solid caoutchouc in the bottle from which that small quantity was poured. Dr. Faraday then remarked as an extraordinary fact, that the composition of the caoutchouc did not seem altered, although its properties are completely changed when, by melting, it is converted into a viscid matter incapable of again coagulating; and when, by a still higher heat it is distilled over into the spirit termed caoutchoucine (10 parts of which are obtained from 12 of solid caoutchouc, and when rectified has a specific gravity of .680, being lighter than ether, and presenting a most remarkable instance of the quantity of solid matter that can be suspended in a liquid form.)

What is most extraordinary in the opinion of the Doctor is, that this very liquid is itself a solvent for caoutchouc in a natural state, and deposites it on evaporation unaltered, affording a grand desideratum in the arts, and promising a most abundant source of useful manufactures.

Caoutchoucine is extremely volatile; and yet its vapor is so exceedingly heavy that it may be poured, without the liquor, from one vessel to another like water. A portion of the vapor was poured into an open glass vessel, which, of course, seemed to contain nothing, and yet, when carried towards a lamp, placed at the extremity of the lecture table, and then inverted, or rather the vapor poured out into the flame of the lamp, when it immediately inflamed, and thus most satisfactorily establishing its presence in the open glass vessel; and consequently its weight which had prevented its escape through the vessel had been removed, affording a most satisfactory proof of these facts, and of amusement to the spectators generally.

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* Previous to October, 1832, the duty levied upon elastic gum (as it was called) was 5*d*. per lb., or nearly 50*l*. per ton. Its extensive introduction was thereby entirely precluded. The Legislature have, subsequent to that period, reduced the duty to 1*l*. per ton; hence its increased importation and consumption, which is still greatly increasing.

The supply of this material is inexhaustible; the banks of the river Amazon, as reported by Messrs. Enderby's agents sent out expressly for that purpose, are covered with forests of trees producing it in large quantities, and from Java alone the world might be supplied.

WILMINGTON AND SUSQUEHANNA RAILROAD.—At a meeting of the Directors held in the city of Wilmington, on Monday last the following persons were elected to the offices that precede their names:

General Superintendent—George Craig.
Agent at Depot—James Frazier.
Superintendent of Motive Power—James Elliott.
Superintendent at Elkton—Zebulon Rudolph.
Superintendent of Locomotives.—William Huston and Ellicot Hewes.
Conductor of Trains—Robert M. Hill and Caleb T. Swayne.
—[Delaware Gaz.]

THE DELAWARE CANAL.—We published in our last that it was rumored that the business on the lower section of this canal would be suspended for a week or two, in order to repair the aqueduct over Hough's Creek, which gave way on Saturday a-week. The damage sustained was not so great as many feared, and it is with pleasure we state that the Supervisors had the aqueduct thoroughly repaired, and the whole line in full flow of business in a few days after the accident happened.

The officers who have this important branch of our internal improvements under their charge, are the right kind of men for such a service. When breaches or other injury takes place on the line, they are at their post night and day—rain or shine—and having a practical knowledge of cannalling, they are enabled to accomplish in *days* what under other circumstances would require *weeks*; thereby adding thousands of dollars to the funds of the Commonwealth.—[Eas on Whig.]

The receipts of the Boston and Worcester Railroad, last week, amounted to nearly $5000.

Agriculture, &c.

SHORT NOTICE OF A NEW MANURE [MADE OF HUMAN EXCREMENT] MUCH USED IN FRANCE, AND A PROPOSAL FOR ITS INTRODUCTION INTO ENGLAND.

[The following article was found in our latest received British periodical, after the last of the foregoing numbers on "The Police of Health" was in type. This furnishes both newer and more particular evidence of the value of the kind of town manure under consideration.—ED. FAR. REG.]

Messrs. Payen and Buran, of Paris, having discovered a composition which disinfects human excrement, and all animal substances, and renders them the most fertilizing manure, perfectly free from any obnoxious odor, and in a pulverized state, now manufacture it on a large scale in France, where it is generally used. Some individuals, who have purchased the right and taken out a patent for the invention in the British Empire, purpose manufacturing it in this country; to effect which object they are desirous that a few capitalists, more particularly those who are interested in Agriculture, should join them in raising the small sum which will be required for that purpose.

Allowing amply for all contingencies, it is estimated by competent persons that £6,000 will be required for establishing a manufactory for the above manure; £1,000 of which has been already subscribed, and on which it can be shown, by a moderate calculation, that fifty per cent. annual profit can safely be anticipated.

The following tables show the comparative expense and advantages of the old and new systems of manure, as tried upon two separate arpents (1 acre 2 roods 30 6-13ths perches;) of the same soil in the neighboorhood of Paris, by an experienced practical agriculturist, one being manured according to the usual custom of the country, and the other with the improved manure.

OLD SYSTEM.

Expense of Manure.

		£	s.	d.
1st year, twenty cart loads stable dung, at 6 *frs.* (4*s* 9*d* 1-7*d*) a load, which lasts for three years.	120*f.*	4	15	2$\frac{4}{7}$
2nd year	0*f.*	0	0	0
3rd year	0*f.*	0	0	0
	120*f.*	4	15	2$\frac{4}{7}$

Produce of Crops.

1st year seven setiers (30 bush.) of corn, at 20*f.* (15*s* 10 1-2*d*)	140*f.*	5	11	1$\frac{1}{3}$
2nd year, five setiers oats 21 bush. 1-8 pk. at 18*f.* (14*s* 3 3-7*d*	90*f.*	3	11	5$\frac{1}{7}$
3rd year, green crops	90*f.*	3	11	5$\frac{1}{7}$
	320*f.*	12	13	11$\frac{1}{2}\frac{1}{7}$

NEW SYSTEM.

Expense of Manure.

1st year, eight hectolitres (15 cwt. 2 qrs. 16lb. at 5*f.* (3*s* 11$\frac{1}{2}$ 3-1)	40*f.*	1	11	9
2nd year, do.	40*f.*	1	11	9
3rd do., no manure	0*f*	0	0	0
	80*f.*	3	3	6

Produce of Crops.

1st year, seven setiers of corn (30 bush.) at 20*f.* (15*s.* 10$\frac{1}{2}$*d*)	140*f.*	5	11	1$\frac{1}{3}$
2nd year, seven setiers (30 bush) of do.	140*f.*	5	11	1$\frac{1}{3}$
3rd year, five setiers (21 bush. 1 8 pk.) of oats at 18*f.* (14*s* 3 3-7*d*	90*f.*	3	11	5$\frac{1}{7}$
	370*f.*	14	13	7$\frac{1}{2}\frac{1}{7}$

From which it appears that with a reduced expenditure of 40*frs.* (£1 11*s.* 9*d.*) an increase of 50*fcs.* (£1 19*s.* 8*d.*) in the value of the crop was obtained, thereby giving a gross total advantage in three years of 90*frs.* (£3 11*s* 5 1-7*d*) in the new system over the old system, or at the rate of 30 francs (per French arpent,) or 2 *s.* per English acre per annum.

We are also informed by the same individual, that the new manure possesses the following desirable qualities, viz: the decided improvement of the land, economy in the conveyance, cleanliness in the crops, freedom from weeds, the production of a stronger ear of corn, and, lastly, that long-sought for desideratum by the farmer, the destruction of the fly.

Extracts from the reports of the different learned societies and the public journals in France, which have expressed the highest opinion of this successful discovery, for which the inventor received from the Academy of Sciences in France on the 8th September 1834, a prize of 8,000 francs:—

Agricultural Society of the Seine and L'Oise.

Extracts from remarks on differents sorts of manure by M. de Cauville. This society has voted the insertion of this paper amongst its memoirs, with the hope by this means of inducing agriculturalists to repeat the experiments of De cauville.

"Amongst manures there are several new ones; but many farmers, not knowing their value, hesitated to use them, and thus deprive themselves of valuable resources. Having this year tried some experiments upon several of them, I have now the honor to communicate to you the result.

"In a piece of clayey and chalky ground of the extent of thirteen French acres (nearly eleven English) which did not possess much fertility, I had some barely sown after two ploughings, and at the same time, I spread the following manures. On the first part the blood manure made by Mr. Derosne; on the second, the animalized black (made by Messrs. Payen and Buran;) on the third, the disinfected soil [human excrements] of Messrs Payen and Buran; on the fourth, the Laine manure; on the fifth, the Boulogne soil.

"In order to ascertain the duration of the different manures, I sowed some lucerne amongst the barley, and the following crops served to show those which act the longest on the soil; three farmers were chosen as judges, one a member of this society, who were ignorant of the manure which had been employed, and the following is their decision. All the manures produced some effect, compared with that part which had no manure, the most efficacious was the *disinfected soil*; the second, the animalized black; the third, the blood manure; the fourth, the soil of Boulogne; the fifth, the Laine manure"

Extract from a report of Mr. C. Brianne, director of the model farm of Grignon, 20th September, 1834:—

"In a course of experiments, I manured about one hundred acres of rye and wheat with animalized black in the department de l' Aube, at forty leagues from Grignon; although the season was not favorable, one can inquire of the people of the country, if they have ever seen a finer crop in the world."

Extract from a report made to the Horticultural Society of Paris, by the Viscount Debonnaire de Gif.

"The result of my examination of the effect produced by this new manure in horticultural proceedings is this: that this pulverised compound appears to hasten the development of vegetables, and consequently accelerates their fructification; that it does not possess the bad quality of containing the seeds of weeds; that it improves by degrees the soil, and produces more abundant crops; and it can, consequently, be applied to garden plants, which exhaust the soil, nor does it impart any disagreeable flavor to fruits or vegetables. It likewise adds considerably to the growth and beauty of the dahlia, and other bulbous roots. The facility of its conveyance is also a great recommendation."

Several attestations of persons, who have witnessed the disinfecting process both in France and England, are in possession of the individuals who propose to introduce this manure into England, and may be seen at T. G. Margary's, Esq., solicitor to the patentees, Quality-court, Chancery-lane, from whom any further information can be obtained.

N. B. Many preparations for night soil have been used for some years, both in England and France, but none of them are allowed to possess the superior qualities of the one which it is now proposed to offer to the British public.

BONE DUST.—Upwards of 10,000 bushels of bone dust were sold at Maduff, Ivernessshire, on Monday s 'nnig't, many people have come upwards of thirty miles for it. It is supposed that there could not have been fewer than three hundred carts in town; and a greater bustle was never witnessed by the oldest inhabitants.

From the New-York Farmer.

POUDRETTE, *French mode of Preparation*; *its value in France, &c. &c*

We are enabled by the politeness of an intelligent French gentleman, to give useful information in relation to the mode of preparation, in Paris, of this valuable manure.

The material, the contents, of privies, is taken beyond the limits of the city, into a large enclosure, with reservoirs into which the solid part is put. to the depth of 18 to 20 inches. when from *one tenth*, to one *eighth* in quantity of *dry earth* is mixed with it—and then the mass is left to the influence of solar evaporation. The length of time required to carry it through the process of preparation varies from *one*, to *two*, and sometimes even to *three* years—which renders it both tedious and expensive; yet so highly is the article valued, by the agricultural community, that the privilege of the *monopoly*, is sold by the city, to the highest bidder. for periods of *nine years each*; and companies are formed, consisting of *intelligent* and *wealthy* men, which *compete for the privilege* of monopoly. The present company pays to the city of Paris *one hundred and thirty thousand dollars*, for the *exclusive* privilege of removing and *using* the contents of the privies—the company, of course, have the right to charge the proprietors a certain price for the removal.

The estimated value of the article may be readily understood by the prices paid in Paris, and the distance to which it is carried.—The price varies from *six* to *eight* francs the *hectolitre*, which is equal to about 3½ cubic feet, or to two and eight-tenths Winchester bushels; which will give about an *average* of 47 to 50 cents per bushel—and then it is transported from 60 to 100 miles from Paris, and even *exported* to the *West India Islands*.

CHAPTAL entertained a high opinion of the value of this manure, and speaks of it as follows:—"This pulverulent product is sought for by our Agriculturists, who acknowledge its good effects; let us hope, that becoming more enlightened. they will employ the fecal matter itself, as being more rich in nutritive principles, and abounding equally with salts; they can easily govern and moderate the too powerful action of this, by fermentation, or what is better, by mixing with it plaster, earth, and other absorbents, to correct the odor." The suggestions of Chaptal induced a distinguished chemist of Paris. in connexion with a friend of his, to untake a series of experiments, to ascertain whether *Poudrette* could not be made, of *equal quality*, without the necessary delay of *solar evaporation*, as in France; or by *artificial* heat, as in London,—which experiments were, we are satisfied, *altogether successful*—and the coadjutor and friend of that chemist is now in this city, and will undertake the superintendance and management of the *scientific* and *mechanical* department of a company in this city, for its manufacture, as soon as *five thousand dollars more* are subscribed, to provide the necessary outfit and buildings.

The general business of the company. will be under the superintendance and management of an active business man, who will give information, and receive subscriptions at *this office*.

It has been ascertained that from *one thousand five hundred*, to *two thousand* bushels may be made *per day*. in this *city*. from the materials which are *now thrown away*—and that it would be worth from *twelve and a half, to twenty-five cents* per bushel. Taking the lowest *quantity* and *price*, it would be worth over *one hundred and eighty* dollars per day, for at least 250 days in the year. the average working time.

Of the *improved* process of preparation, we will say that it is simple when understood: it is completed in from *twelve to forty-eight* hours. by the addition of a preparation, or *compound of vegetable substances*, which disinfects it of, or allays the odor. *without deteriorating* the quality of the manure; aided by machinery which prepares it for use, by dividing it into particles while drying, from the size of *a mustard seed, to that of a hens egg*—or it may be reduced to a powder and put into barrels, or made into cakes of any size and dried for transportation, and then ground for use.

The *entire* cost of outfit, including *teams*, apparatus, machinery, and buildings, for preparing *fifteen hundred bushels per day*. will be less than fifteen thousand dollars: and six thousand dollars will commence it on the scale of 500 bushels per day. The *capital* to be entitled to *one-third* of the profits, which will be over *four per cent a month*—and subscribers to the amount of *five hundred dollars* to have the privilege of using manure at *half* the market price.

☞ When in successful operation in *this* city, measures will be taken to give other cities, and large towns, the benefit of so valuable an improvement in city and agricultural economy.

Any information in our possession will be cheerfully communicated, as our desire is to contribute all in our power to the *cause* of agriculture and health.

BUCKWHEAT.—Let no Farmer who has ground to spare, neglect to put in a few acres of this excellent grain; while its flour commands a ready sale and good price, its straw is among the best hay that he can give to his milch cows.

From the Farmer and Gardener.

We have upon repeated occasions urged the culture of *Millet* as *hay*, upon the consideration of our readers. and we are happy to know, that those recommendations have had their effect in numerous instances. Encouraged by our success, heretofore, we take the liberty of again respectfully urging upon such of our subscribers, as may apprehend short crops of hay. to devote a few acres to its cultivation. Its rapid growth, great yield, and the ease with which it may be cured, are qualities which certainly commend it to favor. In six weeks from the time of sowing last year, we committed it to the hands of the mowers, and never saw a larger or more nutritious body of hay garnered from the same quantity of land in our life.

On good ground, ordinarily manured, we have no hesitation in saying that it will yield from 3 to 4 tons to the acre; on good ground without manure, it will bring at least 2 tons to the acre, and last, though not least, it is so easily cured; half a day's exposure in the *swath* to the sun, being all that is required; after which it should be cured in cocks; turning these once a day for two or three days, when it may safely be put away; but if it be desirable to make it acceptable to the stock, it should be salted when stowed away, in the proportion of one peck of salt to the ton. By using salt in this way, it is not necessary to give that condiment to the stock fed on it.

We have heard it urged against the culture of Millet, that it required rich ground; now we would ask, can any reasonable man expect large product of any thing unless it be placed on soil competent to produce it? If there be such, all we have to say is, that they are unreasonable beings, and require more than common sense would justify them in asking. But we maintain, that millet does not require such extraordinary strength of soil. We raised ten tons last year off of two and three-quarter acres of ground, which was not originally *rich*. It is what farmers call *kind* land; a deep sandy loam. It had, to be sure, been *rested*, as the phrase has it, for several years, and depastured by cows. But we did not put on it a single ounce of manure of any kind: we ploughed it twice, harrowed it an equal number of times and then sowed it with millet, at the rate of half a bushel to the acre. We directed a bushel to be sown, but one half of the seed we gave out were not sown; had they been, we have no doubt a larger yield and better hay would have been the result.

Again,—we have often heard the objection made to *Millet* that it made a *coarse* hay! Now this is an evil, if it be one, that may very readily be remidied. Millet will only grow rank where *extra* space and aliment are present to push forward its growth. If an *extra* quantity of seed be cast on the earth, the consequence is, that a *sizable* grass will grow thereon, which, while it adds to *quality*, in its superior fineness, increase the bulk and weight.

We have heard it stated too, that it is a great *exhauster* of land, and so far as theory and philosophy may go, it is very natural to suppose that like all other rapid growers, it is an *exhauster*, for it is consonant to reason to presume, that any vegetable that comes to maturity so early must necessarily draw upon the soil for its support, with no very stinting hand; but then, we believe that, from the rapidity with which it covers and shades the soil from the influence of the sun, that it is not so exhausting as many other crops. In corroboration of this opinion, we would offer a fact, afforded by the ground itself. The lot on which we grew our Millet last summer, we put in Rye the last winter, without giving to it a grain of manure, and have now standing on it as fine a crop as we could desire, without subjecting ourself to the imputation of being avaricious. Now, if the Millet was really as exhausting as represented, could the rye have so successfully grown on it under the circumstances that it has? We think not.

If we were asked what quantity of Millet seed we would sow to the acre, we would reply, that never less than three pecks, or a bushel where we wanted the product for *hay*, and half a bushel if for seed.

Horses and stock of all kinds eat it with avidity, and it may be set down as a proposition perfectly defensible, that two tons of *good* Millet hay, contains as much nutritive matter as three of *Timothy*.

There is another reason of no mean importance why Millet should be cultivated. It is beyond all question the best crop that can be put in to prepare ground for Timothy; its rapid growth, entirely suppressing that of weeds of every description, and leaving the soil in that wholesome condition when nothing is required, but to harrow in the seed, to insure a good and well set crop of Timothy, without any additional trouble or expense of after ploughing.

From the Genesee Farmer.

IS FARMING PROFITABLE.

We ask for the following communication, an attentive perusal. It sets forth a few of the advantages of agricultural pursuits—and should induce many, who are useless drones to become useful members of society, by tilling the soil, from whence they may always draw a competence and *independance*.

In prosecuting the business of life, it is very desirable to do it in such a manner that, so far as regards temporal matters, competency at least may be secured; and the way in which this can be done the most easily, effectually, and with the least probability of reverses, becomes an inquiry of considerable interest. We speak now of the ordinary means of obtaining a good living, of the regular prosecution of professional business, of the usual results of trade, of money at the legal rates of interest, and farming as it has been on the average for the last five years. Now in some respects, the "times are out of joint;" all the customary modes of doing business seem to be broken up; men are in haste to be rich; and the opportunities for speculation, and the success which in some instances has attended it, appear to have had their influence every where—less perhaps among farmers than any other class of citizens, though even for them it will not do to plead entire exemption. Many have sold their farms, and after spending months in looking for others, have come again and consented to pay roundly for the privilege of getting on to the "old place" again. Other farmers have sold out, and without personal investigation, have at once started for that earthly paradise the far west. Disappointed, they have returned, and after having lost most of their property in the expenses of removal, are content to again commence a gradual accumulation of property. But a great majority are still working on, sowing and reaping, and it is a question which should be solved, whether such are not on the whole making money as fast as they probably would with the *same capital* in any other legitimate business. What we mean is, can a man with five or ten thousand dollars, realize as much from it by investing in a farm, as he could by loaning it at the legal rate of interest; and will it support himself or his family as handsomely in the first way as the last? To contribute our mite towards answering these questions, is the object of this paper.

The man who expects to get rich at once by farming, must expect to be disappointed; but in this matter he is no worse off than he who has only the same moderate capital in cash, and uses it in a legal way. In both cases the addition to the capital stock, can consist only of what remains of the income after *all* demands upon it are met. We will attempt to illustrate this. Two men, A. and B., are about to commence life with the same capital, say five thousand dollars in cash each; and their personal expenses are also the same. A. invests the whole of his in a farm, and stock, and goes to work upon it. B. is apprehensive he could not live so, and invests his cash in stock which yields him seven per cent., and determines to do enough to pay his way, so that the interest shall be clear; now which of the two are the most likely to possess competence, if not actual wealth, at the end of ten years? Perhaps a majority at first thought would say B. certainly; but we think differently, and imagine that the chances are altogether in favor of A., and these are some of the reasons for this opinion.

In the first place his occupation is favorable to health. The life of a farmer is one of labor, it is true; but labor, unless carried to excess, if far from being prejudicial to the body or the mind. Vigorous exercise, such is the law of our natures, is necessary to the full developement of either our bodily or mental powers, and unless this necessity is forced upon us in part, we are apt to evade it, and we suffer in consequence. The maxim, that *every man naturally is as idle as he can be*, we do not dispute; acquired habits, induced by the necessity for exertion, are sufficient to account for any seeming exceptions to this rule. Hence the probability is, that A., having before his eyes the necessity of labor on his farm, will perform the labor, and reap the double benefit in his health and in his purse; while B., who cannot expect to feel that necessity, will of course be less active and industrious, will become less and less inclined to labor, and will eventually feel the effects of this disinclination in diminished health and decreasing profits.

Another reason why the prospects of A. are better than those of B. is to be found in the *habits* that personal industry is almost sure to create. Experience and observation both assure us, that the man who has any means of living beyond what depends on his own exertion, is very apt to acquire contemptuous ideas of economy, and whatever may be his original intentions, sooner or later finds himself trenching first on the interest of his capital, and then on the capital itself. There can be very few instances found in the country, where the sons of rich men have not diminished the inheritance received from their parents, and the examples are still more rare in which the second generation have not succeeded in scattering the descending property to the winds. A pride, as false as it is injurious, makes those who *can* live upon their money, dislike exertion, until this dislike becomes a habit, rarely shaken off, even after its effects are staring the individual in the face.

But the most sufficient reason of all why A. will succeed, while B. will probably fail, is found in the fact, that money invested in farming is far better than money at 7 per cent. This we think will be questioned by few who have been in the habit of observing what passes around them, or examining the reports made of particular farms which have from time to time appeared in the farming journals of the day. In all such reports it is evident, that after deducting the expense of working, a certain per cent. for the wear and tear, and the necessary repairs, and the interest of the capital employed, the remainder will be clear profits. The amount of this profit will depend on circumstances. The expense of working a grain farm will be greater than on a grazing farm, but the capital employed in stocking is less, and the profits usually much higher; the returns for labor are quicker, and the proceeds accumulate in a compound ratio.

There have been quite a number of farm reports given to the public through the agricultural journals, but we do not recollect one in which the expense of working was given with precision. The value of the products of the farm have been stated, and the reader has been left to form his own estimate of the amount to be deducted for the items of expense mentioned above, and in most cases the amount of capital employed has been left to conjecture. How then shall the actual expenditure of the farmer be estimated?—for unless this can be done with an approximation to accuracy, it is evident the clear profits of a farm can not be known.

We have been convinced by observation and experience, and by estimates made with as much care as possible, that one-third of the proceeds of a farm will amply suffice to cover all the ordinary expenditures, or in other words, will pay for working, keep the farm in repair, and re-place the interest on the capital. We are sustained in this position by a communication from Dr. Beekman, the Secretary of the State Ag. So., addressed to the editor of the Farmers' Reg., Petersburgh, Va., in which he states, that except in extraordinary cases, one-third of the products will meet all expenses, leaving two-thirds as profit.

Mr. T. S. Vary, of Kinderhook, made a report of his farm for the Cultivator, in which he estimates the proceeds from 145 acres of land at $2,285. Deduct one-third of this, and there is left $1,524, which is the interest of $21,772; Mr. Vary did not state his capital or the value of his land, but the profits would pay the interest on 145 acres at $150 an acre—probably more than double its actual price.

Mr. Carter, of Champion, Jefferson county, has furnished Judge Buel a farm report, which makes a total of $1,639 from 100 acres. Among the items is one not usually found on farms, viz: mulberry trees, and which to Mr. C. are quite a source of profit. This amount, less one-third as expenses, &c., would leave $1,093 as profit, or the interest on a capital of $15,600, which would fix Mr. Carter's 100 acres at $156 an acre—a price which would make the good farmers of Jefferson county open wide their eyes.

We have been furnished by a friend with two farm reports, which, though more full than the foregoing, as they state the capital employed, are still deficient in not giving an accurate account of the expenses of cultivation. The first report is from a farm on which 86 acres are under cultivation, and the capital, including farm and stock, is estimated at $4,500. The proceeds of this farm are given as follows:

Wheat,	$160	Wool,	$112
Barley,	111	Sheep,	24
Oats,	350	Dairy,	50
Hay,	240	Beef,	80
Peas,	40	Grass seed,	35
Pork,	150		
Potatoes,	40		$1,442
Ruta Baga,	50		

Making a total of $1,442, after leaving many minor sources of profit out of the account, such as two or three acres of poor corn, and other things of which the value was not ascertained. The crop of wheat on this farm was reduced at least two thirds by the severe winter, yet after deducting one-third of the whole, a profit of $962 is left. This sum would be worth the interest of $13,742; or in other words, the capital in this case pays an interest of 21 per cent. The cultivated land of this farm at legal interest, would be worth $159 an acre.

The other report is from a small farm, 40 acres under cultivation, and the capital in farm and stock estimated at $1,600. The following is the list of the items, with their value; and it should be added that the report is for 1835, when farm produce, as will be seen from the prices, was from 10 to 20 per cent. below its present value.

Oats, 310 bushels,	44 cents.	$135.62
Potatoes, 340,	25	85 00
Ruta baga, 240	25	60.00
Buckwheat, 24,	50	12.00
Corn, 100,	50	50.00
8 pigs,	$2.00	16.00
15 lambs,	1.00	15.00
20 tons hay,	6 00	120.00
1 colt,	20.00	20.00
Cheese, 11 cwt. at	07	77.00
Butter, 605 lbs.	15	90.75
Eggs,	12	3.12
Beef, 16 cwt.	3.50	56.00
Pork, 8 "	5.00	40.00
Wool, 80 lbs.	50	40 00
Grass seed,		6.00
Peas, 50 bush.	50	25.00
		$851.49

Deduct as before one-third from the above total, and we have $567.66, as the profits of 40 acres. This would be the interest of $8,100, or on the value of 40 acres at $200 per acre. This farm pays 35 per cent. on the capital at the above estimates of expense and profit, a fact which goes far to prove the conclusion often advanced in this journal, that small farms yield a greater profit than large ones, as they are in general much better cultivated.

But it is very possible some will contend that one-third of the products will only pay for cultivation and repairs, and that the interest of the capital employed should still be deducted in order to give a correct view of the comparative profits of A. and B. We will do this, and it will be seen that the farm which is estimated at $4,500 pays 14 per cent. on the capital, and the one estimated at $1,600, 28 per cent. on the sum invested. These two reports have not been given because there was any thing extraordinary in the amount of their products; on the contrary, we imagine there are few good farms which might not equal or exceed them. Our object has been to call the attention of farmers to a proper estimate of their advantages, and show that money might be safely and profitably invested in the business of cultivating the soil.

List of Subscribers to the Railroad Journal that have paid.—Continued.

D. H. Schmidtt & Son, City of New-York,	Jan. 1, 1838
M. Braem, "	June 17, 1838
Benj. Chapman, Trenton, N. J.,	Jan. 1, 1838
A. Munson, Utica, N. Y.,	" "
E. F. Cushman, Troy, "	Oct. 1, 1837
R. M. Boughton, Poughkeepsie, N. Y.,	Jan. 1, 1838
H. S. Dexter, Rochester, "	" "
J. P. Jackson, Newark, N. J.,	June 1, 1837
J. C. Cabell, Richmond, Va.,	Jan. 1, 1838
S. S. Baxter, " "	" "
Ezra Walker, Charleston, Va.,	April 1, 1838
Owen P. Owens, New Albany, Inda.,	Jan. 1, 1838
S. Breese, Carlyle, Ill.,	" "
E. B. Talcott, Chicago, Ill.,	" "
Wm. Gooding, " "	" "
A. M. Jenkins, Edwardsville, Ill.,	June 1, 1837
M. Tuomy, Littleton, N. C.,	June 17, 1838
D. Griffin, Macon, Geo.,	Jan. 1, 1838
Gen. L. L. Criffin, " "	July 1, 1838
F. H. Petrie, Natches, Miss.,	Jan. 1, 1838
W. Petrie, Jackson, "	" "
Howland, Ward & Spring, Charleston, S. C.,	July 1, 1837
H. H. Gird, Jackson, La.,	Aug. 1, 1837
J. Nichols, " "	" "
S. McCaleb, " "	" "
Rev. J. Sharnon, " "	" "

Pontchartrain R. R Company, New-Orleans, La., Jan. 1, 1838				
J. B. B. Vignil,	"	"	"	"
J. Fowler, Jr.,	"	"	"	"
W. C. Claiborne,	"	"	"	"
F. B. Le Beau,	"	"	"	"
John Hewlett,	"	"	"	"
P. Guesnon,	"	"	"	"
S. W. Oakey,	"	"	"	"
H. Turner,	"	"	"	"

New-York, June 15th, 1837.

THIRD ANNUAL FAIR OF THE MECHANICS' INSTITUTE OF THE CITY OF NEW-YORK.

The *Fair* of the Institute will be held at Niblo's Garden, commencing Monday, September 25th, 1837.

To render this exhibition worthy of the arts and of the ingenuity of the Mechanics of our country, the Managers appointed to conduct the approaching *Fair* have determined to make such liberal arrangements as will insure to the contributors a fair opportunity of exhibiting their productions to the greatest advantage.

The object of Exhibition Fairs is to present to the members of the Institute and their fellow citizens who are engaged in the Mechanic Arts, the means of making their skill and ingenuity known in a way no other facilities afford: the many thousands who visit such exhibitions have a much better opportunity of judging of the merits of the various productions, than they would have by a mere verbal or newspaper description, besides the advantage of seeing brought together, in one vast collection, the products of the skill, ingenuity, and industry of our country.

Premiums of Medals, Diplomas, &c. will be awarded for *all* worthy or meritorious articles exhibited, either as it respects superior workmanship, machinery wherein the operations are new, interesting or important, where ingenuity is displayed, or taste manifested, and particularly for all new and useful inventions.

You are respectfully requested to send, for competition or exhibition, specimens of the articles you manufacture; and you may be assured that the strictest impartiality will be observed in the distribution of the Premiums.

Steam power will be provided for the accommodation of those who wish to exhibit Machinery in operation; an experienced Superintendant will take charge of this department, and contributors in this branch are particularly invited to send or bring their Machines or models as early as possible, on the 23d September, that the necessary arrangements may be made in relation to shafting, pullies, &c.

The Managers, in conclusion, cannot but express their belief that this Third Fair of the Mechanics' Institute, will exceed in variety and beauty of display, all previous exhibitions of the kind.

George Bruce, *Chairm.*
Wm. Everdell,
C. Crolius, Jun.
Thos. Ewbank,
Richard Bragaw,
Executive Committee.

N. B. All articles for competition must be delivered to the Committee at Niblo's Garden, on the 23d September. Those for exhibition *only* will be received any day during the Fair, before 10 o'clock A. M.

RULES AND REGULATIONS.

1.—The Garden will be opened for the reception of Goods, on Saturday, 23d of September, from 6 o'clock A. M. until 9 o'clock P. M., and it is respectfully urged that all articles intended for competition may be sent in early in the day. Those articles intended for exhibition *only* will be received any day during the Fair, before the hour of 10 A. M.

2.—The Fair will open for visitors on Monday, 25th Septem. at 10 o'clock A. M., and continue open every day of the exhibition till 10 o'clock P. M.

3.—Competent and impartial Judges will be appointed to examine all articles presented and premiums will be awarded on all such as shall be declared worthy.

4.—The Committee on Premiums, and all firms or partnerships in which they may be interested shall be excluded from competition or the award of any premium.

5.—All persons depositing articles, either for competition or exhibition, must attend to have them registered by the Clerk, at which time they will receive a certificate, which will be required of them when the articles are returned.

6.—Proof of origin must be furnished if required, for any specimen offered for Premium.

7.—Depositors will receive a ticket from the Clerk, which will admit them and Ladies during the Exhibition.

8.—Arrangements will be made to exhibit, in operation, all working models that may be deposited—contributions in this branch are invited—a competent person will take charge of all models sent for the above purpose.

9.—The morning of each day, until fifteen minutes before 10 o'clock, shall be appropriated exclusively to the Judges.

10.—Members will receive their tickets of admission by applying at the Institute Rooms, any time in the week previous to and during the exhibition.

11.—All articles offered by Apprentices, will be received, and adjudged as the production of Apprentices—they must furnish a certificate of name, age, with whom, and the time they have served as apprentices.

12.—Articles subject to injury by being handled, should be secured in glass cases—and contributors are requested to have a person to take charge during the hours of exhibition—in the intervals, efficient measures will be taken to protect property.

GENERAL COMMITTEE.

George Bruce,	John Ridley,
John M. Dodd,	Silas B. Simonson,
James J. Mapes,	Thomas F. Peers,
Thomas Ewbank,	Thomas G. Hodgkins,
Wm. Everdell,	George L. Spencer,
C. Crolius, Jr.,	Peter Wenmell,
A. J. Mason,	Richard Bragaw,
Thos. W. Bartholomew,	Ab'm Peitch,
A. Storms,	Wm. H. Hale,
Wm. Ballard,	Wm. J. Mullen,
Henry Cunningham,	James Thomson,
John Harold.	Abner Mills,
Joseph Trench,	L. D. Chapin,
James D. Phyfe,	A. Cammeyer,
John H. Mead,	Hiram Tupper,
John Conroy,	R. B. Robertson,
Jordan L. Mott,	James Thomas,
Samuel Carter,	H G. Stetson,
George F. Nesbitt,	Ferris Owen,
Henry Worrall,	N. Berry,
W. B. Worrall,	O. Whittelesey,
James B. Cummings,	M. W. Emmons,
James Frost,	J. S. Anderson.

ing in passengers &c. from Fayetteville, the southern and northern villages, &c. For grain, or grass and grain, for the Sugar Root business, a better soil cannot be found in any country. When this railroad is completed, fifteen or twenty *minutes* of Syracuse, two hours of Utica, a few hours of all the river cities and New-York; indeed, when the railroad now making from Boston to Albany is completed, within a few hours of all the principal eastern cities. Upon these great thoroughfares, and all these advantages, surrounded by flourishing villages, strong competition will always secure on the premises, the highest prices for all its products. This is one of the most splendid farms in the state.

Also, for sale 120 acres of Land on the Oswego canal *between* and *immediately* at the junctions of the Seneca and Oneida Rivers, embracing the late widow Eno Plat, Tavern stand, &c. &c. The meeting of these splendid rivers, convenient harbor, the canal—one of the great travelling and commercial thoroughfares, to the west, the beauty of the spot, surrounded by a fertile country, indicate this as a favorable spot for a flourishing village, or for a residence, farming, gardening, *profit* and *pleasure*; no situation on the North River can be more desirable—the favorable spot for the stations for all the Packet and Line Boats—for a public house, mercantile establishments, and where every thing raised can be sold at the highest prices.

Also, a farm of 160½ acres, bounded on the *west* by the Chittenango river, and on the *north* by the flourishing village of Bridgeport, or "the Rifts," two miles south of the Oneida lake, on the northern and shortest travelled road from Utica to Rochester, cultivated, and the stumps out of nearly a hundred acres, fertile and beautiful land, enough of which may be sold for village lots in a few years to pay for the whole. At the head of navigation, at this village, are quite extensive hydraulic advantages—mills, carding and dressing, tannery, stores, public houses, schools, &c. &c. combining to render this a very desirable farm.

Also, a valuable Cedar Lot about two and a half miles north of Chittenango.

Also, as Agent some very valuable Farms in Onondaga and Madison counties.

The above mentioned Farms will be sold on highly advantageous terms. JOHN WHITE.

Syracuse, Onondaga, Co. New-York., June, 1837. 10—m4

AVERY'S ROTARY STEAM ENGINES.—AGENCY.—The subscriber offers his services to gentlemen desirous of procuring Steam Engines for driving SAW-MILLS, GRAIN-MILLS, and OTHER MANUFACTORIES of any kind.

Engines only will be furnished, or accompanied with *Boilers* and the necessary *Machinery* for putting them in operation, and an Engineer always sent to put them up.

Information will be given at all times to those who desire it, either by letter or by exhibiting the engines in operation in this city.

Inquiries by letter should be very explicit and the answers shall be equally so. D. K. MINOR,
30 Wall-st., New York.

FOR SALE AT THIS OFFICE,

A Practical Treatise on Locomotive Engines, with Engravings, by the CHEVALIER DE PAMBOUR—150 pages large octavo—done up in paper covers so as to be sent by mail—Price $1 50. Postage for any distance *under* 100 miles, 40 cents, and 60 cts. for any distance exceeding 100 ms.

ALSO—*Van de Graaff on Railroad Curves*, done up as above, to be sent by mail—Price $1. Postage, 20 cents, or 30 cents, as above.

ALSO—Introduction to a view of the works of the *Thames Tunnel*—Price *fifty cents*. Postage as above, 8 cents, or 12 cts.

*** On the receipt of $3, a copy of each of the above works will be forwarded by mail to any part of the United States.

DRAWING INSTRUMENTS.—E. & G W Blunt, 154 Water-street, New-York, have received, and offer for sale Drawing Instruments of superior quality, English, French, and German Manufacture.

They have also on hand Levels of superior quality at low prices.

☞ Orders received at this office for the above Instruments.

MECHANICS' FAIR.

Notice to Mechanics, Artisans, Manufacturers, &c.—The undersigned give notice that the first Annual FAIR of the Massachusetts Charitable Mechanics' Association will be held in the city of Boston, in September next, commencing on Monday, the 18th, and continuing at least three days.

The Association have placed at the disposal of the Board of Managers, the sum of Five Thousand Dollars, to enable them to conduct the Fair upon a liberal scale; and they hope to be able to render satisfaction to all who may feel disposed to offer articles for exhibition.

Medals or Diplomas will be awarded to the owners of all articles that may be deemed worthy of such distinction; and the Managers intend that the strictest impartiality and fairness shall be observed in the distribution of Premiums.

The Managers, in furtherance of the subject they have in view, invite contributions, of articles from every department of industry; of choice specimens of American ingenuity and skill; rare and valuable domestic productions, natural or artificial; the delicate and beautiful handiwork of females; useful labor-saving machines, implements of husbandry, and new models of machinery in all their varieties.

Judges will be appointed to examine all articles offered, and the managers will award a gold or silver medal, or a diploma, to all articles that may be pronounced by the judges worthy of reward.

Articles intended for exhibition, must be delivered on or before Wednesday, September 13th.

Arrangements will be made to exhibit, *in operation*, any working models that may be offered, which will render the exhibition useful and interesting, and the managers respectfully invite contributions in this branch. A careful and competent superintendent will be appointed to take charge of all models sent for this purpose.

Board of Managers.

Stephen Fairbanks,	Jos. T. Buckingham,
John Rayner,	James Clark,
William Adams,	Henry W. Dutton,
Uriel Crocker,	George Darracott,
Gardner Greenleaf,	Wm. S. Pendleton,
James L. Homer,	Charles A. Wells,
James Barry,	Henry Bailey,
Joseph Tilden,	Jonas Chickering,
Ephraim Harrington,	Henry H. Barton,
Joseph Lewis,	Thomas Boyd,
Walter Frost,	Wm. Uunderwood,
Thomas J. Shelton,	George G. Smith,

John G. Rogers.

P. S. For any further information address JAMES L. HOMER, Corresponding Secretary, Boston.

Boston, March 24, 1837. m28—ts1

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its enagravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subseribors *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

☞ TO RAILROAD COMPANIES.

A PERSON experienced in the construction of Locomotive Engines (many of his Manufacture being in successful operation on important Railroads in the United States) and who is likewise thoroughly acquainted with the management of such machines, and, indeed, the entire ordeal of Railroads, is desirous of obtaining the situation of General Superintendant on some Rail road, South or West.

The most satisfactory testimonials of character and capability can be produced. Communications addressed to the Editors of this Journal, stating the location of Road, &c. will meet with prompt attention.

9t—24

PATENT RAILROAD, SHIP AND BOAT SPIKES.

**The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone.

The work contracted for must be finished by the 1st day of July, 1838.

Persons desirous of obtaining work are requested to apply at the office of the undersigned, in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, Jr.
Chief Engineer Jas. Riv. & Ka. Co.

P. S—The valley of James River above Richmond is healthy.

16—10t

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered.—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country.

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 14 1y

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rohester, Jan. 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleeckerstreet, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

					lbs.	
350 tons	$2\frac{1}{4}$ by	$\frac{5}{8}$,	15 ft in length,	weighing	$4\frac{68}{100}$	per ft.
280 "	2 "	$\frac{1}{2}$,	"	"	$3\frac{50}{100}$	"
70 "	$1\frac{1}{2}$ "	$\frac{1}{2}$,	"	"	$2\frac{1}{2}$	"
80 "	$1\frac{1}{2}$ "	$\frac{1}{4}$,	"	"	$1\frac{25}{100}$	"
90 "	1 "	$\frac{1}{4}$,	"	"	$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, and $3\frac{7}{8}$ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.
28 tf Philadelphia, No. 4, South Front-st

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N.
51tf

TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.
16—6t.

AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, { EDITORS AND PROPRIETORS.] SATURDAY, JULY 22, 1837. VOLUME VI.—No. 29

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JULY 22, 1837.

In giving the extracts of the following report to our readers, we beg leave to state, that it is utterly out of our power to publish the whole of the document, (36 pages) particularly as much of it is matter of local interest only, and containing information and advice relative to the organization and operations of the Company and Engineer Department; highly useful to those to whom the report is addressed, but a matter of every day business with our readers.

The impossibility of separating the two sorts of information gives an unconnected appearance to the portion published, which we the more regret as it does not enable us to do justice to the research displayed by Mr. Johnson, not only in the professional details, but also in those portions relating to the "economy" of railroads and internal navigation.

REPORT.—TO THE PRESIDENT AND DIRECTORS OF THE LONDON AND GORE RAILROAD:

In executing the important trust reposed in me, as your chief Engineer, I consider myself fortunate in the selection of persons employed to aid me. My principal assistant, in the labors of exploration has been Mr. Tracy McCracken. Supplied with all the needful instruments and a select party of assistants and laborers, Mr. McCraken has prosecuted the preliminary surveys, with great industry and perseverance. He has traversed the line of country from Hamilton to Chatham, running double lines, some portion of the distance, examining with much care difficult points of the route, and taking partial views of the country from Hamilton to Queenston and from Chatham to Sandwich. These services have been impeded by a partial out fit, by unfavorable weather, by all the obstructions of a wilderness most of the way, and, along the valley of the Thames, by the necessity of moving their baggage and provisions down the river in a boat, while their line of operations lay from two to six miles distant. Their work commenced the twenty-seventh day of July, and their field work closed the first day of November.

* * * * * *

In calling your attention to the London and Gore Railroad, and to the path of my professional duties, I propose to divide the line into five principal divisions, as follows:

The first division will extend from Burlington Bay, at the village of Hamilton, in a westerly direction along the slope of the great terrace, ten miles and six chains, to a dividing ridge, between the basin of Lake Ontario and the valley of Grand River. The elevation of this ridge is 575 feet above the lake. It is nearly broken through at this point of intersection, being not more than one-fourth of a mile across and composed of sand laying with a steep declivity to the east. Its western declivity is broken by ravines formed by the land drainage into the Welland and Grand River. At one point, this ridge is reduced by a narrow defile and depression of forty feet. Here we propose to pass the railroad on an excavation of thirty-three feet and twenty-seven one hundredth; giving us at the place of passage, an elevation above our starting point of five hundred and one feet and seventy-three one hundredths. This heighth may be attained by a uniform grade, of forty-nine feet and eighty one hundredths per mile, subject to more than ordinary expense of grade in passing one mile on the edge of a perpendicular rock terrace, and passing two principle ravines. It will require extra cutting at, and near the summit.

The second division extends from the ridge to Grand River, a distance of thirteen miles and 40 chains, to the bridge at Brantford. Grand River is here four hundred and ten feet above the waters of Burlington Bay, and we design to cross it thirty feet above the stream. This will give the road a descent in this division, of sixty-one feet and seventy-three one hundredth, averaging four feet, and fifty-seven one hundredths per mile. It is proposed to lay this portion of the road straight, from the east end to a point opposite the Mohawk village and from there nearly straight to Brantford. This division is intersected by Fairchilds' creek, running in a deep ravine and by several smaller creeks, requiring embankments or bridges. It abounds with Pine and Oak timber, and has a clay soil, with occasional deposits of sand above the clay.

The third division stretches from Grand River to the summit, dividing its waters from those of the east branch of the Thames. This summit is seven hundred and twenty-six feet above the waters of the Bay. And the length of the divisions is twenty one miles and thirty-five chains. In this division our line rises two hundred and sixty-five feet, allowing for an excavation of twenty-one feet, at the summit; and would require an average rise of twelve feet and thirty-six one hundredths per mile.

The only obstruction to the economical grading of this division occurs in passing Grand River valley, and reaching the Burford plains, which are one hundred and eighteen feet above the river crossing, and will require a rise of thirty feet per mile, in a direct line. The residue of the ascent to be overcome, will require a grade nearly uniform of eight feet and forty hundredths per mile. eighteen miles may be a straight line. This division is composed of sand and clay containing Oak and Pine timber, with some beech and maple, near the summit.

The fourth division connects the summit, which lies in the town of Oxford with London, being thirty-two miles and fifty chains in length, and requiring a descending grade. King-street in London is five hundred and forty nine feet above Lake Ontario, which deducted from the heighth of the summit, seven hundred and five feet, leaves the whole descent one hundred and fifty-six feet, averaging four feet and seventy-eight one hundredths per mile. The line on this division is mostly straight, with a few easy curvatures. This portion of the road must cross the east branch of the Thames, and several minor streams, where bridges and embankments will be required. They will all be situated in places favorable to their construction. The timber here is chiefly pine, some beech and maple and white cedar. The line passes near Woodstock, Ingersoll-ville, Beach-ville and through an old farming district in the vicinity of those places.

The fifth division extends from London to Chatham, sixty-four miles and forty-two chains. At Chatham, the land of the village is twenty feet above the water of the river and three hundred and thirty one feet above Lake Ontario. This division descends two hundred and eighteen feet, which gives, in the average three feet and thirty-eight one hundredths per mile. A level grade will be continued the first eleven miles, from London, which deducted, will give an average grade of three feet and ninety-three one hundredths per mile; and will in no place exceed a maximum grade of seven feet.

From London the first ten miles, in leaving the bounds of the valley some curvature occurs, the residue of the distance, a straight line may be selected. This division presents a surface remarkably favorable. The east branch of the Thames requires to be crossed at London. On this division the timber is oak, beech, maple, whitewood, and black walnut rising out of a clay soil.

The whole length of road is one hundred and forty-two miles and thirteen chains.

Whole ascent westward, first and third division seven hundred and sixty-six feet and seventy-three one hundredths. Eastward. second, fourth and fifth division, four hundred and thirty-five feet and seventy-three one hundredths.

In reference to the resolution of your Board requiring an examination of the country from Chatham to Sandwich; also from Hamilton to Queenston, being parallel lines with steam navigation I would respectfully state that such examinations have been made, and the subject of your inquiry connected therewith duly considered, and the result is and I am happy in stating, that either of these divisions present very favorable features. I have designated that portion from Chatham to Sandwich as the sixth division in the tabular estimate herewith connected, and that portion from Hamilton to Queenston as the seventh division.

The country from Chatham along the Thames, Lake St. Clair, and the Detroit River, rises to a slight elevation above those waters, and is intersected by extensive marshes on a lower level. A line from Chatham may be traced in one continued direction to intersect the Detroit River at any point; or it may follow the border of the Rivers and Lake without departing materially from a direct line. No grading will be required other than to inclose the timber work, and no stream will be passed requiring any expense other than to leave a passage of the flood waters.

The seventh division on the inspection of the map presents the route from Hamilton to Queenston. This may be passed in nearly a direct line which approaches the lake shore for several miles in the vicinity of the Twenty Mile-Creek. From a point east of Port Dalhousie to Queenston, between the Ridge Road and the lake the country descends gradually to the shore of the lake where the bank is low. From Hamilton eastward, the surface is of the same character, leaving about nine miles in extent along the shore that is obstructed by a high table of land jutting down from the mountain, and forming banks from forty to fifty feet above the water. This table of land is broken through by deep ravines near the Twelve and Twenty mile creeks and other smaller streams. The several difficulties existing on the great highway passing a little in the interior, for the location of a Railroad do not show themselves near the Lake shore where the several indentations occasioned by streams may be easily passed by bridges twenty feet above their waters. Reference is had to the tabular estimate for further particulars and to the general remarks upon important connections of great public thoroughfares.

Railroads are constructed in various forms, both in England and the United States many experiments and much science and ingenuity have been applied to this subject, as well as to all the machinery to be employed upon them. The relative value of all the forms adopted, is well understood by professional men. You enjoy the advantages derived from their experience, and may therefore more safely proceed in your great enterprize. It is the part of practical wisdom, in every undertaking, to adopt its exertions to circumstances. In a new country where the settlements are divided from each other by extensive wood lands—where stone is to be found in but one location—where capital is scarce and the rate of interest high—and where the earth, on which the works must rest, is slippery and soft with few exceptions, prudence dictates the adoption of different methods from those which may be most suitable under different conditions.

Having retired for fifteen years from the professions of a Civil Engineer, (in consequence of extensive engagements in active enterprise in Western New-York,) I am principally induced to resume the profession, from the excitement incident to the introduction of railroads, which is an item in the many important improvements of the age, and which has very much engrossed my thoughts for several years. I have compared all the forms of constructing them, which have come to my knowledge. After diligent enquiry, with much solicitude, in reference to the cardinal points of economy in their construction, durability and efficiency, and as your Engineer, I take leave to recommend one, which I have adopted, and believe most applicable to your views. It is of the following description.

1st. Blocks of round timber, from 18 to 24 inches in diameter, sawed with parallel ends, at right angles with their length, are placed in an upright position, with one end resting ***firmly on solid earth***, from which all roots and top soil are carefully removed.—Of these blocks there are two lines, 5 feet apart, from centre to centre across the road. These blocks will vary in length according to the surface of the ground compared with the grade level.

2d. Timber 9 feet long, one foot in diameter, spotted on the under side where they are to rest on the blocks, and cut down six inches deep, in a notch 15 inches wide, above the blocks where they are to receive the string-pieces. These are to be placed across the road from block to block, each end extending outside of the blocks upwards of one foot.

3d. String-pieces from 18 to 14 inches in diameter, and either twenty or thirty feet in length. These must be squared at each end, one foot square and at each intermediate ten feet where they are to rest upon the cross timbers above the blocks, and parallel with each other, in two lines lengthwise, of the road. They must be well hewed on the upper side and firmly keyed into the cross timbers.

4th. Scantling 3 by 4 inches, square, placed on their broadest side must be extended along the top of both lines of string pieces, parallel with each other.

5th. Above the scantling, in exact parallelism, are to be placed two ranges of iron bars five or six-eights in thickness and two and a quarter inches wide; and then, the iron bars, and the scantling are firmly secured to the string pieces, by spikes seven inches long driven through them both and into the string pieces.

After the road is located, and the grade line established, the timber work is completed, on all parts of it requiring embankment and not subject to a cutting of more than two feet in depth. A kind of working car is then used of simple construction, with four, six or eight wheels, having either of them four boxes, so contrived, as to discharge half their contents between the two lines of string pieces, and half without them, and carrying a cubic yard of earth to each wheel, and thus the embankment is made. Where the cutting is deeper, these cars advance one or two hundred feet, on temporary ways, being moved by horse power, and as the excavation proceeds the permanent timbers are all duly placed and secured, and the road completed. The timber work is all covered by earth within the grade to the surface of the iron except room for the flange of the wheel. Any kind of timber may be used for the blocks and cross timbers; the string-pieces should be made of the best timber afforded by the line of the road, or the adjacent forest.

The earth for embankments, and in excavations, stone and lime for culverts, sawed scantling, iron, &c., are all moved on the line by cars. Forests, defiles, marshes, and inaccessible points, where teams could not penetrate, are accommodated.

*   *   *   *   *

The ordinary mode of constructing wooden roads, is to lay two parallel ranges of sills or string-pieces, lengthwise of the road, six inches by six inches square, or four inches by six or eight square, or plank two or three inches by nine or twelve inches, sawed timber with cross pieces laid at right angles with those placed, from three to five feet apart, eight feet long, and five or six inches by eight inches square. The rails on which the iron rests, being six inches square or five by seven inches, and the iron consisting of bars five-eights by three-fourths inches wide. All this structure is placed on the surface of the grade, and filled in with earth between the ranges of sills so as partially to cover the cross pieces, for a horse path. On some roads the wooden rail has been secured by chairs or castings, to stone blocks placed in deep beds of rubble or pounded stone.

The more expensive and substantial roads of stone and iron are of various forms. The edge rail resting in choirs on stone blocks of various patterns is used in some cases; and in others the T Rail resting on cross timbers bedded even with the surface of the grade, and placed three feet apart, with splicing chairs: and in other cases still, the T Rail resting upon stone blocks; or in place of cross timbers, split stone seven feet long, about one foot square, resting on a bed of stone eighteen inches in depth, the whole width of the track. The expense of constructing these several forms of road, varies from fifteen to fifty thousand dollars per mile.

The expense of some of these forms of railroads, constitutes a fatal objection to their adoption in the Province, and under present circumstances, ought not to be incurred, if capital wer ever so abundant.

1st. Experience has shown that the sawed timber roads are objectionable, when applied to such soils as belong to your route, because the timber work has not a sufficient bearing surface to resist the action of rains, which settle them into the grade; and they cannot sustain the pressure of locomotives with heavy trains.

2nd. The timber work is placed in the most exposed situation possible, and the form of preparing the cross timbers subjects them to the most rapid decay.

3rd. The timber is too light, yielding under the weight of the engine. This yielding and the settling together of the joints formed by the cross timbers in *horizontal sections* of the road offer an obstruction to the passage of the wheels equal to a slight ascending grade.

4th. In our climate the *winter* frosts produce great injury on all such timber roads. The cross timbers being covered with earth, when this earth freezes, (which is the most exposed part of the surface) the cross timbers are raised from the sills, and thus a derangement begins, which spreads and becomes considerable every year, especially in winters of great severity.

As the evils disclosed themselves to my observations, it became a great object to contrive the means of avoiding them, and introducing improvements combining durability, strength and economy. These are requisites of especial importance in new districts; and difficult of attainment in soils rich and deep, and liable to hard frosts. They result in an eminent degree, from the method of construction which I have recommended. This method finds most of the materials on the spot in the heavy forests which encumbers the soil, and which may be brought into and constitute a principal part of the structure, at an expense scarcely greater than would be incurred in removing it out of the way. This very valuable feature of *my* plan, adapts it most happily to your road, where upon the old methods, the timber could not be sawed and delivered without exorbitant cost; and where there is timber standing within the limits to be cleared, sufficient to answer all the demands for that article. Using large timber in its roughest form, saves the great labor of scoring and hewing it, gives unyielding firmness to the frame work in the grade and provides ample strength for the transit of any amount of tonnage. The size of the timber and covering it, (except the top of the scantling) with earth secures its soundness for a great length of time. My examinations of timber in similar situations convinces me, that in close or clayey soils that it will endure from thirty to fifty years, except the scantling, which is but little expensive and may be easily replaced when it decays. Placing the timber work so entirely under the grade, secures it effectually, against the frost, as has been fully tested by a severe winter, on fourteen miles of the Tonawanda Railroad. The blocks on which the upper timber works rests, are a substitute for stone blocks. They are so covered as to be durable, and so situated as to increase the strength and steadiness of the cross and longitudinal timbers amply shoring up the superstructure in any description of soils, and under any pressure from above, which secures the road for use, while embankments are requiring solidity.

The scantling and iron plate incorporated with the large string pieces by strong spikes, throughout their entire length, have a bearing which will not permit them to settle at all from the grade line before or under the wheels of the engine, thus leaving the locomotive its utmost power of traction, and compared with stone and iron roads has that medium of elasticity most favorable to the durability of the Engine, and cars. Experience has shown, that the great difficulty of keeping in exact adjustment the several parts composing a stone and iron road, creates a serious tax annually, in the destruction and wear of its machinery.

This plan of construction materially reduces the time and expenses of the Engineer department. The line is first located by transit centres, or tangent lines, and benches placed by the test level. This prepares the way for the timber work. This being completed, the Resident Engineer gives the levels upon the cross timbers, and transfers the points of curvature from the tangents, preserving the monuments on the straight lines, and directing the several grading parties to form their slopes, as they proceed with the excavations and embankments.

It avoids the tedious detail of staking out the work for the contractor or superintendent, replacing from time, the stakes lost by the cutting, grubbing, embankments, &c., and requiring all to be surveyed and staked anew when the timber or stone work in the ordinary mode is ready to be placed upon the grade.

ABRIDGED TABULAR ESTIMATE FOR A RAILROAD FROM BURLINGTON BAY IN THE GORE DISTRICT TO CHATHAM IN THE WESTERN DISTRICT.

Division 1st, 10 miles 6 chains.

From Burlington Bay to the summit between the valley of the Lake and Grand River.

Sec.	Miles.					£	s.	d.
Sec. 1	1½	Cutting	51090	yards,	6d.	£1277	5	0
		Embankment	1000	"	"	25	0	0
2.	3½	Cutting	33000	"	"	825	0	0
		Embankment	21100	"	"	527	10	0
3.	5 6-80	Cutting	287000	"	7½	8968	15	0
		Embankment	150700	"	5	3130	11	8
		Rock Cutting	53000	"	3s.	7950	0	0
		2 Culverts	59689			400	0	0
		16 Box do.				200	0	0
	10 6-80ths					£23313	1	8

Division 2d, 13½ miles.

From the summit to Brantford at Grand River.

Sec.	Miles.					£	s.	d.
Sec. 1.	8½	Embankment	180970	yards,	6d.	£4524	5	5
		Cutting	153000	"	7	4462	10	0
2.	5	Ditto	90300	"	5	1881	5	0
		Ditto	190400	"	6	4760	0	0
		1 Culvert at Fairchild's Creek,				450	0	0
		4 do.	61460			1000	0	0
		20 Box do.				350	0	0
	13¾					£17423	0	0

Division No. 3d. 21 miles 35 chains.

From Brantford to summit between the Grand and Thames Rivers.

Sec.	Miles.					£	s.	d.
Sec. 1.	4	Cutting	112,500	yards,	6d.	£2812	10	0
		Embankment	130 600	"	7½	4081	5	0
2.	17 35-80ths	Cutting	160,340	"	5	3340	8	4
		Embankment	203,110	"	6	5077	15	0
		Viaduct across Grand River,				3750	15	0
		2 Culverts				750	0	0
		28 Box do.				490	0	0
	21 35-80ths					£30,301	18	4

Division No. 4th, 32 miles 50 chains.
From summit to London.

Sec. 1. 13 50-80ths	Cutting	69.300	yards,	7d,	2021	5	0
	Embankment	137,400	"	7	4293	7	6
2. 19	Cutting	184.800	"	6	4620	0	0
	Embankment	275,200	"	7½	8600	0	0
	1 Viaduct at River Thames,				2000	0	0
	1 do. middle branch of do.				1000	0	0
	Bridge at Cedar Creek				500	0	0
	4 Culverts				1800	0	0
	46 Box Culverts £20 each,				920	0	8
32 50-80ths					£25754	12	6

Division No. 5th, 64 miles 42 chains
From London to Chatham 64 miles 42-80ths.

Sec. 1. 10	Cutting	135,100	yards	7½	£4231	5	0
	Embankment	145,700	"	8	4890	0	0
2. 54 42-80ths	Cutting	310,000	"	6	7759	0	0
	Embankment	485,400	"	"	12135	0	0
	Viaduct over Thames at London				2500	0	0
	Bridge at Dingsman's Creek,				590	0	0
	4 Culverts.				700	0	0
	60 Box Culverts,				1200	0	0
64 42-80ths					£33906	5	0

ABSTRACT.

Division No.	1	10 miles	6 chains		23,313	1	8
"	2	13 "	40 "		17,428	0	0
"	3	21 "	35 "		20,301	18	4
"	4	32 "	50 "		25,754	12	6
"	5	64 "	42 "		33,906	5	0
		142 miles.	13 chains.		£120,703	17	6
Grubbing, Slashing, Clearing, and Timber work £250 per mile,					35,540	2	6
142 miles 13 chains		Iron and slicing plates		£450	63,963	2	6
"	"	Spikes,		50	7,108	2	6
"	"	Sawed Scantling,		25	3,554	1	3
"	"	Laying Iron and Scantling,		25	3,554	1	3
		Total,			£204,423	7	6

Remarks.—Least radius of Curvature 10,000 feet. Greatest length of continuous straight line 54½ miles. Reference is had to a general map showing localities, and to particular map and profiles of line surveyed accompanying this Report.

Important scientific results and their explanation would accompany the minute details of a final location.

Reconnoisance of Division No. 6 and 7, and comparatively estimated as follows:

No. 6	£1 250 per mile,	50 miles		£62,500
" 7	1 500 " "	47 "		70,500

The expense of constructing the timber work, according to the plan herein recommended, is difficult at present to give you in all its detail. From the peculiar form of construction, the economy of doing the work by the day, and the varied character of the work in different situations. Perhaps it may be best ascertained by the following divisions into particulars. A great proportion of the way, the grade line of your road may conform very nearly to the natural surface of the ground; in which case it will be raised two feet above the surface; and require the standing trees to be cut, nearly even with the surface, to the width of the road bed about 14 feet; the large trees standing in the side ditches must be grubbed; and those outside of the ditches cut down with the usual height of stumps—occupying in the road bed, the ditches, and the chopping on both sides, a width of 100 feet. A mile of road will require 1036 blocks two feet in length, and from 18 to 24 inches in diameter, and 10,560 feet of string pieces, running measure, 18 to 24 inches in diameter, and in pieces 20 or 30 feet long each. All timber in the line not wanted for the above specifications must be placed outside of the ditches. To complete the timber work, on a mile of road of this description, within one month, allowing 24 working days, will require the services of the following persons, who will live together in a shantee on the line, and find all their provisions cattle, forage and implements, to wit:

One superintendant to be allowed full time	26 days,	7s. 6d.	£9	15	0
One Principal Hewer,	24 "	7s. 6d.	9	0	0
One Assistant, do.	24 "	6s. 3d.	7	10	0
One Adzeman,	25 "	6s. 3d.	7	10	0
One Team, with two yoke of Oxen,	24 "	12s. 6d.	15	0	0
Fifteen, Axe and Saw Men,	24 "	5s.	80	0	0
Total expense,			£138,	15	0

Such is the amount of labor, and cost of preparing the timber work to receive the sawed scantling, and the iron, involving an expense for mechanical labor of only £24.

I have witnessed the execution of such a work costing £95 per mile.

A mile of such road would contain 12 eighty one hundred hs of an acre, which to clear and fence, and prepare for a crop, at £5 per acre, would cost the farmer £64 0 0 nearly half the amount required to clear away and prepare the timber in the form proposed.

To prepare the grading of this mile, the broad bed being 14 feet wide, and the earth having a slope one and a half foot base to a foot rise, and covering the timber to its upper surface, requires the excavation of ditches 2½ feet deep, 2½ feet wide at bottom and 10 feet wide at top with a slope as above, and containing 6104 cubic yards of earth which at 6d. per yard amount to £152 12 0

And to this the cost of timber work as above 138 15 0

And the aggregate is £291 7 0

Where the grade line adopted requires 3, 4 or 5 feet cutting and embankment the expense of grading would be greater, though in such cases the ditches would only be required in the cutting, and be of less dimensions, to answer the purpose of drainage.

* * * * * * *

In our desire to illustrate and enforce these facts and principles, we have some fear, that we may be thought to have trespassed upon that respect, which is justly due to the high authorities of the Province, and the distinguished individuals engaged in various laudable schemes, for its internal prosperity. If in any degree we have seemed to commit this error, we feel that it would be unjust to suppose it intentional, and we hope to take shelter under the injunction of the worthy company in whose service we labor, to probe the subject submitted to us, in all its bearings and to state our facts and convictions, with perfect ingenuousness.

The Creator of the world has stretched out between the Canadas and the United States the most magnificient series of internal waters, that any where adorn His footstool. From these waters He has, for ages, sent forth His dews and His rains to clothe the vast interior with lavish fertility, and in the course of His good providence, He has recently spread along both their shores, free governments, and a population eminently capable of understanding and educing the means of individual and national advancement. You are an important part of this population; and you occupy a most important position. Can you doubt or hesitate as to the task assigned you? Were the richest bounties of the physical world designed to go forever unimproved, and unenjoyed by him, to whom dominion is given "over all the world?" The spirit of Internal Improvement, with a gigantic arm, has been long engaged below you, and beside you, in turning the lands and waters of wide regions into effective ministers of human good. You are evidently delighted with the spectacle, and you feel the general impulses it imparts. Then cherish the spirits which exhibits it. He is knocking at your doors for permission to enter and pervade every department of your Province. Give him welcome admission. Assist his beneficent purposes. Let no imaginary fears, no local views, no narrow competitions come in between you, and the most vigorous prosecution of your truest interests and your highest honor.

All of which is most respectfully submitted.

ELISHA JOHNSON, Chief Engineer.

Engineer's Office, London and Gore R. R. Co. Dec. 4, 1836.

AN ACCOUNT OF THE HARBOR AND DOCKS AT KINGSTON-UPON-HULL.

Continued from p. 440.

Slip way. In the summer of 1820, a slip, for repairing the small boats and the lock gates, were built on the west side of the entrance basin, abutting upon the Humber. The length is 65 feet, the width 28 feet 6 inches, and the depth 11 feet at the lower end, diminishing upwards in the proportion of six horizontal to one vertical; the side walls are of brickwork, with stone coping; the bottom floor is covered with 3 inch fir plank, spiked to transverse sleepers, supported upon piles. The coping and front brickwork were set with Parker's cement and sharp fresh water sand in equal proportions, and although exposed to the waves and swell of the Humber, have stood hitherto with scarcely a failing joint.

Lockage. What has been said on this head respecting the Old dock, applies also in a great measure here. Locking is begun when there is about the same depth of water, but the sill being 6 feet lower than in that dock, the work can be carried on longer, and fourteen or fifteen pens made at one time. As many as 25 sea-going vessels have passed this lock in a tide, thirteen of the largest when the gates were open for about an hour at high water, and the rest by penning.

There are usually three men to open or shut each gate, which they do in two minutes to two minutes and a half; but frequently two men do the work. With 6 or 7 feet of water on the sill, in average tides, the lock can be emptied or filled in about eight minutes, with all the sluices; but this is seldom done, no more than two sluices being generally opened, for fear of damage to the shipping or the works from the great agitation of the water: with two sluices, the time is about 14 minutes. It may be observed, that two men can easily raise or lower one of these sluices, with a full head of water, in five minutes.

State of walls. In concluding this account of the Humber dock, I would as before, briefly advert to the state of the walls and foundations, as found when taken down in executing the Junction dock.

The timber in the foundations, which was all fir, was, with the exception of the slip, invariably as sound and good as when first put down; the oak fenders, constantly under water, were also in a good state, but the upper part of many of them beginning to decay, and a few actually rotten; as were the horizontal fir fenders, and the oak ties near the top of the wall. The wrought iron varied considerably: in some places the spikes in the foundations were quite fresh and good, in others a little corroded, and in others almost rusted away.

The mortar generally very soft, but in wide parts, and especially the foundation of the old communication at Myton gate, so much so, that it might have been dug up without a drop of water, and used again. In the parts near the top of the wall not so much exposed to damps, the mortar was tolerably hard; but I saw none, except in the inverted arch of Myton-gate old communication, that would bear any comparison with that of the Old dock; the mortar in that invert, which was made from ground lime, mixed with a proper proportion of sand, and then ground again in the mill, was, however, so hard, and adhered so firmly to the brick, that it required a sledge and wedges to separate them. The mortar in the front of the wall had much the same appearance as that of the Old dock, being soft and very much out of the joints for nine or ten feet from the top; below this the joints were not wasted, but had thrown out a sort of stalactite or calcareous incrustation that entirely covered the face of the wall. Notwithstanding the soft state of the mortar in these walls, I am of opinion, from their being in general so well flushed or grouted as to be impervious to water, that it will ultimately acquire considerable hardness, although perhaps not for many years. This I infer from the state of the mortar in the Old dock and several other walls that I have had an opportunity of observing, built with nearly the same kind of lime.

The pozzuolana mortar, were always wet, or were wet and dry alternately, and also where constantly dry, was found in general exceedingly hard, being both in hardness and color very much like a well burnt red brick. This mortar usually adheres very well to the bricks, but sometimes not so well to the stone, partly perhaps from the stone being set too dry, which is commonly the case in summer, and partly from a property peculiar to mortar made with magnesian stone, of expelling or throwing the lime to the outside, either in a dry state, like *flour*, or where the walls are wet or damp, like *paste*; but whether arising from these causes or not, this want of adhesion detracts very much from its other excellent qualities as a valuable mortar for aquatic buildings.

The stone was found in a very good state, particularly the Dundee and Barnsley stone, a little above and below high water, was in places somewhat wasted and decayed, but in all other parts sound and good.

Repair of lock gates. The gates and hollow quoins of the entrance lock, having lately undergone some alterations and repairs, it may be proper in this place to notice their state and mode of reparation.

From a defect not uncommon in artificial foundations, the lock walls had subsided a little, and come over about three inches on each side at the top, thereby contracting the lock six inches, which caused the gates to open and shut badly; one of the gates in particular required four men to work it.

Mr. Walker, who was then engaged in the construction of the Junction dock, was called to advise on the subject, and recommended that these gates should be taken up, the hollow quoins brought to a vertical line, and afterwards secured by land ties. The gates were accordingly lifted in the spring of 1830, by means of two powerful crabs, and two sets of stout treble blocks and pulleys, with a 5 inch fall, one fall being applied at the head, the other at the heel of the gate, and the whole suspended from the butt ends of two large oak trees, raised five feet above the coping, with the inner end resting on the ground, and kept down by two large stones, near four tons each; the chains to which the lower blocks were lashed, were fastened round the sixth bar from the top, blocking being placed between each bar upwards, the better to sustain the weight of the gate. Being thus prepared, the gate, weighing thirty tons, was lifted about eight feet, by a set of men at each crab, when to take the strain off the blocks and tackling, a chain being passed several times round the gate-bar and the tree on the wall, the blocks were eased till the chains bore the principal part of the weight.

The hollow quoins were then dressed to a true perpendicular, and afterwards firmly secured by land ties, nearly similar to those of the Junction dock, which will be hereafter more particularly described. The quoins of the north gates could not be dressed down, on account of the water in the dock, but were securely land-tied in the same manner as the others.

The timber in the gates were all sound; but the bottom bar, from the great pressure against the sill, was worn away upwards of an inch in depth, and the heads and heels were also rubbed a little; the hoops at the foot of the meeting-posts were cut away an inch or more by dragging upon the traverse rails. The wrought iron straps and bolts were much corroded, and came off by a tap with a hammer in thick flakes; the cast iron sluices and frames were particularly soft for about an eighth of an inch on the outside, and might be cut with a knife, like lead; the cast iron plates of the pointing sills were very rough, or in holes and furrows, as if eaten away.

After the repairs were all completed, the gates were lowered into their places. The time occupied in performing the whole was about eight weeks, during which there was very little interruption to the shipping.

THE JUNCTION DOCK.

It appears that a short time after the Humber dock was made, so desirable was a junction of the two docks considered, that a temporary canal was proposed to effect it; this would no doubt have been of great service, as at that time dock room was not so much wanted as a safe and expeditious passage between the docks, which such a canal would have given. This scheme, as well as the more effectual one of a new junction dock, was, however, from one cause or other, deferred till further delay would have been highly injurious to the commerce and trade of the town as well as to the interests of the Dock Company.

By a clause in the Humber Dock Act, the Company were required to make a third dock, whenever the shipping frequenting the port attained a certain amount of tonnage therein specified, provided a moiety of the expense was furnished them for the purpose. Some difficulties having, however, taken place in raising the stipulated supplies, the Company, impressed with the urgent necessity of making another dock, resolved, much to their honor to execute it solely at their own expense, and the necessary arrangements having been completed, the work was begun in October, 1826, according to the designs and under the direction of Mr. James Walker, Civil Engineer, assisted by Mr. Thomas Thornton, the then resident engineer of the Company, as superintendent of the work, in which office he was succeeded, in the month of July following, by the writer of this account.

It is proper in this place to state, that in the early part of the year 1826, Mr. Telford was employed by the Exchequer Bill Loan Commissioners to survey and report upon the proposed works; and the Dock Company being desirous of having the best advice, availed themselves of the opportunity of taking the opinion of that distinguished engineer. His report in general confirmed the plans of Mr. Walker; the principal alteration recommended was the substituting of a lock at each end of the dock, for an entrance with tidal gates only, and it was adopted.

Area. This dock is six acres in area and is capable of containing sixty square-rigged vessels, with room for passing to and from the other docks.

Temporary works. The first preparatory works were the two coffer dams, which were constructed principally of Memel timber; the south dam, or that next the Humber dock, was the largest, being 220 feet span, with a versed sine of 61 feet. The space between the two concentric rows of close piling, which were 6 feet apart in the clear, was filled to the level of the dock coping with clay puddle, the mud in the bottom having been previously well cleansed out; these piles were about 40 feet long and 13 to 14 inches square. The guage piles in front, forty-two in number on each side, were about the same dimensions, and had two rows of wale pieces, 13 by 8 inches, between them and the close piling on each side of the dam, all properly framed and bolted together. The close piling was connected together by an inner wale and cross braces near the top, and wrought iron tie rods lower down, and was further strengthened by a mass of loamy earth and loose bricks thrown in at foot.

On the concave side of this dam, and connected with it, was the temporary bridge. The road way, 24 feet wide, was supported by three rows of whole timber piles, braced together, and connected with the coffer-dam; and on their heads were transverse cap sills, carrying the bearing joists, which were covered with 3 inch planking and paved; a close boarded fence, six or seven feet high, was fixed on each side. From the great height of the dam, and there being at times a pressure of 28 feet of water against it, some of the piles were a little bent, and in very high tides the water found its way through rather feely near the top, particularly along the upper cross braces, but attention being given in time, no detriment to the works ensued. It was found in the repairs, that the puddle had settled from 6 inches to a foot below the cross braces, and that this was the principal cause of the leakage, as the earth for the puddle was good, and the work appeared well done.

In order to guard against accidents, a preventer dam was afterwards made across the centre of Myton-gate lock, in the form of a segment of a circle, the convex side being next the Humber dock. This dam was chiefly composed of tenacious earth well rammed, with a dry brick wall on each side, 6 feet thick at bottom, diminishing to 2 feet 6 inches at top, and including the walls was 30 feet wide at the bottom, and 8 feet at the top; it was carried to the height of the coping of the lock.

The gates also to both locks, after being hung in their places and finished, were well shored and braced, which turned out afterwards to be of the most essential service.

The north coffer-dam, at the west end of the Old dock, was 115 feet span, and the versed sine 14 feet. The plan of this dam and temporary bridge, and the scantlings of the timber, were similar to those of the other dam, except the piles, which were five feet shorter, the depth not being so great as in the Humber dock. This dam stood remarkably well, though there was sometimes a small leakage during very high tides near the walls and upper parts.

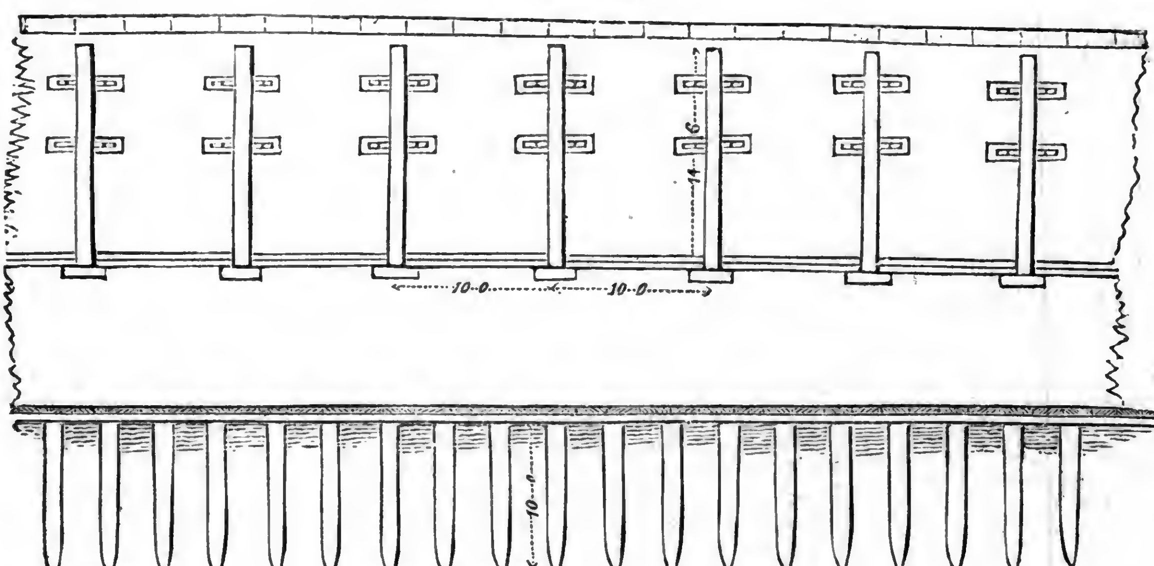
There were two cast iron pipes laid along this dam for supplying the town with water while the works were in progress.

Two steam engines, six horse power each, were used for clearing the works of water; that at the south end of the dock was erected about the same time as the coffer-dams, and was also occasionally employed for grinding the pozzuolana; the other was put up in the end of 1827, at the east end of St. John's church, and was principally employed in pumping the water out of the Whitefriar-gate lock and the north end of the dock; it was also sometimes used for pugging-mortar. This engine was taken down some time before the works were completed; the other remained until they were finished, a nine-inch pipe for conveying away the water having previously been laid through the west wall of the dock, and securely plugged after the engine had done working.

Water in the works. The water that arose in the excavation was not considerable; it was nearly pure, its slightly saline taste being caused, it is imagined, by its passing through the alluvial soil, which no doubt had been formerly deposited by the tide.

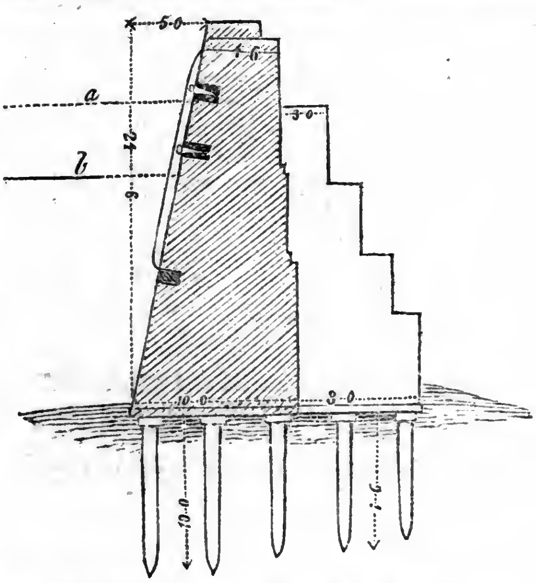
HULL DOCKS.

Plate 17.



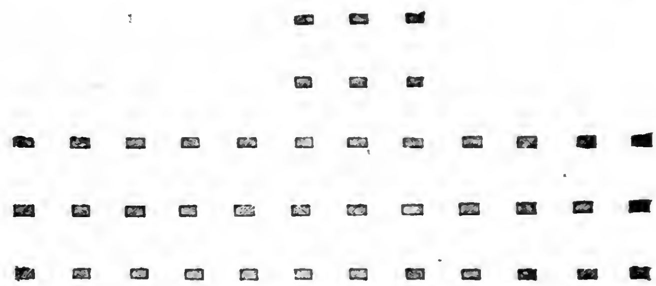
Elevation.

Cross Section.



a, High water spring tides. b, High water neap tides.

Plan.



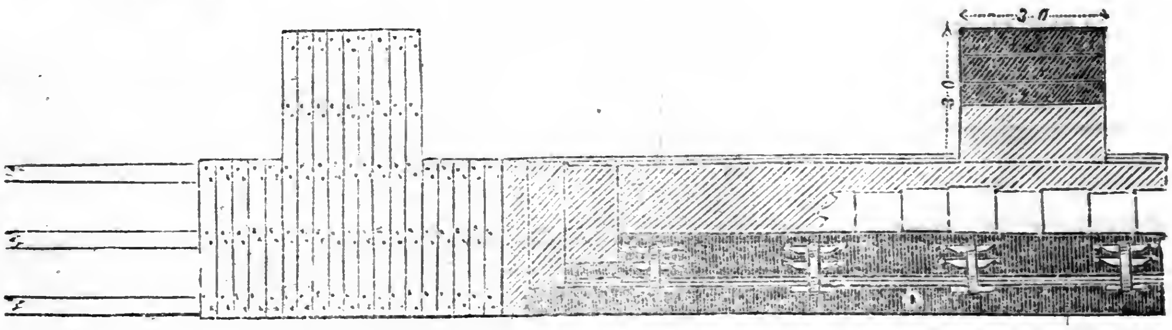
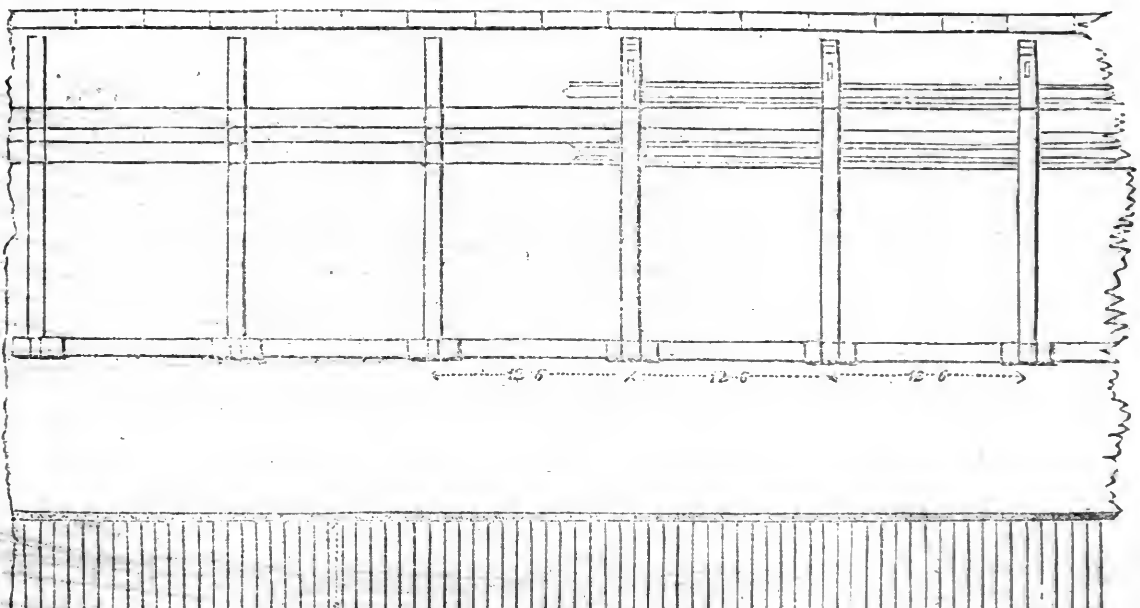
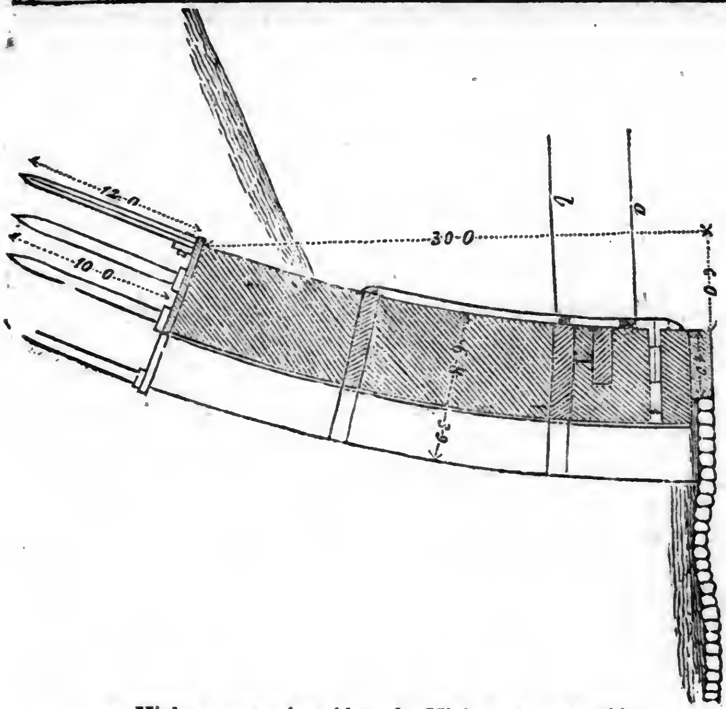
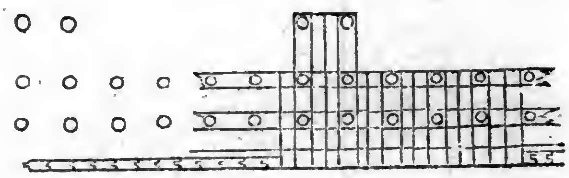


Plate 18.
HUMBER DOCK WALL.





Plan.



a, High water spring tide. b, High water neap tide.

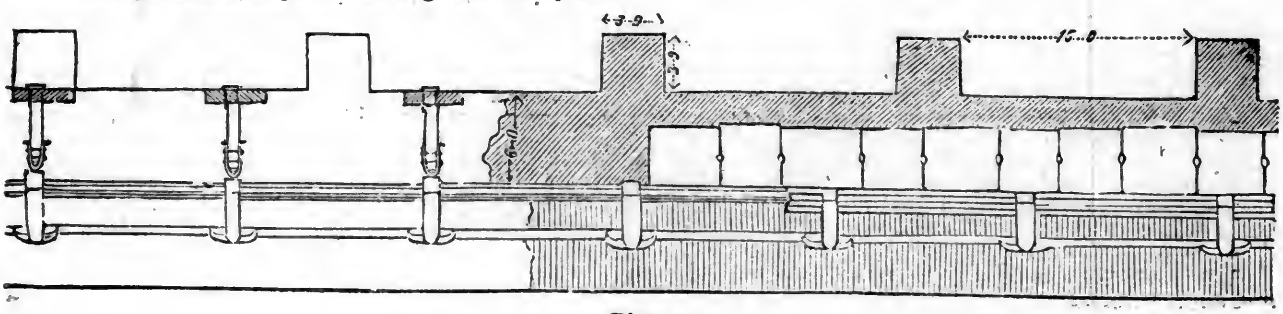
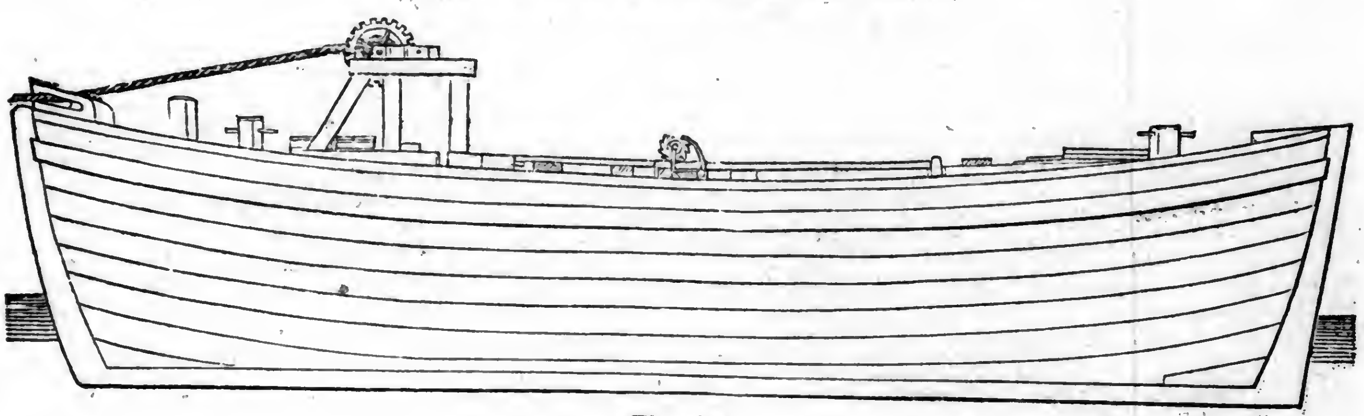
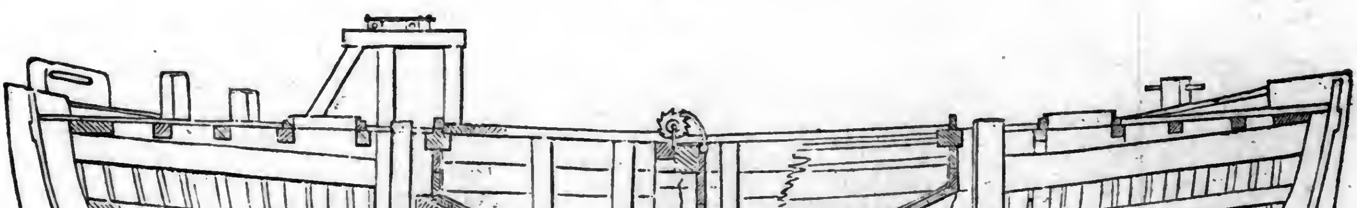


Plate 19.
HULL DOCKS. HUMBER DOCK MUD BOATS.



Elevation.
Plan.



Section A. B.

Kreosote.—For several years past, the dry distillation of organic substances has engaged the attention and exercised the interest of European chemists. This process consists in subjecting them, when deprived of moisture, to a high temperature. By this means the elementary principles of the body are acted on; they enter into new combinations, so that the products are the result of its destruction or decomposition by heat.

In 1830, M. Reichenbach, a chemist of Blansko, while engaged in the investigation of this curious and interesting subject, discovered kreosote and five other substances, all of more or less value in medicine and the arts, and all products of the destructive distillation of vegetable matter. Kreosote, however, is by far the most important of all these products, both on account of its chemical properties and its numerous practical applications. It was first discovered by Reichenbach in impure pyroligneous acid, and afterwards in all the tars. Its name is derived from the Greek *creas*, flesh, *sozo* I save.

It is an oily, transparent fluid, and when pure, perfectly colorless; its odor is very similar to that imparted to meat by wood smoke, varying, however, according to the species of tar used in its manufacture. It is readily combustible in the atmosphere and burns with much smoke.

Kreosote has been successfully applied to the preservation of fresh meats, and hence may become an important article in domestic economy. The meats intended to be preserved should be immersed in a solution of one part of kreosote in a hundred of water. Here they should remain from twelve to forty-eight hours, according to their size, when they are to be dried, either in the sun or before the fire, and afterwards set aside for six or eight days, at the end of which period they will be found to have acquired the consistence, appearance, smell and taste of the finest smoked meat.

Kreosote is probably the most efficient substance yet discovered for the preservation of dead bodies of whatever kind.—Birds poisoned with it resist putrefaction for a great length of time, and the bodies of animals may be *mumified*, so as to keep them sound for an indefinite period, by immersing them in a solution of kreosote in water, or by injecting a mixture containing kreosote into the blood vessels.

And indeed from recent investigations, it has been ascertained, beyond a doubt, that the tarry and resinous substances from which kreosote is chiefly manufactured, were the very articles used by the ancient Egyptians in the process of embalming, and by means of which their mummies have been handed down to after ages—mementos of the science and skill of that gifted people, as imperishable and as wonderful as the pyramids themselves.

It is stated in the Asiatic Journal for February, 1836, that Lieut. Col. M. C. Bugnol presented to the Royal Asiatic Society a human hand and a piece of beef, preserved by means of a preparation of vegetable tar found on the borders of the Red Sea, in the vicinity of Mocha. The Bedouin Arabs with whom he conversed on this subject, were of the opinion that this vegetable tar, called in their language Katran, was the article chiefly depended on by the ancient Egyptians in the process of embalming. They also believed that large quantities of camphor, myrrh, aloes and frankincense were used, but these are evidently not essential, as the tar alone penetrates and discolors the bone. The only use now made of this tar is as a plaster or ointment for the sore backs of horses and camels, rot in sheep, and lastly, in the preparation of the heads of criminals sent from the distant provinces to the seat of government. The tar is obtained from the branches of a small tree or shrub, which is found in most parts of Syria or Arabia Felix.

The process by which kreosote is procured is complex and difficult: that of Reichenbach has been simplified and improved by other chemists. The following is the mode recommended in the "*Annales de Chimie et de Physique*" of July, 1835, by M Koene. The tar derived from pit coal, is distilled in a retort provided with a long tube, having a large mouth. Under this is placed a receiver. The oil which comes over first swims on water; and it is necessary to remove from time to time the products of the distillation, till an oil is obtained which sinks in water When this is found to be the case, the product is collected. The heavy oil obtained during the distillation condenses not only in the receiver, but also in the tube of the retort, where it unites with the naphthaline, forming a buttery substance. By applying a gentle heat, the mass will drop into the receiver. The product is now allowed to remain in a cool place for some hours, after which it is pressed. The expressed naphthaline still contains oil, which is separated by heating it with its own weight of acetic acid till it melts. After allowing it to cool, the crystallized naphtha is pressed; and the acid adhering to the kreosote is saturated with sub-carbonate of potash. The kreosote is now to be shaken for a quarter of an hour with phosphoric acid, the proportions being half an ounce of the acid to twenty ounces of the oil. The mixture ought then to be agitated with its volume of water, and afterwards distilled with a graduated heat, care being taken to separate the oil which floats on its surface. The rectified oil is now to be dissolved in its own volume of a hot solution of caustic potash of the specific gravity 1.120. When it has been allowed to cool for half an hour, the oil upon the surface is again removed, and the heavy oil again treated with the caustic potash, only a fourth part, however, of the solution being this time employed.

On uniting the solutions of potash, a slight excess of diluted phosphoric acid is added, and the free kreosote which floats on the surface is separated. It is again rectified; and the first product which is chiefly water, being rejected, the kreosote comes over quite pure.

Kreosote has now been a sufficient length of time before the public, to enable us to ascertain pretty certainly and accurately its real value as a remedial agent.

Reichenbach, among his first experiments, applied the kreosote to slight *scalds*, in which he found it eminently beneficial. In the treatment of *burns*, it has been employed in France, having, it is said, a remarkable tendency to cause the sores to cicatrize from the circumference to the centre, thus preventing those irregular contractions, which often produce permanent disfigurement.

There is scarcely any disease, in which, according to the concurrent opinion of numerous physicians, kreosote has proved more beneficial than in the *toothache*. It has been employed on the continent for this purpose, ever since its discovery; and for the last two years, it has been prescribed very extensively in Edinburgh, and Dr. Cormack, says, with great success. But unless there be a cavity in the tooth through which the kreosote may be applied to the nerve, as a general rule, no advantage will be derived from it. Where the pain is merely rheumatic, a solution of kreosote and water is highly useful, relieving more speedily, certainly, and for a longer time, than any other remedy.

Various explanations of the operation of kreosote in these cases have been offered, but none seem entirely satisfactory.

1. It has been supposed that the remedy produced its effect by destroying the nerve; to this it has been objected, that if the nerve were destroyed, the pain would never return, whereas, in most cases, the pain returns after a considerable lapse of time.—But the destruction of the nerve, it may be rejoined, may be partial only, sufficient to paralyze its sensibility for a while, but not sufficient to prevent a return of this sensibility.

2. The kreosote may unite chemically with the albumen of the fluids, which are always exuding from a carious tooth, and thus form a crust to protect the nerve from the action of the atmosphere.

3. It may perhaps afford relief by stimulating the loaded vessels of the nerve, causing them to contract and expel the blood with which they are surcharged.

The best method of introducing the kreosote, is by means of a camel's hair pencil. After this has been done, the cavity should be filled with cotton saturated with pure kreosote, care being taken, if possible, to prevent any adhering drops from touching and irritating the adjacent soft parts. If this should happen, however, the pain is but momentary, and is not attended with any serious consequences.

Dr. Elliottson has published several interesting cases of *cutaneous diseases*, in which the kreosote has effected a cure after various other means had been tried in vain. It has also been recommended in *chilblains*. Dr. Halm, of Stuttgart, says, that whether they are ulcerated or not, he accomplishes a cure in the course of a few days with a solution of kreosote in water. Several cautions should be borne in mind, in the application of kreosote to ulcers. It is of great importance in regulating the strength of the solution, to remember that water dissolves only one-eightieth part of its weight of kreosote. If a small excess of kreosote be present, it will float on the surface in the form of minute globules;

and, of course, when the lint or brush is dipped in the solution, these globules will adhere, and thus a much stronger preparation than was intended will be used.

Of all the beneficial effects of kreosote, however, there is probably none more important than its power of *allaying the irritability of the stomach*, and of controlling the most obstinate cases of nausea and vomiting. Its power in affections of this character (says Dr. Cormack,) exceeds all other known remedies; and Dr. Elliottson says, that he never knew it fail to arrest vomiting. proceding from functional derangement merely. Dr. E. also prescribed it with great advantage in a case of vomiting from arsenic; and several times successfully for "sea-sickness."—[American Journal of the Medical Science.]

THE RICH AND THE POOR.—The following excellent sentiment concludes an article by Professor Hare, on the causes of the present pecuniary embarrassments, and the remedy therefor.

"Never was an error more pernicious, than that of supposing that any separation could be practicable between the interests of the rich and the working classes. However selfish may be the disposition of the wealthy, they cannot benefit themselves without serving the laborer. Let the rich proprietor improve his land; let him build houses or ships; he must employ the poor, and while it is thus certain that the rich cannot serve themselves without serving the laborer, it is evident that whenever the rich are injured the laborer must suffer. If the laboring classes are desirous of having the prosperity of the country restored, they must sanction all measures tending to reinstate our commercial credit, without which the wealthy will be impoverished and the needy be rendered still more necessitous."

Agriculture, &c.

USEFUL IF TRUE.—"We every day hear complaints about watery potatoes. Put into the pot a piece of lime as large as a hen's egg; and how watery soever the potatoes may have been. when the water is poured off, the potatoes will be perfectly dry and mealy. Some persons use salt, which only hardens potatoes." So says one of the foreign journals, and we advise those who are compelled to use watery potatoes to try the lime. There is we think some philosophy in the recommendation, as the alkali of the time may correct the tendency to acidity always manifest in poor potatoes. By the way experience teaches us that good ripe *pink-eyes*, well secured in the ground through the winter, and kept dry till wanted, will keep till July or August, without becoming watery. —[Genesee Farmer.]

LIME.—Lime is said to be an excellent remedy for burns of scalds: equal proportions of lime, water, and any kind of oil, made into a thin paste, and immediately applied and repeatedly moistened, will speedily remove the effect of a burn; and if applied later, even when the blister has risen, the remedy never fails. This paste has been known to stop effusions of blood, when almost every thing else has failed. Dry lime thrown into a flesh wound is always healing.

EFFECT OF CLIMATE AND CULTIVATION ON VEGETABLES.—The *myrtle tree*, which, with us is a small shrub, grows in Van Dieman's Land to the height of 200 feet, and has a trunk from 30 to 40 feet in circumference. The wood resembles cedar.—The Chinese have an art by which they are able to produce miniature pines, bearing a perfect resemblance to the gigantic specimens of our country, and only five or six inches high.

From the New York Farmer.

TROPICAL FIBROUS PLANTS.

Continued from p. 211

10 o'clock A. M., 16th, 1837.

I have passed a very restless night yet will endeavor to proceed.

We now turn to the peculiarly fibrous leaved Agaves, known in Yucatan under the common generic name of Yucatan, and in my writings under the botanical appellation of Agave Sisabana.

I have often stated that there are two distinct *cultivated* varieties in Yucatan, designated by the Indian names of Yashqui and Sacqui. To show at one view a great specific difference between the Henequens and the Magueys, or between the A. sisalana, and the A. americana, suffice it to repeat that the Yashqui variety of Henequen *is entirely destitute of spines on its edges*, while all the varieties of Maguey *have many spines projecting from their edges*. To repeat in other words, the leaves of Yashqui have *smooth* edges, the leaves of the Maguey have *spiny* edges; although both have a thorn at the extremity of their leaves.

The difference between the other variety of the Henequen, the Sacqui, compared with some varieties of the Maguey, is not so easy to describe in words, because the Sacqui has also spines on its edges. I have not with me the book in which I have noted down the minutiæ, but I can convey a general idea of one difference very notable to the sight between this and all other varieties of Henequen compared with the varieties of the Maguey viz.: the relative *narrowness of the leaves*. Cut a leaf of any variety of the fibres producing Agaves, and cut another leaf of any of the drink producing Agaves. but let each leaf be of the same length. Let the two leaves lie together, and that leaf which is pronounced to be notably *broader* than the other belongs to the Maguey. So striking is this difference, that I have before me a winter bleached leaf, of both the Sacqui and Maguey, each 22 inches long, and while the width at the broadest part of the Sacqui is scarcely 2½ inches, the width of the Maguey is fully 5 inches, or double the breadth. It is true that the same disproportion will not exist in all leaves at all lengths, yet in all the difference in breadth is sufficiently notable to strike the most careless observer. I dwell on these facts at the risque of being tiresome, because I am convinced that ere long they will be deemed of high importance by all "intelligent friends of the Union." Mark then further the fact, that both the Sacqui and Yashqui varieties of the Henequen of Yucatan or Agave Sisalana, are still existing in the garden of this model farm.

8 o'clock, P. M.

It is in vain to struggle against sickness! My exertions are protracting my convalescence. I will nevertheless endeavor to finish this page. To show you how vague and erroneous are the ideas concerning the Agaves, take up a Spanish Dictionary and look at the definition of the words Pita and Cabuya. You will find that both are used as the names of plants, and the names of fibres extracted from the leaves of those plants, and yet both are included under the Botanical name of Agave Americana. Under the term Pita you learn that the leaves are eaten by cattle. Under the title Cabuya you are told that the foliaceous fibres are made into ropes. Indeed so common is the fabrication of these fibres in some parts of Spain that the manufacturer has acquired the special name of *Cabuyero*—i. e. manufacture of the foliaceous fibre called Cabuya. As the Spaniards manufacture the tough grass called by them *Esparto*, (Spartina tenacessima) the manufacturer himself is called *Espartero*, the wrought fabrics *Esparteria*. The fact of the invention of the names is the best evidence of the common existence of the things, and processes they represent. So the terms Cabuyero and Cabuyeria imply that in Spain foliaceous fibre is well known. The only rational influence to be drawn from these facts is, that in Spain various species of Agave are acclimated—that they not only have the juice producing Magueys or varieties of Agave Americana, but that they also have the fibre producing Henequen or varieties of the Agave Sisalana.

If then in Spain where the Agaves are so numerous, and where even fibrous leaved species furnish products for common manufacture, the ignorance of the books is so manifest, it is not so astonishing that the writers of France should have imperfect notions on the subject. In the latest Agricultural work, the Maison rustique, published in 1836, and designed to be superior to the Agricultural Encyclopedia of London, there is merely a short article on the Agave Americana, by A. Poiteau, in which he follows the errors of his predecessors, but which we must suppose contains a compend of their actual knowledge on this topic. I have copied it and intended to send it with this communication, but as I am too exhausted to accompany the requisite comments, I must break off until health permits me to address you again from some station during my travels. My present intention is to proceed as soon as I am able to New Orleans, Havanna, Key West, Cape Florida, Charleston, &c., to New-York.

Respectfully,

H. PERRINE.

CITY POLICE—NIGHT SOIL MANURE, &c.

We continue, in this number, the article from the Farmers' Register, on City Police; and devote much space to the subject deeming it one of great importance; first, in point of *cleanliness* and *comfort* in large cities; secondly, as a means of largely increasing the productiveness of the soil, in the vicinity of large cities, and of course of increasing quantities, and reducing prices, of vegetables, and thirdly, it is very important to the cultivator of the soil, who, though he may sell at less prices, is sure to realize larger profits on his labor, from the increased quantities.

We ask the attention of our readers to the subject.

FRENCH METHOD OF PREPARING POUDRETTE AND URATE FOR MANURE.

To the Pennsylvania Agricultural Society.

Concluded.

"The attention of the Philadelphia Board of Health, has been earnestly directed towards discovering some mode of disposing of the contents of privies, which would remove from the precincts of our city, where the deposites are made, a nuisance at present of a very formidable character, and which must necessarily increase. In pursuance of this object, the board has concluded, that an effectual remedy for the evil is only to be sought in the conversion of the offensive substance into *inodorus manures*, after the methods now successfully practised in many parts of Europe, and especially in the cities of Paris and London.

"The principle by which this object is effected, is simple, and consists in the drying, or desiccation of the urinary and fœcal matters, either, apart or together, by the addition of certain absorbent substances, such as plaister, lime, chalk, ashes, &c. It is probable that the ashes of the Lehigh and Schuylkill coal may be thus usefully disposed of. The manure prepared from the fœcal or more solid contents of privies, has long been known, and highly esteemed by the gardeners and agriculturalists of France, under the name of *poudrette*. That prepared from the urinous portion is comparatively of modern invention, and is called *urate*.

"Aware that such a plan is not to be carried into effect under the special direction of either your society or their own body, the board lays the subject before you, in the hope that its advantages will be properly investigated and made known, so as to lead to useful results; for surely, nothing can be more worthy of general and special encouragement, than a plan not only calculated to promote the health and comfort of our large community, but to render essential assistance to the most important of the useful arts, insuring at the same time liberal profits to those actually engaged in its execution.

"That your society may be placed in possession of more particular information relative to the subject under consideration, the board would refer you to numerous highly favorable reports and interesting proceedings of the most respectable associations established in Europe for the encouragement of agricultural and useful arts, among which we would especially call your attention to those of the French "Royal and Central Agricultural Society," and the "Society for the encouragement of National Industry," during the years 1818–19–20.

"The following translation of a French document, furnishes an accurate detail of the process by which the *urate* is manufactured, and throws much important light upon the subject generally:

"Certificate granted upon the application for a brevet [patent] of invention, to M. Donat, (Joseph Etienne-Victor-Gabriel,) residing at Paris, department of the Seine.

"The Ministerial Secretary of the State, for the department of the interior, considering the Memoir of M. Donat, proprietory, residing in Paris, Rue des Bons-Enfans, No. 28, in which he states his desire to enjoy the proper rights secured by the law of the 7th of January, 1791, to the authors of inventions and discoveries in all kinds of industry, and to obtain in consequence, a brevet of invention for fifteen years, for the sudden drying of the urinary portion, and manipulation of the contents of privies, within the twenty-four hours succeeding their removal; all by particular means and processes, of which he declares himself the author, as it appears from the verbal process addressed at the time, to the depot of documents attached to the secretaryship of the department of the Seine, the 19th of January, 1819.

"Considering the designs of the apparatus, and the descriptive memoir of which the following is a copy.

"I have contrived a plan which affords me the means of extracting from urinary and fœcal matters, a manure very superior to those hitherto known. Desirous of securing to myself the exclusive enjoyment of my invention, I have made application to the prefecture, department of the Seine, conformably to the laws of the 7th of January and 25th of May, 1791, for a brevet of 15 years, for the complete and immediate desiccation of fœcal and urinary matters together, or separately, by means of absorbents which I add, such as lime, plaister, chalk, marl, ashes either natural or mineral, such as are taken from the different ash mines. Substances having calcareous bases may be calcined for the absorption of a greater quantity of liquid, at least when the high price of the combustible, or the low price of the absorbent, do not offer greater advantages in using it directly from the quarry.

"This variety of absorbent substances, assures to every country the means of manufacturing a very abundant and active manure with human dejections. The product of my operations is inodorous, for two reasons: The first is, that when urine is employed, it gives out no odor after the absorption of its moisture: The second is, when the fœcal matters are sufficiently mixed with the absorbent, I bury them at least 18 inches deep, to prevent the disengagement of the odor during the fermentation necessary to the good quality of the manure.

"I give to the manure made with pure urine and one of the aforesaid substances, the name of *urate*. I believe that this composition, mixed or combined with that resulting from the combination of fœcal matters with a certain quantity of one of the aforesaid absorbent matters, produces a manure of great activity. The only difficult point is, to ascertain the proper proportions for the admixture.

"For the manufacture of the urate on a large scale, it is necessary to construct at least six basins, in form of a watch glass inverted. They should hold about 12 hectolitres, (about 300 gallons,) of which there will be six of urine and six of the absorbent matter of one of the kinds formerly designated, freshly calcined.

"The cask or vessel holding the urine, is to be so placed that it will empty itself through its bung into the basin. During this operation, one workman is employed in pouring in the plaister, another in mixing it in the basin with a rake or scraper.

"When the mixture is finished the operators pass to another, and so on to the sixth. Then the first is emptied for the purpose of commencing operations anew. The mixture is finished by further drying in the air.

"At the end of the day, the quantity of urate which has been made since morning, is to be broken down by means of a cast iron cylinder rolled over it; after which it is sifted, (*passee a la double claie.*) and then immediately stored or packed up, to prevent the absorption of moisture.

"By this combination, the urine being dried by its union with the absorbent matter, which is itself a manure, unites all the vegetative powers of its two component parts, and will constitute the most productive of all manures, in consequence of the very small quantity that is necessary to employ to procure the best results.

"I have designated six substances as being proper to absorb the superabundant water of urine, and I have only mentioned them without pointing out any particular one, as I thought that no country is without some one of them. But in case I am mistaken in this opinion, very great advantages may still be derived from urines, by mixing them with burnt earth, (that of heath soil is to be preferred,) or with natural ashes (*cendes naturelles.*) I only estimate the value of this mixture as a means of obtaining all the salts of urine in a solid state, which will facilitate its transportation and employment in agriculture.

"The ancients considered urine as the most powerful of manures. This is not therefore the end of my invention, which consists alone in its sudden desiccation and solidification, and the draining or drying up of these infectious depositories of the substance to be met with in the environs of large cities, where they furnish inexhaustible sources of unhealthy exhalations.

"I leave it to the learned societies to express their judgment upon the qualities of the urate, and restrict myself to the application for a brevet of invention, for a method of preparing it immediately, so as to destroy at the same time the odor of the urine.

(Signed) DONAT.

"*Paris, January 19th*, 1819."

["Here follows the certificate granting the brevet or patent to M. Donat. for 15 years, signed by the Ministerial Secretary of the interior department, Count Decazes.]

"Signed for and on behalf of the board of health.

SAMUEL J. ROBBINS.
Attest, *President.*
THOS. A. RITCHIE, SEC.
Philadelphia, January 16th, 1826."

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However beneficial may be this plan both for cleansing a city and for forming rich manure, it is evident that the process is not conducted upon uniform, and rarely upon correct principles—which I consider are only conformed to when the absorbing matter used in some form of *mild* calcareous earth. By calcining this material, as the inventor recommends, a destructive, instead of a preserving ingredient is formed—and one which never should be used to mix with fœcal or other animal matter, if the value of the product, as manure, is of any account. Far better than this French method is that which has been in use time out of mind among the Chinese—a people, who however unenlightened in science, are in advance of most other nations in the means for preserving and increasing the fertility of the earth. Travellers have informed us, that in that country, human excrements are mixed with clay marl (doubtless rich in calcareous earth.) The mixture is made up in the form of cakes, which after being dried, are free from all offensive odor, and indeed give to the senses no indication of their composition; and they are exposed in quantity in the streets for sale, as manure for the neighboring lands.

There is an obvious objection to, or ground to doubt, the effects imputed to decomposing filth as causing disease, in this well known fact, that in spite of this and all other sources of disease, our towns are more free from autumnal sickness, (the effects of *malaria*) than much of the neighboring and surrounding country; and that the towns have all become more healthy, as they have increased in age and population. These general facts are admitted to be correct, but the inference from them is denied, on the following grounds.

In the first place—bad as may be the effects of the gaseous or aeriform products of animal putrefaction, it is well known that they are much less productive of malaria than are those of vegetable putrefaction. This I believe is a well established and universally received medical fact. And as our *police of health* in the country is at least as bad as in the towns, (though the nuisances are of a different character,) it may well happen, that the vast quantity of decomposing vegetable matter in the woods and in the fields, where there is no calcareous ingredient in the soil to combine with products of decomposition, and to fix them there—together with the pestilential effluvia from the numerous mill ponds, which more or less affect injuriously half the places of residence in lower and middle Virginia—may produce more malaria and disease, than the decomposition of animal filth in the towns. Besides, there are counteracting agencies always operating to lessen the ill effects of decomposition of filth in towns, though such operation is neither intended, nor understood, by those who profit by it. From various sources, the calcareous earth in towns is always accumulating. The ashes of all the wood consumed as fuel, furnish a large and rich supply—and though these are sometimes conveyed away for manure, still the far greater part is scattered about the town. Coal ashes, in a much less degree as to strength, also add to the stock. The waste of lime, and the old cement of buildings repaired or demolished, all furnish calcareous matter, and all, though without its being designed, are in time spread every where. But the burning of a town, or a large portion of it, as stated in the first part of these papers, furnishes the great supply of calcareous matter—enough indeed to give a very heavy dressing to the whole space burnt over, and much more—and to serve to combine with all the animal matter for a number of years, and to give permanently to the soil of the town, that valuable quality which is entirely wanting in that of the surrounding poor country.

There is one still more foul abomination in our present system which has grown out of the want of proper public accommodations, and the extreme difficulty (not to say indecency) of daily removals of uncombined and unchanged excrements from private houses. The practice alluded to belongs to the most crowded parts of cities, and has proceeded from them, and from Europe, to this country, where as yet it is but little used. Where space is very costly, deep pits are dug beneath privies, from which the contents are not removed for years together, and more probably *never*. They do not become *full* (or at least very slowly,) and thereby *compel* their being emptied—because after a certain bulk of the highly putrescent matter has been accumulated, the waste by decomposition goes on nearly or quite as fast as the increase from the addition of material. If quicklime is added, this decomposition is hastened, and a different, though but little offensive odor is substituted. But whether these depositories are cleaned out at long intervals, or not, there can be no question but that nineteen-twentieths of the whole mass goes off by decomposition, and is mixed with the atmosphere; and however diluted, or however altered by mixture, helps to form the air breathed by the inhabitants of towns—who are too delicate, and too fastidious, to have all such nuisances prevented by proper, general and public regulations. We have not yet been enough crowded in our towns for the last mentioned practice to have gone to much extent. But as it is the result of (supposed) necessity, it will increase with the growth of the towns; and as such receptacles will be of course concealed as much as possible from observation, their existence will not be known, nor the extent of the evil estimated, and scarcely even suspected.

In France, in past times, when there was neither the refinement of manners, nor the knowledge of the evils produced, that now would forbid the introduction of such a usage, large and deep covered pits, or vaults, to privies, were common in the smaller towns, and which were by no means kept for private use. In such public places (*fosses d'aisance*) the rapid accumulation made it absolutely necessary to remove the matter sometimes, though very rarely; and a description of the state of things at such times, and the effects produced on health, and even the necessity of guarding against them, will serve to show to our citizens, who have never thought of any evils except that of offensiveness to the senses and to decency, that effluvia, always hurtful and sometimes deadly in effect, are actually evolved. And it should be borne in mind, that the same effluvia must be extricated from similar accumulations also, though the effects are diminished according to the smaller amount and more gradual extrication, or more diluted state of the doses inhaled by the surrounding population.

There is another and still more disgusting, and still more evident effect of accumulations of putrescent animal matters in towns, presented in the infiltration of the fluid parts though pervious strata of earth, and the consequent admixture with the water supplying springs and wells. This part of the subject may be resumed, and treated more at length in a future number of these observations, so as not now to interrupt the consideration of the effects of gaseous or aeriform products of accumulations of putrefying animal matters.

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No. III.

THE POLICE OF FILTH, IN TOWNS, CONTINUED FACTS AND OPINIONS ON THE SUBJECT FROM FRENCH AUTHORITIES.

The following article, which I have translated from Rozier's "*Cours Complet d' Agriculture*" etc. (Paris edition, of 1815,) will serve to present in a stronger point of view the dangers to health caused by accumulations of fœcal matters in towns. The reader may be instructed by its facts and reasoning, as to the importance of the subject to health—and he will also be amused by the display of technical terms, and form of scientific arrangement and classification, applied to such a subject. But this manner of the French author, nevertheless, furnishes additional evidence that the subject has been long studied in his country; and therefore, that the results obtained, and the opinions derived, are the more entitled to respect.

It is proper to premise, that in France, and elsewhere in Europe, the poorer cultivators and inhabitants of the country do not generally have separate and isolated dwellings, as in the United States, but are collected in villages, or hamlets which are surrounded by the fields which the inhabitants cultivate, and the pastures on which their cattle graze. This state of things, which was originally required for mutual security, and which old habits still retain in use, has no existence in the United States, except among some cultivators of French descent, on the Mississippi, and the laborers in cotton or other large factories. It is to villages, and perhaps crowded villages, that the author refers, in the following piece, when speaking of the "*country*;" and the "*fosses d'aisance*" of which he treats were common to the use of many persons. The injurious effects described, like the circumstances which produced them, are also (as yet) without parallel in this country. But we have no right thence to suppose that our different habits lead to no danger, or to much less evil than the deep and large vaulted "*fosses d'aisance.*" In the latter, as described in the French account, the accumulation of fœcal matter, and the concentration of the energy of its poisonous products, serve to exhibit its worst virulence bearing upon a small space, and upon the very few persons most exposed by nearness, or actual contact. But if the matter was diffused, as by the practices and habits of our population, the same kind of fermentation would proceed, the same products be exhaled, and as much deadly aeriform poison be evolved and breathed, but rendered scarcely sensible in effect, by being widely diffused over much space, greatly diluted, and thus divided among a much greater number of persons.

[*Translation.*]

Fosse d'Aisance. This subject relates directly to agriculture, as furnishing one of the most excellent manures, at the same time that it interests the health, and even the life of the cultivator; for, how many casualties occur in the country [villages] by the emptying of these pits, for want of knowing the means of preventing them!

We shall not speak of their construction, which makes an essential part of the art of building; but we are going to enter upon some details in regard to the various substances which compose the matter, or contents, of the pits. We have not to fear exciting the *disgust* of the cultivator; accustomed as he is to excrementitious matters, he will consent that we shall instruct him concerning that of which he is less informed.

These substances are distinguished by the names of the *crust* (*croute*) *hecate*, *vanne*, and *scrapings* (*gratin*) The *crust* has often sufficient thickness and firmness to sustain the weight of the laborers walking on its surface! The *hecate* is the pyramidal heaps. The *vanne*, is the liquid part, usually of a green color, and is corrupted (*infecte*) The *scrapings* are the parts adhering to the walls, and to the bottom of the pit.

The crust is sometimes pushed up (from the mass below) by a sufficiently voluminous layer of mephitic gas, so as to induce the belief that the pit is full. In this case, the emptying of the pit may be put off to a future time, by merely opening into, and facilitating the escape of the intermediary layer of gas, and thereby lowering the crust.

We proceed now to the accidents occasioned by the emptying, and often even by the mere opening of a (covered) pit. Frequent as such accidents are in the cities, they are much more so in the country [villages,] in consequence of the little experience of this operation. The two only means of preventing them are, quicklime and fire.

This article, in Rozier, occupies much extent,* and contains a *Memoire sur les Fosses d'Aisance*, which I had prepared when I was engaged in investigating the subject, in concert with Laborie and M. Parmentier. The employment of quick lime consists in slaking it to put it in a state of powder, or to make a fluid by mixing it with very little water, and to introduce it into the contents of the pit, by stirring it with a pole; then the mephitic exhalations are destroyed or confined. The proportion of lime required, depends on the mass of matters, and the cessation of the existence of mephitic gas, of which we may be assured by letting down a lighted candle to the surface. If the flame is extinguished, or even burns dimly, there is still mephitic air undecomposed, and more quick lime is to be added.

As to fire, there are many modes of applying it. Either a chafing-dish of burning coals is placed in the pit, and left there to burn out completely, or dry straw is lighted on it. It is useful to make (in the walls) air holes; they may serve for the escape of the lightest gases; but how little do they draw, when the atmosphere weighs on their orifices! For it is of the *fosse d'aisance* as of the barometer—or rather it is one of the most faithful of barometers. The weather will continue clear, as long as, from the holes over the pit, there arises *ammonia*, that pungent odor so sensible to the eyes, and to the smell.

* It is the writer of this article, Cadet de Vaux, who speaks, and probably in reference to the previous edition of Rozier's *Cours Complet.*—Ed. Far. Reg.

The crust is sometimes firm enough, I have said, for the workmen, without inconvenience, to walk upon its surface. This surface is commonly covered with sulphur, as is also often the vault (or arched covering) of the pit to which the sulphur sublimes, and fixes on. Sulphur is a very abundant product of the fermentation of animal substances: under these circumstances it is formed in the humid mode. When charged with the excavation of the half-moon of the gate of Saint-Antoine, which, from a very remote period, had been made a common receptacle of filth, (*voirie,*) I was struck with the enormous quantity of sulphur with which the earth was impregnated. It is to this sulphur, or rather to the sulphuretted hydrogen gas, which is formed in the pits, and is the most mephitic of known gases, that are principally owing the accidents produced by the operation of emptying these receptacles.—M. Dupuytrein has thrown much light upon the different gases held by the matter of the *fosse d'aisance*. At the time when I was occupied in this investigation, Lavoisier, the Abbe Fontanes, whom I had invited to repeat or examine the experiments, could not pronounce upon diversity of eminent gases; of which one kind, the *mitte* [as vulgarly termed,] which limits the effects to causing to the workman a momentary blindness, seeming to affect merely the system of optic nerves—whilst the other occasions the painter's colic, and conducts its victim to the state of paralysis, to asphyxia, and finally to death. The experiments of M. Dupuytrein, though interesting in their relation to science, have changed nothing in the preservative means which we have stated, to wit, quicklime and fire, as the destructive or ventilating agents. It is to the negligence of these means, I repeat, to which is to be attributed the accidents that occur from time to time

Lime is the most energetic disinfecting agent. Throw it into the putrid fluid (*vanne*) of a *fosse*, and it becomes instantly inodorous; it fixes (*enchaîne*) it decomposes all the mephitic gases. It is thus, that when thrown into a *fosse*, it suspends the extrication of infectious emanations, at the same time that it arrests the tumescence and fermentation of the matter, which is lowered, and the space of time before the emptying becomes absolutely necessary, is thereby prolonged. It is recommended by many to throw snow into the pits, on the pretence of its economizing the emptying, because, as it is said, the snow consumes the excrementitious matter. If the soil in which a pit is sunk is so pervious as to permit the infiltration of the liquid portion of its contents, then the adding of snow (that is, water,) by giving more fluidity, will facilitate the imbibing by the soil. But if the pit is well and solidly constructed, and loses nothing by filtration, the addition of snow does but augment the mass, and hasten the time of emptying. It is thus that people assert every thing, because they believe every thing—and ignorance loves best that which is the most improbable.

There is a phenomenon which it is suitable to mention in this article, as sometimes causing accidents. It often happens that children throw lighted papers down through the orifices of the seats over the *fosses*. When our *barometer-fosse*, in place of ammonia, exhales sulphuretted hydrogen, the gas, the most combustible of all, takes fire, with explosion; and if a sufficient quantity of sulphur is formed upon the crust, or upon the arched roof, the bursting of the roof of the pit may be the result. This gas of *fosses* is also met with in mines, and takes fire there from the lamps of the workmen. But in the mines, the explosion is seldom attended with injury, because there is communication by galleries, or by the ceiling, with the atmosphere: the workman throws himself flat on the floor, and it is as much if his hair is singed by the meteor-like fire, which burns but little, and very rapidly.

But why should *fosses* be permitted to exist, when their contents occasion so many accidents. Their cleaning out is the profession the most abject and most disgusting; and it is difficult to conceive how men can devote themselves to it voluntarily. Certainly, humanity would not permit that a legislator should ascribe such a punishment on the penal code. The workmen employed in this wretched business, raises the stone that serves to close the entrance to the vault, and often there immediately exhales a *mofette*, or gas, dangerous or mortal.—Another *mofette* is found under the crust into which he cuts, which escapes at the first stroke of the hoe. He puts down his ladder, and descends into this gulf; he makes the reign of the cross, asking the protection of Heaven. He draws out the putrid fluid; at the end of some minutes, it is the *mitte** which reaches him; he is struck with blindness; he is drawn out, if not blind, at least deprived of sight for more or less time. Or perhaps it is the *plomb*;* his knees fail, he staggers, and has a universal trembling, cold siezes him, he breathes with difficulty, and he is conducted to the hospital to await the coming of convulsions, violent colic, and other pains, and paralysis which often becomes permanent. Another work man succeeds the first; he has a rope fastened around his breast and beneath his arms, while the other end is held by one of his comrads above, who follows him with his eye, and is ready to draw him up, if he plunges into the *vanne*, or falls extended upon the more solid mass, struck by asphyxia, (fainting) if not by death. It was doubtless, the existence of *fosses d'aisance* among the Greeks, which has furnished grounds for the fable of the mouths of Styx and the Cocytus. The noted Grotto del Cane (of Italy,) does nothing but produce asphyxia—that is to deprive of the signs of life, which are restored immediately by the subject being plunged in the water of the neighboring lake, Agnano. But it is not the same with asphyxia occasioned by the emptying of *fosses d'aisance*. The sulphuretted hydrogen gas is quite another thing to the carbonic acid gas.

The numerous accidents occasioned by the emptying of *fosses d'aisance* were among the first objects which exercised my zeal in the career of public utility to which I have consecrated my labors. In consequence, I enlisted the solicitude of government, and proposed to it to unite myself with Laborie and M. Parmentier, for continuing the researches which were alike interesting to humanity, to science, and to agriculture. Chemistry had analyzed the excrementitious matters; it had commenced to analyze the gases; but it had not penetrated into the interior of the *fosses d'aisance*, the only laboratory in which to examine the phenomena which the most putrescent substance presents.—From these researches, it has resulted, that no workman who will take the precaution which we have proposed in the use of quicklime, and of fire, ought to perish in cleaning out *fosses* or wells; or in the excavation of mephitic soils, to which I have applied, with no less efficacy, these cautionary means against death and asphyxia.

Soft stone (*pierre tendre*) should be used for the construction of *fosses d'aisance*; hard stone has not sufficient resistance.—The gases the most active, the most solvent, exhaling from the excrementious matters which are undergoing an uninterupted process of fermentation, tend to soften the stone, which they penetrate to a great thickness. I have seen walls of extreme solidity, of which the surface might be crumbled by the fingers—not only the wall of the *fosses*, but those of the body of the [upper] building forming the privies; whilst the soft stone permits the penetration of the viscous fluid, which thus forms a coating that prevents infiltration.

The circular form is so much the more necessary, as I have seen [square] *fosses* of which the cleaning caused no accidents to the moment when, the centre being emptied, the corners were commenced upon. Nothing is more dangerous than to meet with bunches of straw or hay, which have been thrown into the pit; it is rare that they do not conceal a *mofette*, or mephitic gas. In general, all foreign substances add much to the dangers of emptying; it is thus that soap waters [which have been used for washing,] may cause a *fosse* to be fatal to the workmen engaged in emptying it.

* * * * * * *

I will observe that pits for farm-yard dung, ought to be considered as true *fosses d'aisance*, in regard to their putrid fluid part, the mephitic gas which they evolve, and consequently, of the accidents, which are of similar character, which attend the emptying of *fosses* of farm yard dung; so that the means indicated as safe-guards in the one case, suit also for the other.

* * * * * * *

* These are provincial names given to the different exhalations, (or *mofettes*), as distinguished by their different poisonous effects on these exposed to their greatest power.—Ed.

New-York, June 15th, 1837.

THIRD ANNUAL FAIR OF THE MECHANICS' INSTITUTE OF THE CITY OF NEW-YORK.

The *Fair* of the Institute will be held at Niblo's Garden, commencing Monday, September 25th, 1837.

To render this exhibition worthy of the arts and of the ingenuity of the Mechanics of our country, the Managers appointed to conduct the approaching *Fair* have determined to make such liberal arrangements as will insure to the contributors a fair opportunity of exhibiting their productions to the greatest advantage.

The object of Exhibition Fairs is to present to the members of the Institute and their fellow citizens who are engaged in the Mechanic Arts, the means of making their skill and ingenuity known in a way no other facilities afford: the many thousands who visit such exhibitions have a much better opportunity of judging of the merits of the various productions, than they would have by a mere verbal or newspaper description, besides the advantage of seeing brought together, in one vast collection, the products of the skill, ingenuity, and industry of our country.

Premiums of Medals, Diplomas, &c. will be awarded for *all* worthy or meritorious articles exhibited, either as it respects superior workmanship, machinery wherein the operations are new; interesting or important, where ingenuity is displayed, or taste manifested, and particularly for all new and useful inventions.

You are respectfully requested to send, for competition or exhibition, specimens of the articles you manufacture: and you may be assured that the strictest impartiality will be observed in the distribution of the Premiums.

Steam power will be provided for the accommodation of those who wish to exhibit Machinery in operation; an experienced Superintendant will take charge of this department, and contributors in this branch are particularly invited to send or bring their Machines or models as early as possible, on the 23d September, that the necessary arrangements may be made in relation to shafting, pullies, &c.

The Managers, in conclusion, cannot but express their belief that this Third Fair of the Mechanics' Institute, will exceed in variety and beauty of display, all previous exhibitions of the kind.

George Bruce, *Chairm.*
Wm. Everdell,
C. Crolius, Jun.
Thos. Ewbank,
Richard Bragaw,
Executive Committee.

N. B. All articles for competition must be delivered to the Committee at Niblo's Garden, on the 23d September. Those for exhibition *only* will be received any day during the Fair, before 10 o'clock A. M.

RULES AND REGULATIONS.

1.—The Garden will be opened for the reception of Goods, on Saturday, 23d of September, from 6 o'clock A. M. until 9 o'clock P. M., and it is respectfully urged that all articles intended for competition may be sent in early in the day. Those articles intended for exhibition *only* will be received any day during the Fair, before the hour of 10 A. M.

2.—The Fair will open for visitors on Monday, 25th September, at 10 o'clock A. M., and continue open every day of the exhibition till 10 o'clock P. M.

3.—Competent and impartial Judges will be appointed to examine all articles presented and premiums will be awarded on all such as shall be declared worthy.

4.—The Committee on Premiums, and all firms or partnerships in which they may be interested, shall be excluded from competition or the award of any premium.

5.—All persons depositing articles, either for competition or exhibition, must attend to have them registered by the Clerk, at which time they will receive a certificate, which will be required of them when the articles are returned.

6.—Proof of origin must be furnished if required, for any specimen offered for Premium.

7.—Depositors will receive a ticket from the Clerk, which will admit them and Ladies during the Exhibition.

8.—Arrangements will be made to exhibit, in operation, all working models that may be deposited—contributions in this branch are invited—a competent person will take charge of all models sent for the above purpose.

9.—The morning of each day, until fifteen minutes before 10 o'clock, shall be appropriated exclusively to the Judges.

10.—Members will receive their tickets of admission by applying at the Institute Rooms, any time in the week previous to and during the exhibition.

11.—All articles offered by Apprentices, will be received, and adjudged as the production of Apprentices—they must furnish a certificate of name, age, with whom, and the time they have served as apprentices.

12.—Articles subject to injury by being handled, should be secured in glass cases—and contributors are requested to have a person to take charge during the hours of exhibition—in the intervals, efficient measures will be taken to protect property.

GENERAL COMMITTEE.

George Bruce,	John Ridley,
John M. Dodd,	Silas B. Simonson,
James J. Mapes,	Thomas F. Peers,
Thomas Ewbank,	Thomas G. Hodgkins,
Wm. Everdell,	George L. Spencer,
C. Crolius, Jr.,	Peter Wemmell,
A. J. Mason,	Richard Bragaw,
Thos. W. Bartholomew,	Ab'm Peitch,
A. Storms,	Wm. H. Hale,
Wm. Ballard,	Wm. J. Mullen,
Henry Cunningham,	James Thomson,
John Harold,	Abner Mills,
Joseph Trench,	L. D. Chapin,
James D. Phyfe,	A. Cammeyer,
John H. Mead,	Hiram Tupper,
John Conroy,	H. B. Robertson,
Jordan L. Mott,	James Thomas,
Samuel Carter,	H G. Stetson,
George F. Nesbitt,	Ferris Owen,
Henry Worrall,	N. Berry,
W. B. Worrall,	O. Whittelesey,
James B. Cummings,	M. W. Emmons,
James Frost,	J. S. Anderson.

MECHANICS' FAIR.

Notice to Mechanics, Artisans, Manu-facturers, &c.—The undersigned give notice that the first Annual FAIR of the Massachusetts Charitable Mechanics' Association will be held in the city of Boston, in September next, commencing on Monday, the 18th, and continuing at least three days.

The Association have placed at the disposal of the Board of Managers, the sum of Five Thousand Dollars, to enable them to conduct the Fair upon a liberal scale; and they hope to be able to render satisfaction to all who may feel disposed to offer articles for exhibition.

Medals or Diplomas will be awarded to the owners of all articles that may be deem-ed worthy of such distinction; and the Managers intend that the strictest impartiality and fairness shall be observed in the distribution of Premiums.

The Managers, in furtherance of the subject they have in view, invite contributions, of articles from every department of industry; of choice specimens of American ingenuity and skill; rare and valuable domestic productions, natural or artificial; the delicate and beautiful handiwork of females; useful labor-saving machines, implements of husbandry, and new models of machinery in all their varieties.

Judges will be appointed to examine all articles offered, and the managers will award a gold or silver medal, or a diploma, to all articles that may be pronounced by the judges worthy of reward.

Articles intended for exhibition, must be delivered on or before Wednesday, Septem ber 13th.

Arrangements will be made to exhibit, *in operation,* any working models that may be offered, which will render the exhibition useful and interesting, and the managers respectfully invite contributions in this branch. A careful and competent superintenden will be appointed to take chare of all models sent for this purpose.

Board of Managers.

Stephen Fairbanks,	Jos. T. Buckingham,
John Rayner,	James Clark.
William Adams,	Henry W. Dutton,
Uriel Crocker,	George Darracott,
Gardner Greenleaf,	Wm. S. Pendleton,
James L. Homer,	Charles A. Wells,
James Barry,	Henry Bailey,
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Ephraim Harrington,	Henry H. Barton,
Joseph Lewis,	Thomas Bayd,
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Thomas J. Shelton,	George G. Smith,
John G. Rogers.	

P. S. For any further information address JAMES L. HOMER, Corresponding Secretary, Boston.

Boston, March 24, 1837. m28–ts1

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with ll its enagravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

AVERY'S ROTARY STEAM ENGINES.—AGENCY.—The subscriber offers his services to gentlemen desirous of procuring Steam Engines for driving SAW-MILLS, GRAIN-MILLS, and OTHER MANUFACTORIES of any kind.

Engines only will be furnished, or accompanied with *Boilers* and the necessary *Machinery* for putting them in operation, and an Engineer always sent to put them up.

Information will be given at all times to those who desire it, either by letter or by exhibiting the engines in operation in this city.

Inquiries by letter should be very explicit and the answers shall be equally so.

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A Practical Treatise on Locomotive Engines, with Engravings, by the CHEVALIER DE PAMBOUR—150 pages large octavo—done up in paper covers so as to be sent by mail—Price $1 50. Postage for any distance *under* 100 miles, 40 cents, and 60 cts. for any distance exceeding 100 ms.

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*** On the receipt of $3, a copy of each of the above works will be forwarded by mail to any part of the United States.

DRAWING INSTRUMENTS.—E. & G. W Blunt, 154 Water-street, New-York, have received, and offer for sale, Drawing Instruments of superior quality, English, French, and German Manufacture.

They have also on hand Levels of superior quality at low prices.

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350 tons	2½ by	½,	15 ft in length,	weighing	$4\frac{63}{100}$	per ft
280 "	2 "	½,	"	"	$3\frac{59}{100}$	"
70 "	1½ "	½,	"	"	2½	"
80 "	1¼ "	¼,	"	"	$1\frac{25}{100}$	"
90 "	1 "	¼,	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

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E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, and 3¾ inches diameter.

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NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

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RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

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Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

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TO RAILROAD CONTRACTORS.

PROPOSALS will be received at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,

Engineer in Chief Hiwassee Railroad.

16—6t.

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructure s of this kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squaki hill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Catauraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOOD N BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rochester, Jan 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States. 12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,

33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames'	superior	back-strap Shovels
150	do	do	plain do
150	do	do	caststeel Shovels & Spades
150	do	do	Gold-mining Shovels
100	do	do	plated Spades
50	do	do	socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.

No. 2 Liberty street, New-York

BACKUS, AMES & CO.

No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

. The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersunk heads suitable to the holes in iron rails to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

. All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

. Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone.

The work contracted for must be finished by the 1st day of July, 1838.

Persons desirous of obtaining work are requested to apply at the office of the undersigned in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, JR.,

Chief Engineer Jas. Riv. & Ka. Co.

P. S.—The valley of James River above Richmond is healthy.

16—10t

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered — The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.— The entire length of the line of the Selma and Tennessee Railroad, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country.

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer.

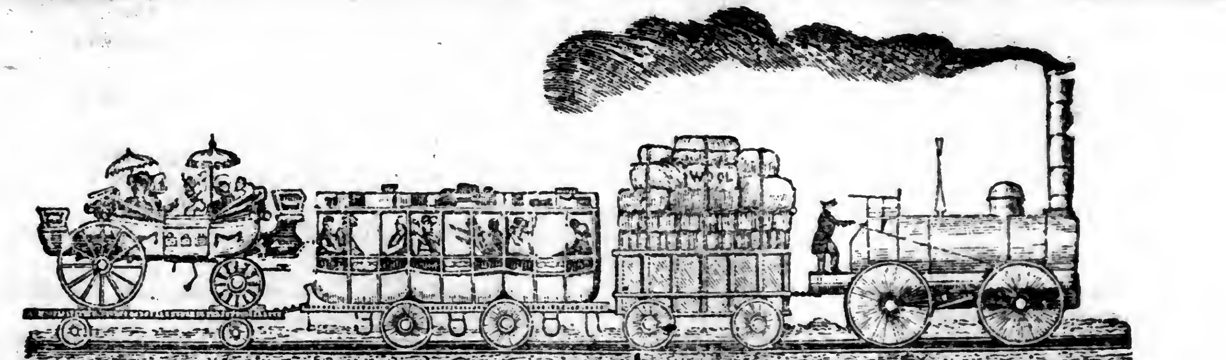
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 14 1y



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, { EDITORS AND PROPRIETORS.] SATURDAY, JULY 29, 1837. VOLUME VI—No. 30.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JULY 29, 1837.

AUBURN AND SYRACUSE RAILROAD.

The reports of Edwin F. Johnson, Esq, Chief Engineer of this road, together with a report of a committee of the Board of Directors, have been received by us, and are given at length in this number of the Journal.

Of the importance of this road, no one acquainted with that section of the country, can entertain a doubt. Diverging, as it does, from the Erie canal at Syracuse, and being a link in the great road from Albany to Buffalo, it must become an immense thoroughfare, both for business and travel—and the period is not distant when there will be a railrord from Albany to Ithaca, thus connecting at Owego with the New-York and Erie road, and becoming the great thoroughfare between the northern part of this State and the Canadas, and the coal region of Pennsylvania.

In referring to the report, we find that the freight is put down at $15,000 and the passengers and mail at $45,000 per annum; an estimate, we are confident, very far *within* the truth, as, by a careful investigation two years since by a committee, it was ascertained that the freight carried to and from the Canal at Weedsport and Auburn, exceeded 10,000 tons, which at present prices, 8 cents per hundred, exceeds $16,000,—and it can hardly be doubted that the business for other places will equal, if not *exceed*, that of Auburn. which will of course be greatly increased—by the increased facilities;—consequently the estimated receipts for transportation should be at least doubled, which would give $30,000.

The importance of this road has not been duly estimated, or it would have been *now* in successful operation.

The intention, we understand, is to complete it this fall, if the necessary funds can be procured, which we trust will be readily accomplished.

For the Railroad Journal.

TO THE DIRECTORS OF THE AUBURN AND SYRACUSE RAILROAD COMPANY.

The Committee to whom it was referred to examine and report to your Board the present situation and prospects of this Company, submit the following report.

That the Report of the Chief Engineer, Mr. E. F. Johnson, to the Board in April 1835, showing up to that time the progress of the work is hereto annexed. Mr. Johnson has furnished us with a further statement which we also annex, and to which we refer without repeating its statements or conclusions.

In estimating the probable future income of the Company allowance should be made for the rapid advance of this country in population and business. The fertile regions of the West, are rapidly filling with an enterprising population, and increasing in their business, wants and capacities. The Auburn and Syracuse Railroad forms an important link in the chain of railway communication already established, and in a train of execution, between the waters of the Atlantic and the Western Lakes; and while New-York as the commercial emporium, furnishes to the Western States bordering on the great lakes, and to the Vallies of the Ohio and Mississippi a commercial mart, the railway from Albany to Buffalo must furnish a thoroughfare for travel and freight, unequalled in advantages either to the traveller for pleasure, or to the man of business

The consequence must be, that when the whole line is completed, the amount of business done must far surpass any calculations to be made upon the facts as they have heretofore existed; and we have no hesitation in saying that taken in connection with the facilities furnished by the Erie Canal, for the transportation of heavy merchandize and produce, and running through the same great valley between the Western Lakes and the Ocean, this railway will naturally become the greatest thoroughfare between the Atlantic states and the West.

To the stockholders of the Company it will be gratifying to learn that while this road will probably cost less per mile (although a much more difficult route) than the Utica and Schenectady road, they can depend upon the following estimate of the income of this road with reasonable certainty.

From a report recently issued by the Utica and Schenectady Railroad Company, it appears that the estimated annual receipts for the conveyance of passengers and the mail upon that road amount to $340,000

The expenditure for transportation during the same time, amount to 140,000

Leaving an annual income of $200,000

The Charter of the Auburn and Syracuse Railroad Company allows the same charge per mile, viz: four cents. Assuming the receipts and expenditures upon that to correspond with the Utica and Schenectady Rail oad, the nett annual income from passengers and the mails will amount to $68,000

The Auburn and Syracuse Railroad as heretofore remarked, is a part of the same chain of communication with the Utica and Schenectady Railroad. Its position for concentrating the travel and business of the country is believed to be equal if not superior to any other position of the same line, unless the Utica and Schenectady shall be deemed to surpass it in this respect.

It is frequently observed that the travel upon the Erie Canal is much greater East of Syracuse than West, and the inference has been drawn that such must be the case upon the line of the railway. But it is believed that the long level upon the canal between Utica and Syracuse has increased the travel on that portion, and that hereafter as formerly passengers will leave the canal at Syracuse, and find themselves better accommodated on the railway.

The divergence of the Auburn and Syracuse Road from the line of the Canal, and passing as it does through a rich agricultural and manufacturing district, and terminating at Auburn, a large manufacturing town and a place of deposit for a large amount of merchandize and produce to be transported to and from the Canal, give it a great advantage in the carriage of freight. Upon the Eastern portion of the line upon the Utica and Schenectady and Utica and Syracuse Roads freight cannot be carried, and these portions of the line are consequently deprived of one great source of profit, which exists in the case of the Auburn and Syracuse Company. The latter is also favorably situated for accommodating the Northern and Southern travel, or that which takes place between the Canadas on the one hand, and the central portions of Pennsylvania, via the Susquehannah Valley on the other. It has through the Auburn and Ithaca Railroad now chartered, and the Western road and the Cayuga lake, and the Owego and Ithaca Railroad a direct communication with the New York and Erie Railroad, thus furnishing additional sources of business and consequent revenue.

By means of a branch to the village of Skaneateles, and the works of the Auburn and Owasco Canal Company, the regions bordering upon the Skaneateles and Owasco lakes are opened to the advantages of this road, and will contribute their quota to its annual business.

With these views of the subject, it is believed to be a safe estimate that the nett receipts for the carriage of passengers and the mail upon the Auburn and Syracuse Road, will certainly equal if they do not far exceed *two thirds* of the amount above stated as the corresponding receipts upon the Utica and Schenectady Road, more especially as the receipts will be annually increasing with the increased population and business of the country.

This will give an annual sum of $45,000

From our knowledge of the amounts annually paid for the transportation of merchandize and produce to and from the Canal for the town of Auburn alone, and other sources, it is believed to be a safe estimate to consider the nett receipts from the conveyance of freight equal to one third the amount derived from passengers and the mail, 15,000

The line of this road runs through inexhaustible beds of gypsum or Plaster, and there is now excavated and upon the road belonging to the Company ready for transportation, 40,000 tons of this article, estimated to be worth after deducting a cost of transportation, &c. 35,000

This article and the future transportation of it alone will furnish an almost unfailing source of profit to the company.

The above estimate gives to the company for the first year after the road shall be put in operation, the sum of $95,000 or nearly sixteen and a half per cent upon the cost of the road, supposing that to be *one third* as much as the Utica and Schenectady railroad of which it is about one third the length.

It appears by the last report of the Chief Engineer, which is annexed, that the grading and superstructure complete for a single track, will not vary much from $15,000 per mile, making a total of $393,000

his must be understood to include iron for the rails.

The expense of lands &c., amount to 70,000
Engineering and Superintendence estimated at 22,000

Making a total, exclusive of buildings and outfit for transportation of $485,000

Estimating of the cost of buildings and outfit, for transportation upon the same scale as the Utica and Schenectady railroad, and it amounts to 60,000

making the total cost of this road, including buildings and outfit, 545,000

The cost of the Utica and Schenectady railroad for the same distance will be found to be about $570,000

It is to be understood, however, that the expense of car-houses, cars and locomotives upon this road will be much less, for the reason that no permanent erections for car-houses will be made at the extremities of the road, until the same are made jointly with the Utica and Syracuse road at Syracuse, and the Auburn and Rochester road at Auburn, and that an arrangement will doubtless be made with both of these Companies, advantageous to this Company, in regard to cars and locomotives, by which the cost will be divided between these Companies.

Your Committee have examined into the condition of this road to ascertain at what period of time it can be put in operation, in the cheapest manner, and they entertain no doubt that it may be put in operation by the first day of October next, provided the Company can have the sum of $35,000 in cash, placed at their disposal immediately.

The project is to substitute oak ribbons for the iron plates for the present, and to use horse power, until iron for the rails can be obtained.

The expense of preparing the Superstructure for the use of horse power will be:

For the oak ribbons and horse track, $5000
To this add total amount for grading &c. as above 393,000
Cost of land, &c., and Engineering, &c., 92,000

490,000

Deduct cost of iron, included in the total amount of $393,000, estimated at 50,000

$440,000

Your Committee also state that a credit of one year has been obtained upon the timber, to the amount of $20,000

And your Committee believe that a credit upon some portion of the cost of land and grading as well as for the cars, and a sufficient outfit can be had for one year, to the amount of 32,000

$52,000

which will enable the Company, without embracing the Plaster in the calculation, to put the road in operation for the Capital Stock, provided $35,000 of the Stock in cash is immediately obtained and the residue of the Stock is paid up or arranged in such a manner as to meet the demands of the Company, when called upon to pay the obligations which they have incurred.

The importance of putting the road immediately in operation is forcibly urged, by the fact that the Plaster now lying upon the road bed, valued as above stated at $35,000, may thus be soon available to pay the postponed debt.

With this flattering prospect before us, your Committee hope and trust, that every effort will be made by the Company, to bring the work to a speedy close. It has hitherto progressed amid difficulties and embarassments unprecedented, but with an energy which not even the unfortunate situation of the country could depress. Your Committee feel confident, that when opened, the road will, in the great benefit conferred upon the public and upon the share owners, realize the most sanguine expectations of its friends.

All which is submitted, &c.

Auburn, July, 1837.

E. MILLER,
S. A. GOODWIN. } Committee.

REPORT.

OF E. F. JOHNSON CHIEF ENGINEER TO THE AUBURN AND SYRACUSE RAILROAD COMPANY, APRIL 1836, WITH A STATEMENT OF THE CONDITION OF THE WORK UP TO JUNE 1837.

To the President, Directors and Company of the Auburn and Syracuse Railroad.

GENTLEMEN.—In compliance with instructions, I present herewith a statement of operations in the Engineer Department of the Auburn and Syracuse railroad for the past year.

The Engineer Department of the Auburn and Syracuse railroad was organized, and surveys commenced in April 1835. The measurements, examinations, &c., preparatory to the final location, occupied the succeeding six months. On the 15th day of October 1835, proposals were received for the grading, bridges and culverts, including the labor and materials of every description necessary to complete the road bed.

In December and January, the excavation was commenced on a few of the more expensive sections, with a view of advancing the work upon them, and to avoid thereby any delay in the opening of the road, which would result from those sections not being completed in the proper time with the others.

The advantages anticipated from this course have not, in consequence of the extraordinary deep snows and severity of the past winter, been fully realized. Much work, however, has been done. The first payment to contractors was made on the first of January, since which time three successive payments have been made. The work is now rapidly progressing on most of the sections. The remainder will be commenced as soon as the Company have acquired a title to the land, which it is believed will not be long, as the legal measures for effecting that object, rendered necessary in those cases where the parties fail to effect a compromise, are in a train of execution.

It is proper to state, that the sections of the road on which the work is not now progressing, are with few exceptions, of the lighter and less expensive character, and the delay in obtaining the land will not therefore prove as serious an inconvenience as it might under different circumstances.

The contractors are efficient, business men of much experience in their profession, and well recommended upon the works where they have been engaged.

In January last, proposals were received, and contracts made, for the delivery of the timber for the railway or superstructure, sufficient to construct a single track. These contracts were made on favorable terms, and it is believed with responsible men, and no apprehensions of failure are entertained.

White cedar, and red or Norway pine, is the timber proposed to be used. The rail timbers are to be exclusively of the latter material.

The width proposed for the rail track is the same as upon the Utica and Schenectady, and Mohawk and Hudson Railroads, a greater width was deemed desirable, but as the Auburn and Syracuse road, is to be a link in the same chain with the roads mentioned, it was concluded to adopt the standard which had been established on those roads.

The timber for the railway, is to be delivered, the most of it, the coming fall, and the balance early in the season following.

The distance from the principal depot, in the Village of Auburn to the site of the contemplated depot in the Village of Syracuse, is 25.73 miles.

The total descent in that distance is 271 feet, making an average descent, supposing the inclination of the road to be uniform, of 10.54 feet per mile.

The maximum inclination of the grade line, is 30 feet per mile. This extends only 8,600 feet, or, 1⅝ miles, and occurs on the west side of the valley of the nine mile creek.

There are in the whole length of the road, 31 changes in the inclination of the grade line, to adapt it in the best manner to the shape of the ground. These changes vary from a level to the maximum above stated.

There is in general the same average descent on all portions of the line. This appears from the fact, that the grade line of the road does not depart from a line of uniform inclination, farther, on the average, than 10 feet, the maximum being precisely 24 feet.

The several consecutive inclinations, are united by vertical curves, of a large radius, to render the transition of the engines and their trains, from one to the other, as easy, and with as little resistance as possible.

The total amount of straight lines and curves is exhibited in a tabular form as follows:

	miles.	
Straight line,	15.976	
Curves to radius 10,000 feet and over,	0.379	
5,000 ft. to 10,000	2.670	
3,000 " " 5,000	2.394	
1,500 " " 3,000	3.067	
1,000 " " 1,500	1.248	9.758
Total,		25,734

Comparing this with the Utica and Schenectady Railroad, which is among the most favorable in respect to straightness, and the result is as follows:

PER CENTAGE OF STRAIGHT LINE AND CURVES.

Auburn and Syracuse Railroad.		Utica and Schenectady Railroad.
Straight line	62	74
Curved do. radius		
10,000 feet and over	2	1
5,000 to 10,000	10	15
3,000 " 5,000 ft.	9	7
1,500 " 3000 "	12	2
1,000 " 1,500 "	5	1
700 " 1,500 "		
	100	100

It appears from the above, that nearly two thirds of the whole extent of the Auburn and Syracuse Railroad is a straight line, the relative amount of straight line being 12 per cent less than upon the Utica and Schenectady road. The minimum radius of curvature on the former is 1000 feet, the curves ranging generally between 1,500 and 5,000 feet radius. In those places where the inclination of the grade line is greatest, curves of a lesser radius have been avoided.

In passing from one straight line to another, the transition, instead of being made as usual, by a single arc of a circle, has in general been effected by three or more arcs, the radii of the extreme arcs being greater than the middle or intermediate ones. This gives an approximation to the eleptic or parabolic curve.

The engine and train on entering a curve of this description, encounters the resistance caused by the change in direction gradually, being less liable to be thrown from the track, and on leaving the curve the acceleration in the motion on being released from the resistance, is likewise rendered more gradual. The method adopted in tracing the curves, rendered this arrangement perfectly feasible, and afforded a line in general better adapted to the shape of the ground.

The principal depot in Auburn is situated near the site of the State Prison. This point is favorably located for uniting with the contemplated road running west to Rochester and Buffalo.

From this depot the road is to be extended to the termination of the Auburn and Owasco canal, to accommodate the hydraulic power which will soon be created at that point.

In proceeding from Auburn easterly, the line of the road passes at the distance of 5 miles near the village of Brutus. At the distance of 8½ miles it crosses the outlet of Skaneateles lake, 4½ miles north of Skaneateles village, and 1¾ miles south of the village of Elbridge. At the distance of 15 miles from Auburn, and 10¾ miles from Syracuse, it crosses by an embankment the valley of the Nine Mile creek, at a point 3 miles north of Marcellus village.

From thence it passes along the east side of the creek, intersecting the Seneca turnpike near the village of Camillus, and thence occupying ground midway between the turnpike and the Erie canal, through the village of Geddes, to its termination on the south side of the canal in the village of Syracuse.

The difference in the distance from Auburn to Syracuse, between the Railroad and turnpike, is less than half of a mile, the turnpike being the shortest.

The ground on which the railroad is located, was selected with the greatest care, and it is confidently asserted that no other railroad can be made between the same extreme points which can compete with it on equal terms, either as it regards the cost of construction or expense of transportation.

The section of country between Auburn and Syracuse is probably as unfavorable for effecting a good location for a railroad as any equal portion of the route between Albany and Buffalo.

The streams which are numerous, all run northerly. The ridges and vallies of course lie in the same direction. The peculiar formation of the country, as it precluded the possibility of following the course of the vallies (the direction of the road being nearly east and west,) added much to the difficulty of fixing upon the best location. These difficulties it is believed have all been surmounted in a manner to afford a railroad, which when completed, will bear a favorable comparison with other portions of the line from Albany to Buffalo.

The descent upon the railroad being towards the east, at a nearly uniform rate of 10½ feet per mile, will favor the expense of transportation, the preponderance of trade being in that direction.

If locomotive steam engines of the most improved description are used, similar to the best recently constructed for the Baltimore and Ohio Railroad Company, or those manufactured in Philadelphia, a single engine will be competent to convey from Auburn to Syracuse in the space of two hours a nett load of 150 tons, and to return in the same time with a nett load of about one third that amount.

The difference between the average and maximum inclination of the railroad being but 19½ feet, will not exceed (provided a suitable reduction is made in speed on the heavier grades,) the range of the power of the best engines

This difference is no greater than upon the Utica and Schenectady Railroad, and is much less than the same difference on the Camden and Amboy, Newcastle and Frenchtown, and Providence and Boston Railroads. These roads have their extremes nearly upon the same level. The maximum difference on the first is 45 feet, on the second, 30 feet, and on the last, 37 feet per mile, the latter extending 5 miles. It is less, likewise, than the same difference on that part of the Baltimore and Ohio Railroad, between Baltimore and the Parr ridge.

The average inclination from Auburn to Syracuse is the same with what is termed the level portion of the Mohawk and Hudson Railroad, situated between the inclined planes. The greatest deviation of the grade line in the latter case, from a line of uniform inclination, is 50 feet. Upon the Auburn and Syracuse road, it does not exceed, as already stated, 24 feet.

The ground on a very considerable portion of the Auburn and Syracuse Railroad, is exceedingly well adapted for forming a firm and substantial road, being composed principally of gravel and loam, and loose shell rock, which is generally of easy excavation. On that portion of the line located upon the side hill along the valley of the Nine Mile creek, for a distance of four miles, Gypsum and Plaster of Paris is found in the excavation, in considerable quantities. Nearly all the solid rock which is required to be excavated in forming the road bed, appears thus far to be of that material. This is deemed very favorable, as the value of the Plaster, if disposed of at the usual prices, will cover the cost of its excavation.

The cost of constructing the road cannot now be correctly stated. The general rise in the value of labor, railroad iron, provisions, &c., which has taken place during the past winter, will have a tendency to enhance the expense

From the facts before me, it is probable that the cost of grading, masonry, &c., for a double track, together with that of a superstructure complete for a single track, will not exceed 12 to 15,000 dollars per mile.

It is contemplated to form the road bed in a substantial and permanent manner. Limestone is the material principally used in the various structures, and is obtained in any quantity in the vicinity of all parts of the line, of the best quality. The bridges are few in number and of very limited spans.

The total value of perishable materials used in forming the road bed, will not probably exceed for the whole road, the sum of $3,500. This, it is believed, will have an important and favorable influence in the cost of repairs.

In the location of the railroad throughout its whole extent, particular regard was had to the prospect of its becoming a portion of the great line of railway, from Albany to Buffalo, and all considerations of a minor and merely local character, were made to yield to this one paramount object. To the liberal and enlightened views of the Board of Directors in this respect, the public will hereafter be greatly indebted.

The road will be completed and may be put into operation, it is confidently believed, if no unexpected difficulties occur previous to the month of September, of next year, in time for the fall business.

Respectfully submitted,

E. F. Johnson, Chief Engineer.

Auburn, April. 1836.

Since the preceeding report was rendered, a period of fourteen months has elapsed, and the undersigned is enabled to state, that notwithstanding, the extraordinary advance in the prices of provisions, labor &c., by which the period mentioned has been distinguished, and the embarrassments under which the Company have laboured from other causes, the expense of constructing the Auburn and Syracuse Railroad will not materially exceed the limits anticipated in that report.

The road bed being now nearly completed, and the contracts for the delivery of the timber for a single track of superstructure nearly fulfilled, it may confidently be asserted, that the total cost of constructing the road, including clearing the ground, grubbing and ditching, excavation and embankment, also the masonry and timber for the various structures connected with the formation of the road bed, including stream and roadway culverts, road, farm and railway bridges, also, the superstructure complete for a single track, will not vary much from $15,000 per mile, making a total of $393,000

The expense of lands, land damages, costs of appraisements, damage to and removal of buildings and fencing, amounts as I am informed by the Agent to	70,000
Engineering and superintendence, estimated at	22,000
Making a total exclusive of buildings and outfit for transportation of	$485,000

In excavating the roadway, an amount of gypsum or Plaster of Paris estimated at 40,000 tons, has been obtained and is deposited upon the line of the road. More will probably be obtained before the grading is completed. This is considered by competent judges to be worth in the aggregate $35,000. Should this sum be carried to the credit side of the grading account, which perhaps would not be improper, seeing that it is saved from the proceeds of the excavation, the actual expense to the Company of grading, masonry and superstructure, will be reduced to $358,000, or per mile $13.770. It may be remarked that the location of the railroad is such, that the gypsum is exposed at various points in the excavations for a distance of 5 or 6 miles. In some few places the bed of the railroad is composed entirely of that material.

Of the whole amount expended in grading and masonry, nearly one half is absorbed by the four sections in the vicinity of the Nine Mile and Carpenters' creeks. The Nine Mile creek is passed by a long embankment sixty feet in height, pierced by three arches of masonry, of twenty feet chord each.

The embankment at Carpenter's Creek is twenty five feet in height and twelve hundred feet long, and is also pierced by three arches or culverts of six, eight and twenty feet chord each.

The passage of the deep valley of the Nine Mile creek constitutes the most formidable obstacle encountered upon the whole route. This obstacle was one which could not have been avoided. The most prominent and feasible of the expedients, devised for lessening the expense, consisted in the substitution of a bridge for the embankment. Had this plan been adopted, the elevation of the bridge must have been not less than about eighty feet, as the surface or grade line of the road was depressed some twenty five or thirty feet to obtain material from the banks on either side to form the embankment.

Had the plan of a bridge been adopted at this place, something might have been saved in the first cost, but from its great length and elevation there is reason to apprehend that it would always have been a terror to travellers, the average annual cost of repairs, insurance and depreciation would have far exceeded the interest upon the extra expense of a permanent structure of earth and stone, and the Company would not have derived the collateral advantage resulting from the Gypsum obtained and uncovered by the excavations.

This work is now nearly finished, the masonry is completed, and the foundations have passed unharmed the ordeal of the heavy spring floods. The embankment upon one side is completed and upon the other is now raised to within a few feet of the grade line.

Of the whole number of sections, into which the road is divided for contract, one half will be ready for a final estimate, provided there is no interruption in two to four weeks, one third in six to nine weeks, and the remainder in ten to twelve weeks.

Should it be the determination of the Company to prosecute the work to a completion the present season, it will be necessary to commence laying the superstructure without further delay. This may be done upon those sections, which are now finished, and the embankments properly settled, and prosecuted to keep pace with the working of the sections.

By adopting this course, it will be perceived that the laying of the superstructure throughout will be effected in a very short time after the last estimate for grading is rendered.

The total cost of building the road with all the necessary appendages for transportation will, it is not believed, vary materially in proportion to its length from the Utica and Schenectady road. The result thus far shows that the grading exceeds, but as other items are less, the total cost may now be estimated to correspond very nearly with that road. Had the prices of labor, &c., remained unchanged, and the Company experienced no embarrassments, the anticipations at first entertained would have been fully realizod.

Comparing the Auburn and Syracuse with the Utica and Schenectady railroad, it appears that the Capital of the latter amounts to $2,000,000

and that the Capital of the former, which amounts to only $400,000, had it been in the same proportion would have amounted to $670,000

or sixty seven and a half per cent greater than it now is.

From a statement just received, for which I am indebted to the Treasurer of the Utica and Schenectady Railroad Company, it appears that the total cost of that road charged to "construction account" (includes building and the necessary outfit for transportation of passengers,) up to the 31st May 1837, is $1,708,894

In the same proportion the expenditures upon the Auburn and Syracuse road would amount to 570,000

or $175,000 more than the Capital.

I do not believe it will be necessary to incur this expense to put the road fully in operation with locomotive steam power, particularly if such arrangements are made as I anticipate will be found both politic and practicable with the Companies East and West.

It should be remarked that the amount above quoted, as charged to "construction account" upon the Utica and Schenectady railroad, includes a portion of double track superstructure not contemplated upon the Auburn and Syracuse road.

This, however, may be considered, when viewed in reference to the relative advantages presented by the two roads for a permanent investment of capital, as counterbalanced by the greater exposure and greater amount of perishable material, which enters into the formation of the road bed of the former, (the ratio being as 6 or 7 to 1 in favour of the Auburn and Syracuse road,) which to render it equally permanent, so that the annual expense for repairs, insurance and depreciation shall be the same per mile upon each, would require, it is believed, a further investment of fixed capital over and above the amount of $1,708,894 above quoted of not less probably than $150,000.

Several circumstances may be suggested from which it might reasonably have been expected, that the Auburn and Syracuse road would have cost more than the Utica and Schenectady. Owing to the peculiar shape of the country as described in the preceding report, the average number of cubic yards per mile, of material to be excavated and removed in forming the road bed is much the greatest upon the former. The grading and mechanical work upon the former was most of it executed during the past year, when the prices of labor, provisions, &c., ranged some twenty five per cent higher than when the latter was constructed. The expense of buildings and fixtures, &c., at the termini, and other arrangements for transportation, it will be easy to understand, are necessarily greater in proportion for a short road than a long one. The relative expense also for engineering and superintendance is greater.

Although the work has not advanced as rapidly as could have been wished, upon the Auburn and Syracuse railroad, yet it has progressed steadily onward, and should no unforseen circumstances occur to prevent, will be accomplished within two years, from the period of its commencement.

No occasion has yet existed, in the execution of the work, neither is any anticipated, for varying either the original plan or design of the road, or of deviating from the line of location as the same is established and placed upon record. Every day's experience serves to confirm, that in the choice of ground for its location, and of the general plan of consruction, the best selection was made.

The mechanical structures, which are now mostly completed, are all erected in accordance with the plans and specifications as originally prepared.

Much expense has in consequence been saved in the construction, and in avoiding those controversies which invariably spring out of a deviation from, or an infringement of, the terms of a contract.

Experience thus far also has shown, that the peculiar method adopted of placing the work under contract has fully answered the end intended, preventing all interference among contractors in the execution of their jobs, and collision among labourers, and so arranging the compensation for work done as to correspond more nearly in every instance with its actual value, thus saving the Company from the payment of extravagant prices for labour, while upon the other hand the hazard of loss on the part of the contractor, resulting from error in judgment is materially lessened.

There has been, it is believed, thus far no misapplication or waste of labor. No work has been so injudiciously executed as to require to be revised or executed a second time. The material obtained from the excavations has all been, with few exceptions, profitably disposed of in forming the embankments. No failures have occurred in any of the structures, and the mechanical and other work has been executed in a superior and workmanlike manner.

For the success attending the progress of the work, both in reference to the earlier surveys, and subsequent operations, I am greatly indebted to the faithful and efficient aid derived from my two Assistants, Messrs. L. Williams and H. Lee.

It gives me pleasure also to state, that the contractors, as a body, have exhibited a commendable disposition, faithfully to fulfil the spirit as well as the letter of their contracts. This is the more praiseworthy, as they have had difficulties to contend against from the outset of a very discouraging character.

It is hoped that the embarrassments under which the company labors, resulting from the recent sudden revulsion in the credits and currency of the country, and which are experienced in an equal degree by other similar companies in the country, will not oblige them to suspend entirely their operations. A step of this description in an earlier stage of the work, would not have been so objectionable, but it cannot now be adopted, without incurring a sacrifice, which it is exceedingly desirable to avoid.

The road is now so nearly completed as to present little or no inducement to contractors in case of a suspension, to return and resume their work, but would it is feared, be generally abandoned, and a demand in consequence be made for a final settlement, which under the circumstances, could not consistently be refused. To complete the work at a future time, new contracts or arrangements must be made, incurring all the extra expense of new fixtures, tools, &c., with the higher prices which invariably attach to lighter jobs. The Company must in the mean time suffer a loss of interest on the large amount which has already been invested, and whatever might be derived from the receipts upon the road, by sooner putting it in operation. Other difficulties would also occur, alike serious in their nature, which it is perhaps unnecessary at the present time to mention.

The grading of the road being now so nearly finished, it is hoped, that no effort will be spared to complete it. The timber for the superstructure as already stated, is mostly delivered, and the remainder is on its way to the line of the road. It is not now too late with suitable means at command, to put the road in operation, in time to meet any expectations which may have been raised, by the encouragement given in the preceding report, that it would be in readiness in time to accommodate the Fall business.

Respectfully submitted,

EDWIN F. JOHNSON,
Chief Engineer,
A. and S. Railroad.

Auburn, June 1837.

COLUMBIA RAILROAD.

Amount of the following articles arrived at and cleared from Philadelphia, by the Columbia Railroad from the 1st of January, to the 30th June, inclusive.

ARRIVED EAST.

Bacon,	1,780,469	lbs.	Lumber,	736.955	ft.
Butter,	64,993	lbs.	Oil,	8,961	galls.
Cotton,	124,468	lbs.	Pork,	587	bbls.
Flour,	48.699	bbls.	*Provisions	89,318	lbs
Glass,	2,322½	bxs.	Seed,	1,685	bush.
Grain,	108.202½	bush	Sundries,	1,219.142	lbs.
Iron, Bar	1.064 389	lbs.	Tobacco,	475.146	lbs
—— Castings,	453.857	lbs.	Wheat,	10,405½	bush.
——Other kinds,	112,648	lbs.	Wool,	46.356	lbs.
Lard & Tal.	313.339	lbs.	Whiskey,	199.435	galls.
Leather,	184,833	lbs.	*Kind not specified.		

DEPARTED WEST.

Cotton,	158,867	lbs.	Iron,	290.617	lbs.
Fish,	4,605	bbls.	Merch'dize,	10,303.732	lbs.
Groceries,	7,043.868	lbs.	Plaster,	1.375	tons
Hemp,	171,296	lbs.	Wheat,	41.032	bush.
Hides,	329,032	lbs.	Wool,	173,195	lbs.

CARS CLEARED.		TOLLS RECEIVED.	
January,	987	January,	$4 707.66
February,	1,145	February,	5 783.76
March,	2,031	March,	18 507 96
April,	2,395	April,	18.103.38
May,	1,422	May,	17,320,03
June,	1,894	June,	13.387 32
Total,	9,794	Total,	77.810,11

During the same period in 1836, the arrivals and clearances were as follows :—

ARRIVED.			CLEARED.		
Bacon,	1.362.434	lbs.	Castings,	262.885	lbs.
Butter & Cheese,	66.977	lbs.	Cotton,	163,395	lbs.
Flour,	56,419	lbs.	Drugs & Dyes,	186,633	lbs.
Ginseng,	77,724	lbs.	Fish,	1,544½	bbls.
Glass,	938	bxs.	Furniture,	325,960	lbs.
Grain,	110.545	bush.	Groceries,	4,478,571	lbs.
Iron, all kinds,	2,262.062	lbs.	Hemp,	187,313	lbs.
Lard & Tal.	106,968	lbs.	Hides,	186.589	lbs.
Leather,	35,250	lbs.	Lead,	27,552	lbs.
Pork,	223	bbls.	Oil.	9.877	galls.
*Provisions,	72,349	lbs.	Paper,	179,412	lbs.
Rags	69,990	lbs.	Plaster,	5,951	tons
Seed, Corn, &c.	18,582	bush.	Rags,	191,093	lbs.
Sundries,	330,265	lbs.	Salt,	7,847	bush.
Tobacco,	1,450,719	lbs.	Sundries,	370,580	lbs.
Wool,	43,927	lbs.	Wool,	121,617	lbs.
Whiskey,	176,785	galls	Tolls received, in June, $13,181,72.		
*Kind not named.					

Pennsylvania Canal and Railroad Tolls.—Receipts for toll on the State Canals from 1st Novlast up.

to July 1st. 1837,	$274,673,17
Railroad Tolls,	160,045,02
Motive Power,	119,768,31
Total amout,	$550,487,17

ECONOMY OF MANUFACTURE.

It sometimes happens that when theoretical laws, holding good to a certain extent in practice, are carried to extremes, the result is very different from that practiced, if not entirely the reverse.

Any one who has carefully noticed the prices of various articles during the last three or four years, cannot have failed to remark several anomalies in the relations usually conceived to exist between the plenty or scarcity of money and high or low prices. It is true that some of these are only apparent, but still we are inclined to think that the test of the "extreme case" will demolish many of the commonly accepted principles of Political and Manufacturing Economy.

Our attention was drawn to this subject while reading an article in the last No. of the American Journal of Science and Arts, on the salt works of Zipaquera near Bogota, in New Granada, by J. H. Gibbon, M. D. This paper contains not a little amusing information in regard to the manufacture of salt.

We refer however to the annexed extracts, in which the writer seems to think that want of civilization and improvement counteracted the expected results. We, however, are inclined to think that results not very different might have been obtained nearer home.

The first instance related, the Company were producers, and the people consumers.

"The masses of salt are dug from the rock by means of crow bars, and in its impure native state, is bought by the people of certain districts of the country, who thus prefer it; while others will purchase it only after being purified and hardened by calcination, although the price for both kinds is now the same. The consumption of grained salt, made in pans or *calderos*, is very trifling; the salt undergoes this process of crystallization before it is calcined; and it was supposed that the ability and desire on the part of the Company to supply grained salt at a lower price would increase the consumption of it, especially in the vicinity of the works. But "ancient custom" has still more influence with these people than any arguments of special or political economy, and arrangements which are well appreciated elsewhere, have often no sort of influence upon their minds, in comparison with former prepossessions. Some years ago the price of the rough natural rock salt, in the state in which it was dug from the mountain, was suddenly reduced, the expense of cutting it out being trifling compared with that of the process of calcination. As one portion of the population gave it the preference, it was presumed the consumption of it might be augmented in other districts; but the people who had formerly purchased this kind in preference, could not understand the sudden decrease in its value, and were prejudiced to believe that the salt was "rotten," as they said, or that there was some peculiar cause not apparent to them, and therefore suspected why the reduction took place; so that the Company found it better to keep the price at the former rate—there was then no diminution in the consumption. The abstract reasonings of political economy, it appears, must have reference always to the condition and information of those among whom its principles are to be applied."

In the next the order was inverted, the people producing, and the Company consuming.

We think the padre deserved much credit for his knowledge of "political economy" and still more for his knowledge of "human nature" the study of which, by the way, is the true basis of all political economy.

"Upon one occasion there was a great demand by the company, who wished to extend their operations, for the earthen ware pots in which the salt is calcined; these are made altogether by the Indians. The gentleman who had charge of the works, in order to effect the supply, as he thought, offered double the usual price for these necessary articles; still there was a great deficiency. In this dilemma he applied to the priest of the parish to aid him with advice, and to know what plan he should pursue to obtain the required number of pots for the work. The padre, having heard the fact of the payment of an increased price for the pots, shook his head, and observed, that since the people received so much more money than formerly for their labors, they occupied their time in spending it, instead of making more pots. He advised that the price, which was originally three medios (18¾ cents.) for each pot, and had lately been increased to three reals, (37½ cents.) should be *lowered* to three quartillos, (9 cents.) The plan was tried, and the stores were soon found filled with a superabundance of earthen ware."

AN ACCOUNT OF THE HARBOR AND DOCK AT KINGSTON-UPON HULL.

Continued from p. 456.

Excavation. The excavation of the dock and lock pits commenced soon after the coffer-dams; the principal part of the material, over and above what was necessary for backing the walls and forming the quays and roads to the bridge was used to raise the adjoining low ground, and as ballast for shipping. The sides of the dock were cut to a slope of about one horizontal to one vertical, and the lock pits about one and a half horizontal to one vertical, and formed in steps, 3 feet wide, to receive the backing. The top for 4 or 5 feet below the surface, was a stiffish clay, of which a great many bricks were made for the use of the works; below this, to the bottom of the dock, was silt, or a mixture of mud and sand, evidently left by the tide, from the small shells and other extraneous matter interspersed in it; this soil becomes exceedingly firm and solid very soon after removal. Several slips occurred both in the dock and lock pits; one on the east side of the dock, near the south end, (probably caused by the old fortifications or town ditches,) was about 90 yards long, and extended back to the buildings, several of which gave way, and had to be rebuilt; some of the foundation piles near the south east corner of the dock were also forced forward. The ground was a good deal cracked in other places on this side, but further damage was prevented by shoring with timber; and the smaller slips that took place, particularly in the lock pits, were attended with no further inconvenience than the expense of their removal.—The average depth of the excavation of the dock was 19 feet, that of the lock pits 6 to 7 feet more; the quantity of excavation was about 330,000 cubic yards.

Piling of foundations. The bearing piles were chiefly of American red pine 10 inches square; the sheeting piles of Memel fir, 6 inches thick, with tongue and groove two inches square; all were driven without shoes, but the heads were in general hooped, to prevent splitting. The piling commenced in the dock wall on the east side, the first pile being driven near the south-east corner.

Pile driving. In all buildings resting on piling, it is important that the piles should be driven, so as to carry the weight of the superstructure, and also to resist the lateral pressure, which in dock walls like the present is very considerable, and in alluvial soils of a loose and yielding nature, more than ordinary strength is necessary in this direction. Such being the case, and having before him the example of the other two docks, the walls of which had both given way, Mr. Walker was particularly desirous that the piling of the Junction dock should be effectually done; and for this end, requested to have an account of the driving from time to time, and where the ground proved softer than ordinary, longer piles were used; indeed, the length and size of the piles were adapted as much as possible to the nature of the soil, varying in length from 10 to 18 feet in the dock walls, and in the locks some of them were 4 feet long.

Much irregularity prevails in pile-driving; sometimes a pile will go down at the last stroke more than it did at the third or fourth, though the fall of the ram and the density of the ground may be nearly the same, and the friction of course greater.—Hence we perceive how uncertain all theories must be which profess to ascertain the actual weight a pile will bear, by having given the weight of the ram, the fall, and the depth driven at a stroke. There can be no doubt that a great deal depends upon the state of the head and point, for when these are sound and perfect, the pile will penetrate much deeper by a given stroke, than when soft and bruised; this is well known to pile-drivers, for frequently, when the pile moves a little or none, by sawing or even paring off a little of the head, it will go down again freely: also, if the weight falls exactly in the direction of the pile, and strikes the head fairly, so that the two bodies come into actual contact in every part, the pile will go further at a blow than when the stroke is oblique and the head only partially struck by the ram.

The sheeting piles under the front of the dock walls, driven by a crab engine, with a $10\frac{1}{2}$ cwt., iron ram, the fall varying from 8 to 18 feet, or 12 feet on an average, went down, at the end, about an inch at a stroke; the bearing piles, with a 20 feet average fall, about $1\frac{3}{4}$ inch, except in particularly hard ground, where they did not go down more than half the above at a stroke. The piles of the dock walls all battered about $2\frac{1}{2}$ inches to a foot.

The bearing piles in the foundations of the locks were driven with a ram of $13\frac{1}{2}$ cwt., and the average depth per stroke, when fully driven, was about 2 inches, with a 24 feet fall. The sheet piles, driven with a ram weighing $11\frac{1}{2}$ cwt., went down $1\frac{1}{2}$ inch with a 17 feet average stroke.

There is greater regularity in the driving of piles by the *ringing* than the *crab* engine, which is attributed principally to the head and point being much less injured, in consequence of the shorter fall of the ram, and its being of wood; but as the crab has the advantage in point of economy of working, the ringing engine was but little used, and that only for the dock piling.—The bearing piles driven by it went down on an average $1\frac{1}{2}$ inch in thirty strokes, with a 6 feet fall, when fully driven; and the sheeting piles, 1 to $1\frac{1}{2}$ inch with the same fall and number of strokes. The points of all the bearing piles were very obtuse, tapering not more than 12 inches, the better to support the weight of the walls.

It is well known that in piling, the ground, particularly if soft, becomes much consolidated, the first piles driving more easily than those after; on this account it was found advisable to drive the sheeting piles first, as they then went easier and were truer than when driven after the bearing piles; and this was more particularly the case in the lock pits, in some parts of which, especially under the platforms, where a great number of piles are inserted in a small space, the ground with the piles, after they were driven, rose together several inches.

Under the dock walls there are 2,411 bearing piles, containing 18,500 cubic feet of timber, and 2,140 lineal feet of sheet piling, 12 feet long, containing 12,840 cubic feet. In the Mytongate lock there are 923 bearing piles, containing 10,126 cubic feet, and 540 lineal feet of sheeting piles, 16 feet long, (except the row next the Humber dock, which is 20 feet long,) containing together 4,440 cubic feet. In the Whitefriar-gate lock there are 906 bearing piles, containing 9,862 cubic feet, and 600 lineal feet of sheeting piles, 14 feet 6 inches long, amounting to 4,350 cubic feet.

It may be useful to know the actual weight sustained by some of these piles. The bridges are each supported by about twenty-eight 16 feet piles, and the superincumbent mass of masonry and iron being about 600 tons, there is a load of upwards of 20 tons on each pile; this is borne with settlement.

In variable ground it is not to be expected that all the piles can be equally well driven; but it may be stated, that the only yielding observed in the whole of this work, was at the projecting corners of the locks, adjoining the dock wall, where a small crack, about the thickness of a knife blade, or a little more, appeared for a few courses below the coping, caused, as it is believed, not by the sinking of the piles, but by the lateral pressure of the earth behind, on a part which from its construction is necessarily weak.

Dock walls. Plan, No. 3. We proceed now to the dock walls, in the foundations of which an arrangement of the piling somewhat different from that in previous use was adopted. A row of bearing piles having been driven outside, a wale, 12 by 6 inches, was bolted to it, and the sheet piling driven behind and spiked to this wale. The back piles having also been driven, transverse sleepers of half timber are fixed on the pile heads, and over them were laid three longitudinal planks, 12 by 4 inches. Except the main piles, the whole is of Memel timber, and well spiked together.

The space for 18 inches below the sleepers is filled up with brick rubbish, or Hessle-cliff stone, puddled in with hot lime and sand, and a similar concrete is laid at the foot of the wall, and covered with earth as an additional protection to the foundation.

The wall is of brick work, faced in part with stone, and built in mortar consisting, for the backing, of one part of unslacked blue Warmsworth or Weldon lime to three parts and a half of sharp, clean, fresh water sand, and, for the front, two parts and a half of sand; but a great part of the outside, or facing, was set in the mortar hereafter described for the stonework.

The stone facing, which extends for a height of 11 feet 9 inches from the top of the wall, is of Bramley-fall stone, in 12 inch courses, except the lowest two courses which are of Barnsley and Whitby stone, 15 inches thick; the coping is also 15 inches thick. The work is laid with one header to two stretchers, the headers being 1 foot 9 inches to 2 feet 3 inches on face, by 2 feet 9 inches to 3 feet 3 inches in bed, and the stretchers 2 feet 6 inches to 3 feet 6 inches long by 18 inches in bed, except at the corners of the dock, where they are 2 feet deep. The joints are champhered in front, the four lower courses are hammer dressed on face, and the rest neatly *bosted*. The coping, which is 4 feet wide, is secured by a 4 inch square dowel at each joint.

All the masonry, except the hollow quoins is set in mortar, composed of two parts of unslacked blue Warmsworth or Weldon lime, one part of finely ground pozzuolana, and four parts of clean, sharp, fresh water sand, tempered in a pug-mill; the mortar for the hollow quoins was composed of one part of lime from Haling near Rochester, one part of ground pozzuolana, and two parts of sand. The whole of the mortar and grout was used in the hot or caustic state

The walls, except near the church, are curved horizontally, (7 feet on the east and west sides,) a mode of construction which, giving great additional strength, is advantageous in all situations, but more particularly in soils like those of Hull docks.

Locks. Plans, Nos. 9 and 10. The locks are 120 feet long within the gates, 36 feet 6 inches wide at top, and 25 feet high above the pointing sills; the construction of the two being, with some trivial exceptions, alike, a description of one will suffice: we take the first begun, viz. that at Myton-gate.

The construction of the timber work of the foundations, is believed to be in some degree new, and appears to connect the different portions together more effectually than the ordinary mode. The piling is in rows driven at the intervals shown by the sections, with additional piles under the hollow quoins and traverse rails, the better to support the weight of the gates. Longitudinal sleepers of whole timber are laid upon the pile heads, and over them transverse sills, 12 by 6 inches, and a foot apart in the chamber, and 12 inches die square, close together, with water-tight joints, in the platform, in laying the sills of the platform, the last, which was about the middle, was made tapering, and driven down by a pile engine, whereby the joints were wedged up. These sills and sleepers are all of Memel timber, but could elm of the requisite lengths and scantlings have been procured in sufficient quantities, it would have been preferable, as spikes hold much better in it, and drive without splitting the timber. The platforms are covered with 6 inch elm planking, laid upon a bed of tarred felt, firmly spiked with close water-tight joints. The platforms of the reversed gates were done nearly in the same manner, but without felt, and the transverse sills are laid about nine inches apart, the interstices being filled up with brickwork For economy, the foundations of the bridges were not laid so low as the rest of the lock, but particular care was bestowed on the driving of the piles, which are 22 feet long, by 11 inches square. The sills generally are spiked down, but in the platforms they are secured by two dogs to each pile.

The pointing sills were not fixed till the lock was nearly completed. The principal ones are of African oak, 18 inches die square; they were sunk 1½ inch into the planking of the platform, strengthened by oak cleats abutting on the back sill, and the whole secured by jagged bolts, straps, &c. A cast iron plate, about 12 feet long by 5 inches wide, was secured to the top of each sill near the middle of the lock, to prevent injury from deeply laden vessels, and as a further security, there is a strong sill at each end of the lock, laid level with the pointing sills. The reversed pointing sills are 14 inches square, and are secured nearly in the same manner as the principal ones.

The ground was taken out to a foot below the heads of the piles, and the space filled with Hessle-cliff stone, flushed with soft mortar up to the top of the longitudinal sleepers; the intervals between the transverse sills are made up with bricks as a flooring for the inverted arch, which in the chamber of the lock is entirely brickwork, except the stone quoins at the ends. The invert consists of three separate rings of headers set in pozzuolana mortar, the work behind being laid in level courses with common mortar and well grouted: the short inverted arches between the direct and reversed hollow quoins, are chiefly of Mexborough stone, bosted on face and radiated in the joints; the facing over them is likewise of stone, as also that of the wings beyond. The work of the side walls of the lock is generally of the same character as those of the dock, except that the stones of the facing are of somewhat larger dimensions and greater depth of bed.

The hollow quoins are of Dundee stone, 5 feet 6 inches long by 3 feet 6 inches wide, and in 12 inch courses to correspond with the ashlar facing, laid header and stretcher alternately, with two cast iron hollow dowels let into the beds of each joint to unite all firmly together, and the part in which the heel-post of the gate turns well rubbed to a smooth water-tight surface. The reversed hollow quoins, so called from being intended to receive the gates in a reversed position, are of Bramley-fall stone, dressed and set in like manner, but without dowels.

The foundations of the bridge are brought solid to the proper level, and then divided by partition walls of stonework into four pits, each about 4 feet wide, to receive the ends or *tails* of the bridge when up.

Lock gates. Plan, No. 11. The lock gates are partly of English, partly of African oak, from the difficulty of procuring the former timber of the requisite curve and size.—They are framed and secured together in the usual way, with 3 inch fir planking closely jointed and caulked on one side, and 2½ inc fender planks on the other. The gates were completely fitted on shore, and having been taken apart, were reframed in the bottom.

Each gate is hung at top with a wrought iron collar in a cast iron anchor let in o the stonework; and fitted to the lower extremity of the heel-post is an iron socket, which turns on a brass pivot fixed in the platform the outer end of the gate being supported by a brass roller, 12 inches diameter by 4 inches wide, fitted with an adjusting screw revolving on a brass segment let into a cast iron one screwed down to the platform; the socket and shoe at the foot of the heel-post being of cast iron, a brass circular plate, 1¼ inch thick, is let into the bottom ... to protect the stone from injury and prevent leakage. The gangway or footpath is supported on cast iron brackets, and has a chain and stanchion fence on each side.

The machinery for working the gates, which is fixed in a cast iron box on the side of the lock, consists of a 7 inch pinion working into a spur wheel 4 feet diameter, on the axis of which is a cast iron roller, 3 feet long, and varying from 12 to 9 inches in diameter; round this a ¾ inch chain winds, and passing under a roller at the bottom of the well, and over a another similar roller in the face of the wall is secured to the gate. There is also a counterbalance weight and chain, as in the other locks.

There are two set of sluices to each gate, with three doors in each set, working on brass facings, in iron grooves, and so constructed that one set is raised whilst the other is lowered; which is done by the sluice rod connected with the screw at top having a rack upon it that turns a spur wheel working into another rack at c ed to the other sluice-rod. By the disposition and mode of adapting the sluices to the spaces between the bars, a capacious opening is obtained without weakening the gates, and one man can perform the work of two in the ordinary way, in less than half the time,—an important consideration where economy and despatch are required. The machinery ought to be completely enclosed, to prevent chips or other floating matter getting inside, for want of which, one of these racks was broken soon after the dock was opened; and there should also be a stop to keep the sluices from falling into the bottom of the lock in case of accident.

Each gate complete, it is calculated, weighs upwards of 20 tons, or each pair 40 tons; the whole weight resting on the platform, which has not, however, settled in the least, but is now as level and perfect as when first completed. This, it need hardly be observed, is a most essential point in the working of large gates that move on friction rollers at the bottom, as is also the perpendicularity of the hollow quoins. To effectually ensure the latter point, Mr. Walker judged it expedient to have all the hollow quoins securely landtied; this was done by putting a 6 inch landing, or flag, about 12 feet long by 8 or 10 feet deep, vertically behind the walls at the hollow quoins, with three 2 inch tie rods, let through and secured to the flag by means of nuts and screws and a wrought iron plate extending its whole length, the other ends of the rods taking hold of the anchor and being cramped into the stonework. Three similar tie rods are secured in like manner to the landing on the reverse side, having a connecting ring at the outer end by which they are united to a single tie extending to a row of piling about fifty feet from the side of the lock, like that for securing the mooring rings in the dock walls but with shorter piles.

Reversing gates. The reverse hollow quoins and pointing sills, alluded to above, are for facilitating the repairing of the lock when necessary; in which case the gates will be removed into these quoins, so that the water may be pumped out of the lock for the repairs, without interrupting the business of the docks. This plan was first adopted by Mr. Walker at the Commercial Docks in London, where the gates were lifted by barges, and removed in a vertical position into the reverse quoins, and were ready for emptying the lock in one tide. The arrangement is simple, and attended with but little extra expense,—points that cannot fail to recommend its adoption.

Bridges. The bridges over the locks are on the balance or lifting principle, and consist of eight cast iron ribs, 9 inches deep at the centre or meeting by 1½ inch thick in the plain part, and 2 to 3 inches at the edges, connected together by two sets of cast iron crosses to each half or leaf, the lowest being close to the abutement, by hollow pipes and bolts nearer the middle, and by the meeting plates, which fit together with a tongue and groove. When the bridge is down, the under side or soffit of the ribs forms an arch of 36 feet 6 inches span, and 3 feet 6 inches rise, resting on cast iron abutment plates fixed in the masonry at the sides. From near the axis, the ribs curve down below the fixed part of the bridge, and terminate in boxes filled with kentledge, by way of counterbalance, each box being attached to two ribs. The axis on which the bridge turns is 9 inches square, with five turned bearings working in plummer blocks bedded on the stonework, the centre being 5 feet 3 inches from the side of the lock. The fixed part of the bridge is supported by iron joists resting on the division walls of the pits above described. The roadway is formed very much as in the bridge over the Old dock lock.

The bridge is lifted by means of four crabs, two on each side; the handle is applied to a 6 inch pinion, which works into a spur wheel, 4 feet diameter, having on its axis a 12 inch pinion, which works into a toothed segment, 5 feet 9 inches radius, fixed to the outer rib of the bridge.

When the bridge was nearly finished, it was found that a variable counterbalance weight was necessary in addition to the kentledge, to render it nearly on a equipoise in all positions; this is effected by hooking to the tail two chains, which passing over pulleys fixed in the stone work at the back, and from thence over two other pulleys on the dock wall, are attached to a chain, composed of heavy flexible links, hanging into the bridge pit; when the bridge is up, the chain is just clear of the bottom, and assists by its gravity to draw it down, and as the bridge descends and less balance is required, the weight of the chain, by falling on the bottom is reduced accordingly, till the kentlidge alone acts. In raising the bridge, exactly the reverse of this takes place. The weight of each bridge is about 100 tons; one half or leaf is usually opened or shut by three men in half a minute, but in an emergency two can do the work.

In comparing the balance with the swivel bridge, it may be observed that the former will work longer without adjustment, and is also stronger, from bearing more firmly upon its abutments; but it is more affected by the wind, the original cost is greater, and double the number of men are required to work it.

The bridges and lock gates were constructed by Messrs. Hunter and English, Millwrights, of Bow, London, who deserve credit for the complete and workmanlike manner in which they executed their contract; the ironwork was cast at Alfreton, Derbyshire.

Quays. The part of the backing for a width of a yard next the dock and lock walls is composed of the best clay or loamy earth, well rammed, so as to be water-tight, and the top of the quay afterwards levelled and trimmed, with a declination of ¾ inch in a yard from the side of the dock covered for a foot in thickness with Hessle cliff stone and shingle gravel, and having a paved channel towards the outside, with proper grates for the rain water. The quay is nearly level with the streets, on the east side of the dock, but six or seven feet above them on the west side, where it is supported for a considerable distance by a retaining wall.

There is a post and chain fence round the dock, about 15 feet from the side, and a railway is laid outside the east quay, within 5 feet of the foot-path, to connect the railways of the Old and Humber dock, as already noticed.

Moorings. Plan, No. 8. On the east side of the dock, at intervals of about twenty yards, there are wrought iron mooring rings, fixed in front of the wall underneath the coping, and coupled to a wrought iron tie rod, the outer end of which is secured to a waling, behind a row of piling driven at some distance back. The ring is prevented from being lifted, by a wrought iron vertical plate sunk in and secured to the stonework by means of three dove tailed screw bolts, let into the wall. This plate being convex, and projecting a little from the wall, at the same time answers in some measure the purpose of a fender. The rings make very durable and excellent moorings, and have besides the advantage of keeping the quays clear of ropes and chains, which are always an annoyance to business.

The moorings for the other parts of this dock, in consequence of the Company having had timber on hand, are oak posts, about 18 feet long, and 15 to 18 inches in diameter near the top, fixed about 12 feet from the side of the dock, and secured by two Memel land ties, 9 by 6 inches, about 30 feet long, and diverging outwards, like the letter V, so as to be about 10 yards apart at the outer end, where they are bolted to a sill behind piling, nearly in the same manner as the ring moorings. The timber underground is all *charred*, for preservation. The moorings to the locks are either of small cannon or of Bramley-fall stone, 2 feet diameter, and are 3 feet 6 inches high.

Buoys. There are six buoys for warping and mooring vessels in the lock; they are 6 feet 6 inches square, by 4 feet 6 inches deep, made solid of Memel logs, with a casing of 3 inch fir planking spiked on tarred woollen felt, and the joints caulked. The ring is secured to a wrought iron bolt driven through the centre of the buoy; underneath hang a shackle and chain yards long, the lower end of which is fastened to strong timber framing bolted to four piles, 20 feet long, driven below the bottom of the lock.

Sewers. There are two main sewers for draining the quays and some parts of the town adjacent; that on the east side of the dock is 9 feet below the coping, and extends from Whitefriar-gate to Myton-gate, where it joins the Humber dock sewer. The other commences at the west side of Whitefriar-gate bridge, and joins the town sewers near the Dock Company's workshops on the west side of this dock; its bottom is 12 to 13 feet below the dock coping.

The sewers for draining the bridge pits are 2 feet wide by 3 feet high in the middle; the pits on the east side being 2 or 3 feet below the bottom of the sewer, the water has to be pumped out occasionally; but on the west side, the drainage by the new sewer is effectual.

A scouring sluice near Postern gate cleanses the sewer on the east side of the dock, and another near St. John's church, that on the west. These sluices are both alike, and of cast iron, 3 feet 3 inches wide by 3 feet high inside, sliding in a cast iron groove in the face of the dock wall, and worked by a screw: their bottoms are 9 feet below the coping, and there is an oak frame with folding doors on the outside to protect the sluices, which communicate with the main sewers by a culvert, 3 feet square. The sewer at Postern gate is provided with two of these sluices, by opening one and shutting the other of which, the scour is to the north or south as may be required.

The sluice at the east end of St. John's Church was built at the expense of the commissioners under the Myton Improvement Act; the water, after passing along part of the Company's sewer, cleanses several others in Myton, and proceeding still further westward, discharges itself into the Humber at the general outfall in Lime-kiln Creek.

Water pipes. The pipes for supplying the town with water, which formerly were across the site of Whitefriar-gate lock were removed while the works were in progress, and laid across the coffer-dam, as noticed before. In building the lock, a cavity 2 feet 9 inches wide by 15 inches deep, was formed in the face of the stonework, across the bottom and up the sides to the level of high water of neap tides, and in this cavity two 8 inch cast iron pipes were laid, and secured to the stonework by a flanch cramped down at each joint; the space round was then filled in solid with brickwork, and covered with cast iron plates, bolted to the masonry. There are two bonnet pipes at the middle of the invert, made a little deeper than the rest, to contain any sediment that may remain, and so formed that the top can be taken off and the pipe cleansed by means of the diving bell; but to prevent any great accumulation, there is a small chain inside the pipes, by drawing which backwards and forwards it is supposed the sediment will be disturbed, and carried away by the force of the water. From the level of high water of neap tides, the pipes are built inside the wall, and carried up in a slanting direction to the height of the under side of the coping, near which they are joined by the regular mains leading from the water works into the town. Before these pipes were used, they were proved by means of the force-pump of a fire-engine, to a pressure of upwards of 200 feet of water.

Gas-pipes. About the end of 1828, the Hull Oil Gas Company requested permission to lay a gas pipe under each of the Junction dock locks; this was granted them on certain conditions, and the Dock Company also resolved to lay two pipes in each place at their own expense, in order to prevent the possibility of a monoply, and so at all times secure to the town and its environs a supply of gas at a reasonable rate: as the locks were at this time nearly completed, the work was attended with some difficulty, and much greater expense than if it had been done at an earlier period.

The provision made at the two locks was nearly the same; we shall describe that at Whitefriar-gate. In the first place, there was sunk, on each side at the north end of the lock, a shaft or well 30 feet deep, *steined* with brickwork, at the bottom of which an aperture was made under the foundation of the walls to receive the pipes; a trench was then cut across the bottom, and two rows of piles, 9 feet asunder, driven down 4 feet below the dock sills; transverse cap sills were next bolted on the pile heads, and blocking sills firmly spiked to them, on which 10 inch pipes in 9 feet lengths, with spigot and faucit joints, were, after being proved, laid with a declivity of 12 inches from side to side, to allow the sediment from the gas to run to tar cisterns provided at the bottom of the wells; the cisterns that belong to the Dock Company being on one side, and the Gas Company's on the other. In order to guard the pipes from injury, two longitudinal sills, 9 inches wide by 17 inches deep, and extending from wall to wall, were fixed, one on each side, on the transverse sills, and brickwork laid in the foundations as high as the under side of the pipes, which were then surrounded with a 4½ inch brick ring set in Parker's cement, and the rest built up with brickwork to the under side of the longitudinal sleepers, which were connected together at top by cross ties. The whole was afterwards covered with earth to the level of the dock bottom, the openings under the walls closely bricked up, and the well coped and covered with oak planking. The tar cisterns were laid on large 6 inch flags, and had short pipes at the side and top to unite with the horizontal and vertical gas pipes; these pipes not having yet been wanted, are still unconnected with the street pipes, but this can soon be done when required.

Breach in coffer-dam. It has been before observed that a preventer dam was made across the Myton gate lock pit; for further security, as soon as the south gates were hung, they were ordered to be securely braced, to prevent any irruption of water from the Humber into the new dock. The coffer-dam at the Whitefriar-gate lock being less extensive, was considered safer and it was at first thought the bracing of the gates might be dispensed with, but the contractor having prematurely begun to remove the temporary bridge, with a view which he thought to expedite the completion of the work, the coffer dam being connected therewith was placed in jeopardy, and it became necessary that these gates should also be securely braced. This precaution was soon found to be of the utmost advantage both to the work and for the safety of the shipping.

The following spring tides, in the morning of 21st March, 1829, there appeared a small leakage under the east end of the coffer-dam, which it was attempted to stop by treading in a quantity of tempered clay, but without success, as the leak still continued, and in three hours there were several feet of water between the dam and the lock gates; the leakage then increased very rapidly, and filled the above space so fast, that for the safety of the gates, it was thought advisable to draw the sluices and let the water flow into the dock: about the same time the sluices of the Old dock gates were also opened, to lower the water in that dock, then about 19 feet deep on the lock sills, in order to reduce the pressure upon the Junction dock gates; but the breach under the dam soon after became so extensive as to undermine the Old dock wall, and in the course of the forenoon a length of about 60 feet of it fell down. This in some measure stopped the leak, and the water rose more slowly afterwards; but the succeeding tide it was nearly on the same level in the Old and Junction docks.

Happening as it did, near the conclusion of a great work that had been so far successfully carried on, this accident is to be regretted, and the more, as it might certainly have been avoided by deferring the removal of the temporary bridge a week or two longer, when the works would have been in such a state as to have allowed the dock to be filled with water in the regular way; yet the damage might have been infinitely greater, had not the Junction dock gates been closed and secured previously to the accident; it was this, indeed, that prevented the dam from being blown up together, in which case, from the tremendous rush of water through the lock, the consequences to this part of the work would in all probability have been most disastrous, while the shipping in the Old dock near the dam must inevitably have been swept with violence into the lock, and most serious damage been the result.

On being apprised of this accident, Mr. Walker repaired to Hull without loss of time, and finding the works so far advanced that they might be completed with the diving bell, advised the immediate removal of both coffer-dams and temporary bridge, and that the materials left in the bottom of the dock and locks should be taken out by the bell at the same time. He also recommended that the Old dock wall should be rebuilt upon piles, about 11 feet below the top of the wall, having a row of close piling with a substantial wale in the front well land-tied, with cross sleepers and planks over all; this was accordingly done, and a stone string course laid on the front piling, upon which the brick wall was erected in the course of three or four weeks.

Removal of temporary works. In removing the temporary bridges and coffer-dams, the piles were principally drawn by one engine crabs, with double blocks and chains, and so firmly did they hold, that some of them required sixteen men with four crabs to move them, but in general half this power was sufficient; after the piles were started, one crab with four men (assisted by the bouyancy of the water) accomplished the business. The power applied to some of these piles was not less than from fifteen to twenty tons. There being occasion in the course of the work to draw several of the sheeting piles in the Whitefriar gate lock pit, a 4 inch screw was used, and one of the piles, 14 feet long by 12 inches wide, required, on the most moderate calculation, a power of 18 tons to draw it, the soil being nearly a pure sand; another pile could not be drawn by even a greater force, until a hole was dug round it, but the others, being in softer ground, moved more easily. In examining the sheeting piles when drawn, we found the points (none of which were shod) generally in a good state, a few, which were driven into a sheer black sand, bruised a little, and some of the grooves, originally 2 inches wide, increased to 3 inches, from having been forced outwards by the tongue in the hard soil.

After the dam and bridge piles were all drawn, and the part of the puddle above water removed, the remainder of the puddle and the earth at the foot of the dams were taken up by the dredging machines.

Dock opened. The dock was publicly opened on the 1st of June, 1829, being little more than two years and a half from the commencement of the work.

Mortar and lime. The Warmsworth having been represented as a good water lime, the work was begun with mortar made from it and sand only; but from the bad state of similar mortar in the Humber dock walls, when taken down, and from some experiments, the lime appeared not to answer the description given of it, and Mr Walker recommended the front of the dock and lock walls, to be set in pozzuolana mortar, which was accordingly done. At this time the greater part of the east wall of the dock, and a part on the south side of St. John's Church, were as high as the under side of the stonework, and it was observed that, notwithstanding the thickness and the solidity of the walls, the water in very wet weather found its way through, so that they were exceedingly damp even in front, and in several places the water literally ran down the face of them; this was ascribed to the mortar and grout not hardening sufficiently, as in all cases where the front was set in pozzuolana mortar, although the walls were a little damp in places, the water never penetrated through.

It may be proper in this place to state very briefly the result of some experiments on various kinds of mortar, which were made by the writer at Mr. Walker's request. The specimens were in small flat cakes, dried for a few days before being put in'o water. With respect to the quality of the line, but little difference was found between the Warmsworth, the Weldon, and Fairburne; none of them mixed only with sand ever hardening in water, but on the contrary, dissolving quite in the cours of a few weeks. Experimen s were also made with these limes mixed with sand and pounded bricks or brick dust; with sand and *minion*, or pounded iron scales; and with sand, pounded scales, and bricks, in various proportions; but none of these different compositions showed any tendency to become hard in water, and were inde d little be ter than lime and sand only. Several specimens made with the same kinds of lime mixed with sand and pozzuolana in various proportions, were then tried, and it was found that one of lime, one of pozzu olana, and two of sand, made an excellent mortar, either in or out of water; but, for economy, a mortar composed of two of lime, one of pozzuolana, and four of sand, was afterwards adopted, which, although it did not indurate quite so soon, retained its hardness in the water, and was but very little inferior to the former. Some experiments were also made with mortar of Halling lime and sand only, which, though superior to that made with the Warmsworth or Weldon lime, was by no means to be compared with the pozzuolana mortar, and as the expense was nearly the same, there was no hesitation in giving the latter the preference.

Stone. A few words descriptive of the stone used may not be improper The Bramley-fall, got from an extensive quarry on the side of the Leeds and Liverpool canal, about four miles west of Leeds, is a coarse sand-stone. or mill-stone grit, of an excellent quality, and in durability as building stone in all situations, perhaps inferior to none in this country except granite Kirk-stall Abbey, which is near seven centuries old, is built of it, and although the building is now a ruin, the stone generally is very perfect and entire. The Old bridge of Leeds is built of a similar stone; this structure has been twice widened, but the original part is very ancient, and still in a good sta e of preservation; as are also some of the locks on the Aire and Calder Navigation, which have been erected more than fifty years. The Barnsley and Whitby are both fine sand-stones; the former a sharp grit, much in use for grind-stones: they are generally used in their immediate neighborhoods for building in water and otherwise, and some beds of each are very durable; but they are both much inferior in this respect to Bramley-fall. The Dundee stone used in the hollow quoins is a fine grained close stone, very hard and durable, though on account of its laminated structure, improper for coping, and if quarried a little before or during winter time, liable to be rent by the frost. There were several other kinds of stone brought on the ground, particularly the Mexborough, but being of inferior quality, they were only used in the inverted arches of the locks and other parts constantly under water. Whilst upon this subject, it may be proper to observe, that by fronting the walls with stone above high water of neap tides, they have been rendered exceedingly durable as compared with a brick facing, without materially adding to the expense.

Lockage. The passage of a ship through the lock, including the opening and shutting of the bridge, usually occupies about five minutes, but frequently little more than half that time; six to eight heavy laden ships, besides small craft, have passed through Whitefriar-gate lock in an hour, proper time being also allowed for the passengers and trafic over the bridge, which is sure very great.

In stating the waste of water, or leakage, it should be noticed that there are seven scouring sluices besides the eight sluices of the entrance lock gates. From a series of observations made on Sundays, when there is no waste by locking, the leakage of the three docks is about three quarters of an inch per hour in spring tides, and half an inch in neaps.

Mud. The accumulation of mud in the Junction Dock has hitherto been very little, certainly not more than at the rate of an inch a year; so that the total quantity of mud in the three docks now, is not so great as in the two docks heretofore; and as the steam dredger has now a ready communication with the different docks, it performs the whole work, the horse machine having been altogether dispensed with since 1829.

State of walls. Having before described the state of the mortar in the Old and Humber dock walls, I shall here give a very brief description of that in the Junction dock. The common front mortar, especially that used late in autumn, all suffered more or less injury from frost; and no part of it, so far as there has been opportunity of examining, has hitherto, where

SECTION C. D. PLATE 20.

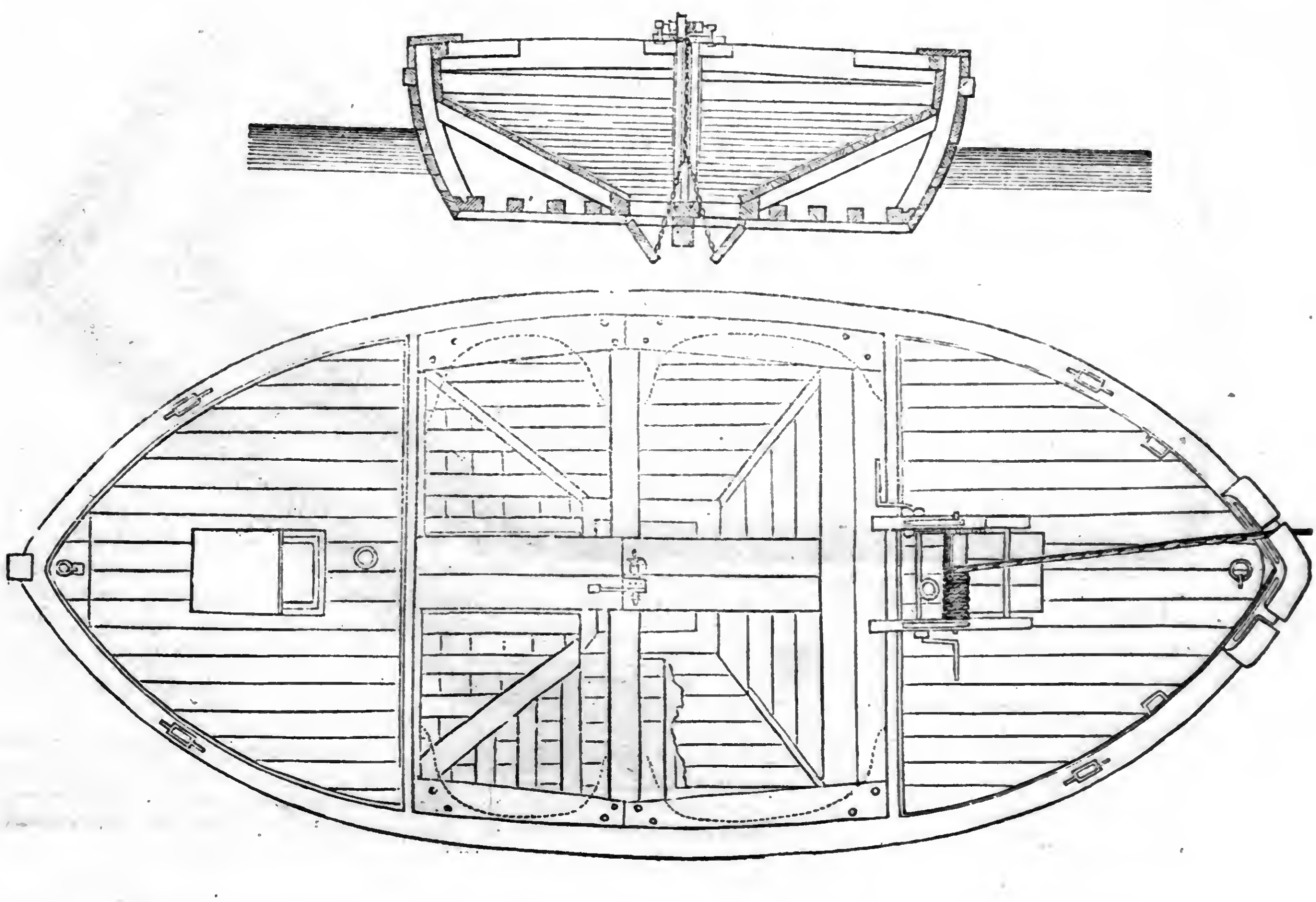
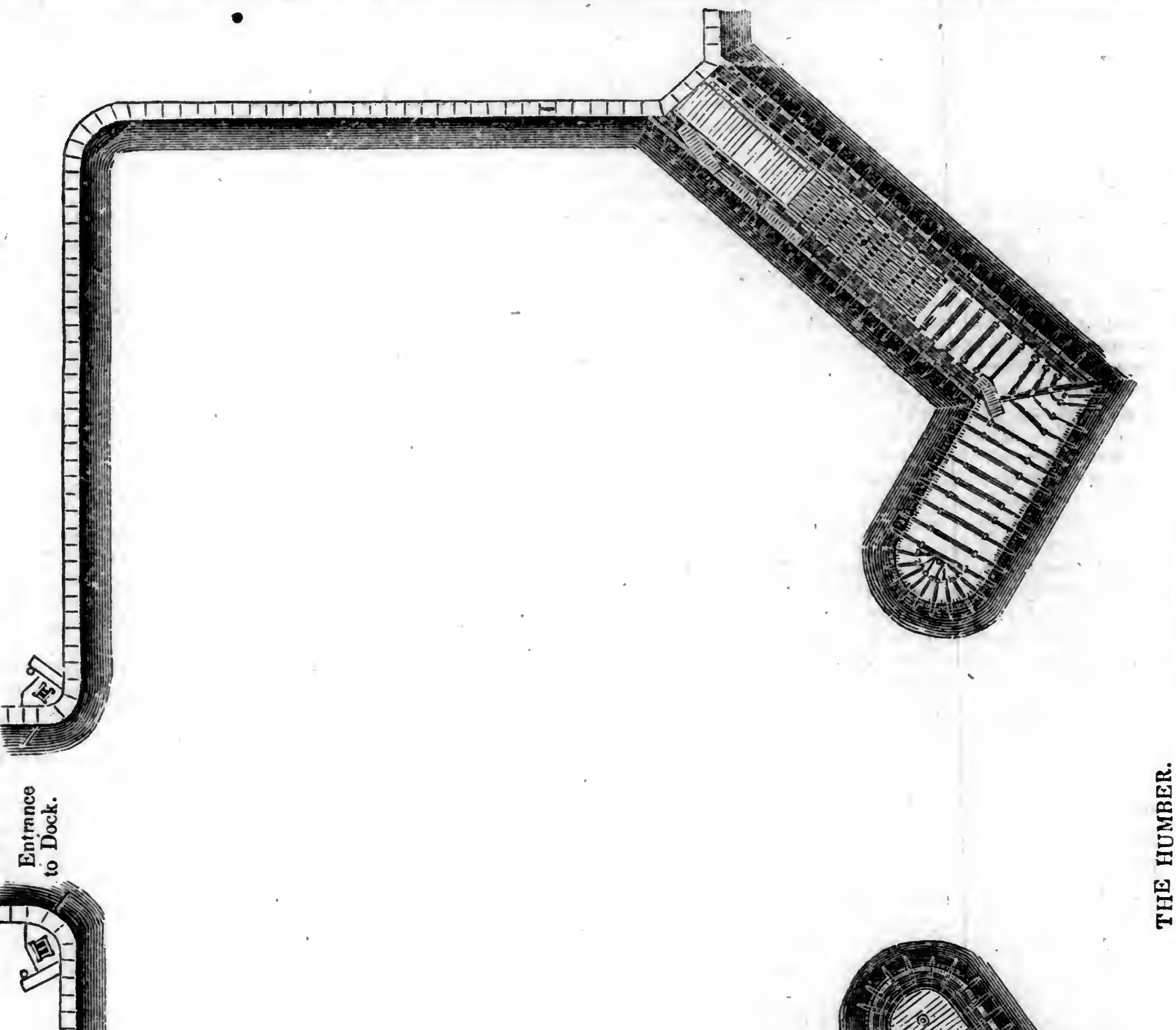


Plate 21.

HULL DOCKS, BASIN OF HUMBER DOCK.



List of Subscribers to the Railroad Journal that have paid — Continue

A. A Goodriff, Oxford, Mass,	July 1, 1838
Col. Jn. Gadson, Charleston, S. C.	Jan 1, 183
J S Beebee, Ithica, N Y.,	Aug. 1, 1837
J M Barbour, Bertrand, Mich.,	July 1, 1838
Fitzhugh Coyle, Cumberland, Md.,	" "
J B. Arnnib'e, Boston, Mass,	Jan. 1, 1838
J E. Adams, East Brookfield, Mass,	July 1, 1388
J F. Hillyer, Athens, Geo.,	Jan. 1, 1838

Agriculture, &c.

Dr. H. Perrine.—We have again the pleasure of receiving a letter, from Dr. Perrine; it is accompanied by a circular and resolutions of the Agricultural Society, and Legislature of Louisiana, approbatory of his untiring efforts, in the cause to which he has for many years devoted himself, which we lay before our readers, in the hope that we shall thereby aid him in his efforts.

We ask for the subject, the favorable consideration of the members of the ensuing Congress.

To the Editors of the New-York Farmer.

Key West, Tropical Florida, 28th June, 1837.

Dear Sir.—I left New-Orleans on the 5th inst., reached Havana on the 11th, left that Paradisical site on the 5th, and arrived at this calumniated Island, on the 17th, with all the seeds and vegetable products brought by me, from Campeche. I intended to proceed directly to the vicinity of Cape Florida, in order to sow and plant a preparatory nursery; but the news of the recent treachery of the savage Seminoles, detained me here, and their hostile appearance all along the coast, from Cape Sable to Cape Canaveral, renders it impossible to effect a location, so long as our government continues to leave Tropical Florida in an entirely unprotected condition The sub soil of this Island, appears to be composed of solid limestones, and its soil of calcareous powder, colored by vegetable mould. Clay and sand, even for masonry, I am told, has to be imported. and yet the surface of the Key is covered with a vigorous growth of woods, embracing various valuable to.e.t trees The celebrated Habi, or Campeache Teak—a specie of Piscidia, valued more highly in Yucatan, for the construction of vessels, than even the live Oak of the United States, was one of the first which agreeably excited my surprise. But I will enter into details at another opportunity. The principal object of my present address is to transmit you a copy of a circular from the President of the Agricultural Society, to the Agricultural Societies of such Southern States as have one organized, and to the Governors of the remainder, which I beg you will publish in your next number. During a correspondence of several years from Campeche, and during my recent visit of several months to New-Orleans, the Ex-Governor Roman, has had an ample opportunity of appreciating the value of my suggestions, and of my services, and I respectfully hope that all patriotic vegeculturalists, will confide in his testimony, and imitate his example, by contributing their sympathy and their assistance towards an enterprise, to which, unaided and alone, I have sacrificed the last ten years of my life. Very respectfully, your

ob't serv't, Henry Perrine.

TROPICAL PLANTS.

We are pleased to find that Dr. Perrine, late Consul to Campeche, has found able advocates of his praiseworthy efforts to acclimate tropical plants in Florida, in the Legislature and Agricultural Society of Louisiana. The following circular. to other Agricultural Societies, and resolutions passed by the Legislature, should meet with a hearty concurrence in every State in the Union.—[Ed. N. Y. Farmer.]

New-Orleans, June 1, 1837.

Sir—I respectfully invite your attention to the following resolution of the Agricultural Society, over which I have the honor to preside, and also to the appended resolution of the Legislature of this State, which were presented by a director of the Society.—The preamble to the resolutions of the Legislature expresses our motives for thus endeavoring to facilitate the persevering enterprise of Dr. H. Perrine; and I may add, that my personal knowledge of himself and services, induces me to hope that the Agricultural Society and the Legislature of your State may render him some assistance, at least towards the passage of the Bill alluded to, during the ensuing season of Congress.

Very respectfully,

Your obt. servant,

A. B. Roman,

Prest. Ag. Soc. Louisiana.

"Resolved. That the President of the Board be, and he is hereby authorised, to make such arrangements, as he may deem proper, with Mr. Perrine, for the publication, at the expense of the Society, of such part of his writings as may promote the interests of Agriculture; and to procure from Havana, and other parts, through Mr. Perrien, such plants as in his opinion may be acclimated here."

The foregoing is a true copy from the journal of proceedings of the Agricultural Society of Louisiana, at its meeting of the 7th of March, 1837. New Orleans 27th of May, 1837.

(Signed) Eug. Rousseau,

Sec. Ag. Soc., Louisiana.

—

(No 96.) Resolution. Whereas, in obedience to the Treasury Circular, of the 6th Sept. 1827, Dr. H Perrine, late American Consul at Campeche, has been distinguished by his persevering exertions to introduce tropical plants in the United States; and whereas, the Committee of Agriculture in Congress, on the 22d of April, 1832, did report a Bill to encourage the introduction and promote the culture of tropical plants in the United States, by conveying conditionally, to said Perrine, and his associates, a Township of Land in Southern Florida; and whereas the gradual acclimation of tropical plants in all the Southern and Southwestern States, may be better accomplished by their immediate domestication in the tropical district of Florida.

Sec. 1. Be it therefore resolved, by the Senate and House of Representatives, of the State of Louisiana, in General Assembly convened, that our Senators be instructed, and our representatives requested, to procure the passage of said Bill into a Law, under such conditions as may best comport with the public good.

Sec. 2 And be it further resolved, that the Governer be instructed to forward a copy of this resolution, to each of our Senators and Representatives in Congress.

(Signed) Alcee Labranche,

Speaker of the House of Represen'atives.

(Signed) C. Derbigney,

President of the Senate,

Approved, March 11th, 1837.

(Signed) E. D. White.

Governor of the State of Louisiana.

This being about the proper time for sowing Turnips, we ask for the following article, particular attention.

From the Genesee Farmer.

THE TURNIP CULTURE.

All Brittish writers agree, that the introduction of the turnip culture into Great Britain, which is of comparative recent date, has contributed more than any other improvement in rural economy to the advancement of agriculture. This culture is of very recent introduction here, and indeed may be said hardly yet to have obtained a footing among us. Yet from the limited experiments which have been made, and from the rapid extension of the culture within the last two years, we have reason to believe our climate and soil are well adapted to the growth of this root; and that although it requires some extra labor to secure the crop for winter and spring use, it may nevertheless be cultivated here to great advantage.

The benefits that result to the farmer from the culture of turnips, as a field crop, are three-fold, viz. 1. They serve to ameliorate the soil, and are excellent as a green crop, to alternate with grain and grass. 2. They afford the most animal food, at a given expense, on a specific measure of land. And .3 They return the greatest quantity of manure to the soil. The turnip like the clover and root crops generally, not only exhaust the soil least, but make up for this exhaustion, in a measure, by dividing and pulverizing the soil, and freeing it from weeds. Although 20 tons an acre may be deemed a fair average crop, the product has in many cases been carried beyond 60 tons. They come in use at a season when succulent food is most in demand; they are eaten by all kinds of farm stock, and constitute, in Britain, the principal material for winter fattening beef and mutton. It will be seen in our March number, that turnip feed is estimated to add one quarter to the dung of the cattle yard. These considerations induce us to add to the facts we have already published, in regard to the turnip culture, such others as may tend to increase their growth among us.

Soil.—The *soil best adapted to turnips* is of a dry bottomed, free nature, of some depth and fertility; but, although distinctively termed "turnip land," it yet comprises every species of earth which can be profitably used for any arable purpose, provided it be light, dry and friable: consequently exclusive of heavy clays. It must, however, be understood, that although the common root can be grown on the poorest sands and gravels, yet there are some species which require stronger soils—even rich free loams; and they all demand very careful culture, with an abundant supply of manure. The plant delights in a "cool, temperate and moist climate," and therefore will thrive best in the northern section of the union and in elevated districts.

Species—Although the varieties are numerous, the British writers class them under the heads of white and yellow species, and Swedish. The latter has gained a decided preference, on account of its superior richness and long keeping property. Yet, as affording earlier feed, and as enabling them to preserve the Swedes till late winter and spring, the extensive turnip growers in Europe generally cultivates also the white and yellow. The white turnips,—the white globe is preferred—are fed first; the yellow which are richer, and keep longer than the white, particularly the Aberdeen yellow, are fed next, and the ruta baga last. The roots of the Swedish are at least one third heavier than the other species, and their tops are so much more palatable, that cattle after being fed upon them, will not eat the common kinds, unless impelled by hunger. They are besides more hardy—a large quantity having stood the severe winter of 1835–6, in the open ground, without material injury; though it should be mentioned that they were sown very late, and had not attained their natural growth. They differ in another respect from most other roots—the larger they grow, the greater is their specific weight and nutritive properties. We will add another remark—there varieties of the ruta baga differing greatly in excellence. The true sort has yellowish flesh, a globular shape, and is without a stem, but it is apt to degenerate by the flesh becoming white or by the crown running up into a stem of more or less length. None but the true kind should be employed for seed. Besides, the species requires a richer soil than will grow the other kinds.

SEED AND SOWING.—The time of sowing should vary according to the kind and climate. It has been suggested, that if the white and yellow were sown in April or May, as in Britain, they would afford fattening materials for cattle and sheep in September and October. We do not know that the experiment has been tried, but we doubt its success, on account of the heats of our summer being unfavorable to their growth. From several years experience with all the kinds, we recommend for this latitude, from the 20th June to the 1st July for the ruta baga; from the 5th to the 15th July for the yellows and globe, and from the 20th to 30th July for the flat red and green top; the first of these periods for cold soils, and elevated districts and the latter for warmer situations. For table use, where large size is an objection, the Swedes may be sown in the early part of July and the flat kinds early in August. Half a pound of good seed will give plants enough for an acre, put in with a drill barrow; yet as many seeds will not vegetate, and as the plants are liable to be destroyed by the fly, we generally allow a pound of seed to the acre, and some give double this quantity. The seed should be full bodied and black, the green and yellow often proving abortive.

CULTURE.—The drill culture is decidedly best for the Swedes, and for the other large varieties, on account of the greater facility of cleaning and stirring the ground with the cultivator among them. The British writers recommend ploughing directly after harvest of the preceding year. This would be a waste of labor and of ground here. Early southern clover may be cut in time, to put in even the Swedes here, and our small grain is off the field here generally in time to sow the white and yellow as a second crop upon the stubble. And at all events, if the crop is put on tilled land, the more recent the ploughing and harrowing before sowing the better. If sown broadcast, the ground should be afterwards rolled, and the crop hand hoed and thinned as soon as the plants have well put forth their first rough leaves. The manure, which should always be applied to this crop, is differently applied. If long manure is applied, we would prefer to have it spread and covered with the plough; though if it is applied moist or is immediately after covering saturated with an abundant rain, it may be advantageously applied in the drills. There is a greater propriety in applying short manure, or bone dust, in the drill to this crop, than to almost any other, as the roots gather their food within a limited space. We have seen short muck applied as a top dressing to the common turnip, when sown broadcast, with the best effect. When cultivated in the drill system, with the manure deposited in the drills, the usual distance between the rows is twenty-seven to thirty inches.

In sowing, the drill harrow, of which several kinds are now for sale, is the best implement to use. A man walks briskly forward with one of these before him, propelled like a wheel-barrow.—The drill is made, the seed sown, covered, and by some the ground rolled as he advances. Where this implement cannot be had, a small implement formed like a pepper-box, with holes at one end, and fastened to the end of a walking stick, and followed by a man with a rake to cover the seed, may be substituted. Sow upon the fresh stirred soil.

The following article from the Long Island Star, should be read by every young man who would be the architect of his own fortune.

THE CERTAIN REWARDS OF INDUSTRY.—We remember reading some time since, the memoirs of a certain bookseller, named *Lackington*, who lived in London. He was early apprenticed to a shoemaker, and industriously served out his apprenticeship. He pursued this vocation for some time afterwards, working at various places for a bare subsistance, and at length married a wife as poor as himself. They endured sickness and privation. At length Lackington, who had some penchant for bookselling, opened a shop in an obscure part of London, with a few books on divinity, and at the same time wrought at his trade. He made a few pounds, and gaining confidence, entered upon bookselling altogether. He continued to grow prosperous. His store at length became immense; he rode in his coach, and died exactly at the age of three score and ten.

The story of Lackington may be of much use to society.—It resembles in some points that of our countryman Franklin, but still Lackington was a very different man from the American philosopher. He never would have encountered any hazard in the pursuit of science. "His soul proud science never taught to stray." He kept plodding onward, in the accustomed rotine of his business, and leaves his history as an example of the benefits of quietly sticking to the shop.

Of late years with us, as with the olden nations, the pursuits of humble industry seem to have been despised. Many have been led to look to sudden means of obtaining wealth, and have turned from the beaten track of soil, to untrial but more attractive paths. Some have been lost and many bewildered, and those who are able to find their way back to the quiet duties of useful stations, will not soon be likely to violate the rules of prudence, for the sake of trying ambitious experiments.

Even in countries where aristocratic distinctions prevail, great respect is paid to men of substantial character, who can show that by labor, and patience, and self-denial, at the outset, they have at length conquered fortune and acquired the control of wealth. Such individuals, too, feel the comfort of that characteristic of mind which is called *independence*. They have wrought for themselves—they have risen by their own exertion—they sustain themselves upon their own wings. Such independence should be the common exertion.

It is becoming too general with the people of this country. to despise the occupations which require labor. Men would have their children tenth ra'e professional men, or *mere nullities*, rather than turn their minds to useful trades. We need not enforce the principle, that it is better to encourage humble desires and more useful aspirations. If the mind, after the body has been disciplined and suited to habits of patient toil rises to a different and higher range of duties, the humility from which it arose, but adds to the pride and elevation of its soaring.

The great aim of every man should be. to render himself useful; and every man who has the steadfast ess which will enable him to go perseveringly through the labor of a few year, may attain competency almost with the certainty of a mathematical demonstration. In order to follow ou the plan, here must be a resistance of all temptation to turn aside, a ready submission to unavoidable disasters, a continual effort to build up and increase—in brief, an unyielding desire and effort to do one's duty to society, in the regular pursuit of a use ul vocation.

We think it would be of benefit to many readers if a new edition of the life of Lackington, were published; for while the moral of his industry is very forcible, the moral of some of his errors is not less so. He suffered from being induced to act the politician—he felt the effects of time and spirit sacrificed at conventicles.

The life of FRANKLIN is one not less than his of *constant industry*, but it is characterized by the further efforts of mind and genius, which without diverting him from his practical pursuits, enlarged the sphere of his u efulness.

RADISHES.—This root being liable to be eaten by worms, the following method of raising them is recommended in the Farmers' Assistant: "Take equal quantities of buckwheat bran and fresh horse dung, and mix them well and plenti ul y in the soil by digging. Suddenly after this, a great fermentation will be produced, and great numbers of toad stools will spring up in forty-eight hours. Dig the ground over again, and sow the seed; and the radishes will grow with great rapidity, and be free from the attacks of insects. They will grow uncommonly large."—[Broome Co. Courier.]

Advertisements.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles to sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

						lbs.	
350 tons	2½ by	½, 15 ft in length,	weighing			$4\frac{88}{100}$	per ft
280 "	2 "	½, "	"		"	$3\frac{50}{100}$	"
70 "	1½ "	½, "	"		"	2½	"
80 "	1½ "	½, "	"		"	$1\frac{5}{100}$	"
90 "	1 "	½, "	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front st

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.
4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron, Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wallstreet, N. Y.
51tf

TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, on Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.
16—6t.

FRAME BRIDGES.

THE undersigned, General Agent of Col S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of this kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squaki hill, Mount Morris, New-York. Across the White river, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Catarangus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.
Rochester, Jan. 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER.
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior back-strap Shovels		
150 do	do	do plain	do
150 do	do	do caststeel Shovels & Spades	
150 do	do	Gold-mining Shovels	
100 do	do	plated Spades	
50 do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleeckerstreet, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersunk heads suitable to the holes in iron rails to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany; and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO CONTRACTORS:

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone

The work contracted for must be finished by the 1st day of July, 1838

Persons desirous of obtaining work are requested to apply at the office of the undersigned in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, JR.
Chief Engineer Jas. Riv. & Ka Co.

P. S.—The valley of James River above Richmond is healthy.

16—10t

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May, Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract

The line, after the first few miles, pursuing the flat of the Mulberry Creek occupies a region of country, having the repute of being highly heathful. It is free from ponds and swamps, and is well watered—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country.

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

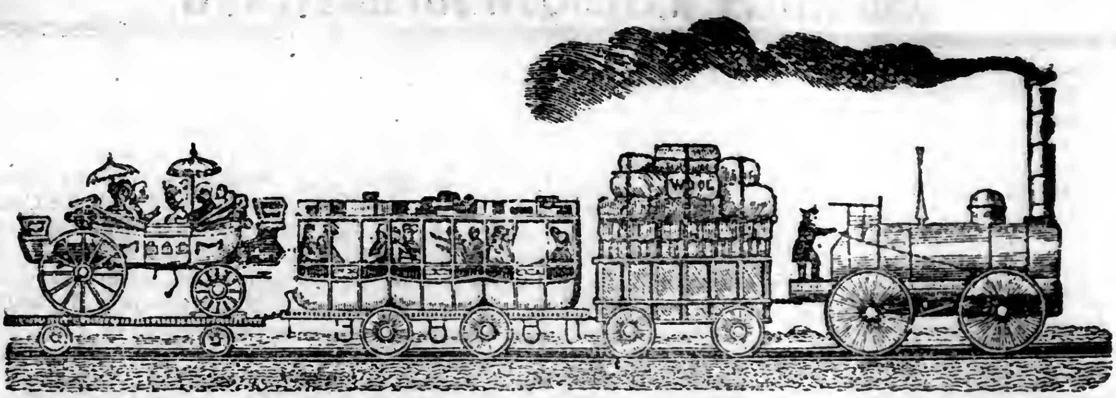
ANDREW ALFRED DEXTER, Chief Engineer.
Selma, Ala., March 20th, 1837. A 15tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 1y 14



AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K. MINOR, and GEORGE C. SCHAEFFER, { EDITORS AND PROPRIETORS.] SATURDAY, AUGUST 5, 1837. VOLUME VI—No. 31.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, AUGUST 5, 1837.

We intended to have completed, in this number, the long article on the "Harbour and Docks at Kingston upon Hull," but have been disappointed in the engravings. It will be concluded in our next.

TONAWANDA RAILROAD, or as it might, we think, more appropriately be called, the *Rochester and Attica* Railroad. We publish in this number the report of a committee to the stockholders of this road. This is one of the several roads, or sections, which are to constitute the great thoroughfare between the Hudson and Lake Erie. That part of the road between Rochester and Batavia has been completed and is now in use. We ask for this report an attentive perusal, as the road has been constructed by, and on the plan of, Mr. Elisha Johnson; in relation to which we published strictures by Q., in a recent number of the Journal. We have received, from Mr. Johnson, a reply to those strictures, together with the illustrations of his plan of construction, which we shall publish in the number of week after next. It is delayed until then that we may complete in our next number, the long article from "the transactions" on the Hull Docks.

REPORT &C. TO THE BOARD OF DIRECTORS OF THE TONAWANDA RAILROAD COMPANY.

The Committee appointed, at the last meeting of the Board, to report upon the present situation and probable prospects of this corporation and the work in which they are engaged, submit the following statement:—

The TONAWANDA RAILROAD COMPANY was incorporated by an Act of the Legislature of the State of New-York, passed April 24th, 1832. It is authorised "to construct and, during its existence, to maintain and continue a railroad with a single or double track, and with such appendages as may be deemed necessary for the convenient use of the same, commencing at an eligible point within the village of Rochester in the county of Monroe, and extending on the most direct and eligible route, through the valley of the Tonawanda to Attica in the county of Genesee." The duration of this charter is fifty years from the day of its passage. The capital stock is five hundred thousand dollars, divided into shares of one hundred dollars each. The charter is, perhaps, one of the most favorable railroad charters in this State—favorable from its duration, and from its entire freedom from any restrictions as to carrying produce, or the price for carrying produce or passengers. The books for subscription to the capital stock of this company, were opened by the Commissioners appointed under the charter, on the fourteenth day of August, 1833; and, on that day, the whole of the capital stock was taken by ninety-six subscribers. No effort was made to procure subscriptions to the capital stock, from abroad. Individuals residing in the section of country in which it was contemplated the road would be located, knowing the importance and feeling confident of the success of the enterprise, determined to take the whole hazard of the experiment upon themselves. They justly thought that they could furnish no better evidence to distant capitalists, whose aid they might want, of the value of the stock, than by such manifestation of their own confidence in it; and it is worthy of remark, that this whole stock was readily taken in a single day, and after a very short notice, by persons who had the best opportunities of knowing its value, from a residence in the immediate vicinity of the work.

Immediately after the distribution of the stock and the election of the first Board of Directors, Engineers of skill and experience were employed to survey and report upon the most eligible route upon which the track of the company's road should be constructed. As the line of the road was not defined, in the charter, with any particularity, a wide and ample field was left open for the selection of the most advantageous route. This gave rise to the necessity of several surveys and estimates, and furnished ground for some differences of opinion as to the proper route; but after the reports and estimates of the different Engineers were carefully examined by the Board, the line of the route was finally settled in

September, 1834. Preparations were made at once, after this, for the acquisition of title to the necessary lands for the construction of the track of the road; and, this having been accomplished the construction was commenced late in the year 1834, and vigorously prosecuted during the two following years, and finally opened to Batavia in May of the present year. Elisha Johnson, Esq. of Rochester, was selected as the Chief Engineer, to direct the construction of the road in that capacity; and the track of the road was made upon a plan believed to be heretofore untried, which was invented by Mr. Johnson, and adopted by the Board o Directors. His plan consists in making a frame work of heavy timber to sustain the grade of the road and support the embankments, upon which frame work the earth for filling the grade was transported. Large posts of twenty four or thirty inches in diameter, were placed upon each side of the track, opposite to each other, so as to sustain the side timbers of the track. These posts were permitted to enter the earth so as to stand firm upon the hard ground, and were squared at the top. Each of these sets of posts was about ten feet apart. Upon the top of these posts, were laid transversely sticks of timber twelve or fifteen inches in diameter, morticed on the upper side, near each end, so as to receive the longitudinal timbers. The longitudinal timbers—being from sixteen to twenty inches in diameter, smoothed only upon the upper sides, and intended for the support of each of the rails—were let into the mortices of the transverse timbers, and supported by them and the posts. This, where an embankment was to be made, presented a substantial frame work of the proper grade. Upon the top of the longitudinal timbers, proper wooden ribands, as a substitute for iron rails, were laid. Railroad cars were provided to carry earth, with four different boxes each, turning upon hinges attached to the car frame so as to discharge the earth both between the rails and over the outside of each rail. These cars were loaded with earth at places where excavations were necessary, and transported by horses upon the railroad track, and emptied, without any delay, to make the embankment. The same frame work of timber, with the exception of the posts, was laid where excavations were to be made. When the road was finally prepared for operation, pine scantling, of the usual dimensions, was laid upon the longitudinal timbers, and the iron-plate rail upon the scantling, and all securely nailed together by heavy spikes seven inches long.

We have reason, from experience, to be very much gratified with this plan of construction, as simple, economical, and durable; and we cannot but feel very much indebted to Mr. Johnson, the Engineer, for the ingenuity manifested in its successful application. In a country like ours, abounding with timber, it seems peculiarly applicable. The removing of the earth upon the railroad itself, was a great saving in the expense of teams; and the facility and ease with which it could thus be transported considerable distances, caused the excavations and embankments both to be made with an expense very little enhanced from what either would have cost, if made in the usual mode. The whole timber work, with the exception of the pine scantling, is covered with earth, which will prevent it from speedily going to decay; and as the frame work and embankments mutually support each other, it must add materially to the strength of the road. Much of this road has stood the test of two winters and has exhibited the effects of frost much less than the common wood roads; and we are satisfied, from this experiment, that the plan adopted is preferable to that of any road not made of more durable materials. The same experience has enabled us to pronounce, with great confidence, that the yearly expense of repairs will be much less than upon other roads, while the danger arising from cars running off the track, is much diminished, by the fact that it will, in such case, have a smooth road of earth to run upon, unobstructed by any cross timbers above ground.

The construction of the road was commenced at Rochester and finished through to Batavia, so as to be put in operation for the whole length of the line between those two places, in the month of May last. The length of the road is a fraction over thirty-one and a half miles. The line of the road is nearly straight, so nearly so that the track of the road between the two places, is shorter in length than any travelled road which was before used for communication between the two points. There are but few curves in the road, and those are so slight as to be scarcely perceptible. The average ascent is about twelve feet to the mile. The grade has been of comparatively easy construction, except in the section near Batavia, where two heavy excavations and two considerable embankments greatly retarded the completion of the work. Seventy dollars per share have been paid in upon the stock, making in the whole the sum of three hundred and fifty thousand dollars. There have been expended by the Company, nearly three hundred and seventy five thousand dollars. In addition to the expenditures upon the road itself, the Company have purchased lands in Rochester and Batavia for the necessary purposes of the road, to the amount of about twenty thousand dollars. They have erected an engine house, machine shop, car houses, shops for making cars, and other buildings in Rochester. They have a ware house upon lands purchased by them, and also occupy another ware house hired by them. They have two locomotive engines, ten passenger cars, and a large number of freight cars. Since the opening of the road, the loco-motives make two trips daily between Rochester and Batavia each way, with passengers and freight. The passenger and freight cars were made in the Company's shops. In their shops are also now manufactured wheels, springs, and other articles for furnishing railroads; and it is not improbable that this Company will hereafter manufacture all such articles for railroads west of us.

Your committee have endeavored to make an accurate estimate of the cost of the railroad, so far it has been constructed. It is impossible to be absolutely precise; but the whole expense of acquiring title to land for the road, and of constructing the railway and fixtures thereon, is something less than ten thousand dollars per mile. Though this amount exceeds the original estimate of expense, yet the road has been constructed in a much more permanent manner than was originally contemplated; and when we compare with the cost of other roads, we have much reason to be satisfied with the result. A careful examination of the road since its completion, and attention to its construction while it was in progress, united to the testimony of the Engineers who run it, as well as witnessing ourselves its operation, enable us to report with confidence, that the road is well and substantially constructed upon an improved plan, calculated to last for years without any considerable expense for repairs, and runs as well, as easily, and as safely as any other road we have ever examined. Thus much we have thought proper to say in relation to the *present* situation of the road.

It is to be regretted that the name adopted for this corporation, is not more significant of the locality of the road. It is now utterly impossible for any person not acquainted with, or informed of, the locality of the road, to acquire from the name of the corporation any idea of the part of the country in which it is situated, or the towns through which it passes. The name of a railroad should be significant of its route, so as to convey a distinct and correct idea by its name alone. This, unfortunately, is not the case with ours, which renders it necessary to explain for the information of those unacquainted with its location. The Tonawanda Railroad commences at the city of Rochester, on the Genesee river, and runs almost in a straight line from that place to Batavia, a distance of nearly thirty-two miles, to which place it is completed, and is now in daily operation with locomotive engines. A glance at the map of western New-York, will show the importance of the route. The entire travel which throngs through the western part of the State of New-York, now either passes through Rochester, by the canal or stage, on one route, or through Le Roy and Batavia, by stage, on another route still farther south. This railroad passes from an important point on one route to an important point on the other, and connects the two. It must, consequently, by reason of additional speed, secure the travel of both. Again: this railroad is a connecting link in the great chain of railroads from Albany to Buffalo, completed now from Albany to Utica, in progress of completion from Utica to Auburn, and now being surveyed from Auburn to Rochester where the Tonawanda Railroad commences. Charters have been granted and arrangements made for filling up the entire line from the Hudson to the Lakes, with railroads, in a very short time; of which the Tonawanda Railroad constitutes a necessary and essential link. The land has been purchased and the route surveyed for a railroad from Batavia to Buffalo, and the work will be soon commenced. This is a straight line for the whole distance, and the descent is uniform and does not average more than eight feet to the mile. When this is completed, the whole line from Rochester to Buffalo will be nearly straight, and the distance less than sixty-seven miles; while the distance between the two places, by the present travelled road, is seventy-four miles, and, by the canal, ninety-three miles. The railroad can be traversed in three, or at the most, in four hours; while the stages consume fifteen or eighteen hours, and the canal boats twenty-four hours, in passing between the two places. Who, then, can doubt that this railroad will take the entire travel which passes through western New-York? It does not require that the Auburn and Rochester road should be finished, to reap these fruits. Before the completion of that work, all the travellers westward, either by stage on either route, by the canal, or by lake Ontario whose steamboats touch at the port of Rochester, will almost necessarily take this railroad at Rochester; and travellers eastward will also avail themselves of it. And how great is the amount of that travel? See the numbers thronging the railroad cars on the Utica road, the numbers crowding the stages and canal boats farther west, and the numbers daily landed from the lake Erie steamboats at Buffalo, and we can begin to have some idea of the amount of travel through this section of country. We have hardly sufficient data for calculating the precise number of persons thus transported each way, but we can approximate to it. There are, we think, on the roads running from Rochester through Palmyra, from Rochester through Canandaigua, and from Canandaigua through Le Roy and Batavia, no less than sixteen daily lines of stages, computing those which run each way. In the travelling season, these are generally full, and many extras are put in requisition every week. On the Erie canal which passes through Rochester, there are three daily lines of eastern packet boats which arrive and depart three times every day, besides the vast number of line boats, many of which carry as many passengers as the packet boats. The steamboats on lake Ontario touch at Rochester on their trips, and leave some passengers. A great majority of these travellers, except emigrants, will almost necessarily take the railroad; and it has been computed, and we believe the estimate is not over the mark, that in a season of busy travelling, from eight hundred to one thousand persons pass daily through the country by these different conveyances, or from four to five hundred each way. To fortify the computation, we have seen it stated repeatedly in the prints of Buffalo, where all the above routes end, that an average of about one thousand persons passed through that place daily, during the travelling season last summer. From returns kept at the Canal Collector's office at Little Falls in 1835, it appears that seventy-six thousand four hundred and sixty-three passengers passed that office on the canal (which is but one mode of travelling) in that year. The statistics of the Utica and Schenectady railroad show an average of about five hundred persons passing over that road daily. This result brings us as nearly to an accurate estimate, perhaps, as any other, for we are satisfied, from observation, that full as many travellers pass through Buffalo, upon an average, as through Utica. The diminution occasioned by leaving the route at or west of Utica, is about compensated by acquisitions from lake Ontario and the north, and from more southern routes and local travel.

From calculations drawn from all these facts, and after making deductions for emigrants who will continue to travel in a great measure upon the canal, we think we are not too sanguine in assuming that, after the railroad shall be completed to Buffalo, from four to five hundred persons will pass over the railroad from Rochester to Buffalo daily, during the travelling season of the year; The price of passage from Rochester to Batavia, is $1 50; from Rochester to Buffalo it will be $3 00. As the whole road will be run, it is contemplated, under a single arrangement with one set of cars and locomotives, the expense of running cannot be very considerable, not greater certainly than that of the Utica and Schenectady road, while the yearly expenses of repairs to the road itself, we are also satisfied by experience, will be greatly less than is common upon wooden roads. The cost of constructing the entire road and finishing it fully, with cars, locomotives, depots, &c., cannot exceed the sum of $700,000. A slight calculation from the above data, will show how great must be the income, even after making every allowance for expenses. If we suppose the receipts to be $1,000 per day (which is less than the above estimate would warrant) for two hundred and forty days, it would give for receipts, $240,000. If we suppose the expenses to be $200 per day for the same time, (which is much greater than our present expenses would justify,) it would give for our expenses, $48,000, and the balance or profit would be nearly $200,000, which, upon a capital of $700,000, would be nearly 30 per cent. The construction of the track from Batavia upon the Tonawanda creek to Attica, twelve miles, will cost about $100,000, and will, of course, add that amount to the capital. As this extends into the fertile country south of Batavia, it may be fairly considered that this part of the road will at least support itself. But if it should yield nothing, the income from the main track will be, by the above calculation, about 25 per cent. upon a capital of $800,-000, and this for passengers alone.

The Company, in addition to the carrying of passengers, have no restriction upon the carrying of produce and merchandize upon their road. Indeed, this was considered one of the important objects both to the stockholders and the country. A glance again at the map of western New-York, will show the importance of the road in this respect. We can see, by such inspection, that the railroad from Rochester to Batavia and Attica, diverges from the canal, and passes through the most fertile and productive of the wheat-growing regions of this State. The various and abundant produce of all this region, has heretofore been transported by teams to different points on the canal. The wheat from the different towns and the flour from the numerous mills in this section, has been carried on in this way to Albion, Holley, and Brockport. The merchandize for the supply of this wealthy and populous section of the State, has in like manner been transported from these different points on the canal, to the several towns and villages in this region. It is now apparent that all the produce of the rich towns through which the railroad passes, and of the fertile towns south of the railroad, will seek the railroad as a mode of conveyance, and by it be transported to the canal at Rochester. It is equally evident that the merchandize destined for this whole region, will be received from the canal at Rochester, and delivered upon the railroad to points nearest the places of destination. The facility and economy of transportion upon the railroad, forbids any competition from teams; and the delivery of the produce and the receipt of the merchandize upon the canal, at a point nearer to the tide waters, increases this advantage. The amount of this branch of business, is hardly susceptible of computation. The business of this kind done upon the road last fall, when it was only in partial operation, show that it must be very large, and will require at least one hundred freight cars to perform it, drawn by locomotives. The towns thus within the influence of the railroad, are known to be among the most productive of our wheat growing towns; and a calculation made with care, predicated upon the crops of two or three years, show an average yearly amount of crops from those towns, of nearly fifteen hundred thousand bushels of wheat. All this amount not wanted for consumption at home or for sowing, must find its way to Rochester upon the railroad, either in the shape of wheat or flour. The other produce of this region, the smaller grains, the pork, the ashes, and the lumber, must seek the same mode of conveyance to market.—The merchandize, the salt, the iron for this same region, must also be transported into the country by this same mode of conveyance from Rochester. A computation of the amount of business transacted at the different mercantile establishments in this section, will give an aggregate freight, of this kind alone, of more than ten thousand tons annually. When we reflect that the city of Rochester contains now eighteen thousand inhabitants, that part of the county of Monroe west of the Genesee river more than thirty thousand, and the county of Genesee more than sixty thousand inhabitants, all imbued with the spirit of enterprise and cultivating a fertile soil, the magnitude of this domestic or local business will appear in its true light. The transportation of produce and merchandise is attended with considerable expense of labor in the handling; but the rates of freight charged are such as, from the last year's experience, we find leaves the Company a reasonable profit, and such as to make it no inconsiderable object to transact this species of business. It will at any rate, aid in defraying, if it does not quite defray, the expenses of the passenger trains, and leave almost the entire income from passengers, a clear profit.

In conclusion, your committee cannot but congratulate the Board upon the flattering prospects which their enterprise—so boldly undertaken and so nearly completed—holds out. The expense of construction being only one half the expense of the construction of other roads not more permanent, the probable expense of repairs being greatly less, and the probable income being equal to other roads of double the capital, this work must afford dividends which will amply remunerate the stockholders for their enterprise, and handsomely repay capitalists who may make investments in its stock.

F WHITTLESEY,
DAVID SCOTT,
JONATHAN CHILD, } Committee.

Dated June 16, 1837.

APPENDIX.

PRESENT OFFICERS OF THE TONAWANDA RAILROAD COMPANY.

DIRECTORS.

David E. Evans,	David Scott,
Trumbull Cary,	James Brisban,
George W Lay,	Daniel H. Chandler.
Abraham M. Schermerhorn,	Jonathan Child,
Frederick Bushnall,	Frederick Whittlesey,
Thomas Kempshall.	Joshua Lathrop.

DAVID E. EVANS, President,
JONATHAN CHILD. Vice-President,
ABRAHAM M. SCHERMERHORN, Treasurer,
FREDERICK WHITTLESEY, Secretary,
DAVID SCOTT. Superintendent.

The present number of Stockholders in said Company, is sixty.

From the Illinois Journal.

BOARD OF PUBLIC WORK'S REPORT.

To the Governor of the State of Illinois

STATE OF ILLINOIS.
VANDALIA, JUNE 5, 1837. }

SIR,—The undersigned, Commissioners of the Board of Public Works, in obedience to the law of the last session, entitled "An act to establish and maintain a general system of internal improvements," have the honor to lay before the Governor a report of the proceedings had by them under the provisions of the said act.

At their first meeting in April last. the Board was organized by the unanimous choice of WILLIAM KINNEY, commissioner of the second judicial circuit, as President of the Board, and by the appointment of GEO W. CARRUTHERS. as Secretary.

The several proceedings of the Board in the adoption and organization of a plan for the conducting of the system of improvements upon the comprehensive scale contemplated by the bill, and extending over so many different portions of our State, will accompany this report The plan adopted by the Board was the best that could be devised by it; and although it is not without its objection, it is believed that no better system could conveniently have ben presented for the purpose, if the number and extent of the works to be surveyed and prosecuted shall be properly considered.

The short period which has elapsed since the organization of the Board, and the difficulty which presented in the outset of obtaining competent engineers, and the necessary instruments for their use, will in some degree account for a want of interest in the present report.

Soon after the adjournment of the Legislature., JAMES BUCKLIN, Esq. by the private aid of some of our citizens, who felt an interest in the progress of the system. was employed to proceed to some of the eastern cities, for the purpose of procuring the necessary instruments, for four engineering parties; and since his return the surveys of several of the roads directed by the act have been commenced.

The Northern cross railroad and the road from Mount Carmel to Alton, and also the Central railroad at two different points, have already been placed under survey.

It was the intention of the Board to have placed an additional engineer upon the Central railroad, at its northern termination; but contrary to the promises which were held out to the Board at its first meeting, it is found upon making inquiry at the office of the Secretary of State that the relinquishment of the charter granted to the corporation of the Central Railroad Company has not been filed; consequently it becomes the duty of the Board to cease all further operations upon this important improvement The delay which has occurred in the relinquishment of this charter, renders it somewhat doubtful whether any such relinquishment will be made, must of course be the occasion of regret to all those who desire the prosperity of the State, and who wish to witness the developement of its resources, since it is evident that a work of the magnitude of the road under consideration could not, under the present aspect of affairs, be prosecuted with any reasonable certainty of a speedy completion by the means of a private company. The prosperity of a large portion of our State is intimately blended with this work which was designed to be a great artery for the distribution and extension of all those important benefits which result from a continuous and easy line of communication from the extremities of the State; and it is therefore with regret that the undersigned feel constrained to divert that attention from this work which they were equally urged by inclination and duty to bestow upon it.

The Board has also been embarrassed in its proceedings, from the delay which has transpired in the relinquishment of other charters; and this delay will be more severely injurious, as the surveys proceed, since it may be necessary to retain Engineers in the employ of the State to await the tardy action of those interested in their respective charters. In the number of these the Board will include the Alton and Shawneetown railroad. It would seem that some of the inhabitants interested in this road are exceedingly eager to witness a survey of it, and are complaining of a want of diligence and attention on the part of the Board; while it was impossible for the Board to proceed until the stockholders shall have relinquished their charter.

There are already five engineering parties in the field actively employed; and it is confidently expected that there will be six additional parties soon in active operation which will in the course of the ensuing season enable the undersigned to complete the surveys of a greater proportion if not all the railroads provided for in the law. Every exertion will be made to proceed with the survey of all the roads with a due regard to utility and economy, and since it was impossible ever to close the survey of any of the roads unless a commencement should be made upon some of them, and since no particular preference to any could be given, without incurring censure from the persons interested in the prosecution of other roads, the undersigned commenced upon such of them as from their importance coupled with the extent, and greater facilities for a speedy commencement upon them would in their estimation best advance the general interests of the State. It is the intention of the Board to proceed as speedily as a prudent regard to circumstances will permit in the survey of the roads and rivers, and they will in all probability have portions of all of them ready to be placed under contract, as soon as, if not before, the Fund Commissioners will have provided sufficient means for that purpose.

The pecuniary distress which prevails in the other States, and the present unpropitious prospect before them, will doubtless induce a large number of emigrants to seek a home in this State; so fertile in soil, so salubrious in climate, and holding out to the industrious and enterprising the most encouraging promises of happiness and prosperity.

The certainty that we shall have a large and valuable accession to our population is strengthened, from the knowledge that our State is unembarrassed, and that loans will in due time be effected, to prosecute our several works of improvement; the employment these will afford, with the stimulus which they will necessarily give to agricultural industry, will be a sure means of advancing the prosperity of all classes of our citizens, and consequently of placing our State upon that exalted eminence among her sisters of the Union, which her many superior advantages entitle her to claim.

The embarrassment which is felt in most of the eastern and southern States, has not yet been visited upon this State. The limited banking capital of this State has prevented an accumulation of indebtedness; the value of our lands has heretofore induced large investments of eastern capital which has generally resulted for the benefit of our citizens, and there has been comparatively but little over-trading in our commercial community: consequently that despondency, which is hanging over other States, is not seriously felt in this; therefore we may reasonably gather confidence that if our several public works shall be prosecuted with zeal, that the evils which are mourned over in the older States, will work to our good, anp produce permanent and salutary benefit to Illinois, and though we may lament the mischief and ruin we could not avert, we are not to be censured because circumstances render it necessary that we should profit by the distress of others.

Owing to the recent organization of the several engineergti parties, and to the incomplete arrangements for those about to take the field, and to their remoteness from the respective commissioners, the Board regret that they cannot show specifically the amount expended by the different members of the Board, up to the present date; but before their next semi-annual report, such an organization will have been made, as will render it more easy to comply with the requisitions of the law in this behalf. As nearly as can be ascertained from the ports of the respective Commissioners up to the period that they left their respective circuits to attend the present meeting; the entire amount expended did not exceed seven thousand dollars, but the expenditure for the ensuing months, including camp equipage and equipments, and the compensation of the additional engineers and their parties, will necessarily exceed that of the past. Notwithstanding which, from the information obtained from the Fund Commissioners, the Board of Public Works is confident that with a due regard to economy sufficient means will be provided to ensure a successful prosecution of the several improvements contemplated by law, and so ardently desired by the people.

Signed

Wm. Kinney,
M. Mc Connell,
E. Willard,
M. K. Alexander,
J. Wright,
E. Peck.

Vandalia, June 6th, 1837.

From the New-York Mechanics' Magazine.

Sir,—I see in your No of the 1st inst. an article from the London Mechanics' Magazine, relative to the discovery of M. Ganal, of Paris, for the preservation of dead bodies and the study of anatomy in summer as well as in winter time. Allow me to correct the assertions of the writer.

Two years ago M. Ganal submitted to the Royal Academy of Medicine in Paris, a preparation of his for the preservation of dead bodies to facilitate the researches of anatomy. I have seen at the Hotel-Dieu, bodies that had already been kept for nearly five months, without the least decomposition, while the limbs and flesh retained the same elasticity, which they had immediately after death had occurred.

The body taken out of the compound could be placed upon the table, ready for the scalpel, and could again be placed in the compound to be retained for future dissection. In this case the compound should always be weakened.

The preparation is very simple, consisting of different substances in certain proportions—and the cost is very small, 16 pence being sufficient for the preservation of a human body.

But *it is not injected into the veins* nor *into the carotid artery* as the English Journal asserts. If indeed, this were the case would not the scalpel release the fluid, and then what would become of its virtues.

Not long ago a man by the name of Tarquinia, I believe, physician in ordinary to the King of Naples, discovered a mode of preservation, and M. Ganal may have been induced to make some further experiments upon the preservation of anatomical specimens for *museums*, but this discovery must not be confounded with the other.

The process of the Neapolitan Doctor consists only of arsenic dissolved in water, in the proportion of 2 pounds for a human body, and injected into the arteries by a small pump. This process however, has been found deficient, the body undergoing no apparent alteration for 5 or 6 months, but after that time it becomes very hard and dry, the skin turns yellow, and in less than a year it is converted into a complete mummy.

Of the last process of M. Ganal I know nothing, but I am confident that it has nothing to do with his other method, useful both for the preservation of subjects in the amphitheatre, and for their transportation to a distance for the purpose of dissection.

An Amateur.

From teh New-York Farmer.

MANAGEMENT OF SHEEP.

No. V.

Messrs. Editors,—In my last communication I endeavored to maintain, that in cleansing and putting wool in the best condition for market—*honesty* and *interest went hand in hand.*

The proposition was fully demonstrated so far as my experience has carried me. I shall not now add further proofs, but merely make one or two more suggestions in regard to making use of *vats* for washing of sheep.

I could fill my sheet, if it was necessary, with affidavits of my neighbors maintaining the vast superiority of vats over pools, or in fact, any other mode in use.

There are few streams but that afford a needful supply of water, and also a sufficient fall. Where the latter is *not* the case, it is only necessary to excavate a place near, or on the margin of the brook, sufficiently large for the admission of the vat and platform. A fall of three or four feet is of the greatest consequence, as without it, it is impossible to gain the full advantage to be derived from vats. I mentioned in my last, that it was my practice to have my sheep, first soaked, (as we wool growers call it,) after which, they are removed under the spouts, and the water falling, the above mentioned distance, separates the dirt more effectually, and in a much shorter time than it can possibly be done by *squeezing*. A fact, it is out of the question to get wool white and clean by squeezing, unless a much longer time is taken than usual, and after the greatest pains, its aspect is dingy.

But, believing that those of your readers who are practical farmers, can readily appreciate the *vat system* without any further efforts of mine, I will only say a word or two as regards expense of construction. I have already stated that the cost of mine, including platforms and all other appendages, was only seven dollars. Now I will recommend, if so small an expense will deter any individual, that some half dozen farmers, or more, *club* and fix on some eligible site, and each contribute his pro rata of expense.

My neighbors, have, for years past, brought their flocks to my place for washing:—I charge them nothing—they are perfectly welcome—and happy am I, that I am instrumental in putting them in the way of doing the *clean thing.*

In exposing the slovenly practices of our farmers relative to shearing of sheep, and matters connected therewith, want of time will compel me to be brief.

Generally speaking, shearers are too much in haste to get off the fleece; and, hence, as my honest neighbor Ben. Rogers says, "they not only take off wool, but enough of hide with it for moderate sized leather apron." This is wrong—it is cruel:—but arises altogether from haste and carelessness. There are shearers, who will shear from 50 to 80 sheep per day—such however, are rarely found:—in general, no man can shear beyond 30 or 40, and perform his work as it should be.

There is an inhuman practice of shearers, which every wool grower ought to discountenance and correct—if it was not so common I would not allude to it—and that is, of *cuffing* and *kicking* sheep to *make them lay still* when shearing. Those who are acquainted with *my ways* know better than to exercise this foolish and brutal spite thus.

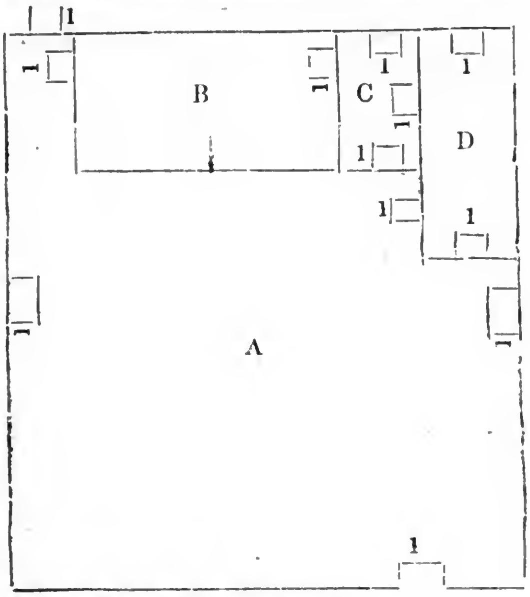
It is almost universally the case in this quarter, that, in putting up a fleece, a band is twisted of wool to bind and secure it. I can inform those who do this, that manufacturers do not approve of it; and, for the reason, that it causes much trouble to the staplers in untwisting and separating the different qualities of wool, of which the band may consist. The best way is to secure the fleece with twine.

Connected with the subject of shearing, pounding or yarding sheep is suggested to my mind.

Nine times in ten, when ready for shearing, a temporary yard is built of rails or poles, for the reception of the flock, which is *always too* small, and of course the poor animals are almost suffocated:—losses have indeed, occurred in this way. But this is not all:—when so many are confined, much filth accumulates, which, readily, finds its way on the floor of the shearer, and *some how* is very apt to go still farther, viz: *inside of the fleece.*

I experienced many of the evils attendant upon pounding sheep, in the usual way for a length of time:—but a number of years since were obviated by the erection of a shearing house, with all the necessary pounds, which are constructed of posts and boards, and of course, firm and durable.

I herewith, Messrs. Editors, present you with the outlines of the whole with the necessary explanations. I do not doubt but there are many whose establishments of the kind are superior,—if so, I am glad of it. But to those who are not provided with any, I can recommend my own plan as affording not only great ease and facility in yarding of sheep, but every other convenience desirable.



A Large yard, some 30 rods square.
B Large pound, 50 feet by 15 feet.
C Small pound, 15 feet square.
D Shearing house, 36 feet by 18 feet—14 feet posts.
1 Represents gates and doors.

Pound B is amply large for 400 sheep:—the small one C, has abundance of room for 80, but when shearing, I never permit more than half that number to remain in it:—the residue of the flock are let out to roam in the large yard A. Nothing is permitted to run in this yard previous to shearing, which is at all times thickly covered with grass, and consequently, is a very suitable plan for sheep to lay down upon. The small pound as Ben. Rogers says "is a *great thing*, as you need'nt run all over creation to catch a sheep."

My wool is stored in the second loft, in the floor of which is fixed a trap door, and from this is suspended the sacks when packing.

I close this communication, now, with regret, as much else could be added in reference to shearing, &c., of sheep—but my sheet is full. Yours,

Lansing, Tompkins Co., N. Y. M.

From the New-York Farmer.

Key West, Tropical Florida, 12th July, 1837.

Dear Sir. On the 28th ult., I addressed you a few lines with a circular from the President of the Agricultural Society of Louisiana. The bearer of that letter was A. A. M. Jackson, Esq., Clerk of the U. S. District Court whose address, while in your City, will be at 273 East Broadway. Wm. A. Whitehead, Esq., the Collector of this port will carry the present brief communication, and his address during the summer will be at Perth Amboy, New Jersey. Having now been twenty-five days on this Inlet, during the worst season of the year, I can declare that I have been agreeably disappointed in the character of its surface, of its climate, and of its inhabitants. I had anticipated a barren bank of sand, but found a verdant woods on a limestone base. I expected to meet with stagnant ponds of putrefying materials exhaling pestilence and death, I find running inlets of the sea as pure as the waters of the deep ocean itself, which are sources both of health and wealth. I was told that the moschitos and sand-flies were so numerous that the inhabitants could scarcely breath without swallowing mouthfuls of these insects; but of sand-flies I have not yet seen or felt a single swarm, and of moschitos I can truly say that of these are never more than I have seen or felt during this worst season for them. Key West may challenge comparison with any equal surface on our coast, from New-York to New Orleans. But as I have not taken up my pen to give a detailed description or history of this Island, I will be as brief as possible in what I have to say. The whole Island, including the salt pond, contains only 1975 acres. The salt pond has a surface of 340 acres. The town at the N. W. extremity of the Island is in 24° 25′ N. L. and 82° 04′ W. Long. The subsoil of the Island is limestone, (not coral rocks,) and the soil a calcareous powder, (not siliceous sand,) colored by vegetable mould. This soil is said to be exhausted by two or three years exposure to the sun, so that garden vegetables are no longer cultivated. Sweet potatoes, however, and pumpkins continue to be very productive. Siliceous sand and clay would be very valuable here, as even the quantity requisite for masonry has to be brought from great distances on the mainland. But the greatest defect on this Island is the want of water. The rains are so few and so little, that they do not suffice for agriculture, and the wells do not furnish either the quantity or quality of water necessary for artificial irrigation. Nevertheless the vegetable growth on this Key demonstrates that there are valuable vegetables adapted to flourish in even this moreland soil and atmosphere. I therefore annex a brief list of the plants both indigenous exotic that have already fallen under my observation.

Indigenous.—The wild fig, the manchineel, the Campeachy teak or Jamaica dog-wood, the Gumbolembo or Almacigo, the nickernuts, 5 species of Cactus, the wild Papaya and it is said the Salinwood tree, &c., &c. I will give the botanical names in my next.

Exotic.—*Terminalia Catappa*, (or Indian Almond,) the *poinciana pulcherrima*, (or Chansiquin of Campeachy,) the *moringa pterigosperma*, (or oil of hen tree,) *Serbania picta*, (or Guacamaya,) *Cicca racemosa*, (or Gooseberry tree,) red Mulberry, wild lime, monœcious Papaya, Pride of China or India, the W. I. Tamarind and the Cocoa-nut palm.

The Cordia sebostena is by some said to be indigenous and by others exotic. But as I have arrived at the bottom of my page, I close for the present by subscribing myself very respectfully your ob't ser't,

Henry Perrine.

Useful Education.—The following excellent article from the Cultivator upon useful education should be read by every parent. It should be printed in letters of gold and be born constantly in mind by those who have the charge of children.

WHAT IS A USEFUL EDUCATION?

We put the question in reference to the great body of American youth, who are to earn their bread by the sweat of their brows, and, under Providence, to wield the future destinies of our country. Two principles should govern: *Teach them* TO PROVIDE FOR THEMSELVES HONORABLY, under any ordinary contingencies,—*and qualify them to become* USEFUL TO SOCIETY. The times, as well as universal experience, abundantly admonish us, that however the children of wealth may indulge in indolence and dissipation—while their means last,—the great mass of American youth must, and ought, to depend upon their labor for their fortunes and their usefulness. Fortune is at best precarious; patrimonial dependance is uncertain, and reliance upon the friendship or charity of the world, or upon office, is frail and often debasing. Self-dependance is the only sure stay. *We are ever most willing to help those who help themselves.* Productive labor is the legitimate source of all our wealth, individual and national; and this labor is profitable to the individual and to the nation, *in proportion to the measure of intelligence and scientific knowledge which guide and direct its operations.* Hence it is of primary importance, that our youth should be efficiently taught to labor, and that their minds should be early imbued with that kind of knowledge which will instruct them in the principles of their business, render it honorable, and make them independent in conduct and in fortune.

We have, to be sure, colleges and academies in abundance, more than can be well supported, or that can be made economical and useful. But these are in a measure consecrated to the learned professions—to the privileged few—for they are privileged, inasmuch as they are the exclusive recipients of public bounty in the higher branches of learning. Productive labor derives little or no advantage from their teachings. Few of the youth who enter their halls ever seek for a livelihood in the laboring arts. They learn to look upon labor, as servile and demeaning, and to seek their level in what they consider the *higher classes* of society. They do not go to these schools to *learn to work*, or to *learn to live by work*,—in the common meaning of these terms—but to *learn to live without work—above work*. They are virtually withdrawn from the producing classes. These young aspirants flock to the learned professions, and the genteel employments, as the avenues to honors and office; and notwithstanding that labor is taxed heavily, in one way or another, to supply their real or imaginary wants, yet the *genteel* professions have become so overstocked, and the threshold of power so thronged with supplicants, that hundreds and thousands are thrown back, as parasites upon society, exhibiting the melancholy spectacle of men, born to be useful, but unable, or unwilling, from the bias of a wrong education, to become so. Had these men been taught to look upon labor, as it truly is, a necessary, healthful, independent, and honorable employment, *and been instructed in its principles and its practice*, while young, they would have cherished its interests, respected its virtues, and cheerfully shared in its toils and its pleasures. We seek not, by these remarks, to pull down that which is, but to build up that which is not. It is not that we love a part less, but the whole more. We would raise the standard of labor, without depressing that of literature.

We have common schools too, munificently endowed, where all may acquire the *rudiments* of knowledge, but the rudiments only. They teach nothing of the sciences which are necessary to the successful prosecution of the arts—and give no instructions in the best models of practice. They neither learn the boy how to provide for himself, nor fit him for extensive usefulness. They lay the foundation, but they do little to build up and beautify the temple.

We find in the London and Westminster Quarterly, in an article on the means of lessening the evils of pauperism, some very apposite remarks upon this subject, which we here transcribe:

"We advocate," says the Review, "both for England and Ireland, the necessity of a national provision for the moral and industrial training of the young. In the old we cannot hope for much improvement. But the new generation springing up might be modelled to our will. Schools are wanted; but not such as are now spreading over the country, to teach a little reading and writing, as if that embraced the whole business of life, and the whole duty of man—schools in which both boys and girls should learn to employ both their heads and their hands—in which they should be taught practically the use of various tools, and in which such general information should be imparted, relating to different branches of industry, (the rights and duties of citizens,) and the resources of other countries and their own, as would enable them to begin to mount the uphill path they would have to climb in after life, with a heart full of hope, and with a spirit of energy and intelligence which no difficulties would overcome."

Who will tell us why it is, that classic schools, available only to those who design to live without labor, are made the special and exclusive objects of legislative bounty, in regard to the higher branches of instruction? Why is it, that six or seven thousand youths, which is about the number in our colleges and academies, should receive gratuities from the public treasury, till the aggregate exceeds three millions of dollars, to enable to live without work, while half a million of other youth, with like capacities and like claims, destined to labor, and to augment the resouces, the wealth and the happiness of their country, are denied a miserable pittance, in the higher branches of knowledge, to qualify them for their more important duties in society? Is not knowledge as beneficial to the arts of labor, as it is to the learned professions? Is it not as efficiently and beneficially applied in developing the riches of the earth, in perfecting the mechanic and manufacturing arts, and in augmenting the products and profits of labor generally, as it is in the warfare of party politics, in the chicanery of the law, and in prolonging unprofitable debate in our legislative halls? May not natural science be as profitably studied and applied on the farm, where nature is constantly presenting new subjects of illustration and appliance, as in the town or in the closet? Is not chemistry, which instructs us in the nature and properties of all bodies, as useful to the farmer, in ascertaining the qualities of his soils, and their adaptation to particular crops, and in regulating the multifarious operations of husbandry,—and to the artizan, in managing his various processes,—as it is to the lawyer, the statesman, or the divine? There is probably no employment in life that embraces so wide a scope of useful study, as that of cultivating the soil. The great use and end of science is to improve art, to impress us with a sense of our obligations to God, and of our duty to man. In truth, science belongs to, and constitutes an integral portion of the arts, and cannot be divorced from them without throwing us back into a state of semi-barbarism, such as now debases a great portion of the population of the old continent. Why then teach science exclusively to the few, who have comparatively so little use for it, and withhold it from the many, to whom it would be a help and a guide?

We look to Europe for precedents, and blindly adopt some that are prejudicial, as well as many that are good. We forget that we are a new people in government, manners and laws, and that there is no country which will serve us our model in all cases. The education bestowed upon the working classes in Europe is designed to qualify them for the subordinate stations in society—for labor and obedience, as *subjects*. There governments recognize a privileged class—who are the owners of the soil, and live upon the labors of the many. The working classes have very little to do with the affairs of government. Here all are professedly upon a footing of equality. All enjoy political rights, and have political duties to perform—and all should be equally favored, so far as the public bounty is dispensed in the means of obtaining useful knowledge, and of acquiring wealth and honors. We should take care to have good farmers and good mechanics, as well as good lawyers and good doctors. We want not only good *subjects*, but intelligent *freemen*—high-minded, independent freemen, "who know their rights, and knowing, dare maintain them." We wish to keep the fountains pure, that the stream of power may not become defiled. We wish to base our political and social fabric upon a rock, steadfast and sure—upon the intelligence, industry and moral rectitude of the great working community. When this class shall cease to exert a healthful and controling influence in political affairs, our boasted freedom will be at an end. A privileged class, whom the bounty of government has assisted to arm with exclusive power, will control and direct the political machine, as may best subserve their aggrandizing views, without regard to the common weal. Ambition is the same in all ages and countries. Man loves power, and is corrupted by it; and in its prolonged exercise, the servant will ever swell into the master. Our freedom can only be securely guarded by the vigilance of an enlightened, independent, prosperous yeomanry.

Men have tried all sorts of expedients. for thousands of years, to obtain wealth and happiness; and after all, it has become pretty evident, that there is no course that wears so well—that is so self-approving—that is so certain in its success; that gives so much health, contentment and independence—the substantial elements of happiness—as manual industry, tempered and directed by a cultivated mind,—be it in the learned or laboring professions. The consciousness, that we are not only providing for ourselves, and those naturally dependent upon us, but that we are doing good to society, and thereby fulfilling one of our highest moral obligations, is a rich source of enjoyment, which the indolent and dissipated must ever remain utter strangers.

We say, therefore, that we want schools of moral, industrial and scientific instruction for the working classes of society—that these classes are entitled to them—and that their establishment would conduce alike to the prosperity of the country, and to the perpetuity of our political and religious freedom

From the Mechanic's Magazin

MR. BURDEN AGAIN.

Nature appears to have invested few individuals with that quantity and kind of intellect which is necessary to invent useful improvements; and the time and study of inventing and perfecting, and often the pecuniary expense of putting them into practice too frequently subject their inventors, though the most useful class of people, to poverty; and ungrateful neglect and cold contempt are often the reward of the person whose talents have conferred more benefit on mankind than could have been effected by the hard labor of thousands or perhaps millions. These circumstances cannot fail to be a subject of regret to a person whose mind is capable of appreciating the value of those services, and it is, therefore, commensurately pleasing to meet with the rare occurrence of an inventor of the first order, who has the talent to command from the public, the remuneration, both in money and respect which is so justly his due.

Such is the individual whose name is at the head of this article, which is not designed so much to gratify his independent mind as to encourage others to imitate his example. When in very moderate pecuniary circumstances, his invention of making wrought iron spikes, which he put in immediate practice render his own inspection and for his own emolument, together with his usually industrious application to business, raised him in a short time, not only above want, but to a handsome degree of independence.

But notwithstanding his necessary attention to an extensive business, he found time to invent and arrange the plan of a boat which he was convinced would effect an important improvement in steam navigation. Instead of making this the subject of stock jobbing and hollow speculation, he determined to test its value at his own cost and risk, though it would incur an expense beyond the ordinary means of a common individual. It was vigorously and soon effected, and on experiment bid fair to realize his strongest anticipations. But an unforeseen disaster, arising from no defect in his boat, in a moment destroyed it and his hopes together. But he had the proud satisfaction, that the disaster involved no one's interest but his own, and that he was able to pocket the loss, without any sacrifice of credit.

In a short time, he astonished the public, and even the world, with his machinery for making horse shoes, which in the short space of a few hours, converted a ton of iron into those articles of very superior quality, and which has, probably, already much more than remunerated his loss, as it is not only supplying his own country with horse shoes, but the invention is already successfully established in actual use in several countries of Europe.

But as the mind is naturally inclined to revert to the source, where it sustained great loss or suffered any severe disaster, the subject of steam navigation, no doubt, presented itself at frequent intervals, in all the shapes which an inventive imagination could suggest. He is now once more before the public with a steamboat on a plan entirely original and differing altogether from his former boat and from any other in operation, and whatever minor defects future experience may discover, it is certainly possessing many and important advantages over any other boat heretofore constructed. It will possess far greater strength than could be obtained by timber or any other material by any other mode of combination. It will draw less water, probably by one third, in proportion to its length and burthen than any other boat in use; and its capacity for the accommodation of passengers will be at least equal to its improvements in other respects. It is now afloat on the water and will probably in a short time be in operation, finished and furnished in a style worthy of its character. As a description of the principles and form of this boat, in its present state of advancement, would perhaps be considered premature, it will not be attempted; at a proper time should an opportunity occur to examine it, unless previously given by some abler pen, it will be forth coming from

ARCHIMEDES.

Extract, the specification of Edward John Dent, of London, for an improvement of the balance springs of Chronometers.—Mode of preserving them from rust.

SPECIFICATION OF THE PATENT GRANTED TO EDWARD JOHN DENT, OF THE STRAND, IN THE COUNTY OF MIDDLESEX, CHRONOMETER MAKER, FOR AN IMPROVEMENT OF THE BALANCE SPRINGS, AND THEIR ADJUSTMENTS, OF CHRONOMETERS AND OTHER TIME-KEEPERS.—SEALED APRIL 23, 1836.

It is well known that the delicate spiral balance-springs of chronometers and other time-keepers, and their adjustments, are exceedingly liable to injury from oxidation or rust, both during the progress of their manufacture and when in use, and whereby they are not only subject to decay, but their rates of going or accuracy of performance is very considerably varied from time to time. Now this said oxidation or rust may either be caused by the moisture ordinarily contained in the atmosphere, especially in the in the sea air in voyages, or in countries particularly exposed to its action. Nor are chronometers only liable to suffer from these causes, but also from the perspired matter and the breath of the workman during the progress of their manufacture. Now it is the chief object of my invention to prevent, as far as possible, the said oxidation or rust, by coating or defending those delicate parts of chronometers with a coating or varnish, sufficiently flexible to allow the perfect free action of the balance-springs, and yet capable of preventing the action of moisture or saline and other vapors to which they are liable to be exposed. And I hereby claim as my invention, and the object of this patent, the use and application of any fit and proper flexible defensive coating or varnish to the more effectual prevention of oxidation or rust in the balance springs and adjustments of chronometers and other time-keepers. In order, however, to afford an example of the best means I am acquainted with for carrying my said invention into effect, I will describe the composition of such a varnish or coating as I have found to answer the purpose completely.

"I take half an ounce by measure of pure spirits of turpentine, and put to it forty grains of camphor, and also add ten grains of bruised gum copal to the said mixture; I then heat it nearly to its boiling point, and keep it in that state for two hours. I then filter the mixture through cotton, or other proper substance. This varnish should be kept in an air-tight bottle, closed by a glass stopper, the mouth of it being sufficiently large to admit the balance-spring and its adjustment, which are to be put into the bottle in a dry state, and free from oil or grease, and after being completely immerged in the varnish, are to be carefully drained before they are removed from the bottle. The balance-spring and its adjustment must then be placed into a temperature from 200 to 300 degrees of Fahrenheit's thermometer, and be kept therein from six to eight hours. I would remark that in place of using pure spirit of turpentine and camphor, I prefer to use half an ounce of an oil found in portable gas reservoirs, when that oil can be obtained; but as portable gas is now but little employed, and is going out of use, the materials I have above described will be found to answer well, and may be readily obtained from chemists, care being observed in obtaining pure spirits of turpentine.

(From the Genesee Farmer.)

BARTRAM BOTANIC GARDEN.

MR. TUCKER,—In conformity with my promise to you when at Rochester in the month of May, I purpose occasionally sending for your pages such matter as I may deem worthy of notice. I flatter myself the following observations respecting the first botanical establishment ever attempted in America, its founder and his successors, with its present state in the scale of Botany and Horticulture, will be acceptable to many, particularly the gardening portion of our readers.

Bartram Botanic Garden is situated on the west banks of the river Schuylkill, about three miles from Philadelphia. It was established by that venerable and enthusiastic naturalist, John Bartram the elder, in the year 1720. The worthy founder of these gardens discovered in his early youth a love for philosophy and natural history in general. He was however particularly drawn to the study of botany from considering the importance of vegetables in the practice of medicine, and their indispensable use in various departments of human economy. But at that time botany was but little attended to in America, and in the old world the works of the great Linnæus had not appeared; he had therefore no other aid in studying the great book of nature than his own persevering genius. His view in the establishment of the garden was to make it a deposit of the vegetables of the United States, (then British Colonies,) as well as those of Europe and other parts of the world, that they might be more convenient for investigation. He soon furnished his grounds with the curious and beautiful vegetables in the environs, and by degrees with those more distant, which were arranged according to their natural soil and situation, either in the garden or on his plantation, which consisted of between 200 and 300 acres of land, the whole of which he termed his garden. The novelty of this horticultural scene attracted the notice of the ingenious and curious, and coming to the knowledge of Europeans, several scientific men in England, particularly of the Royal Society, united to encourage the founder to undertake journies towards the western frontiers, in order to discover and collect various non-descript productions in nature, particularly vegetables, that they might be sent to Europe.

From the American edition of Rees's Cyclopedia, [illegible] Mr. Bartram corresponded with *Linnæus, Lord Petre, Sir Hans Sloane, Dr. Fothergill,* and many other eminent men. The former said in one of his letters, that he (Mr. Bartram) was the greatest natural botanist in the world. He employed much of his time in excursions through the provinces, from the shores of Lake Ontario to the source of the river St. Juan in East Florida. He was appointed American Botanist to his Britanic Majesty George the Third, in which appointment he continued till his death in Sept. 1777, in the 76th year of his age. Mr. B. was a native of Delaware county, Penn. John, the youngest son, succeeded his father as proprietor of the Kingsess Botanic Gardens, but they were chiefly under the superintendence of his brother, Mr. Wm. Bartram, well known in the literary world by his travels in East and West Florida, the Cherokee country, &c., &c., who accompanied his father on many of his extensive botanical tours, and who seems to have inherited his unwearied zeal and vigorous capacity for that sublime science. The fame of this gentleman extended to both continents; in his sphere he was one of the most useful men in America; his knowledge was acquired by incessant bodily labor; the fields of natural science in his days were unexplored, and he resorted to the study of nature where she unfolded her works to the senses as the only true source of knowledge. To this gentleman we are indebted for the discovery of many new and rare plants, and among others the *Franklinia Altamaha,* (Gordonia pubescens,) a beautiful tree so called in honor of Dr. Franklin. At the solicitation and expense of the celebrated Dr. Fothergill of London, he made excursions to the Floridas and to the western parts of Carolina and Georgia, in search of rare and useful productions of nature, but chiefly of the vegetable kingdom, to which gentleman he sent his collection of plants, dried specimens and drawings. The work already alluded to was the result of these travels. This work was published almost simultaneously in Germany, in Dublin, (Ireland,) and the United States.

A few minutes before the death of this enthusiastic admirer of nature, he wrote an article on the natural history of a plant, and in rising from his desk to take a morning view of the botanic grounds, he had only proceeded a few steps from the door, when he burst a blood vessel, which suddenly closed his useful life, July 22, 1823, in the 85th year of his age.

The gardens are now in the possession of Col. Carr, to whose indefatigable exertions, aided by that of Mrs. Carr, the gardens owe their present celebrity, for they are the admiration of every visitor, whether native or foreigner. Mrs. Carr is the daughter of John Bartram the younger, but to speak in just terms respecting her enthusiasm for plants, (which is only equaled by her success in their cultivation,) is a task I am incompetent to perform, for I am not possessed of words which could convey in the most remote degree the passionate fondness with which she toils among the plants, and in every department, from the earliest dawn until darkness renders her operations impracticable. Mrs. Carr's botanical acquirements place her in the very first rank among American botanists. Her knowledge of American plants is most extensive, not surpassed, if equaled, by any one in the United States. But to this lady and her uncle, Mr. Wm. Bartram, the world is under another deep debt of gratitude, for it was to the friendly conversations and instructive communications of the latter that Alexander Wilson, my countryman, first imbibed, or at all events carried his passion to such an extent for the native birds of America. To the former (Mrs. Carr) he was principally indebted for his knowledge of and his proficiency in drawing. To their combined efforts we are indebted for his American Ornithology.

In examining Bartram Botanic Garden, one characteristic feature will be obvious to the most inattentive observer, viz: the large specimens of various trees planted by John Bartram, the elder, and his son Wm. Bartram. While on a visit to the garden in the month of November, 1831, I was forcibly struck with their magnitude, (see Loudon's London Gardener's Magazine, vol. 8th, page 284.) but then, and on several succeeding visits, I could not dedicate time to ascertain their exact dimensions; however, with the assistance of Mr. Carr, Jr., I have recently been enabled to gratify myself on this point, having accurately measured thirty distinct species, the dimensions of which were as follows:

No.		Circumference. feet.	inches	Height. feet.
1.	Æsculus flava,	6	4	90
2.	Ailantus glandulosa, (25 years old.)	4	2	55
3.	Andromeda arborea,	3	10	60
4.	Bignonia radicans,	3		
5.	Buxus sempervirens—*vel. variegata.*	2	6	25
6.	Castanea pumila,	2	9	
7.	Cercis canadensis,	3		35
8.	Chionanthus virginicus (one limb of.)	2	6	20
9.	Cornus florida,	2	9	30
10.	Cupressus disticha,	23	9	123
11.	Cyrilla caroliniana,	2	1	
12.	Diospyros virginica,	5	7	70
13.	Gordonia pubescens, (Franklinia)	3	8	52
14.	Gymnocladus canadensis,	5	2	80
*15.	Dirca palustris,	25	6	6
16.	Halesia tetraptera,	4	0	45
17.	Juglans olivæformis,	4	6	70
18.	Magnolia acuminate,	6	3	80
19.	——— auriculata,	4	1	59
20.	——— tripetela,	3	0	35
21.	Morus rubra,	4	1	40
22.	Pinus microcarpa,	4	4	
23.	—— picea,	5	5	85
24.	—— resinosa *vel. rubra,*	4	9	75
25.	Porcelia glabra,	1	10	30
26.	Quercus alba,	12	0	80
27.	——— heterophylla	3	9	50
*28	Rhododendron maximum,	45	0	15
*29.	Stuartia virginica,	60	0	20
30.	Thuyra occidnetalis,	3	5	40

☞ Those marked with an asterisk were measured round the branches, and the whole for the circumference were measured about 6 feet from the ground.

As before mentioned, the gardens are situated on the west banks of the Schuylkill river, about 3 miles from Philadelphia, and contain about eight acres of ground, compactly filled with the choicest ornamental trees, shrubs and herbaceous plants, properly located in their natural soils and altitudes as far as practicable. The mansion and green houses stand on an eminence, from which the garden descends by gentle slopes to the river. From the mansion are distinctly seen the winding courses of the Schuylkill and Delaware, with the broad spread of meadows and cultivated farms up and down those streams. Beyond these there is an interrupted view of the Jersey shore, from the eastern to the southern horizon. The whole comprehends an extensive prospect, rich in the beauties of its scenery and endless in diversity.

The exotic department in the garden is very extensive, and comprises the following houses.

	Length. feet.	in.	Width. feet.	in.
1. Green house,	50	0	30	0
2. Orange house, &c.	30	0	15	0
3. Geranium house,	65	0	11	6
4. Propagating house,	21	6	11	10
5. Rose house,	49	0	13	6
6. New Holland and Stove,	68	0	14	0
7. Geraniums, roses, &c.	26	6	10	6
8 and 9. Rose Pitts,	63	0	7	0
10. Cactus house,	29	0	8	0

No expense is spared in procuring every desirable notice for the exotic department, and in the Geranineæ, Camellieæ, and Cacteæ, this garden is par icularly rich. Independent of the Botanic Garden, there is a very extensive Nursery connected with this establishment, occupying upwards of 12 acres, compactly filled with choice fruit trees, ornamental trees, shrubs, &c. Col. Carr has, by the most indefatigable exertions, imported the choicest varieties of fruit trees from the different horticultural establishments in England, France, Germany, &c. Col. C. not only imports scions of all that is rare and valuable, but also trees for immediate sale, the demand for fruit trees in the western country being much greater than the existing establishments can supply. The unwearied zeal of the proprietor renders his nursery inferior to none in the United States, as respects the variety of fruits, ornamental trees, shrubs, &c. The whole establishment does great credit to the owner, who is universally respected, but not more esteemed for his laudable exertions and correctness in the various department of his establishment, than for his amenity as a gentleman.

Immense quantities of seeds collected in this garden from the old specimens are annually exported to Europe. The garden is the resort of the Philadelphians, the casual visiter, and in fact of the tourist in general—they command universal admiration. In fact, the great variety they contain of the choicest American shrubs—the enormous magnitude of many, and the extensive collection of exotics, must prove as a source of attraction to the amateur, and an interesting field for the scientific. But to convey an idea of the estimation in which these gardens are held, I may here mention that the Philadelphia and Baltimore railroad, now constructing, as originally planned, would have gone through the very center of the gardens, and sacrificed the most splendid of the specimens, but the railroad company, with a desire to preserve them entire, altered the route at an additional expense to themselves of 10,000 dollars. Such a magnanimous act was highly meritorious, and deserves the gratitude of an American public.

Col. Carr corresponds with many scientific gentlemen in Europe, and in North and South America, consequently the garden is a depot for all that is rare and valuable.*

I am, dear sir, yours very truly,

ALEXANDER GORDON.

Philadelphia, July 3, 1837.

* It is I understand the intention of Col. Carr to dispose of the gardens, green houses, &c. Should he meet with any gentleman who would preserve them entire, or if the Philadelphia Hor. Soc. would purchase them, he would make a considerable sacrifice. To any gentleman devoted to Botany what an opportunity here presents itself, and it is sincerely to be hoped that either the Society will purchase them, or that some amateur will step forward and possess himself of this rich and charming establishment. A. G.

PRACTICAL DRAINING.

In this coun'ry, but little and very partial attention, has, as yet, been paid to the important subject of draining lands. The loss from this neglect, would, in a single year, be found to be immense, even in our cultivated districts. Land having an excess of water is comparatively good for nothing—all grain crops fail, and grass, however luxuriant it may be, is of inferior quality. This is the season of the year in which drains should be made. Information on this subject is much wanted. To supply this in part, I would direct the readers of the Railroad, to the 6th and 7th numbers of the Rural Library, published at 79 Barclay street. In these is published an excellent work, entitled The Practical Drainer, with Directions for straightening water courses, protecting river-banks, and embanking. By George Stephens. The work contains numerous engravings. I make the following extract

From the Practical Drainer.

DRAINING.

The importance of draining, previous to the commencement of any other improvement in agriculture, being acknowledged by every cultivator of the soil, it is of the greatest consequence that these undertakings should be conducted on principles which will insure complete and permanent success. The full advantages of this primary improvement can only be obtained when it is well done. It is, indeed, the mother of all other improvements in land; and, to make it effectual, it is necessary that the qualities of the soil, the nature of the ratification, and the laws that govern the rising and running of water, should be taken into consideration. Any drainage, not conducted with due regard to these, however apparently successful at first, will, in the end, turn out a complete failure If the work is executed in an insufficient manner, it will often be attended with more expense to remedy the evil than the first outlay, and the operations being concealed under ground, the defects cannot be discovered until a great loss has been sustained.

If landed proprietors were alive to their own interest, they would assist their tenants to ang reasonable extent, in draining on the best principles and in the most substatial anner; for, when properly executed. it is equally as aduantageous to the proprietor as to the tenant; and it must be of the highest importance that the interes of both parties should be combined, by performing the work in a complete and permanent manner, as land that is imperfectly drained can never produce crops, either in quantity or quality, equal to land that has been properly dried."

GENERAL PRINCIPLES OF DRAINING.

Wetness in land proceeds either from rain water lodging on the surface or from subterraneous water confined in the bowels of the earth, which, by its own pressure, forces itself to the surface in the form of springs. On tenacious clays that are nearly level, wetness is often produced by the first of these causes, but it much more frequently proceeds from the latter. It is necessary to be able to distinguish from which of these causes the wetness proceeds, to ensure success, (for *surface draning*, when the water is subterraneous, can only alleviate the effect, in place of removing the cause,) to accomplish which, requires no small extent of knowledge of the nature and source of springs.

The earth is composed of strata of very various kinds, which, when applied to draining, may, without regard to their other characteristics, be divided into two classes, viz., *porous* and *impervious*. All those kinds of strata whose less coherent essential parts receive water freely, and through which it runs with ease, such as rotten rock, gravel, sand, and loamy clays, are called *porous*.—On the other hand, tenacious clays, and a certain kind of gravel, having a proportion of clay in its composition which, by binding the small stones together, renders it equally as impervious as clay itself, and such rock as is of a close and compact nature, without any fissures in it, are the principal strata that resist the reception of water, and are therefore called *impervious*. Springs undoubtedly originate from the rain and snow water subsiding through porous strata, till it meets an impervious stratum that prevents an obstruction to its further descent, and here forming a reservoir or considerable collection of water, it is thus forced either to filtrate along such a substance or rise to the surface, where it oozes out in those different ways that are so frequently met with. When the stratum which contains the water composes part of a hill or rising ground from which the water has descended, it will force its way to the surface wherever it finds the easiest passage; this is sometimes by a natural outlet, but often this is not apparent, and it is confined so near the surface as to injure it by constant moisture, or by oozing imperceptibly through any such pores in the soil. The great object, therefore, in draining is to cut off entirely the source of the springs of subterraneous water, which causes the wetness, by flowing over the surface or being confined beneath it. This was discovered by Mr. Elkington, whose leading principles are, *first*, to find out where the water lies in different soils and situations, and under what circumstances; *second*, to lay out the drains so as most effectually to remove the water; *third*, to make the drains the most perfect for this purpose, either by digging alone, or by digging and afterwards boring in their bottoms with an auger—the chief object being to dry the ground effectually and at the least expense. When the subterraneous water lies at such a depth that the level of the outlet will not admit of a drain being cut so deep, or where the expense would be too great, the auger is used to make bore-holes in the bottom of the drain, through which the water rises by its own pressure.—The truth of the principles of this system of draining has been proved by the extraordinary results which have attended it, not only in this country, but in others, as will be seen by the annexed account of draining in Sweden. By it not only the land that was intended to be drained, but also springs, wells, and wet ground at a considerable distance, with which there was no apparent communication, have been made dry.* As, however, the whole demust be obtained before any of the operations are commenced, which will be fully explained in the following details of the different cases.

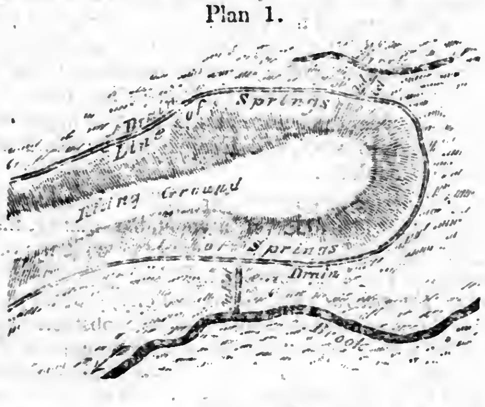
DRAINING HILLY AND SLOPING GROUNDS.

Before commencing any operation on land of the above description, it is necessary to examine the quality and inclination of the strata of the adjoining high grounds, and the connection they have with the land to be drained, in order to judge where the water lies. The best way to ascertain the inclination of the strata is, by examining the beds and banks of the nearest rivers, and any old pits and quarries in the neighborhood, and then sinking pits or boring in the ground to be drained. Rushes and other aquatic plants appearing on the surface, may facilitate the investigation, but these being also produced by stagnant water on the surface, where there is no spring, cannot be depended on in cases where more minute precision is necessary.

If the *impervions* stratum immediately under the *porous* one lies horizontally through the hill or bank, the surface of the ground below the level will be wet on both sides of the hill, and the upper side of the wet surface will be found nearly on a level all the way round. When this is the case, and the hill or bank is composed of gravel or rotten rock, a drain properly conducted along one side of the hill will carry off the water that breaks out and causes the wetness on both sides. But if the stratum of which the hill or bank is composed is a substance of a less porous nature, such as very fine sand, through which the water requires a considerable time to filtrate, the drain must be carried round the hill, near the upper side of the wetness, otherwise a complete drainage will not be obtained in wet seasons, when every part of the porous stratum is full of water. (See plan 1.)

It very frequently happens on sides of hills and sloping grounds, that several lines of springs break out and cause wetness to a considerable distance below, with intermediate spaces of dry land between them; in such cases, it is of the greatest consequence to

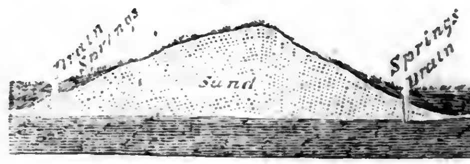
Plan 1.



*The author experienced a case of this kind lately in draining some fields for Lord Willoughby de Eresby, in Lincolnshire, where a well, in the possession of the tenant, about a mile distant from the operations, was completly drained.

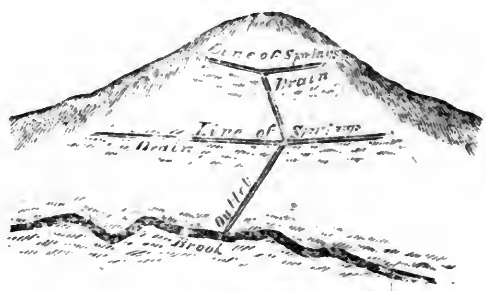
pends upon the situation of the ground and the nature and inclination of the strata of the adjacent country, a knowledge of these

Section.



ceeds from the same stratum or from severl distinct strata. If it is from the first of these causes, which is very seldom the case in hilly lands, the greatest quantity of water will issue from the low ascertain whether the water causing these lines of wetness est springs, and in dry season the upper ones will be dried up; in this cose the drain should be directed along the lower line of springs, as shewn in plan 1, which must be made of sufficient depth to cut off the water from the land below. When, however, the springs come from different strata, having no communication with each other, which most frequently is the case, a drain must be carried along the upper side of each line of springs, as shown in plan 2, deep enough to cut through the porous stratum, or to

Plan 2.



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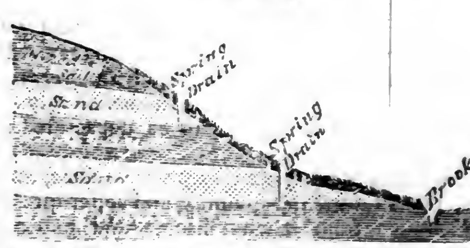

free the land from superfluous moisture to such a depth as will prevent it injuring vegetation. Sometimes the upper line of springs causes the whole of the wetness below, by the water, after having run over the surface for some distance, sinking into the soil and breaking out again farther down the declivity, or where from the inclination of the ground, it may collect itself. When this happens in a steep bank, and the water gets into the loose earth, it causes the bank to slip, and it therefore is of the greatest importance that this fact should be ascertained before the commencement of the operations, as when such is the case, the drain must be made across the slope, further up than where the water makes its appearance, in the sound ground that has undergone no change; and, if it is made deep enough, the real spring will be intercepted, and the bank secured from slipping.

From the Genesee Farmer.

QUESTIONS RESPECTING THE ECONOMY OF CUTTING UP CORN—TOPPING CORNSTALKS SHOULD NOT BE PRACTISED.

It has we think been sufficiently ascertained, that when corn is injured by an early frost, cutting it up contributes nothing to its relief, and nothing to its subsequent improvement. It is we think better, in such cases, not to molest it, for unless the frost be a very deadly one, the corn will still derive nutriment from the stalks and leaves. There is another question related to this which we think merits the attention of agriculturalists. The question is this: Is it, in general, good practice to cut up corn at all, or to cut up the stalks while the ears are attached to them? We are not for war, and if we were disposed to answer this question in the negative, we should scarcely dare do it, knowing as we do that this would bring us into conflict with almost universal opinion. We will, however, suggest certain considerations, and leave the question to be adjudicated and settled by our readers.

1. Cutting up corn at any time before the leaves are fully dead, does undoubtedly injure the crop in some degree, affecting it probably both as to quantity and quality.

2. When corn is cut up, and the stalks secured in the best manner they can be, it rarely fails that some of them get down, and thus both the corn and stalks are damaged by exposure to the weather. If it were not so, the large butts and stems of the stalks are of little value for fodder, for no sort of stock will eat them, unless compelled to it by dire starvation.

3. If the stalks be left standing in the field, cattle will consume quite as great a portion of them in the field after the corn is gathered, as they would if they had been cut and gathered to the barn.

4. As materials for dung, stalks cannot be disposed of to better advantage than to be allowed to remain where they grew, and there be mixed with the soil, as is usually done by subsequent tillage.

5. Cutting up and securing a well grown crop of corn, is a heavy and toilsome labor, involving, together with the subsequent ingathering of the stalks, no trifling item of expense.

If these things be true, is it, in general, good practice to cut up corn at all? In times of threatened scarcity of winter feed for stock, it may be, and probably is, wise and prudent to do it. It may too be profitable to do it, in the vicinity of cities and large villages, where fodder commands high prices.

In agitating the question thus far, we have supposed that the stalks, if they were cut and gathered to the barn, were to be given to stock, without further cutting, or any other preparation. In the case of farmers who have good cutting machines, and intend by cutting to prepare their stalks for the use of animals, the question may assume an entirely varied aspect.

With a few occasional exceptions, our practice for several years has been, to let our corn remain unmolested, until the time of harvesting it. Sometimes we have cut up and gathered the stalks, after the corn had been separated from them. This, when corn is harvested early, can be done to advantage, and if cutting be practiced at all, we think this is the better way. More generally we have left our stalks to be depastured in the field where they grew.

The advantages of practicing as we have done, are supposed to consist, 1st. In a greater quantity and better quality of corn. 2d. In exemption from much toilsome and expensive labor. The only loss known to result from this practice, consists in the inferior quality of the stalks to be consumed as fodder. It does not appear that, as to quantity, there is any loss, for cattle will consume as great a portion of the stalks, while depasturing in the field, as they would if they had been cut, as is usually practiced, and given out in the barn yard. Neither does it appear that any thing is lost, in connection with the economy of manures. Or if there be any loss in this article, certainly it is very small.

We offer these remarks for the considerations of farmers. The question is, are the advantages which, in ordinary cases, result from cutting up corn while yet in a state of imperfect maturity, sufficient to balance the damages which it does to the crop, and the expenses of doing it?

Hitherto we have said nothing relative to the practice of topping cornstalks, which formerly prevailed almost universally, and prevails now to some extent. The economy of this practice has been the subject of so many experiments, and so much light in regard to it has of late been gained, and disseminated in the public journals, that it seems scarcely necessary to reagitate the subject. By many well conducted experiments, it has been proved most conclusively, that topping the stalks of corn, while as green as to be worth topping, essentially injures the crop, often causing a reduction equal to one fifth of its value. Among enlightened farmers, the practice of topping has fallen into general disrepute, and as it is most clearly an unprofitable practice, it should be entirely abandoned. DAN BRADLEY.

Marcellus, Feb., 1827.

From the New York Farmer.

I have read with much attention and pleasure, the useful information contained in your late No., relative to ***poudrette.*** In France it is an article of great value, and a source of much profit to the companies vested with the exclusive right (disposed of at auction) of cleaning the privies in large cities.

Some sixty years ago, Paris was in a state of shocking filthiness, and the police by no means as well directed as at present. Fountains furnishing throughout the day, streams of pure and fresh water—sewers of ample dimensions (6 feet deep and 5 feet wide,) emptying into the river; companies appointed to sweep and clean the streets every evening before ten o'clock, and to make a proper disposition of the manure, were not then in existence. The streets were narrow and badly lighted, and that part of Paris, yet called the ***City****, would give but an imperfect idea of what the whole metropolis was before the revolution.

M. Boursault, who had been unsuccessful on the stage of one of our minor theatres, was the first man who entertained the idea of regulating and improving the administration of this department of the police. He solicited from the Corporation the use of a piece of ground, where the daily produce of the city might be deposited until converted into good manure, his plan being founded upon free ventilation and action of the sun, required a large space of ground. He was authorised to use the ***Petit Pantin*** better known as ***Mont faucon*** and that place has since been the rendezvous of all manufactories of dangerous and disagreeable nature, horse and dog slaughter-houses, &c.

For several years M. Boursault carried on his business to the general satisfaction, and to the benefit of agriculture, he made an immense fortune which he used nobly. The garden of his Hotel in the faubourg Poissonniere, is one of the first in France, and contains a collection of roses superior to that of the Royal Garden of Plants. Open to all strangers and amateurs it is as well known as the Hotel itself, whose saloons are frequented by the most agreeable society.

M. Boursault is now 70 years of age, and is yet very active and healthy. He still retains his early theatrical predelictions, and is one of the most constant visitors on the stage of the Theatre Francais and at the Opera.

If the Corporation thought it just and fair that he who had been a benefactor to the city should be allowed to enjoy the profit of the business he had so well organized, it was reasonable that his profit should not pass entire to his successors, and since M. Boursault has left the management of the general cleansing of Paris, it is every year given to the highest bidder as you term it, and is not left to adventurers as the Editor of the Farmers' Register states.

But as in society we constantly aim at perfection, the process which has been found so useful for 40 years, has become insufficient, and a positive nuisance. While the Corporation looks for another and more remote location, science has been consulted for a process that would dispense with so many reservoirs, the emanations of which are very disagreeable, if not dangerous, and even injurious to the manure prepared.

Long ago, M. Chaptal endeavored to remedy the mode of evaporation in the sun, but the suggestions of that great chemist were then only pursued in their application to the arts and manufactures, while his ideas on agriculture, though considered good and advantageous, were not so generallly admitted into practice. But the benefits of 20 years peace, and the general improvement have set many minds to work, and Chaptal will be found once more a benefactor of mankind.

You are perfectly correct Mr. Editor, when you say that a French chemist has found in a vegetable matter, the means of drying and pulverising in a few hours, the contents of privies.—The contracts that exist between the Corporation of Paris and the bidders of *the general cleansing* of the city, prevent the immediate application of the process—but as no such obstacle exists in New-York, I think you deserve credit, encouragement and protection, for your efforts to found in your city so desirable an establishment in which I wish you complete success.

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* The reader may form some notion of this Parisian five points when it is recollected, that it was built before carriages were in use.

From the Quarterly Journal of Agriculture for June.

The late period of receiving our foreign Periodicals prevents us from making further extracts for this number.

ON AN IMPROVED METHOD OF MAKING CLOVER HAY.

BY MR. JOHN PROUDFOOT, INVERESK.

[The Editor says that hay making is perhaps the worst conducted operation in Scottish husbandry, and the object of the Society in offering premiums for Essays on the best method of making both clover and meadow hay, is to urge the general adoption of a superior management in securing the crop of that valuable and nutritious winter provender. It is to be hoped that the success attained by the writers of the following essays will prompt other hay makers to adopt the practice described by them. A premium of Ten Sovereigns was awarded for this essay.]

The present practice of making hay in the neighborhood where I reside (and, I believe, it is much the same throughout Scotland) is liable to many objections. The chief of these are, 1st, That of allowing the grass to be "too ripe," as it is generally called, before it is cut. 2d, Allowing the grass to be on the ground till it either be rotted with bad weather, drenched with rain, or dried up by too long exposure to the sun.

The method I have adopted for the last three years is very simple, but, in my opinion, a very secure one for our changeable climate. It is as follows:—This year (1836) I commenced cutting a field of grass of ten acres, on the 1st of July, just when the flower was going off the rye-grass, which I conceive to be the true criterion for cutting. This field was sown down with 12 lb. of the best Dutch red clover, and 1 lb. of white ditto, with 2½ pecks of best Ayrshire annual rye-grass per imperial acre. It was a most excellent crop, and, as quick as five men could cut it down, women put it up close behind them in the following manner:—taking hold of the grass by the top, and placing it neatly round the left foot, keeping the foot *steady* in the heart of the handful, then tying a little band round the top, to keep it steady in the upright conical position, and when the foot is removed the aperture serves for a ventilator. Thus nearly all the surface of the grass is exposed to the air, and if the hollow cones are neatly put up, they will be almost safe from the weather, as, in case of rain, it runs off as fast as it falls.

If the weather is at all favorable the conical handfuls will be ready, in twenty-four hours, for turning out, and putting up into small cocks the same day; but they may, with greater safety be allowed to remain in the first position until ready for putting up into large cocks. I am of opinion that the less turning clover hay gets the better, as the oftener it is turned its value is deteriorated, more especially after getting rain.

One-half of the field was turned out of the handfuls, the other half allowed to remain until it was ready for being put into cocks and my manner of making cocks is this:—A man stands at the cock, to whom the women bring the handfuls, which he puts neatly up, always keeping the tops of them to the centre of the cock, in a direction sloping upwards, from him, so as the slope may throw off the rain. In thus carefully constructing the cock little vacuities will be left *between* the handfuls to act as ventilators, the influence of which will very soon render it proper to put the hay into larger cocks. In one week I had all the hay of the ten acres put into ricks of 130 or 140 stones, in which state I conceived it to be proof against *any* kind of weather,—indeed, were it not that purchasers were expected to take it "*off the rick*," it might have been put into the stack. I may mention, that the rain fell less or more almost every day, excepting on Sunday the 3d, and Monday the 4th, but on the 5th there was a severe thunder-storm, *and, notwithstanding this most unpropitious weather, I made nearly 4000 stones of hay in the finest condition, in one week from the time it was cut; and as to its quality,* I think I am not too bold when I say, that I am not affraid to challenge the county of Edinburgh.*

The great advantage of this system over the common one in a bad season is, that *one* hour's sunshine will have more effect in drying the hay than a whole day! I have this year seen hay lying on the ground for weeks together, and the aftermath growing up through it, which is destructive both to the hay and the second crop; but if the system which I have described *be followed out*, I will venture to say that the hay will not only be infinitely superior, *but in the end will be put up at less expense* than in the old system, under the most favorable circumstances.

I have also converted the second crop into hay over the same ground with equal success, notwithstanding the bad weather, and all the obstacles incidental to making a second crop of good hay.

* Testimonials of the superior quality of the hay were furnished to the Society by the author, from Sir John Hope of Pinkie, and William Aitchison, Esq. younger of Drummore.

HOW TO IMPROVE A POOR FARM.

RICHARD A. LEONARD, of Middletown, N. J. has furnished us an interesting account of his manner of improving a worn-out farm, and of the sale of its products the last year; and we regret that from the great accumulation of matter on hand, we cannot give his letter in detail. We are obliged to content ourselves with a brief abstract of material facts.

Mr. Leonard came into possession of 90 acres of cultivated but exhausted land, in May, 1833. In that year the sale of its products amounted to $550,88; in 1834 the sale amounted to $718,05; in 1835 to $1,125,04; and in 1836, notwithstanding the unfavorable season, and the failure of most of his staple crops, to $1,166,13—thus more than doubling its products, by judicious management, in three years. His expense during the last year, for labor, dung and freight, amounted to $254,72—thus leaving him a nett profit on the farm, of $912,41—or more than $10 per acre per annum. We will quote Mr. L's. statement of the means he adopted to thus double the fertility of his soil.

"My farm," says he, "was in so low a condition that it would not produce more than ten bushels of rye, or twenty of corn per acre; and as I had no other income but what I could make upon this poor farm I set about farming in earnest. I found it was in vain to attempt improvement without manure, so I contrived to get about 400 loads a year, 300 of which I made in the following manner. I have marl, though of very inferior quality. I cart about 100 loads of this into my barn yard, and by yarding my cattle upon it through the season, contrive to increase it to 200 loads. I also cart about 50 loads to my hog pen, on which I keep my hogs the year round. In this way I got 100 loads more, which is excellent for potatoes, corn, &c., and as my farm is situate near the bay, I obtain from New-York, annually, from 50 to 75 loads of the best stable dung, at about $1 per load on delivery, and by mixing it with the earth, &c., make up the 400 loads. By this treatment I find my land improve rapidly, and my income in like proportion. But I am sorry to say there are many farmers among us who are still pursuing the old land-killing system, scarcely making both ends meet. I might say something concerning the beneficial results of under draining, and of lime as a manure; but I conclude for the present."

This communication affords a worthy example of prudent industry and good management, and shows that even a poor farm, well managed, may be rendered more productive than many a good farm now is under bad management.—[Cult.]

ROOT CULTURE.

The root, and particularly the turnip culture, which has been extolled as the basis of improved husbandry in Great Britain, is rapidly extending among us; and we confidently anticipate from it the best practical results. Five years ago there was not probably two hundred pounds of ruta baga seed sown in the state: this year tons of this seed have been sown; and the culture of mangold wurtzel and carrots, has been also greatly extended. One seedsman has imported 26 cwt. of ruta baga seed, and this probably has not been more than a quarter, or a third, that has been sown. The supply has been exhausted, from Baltimore to Boston, and yet the demand has not been supplied. Our neighbor, Thorburn, has sold this season 1,500 lbs. ruta baga seed; 150 lbs. carrot do.; 100 lbs parsnip do.; and 150 lbs. mangold wurtzel do.; and, as indicating the extended culture of roots, and the advance of agricultural improvement, we add, that he has also retailed seventy cultivators; eighty drill-barrows; and seventy-five of Green's straw-cutters. We record thes facts as affording, in our mind, substantial proofs of a propitious change, and of the efforts to improve, which are now being manifested in our agricultural community. And from the spirit of inquiry which is abroad, and the general circulation of agricultural periodicals, we hazard little in saying, that the rising generation will be better farmers, and more enlightened men, than their fathers have been. Let every young farmer ponder upon these facts, and to stimulate him to honorable exertion, let him remember, that he who aims to excel, will at least attain mediocrity; while he who aims at mediocrity, will generally fall short of it. Cultivate the mind, as the sure means of increasing the profits of the hands.—[Cultivator.]

(From the Cultivator.)

THE WOOL MARKET.

As clipping time is near at hand, I have thought some remarks on the subject of wool would not be uninteresting to those who are engaged in sheep husbandry. I am largely interested myself, and with a view of learning the actual state of the market, I have just visited many of the manufacturing towns of Connecticut and Massachusetts.

In consequence of the extensive failures or suspensions of many of the large commission houses in New-York the manufacturers were more or less embarrassed. The losses of some were so great as to cause a failure, while others, witnessing the the storm around them, immediately stopped their mills and discharged their hands. The great majority of woollen mills are of this class, who stopped from expediency, more than necessity. They have worked all their wool and finished all their goods, and only wait for a change of times to start their machinery again.

Nearly every mill has on hand the cloths manufactured in the last four months, and they will not be sent to market till the fall sales commence, when fair prices will doubtless be obtained.

The stock of domestic woollen goods in Philadelphia, New-York, or even in the country, is not large. There is no difficulty from an over supply. It is well known that there will be few or no woollen goods imported this season, and our own manufacturers will have the entire benefit of the market.

The present state of affairs prevents the importation of either wool or woollen goods. The duties are required to be paid in *cash*, when imported, which now amount to almost prohibition. Indeed, since the bursting of the credit-system, as practised by importers, goods will hereafter, from necessity, be imported for cash. cash.

All these things will eventually help our manufacturers, by giving them the market of this country, quite as effectually as by an extensive tariff or duties.

June, 1837. Yours, &c. OSTEGO.

From the Cultivator.

THE HARVEST PROSPECT, has brightened surprisingly within the last six weeks. In the valley of the Mohawk, through which we have recently passed, we never saw crops look more propitious to the hopes of the farmer, than they now do, considering the backwardness of the season. The wheat, there, stands pretty well, and were it not for apprehensions from the grain worm, the prospect would be that of a good crop. Many of our readers abroad identify this insect with the hessian fly, and others with the wevil. It is neither. The hessian fly preys upon the stock of the wheat; the wevil upon the ripened grain, in the barn or in the bin; the grain worm destroys the wheat in the germ or milk. The spring grain and grass look very well, where any attention has been given to draining; and even Indian corn, though got in late, has come up well, and is of a good color. There has been an abundance—an excess of rain; and although "spring lingered long in the lap of winter," yet the warm weather in the last of and first of June has caused such a luxuriant growth, that if the coming month is favorable, and the nipping frosts of autumn are delayed, the corn crop will yet be a tolerable good one. The prospect of the crops farther west, we are happy to learn, is equally flattering. Abundant crops will do more to mitigate present evils, than a hundred banks. The truth is, that as a national family, we bought sixty-four millions of dollars more last year than we sold—and the sixty-four millions balance must be paid before we can have easy times—*must be paid from the profits of agriculture.* Banks enrich individuals—good crops the country—the whole country. Then let us "speed the plough," and honor and instruct those who guide it.

POUDRETTE COMPANY, or *Cleanliness, Health* and *Economy.* A Company will be organized in a few days, for the purpose of preparing this valuable manure. One of the main objects of the Company is to introduce an improved, or far less offensive mode of emptying sinks in this city.

The improvement consits in removing the contents *without exposure to the atmosphere. while on the way from the yard to the cart*, or *to the place of deposite*—and also avoids. and will *prohibit* the present practice of throwing 40 or 50 loads of filth *into the river every night.*

Shares in the Company are One Hundred Dollars each.—Every Subscriber will be entitled to appropriate as many bushels of manure annually, at *half the market price*, as he may subscribe dollars.

Those who may prefer not to subscribe to the company, and yet desire to contribute to its success, can do so by depositing *ten* or *twenty* dollars with the agent, which amount will be placed to the credit of the depositor, and entitle him to the services of the company in emptying sinks, at *five* cents the cubic foot, until the amount is thus balanced.

Information will be given, and subscriptions received, at the office of the NEW-YORK FARMER, No. 30 Wall-street, *basement story.*

☞ The Company *is now* organized. The chemical, and manufacturing department, will be under the care of Peter Barthelemy, Esq, who introduces the improved plan. The business generally, will be under the care of D. K. Minor, at the office of the *New-York Farmer.*

⁂ The last few numbers of the New-York Farmer contain several articles in relation to its use and value in *Europe.*

D. K. MINOR.

New-York, July 19, 1837.

Advertisements.

that the necessary arrangements may be made in relation to shafting, pullies, &c.

The Managers, in conclusion, cannot but express their belief that this Third Fair of the Mechanics' Institute, will exceed in variety and beauty of display, all previous exhibitions of the kind.

GEORGE BRUCE, *Chairm.*
WM. EVERDELL,
C. CROLIUS, JUN.
THOS. EWBANK,
RICHARD BRAGAW,
Executive Committee.

N. B. All articles for competition must be delivered to the Committee at Niblo's Garden, on the 23d September. Those for exhibition *only* will be received any day during the Fair, before 10 o'clock A. M.

—

RULES AND REGULATIONS.

1.—The Garden will be opened for the reception of Goods, on Saturday, 23d of September, from 6 o'clock A. M. until 9 o'clock P. M., and it is respectfully urged that all articles intended for competition may be sent in early in the day. Those articles intended for exhibition *only* will be received any day during the Fair, before the hour of 10 A. M.

2.—The Fair will open for visitors on Monday, 25th Septem. at 10 o'clock A. M., and continue open every day of the exhibition till 10 o'clock P. M.

3.—Competent and impartial Judges will be appointed to examine all articles presented, and premiums will be awarded on all such as shall be declared worthy.

4.—The Committee on Premiums, and all firms or partnerships in which they may be interested, shall be excluded from competition or the award of any premium.

5.—All persons depositing articles, either for competition or exhibition, must attend to have them registered by the Clerk, at which time they will receive a certificate, which will be required of them when the articles are returned.

6.—Proof of origin must be furnished if required, for any specimen offered for Premium.

7.—Depositors will receive a ticket from the Clerk, which will admit them and Ladies during the Exhibition.

8.—Arrangements will be made to exhibit, in operation, all working models that may be deposited—contributions in this branch are invited—a competent person will take charge of all models sent for the above purpose.

9.—The morning of each day, until fifteen minutes before 10 o'clock, shall be appropriated exclusively to the Judges.

10.—Members will receive their tickets of admission by applying at the Institute Rooms, any time in the week previous to and during the exhibition.

11.—All articles offered by Apprentices, will be received, and adjudged as the production of Apprentices—they must furnish a certificate of name, age, with whom, and the time they have served as apprentices.

12.—Articles subject to injury by being handled, should be secured in glass cases—and contributors are requested to have a person to take charge during the hours of exhibition—in the intervals, efficient measures will be taken to protect property.

GENERAL COMMITTEE.

George Bruce,	John Ridley,
John M. Dodd,	Silas B. Simonson,
James J. Mapes,	Thomas F. Peers,
Thomas Ewbank,	Thomas G. Hodgkins,
Wm. Everdell,	George L. Spencer,
C. Crolius, Jr.,	Peter Wemmell,
A. J. Mason,	Richard Bragaw,
Thos. W. Bartholomew,	Ab'm Peitch,
A. Storms,	Wm. H. Hale,
Wm. Ballard,	Wm. J. Mullen,
Henry Cunningham,	James Thomson,
John Harold,	Abner Mills,
Joseph Trench,	L. D. Chapin,
James D. Phyfe,	A. Cammeyer,
John H. Mead,	Hiram Tupper,
John Conroy,	H. B. Robertson,
Jordan L. Mott,	James Thomas,
Samuel Carter,	H. G. Stetson,
George F. Nesbitt,	Ferris Owen,
Henry Worrall,	N. Berry,
W. B. Worrall,	O. Whittelesey,
James B. Cummings,	M. W. Emmons,
James Frost,	J. S. Anderson.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its enagravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribors *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

					lbs.	
350 tons	2½ by	½,	15 ft in length,	weighing	4 $\frac{63}{100}$	per ft.
280 "	2 "	½,	"	"	3 $\frac{50}{100}$	"
70 "	1½ "	½,	"	"	2½	"
80 "	1¼ "	½,	"	"	1 $\frac{25}{100}$	"
90 "	1 "	½,	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front st.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires, Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires, Axles of best American refined iron, Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N. Y.
51tf

TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad
16—6t

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of this kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squaki hill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 Feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rochester, Jan 12th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice. the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836 Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleeckerstreet, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. 25tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersunk heads suitable to the holes in iron rails to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone

The work contracted for must be finished by the 1st day of July, 1838

Persons desirous of obtaining work are requested to apply at the office of the undersigned in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July

CHARLES ELLET, JR.
Chief Engineer Jas. Riv. & Ka Co.

P. S.—The valley of James river above Richmond is healthy.

16—10t

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May; Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the company.

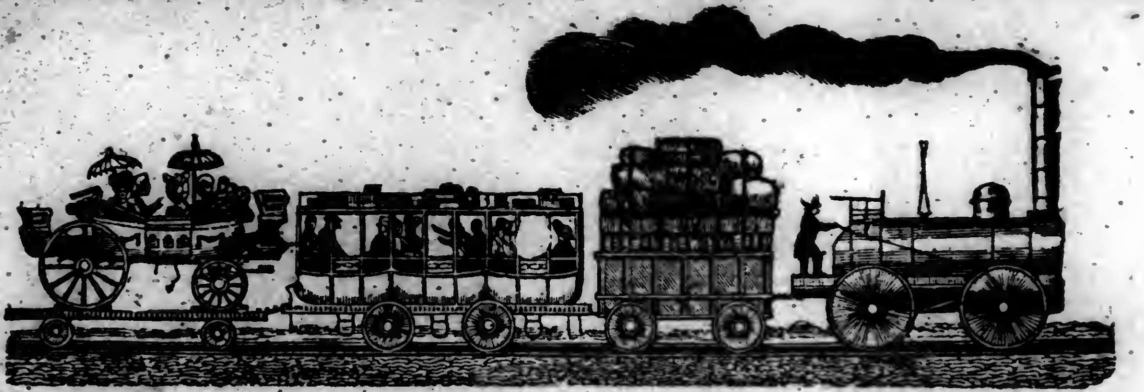
ANDREW ALFRED DEXTER, Chief Engineer.
Selma, Ala., March 20th, 1837. A 15tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 1y 14



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, AUGUST 12, 1837. [VOLUME VI.—No. 32

AMERICAN RAILROAD JOURNAL.

NEW-YORK, AUGUST 12, 1837.

CONTENTS.

The following communication gives us what we desire to receive from every Engineer—*precise* information in relation to an important work, which will be useful to many of our readers. We are truly obliged to W., and desire him and others to repeat such favors:—

To the Editors of the Railroad Journal.

Thinking it probable that a description of the Tunnel on the Philadelphia and Reading Railway might prove interesting to some of your readers, I have drawn up a statement of the most important facts relative to that work, which is at your service should you deem it worthy of a place in your Journal.

This tunnel is on the line of the Philadelphia and Reading Railway, near Phœnixville, in Chester County, Pennsylvania, and about twenty six miles north west of Philadelphia. The total length from face to face is 1932 feet, width 19 feet, and height $17\frac{8}{10}$ feet. The sides of the tunnel are perpendicular to the height of $10\frac{3}{10}$ feet from the bottom or grade line, above which is a semi-ellipse rising $6\frac{3}{10}$ feet. At the north face the depth of open cutting is 47 feet, and at the south face $54\frac{5}{10}$ feet. The excavation has been driven from the two ends and from five shafts; these shafts are 7 feet in diameter, and their depths from surface of ground to grade line of tunnel are as follows, viz: $116\frac{6}{10}$ feet, $139\frac{4}{10}$ feet, $138\frac{7}{10}$ feet, $100\frac{8}{10}$ feet, and $82\frac{1}{10}$ feet. The shafts are not placed as customary over the centre of the tunnel, but in such a position that the side of the tunnel forms a tangent to the circumference of the shaft; in consequence of this arrangement, very little if any danger is incurred by the men below from the accidental falling of any thing in the shaft. The distance between the 2nd and 3d, and between the 4th and 5th shafts is only 100 feet; the advantage of this is obvious; very little error can occur in working out the short drift between the two shafts, as soon as this is accomplished two correct points are obtained in the tunnel 100 feet apart, and the long drifts are worked with certainty from the range of these points. During the progress of sinking the shafts, a common windlass was used worked by hand, but as soon as tunnelling was commenced, resource was had to a gin worked by two horses; at first one guy placed between two adjacent shafts was sufficient to remove the material excavated from both drifts, a single rope being used so that one bucket would be up, while the other was down; but as the drifts became enlarged and the number of miners increased, it was found necessary to put up a separate guy with two buckets for each shaft.

The method of removing material is simple and expeditious; a temporary railway track is laid in the drift from the foot of shaft, and another from the top of shaft elevated a few feet above the surface of ground; on each track a small car on low wheels is kept; the bucket being placed on the car below and filled, is pushed by hand to the shaft, attached to the rope and drawn up; then the car above is run under the bucket which has a false bottom secured by a hinge and bolt; the bolt being knocked out, the material falls into the car, is conveyed away, and thrown out by tilting the car. The bucket used is $2\frac{1}{2}$ feet in depth with a average diameter of 2 feet 4 inches, being rather smaller at top than at bottom and holds about 9 cubic feet of stone; the rope is $1\frac{1}{2}$ inch in diameter.

After the shafts attained a depth of about 70 feet, and until a connection was effected between two shafts, it was impossible to proceed without adopting some artificial mode of driving out the impure air and smoke caused by continual blasting.

Several plans were tried, but none proved so effectual as the following: a wooden pipe about 4 inches in the clear was passed down the shaft terminating below in a piece of canvass pipe, (which could be removed during the blasting,) and having the upper end secured to a fanning machine constructed expressly for this purpose; this machine, when worked by one man, forced down sufficient good air to drive up the smoke and bad air from below.

Both the shafts and tunnel have been excavated for their whole length through a very hard siliceous slate rock, which, although difficult to be worked, affords an excellent roof. No arching for masonry is required, except for a few feet at each end in connection with the facing of cut stone.

This work was contracted for on the 21st of October 1835 by Mr. James Appleton who had previously completed the Portage Tunnel on the Pennsylvania Railway. On the 30th November, the excavation of shafts was commenced, and in December the deep cuts at the ends of tunnel. On the 8th of March 1836, the first tunnelling began, since which time as large a force as possible has been kept at work, day and night, the number of men employed amounted at one time to about 450.

At this date the tunnel is open from end to end, (the last junction having been effected on the 7th of July,) about 11?0 feet is ex cavated to the full size, and the remainder is in such a state of forwardness as to warrant the belief that the entire excavation will be completed by the first of September, being less than two years from the date of its commencement. W.

July, 21st, 1837.

New Propelling Power.—Some account has been given here already of an invention by Francis B. Ogden, Esq., our Consul at Liverpool, for the propulsion of vessels by a far simpler and cheaper method than has been heretofore practised.—We have not yet obtained any details, or any clear understanding of the means used, but we believe the system to be all that it promises.—The power may be used in separate vessel for towing, or it may be employed in a sailing vessel—rigged in during fair weather, or employed during calm, or in getting off a lee shore, &c.—It will occupy no considerable space in a ship, and its aid may often be invaluable. As yet it has been only employed for towing other vessel, but the packet ship United States will probably be fitted out with an engine before she returns. One is in preparation for her. The power used we understand to be steam.

A letter before us to the captain of one of our crack packet-ships, dated May 27th, says, "we are now making the most triumphant experiment with our little boat, (45 feet long, 8 feet beam.) We have the Toronto in tow, and the pilot and mate, (the captain is not on board,) beside that we are making good four mile through the water. This decides the question beyond the possibility of a doubt, and your shipmasters need not now be afraid of steamboats as rivals on the ocean.—We can put an engine on board your ship that will not weigh ten tons, and yet will drive her five miles an hour. We shall go to work at once on an engine for the ship United States.—We are now going full five knots."—[Bal. Gaz.]

Patent Office,
Washington, July 13, 1837.

In consequence of the destruction of the records of the Patent Office by fire in December last, Congress provided by law for recording all patents *anew*; and no patent can be given in evidence *until* the same has been recorded *again* in this office.—The law provides for the record of all patents which have been issued, whether the same have or have not expired. Such, record, it is believed, will be honorable to inventors, and highly useful in the future management of the Patent Office. Arrangements are accordingly made for recording all patents *anew* in this office, expecting that persons holding patents will promptly comply with the law in this respect. It is hoped none will delay transmitting patents because the invention may be deemed unimportant. A copy of *every* patent issued is desirable, as the best means of preventing imposition. Many persons have already complied with the law, and their patents have been recorded and returned to them; and all who have *omitted* to forward their papers are requested to send them to the office by *mail*, without delay. In this mode patents will be secured from infringement, and useful inventions perpetuated. Papers forwarded will be safely kept, and speedily returned. *Transfers* or *assignments* of patents are in like manner required to be recorded anew. Publishers of newspapers will promote the cause of science, as well as oblige their customers, by publishing this notice.

Henry L. Ellsworth,
Commissioner of Patents.

Important to Steam Machinery.—It has been discovered in France, by M. Chaix, that the incrustation on the inside of the boilers is totally prevented by mixing clay with the water. The government has rewarded the discoverer with twenty thousand francs.—[Buffalo Journal.]

On an improved method of making meadow-hay. By Mr. John Irving, farm-overseer at Closeburn Hall, Dumfries-shire.

[The Society's Silver Medal was awarded for thi Essay.]

It is too much the prevailing opinion in Scotland, that meadow-hay cannot be secured there as effectually as it is in England.—The cause of this prevalent opinion, it is apprehended, is the want of knowledge in the art of making meadow-hay. The usual practice of making every kind of hay in Scotland is, to allow the grass to stand too long before it is mowed, and in the case of meadow-hay until August, when the seeds of the grasses are nearly ripe, and the staks have lost almost all their succulency; and to allow the swath to lie some days till a considerable part of its moisture is evaporated. The cut crop is then shaken out and turned over when it again lies for some days till it is thought sufficiently dry for putting into large cocks. The hay frequently remains in these cocks, in the field, for two or three months. It is then carried and made into a stack, when it is expected that no fermentation will take place, Scotch farmers imagining that fermentation in hay should always be avoided.

A method of making hay similar to that practised in England has been adopted by C. G. Stuart Menteath, Esq., of Closeburn, by whom I have been employed for some years past as farm-overseer. This method practised over an extent of water meadow chiefly consisting of peat-moss of 20 feet in depth, and upwards, of 100 imperial acres in extent,) is to cut the grass as early in July as the weather will permit. The grass mowed in the morning before twelve o'clock, is carefully shaken out upon the ground by hand, and that mowed after twelve o'clock is allowed to remain in the swath till next morning, when it is likewise shaken out. If the weather is at all dry, the hay that has been shaken out is always put into small cocks for the night, so that the ground may be sooner dry the next morning to receive the hay for its exposure to the sun; and after two dry sunny days' exposure, it is frequently, and always upon the third day, carried to the hay barn, where it undergoes a trifling fermentation, which is a desirable process when hay is made with its natural juices. If the weather prove rainy, the hay should remain in the small or hand cocks till a dry day, allow of its being shaken out, and, in the evening, carried to the hay or Dutch barn. This barn is formed of larch poles, set upright, 15 or 18 feet in height, including a space of 15 feet in breadth, and 60 feet in length, and supporting a light roof of thin boards, or a slight covering of straw stitched upon the rafters. No person who expects to have good meadow-hay should be without such a Dutch barn. Salt is generally sprinkled amongst the hay when it is packing up in the hay barn, in the proportion of about 16 lb. to the ton; and, should the hay have been exposed to much wet weather, a double quantity will be advisable.—Hay has thus been made here, under my direction, for many years, without a single ton of it ever having been spoiled.

Bounty on Wheat.

A late act of the Legislature of Maine, gives a bounty of *two dollars* to the person who raises 20 bushels of well cleaned wheat, and six cents per bushel for all over thirty bushels. This is a good encouragement, and we hope it will be the means of arousing our farmers to do their best.

With our natural advantages, seconded by industry and enterprise, with improvements that are making in the introduction of valuable kinds of seed, new methods of culture and new machines for threshing, winnowing and cleansing grain, and with the spur to action now giving by the bounty, we believe that every farmer among us will endeavor to excel in raising wheat, and we shall no longer pay millions to other states for breadstuff, and use foreign grain raised in a climate less congenial to its growth than our own.—[Yankee Farmer.]

Ludwig Borne.—Ludwig Borne, the well known German writer recently died at Paris, where he has long resided.

White Weed.—What benefit is white weed to the farmer? One would be led to suppose, from witnessing the great amount of this article growing over many fields, that it was some valuable thing, suffered to grow and spread itself, or carefully cultivated, until scarcely a blade of grain can be seen without a very close inspection. What benefit is it? We never heard any person (save one) say it was good for any thing but to poison and root out every thing valuable from the ground. We never heard one speak of it, but to scold that it should have existence; still it is suffered to keep quiet possession. If it is a noxious weed, why not destroy it.

AN ACCOUNT OF THE HARBOR AND DOCKS AT KINGSTON-UPON-HULL.

Continued from p. 456.

damp, acquired any considerablo degree of hardness; nevertheless, as the walls are all substantially founded and solidly built, it is confidently expected that the mortar will continue to indurate till the whole becomes one compact body. The pozzuolana mortar in the front of the walls, even before the water was let in, was in general hard and good, the only defective part being in the west end of the dock, where the wall was damp in consequence of being backed with wet soft earth; some part of this mortar, being used late in the year, was a little perished by frost, and required fresh pointing, but the front of the walls has been frequently examined since the dock was opened, and the joints found every where as perfect and entire as at first. In some parts of the work, accidentally injured by the shipping, and taken down and rebuilt, the pozzuolana mortar was found in a good state, although not so hard in the interior as in the front; the mortar in the beds of the stonework, also, was more indurated than in the vertical joints, and for the most part adhered much firmer.

Town walls or fortifications. In the course of the works of the Junction Dock, a part of the old fortifications on the east side was cut through and taken down; from their antiquity they may be deemed not unworthy of notice. The walls are said to have been originally built of stone in the time of Edward the Second, but repaired and strengthened with bricks in Richard the Second's reign, when the art of brick-making was revived in this country. The bricks were about 11 inches long by 5¾ inches wide, and 2½ inches thick. The mortar was of two kinds, one composed of lime and sand only, the other of lime and powdered bricks or tiles, with very little sand; both were, with a very few exceptions, extremely hard, the latter being the more so. The mortar appeared to have been used in a very soft state, or as grout, but by no means well tempered, small lumps of pure lime, resembling hard tallow, being interspersed in great abundance. In three or four of the bottom courses, and nine to eighteen inches in width at the back of the wall, where it was in a damp state, it had not set in the least, and at the bottom in particular, appeared like pure sand, while the neighboring parts, being dry, were particularly hard, and united together like a rock. It is a generally received opinion, that the extreme hardness of mortar in old buildings is owing entirely to its having been much better tempered in ancient than in modern times; although there is no doubt that this is a most essential point in all kinds of mortar, it is conceived that the superiority is caused chiefly if not wholly by *time*, and that mortar continues to harden in certain situations probably for centuries. The foundations were eight or ten feet under high water, and in some parts were on small piles, the rest being on the natural ground. The piles were 5 or 6 feet long, and 6 or 7 inches diameter, some of oak, some of fir, and the hearts of both kinds quite sound and of a blackish color, but the sap much decayed.

Tides and currents in docks. It was expected when the Junction dock was opened that it would, on account of its situation, be in a great measure supplied with water from the Humber, but the contrary has been the case, the principal supply being certainly from the river Hull, as is proved by the altered quantities of mud deposited in the Old and Humber docks already noticed; there being an annual increase of mud in the Old dock of about 4,000 tons, and a decrease in the Humber dock of about 6,000 tons, since the Junction dock was opened, as compared with former years. This also shows, that even the Humber dock is in part supplied from the purer source of the Hull.

As a further elucidation of the nature and course of the tides since the Junction dock was opened, the following observations are submitted. During the night tides and on Sundays, when no business is done in the docks, the Humber dock gates are secured fast together, in order to shut out the muddy waters of the Humber. On one of these occasions, very soon after this contrivance was adopted, I noticed that, the water being level on the two sides when the gates were thus shut, the flow was faster on the side next the Humber for the first quarter of an hour, at the end of which the difference was at its maximum of about three inches; the water on the opposite sides began to approximate again, and at the end of fifteen minutes more it was again exactly level throughout. This observation has been since repeated with nearly the same result, though varying a little, according to the state of the tides, and as there may be freshes in the river Hull; in one instance the difference of level was as much as four inches. It appears, then, that the principal supply from the Humber is in the first half hour after the tidal water arrives at the level of the water in the docks, and this agrees with the current or course of the tide through the different locks. I have frequently set off from the Old dock lock at the time the tidal water opened the gates and began to flow into the dock, and have walked slowly on to the Whitefriar-gate lock, where the water had just commenced running very gently into the Junction dock; proceeding forward to the Myton-gate lock, I have generally found the water stagnant, but in the course of a few minutes there appeared a very slow motion towards the Humber dock, and by the time I have arrived at the Humber lock, or about half an hour after leaving the Old dock lock, the water was running gently towards the Humber. It should be observed, that in neap tides the the above currents through the locks are always slow, but in spring tides, and when there are freshes in the Hull, the velocity is often as much as three quarters of a mile per hour, and sometimes even more. The current into the Old dock through the entrance lock is also considerably increased since the Junction dock was made; from observations soon after the opening of the latter, as to the exact level of the tide at the entrances of the Old and Humber docks, it was found that, on a average of several tides, the gates of the former were opened by the rising tide about three minutes before those of the Humber dock.

Before leaving the subject of the tides, I may notice a curious fact, founded upon repeated observations; viz., that about three hours before and after high water, there is sixteen feet water on the Humber, and only ten feet on the Old dock sill.

Conclusion. Having thus endeavored to give a concise account of the Harbour and Docks at Kingston-upon Hull, with reference to that department more immediately connected with the object of the Institution for which this paper has been drawn up, I cannot conclude without again briefly adverting to the great and important advantage the town and port have derived from the improvements described.

It is but little more than half a century since the first dock was completed; before that time, the river Hull below the bridge was the only safe harbor in the port, and in this narrow confined space the shipping and small craft were so crowded together, that it was often with great difficulty they could have access to the quays to take in or deliver their cargoes, and damage was sustained by the larger vessels from grounding every tide. It also sometimes happens that the harbor was incapable of containing all the shipping that frequented the port, in which case they were laden and delivered in the Humber by means of craft, at the expense of much delay and considerable additional charges. These inconveniences, and the want of a legal quay, with the complaints they gave rise to on the part of the revenue officers, at length led to the formation of a dock, which in time was followed by another. But extensive and commodious as were the Old and Humber docks for want of a ready passage between them they were still incomplete,—the Junction dock has perfected the communication; and instead of being surrounded, as of old, by fortified walls and deep ditches, which (their occupation being gone) had latterly become stagnant pools, the common receptacles for filth and nuisance, the town is now encircled by the rivers Humber and Hull, and three spacious and commodious docks; improving the public health by the assistance afforded to drainage through the liberality of the Dock Company, and rivalling in convenience for the mercantile men and facilities for the despatch of business, those of any port in the kingdom. These, and the means of inland communication, enjoyed or in prospect, with a district peculiarly rich in materials and manufactures, added to its situation on so noble an estuary, and its contiguity to the continent, cannot fail to maintain the eminent rank Hull has hitherto held among British ports.

DOCKS.

	Lenth.	Bredth.	Area.			No. of Ships.
	Feet.	Feet.	Acres.	Roods.	Poles.	
Old Dock,	1703	254	9	3	29	100
Humber Dock,	914	342	7	0	24	70
Junction Dock,	645	407	6	0	5	60
			23	0	18	230

BASINS.

	Length.	Breadth.	Area.		
	Feet.	Feet.	Acres.	Roods.	Poles.
Old Dock,	213	80½	0	1	23
Humbe Dock,	267	435	2	2	27
			3	0	10

ENTRANCE LOCKS.

	Length.		Breadth.		Depth of Water on Sills at Neap Tides.		Spring Tides.	
	Feet.	In.	Feet.	In.	Feet.	In.	Feet.	In.
Old Dock,	120	9	38	0	14	0	20	0
Humber Dock,	158	0	42	0	20	0	26	0
Junction Dock.	120	0	36	6	14	0	20	0

BRIDGES.

	Each Footway.		Carriage way.		Width inside Railing.		Total width outside.	
	Feet.	In.	Feet.	In.	Feet.	In.	Feet.	In.
Old Dock,	3	6	7	6	14	6	15	0
Humber Dock,	2	8	6	11	12	3	12	6
Junction Dock.	4	0	15	3	23	3	24	0

WAREHOUSES AND SHEDS.

	Length.	Breadth.	Area.
	Feet.	Feet.	Superl Yards.
Warehouses, Old Dock,	345	. . .	2,251
Sheds, Ditto.	143 / 492	23 / 23	1,623
Sheds, Humber Dock.	754	25	2,095

QUAYS.

	Legal Quays.	Totals.
	Square Yards.	Square Yards.
Old Dock,	18,160	19,600
Humber Dock,	8,830	17,639
Junction Dock,	. . .	15,613
Humber Dock Basin,	. . .	8,419
	29,990	70,701

Plate 6.

HULL DOCKS. PIER HEADS OF BASIN AND ENTRANCE OF HUMBER DOCK.

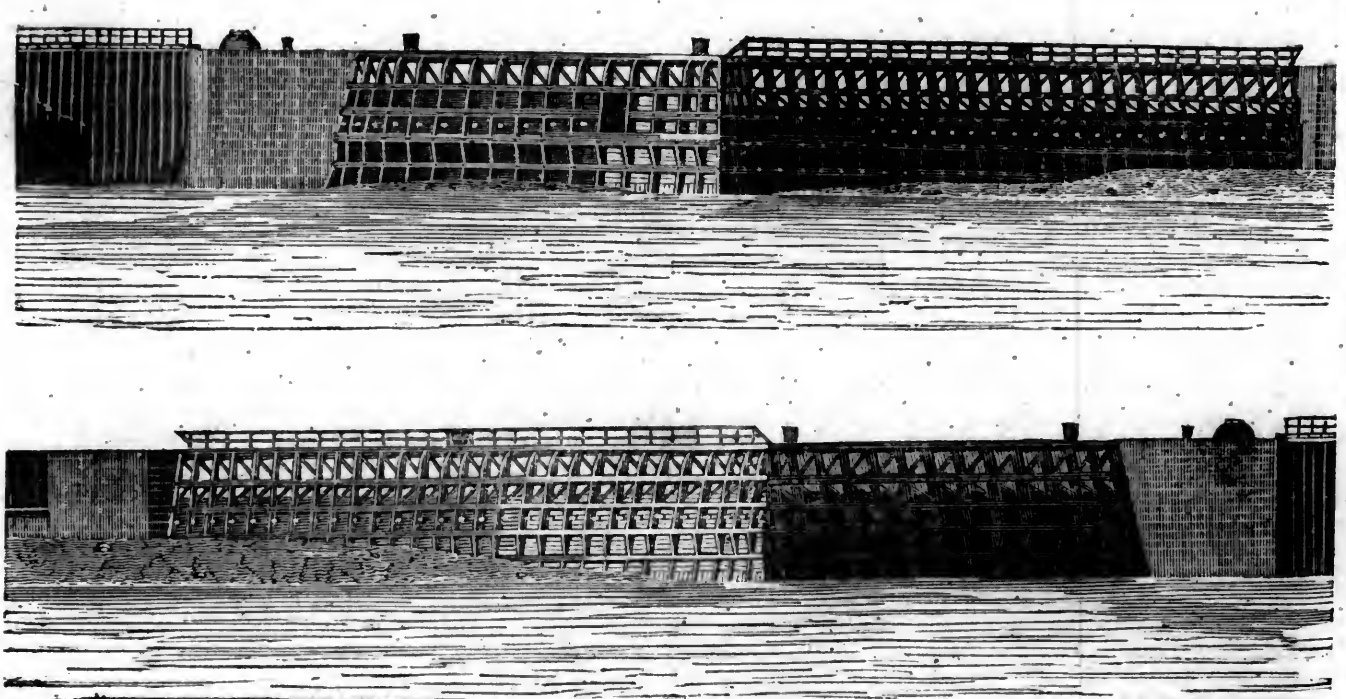
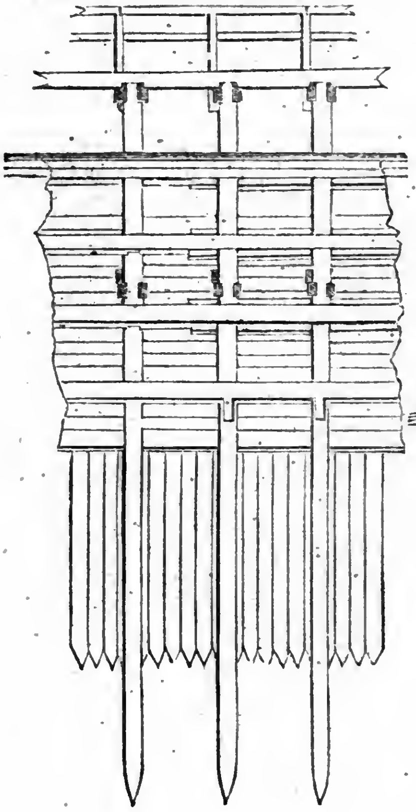


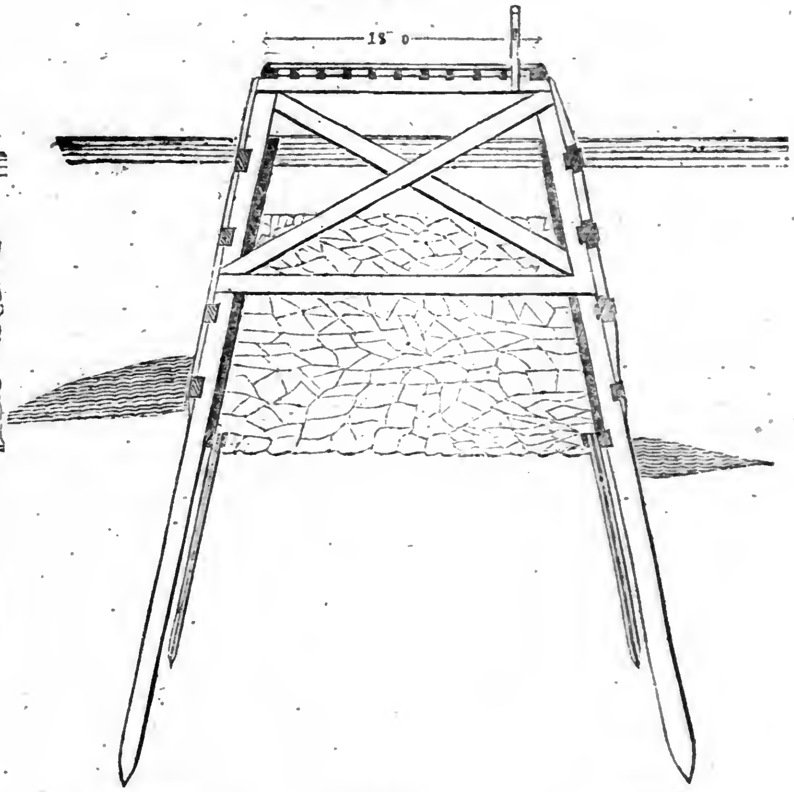
Plate 7.

HULL DOCKS. PIERS OF HUMBER BASIN.

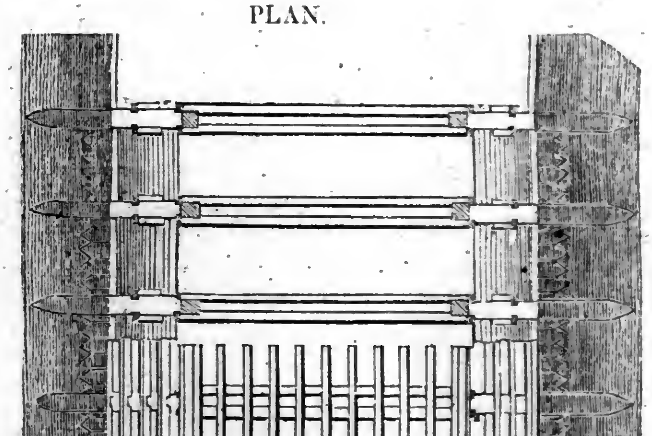
TRANSVERSE SECTION.



ELEVATION.



PLAN.



SCANTLINGS.

Main Piles	14 - 14
Outer Wale	14 - 14
Inner Wale	12 - 6
Cap Sill	12 - 10
Joists	7 - 4
Ties	12 - 6
Sheet Piling	6 in. thick
Planking	3 in. thick

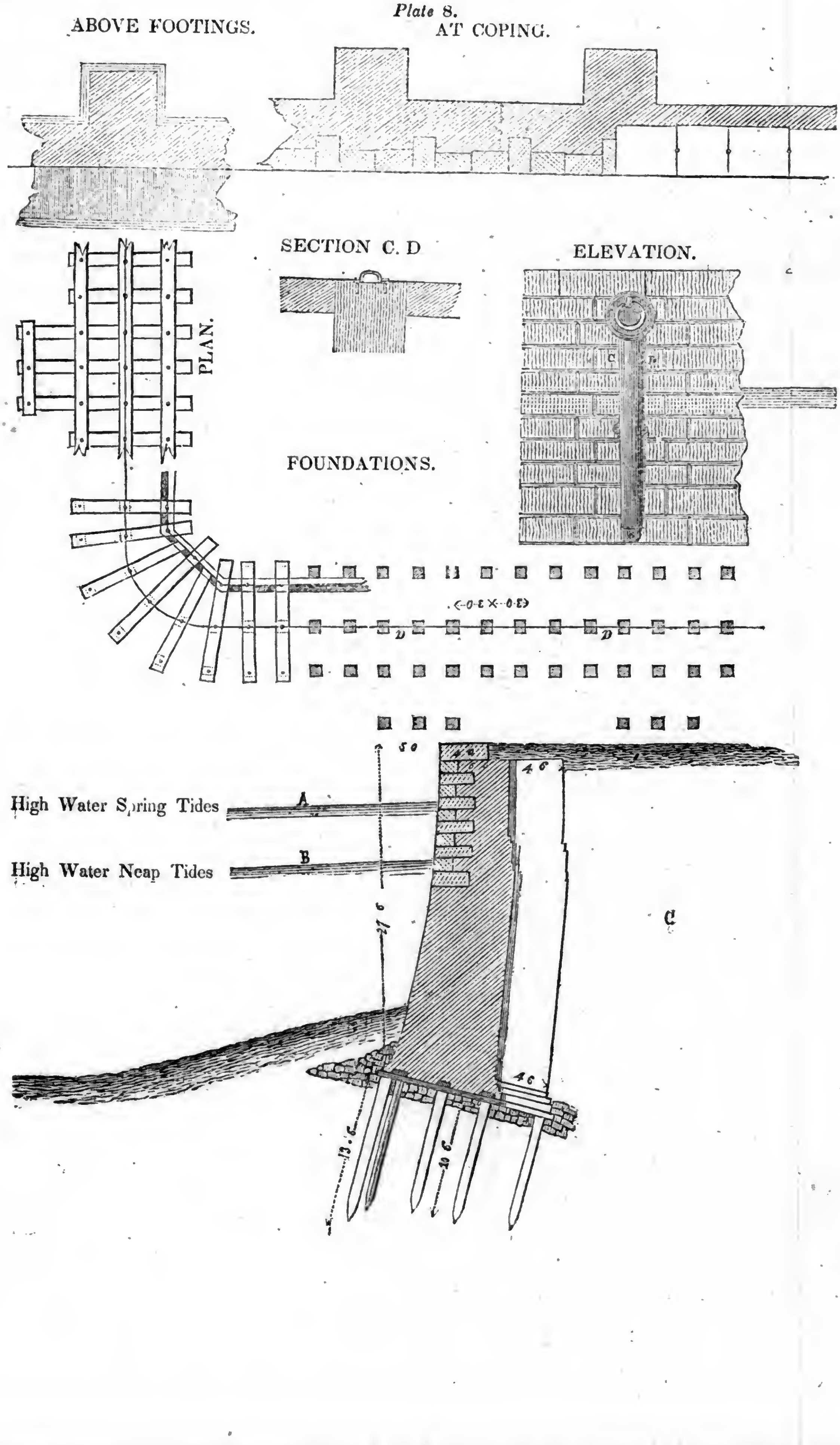
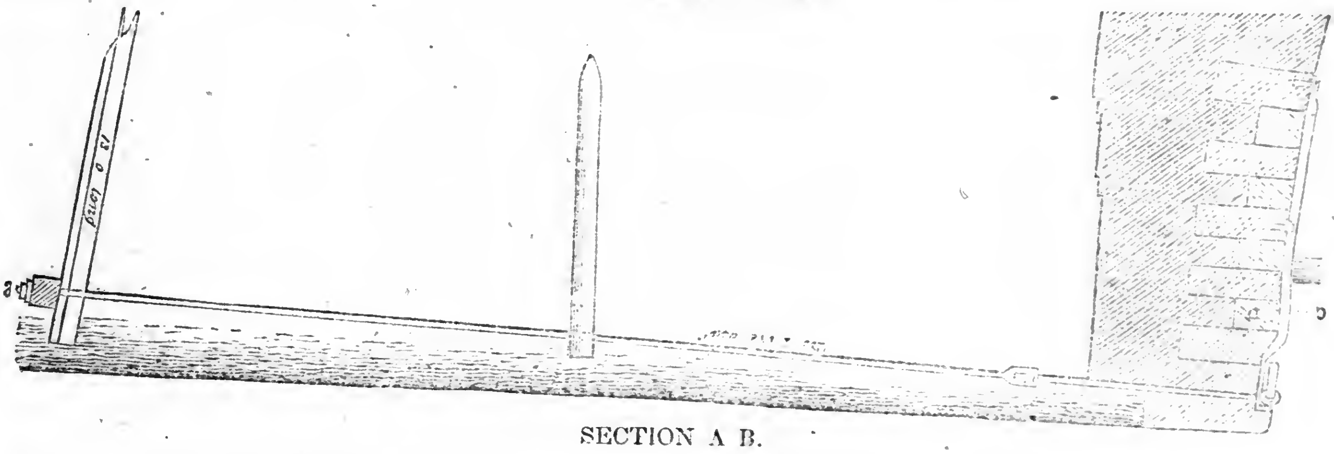


Plate 8.
ABOVE FOOTINGS.
AT COPING.
SECTION C. D
ELEVATION.
PLAN.
FOUNDATIONS.
High Water Spring Tides
A
High Water Neap Tides
B
C

Plate 8.

CROSS SECTION.



SECTION A B.

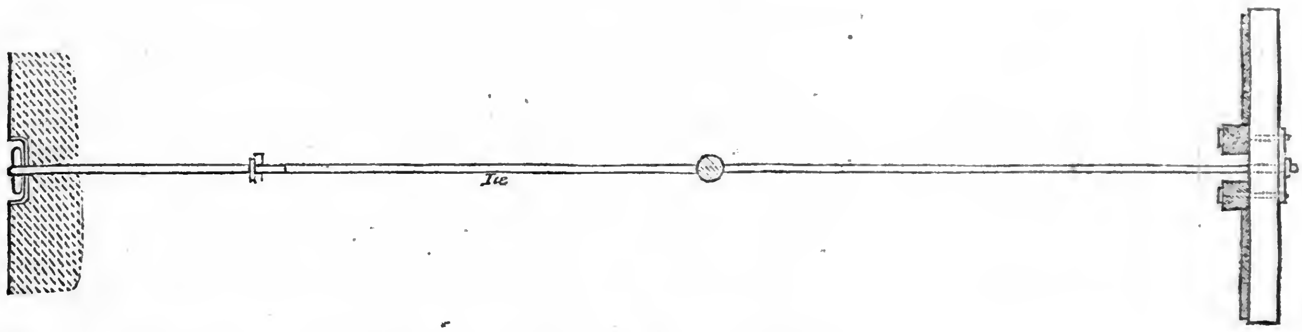


Plate 9.

Plate 9 is a representation of the Locks of the Junction Dock. This plate is given in full size and divided into three parts, or page of this reprint.

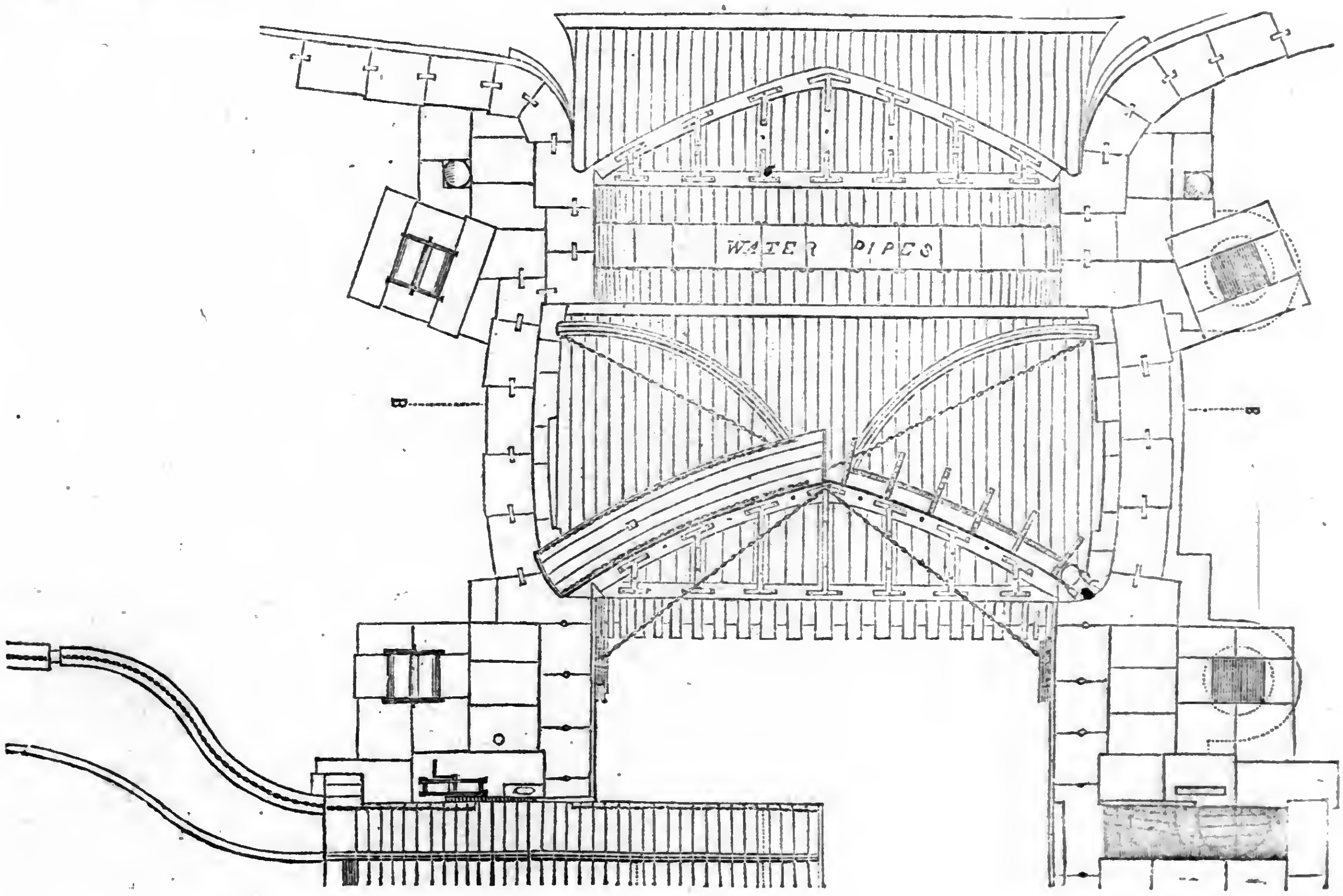
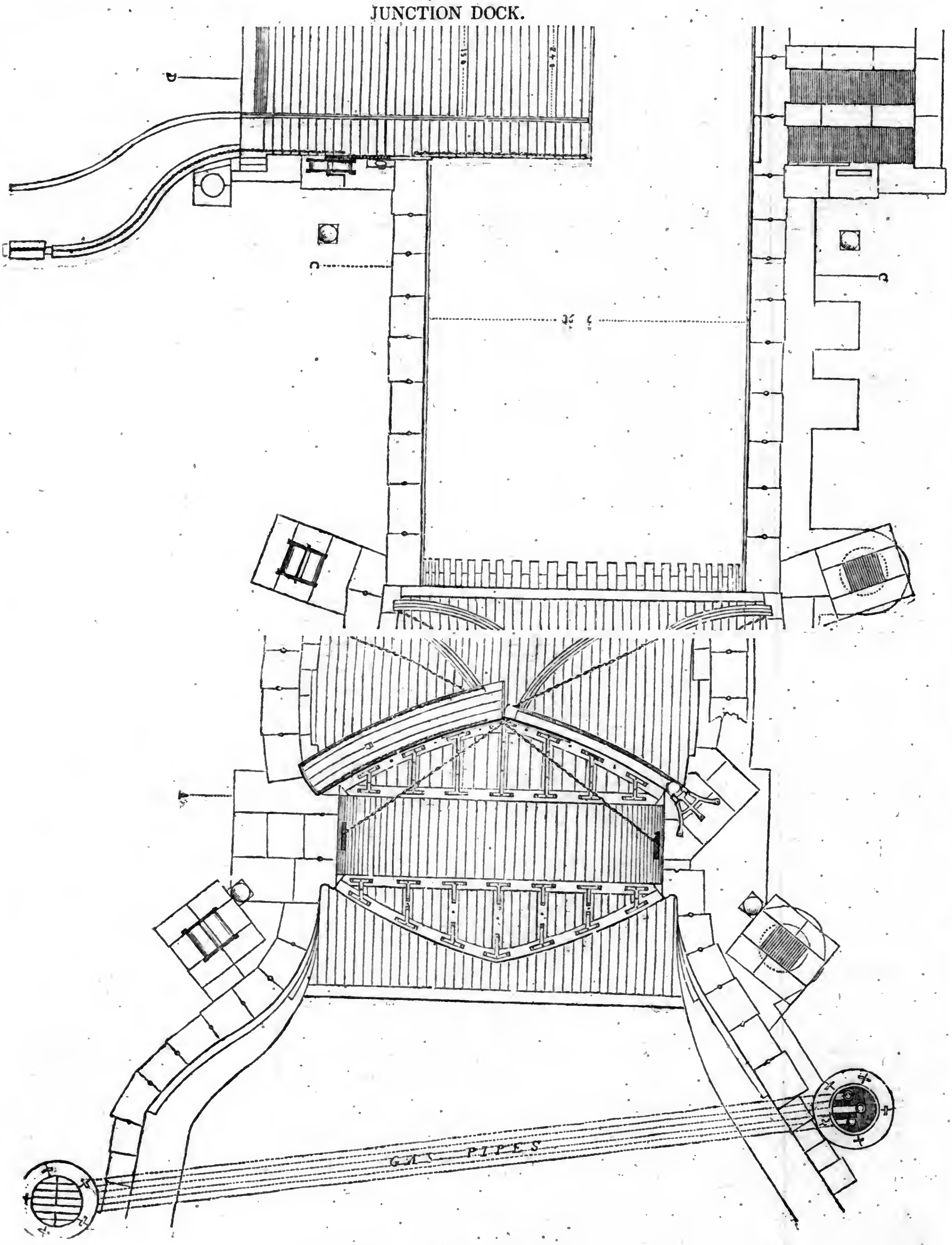


Plate 9.

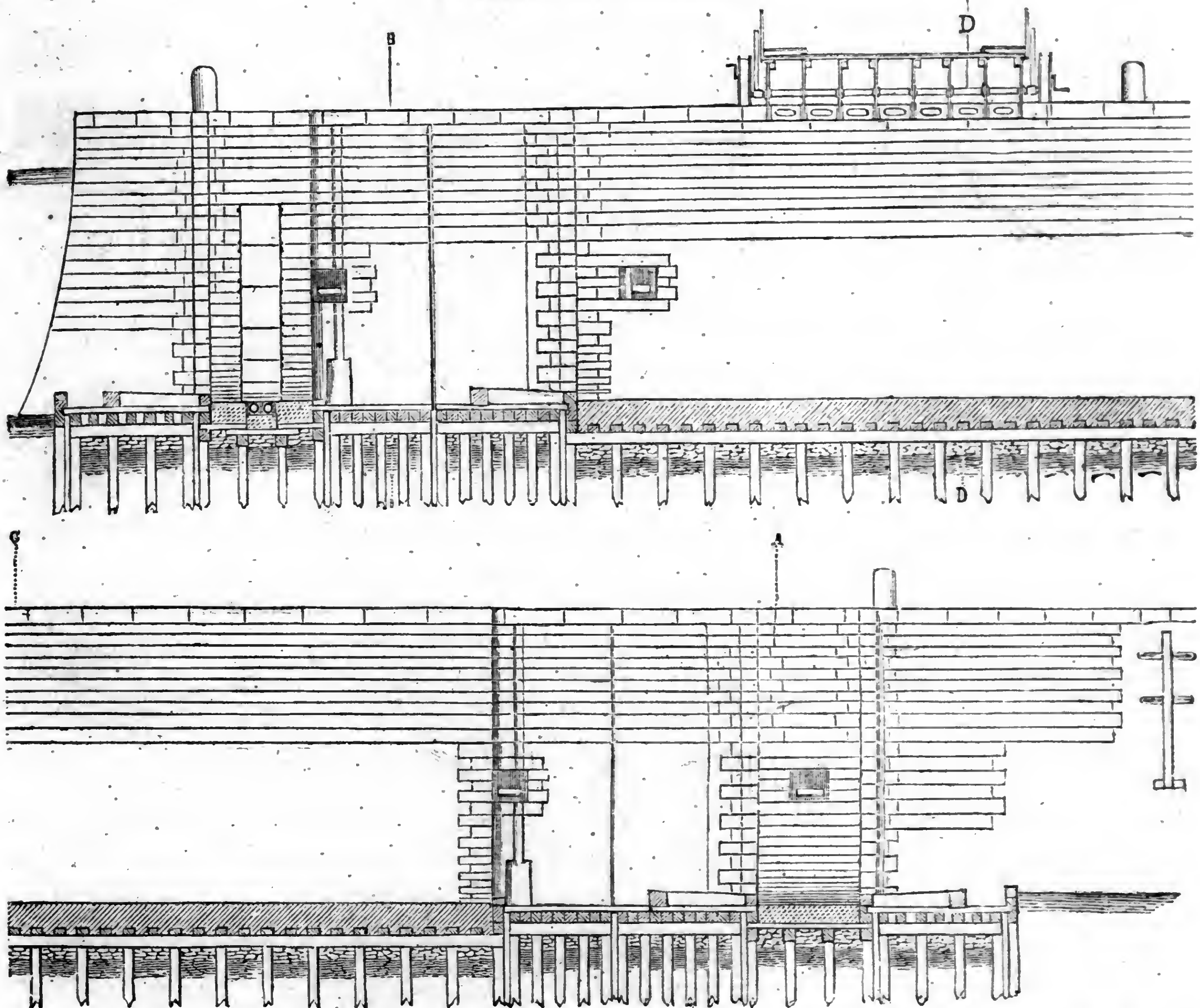
JUNCTION DOCK.



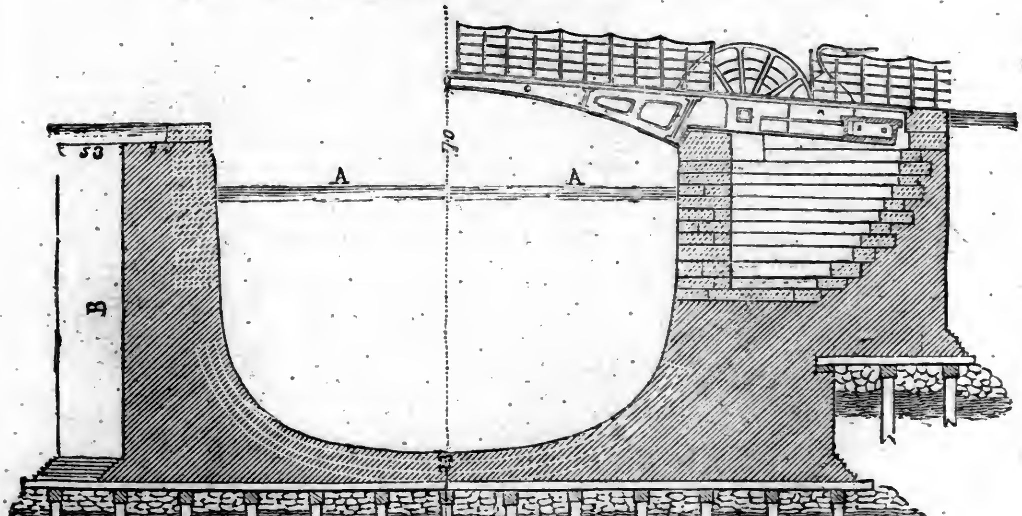
OLD DOCK.

Plate 10.

LONGITUDINAL SECTION.



TRANSVERSE SECTIONS THROUGH C. C. AND D. D.



SECTION THROUGH B. B.

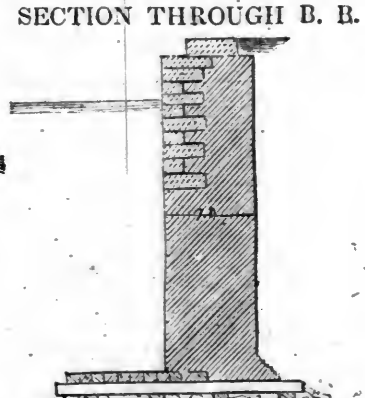
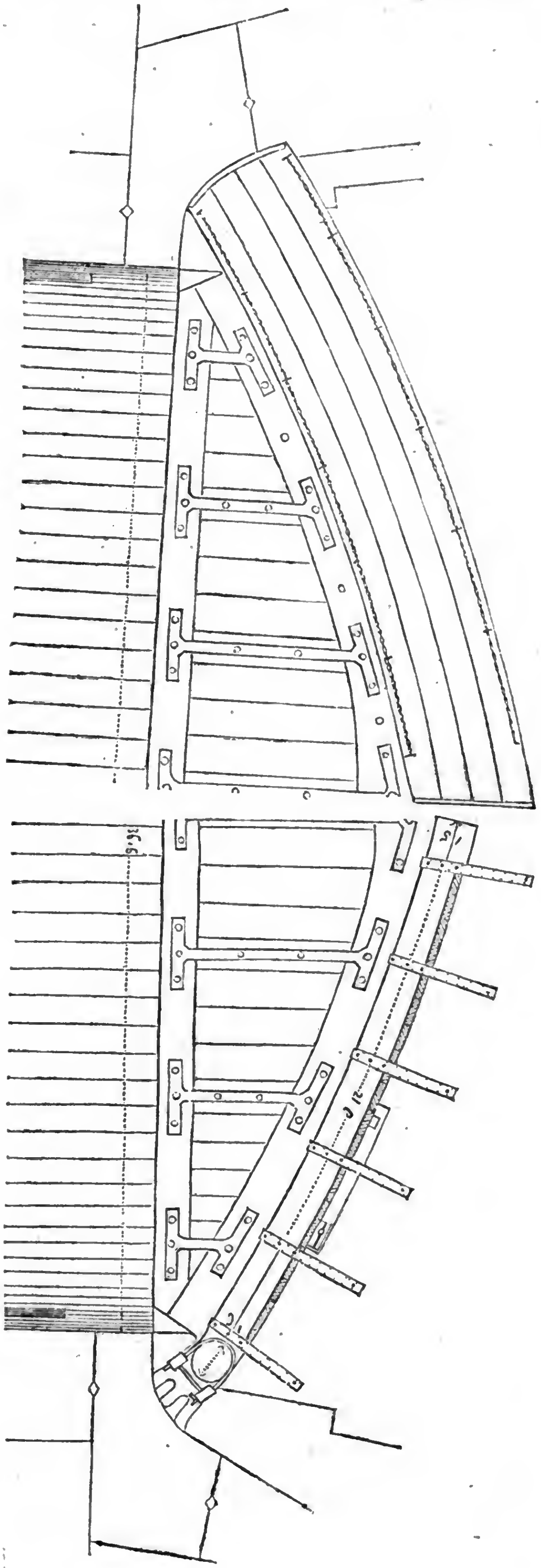


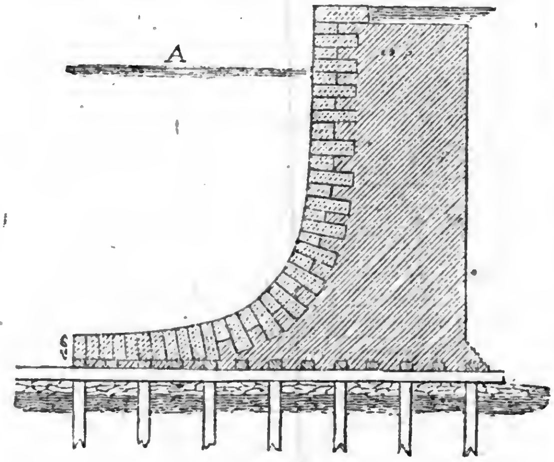
Plate 11.



PLAN.

Plate 10.

TRANSVERSE SECTION THROUGH A. A.



SECTION.

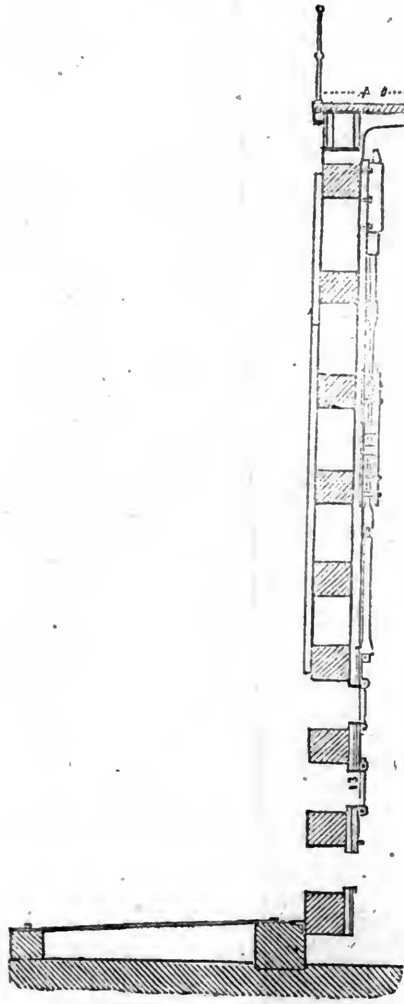
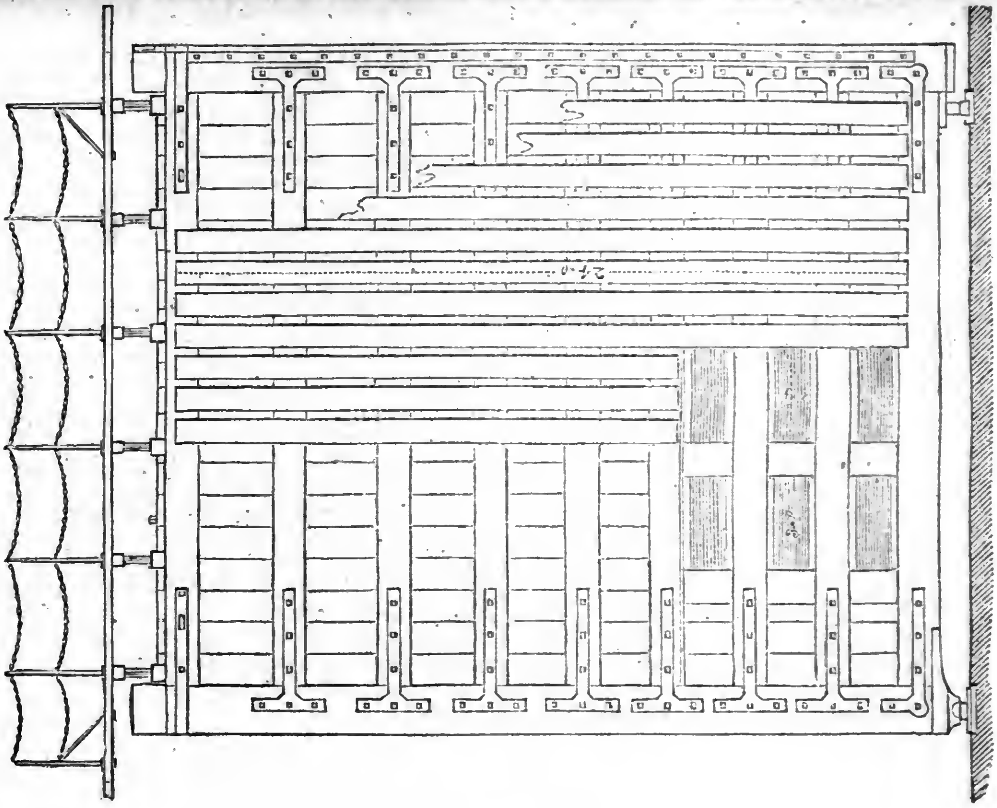


Plate 11.

ELEVATION OF FRONT.



ELEVATION OF BACK.

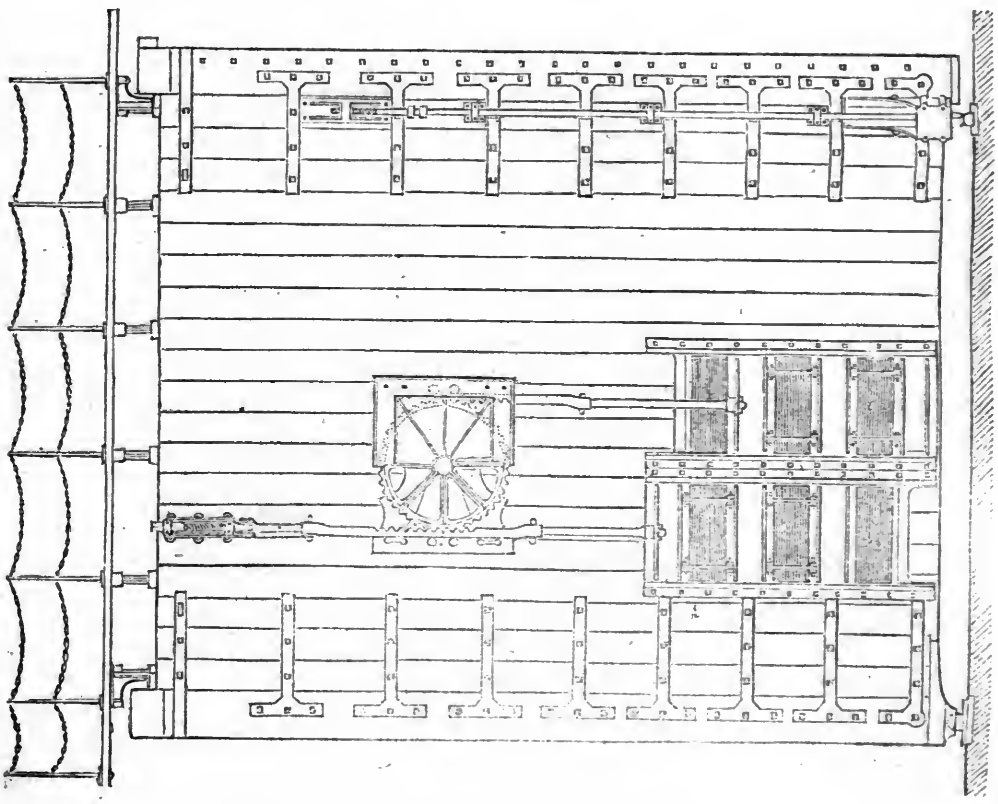
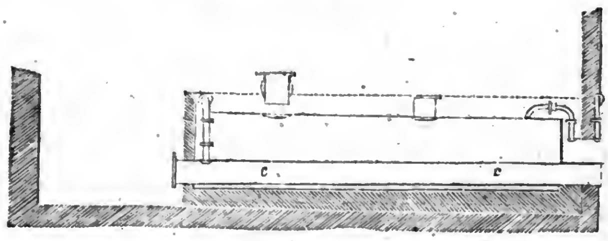
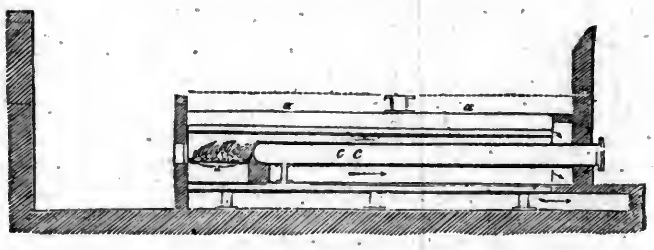


Plate 16.

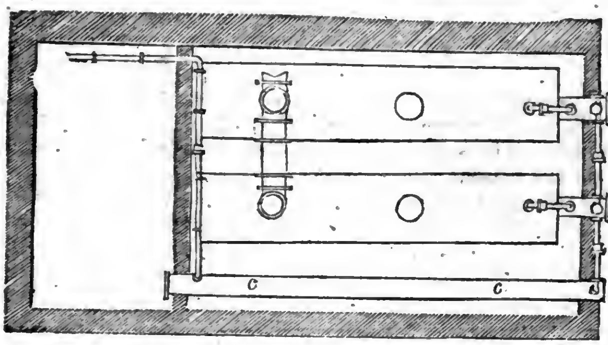
ELEVATION.



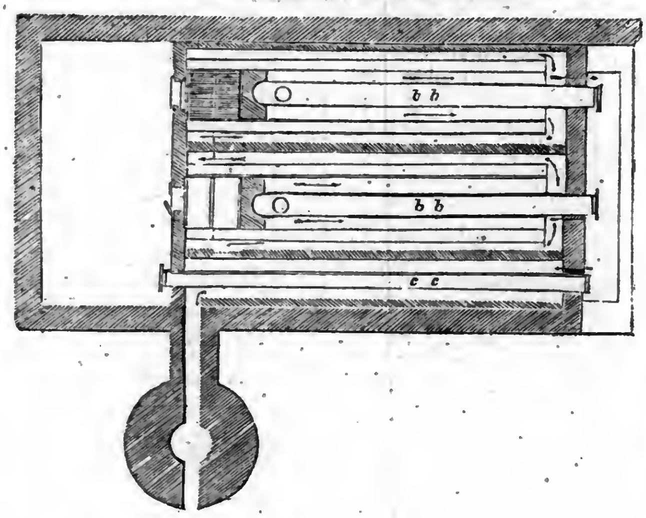
LONGITUDINAL SECTION.



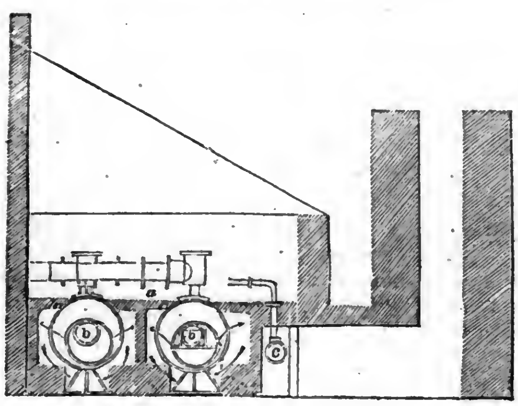
PLAN.



ORIZONTAL SECTION.



TRANSVERSE SECTION.



REFERENCE.

a. a. Sawdust and Ashes.
b. b. Internal Tubes.
c. c. Feed Pipe.

The following circular, addressed by Mr. Colman to the Farmers of Massachussets, evinces a determination to enter thoroughly into the business, for which he was appointed :—

Sir,—Having been appointed by the Executive of the Commonwealth, under the provisions of a Resolve of the Legislature, passed at its last session, Commissioner to make an Agricultural Survey of the State, I take the liberty of addressing this Circular to several gentlemen of intelligence and respectability in the different towns, yourself among others, with a view to obtain their advice and co-operation in accomplishing such survey.

You will allow me, then, to point out the general objects of inquiry ; and to solicit particularly your attention to them ; that when I visit you, as I shall ask the pleasure of doing, you will be able to give me, in respect to those which have been the subjects, either of your experience, inquiry, or observation, the desired information. By the Resolve it is made the duty of the Commissioner "To collect accurate information of the state and condition of the Agriculture of the Commonwealth, every and subject connected with it ; point out the means of improvement ; and make a detailed report thereof, with as much exactness as circumstances will admit." From the terms of the Resolve it is apparent that the duty is very comprehensive ; as it embraces every subject connected with the agriculture of the State, and the means of its improvement. The more full however it is, the more useful it is likely to prove ; and exactness in the information obtained is obviously of the very highest importance. I will now point out some of the objects to which inquiries will be directed.

I. The nature of the Soil, in different parts of the State ; and particularly in reference to the crops cultivated.

II. The Climate, with reference to the crops grown ; the usual time of ploughing, planting, and harvesting ; the occurrence of early frosts ; the length of winter ; the average temperature ; and the quantity of rain and snow in any year.

It is desirable that meteorological observations should be made in different parts of the State.

III. I. The Number of Acres in any town cultivated or in any form productive.
2. in wood, timber, &c.
3. capable of cultivation but unproductive.
4. waste or irreclaimable.

IV. Products.
1. The amount raised in any town in any given year.
2. The average yield in any crop per acre.

V. Crops cultivated ; among which are the following :

Wheat.	Hemp.	Herds Grass.	Potatoes.
Indian Corn.	Flax.	Clovers.	Onions.
Rye.	Tobacco.	Red top.	Cabbages.
Barley	Hops.	Orchard.	Carrots.
Oats.	Broom Corn.	Lucerne	Parsnips.
Buck Wheat.	Teasels.	Tall Meadow Oats.	Beets.
Peas	Madder		Artichokes.
Beans.	Woad.	English Bent.	Pumpkins.
Tares.	Saffron.	Rye Grass.	Turnips.
Lupins.	Rape	Millet.	Fruits.
	Mints.	Foul Meadow.	Garden Vegetables.
		Blue Grass.	
	Grass for Bonnets.	Salt Meadow Grasses.	
		Thatch.	
	Mulberry for Silk.		
	Sunflower for Oil.		
	Poppy for Opium.		
	Mustard.		
	Succory.		

VI Other Products.

Wool.	Beef.	Mutton.	Cheese.
Silk	Pork.	Lard.	Butter.

VII. Rotation of crops.

VIII. Modes of Cultivation.
1. Soils adapted to particular crops.
2. Preparation of the soil by ploughing and manures.
3. Seeds ; selection ; change of seed ; quantity ; preparation ; steeps for seeds ; preservation of seed from worms, birds, and vermin.
4. Care and management of the growing crop.
5. Harvesting Time and manner.
6. Use and application of the product.
7. Labor required ; and general expenses of a crop
8. Value of the crop for use or sale.
9. Marketing of the product.

IX. Diseases of Crops. Blight ; mildew ; rust ; curl ; &c., &c.

X. Weeds, and Methods of Extermination.

Thistles ; Canada thistles ; brake ; laurel ; ox-eyed daisy or white weed ; rannunculus or Butter cup ; wood wax ; pineweed ; St. John's wort ; charlock and cadluc ; sorrel ; cockle ; tares ; chess or cheat, &c., &c.

XI. Refuse of Crops. Preservation ; value, and use for fodder or manure.
1. Value and use of the Stalks and Husks of Indian Corn, and how preserved.
2. Value and use of the Stalks and Husks of Broom Corn.
3. " " of the Straw of the Wheat, Rye, Oats and Barley.
4. Value and use of the Haulm of Pease and Buck Wheat.
5. " " of Potato Tops, &c., &c.

It may be useful in this place to give an outline of the manner in which it may be desirable to conduct the inquiries. I will take for examples, Wheat and Indian Corn.

Wheat.

1. History of its Cultivation in the State.
2. Kinds ; bearded or bald ; flint or soft skin ; red or white ; summer or winter ; where obtained ; by what name or quality designated ; average weight per bushel.
3. Amount of any particular crop ; extent of land sown.
4. Condition of the land ; nature of the soil ; whether newly cleared ; burnt ; swarded ; or how used for two or three years previously ; how prepared for sowing.
5. Kind and quantity of manure ; use of lime ; plaster, or any compost manure.
6. The quantity of seed to an acre, and preparation of the seed ; advantages or evils of steeping the seed.
7. The time of sowing ; week and day, if possible to be ascertained. The importance of such an inquiry as this will appear for the reasons which follow :

It is strongly recommended that wheat should be sown before the 14th of September, so as to be well rooted before winter ; thus affording a better protection against frosts. Or else so late as not to germinate before spring ; this method has been tried. Or frozen in water in the autumn and kept so until the spring, which experiment is reported to have been successful. It is often desirable for wheat to follow Indian corn ; but Indian corn in general cannot be taken off in season to get the wheat sown. The discovery of any mode, such as the above for example, by which the necessity of this early sowing could be obviated, would be of great advantage.

Wheat sown early is more likely to have passed beyond injury from the hot, damp, steaming weather, which occurs in July and occasions rust. Query ; whether late sown wheat is not likely to pass beyond that season before it gets into a condition to be injured, which is while it is in the milk

Late sowing of wheat, as in some cases the last of May and the first of June, it is stated, has carried the season of flowering beyond the time of the wheat insect, and the crop has been saved.

8. The diseases or accidents, if any ; whether affected by rust, smut, or mildew ; and any circumstances of weather, situation, or particular condition of the plant connected or contemporaneous with such occurrence. The situation or exposure of any blighted field, whether high and airy, or low, damp, and confined.
9. Whether or not affected by the vicinity of barberry bushes.
10. Whether winter killed or not ; under what circumstances as it regards the forwardness or lateness of the plant ; and how affected by the snow.
11. Whether attacked by the Hessian fly or other insects ; and preventives, if any.

Wheat is, in many parts of the country, subject to injury from an insect or worm, whose appearance is comparatively recent ; and whose habits are not well ascertained. He is making dreadful havoc in the wheat regions, producing in many cases, an entire destruction of extensive fields of the most promising appearance; and has advanced at the rate of forty miles a year. The same insect, it is believed, though the identity is not perfectly ascertained, has attacked barley, rye, and oats with alarming success. The cultivation of barley has on this account been abandoned in some parts of the State; and so has the cultivation of wheat in what have heretofore been deemed some of the most productive wheat regions in New-York

Inquiries and experiments on this subject are of immense importance. A perfect preventive or security would be worth millions to the country.

12. Remedies or protection against blight, or other accidents.

13. The extirpation of weeds particularly injurious to the wheat crop, such as tares, cockle, chess, garlic, and the Canada thistle; and any machinery by which the grain may be cleansed of "foul stuff."

14. The experience of farmers in the cultivation of wheat crops successively on the same land; and in sowing clover with the wheat with a view to ploughing it in as manure for a succeeding crop; and whether customarily ploughed in with the stubble, or depastured; or mowed for one or more years.

15. The general subject of sowing grass with grain; and the value in such case of a stubble crop for winter fodder.

16. Harvesting.

Time and state of cutting; and whether early or late cutting be preferable; the time, in the opinion of some persons, making a material difference in the amount and value of the crop.

Modes of harvesting; reaping or cradling; and cost by day or piece work; average amount of a day's work.

17. Threshing and Cleaning.

Threshing Machines. Winnowing Machines.

18. Manufacture of Flour. Various qualities. Number of bushels required for a barrel. Miller's charges and profits.

19. Construction of Mills and flouring Machinery. Water, steam, and wind power. Domestic Mills.

20. Value and uses of bran.

21. Value and uses of Wheat Straw.

22. Value of a wheat crop compared with other crops. Average yield.

23. Capacity of the State to furnish its own wheaten bread.

24. Experiments and observations in regard to this crop.—Causes of its general failure.

25. Some general estimate of the quantity and cost of imported flour consumed in any village, town or county.

Indian Corn.

1. Kinds. Gourd seed. White soft Corn. Sweet Corn. Flint Corn.

2. Varieties of Flint Corn. White; yellow. Weight per bushel. Comparative amount of cob and grain in different varieties.

3. Soils most suitable. Preparation of land. Crop, if any, which it may best succeed. Fall or spring ploughing. How often may it be repeated on the same land.

4. Manuring; kinds of manure most suitable; quantity to the acre; how distributed—in hills, drills, or spread—applied green or rotted.

Lime; its value to Corn—how applied.

Gypsum; its value to Corn—how applied.

Ashes; its value to Corn—how applied; crude or spent.

5. Seed—how selected; effects of selecting in increasing the crop; how saved; steeped or sowed dry; various steeps; copperas water; lye; rolling in tar; coating with gypsum or ashes; quantity of seed.

6. Time of planting; modes of planting—in hills or drills; distance of plants; protection against vermin or birds.

7. Cultivation. Weeding; ploughing or harrowing among corn; use of a cultivator; number of hoeings; hilling or earthing up. Topping; suckering; stripping; with the effects upon the crop.

8. Value of the corn stalks and leaves when taken green; and mode of curing.

9. Alternate rows of corn and potatoes. Planting pumpkins or turnips among corn. Sowing grain among corn for a succeeding crop.

10. Harvesting. Gathering by the ear; or cutting up and stacking in the field.

11. Preservation of the Grain. Construction of Granaries.

12. Preservation and comparative value of the stover or dried fodder.

13. Machines for shelling.

14. Average yield per acre; value of the crop; cost of cultivation from beginning to readiness for the mill. Kiln-drying.

15. Value and uses of Indian Corn—for Dairy Animals.
" " " for fattening stock.
" " " for swine.
" " " for horses.
" " " for distillation.
" " " for extraction of oil.

(To be continued.)

GEORGE HALL.—Information is wanted of George Hall of the city of New York, who left Newburgh last September if this should meet his eye, he will hear of something to his advantage, by addressing a letter to his Sister *Jane Hall*, 46 Oak street, New York.—Any information concerning him, will be thankfully received by his Brothers and Sisters as above directed.

New-York, June 15th, 1837.

THIRD ANNUAL FAIR OF THE MECHANICS' INSTITUTE OF THE CITY OF NEW-YORK.

The *Fair* of the Institute will be held at Niblo's Garden, commencing Monday, September 25th, 1837.

To render this exhibition worthy of the arts and of the ingenuity of the Mechanics of our country, the Managers appointed to conduct the approaching *Fair* have determined to make such liberal arrangements as will insure to the contributors a fair opportunity of exhibiting their productions to the greatest advantage.

The object of Exhibition Fairs is to present to the members of the Institute and their fellow citizens who are engaged in the Mechanic Arts, the means of making their skill and ingeunity known in a way no other facilities afford: the many thousands who visit such exhibitions have a much better opportunity of judging of the merits of the various productions, than they would have by a mere verbal or newspaper description, besides the advantage of seeing brought together, in one vast collection, the products of the skill, ingenuity, and industry of our country.

PREMIUMS of Medals, Diplomas, &c. will be awarded for *all* worthy or meritorious articles exhibited, either as it respects superior workmanship, machinery wherein the operations are new, interesting or important, where ingenuity is displayed, or taste manifested, and particularly for all new and useful inventions.

You are respectfully requested to send, for competition or exhibition, specimens of the articles you manufacture; and you may be assured that the strictest impartiality will be observed in the distribution of the Premiums.

Steam power will be provided for the accommodation of those who wish to exhibit Machinery in operation; an experienced Superintendant will take charge of this department, and contributors in this branch are particularly invited to send or bring their Machines or models as early as possible, on the 23d September that the necessary arrangements may be made in relation to shafting, pullies, &c.

The Managers, in conclusion, cannot but express their belief that this Third Fair of the Mechanics' Institute, will exceed in variety and beauty of display, all previous exhibitions of the kind.

GEORGE BRUCE, *Chairm.*
WM. EVERDELL,
C. CROLIUS, JUN.
THOS. EWBANK,
RICHARD BRAGAW, } *Executive Committee.*

N. B. All articles for competition must be delivered to the Committee at Niblo's Garden, on the 23d September. Those for exhibition *only* will be received any day during the Fair, before 10 o'clock A. M.

RULES AND REGULATIONS.

1.—The Garden will be opened for the reception of Goods, on Saturday, 23d of September, from 6 o'clock A. M. until 9 o'clock P. M., and it is respectfully urged that all articles intended for competition may be sent in early in the day. Those articles intended for exhibition *only* will be received any day during the Fair, before the hour of 10 A. M.

2.—The Fair will open for visitors on Monday, 25th Septem. at 10 o'clock A. M., and continue open every day of the exhibition till 10 o'clock P. M.

3.—Competent and impartial Judges will be appointed to examine all articles presented, and premiums will be awarded on all such as shall be declared worthy.

4.—The Committee on Premiums, and all firms or partnerships in which they may be interested, shall be excluded from competition or the award of any premium.

5.—All persons depositing articles, either for competition or exhibition, must attend to have them registered by the Clerk, at which time they will receive a certificate, which will be required of them when the articles are returned.

6.—Proof of origin must be furnished if required, for any specimen offered for Premium.

7.—Depositors will receive a ticket from the Clerk, which will admit them and Ladies during the Exhibition.

8.—Arrangements will be made to exhibit, in operation, all working models that may be deposited—contributions in this branch are invited—a competent person will take charge of all models sent for the above purpose.

9.—The morning of each day, until fifteen minutes before 10 o'clock, shall be appropriated exclusively to the Judges.

10.—Members will receive their tickets of admission by applying at the Institute Rooms, any time in the week previous to and during the exhibition.

11.—All articles offered by Apprentices, will be received, and adjudged as the production of Apprentices—they must furnish a certificate of name, age, with whom, and the time they have served as apprentices.

12.—Articles subject to injury by being handled, should be secured in glass cases—and contributors are requested to have a person to take charge during the hours of exhibition—in the intervals, efficient measures will be taken to protect property.

GENERAL COMMITTEE.

George Bruce,	John Ridley,
John M. Dodd,	Silas B. Simonson,
James J. Mapes,	Thomas F. Peers,
Thomas Ewbank,	Thomas G. Hodgkins,
Wm. Everdell,	George L. Spencer,
C. Crolius, Jr.,	Peter Wemmell,
A. J. Mason,	Richard Bragaw,
Thos. W. Bartholomew,	Ab'm Peitch,
A. Storms,	Wm. H. Hale,
Wm. Ballard,	Wm. J. Mullen,
Henry Cunningham,	James Thomson,
John Harold,	Abner Mills,
Joseph French,	L. D. Chapin,
James D. Phyfe,	A. Cammeyer,
John H. Mead,	Hiram Tupper,
John Conroy,	H. B. Robertson,
Jordan L. Mott,	James Thomas,
Samuel Carter,	H. G. Stetson,
George F. Nesbitt,	Ferris Owen,
Henry Worrall,	N. Berry,
W. B. Worrall,	O. Whittelesey,
James B. Cummings,	M. W. Emmons,
James Frost,	J. S. Anderson.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its enagravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

				lbs.
350 tons	$2\frac{1}{2}$ by $\frac{1}{2}$,	15 ft in length,	weighing	$4\frac{68}{100}$ per ft.
280 "	2 " $\frac{1}{2}$,	"	"	$3\frac{50}{100}$ "
70 "	$1\frac{1}{2}$ " $\frac{1}{2}$,	"	"	$2\frac{1}{2}$ "
80 "	$1\frac{1}{4}$ " $\frac{1}{4}$,	"	"	$1\frac{25}{100}$ "
90 "	1 " $\frac{1}{4}$,	"	"	$\frac{7}{8}$ "

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, and $3\frac{1}{2}$ inches diameter.

Chains for Inclined Planes, short and stay, links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,

28 tf Philadelphia, No. 4, South Front-st

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size. Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron, Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style, and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR

Patterson, New-Jersey, or 60 Wall street, N.

51tf

TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,

Engineer in Chief Hiwassee Railroad.

16—6t.

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rohester, Jan. 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing, Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,

33—tf GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames'	superior	back-strap Shovels
150	do	do	do plain do
150	do	do	do caststeel Shovels & Spades
150	do	do	Gold-mining Shovels
100	do	do	plated Spades
50	do	do	socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.

No. 2 Liberty street, New-York.

BACKUS, AMES & CO.

No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleeckerstreet, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

THERE is still a large amount of mechanical work to let on the line of the James River and Kanawha Improvement, consisting of twenty locks, about one hundred culverts and several large aqueducts, which will be offered to responsible contractors at fair prices.

The locks and aqueducts are to be built of cut stone.

The work contracted for must be finished by the 1st day of July, 1838

Persons desirous of obtaining work are requested to apply at the office of the undersigned in the city of Richmond, before the fifteenth of May, or between the fifth and the fifteenth of July.

CHARLES ELLET, JR.

Chief Engineer Jas. Riv. & Ka. Co.

P. S.—The valley of James River above Richmond is healthy.

16—10t

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May; Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered.—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer

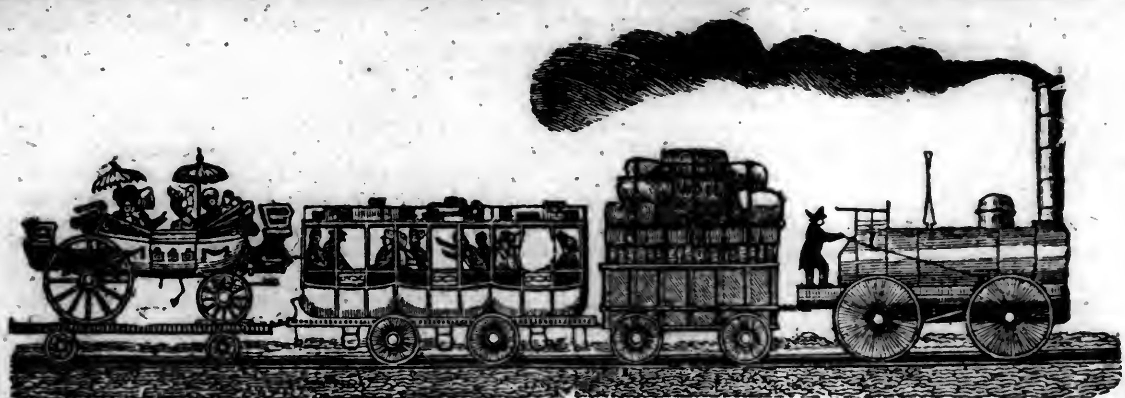
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 1y 14



AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, { EDITORS AND PROPRIETORS.] SATURDAY, AUGUST 19, 1837. [VOLUME VI.—No. 33

CONTENTS.

AMERICAN RAILROAD JOURNAL.

NEW-YORK, AUGUST 19, 1837.

In presenting the report of Elisha Johnson Chief Engineer on the "Niagara and Detroit Rivers" Railroad, we would remark that the portion relating to the proposed peculiarities of construction is the same as in the report recently published. Being illustrated by cuts, a better idea can be obtained than from verbal description. We make this republication accompanied by the cuts, at the request of Mr. Johnson, in consequence of the strictures of our correspondent Q.

We have also received a communication in answer to Q., and also a copy of the report for Q.

REPORT TO THE PRESIDENT AND DIRECTORS OF THE NIAGARA AND DETROIT RIVERS RAILROAD COMPANY.

GENTLEMEN,—In making a report, as your Engineer, I would first ask your attention to the ample provisions of your charter which accompanies this report. This provides for the construction of a Railroad from the town of Burtie to the town of Sandwich, with very favorable provisions in the details of the charter. By an act passed in March, 1834, a charter for a Railroad from Hamilton or Burlington Bay, to London, and from London, to the navigable waters of the River Thames, and to Lake Huron, was granted. On the last mentioned road, I had the honor to make a survey and report, voluminous in their details, with a view, on the part of the company, to amend their charter, and to present to the Government facts and reasons to induce them to aid the work.

During the progress of Parliamentary enactments, connected with that survey, I have further had the honor to be selected by you, to make a survey under the provisions of your charter; and the work has been in progress during the sittings of your Parliament. At the period of making this report, Government have completed their enactments, and extended liberal aid for the promotion of Internal improvements in the Province. They have amended the charter of the London and Gore Railroad, and under the title of "The Great Western Railroad Company." authorised negotiations with your company, under certain provisions; and the issuing of Debentures in aid of their work, confining their appropriations to the distance between Hamilton and Woodstock, and providing for the final location of its western termination, by Engineers to be appnoited by the Governor—thus giving it the character of a public road for the promotion of general Provincial interests, and of course expecting its location will be such as will best promote that interest, and attract commerce and intercourse most extensively to her capital and commercial cities.

This is a subject of great importance, and will address the hopes and feelings of many with considerable effect. The location of roads through a vast extent of fertile country, connecting all its population, business and intercourse in the most favorable general arrangement, is one of difficulty and of great importance.

The foregoing details of facts may be thought, by some, to constitute serious impediments to a faithful performance, on my part, of the duties of your Engineer. To me it seems otherwise. It is impossible for the information of an Engineer, on all subjects relative to the topography of the country, in the neighborhood of which his professional labors are engaged; of its population, their wants and wishes, of its means, resources, plans, purposes, improvements, connections, and means of intercourse, to be too extensive. If he be a man of probity, experience, and skill, the more he has of such information the better; for it will enable him, with greater success, to adapt his services and recommendations to the profit of any work with which he may be charged. The exertions I have been called to make in the Province, have brought me into useful communication with many of her worthy inhabitants, afforded me opportunities of understanding her soil, her timber, her streams, her minerals, her settlements, her agricultural, commercial, and manufacturing facilities, and her actual intercourse and means of prospective advancement, better than I could otherwise have done without much longer enquiry. And I am conscious of very strong convictions in favor of the importance of prosecuting Internal Improvements in the Province, with the greatest vigor, upon a scale so large as to embrace the interests of all.

It ought not to be expected of an Engineer, that he should be so absorbed, by devotion to any sectional interest, as to be insensible of the value of other interests, and the power by which they are likely to be advanced. Such an absorption would subject him to errors equally disreputable to him, and injurious to his employers. Exempt himself from the bias of special pecuniary interest, in the result, the elevation of his views, and the comprehension of his knowledge, guided by long experience and habitual meditation, upon such subjects, ought to enable him to judge more safely than others, for the interest of the Stockholders. He should certainly be cautious of giving hasty and inconsiderate opinions; but when properly called upon to express his views, should be prepared to present facts and plans collected and matured, with all the industry and ability of which he is master, and combined under a deep sense of all the objects of his trust. In his recommendations, all the capitalists, who make investments in the work, to which they refer, are interested to hold him, and they should hold him, to no slight accountability.

The object of your company is great, in all its bearings, and I am satisfied, is entirely feasible, and you expect much from a professional report upon it. This expectation is natural and reasonable; but it cannot be met without fearful responsibility, on the part of your Engineer. A preliminary survey, carried on with rapidity and under disadvantageous circumstances, through a country presenting a wide extent of wilderness compared with settled portions, to elucidate a vast plan of improvement, in which every settlement already formed feels a lively concern, and every new-comer finds the principal motive to determine his individual residence, involves in every step of the progress, much care and anxiety, and these are rendered still more grave, when the survey is looked to, for eliciting facts, and suggesting plans, which shall lead to large investments of money for stock, already in part subscribed for, and for opening such expansive means and facilities of internal communication, as will strikingly advance private interest, and the general prosperity. Under such circumstances, it is due to those interested in the survey, on either side of the proposed lines, as well as to myself, to say, that I have been compelled to confine my instrumental examination to a single line. This compulsion has been the result of limited appropriations to meet expense, and the shortness of time, after the survey was commenced, before uncontrollable impediments would arise from the approach of Spring.

The country to be traversed by your road, on which the location is to be situated, is a belt from five to twenty miles wide, except at or near the terminating points, extending from Niagara to Detroit rivers, along the north shore of Lake Erie. This belt is bounded on the north by the river Thames—a range of high lands stretching from Westminster easterly beyond Norwich—and the Welland River. From the Niagara westerly the most favorable location is found in a direct line near the lakes. To this line our work is confined, by extensive low lands and swamps, further north, discharging into Welland river. It is expedient to avoid the southerly bend of the Welland Canal feeder, which requires passing along the south side of Broad Creek, both of which objects may be answered, by a continuation, on favorable ground, of the same direct line to Grand River and far beyond. This location is very fortunate, in all respects, as the surface which it occupies is unbroken by water courses, and rises but little above the Lake level. From Black Creek to Patterson's Creek, there is but one direction, in which an uniform and easy grade can be secured, in rising from a lower to a higher table of country. And this direction falls in with a continuation further westward of the same straight line with which we commenced. From Grand River to Black Creek, the table lands are every where of easy passage. But the valley of this Creek, as well as that of Patterson's Creek, present increasing difficulties, at every point, approaching the Lake, which, with the projection of a high ridge from the north as far down as the village of Simco, designate that as the most eligible, for the location of our line. From Simco westward, the general elevation of the country is two hundred feet above the lake level; and the streams by which it is intersected, plow it into ravines, deep, wide, with abrupt banks, in proportion to the length of their progress from their sources. Besides, the drainage of the country, in this section, originates longer water courses than exist elsewhere on the route, in consequence of the greater space between the various points of its discharge, into the Thames, Grand River, and the Lake respectively. These circumstances result in offering diminished difficulties, on a route further from the Lake shore. On such a route the difficulties may be confined to the crossing of Big Creek, Otter Creek and Kettle Creek, which draw their supplies from a higher range of country lying in between the Thames and Grand River. This presents the possibility of finding a line further north, but north of the line as shown upon the map, higher land makes down between the streams, creating an increase of summit, and producing inequalities of surface much more unfavorable.

On the Otter Creek, from the proposed line southerly to the lake, greater difficulties present. The surface is diversified by numerous ridges and ravines, bold and deep, many of them lying at an angle of ascent vertically of 30°. The soil is sand and clay, greatly indurated, and covered by extensive forests of pine. On the south of the proposed line, lie Yarmouth heights, between the Catfish Creek and Kettle Creek, along the line of Talbot street. These heights will require the curve which must be adopted in pursuing our course westerly to be established in the vicinity of Kettle Creek; where the final arrangement of the curve, and connection of the tangents, cannot be judiciously determined, without extensive and careful surveys. The valley of this creek, offers difficulties not to be encountered below St. Thomas.

From St. Thomas westerly, the high levels of sand formation continue in a narrow belt terminating at the O. At this point and further along the Lake shore, the waters of the Lake have evidently encroached upon, and worn away, the dividing ridge, from which the drainage passes northerly into the Thames. This tract is broken by numerous short and deep ravines, and intersected by small ridges of sand in a part of its surface, making it unfavorable, and in places impracticable to locate a line upon it. Between this and the Thames the land is lower and of a more favorable description. Portions of it in the vicinity of the dividing ridge are encumbered by swamps, but nearer the river, and yet above the short ravines extending southerly from it, is a very favorable line of country, the soil being clay covered with oak, maple, black walnut, and other varieties of timber, and gradually descending toward the west, to a low level occupying the whole distance between the Lake shore and the Thames. West of the O and Chatham, the same level without ravines or undulations continues to the Detroit river.

The settlements on the lake shore have been fostered and will continue to rely chiefly upon the commerce of the lake. They will be somewhat affected by the location of our road, but much more concerned to encourage facilities of communication extending at right angles across it, from their own doors to the interior. By these alone will interior productions come down to them, and the demands of the country for merchandize, salt, and other articles from abroad, be made conducive to the increase of their trade and wealth. But there are several important settlements more inland, which cannot fail to be greatly, and most of them, beneficially interested in your enterprise. Simco, situated in what has been long known as the Long Point Settlement, is now designated as the centre of the new district, and growing in importance. St. Thomas, a flourishing village upon Kettle Creek, at the crossing of Talbot street, Chatham, occupies a point of much promise at the head of steam navigation on the Thames, and is putting forth laudable efforts to call out all of the advantages of her position. Dunville, on the Grand River, at the point where the Welland canal intersects it, is secure of a rapid augmentation of population and business. The water power produced here, by the dam erected for feeding the canal, with the navigation of the river above and below it, and of the canal itself into lake Ontario, and by means of the Chippawa river, into the Niagara, make its advantages conspicuous. Already it has become the site of extensive lumber establishments; which are beginning to turn to good account the valuable forests extending far and wide within its reach. The demands for lumber are greatly increasing upon the lakes Erie and Ontario; and the ease with which saw logs may be brought to Dunville from large and unculled regions, and after being manufactured there, shipped at the mills, for either a southern or northern market will first call into activity large amounts of capital and enterprise at this point; and they will be augmented by every opening of the adjacent country to other branches of productive labor, and by a growing commerce with the Lakes in other articles.

The residue of the belt, being a great proportion of its entire extent, is yet so little settled and known, as to leave important positions for towns, (between the Grand River and Chatham particularly on the proposed line of road) to be determined chiefly by your, road, and future improvements to connect with it.

It will be perceived, by the foregoing description, and the Map herein referred to, that the most favorable location of your road will give it an extraordinary character. The physical condition of the country, the position of its leading settlements, and the largest accomodation of rich agricultural tracts, all conspire to point out a route from the Niagara to Detroit Rivers to consist of two tangent lines, each over one hundred miles long, and connected in the centre, by a curve so gradual as not to be distinguishable from a straight line, in short distances, by the eye! The formation of the country is peculiarly favorable for a railroad; the surface being level or uniformily ascending and descending in such a manner as to admit every where of easy grades.

The principal difficulties will be encountered at five pla es on the line, to wit, at Grand River, Patterson's Creek, Big Creek. Otter Creek and Kettle Creek, and none of these are very formidable! The first, will require a draw bridge and an embankment under favorable circumstances; the second an extra amount of both deep cutting and embankment, and culvert at Patterson's Creek. The other three streams are proposed to be crossed by bridges, after the form of Long's or Town's, enclosed with a double track supported by timber piers from the bottom. These piers are to be covered for half their height, with cones of earth brought on the road and dropped around their base, the upper portions enclosed in connection with the main trunk. The object of this is to strenghten the piers, and preserve the rimber from decay below the earth, to serve as a foundation, when a re-construction shall be required. These bridges will be about 1000 feet in length each, and 80 feet above the stream. Their cost will be found stated in the estimate.

The extraordinary lengths of straight line on your road are attainable with little or no extra expense, and are unparalleled in the history of similar improvements. And they are the more remarkable as the line crosses the whole drainage of the country at right angles. These desirable distinctions of your undertaking do not depend upon conjecture, but from an actual survey of the whole route, and a level carried through it, except a small portion of the west end, where the land rises but slightly over the adjacent waters, and where the line may be run in any direction best comporting with the policy of the company.

So far as my survey is necessarily connected with the decisions of the commissioners, by their resolution adopted in March last, at the town of St. Thomas, I see no difficulty in the proposed terminating point on the Niagara; and would establish the other termination at the wharf and landing of John Prince, Esq., in the town of Sandwich.

To establish any portion of the route definitively, by a preliminary survey, cannot be expected, nor is it practicable with a just regard to prudence. The best final designation may be effected, by such variations of the ends of the tangent lines and the curves connecting them, as more minute and detailed examinations shall serve to recommend: and such examinations cannot be duly made without much scientific and vigilant application with transit instruments, in establishing correct lines, and corresponding expense.

The desire to adopt the greatest extent of straight lines, and the easiest curves attainable, may be deemed needless. Experienced men seek for them with great solicitude; and for their sake will incur large extra expense. They are the shortest line possible, and may serve to telegraph from each station house through the line; they promote the safety of rapid motion, in the heavy locomotives employed upon them; they give reputation to the work in which they appear; they offer more attractions in favor of profitable connecting improvements; and of course hold out stronger inducements to the investments of capital. These considerations, in addition to those herein before adduced in their favor, make it the duty of the Engineer to adopt them if he can, without exorbitant extra expense.

The line of location to commence on the Niagara river at a point convenient for ferriage—convenient for constructing suitable wharves; and where it will be found practicable to make eligible purchases of a site for the termination of the road line. Thence southwesterly, on a curve of ten thousand feet radius, two miles, nineteen chains, and eighty-two links, to a point most favorable for the commencement of the tangent lines on the Garrison reservation, known as the site of Fort Erie. Thence on a course supposed to be south, 85 deg. 45 min., west 108 miles 9 chains, to a point believed the most favorable for the commencement of a curve of one hundred thousand feet radius. Thence on the arc of said curve (the angle of the tangent being 20 deg. 30 min.) 7 miles 68 chains. Thence on what is denominated the western tangent, south 62 deg. west, 68 miles 13 chains, to what is denominated the St. Clair curve, commencing opposite the mouth of the Thames river. Thence on the arc of said curve, being 100,000 feet radii, the angle of the tangents being 33 deg. 45 min., 11 miles 12 chains 48 links, to the St. Clair tangent. Thence on said tangent 19 miles 3 chains 84 links, to the Detroit river curve, the radius of which is 20,000 feet. Thence on the arc of said curve, 4 miles 18 chains 48 links, to the wharf of John Prince, Esquire; in the village and town of Sandwich. The total distance is as follows; to wit:

	M.	*Ch.*	*L.*
Niagara river curve, 10,000 feet radii, -	2	19	82
Eastern tangent, - - - - - -	108	9	—
Yarmouth curve, - - - - - -	7	66	—
On western tangent, - - - - -	68	61	38
St. Clair curve, - - - - - -	11	12	48
St. Clair tangent, - - - - - -	19	39	84
Detroit river curve, - - - - -	4	18	48
Miles	221	69 Chs.	

Gosfield route, continuing down the western tangent 89 miles 73 chains, to the curve denomina.ed the Gosfield curve. Thence on the arc of said curve, the radius of which is 10,000 feet, angle of tangent 63 deg. 15 min., 2 miles 6 chains 61 links. Then on what is denominated the Sandwich tangent, 14 miles 60 chains, to the wharf before mentioned in the town of Sandwich. Total distance by Gosfield, 225 miles 44 chains 82 links.

The distance from Niagara river to Detroit river at Amherstburgh, is as follows, to wit:

	M.	*Ch.*	*L.*
Niagara curve, - - - - - -	2	19	82
Eastern tangent, - - - - - -	108	9	00
Yarmouth curve, - - - - - -	7	68	00
Western tangent, - - - - - -	107	68	25
Miles	225	78	07

The said general description to allow any such changes of said tangents and curves as shall in a final survey be found best or most advantageous. The eastern tangent may be subject to fractional variations from one favorable point of location to another, particularly the location of the viaducts.

The charter does not anticipate a location of the line to Amherstburgh, a reference to which may be considered in the design, but to reach Sandwich requires a deflection from the tangent southerly as it approaches Lake St. Clair, and its continuance along the border of the Lake and Detroit River, to its point of termination. This would be shorter 4 miles 9 chains 25 links, than a continuation of the tangent to the corner of Gosfield, and thus giving it a direction to Sandwich. It may be thought expedient hereafter, with a view to claim the business and travel from the shore of Lake Erie, from Sandusky Bay to Detroit River, to obtain authority and complete the tangent to Amherstburgh. A reference to this would influence the location to Sandwich, so as to carry it direct to a point equidistant from this place and Amherstburgh. Should it be found for the interest of the Company to obtain the alteration alluded to, this location would save the construction of a greater length of collateral lines.

Before introducing the estimates of your work, I have inserted a copy of my plan and views of constructing Rail Roads; which is the basis on which the estimates are made, and to which I would call your attention.

Rail Roads are constructed in various forms. Much science and ingnnuity have been applied to this subject, as well as to all the machinery to be employed upon them.

The relative value of all the forms adopted, is well understood by professional men. Those now interested in the construction of Rail Roads enjoy the advantages derived from their experience and may therefore more safely proceed in this species of public enterprise. It is the part of practical wisdom, in every undertaking, to adopt its exertion to circumstances. In the districts of country, where timber is abundant, the soil rich and deep, and secondary formation, where capital is scarce, and the rate of interest high, prudence dictates the adoption of different methods from those that may be most suitable under different conditions. I have compared all the forms of construction, which have come to my knowledge. After diligent inquiry, with much solicitude, in reference to the cardinal points of economy in their construction, durability and efficiency, I have adopted, as the Engineer of the Tonawanda Rail Road, one of the following description, which is now in use, with Locomotive Engines of a heavy class, and full freighted trains. The experience of two winters of great severity, confirms the claims here set forth, and its entire efficiency and tendency to keep in perfect adjustment, without the usual annual repairs.

1st. Blocks of round timber, from 18 to 24 inches in diameter, sawed with parallel ends, at right angles with their length, are placed in an upright position, with one end resting firmly on solid earth, from which all roots and top-soil are carefully removed. Of these blocks there are two lines, 5 feet apart, from centre to centre, across the road. These blocks will vary in length according to the surface of the ground compared with the grade level.

2d. Timbers 9 feet long, 1 foot in diameter, spotted on the under side where they are to rest on the blocks, and cut down six inches deep in a notch 15 inches wider above the blocks, where they are to receive the string-pieces. These are placed across the road from block to block, each end extending outside of the blocks upwards of one foot.

3d. String-pieces from 18 to 24 inches in diameter, and either twenty or thirty feet in length. These must be squared at each end—one foot square—and at each intermediate ten feet, where they are to rest upon the cross timbers above the blocks, and parallel with each other, in two lines lengthwise of the road. They must be well hewed on the upper side, and firmly keyed into the cross timbers.

4th. Scantling, 3 by 4 inches square, placed on their broadest side, must be extended along the top of both lines of string-pieces, parallel with each other.

5th. Above the scantling, in exact parallelism, are to be placed two ranges of iron bars five or six eighths of an inch in thickness, and two and a quarter inches wide; and then the iron bars and scantling are firmly secured to the string-pieces, by spikes seven inches long, driven through them both, into the string-pieces.

After the road is located, and the grade line established, the timber work is completed on all parts of it requiring embankment, and not subject to cutting of more than two feet in depth. A kind of working car is then used of simple construction, with four, six, or eight wheels, having either of them four boxes, so contrived as to discharge half their contents between the two lines of string-pieces, and half without them, and carrying a cubic yard of earth to each wheel, and thus the embankment is made. Where the cutting is deeper, these cars advance one or two hundred feet, on temporary ways, being moved by horse power, and as the excavation proceeds, the permanent timbers are duly placed and secured, and the road completed. The timber work is all covered by earth within the grade to the surface of the iron, except room for the flange of the wheel. Any kind of timber may be used for the blocks and cross timbers; the string pieces should be made of the best timber afforded by the line of road or the adjacent forest.

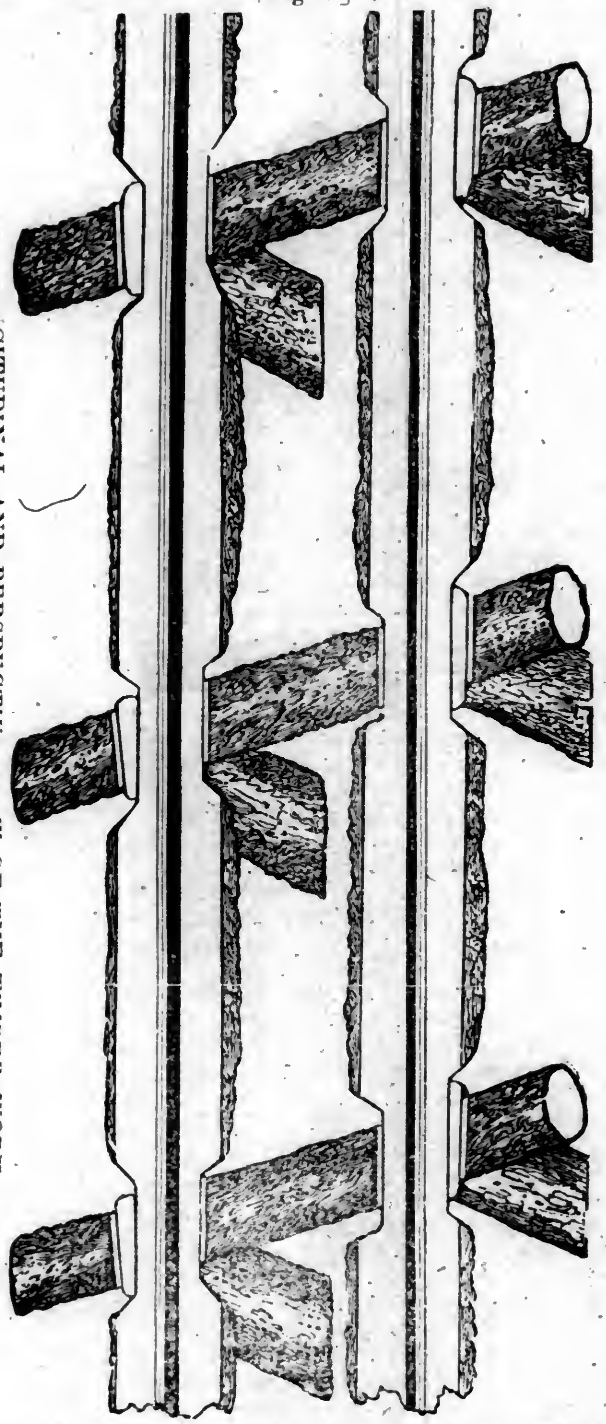
[See Fig. 1.]

The earth for embankments, and in excavations, stone and lime culverts, sawed scantling, iron, &c., are all moved on the line by cars.

[See Fig. 2.]

Men of much experience in constructing public works, particularly Rail Roads, have sought with much anxiety for some better means of applying the necessary labor, than that afforded by

[Fig. 1.]



LONGITUDINAL AND PERSPECTIVE VIEW OF THE TIMBER WORK.

placing it under contract. This means has always made it difficult to secure fidelity in the work, and leads to innumerable controversies and delays in the progress of contracts, and in their final settlement. A method of proceeding, in the construction of the Tonnawanda Rail Road, has been adopted, which avoids those evils almost wholly. An active practical Superintendent, with a party of twelve or fifteen hands, takes charge of the timber work upon a given section of the road. This Superintendent hires and discharges his hands at pleasure. He subsists, pays, and directs their labor, keeps a weekly work list, and is responsible for the industry, fidelity, and economy of the whole. Where cuttings occur, a car of suitable dimensions for the particular work, with a horse, is placed upon the timber work, under a Superintendent and similar regulations. All these parties act in the spirit of an animated competition with each other, and each is proud of having made good progress, during the week, as per estimate of his work, by the resident Engineer.

In the first organization of the Company, the Directors appoint an Engineer, Commissioner and Executive Committee. The

[Fig. 2.]

CROSS SECTION AND VIEW OF THE TIMBER WORK IN THE GRADE.

Commissioner is chiefly responsible for the construction of the work, in all its parts.

The office of a Commissioner, is one of exceeding interest. On his talents, industry, personal vigilance and example, the activity, economy and progress of every department of action, will very much depend. To much knowledge of the local business and resources of the country through which the road is to pass, he should add the benefits of experience in conducting labor; and should think it no hardship to exert his energies, most of the time, in person, and on foot, to advance the various labors on the line, and secure fidelity in all.

In building the road—the more artificial structures—and all the scientific details, he is directed by the Engineer. He receives the money to be disbursed from the Treasurer, and accounts, monthly, to the Executive Committee for its faithful application.

The ordinary mode of constructing wooden roads, is to lay two paralell ranges of sills or string-pieces lengthwise of the road, six inches by six inches square, or four inches by six or eight quare, or plank two or three inches by nine or twelve inches sawed timber, with cross-pieces ... those placed from three to five feet apart, eight feet long, and five or six inches by eight inches square; the rails, on which the iron rests, being six inches square, or five by seven inches, and the iron consisting of bars, five-eighths or three-fourths of an inch by two and one-fourth inches wide. All this structure is placed upon the surface of the grade and filled with earth between the ranges of sills so as partially to cover the cross-pieces for a horse path. On some roads, the wooden rail has been secured by chains or castings to stone blocks placed in deep beds of rubble or pounded stone.

The more expensive and substantial roads of stone and iron are of various forms. The edge rail resting in chains or stone blocks of various paterns, is used in some cases; and in others the T rail resting on cross-timbers bedded even with the surface of the grade, and placed three feet apart with splicing chains; and in other cases still, the T rail resting upon stone blocks, or in lace of cross timbers, split stone seven feet long, about one foot square, resting on a bed of stone eighteen inches in depth, the whole width of the track. The expense of constructing these several forms of road, varies from fifteen to fifty thousand dollars per mile.

The expense of these forms of Railroads, constitutes a fatal objection to their adoption in new districts of country; and they ought not to be adopted, if capital were ever so abundant.

1st. Experience has shown that sawed timber roads are objectionable when applied to soils ... the timber work has not sufficient bearing surface to resist the action of rains, which settle them into the grade; and they cannot sustain the pressure of locomotives with heavy trains.

2d. The timber work is placed in the most exposed situation possible, and the form of preparing and placing the cross timbers subjects them to the most rapid decay.

3rd. The timber is too light, yielding under the weight of the engine. This yielding and the settling together of the joints formed by the cross timbers in horizontal sections of road offer an obstruction to the passage of wheel equal to a slight ascending grade.

4th. In a northern climate, the winter frosts produce great injury on rail roads. The cross timbers being covered with earth, when this earth freezes, (which is the most exposed part of the surface) the cross timbers are raised from the sills, and thus a derangement begins, which spreads and becomes considerable every year, especially in winters of great severity.

As those evils disclosed themselves to my observation, it became a great object to contrive the means of avoiding them and introducing improvements combining durability, strength and economy. These are requisites of especial importance in new districts; and difficult of attainment, in soils, rich and deep, and liable to hard frosts. They result in an eminent degree, from the constuction which I have recommended. That method finds most of the materials on the spot, in the heavy forests which encumber the soil, and which may be brought into, and constitute, a principal part of the structure, at an expense scarcely greater than would be incurred by removing it out of the way. This very valuable feature, in my plan, adapts it, most happily, to woody districts, where upon the old methods, the timber could not be sawed and delivered without exorbitant cost; and where there is timber standing, within the limits to be cleared, sufficient to answer all the demands for that article. Using large timber, in its roughest form, saves the great labor of scoring and hewing; it gives unyielding firmness to the frame work in the grade and provides ample strength for the transit of any amount of tonage. The size of the timber and covering it, (except the top of the scantling) with earth, secured its soundness for a great length of time. My examinations of timber, in similar situations, convinces me, that in close or clayey soils, it will endure from thirty to fifty years, except the scantling, which is but little expensive, and may be easily replaced when it decays. Placing the timber work so entirely under the grade, secures it effectually against the frost, as has been fully tested, by two severe winters, on the Tonawanda Railroad. The blocks on which the upper timber work rests, are a substitute for stone blocks. They are so covered as to be durable, and so situated as to increase the strength and steadiness of the cross and longitudinal timbers, amply shoring up to the superstructure, in any description of soils, and under any pressure rom above; which secures the road for use while the embankments are acquiring solidity.

The scantling and iron plate incorporated with the large string-pieces by strong spikes, throughout the entire length, have a bearing which will not permit them to settle, at all, from the grade line before or under the wheels of the Engine, thus leaving the locomotive its utmost power of traction, and compared with stone and iron roads has that medium of elasticity most favorable to the durability of the Engine and cars. Experience has shown that the great difficulty of keeping in exact adjustment the several parts composing a stone and iron road, creates a serious tax annually, in the destruction and wear of its machinery.

This plan of construction materially reduces the time and expenses of the Engineer department. The line is first located by transit centres, or tangent lines, and benches placed, by the test level. This prepares the way for the timber work. This being completed, the Resident Engineer gives the levels upon the cross timbers, and transfers the points of curvature from the tangents, preserving the monuments on the straight lines, and directing the several grading parties to form their slopes, as they proceed with the excavations and embankments.

It avoids the tedious detail of staking out the work for the contractor, or superintendent, replacing from time to time the stakes lost by the cutting, grubbing, embankments, &c., and requiring all to be surveyed and staked anew, when the timber or stone work, in the ordinary mode, is ready to be placed upon the grade.

The expense of a Railroad, is made up of different items of labor and materials combined in many different ways, and comprising foreign and local or domestic supplies; it necessarily involves a multiplicity of details. Whatever simplifies these, and increases the actual responsibility of those having charge of them contributes essentially to economy. Practical men know this can scarcely be too much insisted upon.

The scantling to be used for the road, I should recommend being of red cedar. There being an abundant supply on Point Pele Island, where it may be shipped to Sandwich, Chatham, Grand River, Gravelly Bay, Point Ebino, and Fort Erie, where exist good harbors for vessels, from which points it could be carried out upon the line of road; or landed at other harbors requiring but little land carriage. This timber could be used with great economy, the scantling being small and of any length. It would give you a good substitute for a stone and iron road, if I am correct in my views of the durability of timber placed in the grade.

The line is divided into three divisions, Eastern, Middle, and Western, as follows, to wit:

The Eastern Division, extending from Niagara river in the town of Bertie to Black Creek in the town of Woodhouse, being 64 miles and 27 chains.

The Middle Division, extending from Black Creek to the west line of the town of Oxford and west line of t e Moravian Indian Rerservation. This embraces that portion of t e line that is on a high level above lake Erie. Length of this division, 93 miles 79 chains 85 links.

The Western Division extends from the town of Oxford to the Detroit river at Sandwich, being 63 miles 42 chains 15 links.

Total distance 221 miles 69 chains.

ABSTRACT.

Eastern Division	64	miles,	27	chs.			£20908	19	11
Middle do.	93	do.	79	do.	85	links,	53835	01	04
Western do.	63.	do.	42	do.	15	do.	13793	18	00
	221		69				£88547	19	03
Timber work, slashing, grubbing and cleaaring of 221 miles, 69 chains, at £250 pr *m.*,*							55,4[illegible]	12	06

* The timber work i here estimated at nearly dou[illegible] the cost of executing the work in a favorable section. Portions of the route would require higher blocking in some cases in embankments and deep alluvial deposits, and in others requiring the timber moved into improved grounds, open prairies, or swamps, where there is not suitable timber; also, purchase of timber which would probably increase the aggregate expense to 200l. per mile. By the estimate I have allowed 20 per cent. in addition.

Iron and splicing plates, £450 per mile,	99,838 02 06
Spike, at £50 per mile	11,093 02 06
Sawed Red Cedar Scantling, £50,	11,092 02 06
Laying Iron and Scantling, £25 per mile,	5546 11 03
Engineer Department, Commissioner, Deputy and Book-keeper,	12,500 00 00
Workshops, Ware-houses, Wharf, Car-houses, &c., Sidelings, Turnouts, Scales, Circles, &c., at eastern Depot on the Niagara River, complete,	10,000 00 00
Do. the western Depot on the Detroit River,	6000 00 00
Station houses and branch tracks,	4000 00 00
100 Pleasure Cars, at £200,	20,000 00 00
200 Freight Cars, at £50,	10,000 00 00
15 Locomotive and Tenders, large class,	27,250 00 00
Land for Depots, 10 acres,	500 00 00
Damages for lands and fencing, in the present state of the improvement of the country, £50 per mile,	11,093 00 08
Total cost,	£371,927 11 02

The estimates are made at such prices as it is believed the work will cost, without adding per centage for contingencies.

Capitalists will think much of the connection anticipated between the Rail Roads of the Province and those of the adjoining States; because on these connections the use, and of course the profit, of them, will very much depend. And if the great lines adapted to the demands of the home poulation are laid out and opened, with a prudent reference to similar works set on foot, and in the way of rapid completion, by the neighbouring population, it is evident that the latter population will be brought to contribute essentially to the enlargement of the annual dividends, and this contribution will be most cheerfully made, being in truth only that reasonable tribute, which good sense and justice may levy upon the natural advantages of local position.

The great length of the route,—the unparalleled extent to which it is absolutely straight—the ease of the curves, where curves are required—the absence of all but very moderate grades of ascent or descent—and the practicability of passing over its entire distance between sunrise and sunset, with locomotives and heavy trains, under a very diminished pressure of the tractile power, are circumstances which could not be so extensively combined in any country but yours; and which will be equally important in your road, by the annual saving in the cost of traction and the perpetual gratifications of interest and curiosity, which they will offer to men of business and science.

It is obvious that the profits to be expected in the shape of dividends, will depend upon the outlay required to complete the work, the cost of maintaining the requisite power of traction, and the amount of business commanded by the road. All these considerations have a favourable application to your work.

Rail Road stocks have been considered, more or less, in the experiments of the age, as fancy stocks. They have been sold in the markets on the credit of popular names attached to them, and often received a fictitious estimate from the exertions of individual speculation, without any proper reference to the substantial merits of the work. But the day of such results is now past. So many Rail Roads have now been made, and in so many different conditions, as to their cost, and use, and value, that every thing concerning them has been subjected to the observation of multitudes of discerning individuals; and they are completely embraced within the experience of men of science. This experience proves that they unite such rapidity and facility of passage, both for travellers and commodities, that no expense of outlay can scarcely be too great to provide them on the great thoroughfares of internal communication. They are therefore the proper subjects of business calculation; and are often undertaken, and may be well undertaken by private enterprise. In favorable situations, where the original construction is cheap, the line when constructed of easy passage, and the direction such as to accommodate a great and growing intercourse, they will ensure abundant dividends, and soon reimburse the sums expended upon them.

The great field of profitable Rail Road investment must be found in lines of natural thoroughfare, in districts under a course of rapid settlement, where alluvial formations are spread into immense tracts, and where primitive mountains do not require to be cut down, and rock bound vallies do not resist, to double or treble the amount of friction in passing frequent and abrupt curves. The great west will witness the highest and most useful power of the locomotive. There will these wonderful powers soon display themselves, upon a scale of such grandeur and utility, as find scarcely any type in the experience of the past, either in Europe or America,—a scale which can be anticipated only by the most comprehensive and intelligent views of the magnificent expanse of her rivers and lakes—her prairies and table lands.

Grade per mile.	*Length of Grade.*		*Ascent.*	*Descent.*	*Elevation above Lake Erie.*	*Distance from Niagara River.*		
Feet.	Miles	Chs	Feet.		Feet.	Miles	Chs	
15	2	0	30		30	2	00	
Level	6	10			30	8	10	
	5	68		3.58	26.42	13	78	
	10	62		14.19	12.23	24	60	
	9	36		2	10.23	34	16	Acrosss the Tamarack
15	3		45		55.23	37	16	swamp to Grand river.
	26	72	3612		91.35	64	08	East bank of Black Creek.
15	6		90		181.35	70	80	Highland east of Patterson Creek.
15	1	40		22.50	158.85	71	48	Elevation of C. at Simcoe 114 feet.
10	5	40	55.0		213.85	77	08	Summit between Patterson and B. C.
	4	12		15.88	197.97	81	20	Bank of Big Creek.
Level	8	22			197.97	89	42	Summit between L. & B. Otter.
12	2		24		221.07	91	42	Big Otter.
15	2			30	191.97	93	42	
15	1	40	2250		214.47	95	02	
6	1	40			205.47	96	42	
5	3		15		220.47	99	42	Summit Big Otter and Catfish.
8	1			8	212.47	100	42	
Level	3	28			212.47	103	70	Swamp in T'ns'p of Malahide.
5	3		15		227.47	106	70	Greatest height, or summit.
8	2	14		17.09	210.38	109	04	
Level	2	56			210.38	111	60	
15	1		15		225.38	112	60	Summit between Cat-
11	5			55	170.38	117	60	fish and Kettle creek.
Level		36			170.38	118	16	St. Thomas on Kettle Creek.
10	2	39	2491		195.29	120	55	
10	1	41		15.59	179.70	122	16	
8	2		16		195.70	124	16	
8	1	76		15.39	180.31	126	12	
	17	36		40.99	139.32	143	38	South of the Big Bend
3	6	5		18.17	121.15	149	43	in the Thames.
10	2			20.00	101.15	151	53	
7	8	64		63.12	39.03	160	27	
	12	65		15.0	24.03	173	12	
	7	00		19.0	5.03	180	12	
Level	12	17			5.03	192	29	Low land south of Lake
3	1		3.00		7.43	193	29	St. Clair.
Level	14	40	0	0	7.43	207	69	
3	6		18		25.43	213	69	
Level	5	60			25.42	219	49	High land east of Detroit River.
10	2	4		20.26	5.17	121	54	
Level		15			5.17	221	69	Wharf at Sandwich.

Whole ascent West, 409,53
Whole descent West, 404,36

——5,17

Average ascent per mile for the whole line is $1\frac{85}{100}$ feet.
Maximum grade, 15 feet per mile, in short sections.

All of which is respectfully submitted for the consideration and further order of your honorable board.

ELISHA JOHNSON,
Chief Engineer.

Engineer's Office of the Niagara and Detroit Rivers Rail Road Co. May 1, 1837.

Circular.

Continued from p. 510.

Having thus given a sketch of the manner in which it is proposed to conduct the inquiries on particular subjects, in respect to which it would confer an obligation on me to have your suggestions, or those of any other experienced farmer, I proceed to other great topics, to be embraced by the survey.

Salt. Marine Shells. Gypsum Clay. Sand. Marl.
Dock Mud. Ashes of Mineral Coal. Burnt Clay.

3. Vegetable Manures.

Ashes of wood and peat. Soot. Tanners' Waste. Straw.
Leaves. Sea Weeds. Rape Dust. Street Manure.
Green Dressings, ploughed in. Buck Wheat. Clover.

4. Artificial Manures. Composts.

5. Modes of applying Manure.

Mixed or clear; solid or liquid; in drill or broadcast; in fresh or fermented and decayed state;—at what season of the year or crop;—annually, or how often; in what quantity.

Use and application to permanent pastures and mowing lands.

6. Manure Houses or Cellars; Vaults for the preservation of urine; and provisions for forming compost manures.

Machines for the application of liquid manures.

XIII. Live Stock.

1. Black Cattle. Horses. Sheep. Swine. Poultry.

2. Comparative value of different Breeds of animals for Stall, Work, and Dairy; and notices of herds or individuals of improved Breeds, with places where found.

3. Animals known among us. Native; Hereford; Black Spanish; Devon; Holderness; Yorkshire; Alderney; Ayrshire.

Improved Durham Short Horns.

4. The subject of Breeding.

XIV. Animals for Labor.

Horses and Oxen. Comparative value. Mules. Cost of keep; harness; shoeing; deterioration or improvement.

XV. Animals for Beef.

1. Sex most eligible.

2. How reared; as calves, how fed; how long with the cow; how managed the first winter.

3. What age at maturity. Age best for fattening.

4. If pastured—average number of acres to an animal.

5. If soiled; how managed and fed.

6. If stalled on dry feed how fed; how long kept; amount of hay consumed per day; of meal; of vegetables; kinds of meal; kinds of vegetables; how prepared; meal ground with or without cob; mixed or unmixed; wet or dry; cooked or raw.

7. Use of flaxseed; oil; and oil cake in fattening.

8. Gain per day; per month.

9. Machines for cutting and steaming food.

XVI. Market; Returns of Brighton and Danverse Markets.

1. Animals—how sold—on the hoof; or by weight after slaughter. If by weight, how determined; customs of butchers; what parts weighed; what considered as perquisites. Liabilities to error or fraud, if any; customs in other markets.

2. Different parts—how disposed of; relative value.

3. Modes of curing, packing, inspecting, beef, pork, hams, &c.

4. Drift of animals; customs of Drovers; expenses; loss in weight by travelling.

XVII. Animals for the Dairy.

1. Choice of Breeds. Examples and history of Cows of extraordinary product.

2. Size and color as affecting produce. Continuance in milking. Effects of early coming in. Disposition of the calf. Time of milking.

3. Average yield of a good cow in milk; in butter; in cheese.

4. Trials of milk as to quantity of cream; of butter; and of cheese, per gallon.

5. Modes of feeding; vegetables; grain; or meal; how given a prepared; quantity.

XVIII. Dairy Produce.
1. Butter; modes of making and preserving.
2. Cheese; modes of making and preserving.
3. Comparative profits of making butter and cheese.
4. Use of skim milk, butter milk, and whey.
5. Advantages, if any, of giving it to the Cow.
6. Value of dairy refuse for Swine.
7. What proportion between number of Cows kept, and number of Swine kept.
8. Steaming; heating; freezing milk, with comparative advantages of each method for raising cream.
9. Effects of different kinds of salt upon butter. Use of sugar and salt petre for butter. Coloring matter for cheese.
10. Protection from vermin.
11. Grasses for Dairy purposes.
Improving Peat Meadows.

XXXIV. Great Farming Operations.
1. Ploughing.
2. Sowing; Planting; Laying down to Grass.
3. Haymaking.
4. Harvesting.
5. Preserving and Expending the Produce.
6. Marketing.

XXXV. Examples in detail and in full of
1. General Farm Management.
2. Particular Crops.
3. Particular Improvements.

XXXVI. Labor.
1. Farm Labor by the month or year.
2. " by the piece.
3. Cost of Board and prices of Provisions.
4. Use of Spirituous Liquor.
5. Laws and Customs relating to Labor.

Mechanical Labor.
1. Blacksmith. Price per pound of Iron.
" Price of Horse shoeing. Ox shoeing.
2. Carpenters' Work, per day.
3. Masons' Work, per day.
4. Wheelwrights' Work, per piece.
5. General cost of Farming Utensils; Carriages; and Equipments.

XXXVII. Farming Implements, &c.
Ploughs. Harrows. Horse Rakes. Cultivators and Horse Hoes. Threshing Machines. Winnowing Machines. Vegetable Slicers. Hay Cutters. Rollers. Drill Machines. Corn Planterrs. Corn Shellers. Wheel Carriages. Stnmp Extractors, &c. &c.

XXXVIII. Condition of Roads and Improvements in Construction of Roads, as intimately connected with the Agricultural Prosperity of a Country.

XXXIX. Miscellaneous Subjects.
1. Size of Farms.
2. Farm Capital.
3. Farm Accounts.
4. Laws relating to Agriculture.
5. Taxes and Burdens upon Land.
6. Agricultural Pauper Establishments.
7. Agricultural and Manual Labor Schools and Colleges.
8. Agricultural Societies. Funds. Premiums. Operations. Cattle Shows.
9. Agricultural Libraries and Publications.

XL. Manufactures connected with Agriculture.
1. Household Manufactures. Manufactures of wool, silk, flax, hemp, hair, bristles, straw, &c. &c.
2. Leather, with all its various preparations.
3. Glue. Combs. Buttons. Bonnets and Hats from grass, straw, or wool. Wooden Ware. Barrels.
Maple Sugar. Maple Molasses. Beet sugar. Potato Syrup. Starch. Opium. Sunflower Oil. Indian Corn Oil. Linseed Oil. Neat's Foot Oil. Wine from Grapes. Wine from Currants.
Cider. Perry. Beer and Ale. Whiskey. Gin.
Soap. Candles.

XLI. Objects of Particular Inquiry, with a view to Agricultural Improvements.
1. Improvements in Live Stock.
2. " in Utensils and Farm Buildings.
3. " in New Vegetables, Fruits, and Grasses.
4. " in Seeds for earliness and abundant yield.
5. " in economical Preparations and Uses of Food for Man and Beast.
6. " in economical Uses of Fuel.
7. " in economical application of human and brute Labor.
8. " in application of water, steam or wind power to purposes of husbandry.
9. " in cultivation—depth of ploughing; mixing of soils; compost manures; manuring with green crops; inverting and covering the sward; drill culture; sowing broad-cast; management of any particular crop, &c. &c.
10. Improvements in rotation of crops.
11. " in uses of Lime; Gypsum; Bone dust.
12. " in application of Ashes; crude or spent.
13. " in application or discovery of other manures.
14. " in construction of Farm Buildings.

XLII. Exports and Imports of Agricultural Produce.
Capacity of the State to supply its own Wants. General views.

XLIII. Specimens of Soil to be analyzed.
Models of improved Implements.
Models of improved Buildings.
Sketches of improved modes of draining lands.
Collection of valuable Seeds or Plants.
Samples of Wool, Silk, and Sugar.

SAXON SHEEP AND WOOL.—E. Tilden, Esq., P. M., New-Lebanon, Col. has a flock of 1,000 Saxon, and Saxon and Merino crossed sheep, which he considers of the first grade, and offers a part for sale—the bucks at from five to twenty-five dollars, according to age and quality. Samples of the wool from these bucks, have been deposited, for examination, at the office of the Cultivator.

J. C. Van Wyck, of Fishkill, Dutchess county, has also a flock of 500 prime Saxon sheep, bred with great care, which he wishes to dispose of—price not mentioned.

REMARKS OF THE CONDUCTOR.

We have adverted to the subject of bone manure in our second and third volumes, and stated our mode of obtaining and preparing it. We have been less urgent upon this matter, because we saw little hopes of our farmers regarding this source of fertility, while they remained reckless, as too many of them do, of their dung and other sources of fertility which abound on every farm. The subject shall receive our early attention. In mean time, in reply to Mr. Foote's questions, we answer, first —the time *has* come for every farmer to husband and apply to his lands, all the means of fertility at his command. Bone dust will not prove serviceable upon clays. It is applied at the rate of 20 to 40 bushels on an acre. Bone mills can only be profitably erected near navigable waters. Secondly—bones can be crushed in plaster mills, so as to answer well. Thirdly—bones that have been boiled are deemed as good as those which have not been boiled, and old bones nearly as good as fresh ones. And fourthly—not only potato tops, but sedge grass, weeds, straw, and every sort of vegetable matter, or earth abounding in it, as that from swamps, ditches, ponds, &c., leached ashes, soap suds, urine, &c., may all be profitably commingled in the dung yards, which should be made concave in the centre, in order to retain the liquids of the yard, and which these vegetable matters will absorb. And the yard should be thoroughly cleaned every spring, and the contents fed to hoed crops.

RUTA BAGA HOE.—We have been presented with a neat little implement for thinning turnips, or other crops, manufactured by Wm. R. Gates, Lee. Mass. It is for sale by Thorburn, at the moderate price of $37\frac{1}{2}$ cents, including the handle.

XXVII. DESCRIPTION OF THE METHOD OF ROOFING IN USE IN THE SOUTHERN CONCAN, IN THE EAST INDIES, BY LIEUT FRAS. OUTRAM, BOMBAY ENGINEER. COMMUNICATED IN A LETTER TO THE LATE PRESIDENT, T. TELFORD, ESQ., BY MAJ. GEN. SIR JOHN MALCOLM, G. C. B, &c., GOVERNOR OF BOMBAY.

Extract of a letter from Mr. Telford, enclosing Mr. Outram's Paper.

"I beg to present to the Institution, a pa-
" per describing a mode of constructing
" stone-roofed buildings in the East Indies,
" which, although it may be little applicable
" in this climate, yet seems of considerable
" value as relating to an important part of
" the British empire. It has been transmit-
" ted to me by direction of the Governor of
" Bombay; as will be seen by the accompa-
" nying note of his private secretary.
" 'I have much pleasure in sending you,
" ' by desire of the Governor, the accompa-
" ' nying copy of a letter from Lt. Outram,
" ' of the Engineers, on the subject of stone
" ' roofed buildings. The few houses which
" ' have been already constructed on this
" ' plan, have been found to answer so well
" ' that I understand Government have re-
" ' solved to construct, on this principle, all
" ' the public buildings, wherever suitable
" ' materials are to be procured.' "

Nature of the arches composing the roof. The roofing with stone (iron clay or laterite) in the Southern Concan is of a compound nature, consisting of two kinds of arches, the first being parallel to each other, from 2 to 3 feet apart, and very light; their average section being from 12 by 10 inches to 15 by 12; i. e. for roof of from 25 to 35 feet span; so that when any two of these arches or ribs are complete, they are strong enough to bear slabs of stone 5 or 6 inches thick, extending a few inches over each, beginning from the wall and meeting at the top, thus forming a second complete arch, and making, with the ribs, a compound much stronger than vaulting of equal solidity over the same extent, made in the usual way.

Their lateral thrust. The arches of one room are counteracted by those of the rooms on its sides, and so on for any extent; those of the end rooms being counteracted on their outer sides by buttresses or by the walls of baths, &c., so that the walls are required to *Walls.* be only sufficiently strong to support the mere weight of the masonry of the roofs, which has an average thickness of about 9 inches, excepting the plaster or tiles, and therefore in rooms of 400 square feet would be about one-fifth weight of the upper *Comparative weight of the whole roof.* walls of a two-storied house. As the roof itself is of considerable altitude, the walls supporting it need not be of more than two-thirds the usual height.

Loading of the arches. One advantage of the lightness of these roofs is, that of whatever form the arches may be, very little *loading* will suffice; of course some arches would require no loading, but such *Their form.* are the most convenient for roofs in general. The best appears to be a compound of two segments of a circle of 50 or 55°, their chords intersecting at an angle of about 100; such compound arch requiring a little loading at the top and the *And outer surface.* haunches, which, when duly added, gives an outer surface of two inclined planes to each roof, which may be then either plastered or tiled. But instead of loading the haunches throughout with solid rubble, it is better to do so partly with hollow masonry, to the upper surface of which may be given any slopes, which by the connection of the opposite slopes of any two adjacent roofs, from a gutter of the securest kind. The average height of this gutter should be about one-third that of the roof, if to be plastered, but not so much if the roof is to be tiled.

Comparison between the expense of houses with stone roofs and those tiled. The expense of these roofs, including the outer plaster, has been found by myself and successor, in the Concan, to be much less than that of tiled roofs over the same extent. The walls should cost no more than those of a substantial bungalow, for although the transverse walls have a greater weight to support, yet as they need not be only two-thirds the height, their total expense should not be greater than that of the walls of a substantial house. The only part of which the comparative expense remains to be considered, is the ceiling. The inner surface of the stone roofs, when finely plastered, forms an excellent ceiling, being light and cleanly, and most durable. The expense of this plastering, if not much ornamented, is below one-third that of the lath and plaster generally used.

Hence it is plain, and has been practically found, that the total expense of stone-roofed houses in the Concan, if properly constructed, is less than that of tiled houses of the same size; but the sums saved in annual and special repairs are of far greater consideration.

In the Deccan. In the Deccan where timber is so expensive, the comparative cost of the buildings would be still less, in all those parts where proper stone is met with.

The principal cause of the cheapness of these stone roofs, is the very little centering, &c., requisite. For as the ribs or primary arches, are very light, centering of the simplest kind does for any one of them, and thus for all successively in either room. But as the centering cannot be removed from any rib till its counteracting ribs are complete, there is of course required one centering for each room, which, when one series of the primary arches is complete, may be removed with ease for the next, till a convenient number are ready for the superior arching, which of course is very quickly formed (as before described) without centering.

Stones fittest for these roofs. The materials fittest for this kind of building are the various kinds of sand-stone, including the calcareous sand-stone of cutch. The laterite, or iron clay, although a good material, and the only one hitherto used, is apparently not so proper as the substance generally called free-stone, which, if worked with saws, &c., would be found to answer better than the laterite, which can be shaped only with a pick-axe, and is very heavy. This iron clay is found to extend from Bancoote E. N. E. to, I believe, Ceylon, lying over the trap-rock, even on the highest Ghauts, but is very unequal in thickness and quality; that of Purnalla and Pawnghur, for instance, being of the softest and most porous kind, and that near Mahabuleshar of the best. This stone, when exposed to rain, &c., becomes very hard if good, but if taken from any depth, is so soft as to be easily cut with a knife. It is hence called *soap-stone* at Belgaum and other Madras stations.

Method of working the ribs. In making the primary arches, each workman should be provided with a small square, one leg of which being laid on the centering, the other will, of course, be the prolongation of a radius of the arch's curve. In beginning the arch, therefore, the workman has only to cut (with a small pick-axe for laterite, and a chisel for sand-stone) the upper end of the first stone, till it is adapted to the square, after which another stone is hoisted up, (the pulley being sufficiently high to allow it to swing freely over the centering,) and its lower end easily fitted to the surface just *Securing them for the superior archway.* prepared; the upper end of it is then cut to the square for the reception of a third, and proceeding thus, both sides of the arch are formed till they meet in a key-stone at the top, which should be connected, *pro tempore*, by a slab, with the side wall, or with the next rib, for otherwise, these primary arches or ribs might be shaken down during the formation of the superior arches.

Advantages of the above method of working arches. By the use of the square, the joinings of the arch-stones must all properly concentrate, although made by the most stupid workmen, and the arches are rendered perfect in much less time than they could have been by cutting the stones to chalked lines on the ground, as is usually done; besides, the stones may be of various lengths, and are thus worked with more freedom, and none spoiled.

Superior arches. The stones of each superior arch should be cut at their ends, so that their inner surface be an inch or two below the upper surface of the ribs.

Plaster for the outer surface. The cuttings of the laterite, good chunam, and sand, (sea sand should never be used,) in equal parts, form an excellent plaster for the outside of these roofs. The cuttings, or stone rubbish, will do pretty well without sand, but it should not be very finely powdered.

Precautions necessary in finishing a plastered roof. The roof having been well washed, and not allowed to dry, the plaster should be laid on it throughout at once, and about two and a half inches thick. No fine chunam should be put over this plaster, but it must be constantly beaten with small pieces of wood, for two or three days. As the tempering of the plaster is of great consequence, every seven or eight square feet should be under a boy, who has, besides the piece of wood, a pot of water, to keep the chunam moist the whole time; at the end of the two or three days the plaster will have become very hard, and less capable of absorbing water: but after the boys have left it, there should be a sprinkline of water over the whole, as long as possible, for the longer these roofs are kept damp, the stronger they become. Their surface should not be left very smooth; but if any cracks appear, they show that the chunam has not been properly beaten, and should be filled by rubbing fine chunam into them.

In places subject to heavy rains. As new chunam, however properly made, absorbs water, it will be advisable in the first season to guard against very heavy rains, by covering the surface with a thin coat of wax and oil, which is easily done by rubbing the mixture on the roof in the heat of the day.

Tiles may be used. But if chunam be scarce, or if it be not very good, the roof should be covered with tiles, (which would cost less than the plaster,) as may be seen by the small proportion the tiles bear in the expense of a tiled roof;—the form of the roofs render such an addition very easy.

If adopted in Europe, buildings of this kind would be as remarkable for warmth as in this country for coolness. But the plastering outside would not be advisable on account of the frost; tiles, however, or slate, would protect the roof completely.

Advantages of stone roofs, &c., in India. The principal advantages of these buildings in this country are, their coolness, and the little expense incurred in annual and special repairs; indeed, the latter will never be required if the building be properly constructed at first. It is also very evident that they can never take fire, nor can white ants affect them; of course they could be built of several stories, the form of the floor ribs being merely a small segment of a circle, (or ellipse,) instead of a compound of two as in the roof. The upper floor of the jailor's house at Rutnaghery is thus built, as also part of another house.

All the buildings hitherto constructed on this principle are, in a climate perhaps the most unfavorable in India; for there is not a terraced roof, constructed in the usual mode over wood, that is proof against the excessive rains of the southern Concan.

In some parts of it a mixture of stone and brick advisable. This system could not be so economically adopted where trap or whinstone only is procurable, unless wood be very expensive, as at Poona; where a compound structure of roofs, between stone and brick might be found even less expensive than common tiled roofs.

I take the liberty to add some remarks on brick and compound roofs of a similar construction, and a proposal for the use of domes in some cases, which I presume would be found more beneficial, and less expensive to government, than certain tile roofed buildings.

Stone ribs. In the compound roofs, the primary arches, or ribs, to be constructed nearly as before mentioned, but being of harder stone, not so massive; the breadth of their section to be greater in proportion to the height. For arches of thirty feet span, the section of the rib stones may be as in the annexed sketch: their length being from two to four feet. The slopes at the upper corners are made for bricks.

Connecting slabs. The ribs thus formed to be connected together by slabs of the same stone. One slab between every two at their tops, and another at each side, about the middle of the segment; the distance between the ribs to be about 3 feet.

Centering for the brickwork. When thus formed, a piece of planked centering may be placed between any two ribs from the wall to the first connecting stone, so that a thin brick vault may be completed over that space,—the sides of both having been prepared (as before stated) to receive it. One piece of centering, in length only one fourth that of the ribs, and two or three feet wide, (consequently extremely light,) would suffice for the whole of the superior arching of a room, for the connected strength of the ribs (by the lateral stones) would be quite enough to sustain the then intermediate arches of brick; similar parts being done in succession, until the whole be covered. But care must be taken that a proper resistance

Resistance against the lateral thrust. be secured against the lateral thrust of the brick-work, which, however, is so very light, that an ordinary thickness for the side walls will do, if the two side ribs of each room be placed about one foot and a half, or two feet from them, so that, as with the laterite, flag stones might lie on the intermediate space; by the loading of which, a much greater resistance than requisite might be obtained.

Roofs of brick throughout. If roofs are made of brick throughout, the proportion of the ribs and the vaulting should be somewhat different; for 25 feet span, the ribs should have a section of 18 by 8 inches, and their intermediate space be about two feet wide, so that the ribs will nearly of themselves sustain the vaulting.

Conoidal domes. In many cases, however, surmounted domes formed on a compound conoid, two-thirds sphere, and the upper third cone, would be the most economical kind of roofing, particularly for detached buildings in this country, where verandahs or screens are necessary to protect them from sun and rain, which object would be at once gained by arches over the butresses the loading of which with mud rubble would of course increase their resistance, and likewise present an additional obstacle to the heat.

These domes would be found particularly advantageous in government buildings; for instance, those in the military department, in comparison with the barracks, storerooms, hospitals, &c., now in use; they are far more easily ventilated by holes and windows, unlimited, at the sides, and one at the top of the roof, (the clumsy method adopted at present in barracks shows the necessity of ventilation,) and the great space inclosed by the roof alone ensures a plentiful supply of fresh and cool air in the closest days.—Secondly, their interior cannot be affected in the slightest degree, by the heat of the roof.—Thirdly, they include a larger space in proportion to their interior surface, thereby requiring less superficial repair, and being more easily kept clean.—Fourthly, they are altogether free from special repairs and cannot take fire, nor being affected by white ants, which have hitherto not only destroyed buildings, but also the men's kits and public stores, the risk of which is perhaps of greater consideration, than the sums expended annually in repairing the buildings now in use; but those sums also would be saved in these brick-roofed buildings, except indeed whitewashing and repairing the floor for the tiles of the roofing being fixed with chunam, would require no turning. They should be placed in horizontal divisions, by which means all angles will be avoided, and unless the tiles actually break, there will be no repairs whatever requisite to the roof.

If the expense of annual and special repairs to buildings in general be considered, together with the destruction of stores by white ants, the loss by fire, and the loss of health, occasioned by the extremes of heat and cold under tiled roofing, it may perhaps be allowed that were roofs of masonry gene-

Comparative expense. rally adopted by Government, even at five times the original cost of the buildings hitherto used, there would accrue a saving of money; but it has been already proved, that the compound arched roofs are cheaper, and it may now be shown, that those with the modified domes are also very economical; for, beginning with the walls, a circle being the least possible perimeter of a given area, the walls, if made of the usual height and thickness, would be much less expensive than those of an equal quadrangular space; a square for instance, would cost one-third more, and the shape generally given to hospitals and barracks, having the breadth one-fourth the length, merely because the roof would be very expensive if wider, would cost just twice as much. But as assistance is required against the lateral thrust of the dome, the additional buttresses necessary would nearly double the expense of circular walls in all rooms above 20 or 25 feet diameter, were it not that the great height of the interior of the dome itself renders it unnecessary to make the walls more than 7 or 8 feet high, i. e. just enough for the doors &c. It will hence be perceived that the expense of quadrangular walls is greater than that of circular walls of only half their height with buttresses; and it will be seen by every one who understands the nature of a dome, that a surmounted dome, as described, would be perhaps the cheapest mode possible (unless brick and chunam are enormously expensive) of substantially covering a given space, and the larger that space the greater the advantage of this dome over wood roofs, &c.: for such requires no centering whatever, although 300 feet in diameter; and is built under the superintendence of one intelligent person, as easily as the upper walls of a house, because the arches over the buttresses afford a landing-place for the materials, and the outer surface of the dome gives a footing to the workmen without any scaffolding; the expense, therefore, should be estimated as for upper walls, i. e. the same rate for the solid masonry of the dome, which, together with the tiles covering it, will cost less than a common tiled roof, over an equal extent.

Disadvantages. The disadvantages of domes, are, their inconvenient shape for houses in general, and upper storied houses in particular, their inelegant appearance, unless the walls be of a proportionate height, which would increase the expense enormously in the buttresses, their depth being in direct ratio with the heights of the walls, so that if the height of the walls be doubled, the expense of the buttresses is fourfold. But where no stone is procurable, a house formed of several dome roofed rooms, properly connected together, would be found not more expensive than one of the same size with compound arches, i. e. in one-storied houses only, both being made of brick. Of course spheroidal roofs may be made nearly as easily as domes, but they would cost more, and would not do so well for tiles.

WHITE OAK AND POST OAK.

J. Seelye, of Sharon, Conn., inquires, first, what is the distinction between post oak and white oak, the former being esteemed, at the south, better and far more lasting, than the latter. And second, on what particular day in the year a tree, perforated by woodpeckers, or slightly girdled with an axe, will die. *White oak* is a tree of the first class as to magnitude, and grows in every part of the United States, though in Florida it is found only on the borders of the swamps. It is the only oak, on which a few of the dried leaves persist till the circulation is renewed in the spring. Of all the American oaks, this is the best and most generally used, according to Michaux, being strong, durable, and of large dimensions. The *post oak* resembles somewhat in foliage the white oak, though the lobes of the leaves are broader, and less pointed; and its acorns are not half so large as those of the white oak. The leaf of the white oak has three, and that of the post oak four lobes. This oak belongs to the second class of forest trees, its height rarely exceeding 40 feet. It is not found growing north of the neighborhood of the city of New York, but abounds in the middle states and in Florida. The wood is less elastic, though finer grained, and more durable than the white oak: hence it is preferred for posts, and is used with advantage by wheelwrights and coopers. As to the second point of inquiry, we are not aware that there is any *particular* day in the year, and we are sure there is not, when a tree will be killed by the pecking of birds. Trees either die by cutting off the supply of sap, which passes from the roots through the sap wood, or for want of elaborating organs—the leaves—which convert this sap into vegetable nutriment. Cutting through the entire sap wood, at any time in the early part of summer, so as to prevent the ascent of the sap, or divesting it entirely of the leaves, which elaborate this sap, in June, will seldom fail to kill the most hardy tree.

THE WHEAT CROP.

Our letters from Illinois, Michigan, Ohio, and the far west, are *not* favorable to a great product of the wheat crop, this grain having been seriously injured by the winter; and we very seriously apprehend, that the grain worm, which our legislators have considered too insignificant to notice, will lessen the crop of our own state to a most alarming extent. We do not mean to be come croakers, but we seriously believe, that the high anticipations of an extraordinary abundant wheat harvest, which our newspapers encouraged, will not be realized—this year.

PRATT'S STUMP EXTRACTOR.—We have received from J. R. Drake, Esq., of Owego, a handbill which contains a figure and description of this machine, and also certificates of its performance, which we shall forward to our correspondent, J. M. Garnet, Esq., of Virginia. The machine is worked by a pair of oxen or horses, and can advantageously employ five men. It appears from the certificate of H. Hutchinson, engineer on the Chemung canal, that with one of these machines sixty-eight stumps was extracted between 2 o'clock, P. M., and sunset; and that with another two hundred and thirty stumps were extracted in a day. It is applied to green stumps, as well as to those which are partially decayed, and without the previous labor of cutting the roots. Nos. 1 and 2 are heavy, and designed for extracting green stumps; No. 3 is more compact, and may be transported on common wagon or cart wheels. Four men, says Judge D. with two yoke of oxen and a stump-boat, will extract, and convert into fence, stumps enough for fourteen rods in a day. The price for a first rate machine, with ropes, chains, &c., is nearly $375—without the apparatus the machine is offered at $150, delivered at Albany or Troy.

SPIKED ROLLER.—Mr. J. Boyle inquires, what should be the diameter of the spiked roller, if made of solid wood? If of plank what thickness—how long the spikes, and how many rows? The size may depend upon convenience or fancy, and may range from twelve to thirty inches in diameter. Any deficiency in the weight of the roller,—for the spiked rolled must be so heavy as to press the spikes or darts into the stiff soil where it is intended to operate,—may be made up by stones or other heavy substances, placed upon the frame. The object is to break and pulverize the ground, and raise a tilth—and consequently the spikes ought to project three inches, and be sufficient in number to effect the entire surface. It will therefore require from eight to ten rows upon a roller two feet in diameter. Concklin's Press Harrow, which very much resembles the spiked roller, has 12 rows of spikes.

PLANT MULBERRY TREES.

We wonder at the remissness of the inhabitants of New-York in cultivating the mulberry tree. That it may, and eventually will, be made the source of considerable profit, there can be no doubt. In many parts of New England, the farmers have already turned their attention to this subject, which will soon add very considerably to their wealth.

Mulberry trees should be planted by the town authorities in the public streets of every town and village; and thus, while they add to the beauty of a hamlet, they may add also to the wealth of its inhabitants. In the south of France, where silk is a staple commodity, the manufacture of it is more or less the employment of a portion of the family of every farmer. The great canal of Languedoc is lined with mulberry trees. The traveller passes over highways overhung with the branches of this beautiful tree, the cultivation of which distributes wealth throughout that portion of Europe.

This climate is known to be favorable to the production of silk-worms; and every gentleman of taste, who wishes to combine ornament with usefulness—every landholder who is desirous of increasing the value of his own property, and of adding a stimulus to industry, should have mulberry trees surrounding their houses, planted by the road-side, and scattered over their grounds. By pursuing this plan, the rearing of the silk-worm will in a few years become a profitable employment and fashionable amusement—certainly a harmless one.

HOLLOW HORN.—Sylvanus W. Gray, of Middlefield, Ohio, has sent us the following receipt for curing the horn-ail in neat cattle. We publish it, though we confess it smacks too much of quackery. It has too many ingredients, a part of which we suspect are at least useless.

"Take three eggs, same in bulk of black pepper, same of soot same of salt, same of hen dung, mix with wheat flour till hard enough for pills; make nine, and give one at a time three successive mornings, and intermit three, and give three again, &c.

ITALIAN SPRING WHEAT.—There has been an abundance of this grain sown. It looks well, and, the grain worm permitting, there will be plenty of seed. Mr. H. Stephenson, who writes from North Lake, Mich., shall be supplied. The price cannot now be determined. We beg Mr. S. not to forget the beautiful prairie flowers, the seeds and bulbs of which he promises to send us. Mr. S. says, that fall wheat in his district, with some exceptions, will be a failure. We coincide with him in opinion, that in many parts of the country our reliance must ultimately be upon spring varieties of this grain.

LIME, we mean the carbonate, whether in the form of powdered lime-stone, effete lime, chalk, marine shells or marl, differs in one particular from the other common earths—clay and sand: it decomposes and disappears in the soil—sand and clay do not. Hence the advantage of re-applying calcareous matters to soils at intervals of a few years—of re-liming, re-marling or re-ashing tillage land.

INDIAN POND SCYTHE STONES are obtaining a decided preference in our market, on account of their superior quality, and are the principal stones now found in our stores. They are obtained at Bradford, Vt, and are manufactured and sold by Filers & Co.

From the Farmers' Register.

REMARKS OF MANURES IN GENERAL—PUTRESCENT, MINERAL AND MISCELLANEOUS.

We have devoted a large portion of this publication to the subject of manures, both because, in the present state of agriculture, arable land cannot be made to pay the expenses of cultivation without the most skilful and economical, though unsparing, use of the various kinds, and because it is notorious that a great number of farmers are either ignorant of the most judicious mode of their application, or negligent of the means of their increase or preservation. The latter remark applies more especially to farm-yard manure, which no one can ride over any part of the country without seeing wasted—dung carted out of the yards and thrown up by the side of some lane without any foundation or further care, until, perhaps after having become mouldy and firefanged, it is at length turned over, while the best part of its juices have been allowed to run into the ditches, or to stagnate around the heaps—thus, neither assisting the proper fermentation of the dung, nor mixing the heap at such regular periods as to ensure its being all of one quality.‡

We have already stated our opinion so clearly on the subject of fermentation, in our view of putrescent manures, that it may be thought hardly necessary to add any thing to the discussion of the point in dispute; yet, as many farmers have been influenced by the reasonings of chemists, who possess no practical knowledge of agriculture, in favor of the invariable application of long dung—though opposed by experience—and as it is extremely important that the question should be set at rest, we request serious attention to the following extracts from an able article which has appeared in the Quarterly Journal of Agriculture since the publication we have written.§

It was promulgated as the opinion of Sir Humphrey Davy, in 1809, and it has, till lately, obtained the confidence of most chemists, that "*as soon as dung begins to decompose, it throws off its volatile parts, which are the most valuable and most efficient. Dung which has fermented, so as to become a mere soft cohesive mass, has generally lost from one third to one-half of its most useful constituent elements; and that it may exert its full action upon the plant, and lose none of its nutritive powers, it should evidently be applied much sooner, and long before decomposition has arrived at its ultimate result.*" Experience has, nevertheless, acted in direct opposition to this opinion. Manure has been continually applied in "a soft cohesive mass," and it has continued to raise large crops; whereas, had it been applied "long before decomposition had arrived at its ultimate result," that result would probably have been a loss of crop, manure and labor.

It is certainly an erroneous assumption to say the first stage of fermentation in dung must necessarily throw off its most valuable parts. Every dunghill of fresh dung throws off a gaseous exhalation a very short time after it is put together; and a quantity thus thrown off is regulated by the state of the atmosphere. But, this exhalation does not consist of the valuable gases; it is mere evaporation of the water contained in the dung. The same hot haze may be seen flickering over a fallow field in a sunny day in summer. Nobody could with truth assert, that this haze arises from the disengagement of the gases in the dung which had previously been inserted into the soil, when it is clearly nothing more than the evaporation of the moisture in the soil. To say, therefore, the first stage of decomposition in a dunghill throws off "the most valuable and the most efficient" parts of the the dung, is just to say the vapor of water is the most valuable part of dung.

"It is true, were the fermentation continued after all the water in the dung was evaporated, a considerable increase of temperature would ensue; and when the texture of the fibrous portions of the manure began to decompose, there would be an evolution of valuable gases. Direct experiment has proved the escape of gases from a heap of dung which has been long fermenting. But, what harm accrues to the dung as a manure from the escape of these gases? None whatever. We are told these gases constitute the food of plants, and if they are permitted to be dissipated by decomposition, the quantity of nourishment in the heap of manure will of course be so much diminished; that, if the bulk of the dung-heap be diminished one-half or one-third by excessive fermentation, the quantity of nourishment to the crops will be diminished in a greater ratio. These cautions have long been whispered in the ears of practical men, but they have listened to the advice with a provoking indifference. Like ducklings when they first take the water, they have continued to disregard every remonstrance of their foster brethren against injurious practices, raising and devouring their food, and enjoying themselves with the greatest complacency in their vocation. It is true, and we must admit it, that some of the gases constitute the food of the plants, but it does not follow that plants would receive them as food directly, as they are disengaged from a fermenting and heated mass; nay, it is probable they would rather reject the food that would injure them.—But, as plants are not endowed with locomotive powers, they cannot avoid the food which is directly presented to them; they will, therefore, be obliged to partake of it in an injurious state, and in thus taking it they die. Accordingly, we invariably find that plants suffer from the contact of fermenting dung; and it is this well known fact, more than from any other circumstance, which deters farmers from applying dung in an unprepared state. It is sometimes applied to the soil, it is true, in an unprepared state, but long before the crop is brought into contact with it, and after it has undergone fermentation in the soil. Though this application of dung is recommended by men of science, it is performed from the very opposite principle which they recommend. They recommend it because the gases arising, while the dung is fermenting, are absorbed by the soil, and are thence given out for the use of plants; on the other hand, farmers perform it, because the fermentation will have ceased before the crop in inserted into the ground. Which of these is the more rational reason? The practical one, undoubtedly; for it is surely impossible that the slight covering of earth upon the dung can prevent the escape of the elastic gases, however it may retard fermentation.

"Moreover, practice finds that fresh dung is injurious to vegetation, and recent discoveries now inform us that this arises from the acridity of the ammonia, which is always present in unfermented dung. Fermentation drives off the acrid ammonia. Fresh dung is found to injure plants by *burning* them, which is a very appropriate term to describe the action of ammonia. In like manner, stale liquid manure is not so good a top-dressing to grass as fresh, or when it is largely mixed with water; because science now informs us, that ammonia becomes concentrated in stale liquid manure, and is, therefore, in an injurious state for plants; and that it is necessary to mix liquid manures largely with water, in order to dilute the ammonia, and allow the proper action of the humic acid, which exists in large quantity in them. Again, it is not an uncommon practice to cover a dunghill with earth in hot weather; and this is now explained, not as it hitherto has been—"that the earth absorbs and prevents the escape of the carbonic acid gas"—but that a violent fermentation in the dung is checked by the earth, partly excluding the atmospheric air and rain water the oxygen in either of which is indispensable to continue the pro-

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* Singer's Survey of Dumfresshire, p. 311—Gen. Rep. of Scotland, vol. ii. p. 353.

† Young's Survey of Sussex, p. 218.

On this, however, the following remark has been inslerted in the report of the committee of the Doncaster Agricutural Association upon bone manure—'The general mode of managing fold manure is erroneous, both as to the expense incurred and loss from evaporation. To prevent both, upon carrying it out to the field, it should be forked up to a considerable height, and the whole covered with the soil nearest to the heap; a long heap, like a potatoe heap, is therefore best; as it accumulates, taking care always to cover the whole of the day's loading, excepting the end to which the next day's work is to be added. The confinement of the steam, which is always observed upon a fresh made heap of manure, effectually secures the decomposition of the whole; which will cut out like a jelly *without the usual process of turning over and over.*'—p. 31.

‡ No. xxiii. pp. 617 to 624. The discoveries alluded to, relate to a substance which chemists call *Humin*, which is said to exist in all soils, and to be formed of carbon and hydrogen. The *Humic acid* is composed of humin and oxygen, and its properties enable it to combine with lime, potash, amonia, and many substances found in soils and manures, and render them easy to be dissolved in water, which could not be done in their separate state.

cess, it being this oxygen which forms the carbonic acid gas by uniting with the carbon of the dung. The necessity of checking a *violent* fermentation in a dunghill, which contains a large portion of horse-dung, is to prevent it being what is technically call "*fyrefangit*"—a state in which dung is nearly useless.

'We thus see that science now agrees with that practice which has been pursued for years with unexampled success.—It is consolatory to practitioners to think that their experience, though unknowingly to them, has guided them to success on really scientific principles. This agreement of experience and science should teach every one that science and experience, and not science alone, ought to be made the tests to try the accuracy of opinions; but, unfortunately for the credit of sciences, the test of accuracy hitherto, in the application of putrescent manures, has not been submitted to practice.'

We now not only beg to impress upon every farmer the absolute necessity of guarding against the waste of any portion of the farm dung, but also to take care that nothing in the shape of refuse animal or vegetable substance be suffered to be thrown away by his servants. Let a bed of sand, or any earth except clay, be laid in spots adjacent to the offices, and upon it let every particle of offal collected from the premises be regularly thrown; to which add the sweepings of the roads and lanes about the house, grass, turf or rubbish, dug out of drains and ditches; every thing, in short, which, by decomposition, can be converted into manure, and all of which may be got together with very little trouble. Let the whole of this be every now and then covered with the earth, between two layers of which a small quantity of quick-lime may be placed, or sprinkled upon any vegetable substance, such as leaves, tough, haulm fern, or any thing which cannot be easily dissolved, and thus formed into a compost. Care, however, must be taken that the vegetative powers of the roots and plants be completely destroyed before the compost is spread upon the land; for, if unskillfully prepared, they will shoot up in the course of the ensuing season, and overrun the land with weeds. Composts thus formed, whatever may be the ingredients which they contain, will ever be found a most valuable species of manure. The whole substance becomes one uniform mass or nutritive matter, which may be either mixed with the soil, or applied as a top-dressing, and, with proper attention, may be got ready for application at any period of the year. There are numberless receipts scattered throughout the writings of various theorists, in which the quantity and the quality of each ingredient in these various mixtures are as accurately stated as if they were the medical prescriptions of physicians; but these are mere quackeries which do not merit the attention of practical men.

Weeds, also, by the sides of fences, should never be permitted to perfect their seeds, but should be invariably cut while in a state of succulence, and added to the heap; and, if those turned up by the process of horse-hoeing were also raked off, instead of being suffered to wither on the land, or to spring up again with the next shower of rain, it is inconceivable what a large quantity of valuable manure might be raised by the occasional employment of children, and of laborers, who may otherwise be idling away their time. It would also contribute in a great degree to that neatness which forms a distinguished feature in a careful cultivation, and would insure a habit of attention on the part of servants, and a consequent portion of prosperity which can rarely be enjoyed by a slovenly farmer.

Were the *practice of soiling* more generally attented to, it would also materially aid the increase of the dung-heap, without which no profit can be gained from arable land. But a very small portion of the soil under the plough is, in this country, capable of bearing crops, unless it be recruited by putrescent manure about once in four years, or that it be either suffered to e for a more than usual length of time under the cultivatep grasses and fed off with cattle, or supported by the fold. To obtain the requisite quantity of farm-yard manure has, however, baffled the best exertions of many industrious farmers, except in the immediate vicinity of large towns. There, indeed, the object is often obtained through the meaus of purchased dungs, the expense of which has been generally amply repaid by the growth of proportionally increased crops; but any one who is dependent upon the produce of his own farm, without the substance of extraneous manure, for the support of the fertility of the soil, should endeavor to cultivate those crops which are bes calculated to afford a large return of food for the maintenance of cattle. When the land is of such a nature as not to admit the growth of green crops, hay and oil-cake should be resorted to for that purpose.

In other cases, *lime, chalk, marl*, and various other *mineral substances*, have been resorted to as auxiliaries; but, the effect of some of these tending more to stimulate vegetation than to enrich the wasted powers of the soil, it has frequently happened that ground which at one time had been greatly benefitted by their application, has afterwards been injured when repeated under the erroneous notion that its powers might be restored by the same operation. Land, thus forced, has in many cases been so much impoverished as to render it incapable of producing any thing but a poor pasture, and to require a great length time to pass away before it can be restored to its original condition. It should, indeed, be observed, that the application f fossil manures requires more judgment and consideration than any other; for vegetable and animal manures contain the fertilizing property within themselves, and, however injudiciously applied, cannot fail to impart ultimate benefit to the land, if not the immediate crop; but the power of fossils consists in their action upon the constitution of the soil, and if this be improperly directed, the greatest mischief may ensue.

None of these has, perhaps, produced more injury in some cases, or greater benefit in others, than lime—of which very striking instances may be found in those parts of the country where it is either very abundant or scarce. In the former it has been not uncommonly laid upon the land without the aid of putrescent manure, until the soil has become worthless; while in the latter, as its scarcity renders it expensive, it has only been moderately been used by farmers of judgment and capital, and the effects, after a number of years, are still apparent in the improvement of the soil. While writing this, we have under our eye a farm of 400 acres of strong clay, which has not been limed within the memory of men. The tenant, who is conscious of the advantages which might be derived from the use of lime—as demonstrated in the condition of adjoining land of the same quality—is yet prevented by circumstances from its employment; and thus, not only are his own profits, but the value of the soil to the landlord also, equally reduced.

On the subject of *burnt clay*, we have recently had an opportunity of making some inquiries in the neighborhood of the late General Beatson's farm, in Sussex; and we have learned, that although several practical farmers in that part of the country adopted his plan, yet very few of them have found it to answer their expectations. One of them, who has followed it extensively, confirms us in the opinion which we have already stated, that much depends upon the mode in which the operation of burning is performed; for if the clay be calcined to the consistence of brick, it yields nothing in the shape of that soft ash which is proper for manure; and, if not sufficiently burned, it will return to its original condition. In the former state it may, however, act in some degree as an alterative of the soil; and, in the latter, it will at least afford some nutriment to the crop to which it is actually applied. It, therefore, does not appear, from past experience, that it can ever be made to supersede the use of lime on land which has not been formerly dressed with the latter; but, in such cases, or in parts of the country where lime cannot be procured, it may yet be employed to a certain extent with advantage.

As to *paring and burning*, there can be no doubt that the earth, if combined with fibrous roots and other vegetable matter, will answer the purpose of manure when burned: yet shallow soils are thus frequently more injured by the abstraction of too large a portion of the surface, than improved by the temporary addition of the manure. We have lately seen down-land, which was broken up during the war, and has been now during several years returned to pasture, yet still bears nothing like the sward of a fine sheep-walk on the poorest chalks, and probably will require half a century to bring it back to its former condition. We, therefore, cannot but again caution all farmers and owners of land against bringing such soils under the plough.*

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* A treatise has been just published by Professor Rennie, on paring and burning, in which he attributes whatever value it may have to the effects of the fire, considering it "in the light of an

To be Continued.

List of Subscribrrs to the Railroad Journal that have paid.—

Mr. Cotton, City New York,	Jan. 1, 1838
F. Argente, do	do
John Stevenson, do	do
do do advertising,	do
C. Loss, Bordentown, N. J.,	do
M. Robinson, Philadelphia, Pa.,	July 1, 1837
C. D. Appleton, Baltimore, Md.,	July 1, 1838
A. Welch, Lambertsville, N. Y.,	Jan. 1, 1838
J. Beasley, Ripley, Ohio,	do
G. B. Slater, Webster, Mass.,	July 1, 1837
H. Sibley, Bucksport, Me.,	Aug. 1, 1837

Advertisements.

It is gratifying to learn that *all* the friends of railroads are not disheartened.—The following notice is cheering to us, may it be so to others.

TO RAILROAD CONTRACTORS.—CENTRAL RAILROAD OF GEORGIA.—Proposals will be received at the office of this Company in Savannah, untill the first day of October next, for grading and preparing for the Superstructure twenty five miles of this road, extending westwardly from a point 26 miles from this city. The distance will be divided into 8 sectioas and the price per cubic yard for excavation and embankment—per acre for clearing and per 100 feet for grubbing, for each section, offered for, must be stated.

The country through which this part of the road is located is pine barren, and as healthy as any part of the State.

The Company have on hand a large quantity of implements such as barrows, shovels, waggons, carts, &c., which will be furnished at cost and charges, to such contractors as may desire it.

Plans and specifications of the work will be ready for inspection after the first of September, and all necessary information given on application to the subscriber.

L. O. REYNOLDS,
Engineer.

Savannah, Aug. 3rd, 1837. 33—t. 1st Oct.

If any of our citizens, who have encountered and survived he storm, desire a comfortable residence on a productive farm, in a healthy part of the country, we would invite their attention to the advertisement of Mr. John White, in this number. His farms, we have reason to believe, are well worthy of notice.

GREAT BARGAINS.

THE subscriber offers for sale 322 acres of Land, known as the late Cook & Haner Farms, on the beautiful valley, near Manlius Centre, in this county—the limestone creek running through it, on which are three Dwellings, three Barns, good Orchard, 200 acres under good improvement, the stumps out, and well calculated for two farms. The Erie canal in sight, *south* and the *Syracuse and Utica Railroad located and being made* about 20 rods from and parallel with the *north* line, and where is to be the first watering place and station from Syracuse for taking in passengers &c. from Fayetteville, the southern and northern villages, &c. For grain, or grass and grain, for the Sugar or Root business, a better soil cannot be found in any country. When this railroad is completed, fifteen or twenty *minutes* of Syracuse, two hours of Utica, a few hours of all the river cities and New-York; indeed, when the railroad now making from Boston to Albany is completed, within a few hours of all the principal eastern cities. Upon these great thorough fares, and all these advantages, surrounded by flourishing villages, strong competition will always secure on the premises, the highest prices for all its products. This is one of the most splendid farms in the state.

ALSO, for sale 120 acres of Land on the Oswego canal *between* and *immediately* at the junctions of the Seneca and Oneida Rivers, embracing the late widow Eno Plat, Tavern stand, &c. &c. The meeting of these splendid rivers, convenient harbor, the canal—one of the great travelling and commercial thorough fares, to the west, the beauty of the spot, surrounded by a fertile country, indicate this as a favorable spot for a flourishing village, or for a residence, farming, gardening, *profit* and *pleasure;* no situation on the North River can be more desirable—the favorable spot for the stations for all the Packet and Line Boats—for a public house, mercantile establishments, and where every thing raised can be sold at the highest prices.

ALSO, a farm of 160½ acres, bounded on the *west* by the Chittenango river, and on the *north* by the flourishing village of Bridgeport, or "the Rifts," two miles south of the Oneida lake, on the northern and shortest travelled road from Utica to Rohester, cultivated, and the stumps out of nearly a hundred acres, fertile and beautiful land, enough of which may be sold for village lots in a few years to pay for the whole. At the head of navigation, at this village, are quite extensive hydraulic advantages —mills, carding and dressing, tannery, stores, public houses, schools, &c. &c. combining to render this a very desirable farm.

ALSO, a valuable Cedar Lot about two and a half miles north of Chittenango.

ALSO, as Agent some very valuable Farms in Onondaga and Madison counties.

The above mentioned Farms will be sold on highly advantageous terms. JOHN WHITE.

Syracuse, Onondaga, Co. New-York., June, 1837. 10—m4

CROTON AQUEDUCT—NOTICE.

SEALED PROPOSALS will be received by the Water Commissioners of the city of New-York, until the 5th day of September next, at 9 o'clock, P. M., at their office in the city of New-York, for the Excavation, Embankment, Bank Filling, Foundation and Protection, Walls, Tunnels, several large and small culverts, and an Aqueduct of stone and brick masonry, with other incidental work on that portion of the Croton Aqueduct which is embraced in sections 9—10—12—13—14—16—19 and 21 to 26 inclusive on the 1st Division; and sections 27 to 53 inclusive, being the whole of the 2d Division.

The prices for the work must include the expense of materials necessary for the completion of the same, according to the plans and specifications that will be presented for examination, as hereinafter mentioned.

The work to be completed by the 1st day of October, 1810.

Security will be required for the performance of contracts—and propositions should be accompanied by the names of responsible persons, signifying their assent to become securities. If the character and responsibilities of those proposing, and the sureties they shall offer, are not known to the Commisioners of Engineers, a certificate of good character, and the extent of their responsibility, signed by the first judge or clerk of the county in which they severally reside, will be required.

No transfer of contracts will be recognized

The line of Aqueduct will be located, and the map and profile of the same, together with the plans and specifications of the materials and manner of construction, will be ready for examination at the office of the Engineer, at the village of Tarrytown, on the 19th instant, and the Chief or Resident Engineer will be in attendance to explain the plans, &c., and to furnish blank propositions.

Persons proposing for more work than they wish to contract for, must specify the quantity they desire to take.

The full names of all persons that are parties to any proposition, must be written out in the signature for the same.

The parties to the proposition which may be accepted, will be required to enter into contracts, immediately after the acceptance of the same.

The undersigned reserve to themselves the right to accept or reject proposals that may be offered for the whole or any part of the above described work, as they may consider the public interest to require.

New-York, August 8th, 1837.

STEPHEN ALLEN,
CHARLES DUSENBERRY,
SAUL ALLEY,
WILLIAM W. FOX,
THOMAS T. WOODRUFF,
} Water Commissioners.

JOHN B. JERVIS, Chief Engineer,
New-York Water Works.

3t—32

TO RAILROAD CONTRACTORS.—Proposals will be received at the office of the Clinton and Port Hudson Railroad Company, in the town of Jackson, Louisiana, until the first of November next, for the completion of the balance of the Clinton and Port Hudson Railroad, being about 21 miles. Plans, profiles and specifications, giving all the necessary information, may be examined at the office of the Engineer in the town of Port Hudson.

A. G. THORN,
Chief Engineer.

Port-Hudson, July 13th, 1837. t—32. 1st Nov.

☞ TO RAILROAD COMPANIES.

A PERSON experienced in the construction of Locomotive Engines (many of his Manufacture being in successful operation on important Railroads in the United States) and who is likewise thoroughly acquainted with the management of such machines, and, indeed, the entire ordeal of Railroads, is desirous of obtaining the situation of General Superintendant on some Railroad, South or West.

The most satisfactory testimonials of character and capability can be produced. Communications addressed to the Editors of this Journal, stating the location of Road, &c. will meet with prompt attention.

9t—31

New-York, June 15th, 1837.

THIRD ANNUAL FAIR OF THE MECHANICS' INSTITUTE OF THE CITY OF NEW-YORK.

The *Fair* of the Institute will be held at Niblo's Garden commencing Monday, September 25th, 1837.

To render this exhibition worthy of the arts and of the ingenuity of the Mechanics of our country, the Managers appointed to conduct the approaching *Fair* have determined to make such liberal arrangements as will insure to the contributors a fair opportunity of exhibiting their productions to the greatest advantage.

The object of Exhibition Fairs is to present to the members of the Institute and their fellow citizens who are engaged in the Mechanic Arts, the means of making their skill and ingenuity known in a way no other facilities afford: the many thousands who visit such exhibitions have a much better opportunity of judging of the merits of the various productions, than they would have by a mere verbal or newspaper description, besides the advantage of seeing brought together, in one vast collection, the products of the skill, ingenuity, and industry of our country.

PREMIUMS of Medals, Diplomas, &c. will be awarded for all worthy or meritorious articles exhibited, either as it respects superior workmanship, machinery wherein the operations are new, interesting or important, where ingenuity is displayed, or taste manifested, and particularly for all new and useful inventions.

You are respectfully requested to send, for competition or exhibition, specimens of the articles you manufacture; and you may be assured that the strictest impartiality will be observed in the distribution of the Premiums.

Steam power will be provided for the accommodation of those who wish to exhibit Machinery in operation; an experienced Superintendant will take charge of this department, and contributors in this branch are particularly invited to send or bring their Machines or models as early as possible, on the 23d September that the necessary arrangements may be made in relation to shafting, pullies, &c.

The Managers, in conclusion, cannot but express their belief that this Third Fair of the Mechanics' Institute, will exceed in variety and beauty of display, all previous exhibitions of the kind.

GEORGE BRUCE, *Chairm.*
WM. EVERDELL,
C. CROLIUS, JUN.
THOS. EWBANK,
RICHARD BRAGAW,
} *Executive Committee.*

N. B. All articles for competition must be delivered to the Committee at Niblo's Garden, on the 23d September. Those for exhibition *only* will be received any day during the Fair, before 10 o'clock A. M.

RULES AND REGULATIONS.

1.—The Garden will be opened for the reception of Goods, on Saturday, 23d of September, from 6 o'clock A. M. until 9 o'clock P. M., and it is respectfully urged that all articles intended for competition may be se t in early in the day. Those articles intended for exhibition *only* will be received any day during the Fair, before the hour of 10 A. M.

2.—The Fair will open for visitors on Monday, 25th Septem. at 10 o'clock A. M., and continue open every day of the exhibition till 10 o'clock P. M.

3.—Competent and impartial Judges will be appointed to examine all articles presented, and premiums will be awarded on all such as shall be declared worthy.

4.—The Committee on Premiums, and all firms or partnerships in which they may be interested, shall be excluded from competition or the award of any premium.

5.—All persons, depositing articles, either for competition o exhibition, must attend to have them registered by the Clerk, a which time they will receive a certificate, which will be required of them when the articles are returned.

6.—Proof of origin must be furnished if required, for any specimen offered for Premium.

7.—Depositors will receive a ticket from the Clerk, which will admit them and Ladies during the Exhibition.

8.—Arrangements will be made to exhibit, in operation, all working models that may be deposited—contributions in this branch are invited—a competent person will take charge of all models sent for the above purpose.

9.—The morning of each day, until fifteen minutes before 10 o'clock, shall be appropriated exclusively to the Judges.

10.—Members will receive their tickets of admission by applying at the Institute Rooms, any time in the week previous to and during the exhibition.

11.—All articles offered by Apprentices, will be received, and adjudged as the production of Apprentices—they must furnish a certificate of name, age, with whom, and the time they have served as apprentices.

12.—Articles subject to injury by being handled, should be secured in glass cases—and contributors are requested to have a person to take charge during the hours of exhibition—in the intervals, efficient measures will be taken to protect property.

GENERAL COMMITTEE.

George Bruce,	John Ridley,
John M. Dodd,	Silas B. Simonson,
James J. Mapes,	Thomas F. Peers,
Thomas Ewbank,	Thomas G. Hodgkins,
Wm. Everdell,	George L. Spencer,
C. Crolius, Jr.,	Peter Wemmell,
A. J. Mason,	Richard Bragaw,
Thos. W. Bartholomew,	Ab'm Peitch,
A. Storms,	Wm. H. Hale,
Wm. Ballard,	Wm. J. Mullen,
Henry Cunningham,	James Thomson,
John Harold,	Abner Mills,
Joseph Trench,	L. D. Chapin,
James D. Phyfe,	A. Cammeyer,
John H. Mead,	Hiram Tupper,
John Conroy,	H. B. Robertson,
Jordan L. Mott,	James Thomas,
Samuel Carter,	H. G. Stetson,
George F. Nesbitt,	Ferris Owen,
Henry Worrall,	N. Berry,
W. B. Worrall,	O. Whittelesey,
James B. Cummings,	M. W. Emmons,
James Frost,	J. S. Anderson.

VICKSBURG AND JACKSON RAILROAD.—NOTICE TO CONTRACTORS.—Persons disposed to contract for and give personal attention to the laying of the superstructure for the Vicksburg and Jackson Railroad, about 45 miles in length, in the State of Mississippi, may receive all necessary information to enable them to propose by applying to the subscriber at the office of J. R. Van Rensselaer, Esq., 21 Wall Street, until the first of September next.

R. S. VAN RENSSELAER,
Engineer, V. & J. R.R.

New-York, 1st A 18ugust,37. t—32. 1st

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with ll its engravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

MECHANICS' MAGAZINE AND JOURNAL OF MECHANICS' INSTITUTE,—Published by D. K. Minor, and G. C. Schaeffer, No. 30 Wall-st Basement story, at $3 per annum in advance.
ALSO,—Published at the same place the RAILROAD JOURNAL at $5 a year.
The New-York FARMER and GARDENERS MAGAZINE, at $3 a year, both in advance.

The following notice of T. G. Bates, Esq., Canal Commissioner of Ohio, will we hope, give employment to many who are now seeking work.

From the Dayton (Ohio) Journal, of 29th July.

EXTENSION OF THE MIAMI CANAL.

NOTICE TO CONTRACTORS.

PROPOSALS will be received on the 11th September next, at Sydney, Shelby County, Ohio, for constructing 17 miles of canal, along the valley of the Great Miami, from the mouth of Loramies Creek, to a point 6 miles above Sydney. The work to be contracted for, consists chiefly of an unusual proportion of bluff and steep hill side cutting—much high embankment—several small aqueducts—a number of culverts and 8 or 10 stone locks.

And on the 15th same month, proposals will be received at the town of St. Marys, for constructing about 26 miles of canal along the valleys of Loramies Creek and St Marys river, from a point 5 miles above Piqua to the town of St. Marys. The work on this part of the line, consists of much very heavy excavation and embankment, several small aqueducts and many small culverts. At the same time and place embankments for the great reservoir near St. Marys will also be offered for contract.

The commissioner will expect certificates of character and qualifications from well known or unquestionable authority, to accompany each proposal, unless the bidder is personally known to him or to the Principal or Resident Engineer.

For further particulars, plans, &c., apply to the Engineers on the line of canal or at their offices in Sydney and St Marys.

T. G. BATES.

33—t. 11th. Sep

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2½ by	⅝,	15 ft in length,	weighing			$4\frac{88}{100}$	per ft.
280 "	2 "	⅝,	"	"		"	$3\frac{50}{100}$	"
70 "	1½ "	½,	"	"		"	2½	"
80 "	1¼ "	½,	"	"		"	$1\frac{25}{100}$	"
90 "	1 "	½,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front-st

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS KETCHUM AND GROSVENOR,

Paterson, New Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires, Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron with wrought Tires; Axles of best American refined iron, Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N.
51tf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakichill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rohester, Jan. 13th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered.—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer.
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 1y 14

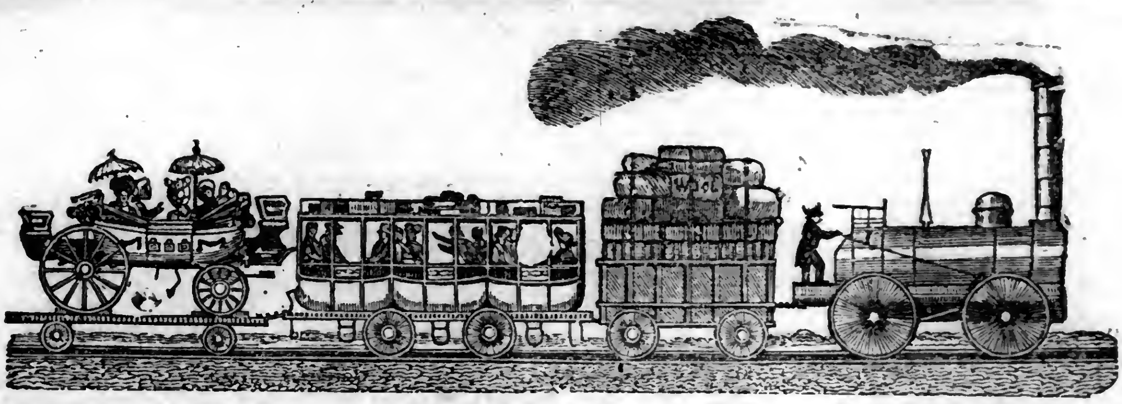
NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf GEORGE COLEMAN,



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, AUGUST 26, 1837. VOLUME VI.—No. 34

CONTENTS.

AMERICAN RAILROAD JOURNAL.

NEW-YORK, AUGUST 26, 1837.

☞ SUSPENSION OF PUBLICATION, *for four weeks.*—The difficulty of *collecting*, or raising money, compels us to suspend the publication of the Journal for *four weeks*, when it will be resumed, and the present volume completed; and if those in arrears will pay what is due, the work will be continued.

SUSPENSION!—It is exceedingly mortifying—even at the present period of *broken promises*—to be abliged to *suspend* the publication of the Railroad Journal; but we are compeled to do so, for a short time—and *only* for a *short* period, as we confidently believe—for the reason that we cannot collect money enough to pay the compositors and pressmen for printing it. To those of our readers who *have* paid in advance, according to the *terms*, this may appear singular, yet it is not by any means a singular circumstance at the present time for Periodicals to fare hard.

The Journal has been published nearly six years; and its subscribers are scattered not only over the whole United States, but also in Europe; and it is therefore exceedingly difficult, we are aware, for them to make remittances, and far more difficult for us to make collections by agents, consequently there is a large amount, not only for the present, but also for *past years*, remaining unpaid—*the amount exceeds six thousand dollars*—yet we are unable to collect enough to defray the *unavoidable* current expenses; and must therefore suspend its publication for *four weeks*, until we can receive from those subscribers who have not yet paid, the amount due, for which bills have been forwarded. In order that each subscriber, whose account appears on our books *unpaid*, may know how it stands, we shall mark on the margin of *this* number, the date paid to, and amount due up to 31st December next, or close of Volume VI. This is done with the hope that those who are indebted for the Journal will pay the amount *at once*, to enable us to complete the volume, and thereby do justice to those who *have* paid up. It is done with a view of showing those who have for years received the Journal without having complied with the conditions of its publication, that is to say *without paying for it*—that they have aided in producing this suspension of publication—and that unless they remit promptly the amount due, they will compel the senior Editor, who established the work, *in opposition to good advice*, to relinquish his interest entirely at the close of the present volume; as he has already been compelled to make an *Assignment* of his interest in it to secure his creditors—who have aided him in sustaining it thus far.

It should not be forgotten that the entire materials of the Office, and 400 full sett of the work, were destroyed by the *great fire*, and therefore that the present *famine* bears upon it with a heavy hand.

The publication *will* be resumed again, in four weeks; and the Volume completed by the close of the year—if those in arrears will deal justly by us, and *pay what is due*.

Those who have paid up in advance, *may rest assured that the volume will be completed*,—to those we acknowledge our indebtedness, and pledge ourselves to complete *the* volume,—and we *hope many* succeeding volumes; *that*, however, depends upon those who have *not* yet paid.

☞ We ask that remittances may be made in such bank notes ar are at the *least* discount *here*—we have paid from *five* to *twenty five* per cent discount on notes sent us—and without *grumdling* too, yet we cannot do it long and publish the Journal—the *best* you have, and *all* that is due, is all we ask—*if we have it soon*—

EAST NEW-YORK.—We publish in this number a description and plan of this *new* city. We have long been aware of the movements of gentlemen of enterprise and perseverance in this matter. It is not the work of a *few days* and a *Lithographer*; but it has been for more than two years in progress, and will eventually show the judgmemt and enterprise of its projector.

MORRIS CANAL.—This canal has been navigable to Jersey city for several months, but we have never examined the line of the work until this week. The section between Newark and Jersey city was a difficult one to construct, most of it being marsh, and another portion of it requiring a heavy sea wall. The route is very circuitous, in consequence of the Bergen ridge. There is now very little business doing on the canal between Newark and Jersey city.

NEW-JERSEY RAILROAD.—The work on the deep cutting through the Bergen Ridge, is progressing. It is a heavy and expensive section; yet it will soon be passable for Locomotives.

NEW-YORK AND HARLEM RAILROAD.—On passing over this road recently, we were agreeably surprised to find it so nearly completed.

Most, if not all our readers, are aware of the nature of the work and its difficulties. The greatest of these is the tunnel through Prospect hill. This and the adjoining deep cuts are there a work of unusual hardness, but are now completed with exception of the dressing off, on the bottom and sides.

We happened to be present while several blasts were made near the centre of the tunnel, which on this occasion became a mighty air gun. The curious ringing and reverberations cannot be described to one who did not hear them.

We found the cars running from the north side of the tunnel to the termination of the road at 125th street, so that with the exception of the tunnel and a small portion of the cut on either side, the whole road is now actually in use.

We were pleased with the neat finish given to much of the new work upon the road. The bridge over Harlem Creek is a handsome and substantial structure on the lattice plan.

The company are also adding to the finish and safety of the road by substantial slope walls along the whole line of earth excavation.

We understand that it is intended to run the cars from Walker street to 125th street, the entire length of the road, before the end of September.

This arrangement will be as much to the profit of the company, as to the benefit of individuals residing or doing business in the upper part of the city.

The new depot on 42th street with its ample stock of substantial and elegant cars, gives proof of the endeavor to meet the public wants.

At present we know of no route more interesting to a stranger or citizen than a ride over this road.—The tunnel alone is worth a journey—while the view from the upper portion of the road is very beautiful. Harlem and Manhattanville and the line of houses between them resemble the germ of some great city, while the Bloomingdale Asylum, the mansions of several of our citizens, together with the remains of the old fortifications, on the surrounding heights, give quite an imposing aspect to the borders of the valley. To complete the view the back ground is made by the palisadoes and banks of the Hudson.

On the other side the view over Hell Gate and the last river is quite as beautiful, though different in character.

The green fields of Long Island and the constant play of steamboats over the intervening expanse of water, are in very pleasing contrast with the sterner heights of the North River.

Those to whom this road offers convenience for transit have already made trial of its merits, and we advice strangers and lovers of variety to do the same.

For the Railroad Journal.

ROCHESTER, July 25th, 1837.

Gentlemen,—While on a visit to my family, in this city, after a long absence, in the employment of the Great Western Railroad Company of Upper Canada—to the construction of whose work my services are engaged, the strictures of a writer, under the signature of Q, in your valuable publication of the 15th instant, have attracted my notice. They are of a character, which seems to require of me a few remarks.

The writer labors under some misapprehension of the details of my plan of Railroad; and, by the concluding paragraph of his communication, may be thought to betray other purposes than the promotion of the great cause of Internal Improvement. Critical expositions of every new scheme for accomplishing useful objects, should be read with care, by all who are interested in the objects; and if they manifest intelligence—point out errors—or suggest improvements—should be regarded with gratitude by those, who are especially responsible for their successful accomplishments. It is the part of prudence to gather wisdom, even from an enemy; and if I do not deceive myself, I should feel obliged to your correspondent, notwithstanding his disregard of the courtesies generally held becoming among men striving to apply science to works of immediate and obvious public importance, if his strictures were founded upon an accurate assumption of facts, or illustrated useful principles in any new application.

It would be needless here to give a description of my plan, in detail, as you, Messrs. Editors, in the spirit of justice claiming my thanks, have promised to publish it. To your publication of it, reference is herein made. Such reference will show, that the whole timber work is *embedded in the grade*; and that the bearing surface, upon the grade, is one third greater than Q has adopted as his maximum. In my plan, the design of shoring up the longitudinal timbers, by blocks, is to facilitate the grading, by the use of cars upon the timber work, and to sustain the same in the progress of perfecting the embankments. And the road, when completed, presents a combination of the longitudinal timbers, blocks, cross timbers, scantling, and iron, *incorporated in the grade*, in such form as best, as to resist the action of the engine and train

It is to be regretted, that Q, in his investigation of the different degrees of resistance to flexure afforded by the common plan of wooden railroad, and my plan, had not taken the necessary precaution to assure himself of the correctness of his premises, before proceeding to his conclusions—and still more, that he had not ascertained the accuracy of his deductions, as based upon these premises, before presenting them to the public. In the plan which I have recommended, in my report, string pieces, from 18 to 24 inches in diameter, and hewn upon the *upper* surface, and laid upon cross ties placed 10 feet apart from centre to centre. In the former part of his communication, Q says in relation to my plan, "that the rails are 12 by12 inches, or large enough to square hat size;" and when he gives the result of his investigations, we find him, not content with assuming them at their minimum diameter, but divesting them of their "fair proportions," and actually reducing them to 12 by 12 inches square. This is unjust; and it is an essential fact, in respect to their stiffness. They are so small, *only* at the points of rest; at all intermediate points, they are larger—they are cylinders of not less than 18 inches diameter, with the exception of the upper surface flatted between the ties, and a lineal foot of them contains 1108 cubic inches more than a lineal foot of timber squared 12 by 12 inches.

Q does not present the "modes operandi" by which he arrives at his results, yet it is evident, that finding, as the result of his enquiry, the sagitta or depression of the rail, between the points of support, in my system (with the dimensions which he assumed for it,) to be in the ratio of 2.7 to 1, compared with the same in the old plan, he jumped at the conclusion, that their natural stiffness is in the inverse of this grading; or that the old system is firmer than mine, in the ratio of 2.7 to 1.

Let us examine this, still retaining the ratio at the dimensions given by Q. Suppose the depression of the middle point to be equal, in the two cases: then, on the old plan, for every three feet in the line, an engine must encountre just as much depression as for every nine feet of mine: consequently what Q has interpreted as the measure of stiffness, in the new system, must be multiplied by three, and the result will be correct—showing that my arrangement is firmer than the old, even with rails only 12 by 12 inches, in the ratio of 1.1 to 1.

The comparison when instituted between the two beams actually under consideration, will show a still more decided advantage in favor of stability, in my system, over the old. In the latter, $\frac{1}{6}$ of the solid contact is lost, in dressing the 6 by 6 iron rail, and in preparing it to receive the iron plate. This is a large allowance to make for what is hewn off from the upper side of my rail to prepare it to receive the scantling, it being not more than $\frac{1}{12}$, and generally less. But we will assume the rails of one system to consist of hewn timber 6 by 6 inches; and of the other to consist of round timber 18 inches in diameter. The beams being supported at each extremity and loaded at the middle point—the formulas which apply are

For the Cylinder. And to the Prism.

$$F = \frac{W\,(2\,c)\,3}{A\,12\,\varpi\,r\,4} \quad \Big\} \quad F\,\frac{W\,(2\,c)\,3}{A\;4\;a\;4}$$

in which we represent, by

F. The sagitta, or depression of the middle point of the beam.
W. The pressure, to which the rail is subjected,
A. The co-efficient of elasticity.
a. Side of the square, or transverse section.
r. Radius of the base of the cylinder.
2 c. The distance between the points of support.

By substituting for a, r, 2 c and w, their proper values we obtain for the cylinder $F = 4,6\,\frac{W}{A}$

for the prism $F = 5,2\,\frac{W}{A}$

W and A being of course constant quantities and known, or susceptible of being known, the results show a depression, in the ratio of 1, in my system, and of 1.1, in the old; and multiplying by 3 as before, for the difference of distance under consideration, we have advantages in stiffness, in my system, in the ratio of 3.3 to 1.

An examination in relation to *rupture*, would show a still greater superiority: for the strength increases with the cubes of the sides of transverse sections, in prisms, and with the cubes of radii of the transverse section, in cylinders, while it decreases with the length.

It ought to be observed here, that experience shows a decided advantage from the use of round timber, in the grade, rather than square,—with the round, the grade unites more perfectly and equally. The action of the rains, and use of the horse track, presses the earth closely and uniformly against the lower sides of the round, soon producing a solid and stable connexion between the timber and the grade, of considerable effect in preserving a proper adjustment of the track—while the difficulty of passing the earth, at all, under the lower angles of the squared timber, hinders its firm connexion with the grade.

Any improvement in the form or mode of executing the details of a railroad, though of little estimation, in a short distance, on one road, becomes of serious concern, in the vast lines of road projected throughout the entire country, whether the improvement relates to cost of construction, stability of the work, or the facility and safety of its use. In the common form of constructing wood roads, great difficulty exists in giving to the longitudinal sills, through the entire bearing surface, sufficient vertical strength, particularly in soils of secondary formation. Various sizes of these under timbers have been adopted, and Q claims one of 6 by 12 inches of prepared timber, and of considerable length. On the road from Buffalo to Niagara Falls, a less size was used. It was found insufficient; and longer timber was subsequently employed than that approved by Q, before the road was deemed fit for the use of locomotive power.

The grade of the road is the legitimate base on which the superstructure is to be erected. It is necessary to give sufficient bearing surface and vertical strength to the sills, connected with the grade, to sustain the superstructure, and all the weight of the engines and trains; for if the sills yield, the superstructure, which they support, yields also. Hence the sills must be large. On these sills, in the common form of road, cross timbers are placed three feet apart, on which are laid rails required to be of sufficient strength to sustains the weight of the engines and trains also, between the cross timbers, because they have no support from the grade, except at the points of contact with the cross timbers. These rails receive the iron, and thus the frame of the road is completed. Proper materials for this description of road, Norway pine, red cedar, and oak, are not easily obtained, in sufficient quantity; and when actually used in the road, are exposed to rapid decay.

My plan admits of using all sorts of timber, and secures greater strength and durability. By placing my cross ties *deep in the grade*, they are almost out of the reach of decay, and by using larger sills in a rough form, also *buried in the grade*, an additional advantage of increased strength is obtained. Instead of the cross timbers *above* the longitudinal sills and the small rails, adopted on the old plan, I employ a small scantling, *continuously* sustained by the strong sill in the grade, and the grade itself; on which scantling the iron is placed to receive the wheels of the cars and locomotives.

On the old plan the entire timber work, above the sills, is unsightly, decaying, dangerous, not equally and continuously supported—and unnecessarily exposed to derangement by frosts. On my plan these evils are either entirely removed, or greatly diminished. The ordinary plan of railroads is copied from the first experiment model adopted in England; and places the timber *above* the surface of the grade. The plan recommended in my report, claims to be a combination of science and art, which the timber work by a more compact connection of and by being placed *within the grade*, secures in a much greater degree, the important desiderata of strength, durability, and cheapness, and by substituting timber for the stone and iron, is happily adapted to the use and circumstances of our country.

What is the necessity of the upper frame work upon the old plan, which, besides the evils already enumerated, involves great expense? I have thought it very desirable to provides a substitute for this frame work; and the form of road which I have recommended, has proved to be a valuable substitute. The wood roads actually made, upon the old plan, have proved so imperfect, temporary, and costly, that iron and stone roads are claimed to be the cheapest, where capital can be had for their construction. But it will be long before sufficient capital can be found to open all the roads actually wanted and projected, in the vast range of North America, unless a form of construction cheaper than any in which iron and stone are the chief materials, can be adopted.

The essential facts respecting the amount of outlay required to open a railroad, are greatly in favor of my plan. In all the newer parts of our country a wood road can be constructed upon my plan with greater strength, permanency and beauty, than upon the ordinary plan, and at *one half the cost*. And I will here say, that none of the features of my plan are derived from the invention of Mr. H. Allen. I understand this gentleman contributed largely to the advancement of the Charleston road, by driving piles, making bents, and forming a kind of truss work, to continue the road over marshes and bottom lands, in place of supporting it in such places by embankment. But this does not compare, in any respect, with the first principles of my form of road.

Experience is the best teacher. The rail road from Rochester to Batavia, 32 miles in extent, was made on my plan. The grading of this road exceeds one million of yards, the cuttings of which were removed into the embankments, at an average distance exceeding one-fourth of a mile, and some portions exceeding a mile. The work was accomplished by cars of eight wheels, carrying at each load 8 cubic yards of earth (about 12 tons weight) into the embankments, upon sills supported by posts. The track of this road crosses swamps, soft and hard land, in considerable variety. It is now used by a heavy class of locomotives, on the *same foundations* prepared for its grading. It has stood the test of two severe winters, and it is now in better condition, and its adjustment better preserved, than any of the expensive roads, constructed on the ordinary plans, in our country; although about one-third of the timbers in it (its posts and sills) are less than two-thirds the minimum size recommended in my report. On this road your correspondent, or any other person, may see the ordinary business of passenger-trains, and a great extent of freighting business, performed at the most rapid rates of motion usual on the most expensive railroads of the country, without producing the evils imputed to the plan by Q.

This road has been made at the expense of several enterprising and intelligent gentlemen residing in its vicinity, who have watched its progress at every stage, and its use in every emergency, with all the vigilance demanded by large pecuniary investment; and so satisfied are they of its advantages over other plans of construction, that they have commenced extending the road, upon the same plan, 36 miles further, from Batavia to Buffalo.

Entertaining, as I do, a very exalted opinion of Messrs. Barlow, Tredgold and Dupin, and duly appreciating the benefits, which they have conferred upon the cause of internal improvement, and science in general, I must be permitted to protest against their being held responsible for every mistaken application of formula, however correct in themselves, or every deduction from principles however rigorously demonstrated. Even the authority of their names will not sanction the application of their theories, to subjects not legitimately within their sphere.

It is the province of the Engineer, "to produce the greatest mechanical results, with the greatest economy,"—not that short sighted economy, which looks to *one* object, and *one alone*—but economy in its enlarged and liberal sense, looking to *ultimate* as well as *immediate* advantage, and which, taking into consideration all the cirumstances of the case, and especially the requisite expenditures of time, money, labor, and materials, adapts its exertions most happily, and without loss, to all With no disposition to undervalue the aid, which science lends to the advancement of works of internal improvement, I must be allowed to say, that the most enlarged mechanical science will avail but little unless guided, in its application, by *sound discretion*. Where timber costs nothing, and must be removed, to make it a substitute for costly materials, in constructing any work, as far as may consist with the object of the work, is the dictate of economy. It would be manifestly injudicious to adopt the same plan of operation, in a project, which might be equally well effected by the use of timber, iron, or stone, without taking into account the cost of these various materials, at the location of the project. If the live oak of the South would alone answer the essential demands of a timber structure to be erected in Canada. It is plain, that the care to save that article and the labor of its long transportation, should be very different from the care to save timber of other descriptions to be found upon the very site of the structure, and necessary to be removed, at greater expense *away* from the structure than to be employed *in* it, if such other timber would as well answer its demands.

I am not unaware of the situation of the Engineer Corps of the United States. The demands of the service have called into the field all the assistance, that could be obtained. In many cases, individuals have been advanced early to the discharge of important duties. All have their theories; most are tenacious of common usage. To depart, in any measure, from this requires great moral courage, and some self-confidence. A young Engineer, though of respectable scientific attainments, would not adopt a new plan, involving great anxiety for himself, and large disbursement for those, in whose employ he might be, until it had obtained the sanction of men high in authority. This would be the course of prudence, of reputation and of probable support for himself and family, if he had one. But it would not be the way of improvement. By a combination of prudence and prejudice many great improvements have either been wholly rejected or made their way slowly to public favor.

The subject of railroads enters largely into the enterprise of our country. And men, not professional, understand yet but little of its details. This of course imposes great responsibility upon Engineers; and they are somewhat divided into advocates of different theories. It has long appeared to me desirable, that men of respectable attainments, and desirable experience, in the applications of science to the opening of railroads and canals, should confer together upon these subjects more than they do; and take such measures as might be efficacious to countenance and recommend new inventions, worthy of approbation, in any branch of their pursuits. Your Journal the appropriate vehicle of intercourse between our countrymen devoted to these concerns, and by communications to the public, through its columns, their digested and deliberate views, principles and plans, they would advance one of the greatest of our public interests, extend their individual reputation, and afford a useful asssistance to a meritorious and much needed publication.

I trust I shall not appear officious, in the remarks called from me by the strictures of your correspondent. I have meant only to justify myself, and my plan of railroad, from objections founded in error. And if my labor shall tend to commend to public favor, any new and useful modification of the details of road making, and thus favor the great interests of the country, I shall be more than compensated for it, and for the uncourteous animadversions to which I have been subjected.

With much respect,
your ob't serv't,
ELISHA JOHNSON,
Civil Engineer.

The following communication is from a gentleman whose opinion, in relation to such matters, is entitled to respect. His doctrine of the *importance of the introduction of a cheap mode of constructing railroads* in this country, and especially in the new and sparely populated States, will find more advantages now than formerly. He will find on referring to tho Journal that we have recently published the Report refered to, and a communication criticising it.

NIAGARA FALLS, August 15th.

Messrs. Editors,—The prosperity of our country is so intimately identified with the completion of its contemplated lines of intercommunication, that all good citizens must look with deep interest upon every measure which is calculated to advance or retard such an event. The financial embarrassments of the community have diverted into other channels, the capital designed for many of the most important *links* in the *great chain* of works; and the operators or projectors have been forced to their expenditures to a very limited amount, and in many cases, to abandon their enterprise altogether, or defer its completion to more propitious times. For such a period, *all* are devoutly wishing and *most* are *confidently* hoping. In the mean time, it becomes us to avail ourselves of the present moment, to look back upon the past, and profit by its tachings, and to look forward to the future, resolved to practice the lessons of wisdom. With our great natural advantage—our vast resources, we cannot for a moment admit the thought, that these stupendous plans must ultimately fail. There is capital enough—there is enterprise enough in the country, if properly directed, to accomplish all that the *real* wants of community demand. These wants *must* and *will* be met. The demand will create the supply. The business operations of the country *will* be resumed—the earth is yielding her bounteous supplies—the products of the fertile fields of *the West* and the *far West,* will seek a market, and it is the interest of all, and especially of *Eastern Capitalists* to furnish easy means of communication between the Atlantic cities and the interior. Sagacious capitalists, foreseeing the coming want of these channels of communication, are already seeking among them, a safe investment and sure return, for capital unprofitably or unsafely employed elsewhere.

The tremenduous revulsion which has every where been felt, will not be without its benefits, if from it we learn a lesson of wisdom. It should teach us the value of economy—the necessity of caution. It should teach us to husband well our resources, and so to expend the money appropriated to these objects, as to produce the greatest amount of benefit.

The inquiry has been often made, whether some plan could not be devised for constructing *railroads,* which should present the requisite degree of strength and durability, at a less expense than in the present modes. It has been urged that American Engineers follow too closely in the footsteps of the European—that they adopt the expensive plans of the latter, which apply to short routes connecting populous cities, without sufficiently regarding the different circumstances in which we are placed. Called upon to construct extensive lines of road, through a thinly populated, and perhaps uncultivated region, and having a limited amount of Capital at our command; it becomes necessary (agreeably to the homely proverb) "to cut our coat according to the cloth."

True, some modifications have been made. The substantial structure of stone and iron, have given place to wood and the plate rail. But the cost of this, is in many instances beyond our means, while some defects in the system abridge its usefulness—the profits being diminished by the tax for annual repairing. The great desideratum—cheapness of construction combined with strength and durability, has not yet been obtained.

Having recently had occasion however, to traverse some portions of the West, I have availed myself of the opportunity presented, to examine the different roads which came under my observation, and to obtain such information in relation to the subject as lay within my reach. In the course of my inquiries I accidentally met with a report made to the Detroit and Niagara Rivers Railroad Company, by Elisha Johnson, Esq., their Engineer. He therein developes a plan of construction, which seemed to me to be more feasible than any that I have met with, and in short, to supply the very desideratum of which I speak. Not having a copy of the report at hand I cannot give you its details. But the peculiarities of the plan I believe to consist in using timber in its rough state, (the *upper side* only being hewn) which is so combined as to offer the necessary resistance to the action of the train, and in its being incorporated with the grade, supporting, and being supported by it, while the earth with which the timber is covered protects it from the action of the sun and rain, and prevents its decay. Mr. Johnson shows by proper estimates that the expense of preparing the road to receive the iron rail is only one half that of the usual mode.—And to extensive woodland districts the plan seems peculiarly appropriate, since the timber can be cut down, and placed in its bed and suitably dressed to receive the rail, at the same expense as would be incurred by removing it from the line of road.

For the manner in which the road answers the end in view, that of affording an unyielding support for the engine and its train, Mr. Johnson refers with apparent confidence to the Tonawanda Railroad which was built by him two years since on this plan. Desirous of satisfying myself on this point, I examined the road with considerable care and attention. The rails appeared in most excellent adjustment, and the condition of the road to be altogether superior to any over which I have travelled. I conversed with several gentlemen of intelligence, all of whom agreed with me in this particular. I was moreover informed, that so little had the road felt the frost of the last two winters that not a dollar had been expended since its completion for repairs in consequence thereof. The action of the engines and train instead of *discomposing*, tends rather to *consolidate* and *perfect* the grade.

Satisfied myself of the excellence of the plan, by all the light which examination and enquiry, aided by some little knowledge of the subject had been able to shed upon it. I thought I could not render a more acceptable service to the great cause of Internal Improvement, than by calling the attention of your readers both capitalists and members of the profession, to the subject in question.

If my views of the subject be correct, Mr. Johnson, by placing within our reach, a plan of construction by which the advantages of railroads may be secured at a comparatively small expense, has opened a new field for successful enterprise. Regions hitherto debarred by position and circumstances from availing themselves of these modes of communication, will now find them within their means. I regret that I can only furnish you with a meagre outline of the plan, but presume you have received the report, and hope you will give it publicity.—Indeed, as I have not seen your Journal for some weeks, owing to my absence from home. I do not know but you have already done so. I hope the plan may receive an examination, commensurate with the importance of the pretensions which it puts forth. Let it stand or fall by its own merits. Although disposed to judge favorably of it, I shall not be sorry to see it strictly scrutinized. Yours, &c., W.

MEMPHIS AND LAGRANGE RAILROAD.—We are indebted to a friend for the following account of this road. It will truly be, as it is termed, "an important link" in the great chain connecting the Mississippi with the Atlantic—a chain which the good sense of the people will not long permit to remain incomplete. About 200 miles, or one third of this route is now constructed, and in successful operation; comprising two of the first completed roads in this country—and more than another third* is now in course of construction, thus placing beyond doubt the early commencement of the remainder.

This road, and the Charleston and Cincinnati road, will open the interior of Allabama, Tennessee, Mississippi, and Kentucky, to the Atlantic at Charleston, and produce a wonderful change in the condition of each—and Charleston, will by no means be the least benefitted.

Extract from a letter dated Lagrange, Tenn. July 31, 1827.

The Lagrange and Memphis Railroad is progressing rapidly, and will be completed in 1840. Distance 50 miles with a lateral of $13\frac{1}{2}$ miles from Moscow to Summerville. When our road is completed it will form an important link in the great chain, connecting the Mississippi with the Atlantic. I am astonished that this great project attracts so little attention. It is to my mind by far the grandest scheme for railroad improvement in the United States. The whole cost will fall short of $5,000,000. The cheapest road for the distance in the world.

From *Memphis** to Lagrange, 50 miles under contract.
" Lagrange to Tuscumbia, 100 miles, not under charter yet.
" Tuscumbia to Decatur, 43 miles, finished in 1834.
" Decatur to Rossville, 100 miles, Via Tennessee river.
" Rossville to Athens, 140 miles, under charter and survey.
" Athens to Augusta, 85 miles, under contract, part comp't.
" Augusta to Charleston, 135 miles, in successful operation.
653 miles or there abouts.

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* The Chickasaw Bluff presents a front on the Mississippi river of about 4 miles, and is the best situation for a large commercial city, from the mouth of the Ohio to New-Orleans, Memphis is situated just below the mouth of Wolf river, and contains a population of about three thousand. A new city about two miles below, at old *Fort Pickering*, is being laid out, called GIRARD, to which a branch of our road will be carried. *Girard* is about half way between the mouths of *Wolf* and *Nonconnah*, at the terminus of Nonconnah Ridge, extending east 25 miles, and on which the railroad runs.

LAGRANGE, is a beautiful town, containing about 1500 inhabitants. In fact the whole route to Charleston will be an exceedingly interesting one.

To the Editors of the Rail Road Journal.

METHODS OF LOCATION FOR RAILWAY ENGINEERS. BY S. MIFFLIN, CIVIL ENGINEER. PHILADELPHIA.

GENTLEMEN: I take great pleasure in calling the attention of the profession, through the medium of your valuable journal, to the above admirable little work. The demonstrations of the different "Propositions" show an intimate acquaintance with Geometry; the "Applications" show the experienced engineer; and the language in which they are conveyed to the reader, shows that the author possesses those acquirements, without which engineering is not a liberal profession, and, without which, no engineer will ever command the confidence of the accomplished and distinguished gentleman entrusted with the direction of many of our public works—I am sorry I cannot say, with all. The demonstrations are strictly geometrical, and the applications of the different problems most clearly explained. It is also, to the best of my knowledge, the first *practical* work on Railway Engineering.

With due deference to the care and labor which have evidently been bestowed on this work, I would suggest that between the 5th and 6th Propositions there should be introduced the general problem—to find the radius required to join 2 straight lines or tangents, the angle they form and the origin of the curve being given, or, to find the origin, the radius, and the angle formed by the lines being given. It appears to me that this is required to render the work complete. There are also half a dozen errors in the letters referring to the figures.

How does it happen that the publishers of this work and of that of Professor Mahan do not advertise in the Rail Road Journal, by which they would *sell* more copies than by advertising in all the other journals of the union.

Both works may be had at the Messrs. Carvills.

Your obedient servant,

New-York, 15th August, 1837. Q.

RAILROAD ACCIDENTS.—The following account of a recent accident on the Roanoke Railroad should arouse the attention of the traveling community. Accidents on Railroads are too common. Those persons having charge of Locomotives should be held to a strict account by the proper authorities.

Correspondence of the Baltimore Patriot.

Steamboat Columbus, August 12th, 1837.

The most serious accident that has occurred in Eastern Virginia since my recollection, happened on the Porthsmouth and Roanoke Railroad, one and a half miles from Suffolk, yesterday, between 9 and 10 o'clock. A company consisting of about 150 ladies and gentlemen, from the counties of Isle of Wight, Nansemont and Southampton, came down on the railroad on Thursday, the 10th inst., with the view of visiting Porthsmouth, Norfolk, Fortress Monroe, and returning the next day—on their return, at the time and place above mentioned, they met a locomotive and train of burthen cars, and horrible to relate, the two ran together while going at the rate of 10 or 12 miles an hour.

A messenger was sent into Suffolk for some physician in the place to come out immediately, and I being accidentally in that town, repaired to the place of accident, with the hope of being able to render some assistance to the wounded.

The most heart rending scene presenting itself that I have ever witnessed; every spot on both sides of the road, which offered the least protection from the sun, was covered with the dead dying and wounded. Three young ladies sitting together on the front seat of the second car were killed, neither living longer than fifteen minutes: another lady, an infant and a negro girl were so much injured, that they died before three o'clock, and ten or fifteen ladies and gentlemen besides, sustained injury of one kind or another, very likely to prove fatal to four or five of them.—The confusion attending an accident where so many were present, the mangled corpses laid out on the side of the road, the mourns of the wounded and the weeping and wailing of relations, presenting a spectacle which defies description. Every possible attention was paid the sufferers by the Physicians and hospitable citizens of Suffolk, but the situation where it happened and the excessive heat of the day, added greatly to the intensity of their sufferings—I shall not attempt to assign any cause for this painful occurrence, as the matter will probably undergo a thorough investigation before a Court of Justice.

AN EYE WITNESS.

The names of those killed immediately were, Miss M'Cluny, Miss Ely, and Miss Roberts.—The three that died afterwards were, Miss Holland, an infant name not known, and a female negro slave 8 years old.—Those injured seriously are Mr. Wiley Watkins, two Messrs. Hollands, Mrs. Ely, Miss M'Cluny, Mrs. Holland, Mr. Phelts and others, names not known.

Major McNeill, the Chief Engineer of the Charleston and Ohio Railroad, arrived in Lexington, July 29th. The Knoxville Register says, from a personal reconnoisance of the route of the road thus far, Major McNeill finds the difficulties much less than he had expected, and entertains no doubt of the entire practicability of constructing the improvement for the estimated costs.

From the Philadelphia United States Gazette.

LOCOMOTIVE ENGINE.—Mr. Chandler—In your paper of to day, Messrs. Garret & Eastwick, by implication, deny that they have violated my patent right for an eight wheeled locomotive, and allege that there is a difference in the plan of their engine and mine. It is my duty to notice this, that no misapprehension in the public mind may exist.

There is not a shade of difference in the *principle*, which it is the object of the patent right to secure, of my eight wheel engine and that of Messrs. G. & E. they are in that respect identical. I had thought that this was perfectly understood by Messrs. G. & E. because both these gentlemen at different times, enquired of me the terms on which I would permit the construction of this species of engine. The controversy however, cannot be settled by newspaper correspondence, and I shall not trouble you again, my sole object being to place before the public my allegations to the facts. Their proof I shall furnish in a court of justice, to which I shall resort in order to obtain redress for the injury which I have sustained.

Yours, respectfully,

H. R. CAMPBELL.

Philadelphia, August 11, 1837.

RAILROAD IMPROVEMENTS.—A locomotive engine of eight wheels, made for the Beaver Meadow Company, was tried last week on their road. She took a train of cars, 52 in number, loaded with 140 tons of coal, down the road from Black Creek, branch of the Quakake, to Parryville, on the Lehigh, a distance of 20 miles, 5 of which lie along the Quakake Valley, on a grade of 250 miles, part of which rises to 95 feet to a mile.—15 miles along the Lehigh river average about 90 feet to a mile. The descent was no way surprising, as the road is all the way descending. But the return shows the improvement in this new motive power. Besides her own weight and that of her tender, (together about 10 tons,) she drew up the road 52 empty cars, weighing about 60 tons, until she reached the 95 feet grade, in a curve: here she detached 22 cars from her train, and with the remaining 30 started anew, and carried them through this heavy grade. The return with 52 cars along the Lehigh was quite easy, the grade not averaging over 20 feet to a mile.

By this experiment, the doctrine heretofore pretty currently established, that railroads cannot compete with canals for heavy transportation, is exploded. The average descent of most of our rivers (if no other sites can be found) present sites for railroads which can with such engines be made to compete successfully with canals of any size. Besides, the most satisfactory proof was presented by this engine, of the complete success of raising and keeping up steam by the use of anthracite coal, for fuel: the doors of the furnace having been, during this experiment, kept open half the time.

It is but just, in publishing these facts, to state, that the public is indebted to Messrs. Garrett & Eastwich, of this city, for this improvement in locomotive power.—[U. S. Gaz.]

The new and improved Locomotive for the Morris and Essex (N. J.) railroad, constructed by Mr. Seth Boyden, of Newark, goes at the rate of 60 to 70 miles an hour. The passengers are wholly protected from the fire of the chimney, the sparks, according to the Morristown Jerseyman, being taken to the ash dan beneath

RAILROAD STATISTICS.—The number of proposed railways, including diversions, extensions, and branches in England and Wales, for which plans have been lodged in the private bill office in the present session, is seventy-five, of which only forty-eight are under the consideration of Parliament; these amount in length to twelve hundred and thirty-three miles, and are estimated at the sum of nineteen million three hundred and fifty-two thousand pounds, or fifteen thousand six hundred pounds per mile. The whole length of tunnelling is twenty-five miles; and the number of bridges, exclusive of viaducts and culverts, two thousand eight hundred and twenty-five, or nearly two and a third per mile. The weight of iron required for the rails is one hundred and ninety-three thousand tons; and of stones for the blocks, two million six hundred and seventy thousand tons. The area of land required to be taken up is upwards of fifteen thousand acres; and of felt for the chairs, one hundred and thirty acres. These railways, if carried into execution, would employ at least five thousand men and fifteen hundred horses for three years, for the earth works alone.

ROTTING OF TIMBER IN CERTAIN SITUATIONS.—Extract of a letter to the editor, from Mr. D. Tomlinson of Schenectady, N. Y., dated April 4, 1836.—In the year 1801, I built a warehouse on my lot in Union Street in Schenectady. The cellar was dug about four feet deep, and the stone wall a foot or two deeper. I left no opening in the walls for door or window. The floor beams were of excellent pitch pine timber of twelve by twelve inches, slit, and were six by twelve inches when placed in the wall, and about eighteen inches above the ground. I laid a floor of three inch oak plank, loose, neither jointed nor nailed, although they were square edge, and lay close to each other. Five years thereafter, I observed a jostling in a place in the floor, and raised one of the planks to learn the cause, and found one of the six by twelve inch beams rotted off and fallen on the bottom of the cellar. The plank was rotten below, except about an inch sound on the upper side. I lifted the whole floor, found most of the planks rotten, except a shell on the top; and the timbers were rotten, and so decayed, that I took them out and put in oak, after making windows and a door in opposite sides of the wall. I thought the depth of the cellar would have prevented injury to the timber, but found it the cause of the destruction, as fine shavings and slivers lying on the bottom of the cellar, were perfectly sound, while the timbers were beautifully ornamented with curtains of white mold, hanging in festoons, nearly the depth of the cellar, as white as snow, very thick, and appeared like bleached muslin.

In the year 1817, I took down an old kitchen on the same lot. The floor had lain on saplings of about 6 by 8 inches, such as are used for scaffold poles. They were bedded in the ground, so that the pine floor came next the ground, and excluded air. They had lain there from 1794, and both the timbers and flooring were very little injured by rot.

I concluded, that a free circulation of air must be allowed, or air must be entirely excluded, to save timber from decay.

It has been found, that when posts are set in the ground and cased with boards for better appearance, the confined air destroys them. Even red cedar, which lasts an age when set open, if cased, which is often done for ornament in gate posts, decays as soon as any other wood, by the confined air.

ŒNANTHIC ETHER.—The œnanthic ether may be deprived of any free acid it may contain, by agitation with a hot solution of carbonate of soda, and subsequently boiling the mixture; the ether rises to the surface and may be readily removed. The small quantity of water or alcohol which it still retains, may be separated by means of the chlorid of calcium. The ether thus purified, is very fluid, similar to the essential oil of mustard. It is colorless, has an extremely strong odor of wine, which when respired is almost intoxicating. Its taste is very strong and disagreeable. It dissolves readily in ether and alcohol, even when the latter is quite dilute; yet it is not sensibly soluble in water. Its density is 0.862 and it is but slightly volatile. It boils between 225° and 230° C.

In three analyses, MM. Liebig and Pelouzé obtained the following results,—

Carbon, -	71.815	72.50	72.02
Hydrogen, -	11.844	11.86	12.05
Oxygen, -	16.341	15.64	15.93

which correspond very nearly with the formula $C^{18}\,H^{36}\,O^{3}$. The œnanthic ether is readily decomposed by the caustic alkalies. With potassa, it affords a very soluble compound, consisting of œnanthic acid and potassa. When this salt is decomposed by sulphuric acid, the œnanthic acid forms an oily bed on the surface of the liquid.

Œnanthic Acid.—This acid presents a butter-like consistence at a temperature of 13.2 C. and is of a white color; at a higher temperature it melts and forms a colorless, inodorous oil, which reddens turnsol and unites readily with the caustic alkalies and alkaline carbonates. The œnanthate of potash, is a pasty mass composed of extremely fine fibres, which present a silky lustre after desiccation. From the composition of the œnanthates of lead and silver, the author infers that 2 atoms of base saturate 3 of acid.

In three analyses, MM. L. and P. obtained for the hydrated acid;

Carbon, - -	69.28	69.74	68.59
Hydrogen, -	11.54	"	11.56
Oxygen, - -	19.18	"	19.85

which lead to the formula, $C^{14}\,H^{28}\,O^{3}$. The anhydrous acid afforded carbon 74.32, hydrogen 12.2, oxygen 13.58, which corresponds with the formula $C^{14}\,H^{26}\,O^{2}$. It may hence be inferred that œnanthic ether is composed of œnanthic acid united to common ether, as is represented in the formula $C^{14}\,H^{26}\,O^{2}+C^{4}\,H^{10}\,O$, in the construction of which and also in the pree ding deductions, Berzelius's atomic weights have been used.

Essential Oil of Potatoes, by M. Augustus Cahours, (L'Institut, No. 199.)—According to Dumas, the essential oil of potatoes is represented by the formula, $C^{20}\,H^{24}\,O^{2}$. M. Cahours infers that this oil is a compound analagous to alcohol and spirit of wood, in consisting of a peculiar compound of carbon and hydrogen for its base, ($C^{20}\,H^{20}$,) united to two atoms of water. He cites the following experiments by himself as proof of the correctness of this view.

The oil treated with sulphuric acid, and subjected to a mild heat, yielded an acid containing the same carburetted hydrogen for base. This acid formed with bases soluble compounds, whose analogy with sulphovinates is incontestable. The salt of baryta, for example, contained $SO^{3}\,Ba\,O+SO^{3}$, $C^{20}\,H^{20}$, $H^{6}\,O^{3}$. If the oil is put in contact with iodine and phosphorus, an ethereal substance is disengaged, giving off a slightly alliaceous odor, which is similar in composition to hydriotic ether. With nitric acid and chlorine, it afforded products of analagous constitution.

OUTLINES OF
PRACTICAL MECHANICS.

II.

OF PRIME MOVERS.

1. *Of Weights.*

16. A weight may be made to give motion to a machine, by attaching it to a cord, which cord may pass over a wheel, or be coiled upon a barrel. As the descent of a weight thus employed has a continual tendency to acceleration, it is necessary that it should be regulated. A regulator well adapted to this purpose may be formed by placing leaves or plates of metal, in the direction of radii, upon a horizontal fly wheel. As the resistance of the air in which the fly wheel moves increases nearly in the ratio of the square of the velocity, the resistance to the motion of the leaves finally becomes so great as to counteract any further tendency to acceleration.

This apparatus does not furnish a perfect regulator, in as much as the density of the air is continually varying.

A better mode of regulating the motion of a descending weight is to be found in the pendulum.

A machine impelled by a weight and regulated by a pendulum is called a clock. Its structure will be explained in the proper place.

2. *Of Springs.*

17. A spring is a flat plate of steel, which bent from a position determined by its original structure, tends to return to its primitive form. The form in which springs are usually fashioned s that of a spiral coil, and such springs are usually enclosed in a cylinder or barrel. This barrel is adjusted around a fixed pin, to which the inner end of the spiral is attached; the opposite end is fastened to the barrel. The spring may be wound up, or caused to form an increased number of revolutions around the central pin, by turning the barrel. As soon as the force by which the spring is wound up is withdrawn, the spring tends to uncoil itself, and in doing so turns the barrel around.

The force with which a spring tends to uncoil itself is not constant, but is greatest at first and gradually diminishes, until the pring is uncoiled. If the spring were of equal elasticity throughout, its force would be always exactly proportioned to its distance from a state of rest.

The most frequent application of the spring to drive machinery, is in the case of the watch and chronometer.

3. *Of the Strength of Men and Animals.*

18. Animals may themselves be considered as machines, planned by the creator with consummate wisdom, and admirably adapted to the several states and circumstances in which they are destined to exist.

19. The prime mover in animals is their life, a force whose origin and action are to us inscrutable. This vital energy is made, by the exercise of the will or volition, to act in producing every variety of motion of which the animal is capable, but the manner in which this volition is transmitted, is also beyond the reach of our finite capacities. In obedience to the will, the muscles contract, or are allowed to lengthen, and the contractile force is applied to cause rigid parts of the animal frame to turn upon the joints. In vertebrated animals, the muscles enclose the rigid parts, which are called bones. In articulated animals, the muscles are enclosed within a jointed shell, to which they give motion.

20. Each several motion of a bone is produced by the joint operation of two muscles which act in opposition to each other, and are hence called antagonists. One of these acts in its contraction to bend the joint, and is called the flexor muscle; the other tends to straighten the joint, and is called the extensor.

By the united action of two or more pairs of antagonist muscles, and by the simultaneous operation of those which act upon different bones, every variety of position and attitude, of which an animal is capable, is produced.

21. The muscles which give motion to the limbs are inserted in the trunk itself, or in limbs more near to the trunk than the parts they are intended to move. These muscles are inserted into the limbs to which they give motion, at no great distance from the joint. Hence each separate bone, when moving around the joint as a fixed point, becomes a lever of the kind ranked by mechanics as the third class. But when the extremity of the limb is pressed against an obstacle, and the muscles act to raise the joint, the arrangement becomes a lever of the second class.

In levers of the third class velocity is gained at the expense of power. But this loss of power is in no case attended with evil consequences, for the contractile power of the muscles is in all cases adequate to the exigencies which the habits of the animal demand. On the otherh and, great benefit is derived from the superior degree of agility which is thus conferred, and there are many cases where the mechanical action, or useful eff—t, is to be measured by the square of the velocity instead of by the velocity simply, and in all these cases a lever of the third class is required for the most advantageous exertion of the strength of the muscles. The foot of man on the other hand is a lever of the second class, and is thus calculated to raise a great weight to a small height by by a comparatively small force. The muscles which perform this office, are much stronger in proportion than in any other animal, and, accumulated in the calf of the leg, add not a little to the beauty of the human figure. Man is thus enabled easily to maintain and move in that erect posture for which all the rest of his structure is fitted. This posture cannot be assumed by the animals which in other respects approach most nearly to the human structure. In these the muscles which form the calf of the leg in man, are slender and comparatively weak; thus, what in man is a firm support becomes in them a hand. These animals are hence styled Quadrumana or four-handed.

21. The erect posture in man is not assumed or maintained without effort. The flexor muscles of the limbs are shorter than the extensors, and thus, the position of the joints, when volition ceases, as in sleep or death, is slightly bent. At the instant of dropping asleep, the muscles before in action relax, and if a constrained posture have been assumed in preparing for repose, a sensation is felt similar to that of a fall.

The exertion required to maintain the erect posture is so great that the muscles which concur in this effect, have frequent need of repose; this is obtained by resting the weight, unequally on the two feet, and shifting it alternately from one to the other

22. In most quadrupeds, the relation between the lengths of the flexor and extensor muscles is the same as in man, and thus, when volition ceases, the joints bend, and the position of standing cannot be assumed or maintained without effort. The elephant is an exception to this rule. His great weight would demand a vast exertion of strength to support it, were the usual relation of the flexors and extensors preserved. But in this large animal their relative lengths are much more near to equality, and the leg, when volition ceases, takes the form of a straight column. Hence this animal can sleep without lying down.

23. Birds have the power of walking upon two feet, of standing upon but one, and of clinging to a perch during sleep, or even after death. These powers are given by an exactly opposite arrangement to that found in the elephant. The difference in the length of the extensor and flexor muscles of the foot is much greater than in any of the mammalia. In consequence of this, the position of the talons, when the muscles are not exerted, is that of the greatest curvature. In moving the foot, the action of the muscles spreads the toes, and they are set upon the ground in their most extended position. The subsequent repose of the muscles tends to draw the claws together, but this tendency is counteracted by the weight of the bird, the talons are thus firmly fixed upon the ground, and their position is the more firm, the less the will of the bird is exerted. Birds therefore may sleep resting upon one or both feet.

In birds which perch when they sleep, the tendons which bend the toes are the prolongations of muscles near the body. These tendons therefore pass over the intervening joints, so that when teese joints are bent, the tendons are put to the stretch, and close the foot mechanically.

24. In the progressive motion of animals over the ground the useful effect of the muscular force may be resolved into two parts. By the first of these the whole weight of the animal, and consequently its centre of gravity, is raised a small distance at each step. By the second, the centre of gravity is pressed forward until its line of direction falls within a new base, provided by the forward motion of the limbs.

The first of these motions is performed in man with great ease, in consequence of the mechanical property of the foot which has been mentioned, and the strength of the muscles of the calf of the leg. The second of these motions is performed with the necessary rapidity, because all the other limbs as we have already stated are levers of the third class.

25. When a man resting equally on both feet wishes to walk, the body is swayed towards one side until the weight rests wholly upon one of the feet, the other foot is then lifted from the ground and carried forwards, until a step of the usual length is taken and the foot again reaches the ground. While this motion is performing by the foot and leg, the other leg is slightly bent; and the muscles of the calf are applied to raise the centre of gravity to a small height, at the same time these with other muscles are employed to throw the body diagonally forward, until the weight rests upon the foot which has been in motion, and is just set down. The foot which had remained fast during the first step, is now raised from the ground, and a similar operation repeated until it is planted and the weight of the body rests upon it. In running, the foot whence the motion is performed is raised from the ground by a powerful exertion of the muscles before the other foot is set down. In walking therefore, both feet are upon the ground together at the beginning and end of each step, and one of them is always resting upon it, while in running the feet strike the ground alternately, and the body is in the interval thrown into the air.

26. A horse, or other quadruped, when about to move, leans forward, his feet are then raised in succession. In walking, one of the fore feet, say the right, is first lifted and thrown forward, the left hind leg is lifted soon after. A short interval then follows, after which the left fore leg is raised and almost immediately followed by the right hind leg. In trotting, two diagonally opposite feet are raised at the same instant of time, and after they reach the ground together, the remaining two feet are raised at the same moment. In racking, the body is swayed from side to side during the progressive motion, as in the walk of man; the two right feet are raised in quick succession, and are followed, after they reach the ground by the two left feet.

In galloping, the feet are taken up one by one, but the right fore leg follows the left fore leg at a short interval; the right hind leg moves next, and is immediately followed by the left hind leg.

27. The motion of birds through the air, or flying, is performed by the action of the wings upon the air. These are kept in action by means of powerful muscles situated upon the breast of the bird, and which are hence called *pectoral*. By the action of these powerful muscles a rapid oscillation is given to the wings. Although the velocity of this motion is equal in both directions, yet as the wing is convex above, and concave below, it is much more resisted in the downward than in the upward stroke, the result of the motions, therefore, is to raise the bird. During the downward stroke, also, the great feathers which compose the wing strike the air directly, and close upon each other so as to form a continuous surface; while, during the upward stroke they meet the air obliquely, or rather by an edge, and the air has a free passage between them. The direction of these motions is inclined, and thus the downward stroke is not only efficient in supporting the bird, but in giving it a progressive motion. The breathing apparatus of birds is so constructed that the air they respire may be passed through the quills and other tubes of the feathers. By this circulation of air, the density of the bird is materially lessened, and may be supported by a less exertion of force.

In the bat, whose skeleton approaches closely in structnre to that of man, the wings are membranes spread upon the hind legs and the fingers or toes of the arms or forelegs. Motion is given to the latter of these by strong pectoral muscles, as in birds. In comparing the structure of this animal with that of man, it will be at once seen that the latter has not the power of flying, even with artificial wings, in consequence of a want of strength in the pectoral muscles. We may also see how monstrous and unnatural are the figures intended to represent angels, in which the wings are set upon the shoulders. The flight of birds is directed upwards, downwards, or horizontally by the feathers of the tribe.

The obliquity of the stroke of the wings differs in different birds, and is expressly adapted to their mode of life. It is greatest in birds of prey, which are consequently better formed for horizontal progressive motion; and is least in birds which rise to great heights in a direction nearly vertical.

28. Fish which live in a dense medium, have bodies whose mean density is the same as that of the fluid. In order to cause their ascent and descent, they are furnished with a bladder filled with air, and acted upon by muscles. When the air bladder is compressed by these muscles, the fish becomes denser than water and sinks; when the action of the muscles ceases, the bladder delutes, the fish becomes less dense than the water and rises.

The air bladder is situated in the lower part of the body of the fish, which therefore tends to be easily overturned. This tendency is prevented by two fins situated on the breast. These pectoral fins are moved by muscles of little strength, and have little effect in giving progressive motion. For the latter the tail is the important instrument, by an action resembling that by which a boat is sculled. In this important motion the greater part of the muscular matter of the fish concurs, and the two muscles of each pair are equal in length, so that under circumstances of rest the body of the fish remains straight. The tail itself is a large fin, whose curvature is altered by muscles, so that it may strike the water under the circumstances best adapted for progressive motion.

29. The force of men and animals may be estimated in the weight they are capable of raising through a given height in a given time. Each individual animal will have a different degree of strength, but in those of the same species the comparison may be direct, and the average strength of a number of individuals may be used to express that of each. In comparing the strength of men with that of animals, or the strength of different species with each other, they must be considered as applied to do the same kind of work. The work which animals are most frequently caused to perform is that of draught. In estimating this the animal is supposed to move forwards upon a level surface, and draw a cord to which a weight is attached, and that the weight is drawn vertically upwards, as might happen, in consequence of the cord being passed over a fixed pully. Man may also be supposed to work in the same manner, and thus their respective strength may be compared.

30. Animals and men are capable of exerting a great degree of strength when impelled by a sudden impulse, and of moving for a short time with great velocities; but such sudden and violent exertions are followed by fatique and exhaustion, In estimating the force of animals, it is therefore necessary to take into account the number of hours per day during which an animal can work, without losing the power of recruiting his strength in the intervals of labor; and the number of days per year for which such work can be performed. The maximum or greatest speed, then, is to be taken, not as that which can be reached for a short space of time, but as that which can be kept up for the number of working hours in a day; and for the maximum resistance, we are, in like manner, to take that which can be strained against, but not lifted, in working the same number of hours.

The greatest force of draught which a man can exert is taken at 70 lbs., his greatest velocity in walking at six feet per second, or a little more than four miles per hour. By the principle of §. 11, a man works to greatest advantage in draught, to raise a weight to $31\frac{1}{9}$ lbs. with a velocity of two feet per second. This is equivalent to raising 4120 lbs., through the space of one foot, in a minute.

The utmost strength of a horse in draught has been estimated at 420 lbs.; his utmost velocity in walking at ten feet per second, he will therefore work to the greatest advantage in draught in raising $186\frac{2}{3}$ lbs., with a velocity of $3\frac{1}{3}$ feet per second. This is equivalent to raising 36,933 lbs. 1 foot high per minute.

A man may work at his most advantageous speed for ten hours per day, for several successive days; a horse cannot work more than eight; but in both instances, days of rest must be allowed from time to time, in order to prevent a prostration of strength. One day of rest in every seven is found sufficient to restore the strength of animals and men working against resistances having the foregoing maximum measure, which fewer will not answer the purpose, hence the institution of the Sabbath is one of absolute necessity to the well being of mankind and the animals it has domesticated.

Taking into view the difference of the number of hours each can advantageously work per day, the strength of a horse applied to draught is usually estimated as equal to that of seven men.

The strength of a horse is often used under the name of a horse power, as the unit in which the force of other natural agents is estimated. This unit has been sometimes taken as low as 28,000 lbs., sometimes as high as 44,000 lbs. each supposed to be raised one foot per minute. The estimate of this unit which we shall employ is 33,000 lbs. raised one foot per minute.

31. Draught is by no means the most advantageous mode of exerting human strength; in fact there is no mode in which he can be applied to that purpose in which he can do more than he can by the exertion of his arms and hands. But in bearing burthens, the relation between the strength of a man and that of a horse becomes greater than $\frac{1}{7}$. The force of the former applied to draught is limited to seventy pounds, which he can move under any weight less than twice his own. Even when loaded with a weight bearing to his own the relation $\frac{3}{4}$, he can mount vertically upwards, as upon a ladder, and with a speed of 2 feet per second. A horse on the other hand supports less weight on his back than he is capable of drawing, and cannot carry even his own weight up a plane inclined more than 45° to the horizon.

Men may carry weights nearly equal to their maximum force of draught, and move under them with considerable speed. Thus a Roman soldier bore in his arms provisions and equipments, 60 Roman pounds, and performed journies at the rate of five miles per hour. A French Grenadier is loaded with 56 French pounds and marches at the rate of three miles per hour. The weights which are born by persons habituated to that species of labor are very remarkable, the most signal instances of this application of strength are to be found in the porters of Constantinople and Bagdad, the Gallegos of Lisbon, and the coal heavers of London.

4. *Of Water.*

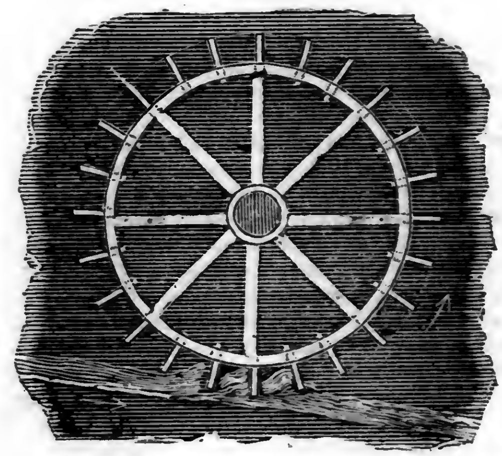
32. Water may give a circular motion to a machine in three ways: by its impulse; by its weight; and by its reaction.

33. The apparatus on which water acts by its impulse to produce a circular motion is called an undershot wheel.

An undershot wheel is suspended upon a horizontal axis, and in its usual form has upon its circumference a number of floats or paddles, whose planes pass through the axis, and which dip, in the lower part of their revolution, into a current of water. This form is represented beneath. (See Fig. 10.)

34. An undershot wheel may be loaded with such a weight as will prevent it from turning, or, were there no resistance, might acquire the whole velocity of the stream, in neither case

Fig. 10.



could it do any work. Its greatest or maximum effect is produced when its velocity is $\frac{2}{5}$ths of that of the stream. This fact was first discovered in the experiments of Smeaton, and has since been shown to be consistent with theory. It is also inferred from theory that at this velocity of $\frac{2}{5}$ths, the useful effect of the wheel would be to raise one third of the weight of the water which forms the current, to the height whence it must have fallen to acquire its velocity, or in other words, one third of the mechanical measure of the action of the water. This last inference is found to vary from the truth in different modes of placing the floats upon the wheel.

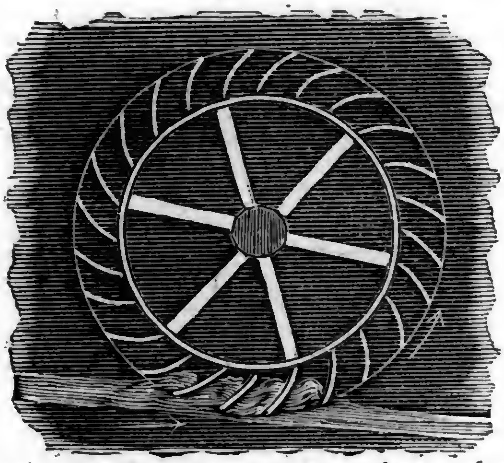
35. When the action of undershot wheels was first considered scientifically, it was inferred, that in order that the water should act most advantageously, no float should interfere with the flow of the current upon another. To fulfil this condition, when the lower float is vertical, the preceding float should be just quitting, and the succeeding float just entering the water. Constructed in conformity with this condition, the best effect was found to be little more than one fourth of the mechanical measure of the action of the water. Smeaton in his experiments found that the most advantageous position of the floats was such, that, when onebucket was vertical, two others should be immersed in the water, a fourth entering and a fifth emerging from it. In the former case no more than two floats can be in the water the same time; in the last case there may be

four. With the latter construction the effect of the wheel becomes three-tenths of the mechanical measure of the action of the water.

36. A further increase in useful effect may be gained by closing up the face of the wheel, and applying flaunches or edges to the two vertical sides of the float; the useful effect then becomes $\frac{36}{100}$ of the mechanical measure of the action of the water.

37. A still better arrangement is that proposed by Poncelet, and represented beneath.

Fig. 11.



In this wheel the floats instead of being plane surfaces are are curved into the form of a portion of a cylinder. By this arrangement the force of an undershot wheel has been doubled

To be Continued.

THE ODOR OF WINES DUE TO A PECULIAR ETHER. By MM. J. Liebig and Pelouze. (Ann. de Ch. et de Phys. Oct. 1836.) It is a fact of common observation, that a bottle containing but a few drops of wine, gives off a peculiar odor, which cannot be imitated by mixing alcohol and water in the proportions in which they exist in the wine. This characteristic odor, which is more or less apparent in all wines, is produced, according to MM. Liebig and Pelouze, by a fluid possessing all the characters of an essential oil. The flower, aroma, or *bouquet of wine*, as it is more especially called, is produced by a substance which is inodorous, and should not be confounded with the subject of these remarks; it is not volatile, is different in the several kinds of wine, and in many fails entirely.

This oil may be obtained by distilling large quantities of wine, or the lees of wine, or especially from the product deposited after fermentation has commenced. From the results obtained they infer that this oil constitutes abou $\frac{1}{40000}$ part of the wine. The oil as thus obtained, before purification, has a strong odor, and is generally colorless. Occasionally it presents a slightly greenish tint, derived from the presence of a small quantity of copper, as is proved by reagents; this color may be removed by distillation.

The constitution of this product, though it contains a considerable quantity of oxygen, is quite different from that of the oxygenated essential oils heretofore known. It proves to be a peculiar ether containing an acid allied to the fatty acids. This new acid is called by its discoverers, *œnanthic acid*, and the ether, consequently, *œnanthic ether*.

From the American Journal of Science and Arts, for July.

INTERLOCKING OF BEECH TREES.—On the farm of Colonel the Geo. Warner, in the southwest part of Stockbridge, Mass., is following curious interlocking of two trees of the common *beech*, fagus *ferruginea*. They grew on the side of a hill near the bank of the Housatonic River, where the passage of the river around and through the north part of Monument Mt. presents very beautiful scenery. The right hand tree, A, as you stand facing the north, is nine a half inches diameter at the base, while the left hand tree, B, which stood at the distance of eighteen inches from it and a little lower down the hill, is four and a half inches in diameter, and shows *forty-four concentric layers*. The limbs of the trees are peculiarly zigzag or tortuous. At the height of ten feet from the ground, a limb from B has become so entangled in the limbs of A, that the body of A has grown entirely over the limb, and so perfectly enclosed it that the limb appears to grow directly through it. The tree A is here five and a half inches in diameter, and the limb passes through it nearly in the middle from the center to the outside. The limb from B is two feet long to A, and one inch and a half in diameter where it enters A, but it is only one inch in diameter were it issues and then extends *ten feet*. The limb starts from B, about eleven feet from the ground. In the winter of 1836, the tree B was cut off for wood; but the farmer, finding it strongly entangled in the other tree and the weather being very cold, left it without ascertaining the reasons of its being held so firmly by A. In the summer he saw that the tree, though cut off and having turned round from the weight above so as to have its lower end about three feet from the ground, was flourishing with rich foliage; he ascertained the singular union of the two trees, and called the attention of the curious to the fact. When I saw the trees in September last, they were covered with large, full, bright leaves, the one equally with the other so far as the eye could ascertain from laying the leaves side by side. The trunk of B, which was cut off, had healed over at the lower extremity so as to be green with life quite to its end, and seemed to be as vigorous as the other. The trunk and limbs of B. extend twenty feet beyond the limb which unites the two trees

It is evident that it is the sap of A, which is elaborated in B, and is employed for its support. It is probable that the vessels in the part of the limb which unites the trees, and in which the sap originally ascended, are now used for the passage of the sap from A to B. In this case the vessels for the ascending sap perform their usual function through most of the uniting limb, and their action is inverted in the uniting part.

Rochester, N.Y., March 29, 1837.

AMERICAN JOURNAL OF SCIENCE AND ARTS.

The July No. of this valuable work contains several articles of high interest.

Prof. Hare has contributed several papers containing descriptions of apparatus devised by him. His article on the subject of Chemical Nomenclature does him great credit—his ingenious views are well defended, and in our opinion with entire success.

The articles of Dr. Zabies Rie and Dr. Page on Electro Magnetism, and of Messrs. Twining and Swain, on Meteorological Phenomena, show how much interest is excited in the various branches of Electrical Science.

The contributions of Dr. Shephard and others on Mineralogy and Geology are also valuable papers. Dr. S. gives the chemical examination and a general notice of two new minerals of highly interesting composition

Dr. Gale has an article on Zinc roofing in reply to the remarks of Prof. Caswell, upon a paper by Dr. G. published in our Journal last year. We give them to our readers.

We look upon this Journal with no small degree of pride; its contributors and its amiable editor would do honor to any country—we are pleased when we can point out living illustrations of the progress of science in our country—more especially when they are to be found in men who, instead of induiging in the common twaddle about "most congenial soil for the growth of science" "most favored country" "general intelligence" "most favorable form and administration of government" &c., &c., go to work in good earnest to make good use of such of those advantages as are real, and to overcome them when they exist as obstacles, instead of advantages.

From the American Jonrnal of Science and Arts.

ON ZINC ROOFING; BY PROF. L. D. GALE, OF THE NEW-YORK UNIVERSITY. READ BEFORE THE MECHANICS' INSTITUTE, JUNE 6, 1837.

Sir—The following remarks are intended as a reply to a paper by my friend Prof. Caswell, of Brown University, and which appeared in the 31st volume of this Journal. In March, 1836, I published in the Mechanics' Magazine of this city, (New-York,) some remarks on zinc as a roofing material, substituted for slate, copper, tin or tiles, in which I stated the bad results that had followed the experiments made on zinc in this city, and pointed out the defects of that metal. Parts of that paper were copied into the newspapers of the day, from which I suppose Prof. C. obtained his idea of its correctness, inasmuch as he has both misconceived and misquoted my paper. In the present remarks I shall first state the positons taken in my former paper, and then proceed to give the details of my experiments, and let others who may be disposed to read the article draw their own conclusions.

Prof. Caswell commences the argument in his paper on the three following subjects, *supposed* to have been the divisions of my paper in the Mechanics' Magazine.

1. Difficulty of making the roof tight.
2. Deterioration of the water which falls from it.
3. Comparatively small resistance which it offers to the progress of fire.

My own division, however, is quite another thing; it is the following. Zinc is objectionable, (as a roofing,) First, from the great expansive power of the metal. Secondly, its brittleness. Thirdly, it deteriorates the water.

As Prof. C. has embraced my threefold division under two heads, namely, tightness of roofs and deterioration of the water, I shall make a few remarks on each of these. As his third division has no place in the original paper in question, it need absorb no time in this.

On the difficulty of making zinc roofs tight Prof. C. states, "There is no practical difficulty in making a zinc roof *perfectly tight*," and this is proved he says "by numerous certificates that place the subject beyond all reasonable doubt. A zinc roof may as easily be made tight as any other. There may be sheet zinc in the market of a bad quality, but none need be deceived on this point, since nothing is easier than to test its flexibility."

This is, it must be confessed, a pretty summary way of disposing of so important a matter. There is probably no place in the United States, where the experiment of zinc roofing has been so extensively tried as in this city. I think I can point out between seventy and one hundred buildings, to my personal knowledge, that have been covered with zinc, and in a very considerable portion of them it has been removed, and its place supplied by copper, tin, or slate; and those roofs that still remain, covered by zinc, I have ascertained by careful investigation, are more expensive to keep in repair than any other roofs whatever; and furthermore, I would say, that zinc is now almost entirely out of use in this city as a roofing material. Let me ask my friend Caswell, why most of our New-York builders, as well as the proprietors of buildings, have abandoned the use of zinc, if there be *no practical difficulty* in making a zinc roof *perfectly tight!* Has Messrs. Crocker and Brother's zinc not come to the New-York market? Has not "foreign zinc from the best manufactories" been imported and tried in this city? Yet all this avails nothing. So long as zinc retains the name and properties of zinc, it will continue to be a brittle metal, and though by heating it to a certain point, it may be rolled into thin flexible sheets, yet, after a few years, the metal may becomes nearly as brittle as it was before being wrought.—This fact is a prominent one, not confined to zinc only, but is common to most other metals; thus, malleable iron laid by for many years, becomes exceedingly brittle, from a tendency in the metal to assume the crystalline texture. I have observed fragments of sheet zinc laid by for a number of years, become so brittle that they would scarcely admit of bending without fracture. This seems to be a general principle, and I have little doubt that it forms one of the great difficulties in keeping zinc roofs in repair. Now if Prof. Caswell, and Messrs. Crocker, Brother & Co. have discovered that there is no difficulty in making zinc roofs *perfectly tight*, and that their zinc "will bear to be doubled and hammered down without any appearance of fracture in the bend," and that the same remark is true of their zinc generally, I would advise them to come to New-York and teach our builders how to make zinc roofs *tight;* for our workmen are unable to do it and consequently zinc has almost entirely gone out of use for such purposes in this city.

I did observe in my paper, that water drained from a zinc roof is deteriorated, and thus is injured, either for washing or for culinary operations. Now because the same properties are not noticed by Thomson, Berzelius, Brande or Turner, Prof, Caswell has very judiciously come to the conclusion, that such properties as I have attributed to zinc cannot exist; therefore, I must have been mistaken. He also says I have not stated very fully the reasons on which my opinion was founded, with regard to the oxidation of zinc on roofs and the solubility of the oxide so formed, and as a proof that I was mistaken he has exposed water from a zinc roof to the air in clean glass vessels for several days, without any appearance of a precipitate: he has also kept the water for several days in a vessel of oxygen gas, subjected to frequent agitation, without precipitation or appearance of milkiness. Hence, he says, "if such water contains the suboxide of zinc, its presence is not to be detected in this way." The conclusion from the above experiment is, I think, very just, but we shall see whether it will apply equally to my experiments, which I shall now give in detail. They were made with a zinc roof, one hundred and eighty feet by ninety, equal to sixteen thousand two hundred square feet, and repeated for three months, at every shower of rain, and the effects produced by alternate dryness and moisture upon the metal were carefully noted. I cannot go into great minuteness of detail, but only sufficient to show the method of experimenting and the result.

As soon as a shower of rain began to fall on the roof, some of the first water that ran was collected and found to have a strong metallic taste, and to decompose soap. The water was set aside and allowed to remain at rest for some weeks, when a fine light yellowish sediment was found on the bottom. This effect was remarkably evident in the cistern, where the metal was precipitated from a large body of water. The sediment was carefully examined, and found to be oxide of zinc. In many cases no sediment was obtained from water that was examined, though collected in the early stages of a rain; so that no good results could be expected from a single experiment. The greatest amount of sediment was produced from a fall of snow, allowed to remain on the roof until removed by gradual thawing. The water drained from the roof under such circumstances was highly charged with metallic matter, which at length disappeared, and a sediment of oxide of zinc was found on the bottom of the vessel and the water left quite pure. Now as a metallic compound did exist in the water, and as that, at length, disappeared by exposure, and oxide of zinc was found deposited on the bottom of the vessel, I inferred that the soluble compound was a suboxide of zinc, and probably the one described by Berzelius. Since Prof. Caswell's paper has appeared, I have called on a number of builders and workers in metal, to ascertain whether and how far my expemriments and opinion, expressed in my paper in the Mechanics' Magazine, coincided with facts as they occur to the workmen, and I am happy to say that I have nothing to retract. The following corroboratory remarks are from the Albany Daily Advertiser.

"ZINC.—The experience of two winters has proved to our satisfaction, that this is a worthless material for covering the roofs of houses. It very soon becomes rotten, and, as it is put on, affords very little protection against rain or snow. Tin or slate will be found far preferable."

In conclusion, I will again say, if zinc is a valuable material for roofs, which can easily be made tight, why is it that the article is going out of use as fast as possible? Why is it that no new zinc roofs are furnished in this great metropolis? It may be said, that they have used a bad article. But, I repeat, does not Crocker & Brother's zinc, does not the best foreign article, come to the New-York market? Where have purchasers a better opportunity of selecting good zinc, where have builders a better opportunity of experimenting and ascertaining the best material for roofing? Is it probable that men who have gone deeply into the business of roofing with zinc, would readily abandon it, if they could sustain it? Would proprietors sustain the expense of tearing off the zinc and substituting some other material, if there were any other better method of managing? Would they not first resort to the expedient of mending? This last question I can answer from personal knowledge, that mending of zinc roofs has in some cases been nearly equal in expense to half the first cost. I am quite satisfied, that if my friend, Prof. Caswell, will review the whole matter of zinc roofs, he will come to the conclusion that notwithstanding the superior products of Messrs. Crocker, Brother & Co. there are still difficulties in the use of zinc as a roofing material that are not entirely imaginary.

Concluded from page 525.

With regard to *gypsum and salt* we have nothing to add, except to repeat our recommendation of experiments on their effects.† Though quite aware of the common sentiment—"that gentlemen may use their superfluous cash for this purpose, but farmers have uses enough for their money in the regular routine of their business, and few are so over-burdened with capital as to afford the risk of its diminution by uncertain speculation"—yet we entreat them to reflect, that experiments may be tried with those two articles upon a single acre; that the expense, if unsuccessful, can only occasion the loss of a few shillings; but, if they succeed, may be productive of incalculable advantage.

Neither respecting the various *miscellaneous substances* which we have enumerated, have we any further observation to make upon their respective properties. The fluid or dissolved parts of animal matter require some preparatory process to fit them for manure, the great object being to blend them with the soil in a proper state of minute division; for when they have been applied in a rank or unreduced state, bad effects have followed. *Train oil, blubber*, and similar refuse, should therefore, be made into composts with a large body of earth.‡ *Rape and malt dust*, requiring no mixture, are very commonly laid upon the land as top-dressings—the difference between which and manure ploughed into the ground, is, that the former are applied chiefly with a view to the sole benefit of the immediate crop, without regard to the further improvement of the soil; though there can be no doubt that if the crop be increased, the soil will also feel their good effects. In this manner *soot* is also invariably used; but its fertilizing properties are solely referable to the ammonia contained in it, which is an active stimulant of vegetation. The practice of laying it upon land which has been limed, or of mixing it, as sometimes done, in composts with lime, is therefore injudicious.§

It has long been a disputed question, whether all plants extract the same nutritive juices from the soil, and convert them into he kind of sap adapted to their peculiar qualities, or whether each is nourished by a different substance. It would at first appear improbable that plants differing from each other in form, smell, taste and properties as food, should be produced by the same matter; yet, when we reflect that different plants deprive each other of nourishment, by extending their roots into the same soil in which various kinds are planted, we cannot but conclude that their first nutriment must be of the same nature, though the sap probably acquires different properties in its progress towards perfection. This, however, is one of the secrets of vegetation with which we are unacquainted; but as we also see that some soils are better adapted than others for the growth of particular kinds of grain and vegetables, and that those crops to which they appear the most favorable yet become deteriorated if repeated, even though regularly dressed with one species of manure, it seems evident that there must be some advantage in the change of manure, as well as in the system of cropping tillage land.|| This will be gained by every farmer who has at his command manures of an unusual kind and who understands their use, for he may then adopt many plans of cropping which are out of the power of others not similarly situated, and vary his rotations according to circumstances of the moment, or to his own convenience.

We have already touched upon the properties of alkaline manures, so far as they have been tested by experience; the solution of the effects of acids upon the soil must be still left to future experiments, for those already made by chemists, in many instances, present different results. Whatever may be the food of plants—whether gasses, oils, salts, or acids—the farmer, however, need not puzzle himself about their chemical qualities, for he may either satisfy himself from the experience of other, or by small trials of his own, whether the effects of any particular species produce fertility or not. Farm-yard manure has been justly called "the farmer's magic wand;" and the oftener that wand is waved, the more will it contribute to his prosperity. He sees that wherever it has been judiciously used, it causes abundant crops, and that wherever it has been withheld, sterility seizes upon the soil; his chief efforts should, therefore, be directed to its increase.

Although the time and manner of applying every description of manures depend so much upon the nature of the soil and season as well as of the crops to be sown, that no precise rules can be laid down for their employment, yet the following general hints may be found useful.

Summary.

When manures of any kind are to be used as top dressings for grass, the best season for that purpose is as early as practicable in the month of February, as the vernal showers will then wash them into the soil. If for arable land, at the same time the sowing of the seed, or immediately after; but if for wheat, when vegetation is about to acquire force, in the spring.

If dung be applied to a wheat crop, it should be ploughed in during the course of a summer fallow; if composts, at the last ploughing before the seed furrow; but compost of lime and earth only, may be laid upon the land during any period of the year.

The land should be laid dry, and the manure should be equally and speedily spread over every part of it, in proportion to the nature of the soil; but if ploughed in, though it should be well mixed with the ground, it should not be too deeply buried.

The stronger and the colder soils are, the more manure they require, and, as such land is generally applied to the production of crops which do not speedily attain their full growth, the application of dung which has not been completely decomposed by the putrefactive process may be there admitted, for although the progress of vegetation may not be so rapidly forwarded, yet the manure will at length decay, and afford a more gradual degree of nutriment to the present, and greater support to the land for the production of future crops. On adhesive land, long manure from the farm-yard also acting mechanically, by keeping the soil open, is not so binding as short dung; but on dry, sandy, hot soils, the dung should, on the contrary, be perfectly decomposed, or rotten; and manure of any description should, on such land, be only laid on in moderate quantities at one time. One general observation may be made regarding all dissertations on manure, which is—that as there will be different gradations both of soils and the substance of which manures are composed, we can never speak but in general terms of their application.

The following table will explain how many heaps of manure —each containing an equal quantity of any given amount—are required to dress any field, per acre, at certain regular distances: so that, by calculating the solid contents of the manure in cubical yards, each containing 27 bushels, and dividing it by the number of heaps, the exact quantity to be laid on in each heap may be correctly ascertained:—

No. of heaps at	5	yds. distance.	193	per acre.
"	$5\frac{1}{2}$	"	160	"
"	6	"	134	"
"	$6\frac{1}{2}$	"	114	"
"	7	"	98	"
"	$7\frac{1}{2}$	"	86	"
"	8	"	75	"

WHITE OAK AND POST OAK.

J. Seelye, of Sharon, Conn., inquires, first, what is the distinction between post oak and white oak, the former being esteemed, at the south, better and far more lasting, than the latter. And second, on what particular day in the year a tree, perforated by woodpeckers, or slightly girdled with an axe, will die. *White oak* is a tree of the first class as to magnitude, and grows in every part of the United States, though in Florida it is found only on the borders of the swamps. It is the only oak, on which

instantaneous fallow.' Were this principle to be relied upon, it would follow that paring and burning might, within a few years afterwards, be advantageously repeated; whereas, experience proves that, with whatever benefit the operation may be attended with in the first instance, a repetition of it always found to impoverish the soil.—See Quarterly Journal of Agriculture, No. XXV.

† See Chapters xiv and xviii.

‡ "Tallow and oils received in a crude state by the roots, may clog the pores of the plant, repel the aqueous fluid, and obsruct the free communication of the leaves with the atmosphere."—Sir H. Davy's Lect. on Agric. Chem. 4to p. 112.

§ Hornby on Lime, p. 26.

|| Sir H. Davy, Agric. Chem. 4to. p. 273. Doncaster Report on Bone Manure, p. 27. See also the recent "Theory of Rotation of Crops," by M. De Candolle.

a few of the dried leaves persist till the circulation is renewed in the spring. Of all the American oaks, this is the best and most generally used, according to Michaux, being strong, durable, and of large dimensions. The *post oak* resembles somewhat in foliage the white oak, though the lobes of the leaves are broader, and less pointed; and its acorns are not half so large as those of the white oak. The leaf of the white oak has three, and that of the post oak four lobes. This oak belongs to the second class of forest trees, its height rarely exceeding 40 feet. It is not found growing north of the neighborhood of the city of New York, bnt abounds in the middle states and in Florida. The wood is less elastic, though finer grained, and more durable than the white oak: hence it is preferred for posts, and is used with advantage by wheelwrights and coopers. As to the second point of inquiry, we are not aware that there is any *particular* day in the year; and we are sure there is not, when a tree will be killed by the pecking of birds. Trees either die by cutting off the supply of sap, which passes from the roots through the sap wood, or for want of elaborating organs—the leaves—which convert this sap into vegetable nutriment. Cutting through the entire sap wood, at any time in the early part of summer, so as to prevent the ascent of the sap, or divesting it entirely of the leaves, which elaborate this sap, in June, will seldom fail to kill the most hardy tree.

The Production of Galvanic Music.—The following experiment was communicated by Dr. C. G. Page of Salem, Mass., in a recent letter to the editor. From the well known action upon masses of matter, when one of those masses is a magnet, and the other some conducting substance, transmitting a galvanic current, it might have been safely inferred (a priori,) that if this action were prevented by having both bodies permanently fixed, a molecular derangement would occur, whenever such a reciprocal action should be established or destroyed. This condition is fully proved by the following singular experiment. A long copper wire covered with cotton was wound tightly into a flat spiral. After making forty turns, the whole was firmly fixed by a smearing of common cement, and mounted vertically between two upright supports. The ends of the wire were then brought down into mercury cups, which were connected by copper wires with the cups on the battery, which was a single pair of zinc and lead plates, excited by sulphate of copper. When one of the connecting wires was lifted from its cup a bright spark and loud snap were produced. When one or both poles of a large horse shoe magnet, are brought by the side or put astride the spiral, but not touching it, a distinct ringing is heard in the magnet, as often as the battery connection with the spiral is made or broken by one of the wires. Thinking that the ringing sound might be produced by agitation or

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REMARKS OF THE CONDUCTOR.

We have adverted to the subject of bone manure in our second and third volumes, and stated our mode of obtaining and preparing it. We have boen less urgent upon this matter, because we saw little hopes of our farmers regarding this source of fertility, while they remained reckless, as too many of them do, of their dung and other sources of fertility which abound on every farm. The subject shall receive our early attention. In mean time, in reply to Mr. Foote's questions, we answer, first—the time *has* come for every farmer to husband and apply to his lands, all the means of fertility at his command. Bone dust will not prove serviceable upon clays. It is applied at the rate of 20 to 40 bushels on an acre. Bone mills can only be profitably erected near navigable waters. Secondly—bones can be crushed in plaster mills, so as to answer well. Thirdly—bones that have been boiled are deemed as good as those which have not been boiled, and old bones nearly as good as fresh ones. And fourthly—not only potato tops, but sedge grass, weeds, straw, and every sort of vegetable matter, or earth abounding in it, as that from swamps, ditches, ponds, &c., leached ashes, soap suds, urine, &c., may all be profitably commingled in the dung yards, which should be made concave in the centre, in order to retain the liquids of the yard, and which these vegetable matters will absorb. And the yard should be thoroughly cleaned every spring, and the contents fed to hoed crops.

List of Subscribrrs to the Railroad Journal that have paid.—

J. W. Judson, Ashford, Conn.	July 1, 1838.
S. Bailey, Bolivar, Tenn.	March 1, 1838.
E. Morris, Lagrange, Tenn.	Jan. 1, 1839.
J. Noonan, Baltimore, Md.	Jan. 1, 1838.
N. B. Bufford, Frankfort, Ky.	July 1, 1837.
W. R. Hopkins, Chambly, S. C.	July 1, 1837.

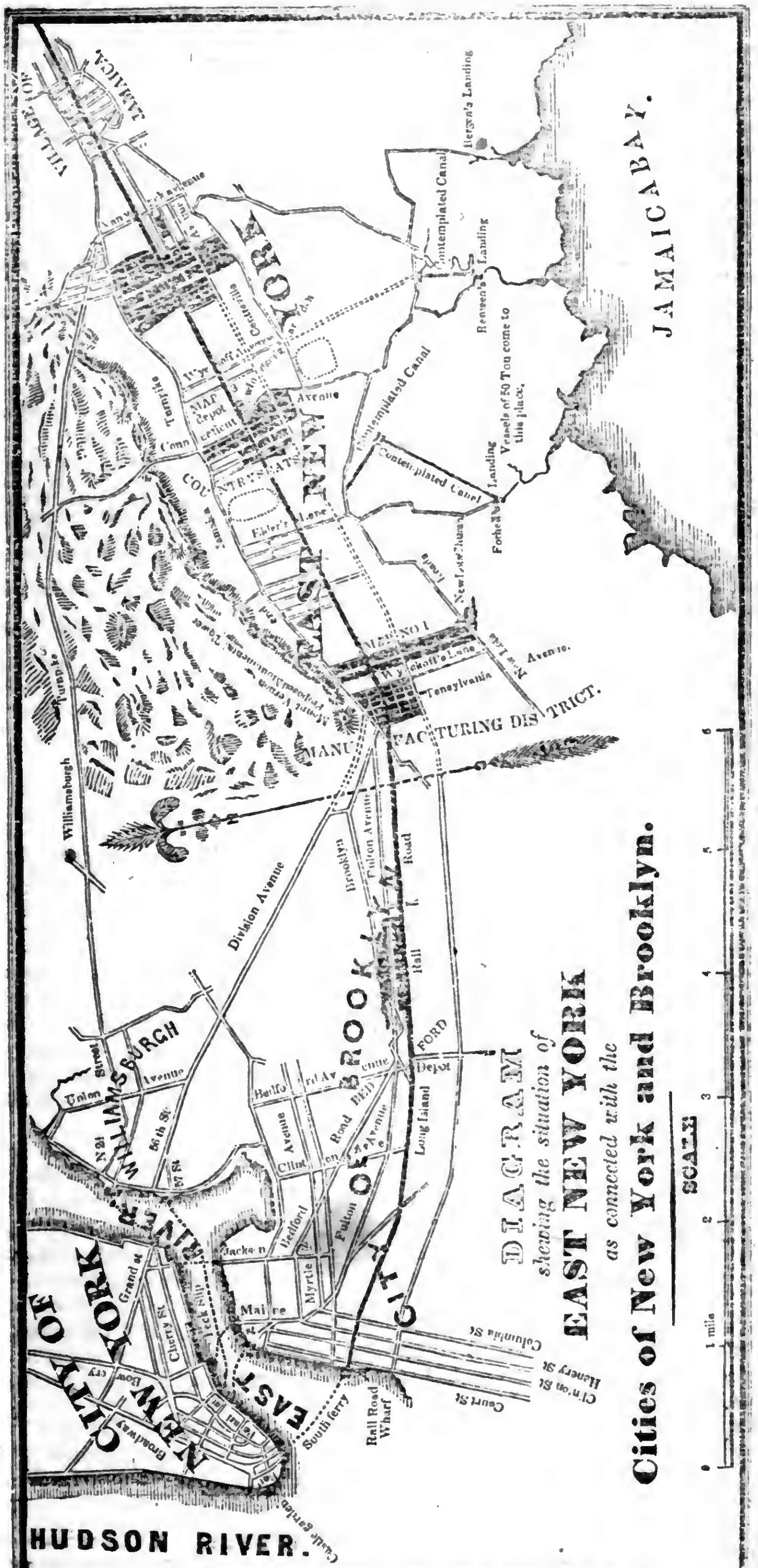

DIAGRAM showing the situation of EAST NEW YORK as connected with the Cities of New York and Brooklyn.

EAST NEW-YORK—LONG ISLAND.

TO MECHANICS, ARTISANS AND MANUFACTURERS:

More than three years have elapsed, since a project was first started to acquire by purchase, a considerable portion of the lands lying between Brooklyn and Jamaica on either side of the Long Island Railroad, with a view of establishing locations for business of every kind, and also for *permanent family residences*—to afford substantial accommodations to the various interests of the different classes of society, who may desire situations in the *immediate* neighborhood of the great metropolis of American Commerce, on very moderate terms—where may be enjoyed all the benefits of a residence in New-York, without the burden of her enormous city expenses.

Every thing anticipated in securing effectually the *choicest* of the lands, has been fully accomplished; also in maturing and adopting plans for their general improvement; and the proprietors feel warranted in saying, that in *no part* of the United States can there be found a more *eligible* section of country for the purposes intended. The present time is peculiarly adapted for the commencement of operations in East New-York, where all, however humble, may participate in its rise and progress. The awful and unprecedented derangement in all mercantile pursuits, and the general prostration of commercial credit, cannot fail to affect more or less every interest. Thousands, who but a few months ago enjoyed the confidence of all, are now reduced to penury and want, and many yet above water, are so far crippled as to be unable to *afford* any *facilities* to the *manufacturer*. The pause and calm which at present exist, cannot last long—*new arrangements* and *modes of doing business must* ere long be the result of the present *revolutions* in trade—and these will doubtless be ***based on moderate and economical*** views. Extravagance and luxury have had their day. The humble, industrious man will seek to accomodate himself to the times; to provide the cheapest and safest location for his particular avocation. The extreme moderate rates at which pr perty may now be obtained, and the great reduction of building materials at this moment, cannot fail to reward richly those who first come into this enterprise. A very small sum now expended, will secure an independence—***a home—a place of business, almost within hail of the greatest market in America.*** Any change in our general affairs, must have the effect to enhance the interest and promote the welfare of those who now become proprietors in East New-York.

That portion which is designated for mechanical and manufacturing operations, is now prepared to a considerable extent for the reception of such persons, as from their connexion with the above mentioned branches of industry, may be disposed to participate in the growth and business of this *now organized*, (and which may be JUSTLY CALLED) BEAUTIFUL MANUFACTURING DISTRICT.

The site selected for this object possesses many advantages, and it is intended by this communication to point out the *most prominent*.

1st. In its immediate proximity to the business and eastern part of the city of New-York, the city of Brooklyn, and village of Williamsburgh; through which latter places the great leading avenues are now *parmanently fixed*, and made to ***terminate at this particular point.***

2d. The average distance from the city of New-York being but a trifle over four miles, makes the communication at all hours of the day *and night*, certain and easy. The ordinary time required by way of the Long Island railroad cars, (the longest route) ***is about*** 25 minutes, (including all stoppages on the road) to PENNSYLVANIA AVENUE, the centre point of the *manufacturing district*, situated half way between the principal ferries in the city of Brooklyn and the village of Jamaica on a *beautiful* plain gradually slooping to the south—protected on the north by a ridge of hills rising about 150 feet above the level of the sea, in the midst of a *highly cultivated* country, *producing* all the *necessaries of living upon its own soil.*

3d. The Long Island Railroad being destined to form a new channel of communication between New-York and the Eastern cities, (Boston, Providence, &c.,) will, when completed, render this location eminently conspicuous to the general observation of travellers, and being immediately on the route of *this great Eastern* and *most expeditious thoroughfare, its value and importance* must be *greatly enhanced from this circumstanc.*.

In presenting this subject so directly to the consideration of Mechanics, at this particular juncture of our affairs, it seems incumbent on the proprietors, to state somewhat more in detail, the advantages which are expected to be derived from an early location in East New-York; but it is desired and expected that all persons wishing to purchase, will first visit the premises, and judge for themselves.

THIS TRULY INTERESTING SPOT MAY BE REGARDED IN REALITY AS FORMING A PART OF THE CITY OF NEW-YORK, (separated only by a narrow channel, and a small section of unimproved lands, barely sufficient to protect its inhabitants from the annoying, if not ruinous, effects of a crowded city, where vice and immorality exist to a great extent, alluring the young and inexperienced:) thus possessing all the advantages of the most important trade of *our whole* country with an uninterrupted open harbor at all seasons of the year, inviting and enjoying the commerce of the world; and yet, so far removed, as to be altogether free from the *excessive taxes*, for widening, grading, and laying out streets and avenues, the maintenance of paupers—expensive Police, &c., &c., all of which way be considered as special charges on the industry of those residing within the precincts of the City Corporation, and will be saved to those who may take their stand at East New-York.

The lands of East New-York can now be obtained at prices varying from 1-10th to 1-40th part of the prices of less desirable lands in the city of Newark, or from 1-20th to 1-80th part of the cost of lands in the upper Wards of the city of New-York. Under these circumstances, there can be no question as to the propriety and profit of investments here. The history of our country furnishes the strongest evidence in favor of early settlers in all advantageous situations, when they become purchasers of the soil; and the present plan of improvement is such as to facilitate and expedite (at the most reasonable cost,) every movement in the way of business. Goods may be landed on the Rail Road Dock, and forwarded to Pennsylvania avenue, (through which a Rail Road track is to be laid,) delivered at, and received again from, the door of the Manufacturer, and returned to the dock; thence by a single cartage, they may be placed on board of vessels, destined to any of the various markets throughout the country; thus affording greater facilities at a mere nominal expense, than can be found in any other part of the world, Manchester, in England, not excepted, there being in our case but five and a half miles of Rail Road transportation, and in the other, 36.

The unexpected and most disastrous shock to commercial credit which, (within the short period of less than three months,) has so seriously affected our whole country, demands the solemn and deliberate consideration of all classes of reflecting men. But while the ordinary channels of intercourse between the Manufacturer (or Mechanic) and the Country Merchant, are almost entirely broken up, so as to occasion a breach between them in the way of business, from Maine to the remotest regions of the South and West; is it not a matter of deep importance to thousands of our most enterprising Manufacturers, Mechanics, and Artizans, to adopt, with sufficient promptness, such measures as will enable them to meet whatever demand there may be for the products of their industry, on such terms as will hereafter protect and guard them against a repetition of the losses attending the consignment of vast quantities of goods to a comparatively few individuals, to be sold on commission. Many articles of American Manufacturers are regarded by Merchants visiting New York as of prime necessity. Consequently when not found (as heretofore) in large quantities, they will be sought and picked up in small lots, either from the workshop of the Mechanic or from such agencies as will of necessity be established under their own eye, on the spot, as is the practice at Newark and many other places. NONE OF WHICH CAN BE SAID TO PRESENT SO MANY INDUCEMENTS FOR A NEW BEGINNER AS CAN BE FOUND AT EAST NEW-YORK. The plan determined on, as most likely to effect this object, it is believed, may now be commenced with every prospect of complete success, and we invite and solicit the special attention of all classes of Mechanics, Manufacturers, and Artizans throughout the country to the consideration of this important undertaking.

Work shops, and other necessary buildings for the accommodation of operatives, can now be erected on a cheap and economical scale at *East New-York*. This name has been adopted by common consent, as most appropriate for our infant city, which is destined before many years to *vie* with the populous and thriving city of Newark, and be able to accommodate, like that and other commercial places, Shoemakers—Hatters—Coachmakers—Wheelwrights—Enginemakers—Blacksmiths—Carpenters—Masons—Chairmakers—Brushmakers—Brewers—Curriers—Coopers—Carvers—Tin and Coppersmiths—Clothiers—Dyers—Milliners—Gunsmiths—Gilders—Painters—Furriers—Founders—Engravers—Lithographers—Cabinetmakers—Tailors—Printers—Glasscutters—Glassblowers—Grate makers—Harness makers—Calico printers—Pianoforte makers—Rope makers—Locksmiths—Jewellers—Machinists—Leather dressers—Cutlers—Blockmakers—Blind makers—Clock makers—Box makers—Bookbinders—Button makers—Cane seatmakers—and every other kind of business, connected with Manufacturing, as well as *Merchants*—Butchers—Bakers—Grocers—*Gardeners*.

There are thousands of persons now living in New-York, and other places in the United States, who have accumulated their little earnings in the Savings Bank, that now have an opportunity to purchase a spot of ground, and erect thereon a comfortable tenement at an extreme low rate, and where the business, constantly increasing will not only give them employment, but add greatly to the worth of their investment; so that while they are earning by labor, their real estate will be augmenting in value.—The high rents, and exorbitant expenses of living in the city always fall heaviest upon the laboring and poorer classes—in proportion to their means—but here, the poor man may purchase in a healthy country, with delightful water, and ocean air, a lot of ground, in *fee* for a less price than he is obliged to pay in New-York, for his yearly rent of a miserable hovel, crowded also under the same roof with so many as to endanger life.

There is nothing more certain, notwithstanding the state of the times, than that shoes—hats—clothing—provisions, &c., will be wanted by the community, and so will the poor man's labor.

In order that no person may be disappointed or deceived as to the value, situation or character of the property now offered for sale, a Land office has just been erected at the corner of Pennsylvania and Atlantic avenues, where maps, plans of improvement, and any other information (which may be required) can be had. For further particulars, apply to

JOHN R. PITKIN, No. 18 Wall-street,
(Office No. 27,) and see future advertisment.

4th July, 1837. 34—1t

It is gratifying to learn that *all* the friends of railroads are not disheartened.—The following notice is cheering to us, may it be so to others.

TO RAILROAD CONTRACTORS.—CENTRAL RAIL-ROAD OF GEORGIA.—Proposals will be received at the office of this Company in Savannah, until the first day of October next, for grading and preparing for the Superstructure twenty five miles of this road, extending westwardly from a point 26 miles from this city. The distance will be divided into 8 sections and the price per cubic yard for excavation and embankment—per acre for clearing and per 100 feet for grubbing, for each section, offered for, must be stated.

The country through which this part of the road is located is pine barren, and as healthy as any part of the State.

The Company have on hand a large quantity of implements such as barrows, shovels, waggons, carts, &c., which will be furnished at cost and charges, to such contractors as may desire it.

Plans and specifications of the work will be ready for inspection after the first of September, and all necessary information given on application to the subscriber.

L. O. REYNOLDS,
Engineer.

Savannah, Aug. 3rd, 1837. 33—t. 1st Oct.

The following notice of T. G. Bates, Esq., Canal Commissioner of Ohio, will, we hope, give employment to many who are now seeking work.

From the Dayton (Ohio) Journal, of 29th July.

EXTENSION OF THE MIAMI CANAL.

NOTICE TO CONTRACTORS.

PROPOSALS will be received on the 11th September next, at Sydney, Shelby County, Ohio, for constructing 17 miles of canal, along the valley of the Great Miami, from the mouth of Loramies Creek, to a point 6 miles above Sydney. The work to be contracted for, consists chiefly of an unusual proportion of bluff and steep hill side cutting—much high embankment—several small aqueducts—a number of culverts and 8 or 10 stone locks.

And on the 15th same month, proposals will be received at the town of St. Marys, for constructing about 26 miles of canal along the valleys of Loramies Creek and St Marys river, from a point 5 miles above Piqua to the town of St. Marys. The work on this part of the line, consists of much very heavy excavation and embankment, several small aqueducts and many small culverts. At the same time and place embankments for the great reservoir near St. Marys will also be offered for contract.

The commissioner will expect certificates of character and qualifications from well known or unquestionable authority, to accompany each proposal, unless the bidder is personally known to him or to the Principal or Resident Engineer.

For further particulars, plans, &c., apply to the Engineers on the line of canal or at their offices in Sydney and St Marys.

T. G. BATES.

33—t. 11th. Sep

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

						lbs.	
350 tons	2½ by ⅝,	15 ft in length,	weighing			4 68/100	per ft.
280 "	2 " ½,	"	"		"	3 50/100	"
70 "	1¾ " ⅜,	"	"		"	2¼	"
80 "	1½ " ¼,	"	"		"	1 25/100	"
90 "	1 " ¼,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front-st

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR
Patterson, New-Jersey, or 60 Wall street, N.
51tf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above planare to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesso river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rohester, Jan. 13th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered.—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country.

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer.
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 1y 14

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, [EDITORS AND PROPRIETORS.] | SATURDAY, SEPTEMBER 2, 1837. (Published January 13, 1838.) | VOLUME VI.—No. 35.

CONTENTS.

AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 13, 1838.

TO THE SUBSCRIBERS OF THE RAILROAD JOURNAL.

In resuming again the publication of the Journal, we have to apologize for the long period which has been permitted to elapse without communication with its readers. Its publication was suspended on account of the difficulty of collecting from those indebted to it, an amount sufficient to pay the printer. At the period of its suspension, it was believed and stated, that its publication would be resumed again in *four weeks*, as it was not doubted but that, on learning of its suspension for want of funds, those, at least, who were indebted for *previous* volumes, if not those who had not paid for the *current* volume, would remit immediately the amount due, that it might again resume its course; yet, in this reasonable expectation we have been much disappointed, as the suspension of publication was followed by almost an entire suspension of payments, and we were led to infer that those who had not fulfilled their engagements to us, by prompt payment, were disposed to balance their remissness against our inability to complete a volume which we had commenced, and for which a large number of our more thoughtful and more *just* subscribers had paid.

It is well known to many of our readers, that the Journal was projected and commenced at a period (December, 1831) when there was comparatively nothing known, and very little information to be obtained, in this country, on the subject of Railroads—no better evidence of this assertion need be asked for than can be found in the first, and even the second volume of the Journal. The idea of sustaining the work was ridiculed by many as preposterous, yet it was continued year after year, notwithstanding its current expenses exceeded by several hundred dollars, annually, its income.

It was continued, with a *hope* that it would eventually become profitable, but with a certainty that it would be useful in the great cause of Internal Improvement, from which our country *anticipated*, and has *realized* so much.

When it had nearly completed its 4th volume, and began to yield a small profit, it was involved in total ruin by the Great Conflagration of December, 1835, when its printing materials, and over 400 full sets of the work, were consumed. Determined, however, to continue its publication, if possible, its price was raised to Five Dollars, a measure which was, by almost every subscriber from whom we heard, cheerfully acceded to. Our subscription list was extended, the work increased in usefulness, and we should have continued to the satisfaction of our patrons, if each subscriber had only paid what was already due to us.

As it is, we have been compelled to submit to the most mortifying sacrifices, rendered the more unpleasant by the reflection, that they were caused by the delay and remissness of those who had received and used our Journal without any recompense, in some cases, for the labor of years.

We cannot in justice to ourselves omit this opportunity of returning our most heartfelt thanks to those of our friends, who have *always* been prompt in their payments and endeavours to assist us.

It is not our intention to continue a large unpaid circulation, and we shall thus be better able to send our Journal with punctuality to such as pay for it.

Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

TO ENGINEERS, OFFICERS AND DIRECTORS OF PUBLIC WORKS—MANUFACTURERS, AND OTHERS ENGAGED IN THE CAUSE OF INTERNAL IMPROVEMENT.

The new year opening with the encouragement that the distressing depression and derangement of affairs which has operated to the disadvantage of Public Works, as well as to our own loss and disappointment, will soon pass away, it is our desire to obtain and circulate as much information as possible, in regard to Internal Improvement.

The severe ordeal of the past season has established the entire confidence of the public in the usefulness and substantial character, in a financial point of view, of our Railroads, Canals, &c.

We invite the earliest attention to our request, to furnish us with all information in regard to such works as each individual is, or may have been engaged upon.

We desire to learn in regard to Railroads:—

The date and conditions of their charter and organization, length of line, and termination.

Amount and cost of grading, its character, information relative to tunnels, &c.

Cost and construction of bridges.

Cost and nature of superstructure, the form, weight and arrangement of the rail.

Cost and extent of depots.

Number and size of Locomotives, by whom made, their power, cost, &c.

Cost per mile of the Road when complete.

Nature and extent of traffic, with all other particulars in reference to the work, which are of interest to engineers and stockholders.

Of work in progress—we desire to

know what has been done, and to be informed from time to time of the progress and prospects of the undertaking.

We also ask for similar information in regard to Canals.

Of Manufactories, we wish the location, the amount and extent of business, particularly those engaged in the construction of Locomotives, Railroad and other machinery.

The value and importance to all parties of such information, is too evident to be insisted upon at this time.

To all who remit us Fifteen Dollars, in advance, we will furnish a copy of the work, and continue an advertisement, equal to one square, in our columns for a year. Railroad companies, as well as manufacturers of Machinery, will unquestionably find their interest in accepting this offer. If generally accepted, the Railroad Journal may be considered as permanently established.

Since our last publication, we have received several reports and other interesting communications, which we hasten to lay before our readers. Several of them we give in this No. with an apology for their late appearance.

We have also been much gratified by our visits to several new and valuable machines, &c. which we desire to notice in our next. We have received the following reports :—

South Carolina Canal and Railroad Company.

Sandy and Beaver Canal.

Ohio Railroad.

Buffalo and Erie Railroad, (Preliminary Surveys.)

Survey of the Valley Railroad, Vermont.

Montgomery Railroad.

Charleston and Cincinnati Railroad.

Several others, which we understand have been sent to us, have been mislaid, or have never reached us—we request in such cases a renewal of the favor.

We are much obliged to the writers of the following letters. We wish to receive similar communications from every Engineer in the United States—they are of great service.

Athens, Tenn. Aug. 18, 1837.

Dear Sir,—The grading of the Hiwassee Railroad has been commenced, at a point two miles below the town of Athens, by Mr. Kennedy Lonergan, the able contractor from the Philadelphia and Baltimore Railroad. A corps of Engineers, under Col. Long, are now making a survey for the junction of the Hiwassee Railroad with those of Georgia. Upon this junction, the cotton growing portions of Georgia depend for the ready receipt of provisions from East Tennessee. The intention of Alabama in effecting a union with the Hiwassee Railroad, is also, in a great measure, attributable to the same source; together with the increased facilities in the North East and South travelling. The Coosa and Wetumpka Railroad will, by its junction with the Hiwassee Railroad, open markets for the produce of East Tennessee at Mobile, New-Orleans, and other shipping ports.

Yours, respectfully,
John C. Trautwine.

D. K. Minor, Esq.

Extract from a letter to the Editors of the Railroad Journal.

I have completed the Survey of Route of the Selma and Tennessee Railroad. The Route is uncommonly favorable. Nature had prepared a succession of valleys, for 150 miles, presenting a surface of unexampled uniformity. The whole estimated expense of the 150 miles is not $1,500,000, and yet it is perhaps the most important route in the Southern States.

The Montgomery Railroad is going on finely. We weathered the storm, however, with some difficulty. We have made an arrangement with the Pensacola Company, by which, on condition that we allow them to bring their Railroad from Pensacola to *Montgomery, instead of Columbus*, they have taken $200.000 of our Stock, and lent us of Iron now on hand sufficient for the first 40 miles. You will thus perceive that the great route from New-Orleans will be through Pensacola, Montgomery and West Point, Madison, Gainsboro, Augusta and Charleston, by a continued line of Railroad. It is my opinion that this line of Road will be as good Stock as any in the United States; and the Montgomery and West Point Road the most profitable link in the chain.

For the Railroad Journal.

THE MOUNT CARMEL AND NEW ALBANY RAILROAD.

Princeton, Indiana, Nov. 1837.

Through the efforts of two enterprising citizens of Illinois, Mr. George Flower, of Albion, and the Rev. Thomas S. Hinds, of Mount Carmel, a convention of delegates was got up at Jasper, in the State of Indiana, in November last, for the purpose of applying to the Legislature of the last named state, for a Charter for a Railroad, to connect the places named at the head of this article. Application was made, and the Legislature granted a very liberal charter, to continue in force and have existence for seventy-five years. Capital, a million and a half, with the power granted to the Board of Directors to increase the same to an indefinite amount, if it should become necessary to complete the work. The power is also given the company to construct lateral branches, so as to accommodate points on either side of the main work—the work to be commenced in five, and completed within fifteen years. There is yet another provision, which is deemed of itself a sufficient *bonus*, to induce capitalists to embark in the enterprise, and that is, the right which is invested in the company, to purchase, hold, sell, and convey any lands, or real estate, they can purchase in the State of Indiana. The distance from New Albany to Mount Carmel is upwards of one hundred and twenty miles—two-thirds of the lands over which, and adjacent to the contemplated route, belong to the United States, and may be purchased at one dollar and twenty-five cents per acre. Were the company to purchase a million of acres of the lands adjacent to the work, *the increase alone* in the price of those lands so purchased, would, before the work is half completed, pay for the entire construction of the work. The bare location of the route will triple the price of every acre of land within two miles of it. All that is wanted is capital to invest in lands, and go on with the work for a short time without being compelled to make sale of them.

It is to be recollected, that the State of Illinois has undertaken to construct a railroad from Alton, on the Mississippi, to Mount Carmel on the Wabash. This work is in progress, and no doubt can be entertained of its speedy completion.

By a transient glance at the map, it will be seen that this road must eventually become of more importance than any other work of internal improvement, now contemplated in the Western States. The Nashville railroad, the Charleston railroad, the Baltimore and Ohio railroad, the Pennsylvania railroad and canal, the Cleaveland and Portsmouth canal, and the numerous railroads now in progress to connect the Northern Lakes with the Ohio river, all converge to a focus at Louisville, forming tributaries to this great road, which, crossing the fertile state of Indiana, intersects first the Central canal, then the Evansville and Vincennes railroad, and strikes the Wabash at the mouth of White River, and at the foot of the grand rapids, passing through the town of Mount Carmel, where the unlimited water power may be presumed of itself sufficient to afford a valuable portion of transportation business, it proceeds through the prairie regions of Illinois, intersects near the meridian line, the Central railroad running through that state north and south, and terminating at the Mississippi, forms as at Louisville, a point, uniting tributary means of conveyance from every direction from the north-east by the Illinois river, from the north by the Mississippi river, from the north-west by the Missouri river, from the south by the Mississippi, and will extend its ramifications through the east and fertile regions of the west.

Indiana.

To the Editor of the Railroad Journal

Auburn, Aug. 14, 1837.

Gentlemen,—In a report made to the Directors of the Auburn and Syracuse Railroad Co. by Judge Miller and myself, recently published, I perceive an error has crept in, which I ask the privilege of correcting through your columns.

The report was put in type at New-York, and neither of the committee had an opportunity of examining the proof. This will account for the error of which I speak, as well as various others, typographical. In the report as printed, it is stated that the Utica and Syracuse Railroad Co. cannot by their charter carry freight upon their road. It will be found by reference to the act of incorporation, that they are allowed this privilege—paying toll upon property during the period in which the Canal shall be navigable.

The committee deem it due to the Syracuse and Utica Co. and themselves, to make this correction. You will oblige me by giving this publicity.

Your obedient servant,

S. A. Goodwin.

From the Baltimore Gazette.

One of the principal difficulties in the use of that portion of the Baltimore and Ohio Railroad already constructed, is the grade of inclined planes on each side of Parr's Ridge, which has been supposed to be too great for the beneficial use of locomotive engines, and much expense has therefore been and yet is daily incurred by the use of horse power, on passing the cars of every description, in both directions over the Ridge—a distance of three and a half miles. So great has been the expense and inconvenience resulting from this mode of passing the Ridge, that the directors as we have understood, have had it in contemplation to make a new location of the road on a more circuitous route, so as to reduce the grade, which of course could only be effected at a very heavy expense.

The steepest grade of any part of the railway over the Ridge, is that of plane No. 3, on the western side, which is rather less than two hundred and sixty-four feet in the mile, and that grade extends only thirty-two hundred feet. It will be seen by the annexed paragraph that a locomotive engine, constructed by Mr. William Norris, is capable of transporting a gross weight of forty-eight thousand five hundred pounds with great facility and rapidity up and down a plane of a grade greater (steeper) by one hundred and five feet in the mile, than the greatest which now offers so inconvenient and expensive an obstruction to the use of our road. We may now reasonably hope that both the use of horses and the expense of a new location may be dispensed with, in consequence of the progress of improvement in the construction of locomotives.

The Philadelphia U. S. Gazette has an account of the extraordinary performance, on Wednesday, of a locomotive engine which had been made by Mr W. Norris, of that city, for the Austrian Government. The engine is intended for a railroad leading from Vienna, and Mr. N. was desirous of making a public trial of its powers, before he sent it to its destination. It had been kept fully employed during the morning of the day appointed for the experiment, and the party assembled to witness its performances had the gratification of seeing it arrive in the city with a train of *forty-one laden burthen cars.*

The party then proceeded to the foot of the inclined Plane, when the Engine with two of the cars and sixty-three passengers ascended to the top in 3 minutes 15 seconds, amid long continued shouts of triumph. The gross weight in motion, (including engine and tender) was 48,500 lbs. The plane is 2800 feet long, and grade 369 feet to the mile. On descending, the load was increased by the addition of more than eighty persons, and this remarkable performance faithfully proved the immense power of the engine, for at three different times this great weight was brought to a dead stand, by the action of the steam alone.

"In the Engines constructed by Mr. Norris, the steam is generated by the agency of wood fuel, which, we learn, propels them at a very economical rate, while it greatly decreases the liability of wear and tear and the cost of repairs."

The following certificate is from the Weigh Master on the Columbia Road.

Philadelphia and Columbia Railroad.

Arrived from the Schuylkill Plane, the Locomotive Philadelphia, (built for the Austrian Government by William Norris of this city) with the following load, viz:

41 cars and load, weighing,	436,705
Tank,	9,000
lbs.	445,705

I certify the above statement to be correct,

Wm. B. Emerick,
Weigh Master P. & C. R. R.

Collector's Office, Phila. Nov. 29, 1837.

The Norwich and Worcester Railroad Company in the prosecution of their work, found upon arriving at Quinebaug Falls, about three miles from this city, an immense mass of rock, lying directly across their contemplated route. On account of its great elevation, it was deemed necessary that it should be *tunnelled.* But upon an attempt to that effect, it was found that a large portion of the rock was of too substantial a character to enable them to do so. They were therefore compelled to open a passage from the foundation to the summit for a distance of 75 feet. Striking finally upon a solid mass of rock, the tunnel was commenced. On Monday the 28th inst. having succeeded, with great labor, in working a passage through, our citizens generally were politely invited by the Directors of the Company to attend a celebration of its opening. A large assemblage of gentlemen and ladies were present. The ceremonies were commenced upon the summit of the hill through which a passage had been wrought, by a prayer from the venerable Dr Nott, of Franklin. An address was made by Asa Child, Esq. the General Agent of the Company, in which he made a brief statement of the present condition and prospect of the work—yielding just and handsome compliments to the Commonwealth of Massachusetts and the City of Norwich, for the efficient and indispensable aid rendered to the Company, by the loan of their credit at a difficult and trying period of their operations. At the conclusion of these observations, by requesting of the Chairmain of the Committee of Arrangement, Col. G. L Perkins, a large portion of the assemblage descended the hill on the West side, passed through the Tunnel, and reascended on the East side. They were received by the City Band of Music, by whom they were escorted to a near grove a few rods distant. There a long range of tables were tastefully and bountifully spread with the good things of the land, of which all were invited freely to partake. Taken in connexion with the wild and romantic scenery of the spot, the whole performance was pleasing in a high degree—and we venture to say that all who were present will join with us in tendering thanks to the Directors of the Company, for the handsome entertainment afforded by them, and our best wishes for the success of their enterprise.

The deep cut made to reach the solid rock where the Tunnel was commenced as well as the Tunnel itself, was executed by the enterprising contractor for the New York and Harlem Railroad, Mr. John Rutter, who is already becoming distinguished in colossal works of this description. The Norwich and Worcester Railroad Tunnel is 22 feet wide, 18 feet high, and about 300 feet long, and passes through a bed of hard gneiss similar to the rock of our own Island, of the vein of which it is probably a part. The first drill driven into this tunnel was on the 28th of April last, and the rock was completely perforated on the 27th August following—comprehending a period of 122 days.

A Stockholder.

From the Courier and Enquirer.

PENNSYLVANIA TRADE AND ITS INCREASE.

The Argus admits that our up trade or tonnage of merchandise on the Erie Canal has fallen off 25 per cent. the last season, but attributes it to a decrease of our imports from England, &c. of 35 per cent. This does not tell the whole truth. Philadelphia has taken a large portion of our business—this is the true secret of the falling off of our tolls, and the increase of those in Pennsylvania. If any one doubts it, the evidence is to be found in the official report of D. H. Beardsley, Collector at Cleaveland, published in the Herald and Gazette of the 8th Dec.; we there find, that although there is the only difference of clearances for the month of November of 203,860 lbs.—(an increase)—yet in the article of merchandise there is a falling off of more than 50 per cent!! The reports says

"The total amount of pounds	
" cleared the past month on	
" the Canal is	4,897,667
" The corresponding month of	
" November last year	4,693,807
" There is a great falling off in	
" the article of Merchandise.	
" Last year there was cleared	
" in November,	2,609,683
" This November,	1,256,681
Falling off	1,353,002 lbs.

Where has this trade gone to? Look at the map and the position of Cleaveland, and the answer is ready. It has passed through Pennsylvania by her Railroads and early canals, via Portsmouth, on the Ohio, into the interior of that state. Will not this fact, with the rapid strides of Pennsylvania in internal improvements, induce Governor Marcy to recommend the next Legislature, to *foster* railways, from tide waters to the Upper Lakes? Also, why not at once commence the Ship Canal around Niagara Falls, and a corresponding work from Oswego to the Hudson, so as to convey barges of produce by steam or animal power, from the Lakes to the wharves in New York? J. E. B.

☞ At all events, let its merits be examined by state surveys.

CANAL MEETING.

A meeting was held at P. Goodman's, on Tuesday evening, and delegates were appointed to attend the Canal Convention on the 20th, at Oxford. We cannot give the names of the delegates, as the proceedings have not been handed in.

A committee was appointed to collect all the facts within their reach, relative to the amount of business which will naturally be done on this Canal—such as statistics in regard to Coal, Lumber, Plaster, Salt, Iron, &c. &c.—distances from the Coal and Plaster beds, to given points on the canal—costs of transportation, &c. &c. &c. The committee to report at an adjourned meeting, on Monday evening next.

To the Editor of the Courier & Enquirer:

I send you a communication on the subject of internal improvements, to which please call the attention of your readers. In an age like the present, when not only the people, but the government of every country, are alive to the vast importance of internal communications, it will be a singular fact if the legislature of our own State should be the last to act. Thus far they have not patronized Railroads; although they were the first to exhibit the unparelleled effects of public prosperity by an introduction of a liberal patronage to Canals.

Your's &c. R.

INTERNAL IMPROVEMENTS.

The subject of Internal Improvements which has for a long period engaged the undivided attention of most of our sister States, (and of *some individuals* in our own State,) has at last been introduced in our Common Council by Alderman Bruen, who offered at a late meeting the following resolution:

Resolved, That it be referred to an appropriate committee to report a suitable memorial to the Legislature for the establishment of a Board of Commissioners on public works, and for the formation of a liberal plan of internal improvements in this State.

The resolution was adopted, and an able committee consisting of Messrs. Bruen, Robert Smith and Ingraham, appointed. The apathy of New-York on this great and important question has for some time been a matter of surprise to all who have examined the subject, and who are aware what great advantages she has already derived from her public works; which, literally speaking, are on a small scale and of limited extent. So great was this apathy that it was with the greatest difficulty that legislative aid was obtained for the New-York and Erie Railroad Company, one of the most important and deserving corporations in existence.

The movement of Alderman Bruen demonstrates that some effort is to be made to bring about a different state of things; and if it should prove successful (as it doubtless will) we may confidently look forward to the possession and enjoyment of the numerous advantages which a steady and well-directed system of internal improvements cannot fail to impart. I have stated before there is great apathy on this subject. My attention to the relative value or prices of the different railroad stocks in the United States, their cost and income, the support they receive from the people, and the dividends they pay the stockholders, has enabled me to collect a few facts, which I add, to establish the accuracy of this position.

There are now in operation in New-York, on leading routes, numerours railroads, of all which only one, the Utica, is above par in the market; while in the States of Pennsylvania, New-Jersey, Maryland, Delaware, South Carolina, Massachusetts, &c. most of them are at or near par. The average prices would bring them above par—(I take the price as the standard of the support they receive from the public—as price depends in a great measure on their dividends) Here with our immense travelling, and great transportation, none but the Utica pays a regular dividend—none other, therefore, receives a cordial support. Why is it so? Is it because there is an antagonist interest at work that operates against the others, or is it because the public, not aware of the great benefits derivable from them, have neglected to employ them? I take the latter to be the true reason. Let us show them, then, what advantages they are throwing away. The Mohawk and Hudson, and the Utica now afford a continued line of communication from Albany to Utica traversable at *all seasons*, and in *all weathers*. From Utica, the line will shortly be continued to Rochester. The railroad from Batavia to Buffalo will soon be commenced, the Holland Land Company having generously given all the land required for the road. The funds to pay for the grading and iron will be obtained in Holland, where a loan is in progress of negotiation. Branch roads already connect the principal places out of the regular Western line. Thus it will be seen these companies will in a short time have completed an uninterrupted railroad communication from Albany to Lake Erie, *without taxing* the public one cent for its construction. The vast savings thereby secured, are fully illustrated by one fact which is mentioned in a late London paper. A statement made by the corporation of the Grand Junction Railway, states that from July 4th to October 4th, 144,818 persons have been conveyed on the road at a cost of 82,000*l*. less than they would have paid had they travelled in coaches. Not a single accident has occurred on the road during that time."

I have stated what may be looked upon as already done in the way of construction of Railroads—but the great point of consideration is what remains to be done. Although we have, a complete chain of railroad to Lake Erie, yet it is one that cannot be enjoyed by the merchants of this city during an important portion of the year. It still leaves us here, some weeks behind our rivals in the western trade.—There are two modes of placing us, not on an equality, but far ahead of them, both of which should be adopted, as both have peculiar advantages. The one is to prosecute with energy and dispatch the New-York and Erie Railroad. And here let me observe, that though political views should not be mixed up in a measure like this, still much is expected from the whig portion of the present legislature. The confidence of the people in their principles will depend on their *action* in this respect. One of them is the prosecution of internal improvements; and I call on them, to use a homely proverb, to "practise what they preach." When this great road is completed, it can at a trifling expense be connected with the city itself by an extension of the Harlæm Railroad to a point opposite its termination at Tappan. The freight can be transported across the river in the cars, and there need be no unlading until it is deposited in its place of destination. The other mode alluded to, is the construction of the Albany & New-York road, and for this reason—That will also connect it with the city by the Harlæm Railroad, and with it and a road of 80 miles in Connecticut, we extend our communication to Boston by means of the Worcester road.—The importance of this last work is self evident. Thus do we see what great results may flow from fairly carrying out the propositions of the worthy alderman. New-York, with her Railroads extending *North*, *East* and *West*, and with her commercial advantages, prosecuting and extending her intercourse with the south and with foreign countries, will then take the station to which the enterprise of her citizens and her *natural position* entitle her. But as long as she neglects to avail herself of these advantages, she is not only allowing less favoured but more industrious rivals to reap them, but is in danger of losing them beyond all hope of recovery. I propose continuing the subject, should my views meet your approbation.

Yours, R.

STEAM NAVIGATION TO AMERICA.

Sir,—An article on "Steam Navigation" appeared in a recent number of the Edinburg Review (No. 131,) in which the writer endeavours to prove that Dr. Lardner is correct in the conclusion to which he came in his paper on that subject laid before the British Association, Sept. 1836,—viz., that a profitable and permanent connexion could not be effected between New York and England in *one* trip.

As the subject is one of general interest, and of great importance to the commercial interests of this country in particular, great care should be taken not to discourage the spirit of enterprise, which has prompted three different parties to make the attempt to establish steam communication with the United States, nor to afford an excuse for the East Indian Government to fall back into its former inertness upon the subject of a steam communication with India, now that it has been just roused into action, by the determined and persevering importunity of its subjects there. It is essential to a fair trial of any project, that the best means be employed to accomplish the end designed. If a vessel whose speed is only five miles per hour be employed to perform a certain passage in a given time, when one whose speed is ten miles an hour can be had, it is evident that the experiment is not a fair one. So in reasoning upon the practicability of any scheme, like that of steam navigation to the United States, if a number of vessels be selected whose size, speed and performance, are notoriously less than those of many other vessels which are actually in existence, it is evident that however correctly the size, speed, and performance of the selected vessels may be given, it does not prove that the scheme is impracticable with vessels of larger size, greater speed, and better performance

The writer of the article "Steam Navigation" in the Edinburgh Review, has given us a very full and elaborate table of the consumption of coals, average speed, &c. of eleven steam vessels, from which he most logically and correctly proves, that with such vessels, a steam communication with New York is impracticable. Had his researches been somewhat more extended, it is very possible that he might have found, at least eleven other steam vessels, whose average speed would have shown that instead of twenty-four or twenty-five days, it would not be possible to perform the same distance in fourteen or fifteen days.

The Reviewer states that Mr. Field considers that great improvements have been made in marine engines since 1834. The performance of many of the new steam vessels fully bear out Mr. Field in the opinion which he is said to have given. Yet, by a strange perversity, he adopts as *data* the performance of steam ships most, if not all of them, built before that time, and concludes, that a steam communication with New York is impracticable!

The Admiralty steamers are the *data* upon which his calculations are made; yet he has not informed us whether they slackened their speed during the night, as I believe is the practice in her Majesty's service.

The writer contends, that any inferences from coast and channel trips are fallacious; but he has not shown us why they are so. It is well known, that on the coast and in the channel, the short cross sea which is so frequent, retards the progress of steam vessels much more than a long rolling sea, and therefore *a priori*, this affords a good test by which to try the performance of a steam vessel.

The use of salt water for raising steam is admitted to be a great obstacle to the performance of long voyages, but it is also admitted, that fresh water may be substituted with good effect; the recent improvements in condensation, warrant us to expect that it may be done with success.

But the great difficulty is, the quantity of coals required, which the Reviewer says, will prove an insuperable obstacle to long voyages. In this particular it seems highly probable that he will be found to be in error, for upon his own showing, the larger vessels require a smaller power in proportion to their tonnage than the smaller ones. And of the vessels which he has selected as the data upon which he makes his calculations, there are only three which are now deemed large vessels,—viz., the Medea Steam Frigate, of 807 tons; the Dee, of 639 tons; and the Private Steamer A, of 660 tons. The two first are constructed for war, and are therefore not to be expected to have sufficient capacity for carrying a large supply of fuel; and the Private Steamer A, is not sufficiently described, for the public to form any judgment as to the quantity of fuel she will carry.

The Reviewer states that a steamer of 1,200 tons, with 300 horse power, will only stow 500 tons of coals. In this statement it is evident that he has taken the nominal tonnage as the actual weight she is capable of carrying; whereas, it is usually found that a vessel will carry about 50 per cent. more than her nominal tonnage; thus, a vessel nominally of 1,200 tons is capable of carrying with safety 1,800 tons. If then the power be equal to 300 horses, the weight of the machinery and water will be, say 400 tons. The consumption of coals per day with boilers of the best construction, will be 72,000 lbs. per day, and for fourteen days will be 450 tons, leaving 950 tons for spare coals, merchandise and stores.

Another important feature which has been overlooked, is the fact, that large vessels are propelled at a much greater rate with the same proportion of power to tonnage than smaller ones. Hence, if the Dundee and Perth, which are about 650 tons, are propelled at the rate of 9.99 miles, nearly ten miles per hour, a vessel of 1,200 tons may be reasonably expected (having the same proportion of tonnage to power) to be propelled at a greater *velocity*, but if, contrary to all experience, she should not go faster, then she would perform the distance between New York and England in fourteen days; and if the currents and winds should be favourable, in much less time, as it is found that with a strong wind in such a direction, that a steamer can set her sails, her speed will be accelerated about a mile, or mile and a half per hour.

Let us take the large steam ship now building in London for the British and American Steam Navigation Company, and try what her capabilities are for performing the intended voyage. Her nominal tonnage is 1,795 tons; she is to be propelled by two engines of 220 horse power each, which will require 47 tons 2 cwt. 3 qurs. 12 lbs. of coal per day of twenty-four hours; if her speed is only nine and a half miles per hour, she will perform the passage in fourteen and a half days, and consume during that period 683 tons 11 cwt. 1 qr. 20 lbs of coals.

Take the estimate weight of her machinery, boilers and water at 600 tons, and (allowing 50 per cent. on the consumption of coals as a reserve) the weight of fuel at 1,025 tons, we have 1,625 tons for machinery and coals. Now the calculated displacement between the light and load water line amounts to about 2400 tons, thus leaving about 800 tons to be occupied in stores, merchandise and passengers. From a drawing which I constructed, in order to be submitted to the directors, I found by calculation, that with her machinery, coals and merchandise, she would draw only 16 feet of water, if built after my design; and, although built from another design, I do not think that her draft of water will be greatly different, probably rather more than less, when fully equipped.

Some of your readers may be impatient at this mode of meeting the question and wish for some facts upon which they too may reason and come to a conclusion for themselves.

In 1825, the Enterprise, a vessel of about 400 tons, effected her passage from England to Calcutta in 113 days, 64 of which she was propelled by steam, and 49 by sails alone.

In the present year, the Atalanta steam ship, of about 650 tons, effected her passage from England to Calcutta in 91 days, 23 of which she was in port, and under weigh 68 days only.

Here then is a striking instance of the improved state of marine steam engines, and of the advantage which a large vessel has over a small one in making her passage. The average speed of the Enterprise, taking the distance at 15,000 miles, is $132\frac{2}{3}$ miles per day, or about $5\frac{1}{2}$ miles per hour; whilst that of the Atalanta is $220\frac{2}{3}$ miles per day, or $9\frac{1}{6}$th miles per hour for the whole distance.

The average speed of her Majesty's steam vessels on the Mediterranean station was, some time since, officially stated to be $7\frac{1}{4}$th miles per hour, which is $1\frac{1}{4}$th miles more than the average given in the Edinburgh Review; taking the highest number as correct, it is much below the rate of most merchant steamers, under much more unfavourable circumstances. For instance, those between Scotland and London come to an average speed of upwards of nine miles per hour; those between Glasgow and Liverpool, perform that passage in, from seventeen to twenty-four hours; and from the books of one company, I found on inspection, that the average time occupied in the passage, both winter and summer, was nineteen hours; and it was thought that some new boats, which were then nearly ready would make the average still less, now the distance by sea being considerably more than 200 miles, the average speed of the steam vessels employed in that trade, must considerably exceed ten miles per hour. The voyages now regularly performed by the merchant steamers to the Peninsula and into the Mediterranean warrant us to expect that a steam communication will be effected with New York in *one* trip.

It would be unjust not to refer to the Columbus, a steam ship, fitting upon Mr. Howard's principle for the purpose of attempting the passage to New York. She is capable, I am informed, of carrying a sufficient quantity of coals to supply the engine for upwards of forty days, and will use *fresh water* only for raising steam.

Excuse my trespassing so long on your time, and believe me,

Yours truly, George Bayley.

MEDAL STRIKING.

We have much pleasure in announcing to the friends of the fine arts that Mr. Pistrucci, chief medallist in the Royal Mint, has discovered a method by which he can stamp a matrix or a punch from a die which has never been touched by an engraver, and shall yet make a medal identically the same with the original model in wax, an operation by which the beauty and perfection of the master's design are at once transferred to any metal, whether gold, silver, or copper, by striking it according to the usual process. It will at once be seen that this is a very different operation from that by which cast medals are manufactured It is as simple as it is ingenious, and Mr. Pistrucci having no intention of taking out a patent for the discovery, and being anxious to give to the public the full benefit of it, in the different processes of manufacturing plate, jewellery, and all kinds of ornamental work in metal, announces that the whole of the process consists of the following method:—The model being cast in any substance, wax, clay, wood, or other fit material, a mould of it is taken in plaster, from which mould, when dried and oiled to harden it, an impression is taken in sand, or other similar substance which may be preferred, and from this again a cast is obtained in iron as thin as possible, that the work may come up sharply, and the iron attain the hardness almost of a steel die hardened. The cast-iron impression is then flattened mathematically true on the back, and fixed in a steel die, the hollow of which is turned to the exact size of the cast-iron, and it is set within the rim or border, hammered as close as possible, so as to form a collar. The metal upon which the impression is to be struck (to form either the medal itself or a steel matrix, if desired) is to be fashioned into the shape of a cone in the ordinary way, perfectly flat at the base, heated red hot, and placed at the bottom dish of the press. When the die, fitted as above, having been previously placed at the top dish, and the workmen quite ready to give the blows instantly, three or four, as may be required, a perfect impression of the cast-iron will be attained without the least injury to it. Of course it will be necessary, previous to the die being used for the artist to polish the surface. Mr. Pistrucci's first experiment was successfully performed upon a punch of hard copper, with his model of Sir Gilbert Blane, being nearly three inches in diameter; and he has no doubt that it will equally succeed on a steel punch, perhaps, too, without its being necessary to heat it. When the process above described shall have been brought to the perfection of which it is capable, there can be no doubt that in the execution of works of this description, it will not only be the saving of the labour of months or years in the engraving of dies, and, consequently, of great expense, but the work to be executed will, in all points be, in an instant, an exact fac-simile of the original conception of the artist, instead of representing, as at present, merely the handiwork of the engraver. copied from such original. It will also dispense with the use of very expensive machinery, such as the *tour a portrait*, introduced into the mint by Mr. Pistrucci several years ago, which, however apparently correct in its productions, can never give a perfectly true semblance of the original, even to the limited extent to which it is applicable. And we may possibly be led by it to discover the mode by which the artists of antiquity succeeded in producing these beautiful coins, in which the softness and boldness of the fleshy parts have never yet been equalled by any modern engraver in steel.—*Times.*

TELEGRAPHIC COMMUNICATION BETWIXT EDINBURGH AND LONDON.

From the Scotsman.

It has been found by experiments made with a view to ascertaining the velocity of electricity, that it is transmitted instantaneously, by means of a common iron wire, a distance of eight miles; and electricians of the first eminence have declared their opinion that, judging from all scientific experience, the electric or galvanic influence would be almost instantaneously transmitted from one end to the other of a metallic conductor, such as ordinary copper wire of moderate thickness, of some hundred miles in length.

If this scientific theory is correct, it follows that a wire, secured by a coating of non-conductors, and protected from external influence or injury, and laid under the turnpike-road between Edinburgh and London, could be the means of distinctly indicating to a person stationed in London, that such wire had been electrified or galvanized in Edinburgh—the transmission of the electric or galvanic influence being clearly discernible by various well known means.

How, then, is this scientific fact to be applied to purposes of practical and general utility? Simply by laying as many wires separated from each other as will correspond to the letters of the alphabet, and preconcerting between the persons stationed at two extremities of the line of communication, that each individual wire is to represent a particular letter; because, if the person stationed in Edinburgh can, by applying the electric influence to any one wire, instantaneously apprise another person stationed in London that a particular letter of the alphabet is thereby indicated, words and sentences *ad infinitum*, may be communicated, and the idea of a perfect telegraph would be realized.

Without experience, it is impossible to say with what rapidity this electro-magnetic telegraph could be worked; but, in all probability, intelligence could be conveyed by such a medium as quickly as it is possible to write, or at least to print; an apparatus could be constructed somewhat resembling the keys of an organ, by which the lettters of the telegraph could be touched with the most perfect ease and regularity.

It has been mentioned, that the transmission of the electricity or galvanism could be discernible by various means well known. If any indication, however slight, is made, that is enough, all that is wanted being that it should be perceivable by the person placed to watch the telegraph.

It has been assumed, that the electric current is capable of transmission by means of a single impulse from Edinburgh to London. But it is not indispensable that so great a distance should be accomplished at once. Immediate stations for supplying the telegraph with new galvanic influence could be resorted to, and its perfect efficiency still preserved.

The best mode for troughing or protecting the metallic conductors, and separating them both from each other, and from the surrounding substances by which the electric or galvanic influence might be diverted, would, of course, require considerable scientific and mechanical skill; but the object appears perfectly attainable. Insulating or non-conducting substances, as gumlac, sulphur, resin, baked wood, &c., are cheap; and the insulation might be accomplished in many ways. For example, by laying the wires, after coating them with some non-conducting substances, in layers between thin slips of baked wood, similarly coated, the whole properly fastened together, and coated externally. These slips might be perhaps ten yards long, and at the joinings precautions for the expansion and contraction of the wire by the change of temperature, might be adopted. The whole might be enclosed in a strong oblong trough of wood, coated within and pitched without, and buried two or three feet under the turnpike road.

The expense of making the telegraph proposed is, of course, an important element in the consideration of ite practicability and utility.

The chief material necessary, viz., copper wire, is by no means expensive. It is sold at 1*s.* 6*d.* per pound, of sixty yards in length. The cost of a wire from Edinburgh to London, say 400 miles, would thus be about 900*l.*; but say for solderings, &c,, 100*l.* additional, or that each copper wire, laid from Edinburgh to London, would cost 1000*l.* sterling, and that the total amount of the wires necessary to indicate separately each letter of the alphabet, would be 25,000*l.* The purchase of so large a quantity, would, of course, be made at a considerably less price; but probably one or two additional wires might be needed, and the circuit of the electrical influence must be provided for by one or more return wires.

The coating, separating, and troughing of the wires can be accomplished by low-priced materials, and the total expense of the whole work (except the price of the wires), allowing a large sum for incidental expenditure, has been roughly estimated at 75,000*l.*, making a maximum expenditure of, say, 100,000*l.* for the completion of the telegraph. For a proportional additional sum it might be extended to Glasgow.

As to the working of the telegraph, it is apprehended, that even if the speed of writing were not attained, there could at least be no difficulty in indicating one letter per second. At this rate, a communication which would contain sixty-five words would occupy about five minutes. This is supposing the vowels to be all indicated. But abbreviation in this, and many other respects, would no doubt be contrived; and the number of words in the communication supposed, are greater than necessary for an ordinary banking or commercial letter, or for friendly enquiries and responses. Supposing, however, that each communication was to occupy five minutes, and to be charged five shillings each, if the telegraph was worked twelve hours a day, (that is, six hours from each end), it would produce a revenue of 36*l.* daily, or 10,800*l.* per annum, supposing there were 300 working days in the year. If, however, the plan is practicable, the public intelligence that would, no doubt, be transmitted by the telegraph would be sufficient to keep it in operation night and day.

Arrangements are being made for having the necessary experiments tried on a metallic conductor of fifty or a hundred miles in length, and if the same instantaneous and perfect indication of the passage of the electric or galvanic fluid is found to take place, as in the case of the recent experiments at the University, the triumph of the scheme would be complete.

LIGHT EVOLVED FROM INSECTS.

A singular phenomenon was witnessed on Tuesday evening, in the city of Canterbury. The residents within and near the precincts of the Old Castle, at the southern entrance of the city, were alarmed in the night by a stream of red light, apparently issuing from the old ruins, as if a fire were raging below. On repairing to the spot, it was discovered that the light emanated from an innumerable swarm of small insects, which had collected on the walls and about the old ruins. The moon was not visible, and, with the exception of the spot on which they had located, all was darkness. With the morning sun the little creatures disappeared. About thirty years ago a similar phenomenon was witnessed on these walls.—*Kentish Gazette.*

STEAM VESSELS IN SWEDEN.

The progress of Sweden in steam-navigation may be considered as very creditable to that country, when we reflect that in spite of great natural resources, it is at present the poorest in Europe. The number of steam vessels now in activity amounts to twenty-six, of which four belong to the government and twenty-two to private individuals. The horse-power of the four government steamers is stated at 275, and that of the private ones at only 899;—the average, therefore, for one of the former is 68 horses, and for one of the latter, 40, or one-tenth of the power of the large steamer just launched at Bristol, to run between that port and New-York, three of a similar size to which would exceed in power the whole Swedish twenty-six. Four other steam vessels are now, however, in course of building for the Swedish government, and it is intended to go on gradually adding more and more to the navy.

ARSENIC IN CANDLES.

At a late meeting of the Medico-Botanic Society, Mr. Everitt made some remarks respecting the tests for arsenic, and afterwards demonstrated its presence in the composition candles. Having fully proved the existence of the poison in the candle, in the proportion of at least two grains in each (and he stated his belief that four grains were a more correct statement,) he then proceeded to assign a reason for its use. Candles which are made of tallow are of too low a melting point to admit of the use of a curved wick. Stearine or spermaceti, either of which has a much higher melting point, is, therefore, employed in making the composition candles, and to prevent its running into grain or crystalizing, a certain quantity of wax was added, which, it was found, would fully answer the purpose. It was afterwards discovered that a small quantity of arsenic would effect the same object, and it being considerably cheaper, it was adopted into use. The professor further stated that, when he had made the discovery, and it had become bruited abroad, his opinions were confirmed by two or three manufacturers who acknowledged using the poison. He left it to the members of the profession to determine whether arsenic thus volatilized, and coming in contact with the lungs, would prove deleterious. Judging from the effects of other gases, he thought it would be injurious.—*Lancet.*

CHINESE LITERATURE.

The study of Chinese appears to be making some progress on the Continent. The Emperor of Russia has appointed a Professor of that language at the University of Kazan, in the person of a Russian missionary long resident at Pekin; he has also purchased his Chinese library for three thousand rubles, and assigned him an annual salary of four thousand rubles, or about a hundred pounds sterling more than it is proposed to give the new Professor at the University of our own wealthy metropolis. The latter situation is, it is rumoured, to be offered to Mr. Kidd, now President of the Anglo-Chinese College at Malacca, one of the Chinese pupils of which has lately found employment under the Government of the Celestial empire, as a translator from the English. At Vienna, also, they are not inactive. Mr. Stephen Endlicher, an industrious and ingenious officer of the Imperial Library, has taken advantage of a recent visit of Baron Schilling de Constadt, the well-known linguist and traveller, whose gigantic stature and proportions found him such favour among the Tibetans, to draw up and publish a catalogue of the Chinese books and coins of the Imperial collection. The number of works, it appears, is 189; the library may perhaps be equal in this department to the British Museum, or even of the East India Company, but is certainly inferior to that of the Asiatic Society, or the London University; and all four of these are in our own capital, now pre-eminent for collections of Chinese literature. With regard to coins, there will probably be no reason for English readers to recur to the pages of Mr. Endliche: a memoir on the subject, embodying information derived from Chinese authorities, by Mr. Samuel Birch, of the British Museum, was recently read before our Numismatical Society.

*** Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare. (tf)

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL,

AND

ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, SEPTEMBER 9, 1837. (Published January 20, 1838.) VOLUME VI.—No. 36.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 20, 1838.

OHIO RAILROAD REPORT.—R. HIGHAM, ENGINEER.

Engineer's Office.

To the President and Directors of the Ohio Railroad Co.

GENTLEMEN,—I have the honor herewith to present the Maps, Plans and Estimates for the proposed Ohio Railroad, beginning at the western boundary line of the State of Pennsylvania, and extending westwardly to the Maumee river in the State of Ohio, a distance of 177 miles.

The several red lines on the maps, are those that have been minutely examined and surveyed; they embrace a large extent of country, and afford sufficient data, to determine the general route the road should pursue.

Of the several routes surveyed, that passing through the towns bordering upon the Lake, presents the least formidable obstacles, and has the most favorable grades. The whole of this route can be traversed by locomotive engines, with a small diminution of their greatest effective power, as the *greatest* inclination does not exceed 16 feet per mile, and only a small proportion even of that elevation. This route, commencing at the Pennsylvania line and extending to the Conneaut Creek, was surveyed with a view of connecting the road with the Pennsylvania Railroad, and can be changed between these points to meet that road when located.

From Conneaut Creek to the township of Perry, a distance of 34 miles, the line passes over a country highly favorable for the construction of a Railroad. The greatest embankment or excavation will not exceed 4 feet, except in crossing Ashtabula river, and some small streams. At this point in the township of Perry, the line diverges, and three lines of about the same feasibility offer:—two of which pass through Fairport and Richmond, and the other through Painesville. The adoption of either of these lines will be a matter for your further consideration, at the final location of the road, when a detailed estimate for each will be submitted. These several lines again unite near the village of Willoughby.

Between Willoughby and Lower Sandusky, the line passes through the city of Cleaveland, Ohio City, Charleston, Vermilion, Huron, and Sandusky city. The only difficulty throughout will be the great elevation at which we shall be compelled from the surface of the country to cross some of the rivers flowing northwardly into Lake Erie.

From Lower Sandusky to the Maumee river, the routes to the several towns on the river, from Perrysburgh to Manhattan, are about equal both in grades and expense; the route to the point which shall be deemed the most advantageous termination of the road, can be selected without fear of an additional expense of grading.

The South route from Ohio City to Lower Sandusky, through the townships of Olmstead, Elyria, Norwalk, Ridgefield, &c., would be considered in ordinary circumstances a very favorable one; but in comparison with the northern route, there is a great difference in favour of the latter, both in point of grading and in the amount of work.

For ease of grades, and proportion of straight lines to curves, perhaps no section of country can be selected more favorable than this route, for the construction of a Railroad. The whole distance from Pennsylvania to the Maumee river being 177 miles, of which $171\frac{1}{2}$ miles are straight lines, and $5\frac{1}{2}$ miles of curves, or about one mile of curved line to 31 miles of straight lines. Of these lines, one is 40 miles in length, another one of 28 miles, four others of 15 miles each, and others from 5 to 10 miles in length.

The grades are short, and are laid to suit the construction of the country. All heavy excavations and embankments have been avoided. The greatest inclination in any one mile is 16 feet, and this may be reduced to 10 feet per mile, and all the other inclinations nearly to a level, with a very small additional expense.

Aggregate length of lines, with Level Grades,	40 miles.
Do. do. with grades from level to 7 ft. per mile,	109 "
Do. do. with grades from 7 to 10 ft. per mile,	17 "
Do. do. with grades from 10 to 15 ft per mile,	11 "
	177 miles.

The following estimate of the probable cost of the road graded for a double track, with a single track laid the whole distance, the necessary turnouts, machinery and buildings, has been made with great care, and I feel confident will be found abundant to complete the work. The superstructure is contemplated to be of the usual form used in the States of New-York and New-Jersey (see plan and Estimate No. 1) having a rail plate of twenty-five tons to the mile. The graded surface to be twenty-four feet wide in embankments, and thirty-six feet in excavations, with a slope of one and a half horizontal to one vertical, having the proper ditches through the excavation. The large streams and valleys are estimated to be passed by wooden viaducts. In those that are of importance, the timber and framing to be completely protected from the weather, the small ones will be built in a simple form as per plan, and can be replaced when decaying, by earth embankments, and stone arches, which with the facility afforded by the road for conveying materials, can be done with less expense than at present.

No allowance has been made in the estimates for the purchase of lands and cost of fencing, nor for grubbing and clearing. The general disposition of the proprietors of the lands on the line to release it, and make their fences, and also the powers granted in the Charter to take the lands, and have the advantages offset against the damages, together with the liberal donations of land, and the enlightened views entertained by the mass of the inhabitants through whose land the road passes, will warrant us in omitting this usually heavy item in the construction of public works.

The light timber on the line, may be cut into steamboat wood, for which there is a great and increasing demand, and the oak and other building timber will find a ready market, in the progress of the work, and will yield more than sufficient to pay all the expense of grubbing and clearing.

The general character of the soil, on the line of the road, is gravel, loam, sand, and alluvial deposit, and throughout the line no rocky or other hard material is found. The earth from the slight excavations, is to be carried into the embankments; when there is not sufficient earth from the cuttings to form embankments, they are to be formed by widening and deepening the ditches on the sides of the road; and where a surplus of earth is taken from the excavations, it is to be wheeled into the spoiled banks contiguous thereto. There are but few excavations where the earth will have to be carried more than five hundred feet. In all cases, both the excavations and embankments have been estimated, so that the price per yard is abundant to meet any contingencies of extra hauling.

An even and level road, for the safe and speedy transportation of passengers and freight—besides the economy in wear and tear of machinery—is of the first importance, and can only be attained through the flat country, by properly draining and elevating the road. With this view, the grades, generally have been elevated about two feet above the surface of the ground, by which means we shall be able to have a dry road upon which the frost will have but little effect, and from which the light snows will be blown off, and the deep ones easily removed.

ESTIMATE.

1,230,164 cubic yards of excavation at 10 c.	$123,016 40	
2,873,889 c. y. of embankment, at 11 c.	316,127 79	
		439,144 19
197, 3 feet drains, (see estimate A.) at $63,	12,411 00	
28, 5 feet culverts, (see estimate B.) at $157,	4,386 00	
5, 10 culverts, (see estimate C.) at $361	1,805 00	
		18,602 00
Bridge over Conneaut River,	18,750 00	
do. over Ashtabula R.	32,290 00	
do. over Grand River,	16,000 00	
do. over Chagrin Riv.	8,200 00	
do. over Cuyahoga R.	88,800 00	
do. over Walworth Run,	10,500 00	
do. over Rocky River,	20,000 00	
do. over Black River,	10,800 00	
do. over Vermilion Riv.	7,200 00	
do. over Huron River,	6,600 00	
do. over Sandusky R.	39,000 00	
do. over Portage River,	4,200 00	
16,100 Lineal ft. of Bridge over the marshes, ravines and small streams, at $4 per lineal foot,	64,400 00	
		276,740 00
708 crossing places for farms and roads, at $10,		7,080 00
177 miles of superstructure at $3,832 per mile, as per estimate D.		678,264 00
12 Locomotive Engines, at $7,000	84,000 00	
20 Lar. Cars, at $1,600,	32,000 00	
20 Sm. cars, at $1,000,	20,000 00	
100 Fr. Cars, at $400,	40,000 00	
		176,000 00
Depot buildings, water stations, &c.		100,000 00
Engineering and superintending,		100,000 00
		1,795,830 19
Add 10 per cent for contingencies,		179,583 01
Total,		$1,975,413 20

Or, $11,160 52 per mile graded for a double track, with a single track laid.

Or, $14,992 52 per mile for a double track complete.

Total for a double track, machinery, buildings, &c. complete, $2,653,676.

To those that are acquainted with the country through which the line passes, and have examined into its merits, the facility it will give to the great mass of travellers that are daily thronging to the west and east, through Ohio, it would be superfluous to say more, than that the route is a feasible one, and can be built at reasonable expense; but to those who have not examined into the merits of this work, it may not be unimportant to give some general statements of its local advantages, to draw their attention to the subject, that it may be investigated by every one interested, when, I am confident they will come to the same conclusion that the projectors and friends of the road have, that is—that it will be one of the most important roads to the public, and the most profitable to its stockholders, of any in the Union, being a connecting link between all the great thoroughfares from the Eastern States to Lake Michigan, and the great South-western Rivers and States.

By referring to the map of the United States, and examining the routes of improvements completed and in contemplation, it will be seen, that both from the east and from the west, they all concentrate and unite with this road; from Maine to Virginia on the east and south, and from Lake Superior to Arkansas on the west.

Through half the year when the navigation of the Lakes is obstructed with ice, this must be the traveller's only route; and the saving of time, the safe and regular transit by Railroad, must secure through the remainder of the season a large proportion of travel.

When we compare the delays, damages and accidents incident to Lake navigation, the high and fluctuating prices of freight and insurance; with the safe, rapid and regular transit at all seasons, and the regular prices of freight, by Railroad, Lake Erie will hardly be considered a rival communication for passengers, merchandise and light freight.

South of the table land (on which the Ohio Railroad is located) to the Ohio River, the country is broken with mountain ridges, dividing the waters flowing north and south, and raising impassable barriers to a parallel route.

The following roads and canals connect through this road the fertile regions of the west and the commercial cities of the Atlantic. On the east it receives the travel:

1st. From Boston to Albany by Railroad, the Erie Canal, and the Railroads through the same valley to Buffalo; from Buffalo by the Buffalo and Erie Railroad.

2d. From New-York city to Albany, and thence by the same route as No. 1.

3d. From New-York city by the New York and Erie Railroad to its intersection with the Buffalo and Erie road, thence by the Erie road to the Ohio Railroad.

4th. From Philadelphia, by Canals and Railroad, to Erie, thence by the Erie, to the Ohio Railroad.

5th. From Philadelphia, by Canals and Railroads, to Pittsburg, and thence to the Ohio Railroad, either by the Conneaut and Beaver Railroad, the Ashtabula and Liverpool Railroad, or the Pittsburg, Warren and Cleaveland Railroad.

6th. From Baltimore, by the Baltimore and Ohio Railroad, the Wheeling and Wellsville Railroad, and the Wellsville and Fairport Railroad.

On the west the road receives the travel;

1st. From the Ohio River, by the Mad River Railroad.

2d. From Missouri and Illinois, by the Terra Haut and Alton Railroad, and the Peoria and Logansport Railroad, through the Wabash and Eric Canal and Railroad.

3d. From Chicago, through the Wabash and Erie Canal.

4th. From Evansville and Indianapolis by Railroad, and Wabash and Erie Canal.

5th. From Evansville, by the Indiana, and the Wabash and Erie Canals.

6th. From Lake Michigan, by the Erie and Kalamazoo Railroad.

7th. From Detroit, by the Detroit, Monroe, Huron and Manhattan Railroad.

Some idea of the business of this road may be formed from the following statement of the amount of business done on Lake Erie, a large portion of which will be drawn to this road. There will be on the Lake the ensuing season:

52	Steamboats, whose aggregate tonnage amounts to	15,900 tons
3	Ships, whose aggregate tonnage amounts to	800
6	Brigs, whose aggregate tonnage amounts to	1,046
150	Schooners and Sloops, whose aggregate tonnage amounts to	13,800
211	**Vessels. Total,**	**31,546 tons.**

One hundred and fifty-nine sail vessels
Fifty-two steamboats.

From the records kept at Buffalo, the average number of arrivals and clearances for sail vessels, will be for each vessel thirteen. The average tonnage of said vessels is ninety-eight tons.

The steamboat clearances and arrivals at Buffalo will average forty-one for each boat. The average tonage for steam-vessels is three hundred and five tons.

This will give for sail vessels	202,566 tons
And for steam-vessels	650,260
Total,	852,826 tons

The navigation is usually open about two hundred days; this will give four thousand two hundred and sixty-four tons daily, that passes to and from the State of New-York, add to this the business from Pennsylvania and other sections, and the increase from the facilities given, together with the fact that the increase of travel has been above twenty per cent. per year for the last twenty years.

It is impossible to ascertain correctly the number of passengers that are passing east and west, but we can approximate something near it by estimating the number of arrivals and departures. The arrivals and departures of steamboats at Buffalo last season were one thousand six hundred and twenty, the traveling season two hundred and sixteen days, making a fraction short of eight boats per day. Allowing six of these boats to ply between Buffalo and Detroit and the intermediate places, and that each boat west has two hundred, and each boat east has one hundred passengers; which every one, who has seen the steamboats arrive and depart from Buffalo, will consider a very low estimate, besides the steamboats and sail vessels, there are two daily lines of stages from Buffalo west. From the above there would be by steamboats:

129,600 passengers going west.
64,800 do. do. east.
5,400 passengers going east and west by stage and sail vessels, 25 per day.
5,400 passengers going east and west by private conveyance.
29,800 passengers going east and west by private conveyance and stages the remainder of the year 149 days at 200 per day, making a total of 235,000 passengers.

I have consulted with a number of gentlemen who are well qualified from their commercial connection, to judge of the passengers passing east and west, and they are unanimous in the opinion that this is underrating the amount.

Without allowing for any increase of travel, and that one-half of the present will take the railroads, and putting the fare at $5 for this 177 miles of road, it will give,

give,	$587,500
100 tons of freight per day for 300 days—30,000 tons per year (which is one twenty-eighth of the tonnage on the Lake for Buffalo Harbor) at 2 cents per ton a mile,	106,800
Transporting United States mail per year,	20,000
	714,300
From this deduct for managing road and repairs, as per estimate D.	96,240
	$618,060

Making a nett increase of 23 per cent. on $2,654,000, the amount necessary to complete the road with a double track.

All of which is respectfully submitted by your obedient servant,

R. HIGHAM,
Engineer of the Ohio Railroad Company.

At a Meeting of the Board, it was resolved unanimously, That this Board fully appreciate the ability and zeal with which Mr. Higham has prosecuted these surveys, for which their thanks are hereby tendered; and from Mr. Higham's high professional standing, they have full confidence in his Report.

From the London Mechanics' Magazine.

LONDON AND BIRMINGHAM RAILWAY.—EIGHTH ANNUAL REPORT.

Birmingham, 18th August, 1837.

The directors on the present occasion of submitting their half-yearly report, have the satisfaction to announce, that the expectation they held out in their last Report of a partial opening of the line in the course of the present summer, to the extent of twenty-one miles out of London, has now been fully realized. Early in the month of July, the engineer having reported that the works of the twenty-four and a half miles, between the Company's station, at Euston-square, in London, and Boxmoor, were in a fit state for use, the directors decided that this portion of the railway should be opened to the public, on the 10th of that month. The trains commenced running accordingly on that day, and although the traffic has hitherto been merely derived from excursions of pleasure and curiosity, and from the journeys of the comparatively few individuals who reside in the immediate vicinity of the line, and although the departures of the trains (in consequence of the progress of the works connected with the entire completion, and finishing off, of this portion of the railway), are at present confined to three from each end, the number of passengers has already exceeded anticipation, and proved fully equal to the means for their conveyance.

On the 16th instant, being 28 days from the first opening, 39,855 persons had been conveyed by the railway, being an average of 1,423 per day, for which the daily receipts average 153*l.*; during the last week the daily average of numbers has advanced to 1,807, and of receipts, to 189*l.*

The directors are assured by the engineer that the works which at present interfere with mid-day trains will be entirely completed, and that the whole of this part of the railway will be in excellent travelling order in the course of a month, by which time the stationary engine for the incline of the extension line will be in readiness for work, and an ample supply of locomotive engines at their command. Full effect will then be given to provisional arrangements, which have been already entered into with the principal coach proprietors, for bringing the passengers by their respective coaches upon the railway, as fast as it is in readiness to receive them, which arrangements, and others calculated to bring an immediate and active traffic upon the railway, all the parties concerned appear most anxious to carry on with spirit, whenever the directors feel satisfied that they are in a situation to perform punctually and efficiently what the company will then have to undertake.

The directors cannot but notice the great advantage arising from the gradual opening of successive portions of the railway; opportunity being thus afforded for organizing the arrangements required in the carrying department, and for progressively adapting them with the benefit derived from experience on a small scale, to more extended operations, whilst the road is becoming gradually and safely consolidated, and an important revenue is afforded by a limited number of passenger's trains.

The advance made towards the entire completion of all the works of the London and Birmingham railway, and the near approach of the time at which the whole line will be opened to the public, appear to the Directors to require, on their part, a communication to the proprietors of the most exact information which it is now in their power to obtain, as to the ultimate cost of the whole undertaking, the periods at which each portion of it may be reasonably expected to be opened for business, and the probable traffic. They have, in consequence, required from the engineer, carefully revised estimates of the cost of all the works in his department which are still unexecuted, and such a statement of the probable cost of those remaining works, of their entire sufficiency for the purposes of the traffic of all descriptions to be anticipated on opening the whole line, and of the exact periods at which, in all probability, each successive portion cannot now fail to be executed and completed, as he may be willing should go forth to the proprietors with the full sanction of his name and professional character.

The details will be annexed to the Report, and the directors cannot but remark with pleasure upon the assurance they have from Mr. Stephenson, at this advanced period of the works, that not only will a few weeks see the railway at the London end, opened from Boxmoor to Tring (a further advance of seven miles), but that in the course of December next it will extend in perfect working order for business, sixteen miles farther, to Denbigh Hall, at the crossing of the Holyhead road, and at the Birmingham end as far as Rugby, making the whole length of railway which will be entirely completed, and which the directors therefore hope to have opened to the public *on the first of January next*, 27 miles. They have thus reasonable ground to hope that at this early period the entire line of railway communication between London, Birmingham, and the principal places in Lancashire, will be open to the public, with the exception only of *an interval of thirty-five miles* of excellent turnpike road between Rugby and Denbigh Hall. The engineer states that the proprietors may calculate with perfect confidence on the entire completion of the whole line, and of the works connected with it, in the course of the autumn of 1838.

The proprietors will see by the annexed revised estimates, that the expectation of the entire completion of the railway and stations in efficient working order from end to end, and of the ample carrying establishment now contracted for, within the capital of 4,500,000*l.*, is confirmed and strengthened by the furtheir means of calculation afforded by the nearer approach of all the works to their termination. As far as relates to the cost of stations, engines, carriages, waggons, and, indeed, every item of future expenditure, excepting the unexecuted works in the engineering department, there is scarcely any opening for error or question, and the directors think that the confident manner in which Mr. Stephenson has expressed his convietion of the sufficiency in all respects of his present revised estimates (confirmed by the circumstance that works in the hands of the Company have been let, and executed by sub-contractors considerably below the engineer's estimate) affords every security and assurance of accuracy that can be obtained on this subject. It should also be mentioned, that no credit whatsoever is taken for a considerable extent of unoccupied land in possession of the Company for re-sale, as opportunities offer, and that the engineer's estimate for the carrying department includes a much larger extent of stock than will be required in the first instance, if at all. The directors, therefore, do not hesitate to express their confident expectation that the proprietors may calculate upon having the railway completed, and in full operation, within the present capital of 4,500,000*l.*, sanctioned by Parliament; and that if there should eventually prove to be any further exces in the engineering department, or if the extent of the future traffic should render expedient any extension of the works at present contemplated, the additional capital cannot be required until a large revenue has rendered it easy of attainment, and placed the proprietors in a situation to judge of the propriety of such further outlay.

As the undertaking approached completion, the probable amount of traffic to be expected became a point of great interest. In order to obtain as near an approximation to truth as the circumstances of the case admit, a sub-committee was appointed to examine into the subject. The result of their investigations may be stated as follows:—

	Per Week.
That the gross receipt from passengers *now* travelling by coaches on the roads parallel immediately contiguous to the line of railway, without assuming any increase, amounts at railway prices to	£5,789
That the gross receipts from persons now posting on the same roads amount to	729
That the gross receipts from parcels now carried by coaches on the same roads amount to	1,571
That the gross receipts from goods *now* conveyed by waggons and canals on the lines between London and Birmingham, not including iron, timber, cattle, minerals, or other goods, which pay low tonnage, amount to	8,120
That the total gross receipts from the foregoing sources, assuming no increase, amount per week to	£47,209
That the total annual receipts amount to	£894,868

The data from which these results are obtained will be found in the Report to the Board by the sub-committee appointed to investigate the subject; copies of which document may be had by the proprietors, on application to the secretaries. The directors congratulate the proprietors upon the completion and opening for traffic of the Grand Junction Railway between the Liverpool and Manchester line and Vauxhall near Birmingham, and upon the commencement of the works of the Midland Counties and North Midland Railways, connecting the London and Birmingham line with Yorkshire and the Midland Counties; all which lines form tributary streams, the full value of which to the main trunk can scarcely be over estimated. The Birmingham and Gloucester, and the Derby and Birmingham Railway Companies, appear to contemplate the use of the entrance into Birmingham and the stations of the London and Birmingham Railway. The directors have the pleasure of communicating the entire success of the opposition announced in their last Report to the attempts to establish injurious rival lines, uncalled for by any public necessity. The judicious regulations now adopted by Parliament relative to all new lines of railway, afford ample grounds of security against the recurrence of projects of a similar description.

The directors have to announce, that the Act authorizing the Company to raise an additional million, and for other purposes, received the royal assent on the 30th June, and that in pursuance of the resolution of the special general meeting of the same date, an additional capital of 625,000*l.* has been created, under the powers of the Act, in 25,000 shares of 25*l.* each, which have been offered to the proprietors of 100*l.* shares, in the proportion of a 25*l.* share for each 100*l.* share. It is proposed that the new shares of 25*l.* each, which form an integral part of the capital stock of the Company, shall be entitled to the same rate of dividend as the original shares of 100*l.* each, without distinction as to the time of the payments of the calls which shall have been made respectively when a dividend is declared.

By the statements of accounts now to be laid before the proprietors, it will appear that—

The receipts to the 30th of June, were	£3,181,069	15	8
The disbursements,	3,102,292	8	5
And the balance of cash in the Company's hands at that date	78,797	7	3

The proprietors in referring to the account of capital, will observe, that there remains of the 4,500,000*l.* a sum of 1,329,282*l.* 17*s.* 3*d.* applicable to the further expenditure of the company, which, in the annexed estimate is stated at 1,313,698*l.*

R. Creed, } *Secretaries of*
C. R. Moorson, } *the Board.*

Engineer's estimate of the Periods at which different Portions of the Line will be completed.

	Miles.	
From London to Boxmoor,	24½	Open.
Boxmoor to Tring,	7½	" Oct. 1837.
	32	
Tring to Denbigh Hall,	16	" Jan. 1838
Birmingham to Rugby,	29	
	77	
Denbigh Hall to Blisworth,	13	" May, 1838.
	90	
Bilsworth to Rugby,	22½	" Autumn, 1838.

Total 112½ Miles.

IMPROVEMENTS IN THE ROYAL OBSERVATORY, GREENWICH.

Since the appointment of Professor Airy, as astronomer royal, various important improvements in this establishment have been effected, or put in a course of accomplishment.

In the first place, a large portion of the Royal Park has been enclosed, and annexed to the Observatory, for the purpose of magnetic observations; and there is every prospect, that such observations will be commenced in the course of the ensuing summer.

The library, as Professor Airy found it, contained the germs of a most valuable astronomical and mathematical collection; but almost every set of works continued in series was imperfect; and much was wanting in the modern works of continental astronomy. At the Professor's application, sums exceeding 200*l.* were placed at his disposal, by the Lords Commissioners of the Admiralty, for the completion of the library. Much has already been done; and before long, it is expected that the library will be made, without any great expense, a most valuable and practically useful collection. Mr. Airy attaches great importance to this part of the institution, for the following reason:—The natural tendency, in an office so much pressed with routine-work, and with official business having no very close relation to science, is, to be degraded into a mere bureau of clerks; and it is difficult even for the director to resist the contagion. The only antidote is, to place in the power of all, the means of acquaintance with the literature and the foreign systems of astronomy: to make the principal persons at least familiar with the speculations of ancient, and the theories of modern, times. It is only thus that the character of astronomer can be made to predominate over that of mere observer or mere calculator.

The only changes which might have been made in the instruments of the Observatory are the following:—The attachment of the telescope on Troughton's circle has been altered, the connexion being now effected by clamps similar to those used on Jones's circle and on the Cambridge circle, instead of the grasp of the spokes by which the telescope had been held in the same position for several years. The acting part of the zenith tube has been completely remodelled.—Micrometers have been placed in the microscopes for viewing the top and bottom of the plumbline: the original telescope-micrometer has been discarded, and a new one mounted, requiring only a small range of screw, and liable to none of the flexures to which the old one was exposed.

Mr. Airy having understood that Mr. Maclear, astronomer at the Cape of Good Hope, had with great care ascertained the precise locality of the Abbé de la Caille's observatory, and had taken measures for connecting, by triangulation, that spot with the new observatory, he ventured to suggest to the Lords Commissioners of the Admiralty the propriety of enabling Mr. Maclear to verify the astronomical part of the measure of the arc of meridian if he should think fit; and he pointed out Bradley's sector as an instrument which, with a change in its mounting, would be well adapted to this purpose. Their Lordships were pleased to direct that the necessary change should be made; and that instrument is now in the hands of Mr. Simms for repair and alteration.

A valuable telescope of $6\frac{3}{4}$ inches aperture has been presented to the Royal Observatory by the Rev. R. Sheepshanks; and, with the approbation of the Board of Admiralty, Professor Airy has taken measures for mounting it equatoreally in the South Dome; a situation greatly preferable to those of the existing equatoreals. The artist employed in constructing the mounting is Mr. Thomas Grubb, of Dublin.

The observations of 1836, with the exception of some small matters, relating to the equatoreal observations and the solar eclipse, are entirely reduced and ready for press. Of the results, the following are the most interesting. The circles exhibit precisely the same kind of discordance between determinations by direct visions and determinations by reflection, which was formerly noticed by Mr. Pond, afterwards by Professor Airy, and more lately by Mr. Henderson and Mr. Maclear; and its quantity is nearly the same. Correcting for this, and using Bessel's refractions, the Professor finds from more than 1300 observations) that Mr. Pond's latitude requires to be diminished by nearly one second. The accurate agreement of the results from stars in different zones seems to show that Bessel's tables represent the Greenwich observations well. The discordance of the obliquities deduced from the two solstices is a very small fraction of a second. The right ascensions of the Nautical Almanac require to be diminished generally about 0s 13. The result of the reduced observations of α Lyræ is not yet wholly investigated, but they appear to show no signs of sensible parallax.

Complaint, we find, is made of a want of hands to reduce the astronomical observations made in a satisfactory manner; or, to speak more properly, of much of the time of the present assistants being wasted upon business not strictly within their line of duty, namely, the daily comparison and official work relating to the government chronometers. Either the establishment should be increased, or the charge of the chronometers transferred to some other department.—*London Mechanics Mag.*

TEMPORARY CAISSOON FOR STOPPING OUT WATER WHILE REPAIRING SEA-COCKS OF STEAM-VESSELS.

(From the Nautical Magazine.)

The following description of a temporary caissoon, applied to H. M. steam-vessel Dee, for the purpose of excluding the water whilst one of the sea-cocks was ground in afresh, by Com. W. Ramsay, R. M., displays that ingenuity under difficulty, for which our seamen are celebrated:—

In describing a caissoon that was used by H. M. steam-vessel Dee, under my command at Port Royal, in the month of August, 1835, the simplicity of the details are such, that it may perhaps be thought by some hardly worthy the attention of the readers of the Nautical; but as all who may have to encounter a similar difficulty may not know how easily it can be overcome, is a sufficient reason for giving them. It is necessary first to state, for the information of those who are not much acquainted with the fittings of steam-vessels, that there are several sea-cocks, which, when turned, admit the water through the bottom of the vessel for various well-known purposes. The most common plan is to have a pipe which communicates with the sea. About a foot from the outside of the vessel is the neck, upon which another pipe is fixed, which conveys the water to its destination. Now these cocks, by constant use, are liable to leak; when this occurs, the water flows in a stream into the vessel, and the only remedy to be applied is to remove the cock, and what is technically called, grind it in afresh, and then replace it. This is, of course, effected without danger when the vessel is in dock; but, it is evident, that if attempted when she is afloat, without some method of preventing the water rushing in, if the pipe inside cannot be stopped, which would be very doubtful, the vessel would fill with water.

This being premised, it may now be stated that the sea-cock on the larboard side of H. M. steam-vessel Dee was found to be leaking very much. It was considered that taking off the cock, and trusting to being able to stop the pipe from inside would be dangerous, besides the difficulty, perhaps impossibility, of putting the cock on again when reground, with such a rush of water as it is evident would take place. As there are no locks at Port Royal, the only plan was to stop the aperture (by which the water enters the vessel) outside, until the necessary repairs were completed.

The vessel was first given as a great heel as possible to starboard, by which the hole to be stopped was brought within four feet of the water's edge; next, having procured several feet of two inch fir plank, a box was made which had three sides, and a bottom, of the following dimensions: the back was five feet deep by four broad, the sides three feet broad, the bottom of course extending from the back to the ends of the sides. The way in which it was rendered water-tight was this: two folds of very thick fear-nought boiled in a mixture of tallow and tar, was placed between each joining of the planks, and the whole was kept together by the means of iron bolts, which were driven quite through.

Now, it was necessary to obtain the exact curve of the vessel's bottom, that the sides of the caissoon might be cut to answer to it. This was effected by means of a long stripe of lead, which was forced during a calm against the vessel's bottom. The curve being thus obtained, the sides and bottom of the caissoon were cut to their proper shapes; small grooves were cut in their edges, and four folds of fearnought, prepared as above were nailed on. The nails were driven along the grooves, so that when the caissoon came to be pressed against the vessel's bottom, there might be nothing to prevent a good fit. Two large cleats were then nailed upon the vessel's side, on the exact spot that the top of the caissoon would be, so that once forced down into its place, it could not rise again. As near the surface of the water as possible, two strong screw eye-bolts were fixed to the vessel's side, through which lashings were rove, and a tackle got all ready.

The caissoon was now put over, forced down under the cleats mentioned above, the lashings encompassed it, which were hauled tight by the tackle, by which means the caissoon was forced against the vessel. A small pump that had been prepared before, was then placed in it, by the aid of which, and bailing, all the water was got out of the caissoon in about ten minutes, after which one man occasionally bailing kept it quite dry. Having this to work in, the aperture was soon secured, the cock taken off and ground afresh. When that was finished and put in again, the caissoon, which had been allowed to fill with water was pumped out, the lead and plank had been nailed on to keep the water out of the ship, was taken off, and the whole business was finished without the slightest stop, impediment, or difficulty, in about forty-eight hours.

MR. CROSS'S EXPERIMENTS.

Mr. Cross has lately written to M. Becquerel, that, among a variety of other things, he has succeeded in forming an entirely new substance, which crystallizes in needles, composed of a strong proportion of sulphur, and a small one of lead, of copper, and zinc. In the beginning of its formation it is of a magnificent crimson colour, which afterward changes to a brilliant scarlet, with an orange colour. The process of procuring it is thus:—An earthen pan is filled with hydro-sulphur of potass, and put in a glass vase, which is filled with a solution of sulphate of zinc. Afterwards is taken a small bow of lead and copper; the lead is plunged in hydro-sulphur of potass; the copper in sulphate of zinc. A copper wire, sufficiently bent, is then plunged in the two solutions, one end in the alkaline sulphur, the other in the sulphate of zinc. Some brilliant red crystals, in the shape of needles, issuing from a common centre, then envelope the extremity of the copper wire in the alkaline solution. This substance experiences no action in muriatic acid, but it then becomes very black. Adding some drops of nitric acid, it is decomposed, and floats, in great part, at the surface; it is then pure sulphur. The remainder contains only lead, copper, and zinc, in small proportions. Mr. Cross writes, that since forming the substance, he had had too little time to examine it, otherwise than with great rapidity.

Among the substances sent to M. Becquerel there were, 1st, some beautiful crystals formed on the positive end of a copper wire, and, on the negative, crystals of sulphur: the solution employed was not mentioned; 2d, some per-oxide of granulous iron (fer mamelonné) on copper, surrounded with a morsel of specular iron, in relation with the negative pole, the liquid employed being a solution of proto-sulphate of iron: also some gold formed *en dendrites* at the negative pole, in a solution of gold, on some clay, slightly hardened by fire.—*Railway Mag.*

RUSSIAN GOLD MINES.—IMPORTANT DISCOVERY.

The St. Petersburg letters are much occupied with a discovery relative to the working of the Russian gold mines, which, if truly stated, may come to have some influence on the circulation of the precious metals. A letter of the 26th ult. says, "There has been found out, it is said, in the Ural Mountains, a new mode of extracting gold from the earth, sand, or ore. The sand or earth has been put into a blast furnace and melted, and the most extraordinary results obtained. By washing, the method hitherto pursued in Russia, if one and a half zolotnicks of gold were produced from 100 poods of sand, &c., the expenses were about covered; two zolotnicks per 100 poods were worth working. Fine sand or earth rarely produced more than three zolotnicks, and five zolotnicks were quite uncommon. By the new process, on 100 poods of melted, they obtained sixty zolotnicks in some cases, in others forty to fifty zolotnicks; and on melting 100 poods of previously washed sand, they got forty to fifty zolotnicks of gold. There is little doubt of the accuracy of these statements, but what the comparative expense of the two modes is, I cannot tell you, nor whether the Ural grows sufficient wood for fuel, and whether coal can be found there. One pound Russian contains ninety-six zolotnicks; 100 poods are about 3550 lbs. English weight."—*Times.*

ANOTHER RUPTURE IN THE THAMES TUNNEL.

Yesterday afternoon the Thames Tunnel became quite filled with water which flowed from an aperture from above. It would appear from the report supplied to us on the subject, that generally there existed some necessity for keeping the pumps at work, for we understand, that a little before twelve o'clock at noon the water was found to increase considerably, but in the course of the afternoon the quantity had somewhat diminished, although it slowly gained upon the pumps, and as the tide rose it was found impossible to keep pace with the increased influx of water, when Mr. Page, the acting engineer, considered it necessary to send for Mr. Brunel, who was in town attending a meeting of the directors.

At five o'clock, finding it was quite useless to proceed in the attempt to check the steady increase of the water, which had risen ten feet, the attention of the engineers and workmen was turned to securing all parts of the shield, which operation was carefully and deliberately performed. The curiosity of the men, who were anxious to watch the gradual rise of the water, rendered it very difficult for the engineer to withdraw them, even when it became expedient to do so. At half past five o'clock the Tunnel was filled, every one having previously retired, and it is gratifying to add, that no accident has occurred to any individual. Soundings were immediately taken by the engineer, and the displacement of ground having been ascertained to be of limited extent, steps were taken forthwith to stop the aperture from above, as upon former occasions, in order to resume the pumping as soon as possible.—*Times.*

PAPER CASTS OF SCULPTURE.

My servants made me casts in paper of the sculpture on the walls of these two rooms, that is, of all the sculpture in the three large plates which I now publish. This method of obtaining fac-similes of sculpture in basso-relievo is very successful, and so easy, that I had no difficulty in teaching it to my Arabs. I found stiff, unsized, common white paper to be best adapted for the purpose. It should be well damped, and, when applied to sculpture still retaining its color, not to injure the latter, care should be taken that the side of the paper placed on the figures be dry—that it be not the side which has been sponged. The paper, when applied to the sculpture, should be evenly patted with a napkin folded rather stiffly; and, if any part of the figures or hieroglyphics be in antaglio or elaborately worked, it is better to press the paper over that part with the fingers. Five minutes is quite sufficient to make a cast of this description. When taken off the wall it should be laid on the ground or sand to dry. I possess many hundred casts, which my Arabs made for me at Thebes and in the Oasis. Indeed, I very rarely made any drawings of sculpture without having a cast of the same; and as the latter are how quite fresh as on the day they were taken, the engraver having not only my drawing but also these indubitable fac-similes, is enabled to make my plates exactly like, and quite equal to the original.—*Hosking's Visit to the Oasis.*

PERCUSSION TUBES FOR CANNON.

Mr. J. Marsh has made a considerable improvement in the percussion tubes used for cannon by the employment of a crow or other small quill, instead of a metal tube, which bursts without any danger from the fragments. Several thousand rounds have been fired on board the Excellent at Portsmouth without a single miss, and the Board of Ordnance have ordered 1,000 guns to be fitted with percussion locks. Mr. M has also improved the fulminating powder by adding to the sulphate of antimony and chlorate of potash a determinate portion of powdered glass, which, by increasing the friction, renders the explosion more certain and instantaneous. The Society of Arts heve awarded to Mr. Marsh their silver medal.

BRIDGE OR TUNNEL FROM DOVER TO CALAIS

Mr. Coppett, an English engineer, is now on his road to Paris to lay before the French government a project for constructing a passage to cross dryshod from Calais to Dover. He at Havre explained his plan to the public. Mr. Coppett asks of France only one milliard, and as much from England. With this trifling sum, he will make cones like those employed at Cherbourg between fifty and sixty years ago. If the government does not approve of this system, he has in his pocket three or four others. For instance, he will make a tunnel under the sea from Dover to Calais, introducing from one end to the other cast-iron pipes 18 feet in diameter. This last mode of communication, according to Mr. Coppett, would cost only one milliard, to be paid in equal portions by both countries.—*Daily Paper.*

FILTERING MACHINES AND INFERNAL MACHINES.

A Frenchman, of the name of Alleume, has lately got into a pretty scrape by the ignorance of the Belgian police upon scientific matters. It appears that he invented a machine for filtering and clarifying water, which he took with him from Paris to Brussels for the purpose of procuring a patent. The police, however, mistaking his filtering, for an infernal machine, he was arrested and thrown into prison, as a conspirator either against the French or Belgian king. After a confinement of two months, he was acquitted, but interdicted from France, and ordered on board a vessel for England, where he arrived without money or friends. The Lord Mayor, to whom his case was made known, a few days ago, recommended him to represent his case to King Leopold, now in England.

GALVANIC TELEGRAPH.

The mode of making instantaneous communications by galvanic power has been put to the most decided test on the London and Birmingham Railway, under the direction of Professor Whetstone and Mr. Stephenson, the engineer. Four copper wires, acted upon each end of the line at pleasure, by the agency of very simple galvanic communicators, have been laid down on the line of the railroad to the extent of 25 miles. They are enclosed in a strong covering of hemp, and each terminus is attached to a diagram, on which the twenty-four letters of the alphabet are engraved, in relative positions, with which the wires communicate, by the aid of moveable keys, and indicate the terms of the communication. The gentleman to whom we have referred, we believe, are fully satisfied that communications to almost any extent may thus be made instantaneously by the agency of galvanism.—*True Sun.*

GIGANTIC ROAD SCRAPER.

A machine has just been introduced for scraping macadamized roads, and is now in use in Hyde Park, where it appears to do its work much more effectually, and in much less time, than the large hoe hitherto used for this purpose. The main objections to it are its weight, and that it appears to be only applicable to roads in good order, having a perfectly even surface.—*Lon. Morning Herald.*

SREAM NAVIGATION OF THE JUMNA, INDIA.

The Agra Ukhbar of February, states, that a measure had been determined on by the supreme government, which was calculated to give impulse to the already fast advancing prosperity of Agra, and the permanent steam navigation of the Jumna. With a view to that object, three iron steam-boats, of the utmost possible buoyancy, had been ordered from Maudeslay and Co., and would probably within a year be plying on the Jumna. It is added, that this, with the presence of the two boards now at Allahabad, and the influx of small capitalists, will give Agra an European population, and activity unsurpassed by those of any city in the Mofussil. Other measures for the improvement of local trade had been submitted to the local government, such as the erection of wharfs, marking the channel of the Jumna, &c.

STEAM-BOATS IN SWITZERLAND.

According to the accounts from Switzerland. several of the Cantonal Governments have determined to build steamboats to run on their inland lakes. This plan will produce great advantages, by opening a more ready communication between Zurich, the Grisons, and Italy. When the boats intended to navigate the Lake of Geneva commence running, travellers may go from Geneva to Berne in one day.—*Gazette de France.*

A NEW LIGHT.

A chemist having found, after many experiments, that a void produced by electricity in a glass vessel became luminous, has, at last, succeeded in forming a long bottle, of 3 inches by 30, from which having exhausted the air, and otherwise acted upon it by a galvanic battery, a light is now emitted, being hung up in his apartment, equally clear, but not so oppressive to the eyes, as that of the sun.—*French Paper.*

EFFECT OF CLIMATE AND CULTIVATION ON VEGETABLES.

The myrtle tree, which, with us, is a small shrub, grows in Van Dieman's Land to the height of 200 feet, and has a trunk from 30 to 40 feet in circumference. The wood resembles cedar. The Chinese have an art by which they are able to produce miniature pines, bearing a perfect resemblance to the gigantic specimens of America, and only five or six inches high.—*Lon. Mech. Mag.*

From the London Mechanics' Magazine

CAOUTCHOUC ROOFS.

Sir,—As yours is a repository for many crude (as well as perfected) inventions, which may afterwards be the groundwork for others of the greatest value and importance to the public, I beg to request you will lay before your readers the following suggestion for a new application of caoutchouc or India-rubber.

I have long thought, that if the tops of houses could be flat, and have reservoirs of water upon them, that water might be made available as a supply for domestic purposes to every room in the house, and also that screw hose might be fixed thereto for the purpose of extinguishing any fire in the room where it originates on its first discovery. Hitherto, lead has appeared the most suitable material for roofs, but weight, price, and contraction by the heat of the sun have been great objections. May not India-rubber be advantageously substituted? If prepared in large sheets one-eighth or three-sixteenths of an inch in thickness, they might be laid on and afterwards the joinings made perfectly secure by the solution of caoutchouc; and in case of damage from any cause, it might easily be repaired by the same means. Some of your more scientific readers can give the necessary strength of wall and timber for bearing the various depths of water which might be required. I apprehend that in large buildings, such as the new Houses of Parliamenr, it would not only be advantageous as a preventive of fire, but also more economical.

Yours,

A Constant Reader—Z.

TURF FOR STEAMBOAT FUEL.

It is an interesting fact, that turf is now used as fuel on board the steamers plying between Limerick, Clare, and Kilrush. The Garryowen has made the passage between Kilrush and Limerick, fired with turf, in three hours and twenty minutes.—*Irish Paper.*

THE QUEEN'S NEW DESSERT SERVICE.

There has lutely been exhibiting, at the Griffin warehouse, (late Weeks's Museum), Piccadilly, an elaborate specimen of skill and excellence in one of the foremost of British manufactures. It is a splendid dessert service of porcelain, made for her Majesty, by Messrs. Brameld, of the Rockingham Works, near Rotherham, Yorkshire, of British materials. The designs, which are original, are by Mr. Brameld; and the pictorial embellishments have been executed by the artists of the Rockingham works. It has taken five years to complete this extraordinary labour of British art, the charge for which is upwards of 3000 guineas. The service consists of 200 pieces, viz., 56 elevated vases, baskets, &c., and 12 dozen plates. The service, by its lightness and elegance, will relieve the massive gold plateau, candelabra, &c., which are used at the royal state dinners.

*** Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN
RAILROAD JOURNAL,
AND
ADVOCATE OF INTERNAL IMPROVEMENTS.

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D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] | SATURDAY, SEPTEMBER 16, 1837. (Published January 24, 1838) | VOLUME VI.—No. 37.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 24, 1838

☞ See Advertisement of the Louisville, Cincinnatti and Charleston R. R.

We cheerfully re-publish the following article at the request of a worthy and esteemed man of science. We desire to add our own earnest request, that the subject may meet the attention that humanity demands for it. Without any reference to the origin of the accident, arising from the want of proper care, to say the least, we call upon all parties concerned in the direction and management of Railroads, to prevent the fearful consequences as described below, resulting, simply, from an improper order of the burden and passage cars in a train. The very frequent practice of placing the passenger cars between the enormous weight of the engine and the still greater weight of the burden cars, has often struck us as at least impolitic, though we had supposed that the practice was a concession to the popular prejudice, that the first place is always the best, which, however true in a line of stage coaches, is most assuredly inapplicable in a train of railroad cars.

Would it not be proper for Directors to forbid the burden cars being placed at the end of the train, and to order them immediately to succeed the engine and tender, in all cases?

From the United States Gazette.

To the Public, and to the Managers, Agents, and Conductors of Railroads.

The following appeal is made in the hope that it may be the means of saving life, or at least, of securing exemption from injury to some fellow-creatures.

The desire to render this appeal as forcible as possible, must be the apology for the gloomy details which accompany it. It is not to gratify the usual morbid propensity to read of distress, or to give food to so depraved an appetite, but if possible to produce such an effect upon all concerned, as may be the means of obviating the evil, which was the source of all the agony of those hours that immediately followed the late accident on the PORTSMOUTH AND ROANOKE RAILROAD, and of the cruel sufferings by which it has been attended.

The writer of this appeal and his only daughter were part of the company who took their places in the centre car of three, which formed a part of the train upon the above named road on the morning of the 10th of December. Our fellow passengers were two ladies, their children, one infant, two female servants, and several gentlemen, the other cars contained an unknown number, but the third car was occupied principally by a party of females, who entered it upon the route, and who were the greatest sufferers by the accident which occurred shortly afterward. They were in high spirits, and were evidently seeking pleasure in their trip, looking forth with gay countenances and cheerful anticipations of enjoyment, at the very moment that they were brought to the most excruciating tortures, some of them to death.

The cars were moving at the rate of 12 or 14 miles an hour, when a crash was heard, and the writer was conscious of a sensation of rising in the air, then a fall, but further than this all sensation and memory fail, save the agony of that moment, when his child was before him, fellow-creatures, including females and children, around, with the instant conviction, that death, in fearful torture, was claiming his victims from among them.

To the scene which followed no pen can give description. The three cars had been crushed to pieces, and all whom they contained, except those only of the second car, were lying torn and mangled, on and among the fragments. The cries, lamentations and prayers of the less injured, distressing as they were, were far less appalling than the faltered accents of the mother who said, "Tell my son to come to me, I am dying." She died that night. Could anything be more agonizing than the situation of that poor girl, who lay with her limbs jammed and crushed by the two iron wheels for hours, whilst all our efforts to relieve her, in the absence of all means, and far removed from aid were in vain. Let us close this detail by stating that two burthen cars were emptied of their loads, and in them were placed twelve of those whose cruel injuries and heart-rending lamentations can never be forgotten, and they were conveyed back to the nearest station. The remainder, with the uninjured, were taken on by another engine and train which arrived in a few hours at the place of the accident,

The loss of life, the wounds and sufferings of the maimed, were not necessary consequences of the accident to the engine, but were occasioned by the excessively reprehensible *custom* of attaching *burthen cars* behind the *passenger cars.* In this instance the facts and circumstances are as follows:—

The road is constructed of light plate rails, laid on wooden string pieces and sleepers. The end of one of the rails was loose, and stood up, it struck the *scraper*, and threw the engine off the track and into the side of the ditch, when its further progress was arrested, the front of the frame being buried in the earth. The *tender* was thrown on its side, against the back part of the engine, which lay partly over the track; against this opposing mass, the light passenger cars were crushed to pieces; and the foot of the baggage car was stove in, as it lay upon the pile of ruins, by the *momentum of a number of burthen cars loaded with cotton, in bales, which formed the rear of the train.*

It is consistent with the laws of *matter* and *motion*, and many circumstances warrant the belief, that if the passenger cars had been placed behind the burthen cars, or if there had been no burthen cars in the train, little or no injury would have resulted to the passengers from the accident.

A pair of horses which were in a car forming part of the train, were apparently uninjured, and a carriage standing upon an open car, was scarcely displaced.

In continuance of his journey, with all

these circumstances fresh upon his memory, and when the papers had announced the deaths of two of the sufferers, the writer entered one of the cars at Washington for Baltimore, and was painfully compelled to witness the attachment of burthen cars behind the train, and this too in the night, when obstructions upon the road are much more to be feared. When the agent came round to examine, and collect tickets, the writer made the circumstance a subject of earnest remonstrance. The agent, with honest candor, acknowledged that the custom was extremely reprehensible, cited instances of injury from the like causes, regretted that his remonstrances had not been attended to, and said that nothing was left to him but to look to his own safety in case of accident.

In publishing this statement, the writer does not mean to censure any one, he makes no charge of neglect or carelessness; but he believes that the parties who had control, were sufficiently aware of the consequence of the sudden arrestation, (and the consequent liability to injury of every thing which intervenes,) of such a moving mass as a train of burthen cars, at the ordinary rate of railroad progress. He feels that this statement is an indispensable duty to his fellow-creatures, called for by circumstances from which, providentially, he is a sufferer only in a slight degree.

Philadelphia, December 23, 1837.

From the U. S. Gazette.

REPORT.

In compliance with the provisions of the charter, the President and Managers of the Union Canal Company respectfully submit to the stockholders their annual report:

The navigation on the canal ceased last fall on the 26th of November, and was resumed on the 22d of March, 1837; since which time it has continued uninterrupted except for a few days in September, while some necessary repairs were made on the feeder. The main line of the canal has required none but the ordinary repairs. It has been all the season in excellent condition, and it continues so still. The supply of water has been ample at all times, and another year's experience confirms the former statement of the board, that entire confidence may be placed in the sufficiency of the supply of water. With the amplest means to procure any additional quantity, the board are confident that the canal may be made able to pass any amount of trade that may be brought to it

Upon this point, the report of the able and experienced engineer, selected last year to examine the whole line of the canal, and ascertain the practicability of enlarging its dimensions, is conclusive. The board have for many years past had their attention directed to this subject, and the result of long and mature reflection and observation has been, that placed as the Union Canal is, as a connecting link between two highways of much larger dimensions, it cannot be as useful to the public, or as profitable to the stockholders, as it might otherwise be, unless its dimensions be made to correspond with those of the Pennsylyania or Schuylkill Canal. While those works admit of a navigation by boats carrying from fifty to sixty tons, the boats on the Union Canal seldom exceed twenty-five tons burthen; the effect of which is, that much of the trade of the interior of Pennsylvania, which should come to Philadelphia by this canal, is diverted to other improvements. Were it not for this circumstance, the stockholders of the Union Canal Company, would long since have reaped the reward due to the public spirit and enterprise, which distinguished its first projectors. While great expenses are incurred by rival companies, to take away the trade that naturally belongs to us, and to direct it to a rival city, it behoves us to make every exertion to secure the natural advantages which we possess. To this course the proprietors of this Canal are urged, not merely by a regard for the prosperity of our City and State, but chiefly by a judicious attention to the interest and productiveness of the great link entrusted to their management, and in which their funds are invested.

Impressed with these views, the managers promoted an application to the legislature at its last session, for such an appropriation as would enable them to construct a new set of locks, of enlarged dimensions, so as to admit of its being navigated by boats of the same size as those that travel on the State Canal and on the Schuylkill. With a judicious liberality that indicated the high sense which the legislature entertained of this work, and by a larger vote than could be secured for any other part of the improvement bill, an appropriation was made in furtherance of the views of the managers, but unfortunately for us, from circumstances familiar to all, the measure failed of ultimate success.

The Board entertain the most perfect conviction, that it is of vital interest to the stockholders, that the application should be renewed at as early a period as possible of the next session of the legislature, and they entertain strong hopes that the aid of the State may be obtained in a manner, which, while it will afford us a highly improved work, will not interrupt for a single day the navigation of the canal, jeopardize the rights of the loanholder, or impair the prospect of the stockholders to early and profitable returns for their past exertions and perseverance.

The tolls collected during the twelvemonths that ended on the 1st instant, amounted to $107,590 37. Although this sum falls considerably below the expectations expressed in the last annual report, it is much larger than the Board ventured to hope for, after they became aware of the commercial crisis which the country was destined to experience.

Two causes have combined to reduce our tolls below those of the preceding year. The first was the almost total failure of the wheat and other grain crops throughout Pennsylvania during the summer of 1836. The disappointment of our farmers was sensibly felt in the revenue of the canal; owing to this cause the transportation of flour and whiskey was reduced to one-half, and that of grain to three-fourths, of what it had been in 1836.

But a still more severe reduction was the effect of the great commercial distress which has marked the present year. Where such a convulsion has occurred, spreading over the whole union; affecting every individual; striking at the prosperity of every interest; arresting every branch of industry, it could not be expected that the Union Canal alone, should have escaped its influence, and that a revenue depending upon the general trade of the country should have remained unimpaired, while the whole prosperity of the country itself was at a stand.

Accordingly the transportation of merchandize fell to one-third of that of last year; that of wool to one-fourth, and that of tobacco to one-sixth. When we reflect that these are among the articles that pay the heaviest tolls on our canal, it is rather a subject of surprise and congratulation that the effect of it should not have been to produce a proportionate reduction in our revenue. That such has not been the case is in part due to the growing wants of the country, which actually occasioned an increase in some important branches, such as the transportation of anthracite, iron ore, gypsum, &c. The board also advert with pleasure to the fact that cotton is a new source of income to the company, this being the first year that the amount has been sufficiently large to justify its being specially enumerated, the same may be said of nails, &c.

The board feel confident, that the depression of the present year may be viewed as entirely of a temporary character, and they doubt not that the returning activity of trade will restore to the canal its due share of business. As an evidence of this, they have pleasure in stating that since the first of November there has been a great revival of business on the canal, and that the tolls of the last three weeks greatly exceed the average of those of the whole year.

Every economy has been practised by the board, consistent with keeping the canal, and feeder in good order; new boilers were obtained for the pond engine; a new trunk was erected, more solid and durable, it is believed, than the old one, to conduct the waters from that place to the canal.

In every other respect the ordinary

expenses have been reduced to as low a point as was consistent with a judicious economy, and notwithstanding the severity of the times, the managers were enabled to redeem the hope given in the last annual report, and to resume the payment of interest on the loans in July last. The interest due in July and October has been paid without difficulty.

The managers have felt the most anxious solicitude to settle all the outstanding claims for damages; part of them to the amount of $5,634 30 have been liquidated, and more would have been done in this respect, if the board had met with a corresponding feeling of liberality and justice on the part of the owners of the property through which the canal and its feeders are constructed. That the work has been of immense advantage to the country through which it passes, and has greatly enhanced the value of every farm on the line, there can be no doubt, and yet, far from producing a favorable effect, the board have been and still continue to be exposed to numerous harassing and extravagant demands.

The managers regret that it becomes their duty to inform the stockholders of the vacancy in the office of president of the company. Their late President, Jacob Gratz, Esq. had for a long time past expressed his desire to be relieved from the duties of that responsible and laborious office, and his intention to decline a re-election.

The managers long indulged the hope that that resolution might be changed; but his impaired health requiring the benefit of travel and change of air, he tendered his resignation of the presidency on the 18th October last, and the managers, while they deeply regretted it, could not, under the circumstances of the case decline to accept it. Mr. Gratz had been a member of the board since the re organization of the company in 1821, and had filled the office of President for three years; no member of the board ever discharged his duties with more zeal or more assiduity.

The board have also to regret the death of Mr. William Y. Birch, one of the oldest and most respectable members of this board.

They have, however, pleasure in announcing to the stockholders, that their colleague, William Boyd, Esq. whose long connexion with, and valuable services to the company, highly qualify him for the situation, has accepted the invitation of the board to undertake the presidency of the company.

Annexed will be found the annual account of the treasurer, likewise a statement of the different articles and tonnage transported on the canal within the year.

By order of the Board of Managers,

C. GRAFFF, *President pro tem.*

Union Canal Office, }
Nov. 21, 1831. }

PARIS AND ST. GERMAIN RAILWAY.

The last "movement" of the Parisians has been by steam. The present *point d' appui* of the excitement of the capital of *La Belle France*, is the result of its first attempt to annihilate distance by the aid of mechanics. Of the opening of the railway from Paris to St. Germain, we extracted an amusing account from the letter of the *Times'* Parisian correspondent.

We shall go more into detail in our notice of this railway than we are in the habit of doing, in the first place, because it forms one of the first practical results, in this branch of art, of the usual superabundance of French theorising; and secondly, that the principal features of the line may be pointed out to such of our countrymen as may be visiting the French capital, who will of course not fail to take a trip by steam to St. Germain. The account which follows is made up partly from the Parisian periodicals and papers of the day.

On entering the station at the Paris terminus and paying for your place, you are immediately struck with the prominent manner in which the national taste for gaudy display, is introduced into an undertaking where every thing is of great weight and giant strength. Having obtained your *billet*, on which is marked the number of the place you are to occupy, you are, on producing it to a *gendarme*, ushered by him into a magnificent saloon, which in the evening is lighted with fine chandeliers. This saloon is in the form of a lunette, with a railing in the centre, to divide the high price from the low-price passengers; each point of the lunette, is the exit from this saloon to the stairs, which lead to each side of the railway; the walls of this waiting saloon are divided into compartments, beautifully painted and decorated in the Louis quatorze style; as also with the medallion portraits of celebrated engineers and men of science. The four principal compartments contain very spiritedly painted figures, emblematic of Science, Industry, Commerce, and Agriculture. In smaller compartments are tablets on which are inscribed the names of Newcomen, Savery, Watt, Washbrough, Trevethick, &c., Papin occupying a place in the centre tablet, in consequence, perhaps, of some new discoveries of Baron Dupin, proving him to be the inventor of railways and locomotive carriages! Elegant and soft cushioned seats, covered with scarlet damask, are provided for the waiting passenger, who is enjoined in the announcements to be at the rendezvous a quarter of an hour before the appointed time of starting—more than half the time occupied in journeying the 11½ miles. The windows of this saloon overlook the railway. The biulding, the interior of which we have just described, is over the commencement of the first tunnel, which is at a little distance from the extreme end of the railway, the line after emerging from it, continuing for a short distance, and terminating in a similar building; and the part between these two erections form a kind of head, analagous to the basin of a canal, where passengers enter the carriages, and the waggons are loaded. The path by the side of the train is here elevated so as to be over the wheels, and level with the floors of the carriages; thus a passenger has merely to walk into the vehicle, any accident from falling being rendered impossible. The same plan is adopted on the Birmingham line, but on the Greenwich, the height to which a passenger has to mount is extremely inconvenient.

The general design of these buildings, and the grand flights of steps, from a point of view taking in the whole, is of a very bold and striking character; and the effect of this design, from being executed in stone, in fact almost cut out of a bed of stone, comes with much force upon an eye accustomed to the dullness of the brick and mortar structures of this country. The facility with which stone can be procured, being often dug from the quarry, hewn into blocks, and used, nearly all upon the same spot, gives the Parisians a great advantage over us, in the power of making a display of taste in the execution of their public works.

The law authorising the formation of a company for the construction of the railway from Paris to St. Germain, was passed on the 9th of July, 1835. It commences, at present, in the Place de l'Europe, on the north of Paris, but it is intended to continue it, by the Rue Tronchet, nearly to the Madelaine, in the very heart of Paris, the termination is at the port of Le Pecq, at St. Germain. The length of the line is 18,430 metres, or 11.160 miles English. At Paris, it is 20.55 metres above the level of the sea (about 127 feet English) and at Le Pecq, 31.497 metres (about 101 feet, the difference in height between the extremities being 8.071 metres (about 26 feet.) The railway passes under the Place de l'Europe in a tunnel of 264 metres, or 844½ feet; then through a cutting, walled on each side until it enters another tunnel of 403 metres, or 1292 feet in length, which leads as far the Rue de la Paix in the village of the Batignolles; it then passes under the exterior Boulevart and the Rue des Dames and Rue de la Paix, and various other streets, by means of bridges. Immediately past that which carries the Rue Cardinet over the railway, are large warehouses occupying an area of 250 m, by 100 m. (800 feet by 320) for receiving goods and merchandise brought to Paris by the railway. The line now proceeds on an embankment until it crosses the Seine a little way past Asnieres by a bridge of five arches of 30 metres each, (about 96 feet); it then continues in a direct line from its first curve before the Batignolles for about 4500 metres (three miles), when between Colombes and Asnieres, there is a curve of 2000 metres (about 1¼ miles) radius. In another direct line it then proceeds as far as the two bridges over the Seine a little way past Rueil, where the railway takes another curve of a similar radius to the last. These bridges cross two arms into which the Seine is here divided, embracing the Isle du Chiard; one bridge is of three arches of 28 metres (89½ feet) each. In another direct line it then traverses the Forest of Vesinet and terminates at Le Pecq, in a large depot for passengers, and for warehousing merchandise brought up by the rivers Seine and Oise to proceed to Paris by the railway; or which has been brought from Paris to be taken on by these rivers.

The whole length of railway is divided into three straight lines, and three curves. Each curve is on a level, and each straight line is an inclined plane of 1 mil. in each metre (or 1 in a thousand.) It was calculated by the engineers that the same power required by the locomotive to ascend this incline, would be required to turn each curve, in going from St. Germains to Paris; and that the power necessary to turn the curve in going from Paris to St. Germain would be obtained from the impetus acquired by the trade in descending the inclines; so that thus the locomotives would always be kept at an uniform power of traction. On approaching Paris the terminal curve diminishes to from 900 to 800 metres (960 to 852 yards), this being rendered necessary by the locality, and it also serves to deaden the speed of the train as it approaches the end of its course.

By the railroad, the distance between Paris and St. Germain is only a third of the length which it is by the river Seine; the navigation between these two points is, besides being circuitous, extremely difficult, and at times impossible. This remark, however, merely applies to the carriage of heavy goods, as no passenger ever thought of travelling to St. Germain by water. Even by the steam-packets which were established about a year ago between Paris and Rouen, from the circuitousness of the route, and the difficulty of navigation, it was found necessary to convey passengers by diligences to a point about 15 or 16 miles down the river, where they then embarked in the steam-vessel.

The "materiel" possessed by the administration of the railway, consists of a motive force of 12 locomotives of different powers; equal in all to 360 horses. The means of transport consist of—

	Persons.
5 Close carriages, having accommodation for,	150
2 Open carriages,	80
8 Diligences,	240
20 Waggons "furnished."	800
70 Waggons "unfurnished,"	2800

Altogether there are vehicles for 4070 persons. There are four double lines of rails from Paris to the Batignolles; three from thence to near Asnieres, and two from thence to St. Germain. As yet, however, only one track is completed, for a considerable distance.

The rails on this line are of great solidity, being twice the weight of those on on the Liverpool and Manchester, the former being about 60lbs. per lineal yard, and the latter only about 30lbs.

The breadth between the rails is 1½ metres, (about 5 feet); between the lines 1.80 m. (about 6 feet) and on each side 1.45 m. (about 4½ feet.) The tunnel of the Batignolles is divided into two galleries, in each of which are two tracks of rails; one gallery was commenced on the 7th June, 1836, and finished, 9th March, 1837; the other is not yet completed. The breadth of each gallery is 7.40 m. (about 23 feet,) the height 6 m., (about 20 feet.

The number of persons going between Paris and St. Germain before the establishment of the railway, by public and private carriages, was estimated at 400,000 a year, or about 1100 per day; it was anticipated that this number would be increased in a tenfold degree; nor do we think the expectation likely to be disappointed: during the day the railway trains are always full, and on fine evenings and Sundays the crush to obtain places, is as suffocating as at the gallery door of a London theatre during the Christmas holidays.

The railway from Paris to St. Germain presents a summary of all the works that any undertaking of a similar nature, is usually called upon to execute. Two tunnels, the one with four double lines of rails under two parallel arches or galleries; the other with also four lines under a single arch. Three grand bridges over the Seine, of which one is of three arches of 150 metres, (480 feet); fifteen bridges for roads and streets, the names of which it is needless for us to mention, to pass over the railway; cuttings to the depth of 17 metres (60 feet,) embankments to the height of from 10 to 20 metres (32 to 64 feet,) and a stone quarry traversed.

The landscape, on the route of the line, is not of any particular interest. On crossing the Seine at Asnieres, are seen the magnificent Arc de Triomphe d'Etoile and the church of St. Dennis. The succeeding country is of a varying character. The forest of St. Germain, near which it terminates is the most extensive in the neighbourhood of Paris, containing 5,550 French acres. Its vicinity to the railroad is already attracting there a new stream of population. The *Maisons Laffitte*, and its vast park of 1500 acres is now, says a Parisian journalist, being transformed into *delicieuse colonie*, where are building under the direction of a young architect, M. Duval, "les constructions les plus variées, les plus agréables, les plus capricieuses, qu'il soit possible de voir." This *delicieuse colonie* is, thanks to the railroad, within forty minutes journey of Paris; and for 8000 francs, or £320, one may become the proprietor of an acre of land, well covered with wood, a pretty house and garden, and near the banks of the Seine.

The railway trains leave Paris at intervals, ten times a day; as also the same number of times from St. Germain. The departures are so arranged, that no more than one train shall be journeying on the railways at once; the time occupied in performing the trip, being from 25 to 30 minutes: indeed this arrangement is at present necessary, as for a great part of the length, the line is only a single track. The fares are from 1 to 2½ francs.

The utility of the railway-system as applied to France cannot be questioned. In the neighbourhood of the capital its effects will be most beneficial. The supplying of the markets of Paris, says a writer in the *Revue Britannique*, with articles of daily consumption, especially milk and vegetables, has been becoming more and more difficult from the increasing population; the great demand impoverishing the lands in the neighbourhood; the kine are being constantly drained to the last drop, and the gardens permanent dunghills. The swiftness of transport on a railway, he adds, being 6 or 7 times that of carriage on common roads, the produce of places six or seven times further distant from Paris than are at present available, would thus be brought into the market. And if lines were to radiate in all directions from the capital, with connecting branches, from 36 to 49 times the present extent of country would be laid under contribution for the supply of Paris.

On the other hand we have heard it objected, that the system of centralization, which gives Paris such a hold upon the whole country, would be increased by railroads; we think, however, that the effect would be the contrary, and that the general adoption of the railway system from the capital to the provinces, and from one province to another, would tend to equalize rather than centralize, influence and wealth, as well politically as commercially.—*Mechanic's Mag.*

The Report of the Liverpool and Manchester road is always regarded with interest, and particularly so after the present reverses which have operated to the great detriment of a road so entirely depending upon commercial prosperity, for the extensive transportation of merchandise. The enormous cost of the road is likewise to be considered, still the semi-annual dividend declared, is £4. 10s on the £100. The latest quotation of its stock, is £201 per share.

LIVERPOOL AND MANCHESTER RAILWAY—ELEVENTH HALF-YEARLY MEETING.

In their last Half-year's Report, the Directors had to notice that their general depression in trade, which for several months had occasioned a serious diminution in the traffic by the railway. They regret to be obliged to state, that the distress which, at that time, had just overtaken the mercantile community, has since increased and extended, in a degree almost unprecedented; destroying confidence, curtailing manufactures, diminishing exports, and assuming the fearful character of a national calamity.

It could not be expected that the railway, considered as a public carrying establishment, should escape the general pressure. Intimately connected with the trade and commerce of the country, the traffic by the railway, in the ***Merchandise Department***, has diminished with the diminished trade of this great commercial and manufacturing district. In the travelling department the receipts have somewhat exceeded those of the corresponding period of 1836; but our judgment of the receipts in both departments, should be formed, not by simple comparison with the receipts of last year, but by an estimate of that *ratio of increase*, the anticipation of which was warranted by former experience, and which only the prevailing stagnation in all mercantile adventure could have prevented.

Since the meeting of proprietors in March last, the Grand Junction Railway has been opened, for the conveyance of passengers between Liverpool and Manchester, and Birmingham. Proprietors are aware that the engines and carriages of the Grand Junction Company pass along the Liverpool and Manchester line, as far as the Warrington Junction. A considerable accession of revenue may be expected from this source. The last half-year's receipts, however, are not improved by any income from this quarter; the opening of the Grand Junction Railway not having taken place till the 4th of the present month.

The Act of Parliament for powers to raise additional capital for the relaying of the road with stronger rails, and for the general completion of the works, has received the Royal assent. By this Act, the Company are empowered to hold their Annual General Meeting for choosing Directors, in January, in each year, instead of in March. By this alteration, shareholders will be saved the inconvenience of attending a formal meeting in March, so soon after the more important meeting in January. Proprietors, accordingly, will be so good as to recollect, that the choosing of five Directors, in the place of those which go out by rotation, will take place at the General Meeting in January next.

The relaying of the road with stronger rails has been continued with little intermission through the last six months; the whole line will be completed in a few weeks from the present time.

The building of a handsome and commodious arrival station at Manchester, has been commenced; and the last suit of offices and package-rooms, at the Lime street station, is now in progress. These works will be completed before the meeting of proprietors in January next.

In their last Report, the Directors informed the proprietors, that in the same management of the railway, their primary object had been to provide that full satisfaction to the public, which affords, in its turn, the surest basis for the permanent prosperity of the railway.

In the half-year just closed, the coaching department has been conducted in a manner superior to what they had previously been able to accomplish. There have been more departures in the day, and the trips have been performed with greater expedition, and with more uniform punctuality; add to which, passengers at the Liverpool end are brought by the new tunnel, to the middle of the town, instead of being set down in Crown-street, a mile and a half from the centre of business. The means employed to attain this end have been principally a larger and superior class of locomotive engines, and very complete machinery for working the new tunnel.

The Directors regret that these improved, but at the same time, more costly arrangements, should have been brought into operation in a season of commercial difficulty; that when the Company were prepared to meet an enlarged business, the aggregate traffic should have been curtailed; that the scale of operations and expenditure should have been enlarged, in expectation of an increased business; while, owing to the peculiar circumstances and pressure of the times, the receipts have been diminished. The Directors nevertheless feel confident that the unremitting efforts of the Company to satisfy the expectations of the public will ultimately conduce to the permanent prosperity of the concern.

The following is a statement of Receipts and Disbursements for the Half year ending the 30th June, 1837.

RECEIPTS.

	£.	s.	d.
Coaching Department,	59,956	4	6
Merchandise ditto,	42,698	13	4
Coal ditto,	3,296	18	2
	105,951	16	0

EXPENSES.

Bad debt,	account	£221	18	0
Coach dis.	do.	10296	11	6
Carrying dis.	do.	9646	12	1
Coal dis.	do.	313	1	2
Cartage (Liv.)	do.	321	9	1
Do. (Man.)	do.	3613	2	0
Charge for direc.	do.	366	9	0
Com. (coach'g)	do.	59	9	6
Do. (carrying)	do.	201	0	3
Coach offices es.	do.	840	7	10
Engin'g. dep.	do.	125	0	0
Interest	do.	6253	8	3
Loco'e. power	do.	22154	19	6
Law disburs.	do.	150	0	0
Main. of way	do.	4113	4	3
Office esta.	do.	1002	2	8
Police	do.	1158	17	8
Petty disburse.	do.	50	5	2
Rent	do.	494	19	7
Repairs to walls and fences	do.	876	7	3
Stationary engine dis.	do.	965	6	6
Tunnel dis.	do.	476	17	3
Tax and rate account		2509	18	3
Waggon dis.	do.	2861	7	2
North tunnel	do.	1116	19	6
		70189	13	5
Nett profit for six months		35762	2	7

Statement of Receipts and Expenditures on Capital Account, from the commencement of the undertaking to 30th June, 1837.

The Treasurer, Dr. to—

Amount of joint capital in shares and loans	1,292,657	10	0
Amount of dividends not paid	1,141	6	2
Amount of reserved fund and interest	4,262	4	8
Surplus in hand after payment of the 13th dividend in Feb. 1837	6,377	15	11
Nett profit for the half-year ending the 30th June, 1837	35,762	2	7
	1,340,200	19	4

The Treasurer, Cr.

By amount of expenditure on the construction of the way and the works, including the new station in Lime-street, &c.	1,326,535	10	6
By ditto of balance of book debts due to the Company.	13,664	8	10
	1,340,200	19	4

By the foregoing statement of Disbursements, and a reference to previous reports, it will be perceived, that the gross receipts for the six months, ending 30th June, 1837, *fall short* of the corresponding receipts of 1836, by 3,405*l.*; whereas the receipts of the half-year, ending 30th June, 1836, *exceeded* those of 1835, by more than that amount.

While the receipts have been thus diminished, proprietors are aware that a half-yearly dividend must now be paid, on the first ***Instalment of 10l. per Share*** on the 7,968 new fifty pound shares, created in July last, as well as on 136½ new shares (issued in quarters) which the Directors were empowered to sell, to make up the aggregate capital authorised by the Act.

To the nett profit as per the foregoing statement	35,762	2	7
Must be added the surplus after paying the half-year's dividend in January last	6,377	15	11
Making a disposal nett balance of	42,139	18	6

The shares on which a dividend is to be declared are—

The old shares as heretofore equaling	£ 7,968$\frac{3}{4}$	100 shares.		
The 10*l* instalment on 7,968 Fifty Pound shares equal'g	796$\frac{8}{10}$	100 shares.		
And on the new shares sold by the Directors	136$\frac{5}{10}$	100 shares.		
Equaling in all	8,902$\frac{1}{20}$	100 shares.		
The Directors recommend to the proprietors a dividend on this number of shares of 4*l.* 10s. per share, making 40,059*l.* 4s. 6d., which, deducted from the disposable fund above stated		42,139	18	6
		40,059	4	6
Will leave a balance of		2,080	14	0

To be carried to the credit of the next half-year's account.

CHARLES LAWRENCE,
Chairman.

Liverpool, July 26, 1837.

BABBAGE'S CALCULATING MACHINE.

Much curiosity has been excited from time to time in regard to this far-famed miracle of art. The following account of the present state of the machine, is taken from a late work of Mr. Babbage, entitled, the "Ninth Bridgewater Treatise," and which, by the way, is no part of that Series, but rather a criticism upon certain of the actual Bridgewater Treatises.

"The nature of the arguments advanced in this volume having obliged me to refer more frequently than I should have chosen, to the calculating engine, it becomes necessary to give the reader some brief account of its progress and present state.

"About the year 1821, I undertook to superintend, for the Government, the construction of an engine for calculating and printing mathematical and astronomical tables. Early in the year 1833, a small portion of the machine was put together, and it performed its work with all the precision that had been anticipated. At that period circumstances which I could not control, caused what I then considered a temporary suspension of its progress; and the Government. on whose decision the continuance or discontinuance of the work depended, have not yet communicated to me their wishes on the question. The first illustration I have employed is derived from the calculations made with this engine.

"About October, 1834, I commenced the design of another and far more powerful engine. Many of the contrivances necessary for its performance have since been discussed and drawn according to various principles; and all of them have been invented in more than one form. I consider then, even in their present state, as susceptible of practical execution; but time, thought and expense, will probably improve them. As the remaining illustrations are all drawn from the powers of this new engine, it may be right to state, that it will calculate the numerical value of any algebraical function; that, at any period previously fixed upon, or contingent on certain events, it will cease to tabulate that algebraic function, and commence the calculation of a different one, and that these changes may be repeated to any extent.

"The former engine could employ about 120 figures in its calculations; the present is intended to compute with about 4000.

"Here I should willingly have left the subject; but the public having erroneously imagined, that the sums of money paid to the workmen for the construction of the engine were the remuneration of my own services for inventing and directing its progress: and a Committee of the House of Commons having incidentally led the public to believe that a sum of money was voted to me for that purpose, I think it right to give to that report the most direct and unqualified contradiction."—p. 170.

EXPLOSION OF STEAM-BOILERS.

The valves being in order, it is generally considered that explosions arise chiefly from the sinking of the water below a certain level. M. Sorel has proposed a method to obviate this by the introduction of a tube into the boiler descending a little lower than the said level. The orifice of the pipe is to be kept closed by means of a valve carried by a float, which sinking, as the water descends, beneath the desired level, opens the valve and permits the steam to pass out.—*London Railway Mag.*

FORCE OF THE WIND.

Few persons can have any idea of the excessive powor of the wind in high velocities. It appears from our table, No. 3, that at 40 miles an hour, which, is a high wind, the force is no less than 6lbs. to the square foot. How many of our glass windows would stand even this pressure with doors open behind them? At 80 miles an hour, which is a hurricane, the pressure is no less than 24·56lbs. per square foot. Against such a wind as this, it would be exceedingly difficult for the strongest man to keep his legs; to walk against it would be out of the question. At 100 miles an hour, it is said the wind would sweep every thing before it; the pressure would be 38·36lbs. to a square foot. There are few houses of any size, which standing singly, would not present 1.000 square feet. In such a hurricane the power of the wind would be no less than 38,360lbs. or above 17 tons, against a house with 1,000 square feet of surface. Its chance of resisting so enormous a force would therefore be very little.—*Ib.*

INVENTION TO SUPERSEDE THE USE OF STEAM.

An invention we have heard, is shortly expected to be laid before the public, by which steam will be, in a great measure, if not wholly, superseded. We are unacquainted with the particulars of the invention, but we have been assured, from two several quarters, that it is simple and efficacious; and is now waiting for the completion of one point in the universal application, which, it is supposed, cannot be long an obstacle.—*Ib.*

STEAM-ENGINES WITHIN THE BOROUGH OF BIRMINGHAM.

By a report made to the Birmingham Philosophical Institution, October, 1836, it appears that 169 steam-engines had been erected from 1780 to that period, of which 17 had been erected in 1834, and 22 in 1835. The total horse power was equal to 2,790 horses. Within the same period engines equal to 162 horses' power had become void, or removed. Of those erected and estimated in horse power, 275 were used for grinding flour; 6,770 for working metals; 279 for pumping water; 87 for glass grinding; 97 for working wood; 44 for paper making and glazing; 37 for grinding clay; 61 for grinding colours and chemicals; and 50 for sundry purposes. The estimated consumption of coals is 216 tons per day; estimated number of persons employed, 4,000 males, and 1,300 females; and the estimated amount of power hired out, equal to 450 horses. These estimates are confined to engines within the borough, and, of course, do not include the great Soho works of Bolton and Watt.

Of the 1,770 horse power employed in working metals, it is computed that 162 is used by iron founders, first applied in 1788; 570 in rolling copper, brass, and other metals, first applied 1790; 150 in drawing wire, first applied in 1808; 201 in iron forges, and wrought iron mills, first applied in 1810; 74 in nail cutting, first applied in 1813; 104 in screw making, first applied in 1819; and 34 in drawing metal tubes, first applied in 1822.—*Ib.*

GLASS CLOTH.

Richard Barker and Son, of Ossett-street-side, near Dewsbury, have fonnd out an improvement in glass, and have it so pliable that they can make a cloth or fabric of the finest texture. They have pieces of this glass two yards and a-half long and from nine inches to thirty-six inches in breadth; they have also made some very fine ladies' head-dresses or ornaments from this material, which are considered both very curious and useful.—*English Paper.*

RESISTANCE OF RAILWAY TRAINS.

Dr. Lardner exhibited some new investigations on the resistance of railway trains. The principal new element introduced was that of the gyration of the wheels, which seems to have been neglected by Pambour and others. Dr. L. gave the data and results of some expements to which he had applied his theorems; and, what is very singular, found the resistance of the train, abstracting the excess of resistance of the engine, to be eight pounds and a half per ton, which he still thought was a little too much, coinciding very nearly with eight pounds, which Mr. Herapath afterwards said he had deduced from some experiments of his own, and used in calculations. We expected to be able to give Dr. Lardner's theorems, but have not been furnished with them. Mr. Vignolle observed that Wood had taken into account the rotation of the wheels; on which it was remarked, that Wood's theorems were never used. Dr. Lardner than made some observations on the practical unimportance of atmospheric resistance in his experiments, which we believe was misunderstood to mean a general neglect of the atmosphere; whereas, from what he afterwards said to us, he meant that his experiments were made at a velocity of only nine or ten miles an hour, and with heavy trains, exposing so little surface as to render the resistance unimportant. Dr. Robinson and Mr. Vignolles decidedly expressed their dissent from neglecting the effect of the air, and Mr. Herapath stated in some experiments he had made, that to a load of thirty tons the air at a velocity of thirty-two miles an hour, that at which he travelled, added an apparent load of twenty-one tons more, and that trains which in a non-resisting air would move at a rate of sixty miles an hour, were by the air's resistance reduced to about forty. Mr. Roberts, of Manchester, made several pertinent observations, and so did Mr. Hardman Earle. Mr. R. said that he once made a top which would spin for thirty-seven minutes, but when gilded, only seventeen minutes—a practical hint for making pendulums. Dr. L. concluded with expressing a wish that the Association would direct some experiments to be made on this very important and interesting subject, which was loudly re-echoed by the section.—*London Railway Magazine.*

CAVENDISH'S EXPERIMENTS.

Government has granted 500*l.* to the Royal Astronomical Society towards repeating the experiments of the Hon. Mr. Cavendish, made about half a century since, and Mr. Francis Baily has granted the use of apartments in his house. With the experience of the present day great discoveries, towards unlocking the secrets of many phenomena, are expected to result from the inquiry. It will take from one to two or more years to finish them when begun.—*London Railway Magazine.*

LARGE METEORIC STONE.

A recently received Halifax (Nova Scotia) paper says, that while several of the inhabitants of Montmorot, in the Jura, were at work in the vineyards which are close to the old castle there, they heard a noise which sounded like a distant clap of thunder, and saw a mass fall down into the vineyard of an innkeeper, named Michaud. On being examined, it was found to be about five feet high and three feet broad. It is of a grey colour, resembling pumice-stone, but marked with ferruginous particles. —*Ib.*

IMPROVEMENT IN THE STEAM ENGINE.

Professor Nollet, employed in the Museum of the State, has just completed a most important invention; viz., a steam-engine exempt from all danger of explosion, not expensive, occupying but little space, and the moving power of which, at the same temperature as the ordinary machines, has a power six times as great, reducing by one-fifth the consumption of fuel, which is an immense advantage, not only in respect to economy, but to the smaller space which may be required for the stock of coals.—*Brussels Paper.*

NEW LOCK.

M. Lettestu has invented a lock, by which the bolt is drawn into the staple by a circular instead of a rectilinear motion. When shut it is said to resist, by its construction, both the opening of the door and the slipping of the frame, (chambranle). The key to move the bolt acts in a nut composed of several little rundles (rondelles); springs carried by some, fastened by others, and unfastened by projections conveniently constructed on a bit of the key, form the garniture or guard of the lock. The several pieces composing the nut, although of a similar exterior dimensions, are various within, and may be replaced from one lock to the other.

COLOSSAL STEAMERS.

In addition to the information we supplied of the great steamer building at Curling and Young's in our last, the *Morning Herald* has furnished the following:—

"After deducting her engine-room, she will have ample accommodation for 500 passengers, 25 days' fuel, and 800 tons measurement goods, exclusive of luggage, provision and stores. The enterprising spirit evinced, may be readily gathered from the following estimated expenses of the voyage out and home again. They are as follows:—

Wages, provisions, and stores for crew .	£ 666	0	0
Coal out and home .	1,140	0	0
Port charges, &c. .	1,378	0	0
Insurance, interest, &c.	2,000	0	0
	£5,184	0	0

List of subscribers to the Railroad Journal, who have paid since the 18th of August last.

J. W. Judson,	Ashford, Con.	July 1, 1838
S. Bailey,	Bolivar, Tenn.	March 1, 1838
E. Morris,	La Grange, "	Jan. 1, 1838
J. Noonan,	Baltimore, Md.	" 1, 1838
N. B. Bufford,	Frankfort, Ky.	July 1, 1837
W. R. Hopkins,	Chambly, L. C.	" 1, 1837
L. O. Reynolds,	Savannah, Ga.	Jan. 1, 1838
R. Higham,	Utica, N. Y.	" 1, 1838
L. D. Jaques,	Painesville, Ohio,	July 1, 1838
J. R. Grout,	St. Josephs, Mich.	Jan. 1, 1838
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Dr. J. W. Francis,	City,	" 1, 1837
D. B. Blanchard,	Shawneetown, Ill.	" 1, 1838
Lucius Lyon,	Detroit, Mich.	Aug. 1, 1837
J. Gore,	Black Creek Valley, Va.	May 1, 1838
Central R. R. & Banking Co.	Savannah, Ga. (Advertising)	Aug. 1837
Do	Do Do (Subscription)	Sept. 1, 1838
Mr. Schoenever,	Brooklyn, N. Y.	Jan. 1, 1838
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Hugh Gillean,	Harpers Ferry, Va.	Oct. 1, 1837
Western R. R. Co.	Jackson, Tenn.	Jan 1, 1837
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Judah Dobson,	Philadelphia, Pa.	" 1, 1838
W. Gregory,	Pensacola, Fa.	" 1, 1839
John Rutter,	Yorkville, N. Y.	" 1, 1838
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N. Y. & Erie R. R. Co.	"	" 1, 1838
L. N. Vilbard,	Orange, N. Y.	" 1, 1838
E. A. Douglass,	Mauch Chunk, Pa.	Dec. 6, 1837
A. Barrett,	Lockport, N. Y.	Jan. 1, 1838
A. & A. H. Belknap,	Newbury, N. Y.	Oct. 20, '37
A, Stein,	New Orleans, La.	Sept. 1, 1838
J. Drake,	Cincinnati, Ohio.	Jan. 1, 1838
T. H De Witt,	Stone Wall Mills, Va.	" 1, 1838
R. Carter,	Bushnell's Basin, N. Y.	" 1, 1838
Kamthers & Erskine,	Salt Sulphur Springs, Va.	May 10, 1838
J. De Frias,	Havana, Cuba,	Jan. 1, 1838
J. Archibald,	Carbondale, Pa.	" 1, 1838
W. B. Gilbert,	Dixon's Ferry, Ill.	Oct. 1, 1838
R. J. Davis,	Tye River, Va.	Jan. 1, 1838
Minard Sturgess,	New Albany, Ind.	" 1, 1838
C. W. Mills,	Natches, Miss.	Oct. 1, 1837
F. Spofford,	Bucksport, Me.	Jan. 1, 1838
James Hayward,	Cambridge, Mass.	" 1, 1838
S. Abbott,	Woburn, "	" 1, 1838
W. N. Grover,	Canton. Ill.	" 1, 1838
M. Coryell,	Harrison, Ohio,	Sept 1, 1837
T. S. Brown,	Dunkirk, N. Y.	Aug. 26, 1837
E. Ross Bittle,	Cooseta, Ala.	July 1, 1838
P. Mitchell,	City,	Jan. 1, 1838
W. B. Thompson,	Richmond, Va.	Nov. 22, 1838
Engineer Office,	Washington, D. C.	Jan. 1, 1838
Elihu Wing,	Quaker Hill, N. Y.	" 1, 1838
Samuel Hall.	Princeton, Inda.	July 1, 1838
Durfee, Coleman & Co.	Hudson, N. Y.	Jan. 1, 1838
Do.	Do. Do. (Advertising)	Aug. 1, 1837
Allen Harris,	Central Village, Con.	Mar. 20, 1838
W. J. Lewis,	Columbia, S. C.	Jan. 1, 1838
J. J. Myers,	Poplar Springs, S. C.	" 1, 1839
E. Lord,	Tappan, N. Y.	Sept. 1, 1837
Dan. Whitney,	Navarino, Wisconsin,	Jan. 1, 1839
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Hugh Fitz Patrick,	Rock Run, Md.	" 1, 1839
Daniel Mc Clain,	Philadelphia, Pa.	" 1, 1839
Alfred Hovey,	Saganaw, Ill,	" 1, 1839
A. A. Dexter,	Montgomery, Ala.	" 1, 1838
Do.	Do. Do. Advertising	" 1, 1838
E. & G. W. Blunt,	City,	" 1, 1838
Do.	Do. Do. Advertising,	" 1, 1838

*** Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS Mc NEILL,
Chief Engineer.

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.: Atlas, Boston; Philadelpia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment.

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. do. cast steel Shovels & Spades
150 do. do. Gold-mining Shovels
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
Fo. 8 State-street. Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR,
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street,
NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Instruments made to order and repaired.

1y—14

RAILWAY IRON, LOCOMOTIVES,

&c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars; with countersunk holes and mitred joints,

								lbs	
350	tons	2	by 5/8,	15 ft in length,	weighing			$4\frac{68}{100}$	per r
280	"	2	" 1/2,	"	"		"	$3\frac{50}{100}$	"
70	"	1 1/2	" 1/2,	"	"		"	2 1/2	"
80	"	1 1/4	" 1/4,	"	"		"	$1\frac{25}{100}$	"
90	"	1	" 1/4,	"	"		"	7/8	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2 1/2, 2 3/4, 3, 3 1/4, 3 1/4, 3 1/2, and 3 1/2 inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEW YORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

*** All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL,

AND

ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.]

SATURDAY, SEPTEMBER 23, 1837. (Published January 27, 1838.)

VOLUME VI.—No. 38.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 27, 1838.

BUFFALO AND ERIE RAIL ROAD REPORT.

T. S Brown, Chief Engineer.

To the President and Directors of the Buffalo and Erie Railroad Company.

GENTLEMEN,—Having, in compliance with your instructions, completed the preliminary surveys of the Buffalo and Erie Railroad, together with the estimates based thereon, I have the honor to submit the following report.

I. *General description of the line.*

The Buffalo and Erie Railroad will extend from the western limits of the State of New-York, eastward, along the south shore of Lake Erie, to Buffalo; a distance of about 70 miles. At its western extremity, it will connect with a railroad, to be hereafter chartered by the State of Pennsylvania, leading to Erie, and thence to the line between Pennsylvania and Ohio. From the eastern boundary of Ohio, along the shore of Lake Erie, to the western extremity of the Lake, Railroad charters have already been granted, and at different points of the line, the construction of the road has been commenced. It is believed, also, that railroad charters already exist, and that surveys have been made, and even construction begun on a connected line of roads, extending westward from Lake Erie to the southern extremity of Lake Michigan, and thence, in the same direction, to the Mississippi river. At Buffalo, the eastern extremity of your road will connect with the continuous line of railroads, constructed, and to be constructed, leading from Buffalo to Albany, whence, by means of the western Railroad of Massachusetts, a communication will soon be opened with Boston. The Buffalo and Erie Railroad, is therefore, an important link in that grand chain of railroad communications, which, by the route along the Erie Canal and the shores of the Great Lakes, is to connect Boston with the Mississippi river, the extreme east, with the extreme west. This line is intersected at various points by important lateral branches which will serve to swell the amount of its business, and to dispense to all parts of the widely extended country through which they pass, the advantages of a cheap and rapid mode of intercourse. At Dunkirk, forty-two miles west of Buffalo, your road will connect with the western termination of the great New-York and Erie Railroad, which commencing at Tappan on the Hudson River, will proceed westward through the southern tier of Counties of the State of New-York, to Lake Erie. To that work, yours will be an important auxiliary, and from the connection between them, when completed, much profit cannot fail to accrue to your Stockholders.

Desisting from these general views, I will proceed to describe, more particularly, the route of the Buffalo and Erie Railroad.

Commencing at a point on the western boundary line of the State of New-York, within a few rods of Lake Erie, in the new village of Napoleon, the line proceeds in a northeasterly direction, inclining at first inland, for the purpose of avoiding the numerous ravines into which the surface is cut immediately adjoining the Lake shore. Having in a length of two miles, attained a distance from the shore of about one mile, the line for about six miles will run on extremely favorable ground, parallel to the shore, and below the ridge on which the postroad is constructed. Here it will again be necessary to converge towards the Lake for a distance of two miles, for the purpose of attaining a favorable point for crossing Chautaque Creek.

At Westfield, and for some distance below, the ravine formed by this creek is very wide and deep, but near the Lake in the village of Barcelona, (Portland Harbor,) a point for crossing is found, which though still requiring the construction of a bridge of considerable extent and cost, is the best which can be obtained.

Passing through the village of Barcelona on the line either of 8th or 6th street, the line will again diverge from the Lake, and crossing numerous ravines, will once more reach the smooth and favorable surface immediately below the ridge occupied by the main road. Running close under the foot of this ridge, the line passes about half a mile north of Centreville and Salem, and crosses Coney's creek and Slippery Rock Creek, at points where no difficulties are presented, though nearer the Lake, the ravines of both these creeks would offer very formidable obstacles. Soon after passing Salem, the line changes direction, and converging towards the Lake, crosses the ravine formed by the Little Canadaway Creek where it is 600 feet wide and twenty deep, the creek itself being only twenty or thirty feet wide, and one or two deep. Leaving Van Buren harbor about a mile to the north, and crossing the Canadaway Creek at a favorable point, the route will pass over some broken ground, and entering Dunkirk, will curve into the line of Third-street, down which it will proceed to its intersection with Lion-street. At this point, which is eighteen miles from Barcelona, or twenty-eight from the State Line, your road will intersect the New-York and Erie Railroad.

In running the experimental lines, all the Lake shore villages have been included in the route, except Van Buren. It was found on examination that the road could not be taken through this place without incurring considerable extra expense, by crossing the valleys of Coney's Creek, Slippery Rock Creek, and Little Canadaway Creek at unfavourable points, besides encountering numerous ravines, which the line, as actually run, avoids; or without approaching Van Buren from the westward, at a rate of descent much greater than has been found necessary on any other part of the road. East of this village the ground is very favorable. A knowledge of the positions and elevations of certain fixed points has led to these conclusions without the necessity, for the purpose of a preliminary survey, of actually running a line of levels through Van Buren. It will undoubtedly be for the interest of the Stockholders, that the road should pass through as many villages as possible, and particularly where the villages are situated at harbors on the Lake, but if future careful surveys should confirm what is rendered probable by the partial examinations already made, it will evidently be better that Van Buren should be connected with the main route by a short branch, than that the road should be seriously injured by taking it there in opposition to the requirements of the ground and to true principles of location. The railroad already chartered, which is to connect Van Buren Harbor with Fredonia, will cross your road not far from half way between those places, and might very conveniently, serve as a branch leading to both.

Proceeding eastward from Dunkirk, the line will follow the course of 3d street for nearly a mile, and then bending more towards the Lake, and crossing several creeks and ravines over eight miles of surface, which is on the whole rather favorable, will pass just to the north of the residence of Oliver Lee, Esq., at Silver Creek, and will strike Silver Creek in the village of Fayette, at a point two or three hundred feet from its mouth. Leaving the creek, the line curves around Oak Hill which lies immediately to the east of it, upon the top, and near the brink of the precipitous rocky bluff forty feet high, which at that place forms the Lake shore.

The valley of Silver Creek, and Oak Hill beyond, present obstacles which appear somewhat formidable; but by passing the road over the valley at a considerable height, by means of a trestle bridge, the alternatives, of steep grades, or of deep cutting and heavy filling, are both avoided at a comparatively moderate expense.

Having cleared Oak Hill by means of two curves of 2500 feet radius, their curvatures being in opposite directions, the route continues on favorable ground to Irving, at the mouth of Cattaraugus Creek, three miles distant from the flats, adjacent to Cattaraugus Creek, are occasionally subject to be overflowed, but this evil will be much diminished when the United States works of improvement at the mouth of the harbor are completed, and a very moderate embankment will obviate all inconvenience from this cause.

Crossing Cattaraugus Creek at a point either immediately adjacent to the new bridge, or at a considerable distance above it, the line traverses the Cattaraugus Indian reservation, where it is only a mile and a half wide, and conforming with the direction of the Lake shore, will bend considerably to the north, for the purpose of keeping upon the favorable surface extending between the Lake and the high and broken ground occupied by the old Erie road. Four miles from the Cattaraugus, in the rear of Cash's tavern on the lake road, a ridge is encountered, running in a direction nearly perpendicular to the line, and terminating in a bluff upon the Lake, and immediately east of the ridge, follows the wide and deep valley of Mud Creek. In passing this ridge a cut will be necessary, which will extend about 2500 feet, with a mean depth of seven feet, and the grade line will pass over Mud Creek Valley for a distance of 900 feet, at a height above the surface of from fifteen to twenty-five feet. From Mud Creek to Big Sister Creek, crossing Delaware Creek, the line passes over very favorable ground. Bending around the point of high ground occupied by Mr. Taylor's farm at Big Sister Creek, the experimental lines of survey have crossed that creek within a few rods of the point where it is crossed by the old Erie road. From this place, which is eight miles from Cattaraugus Creek, or twenty miles from Dunkirk, and about a mile and a half from the lake shore, the line again turns inland, and proceeds in nearly a direct course over ground which is not unfavorable, except that it will require an ascending grade of twenty-five feet to a mile, to the point selected for crossing Eighteen Mile Creek, five miles distant. This crossing place is about two and a half miles from the Lake, and a short distance above the small village, at the mill owned by Mr. Burland. The whole course of the creek for about three and a half miles from the mouth, was carefully examined, and this point chosen as offering, on the whole, the fewest disadvantages. Here the chasm formed by the stream is about 400 feet wide, with precipitous rocky banks on each side, and the height of the grade line above the bottom of the ravine will be about ninety feet. This ravine is the most formidable obstacle which is encountered on the whole road It is proposed to pass it by means of a wooden bridge resting upon two piers, the abutments, and also the piers for a height of thirty feet, to be of masonry, and the upper part of the piers to consist of substantial frames of timber, capable of supporting securely the bridge and load. Progressing eastward, the grade line continues slightly to ascend for a distance of about two miles, when it reaches an elevation above the Lake of nearly 160 feet. To descend from this elevation by an easy slope on favorable ground, required for five miles numerous and careful examinations. In the end a line was determined, which converges considerably towards the Lake, and winding down along the northern slope of the high ground east of Eighteen Mile Creek, at a rate of descent not greater than it has been necessary to adopt on other parts of the road, proceeds in a direction on the whole remarkably straight, towards Buffalo. A point on this line four and a half miles east of the place of crossing Eighteen Mile Creek, is about one hundred feet above the Lake, and one mile distant from it. From this place, the line, continuing to descend over a very favorable surface, with the exception of a few deep and wide ravines by which the ground is furrowed, extends three and a half miles to a point about a mile east from Comstock's tavern, on the Lake road, and about three-fourths of a mile from the shore. In the vicinity of Comstock's, the Lake coast turns towards the north and west, nearly at right angles to its previous general direction, and the railroad route conforming to it, bends in a similar manner. From the point of this route last mentioned, one mile east of Comstock's, and about six miles from Buffalo, two routes have been surveyed leading into this city. One, running parallel to the shore soon enters the Buffalo swamp, and passing for the last three miles between the turnpike and the Lake, and but a few hundred feet from the water, crosses Buffalo Creek on the line of Ohio-street just above the present toll bridge, and proceeds down Ohio-street, towards its junction with Main-street. The other, keeping back from the Lake about one and a half miles, and upon the Indian land, will pass over the Buffalo swamp where it is not wide, and will cross Buffalo Creek one mile and three-fourths above the turnpike bridge. From this place the line follows the course of the Abbott road towards the city of Buffalo, and entering Elk-street, near the boundary line of the Indian reservation, may proceed down that street or any of the streets parallel to it towards Main-street. It will be for the directors to determine which of these routes shall be chosen for final location; and for the purpose of making this choice, careful estimates and statements of their comparative cost and advantages, will at a proper time, be presented. The route last mentioned, has on account of its cheapness, been selected for the estimate contained in the present report.

The foregoing general description applies to the route of the road as determined by the examinations which have actually been made; but it is important to remark that material modifications of it will undoubtedly be suggested by further surveys, particularly from Buffalo to Dunkirk; and it is not impossible that a line may be found, differing entirely from, and possessing advantages superior to the one now described.

In considering the profile of this road, the principal remark which it is important to make, is, that though it is to be constructed immediately adjacent to the waters of Lake Erie, it will have no resemblance to a road built in the valley of a river. The grade line far from being on the whole nearly level, is broken into a continual succession of ascents and descents. At the State Line, Portland harbor, Dunkirk, Cattaraugus creek, and Buffalo, the height of the road is only from 10 to 40 feet above the Lake; but between all those places there are one or more summits, varying in height from 100 to 160 feet. This undulating character of the road, results chiefly, from the necessity of approaching the Lake at certain points, for the purpose of attaining good places for crossing some of the streams, as at the State line, to secure a good location for crossing Twenty-Mile creek in the State of Pennsylvania, and at the mouths of Chautauque creek, Canadaway creek, Silver creek, and Cattaraugus creek; and of receding from the shore on other parts of the line, to avoid ravines, and ridges terminating at the edge of the water in abrupt rocky bluffs. As the face of the country generally inclines towards the Lake at a considerable angle, the distance of the line from the shore cannot be varied, without causing a corresponding variation of level. It gives me pleasure, however, to inform you that the rise per mile will no where exceed twenty-five feet, and that there will not be any curves of less than 2500 feet radius. As the chief points for the receipt and delivery of freight coincide nearly with the Lake level, the ascents and descents between these points will be equalized. The greatest inclination upon your road being as before stated, only 25 feet per mile, on which slope it may be assumed that the gravitating force of the load will be nearly equalled by the friction, the loss of power resulting from the undulations in the grade line, will be much less than might be supposed. The load attached to a Locomotive Engine of given power, will necessarily be limited to that which the steepest grade on the line can be overcome; but in consequence of the compensating effect resulting from the action of gravity on the descending slopes, the measure of the mechanical effort necessary to transport this load from any point at the level of the Lake to any other point at the same level, will be no greater than if the road between were horizontal, and of equal length, except on account of the loss of power arising from the additional friction, produced by the action of the load upon the Engine on the ascents. Practically speaking, the variable action of the Engine will be productive of inconvenience; but this evil may to a considerable extent, be obviated by proper management on the part of the Engine man. Having these important principles in view, it has appeared to me proper to diminish the cost of the road by regulating the grade in short portions, so that it will conform nearly to the various slopes of the ground, always taking care, of course, to keep the inclination below the limit assigned above as the maximum. It has also been my object to keep the grade line, as much as possible, from one to two feet above the surface of the ground, with a view to the use of the road in the winter season, and on account of the wetness of soil; and hence, the estimates show a considerable excess of embankment over excavation. Great improvements in the adjustment of the grade lines will undoubtedly result from further examinations, but it is not probable that any route can be found which will be cheaper than the one I have described.

(To be completed in the next.)

From the London Railway Magazine.

PRINCIPLES AND PRACTICE OF LEVELLING.

BY THE EDITOR.

Simultaneous or Intermediate Levels.

Where the ground is irregular or much undulating within a short distance, levellers elude the trouble of several adjustments of the level, by fixing on a spot commanding a number of them at a moderate distance, on one side of the line to be levelled. In the ordinary way of fore and back observations, a little inaccuracy of the level, or in its adjustments, will not show itself, because on an average the distance of the fore and back observations are about equal, and therefore inaccuracies, or want of perfect adjustment, nearly balance each other; but in the cases of intermediate levels, it is much more needful that the instrument be a good one and truly adjusted.

It is also advisable that the instrument be set up as nearly as possible equi distant from the first and last positions, particularly, if they are any great distance from it.

The following plan of registering simultaneous levels is from the managing surveyor of a very eminent engineer. For fewness of entries, it is preferable to one we have been in the habit of following. But we think ours has the advantage in simplicity and detection of error. We shall describe both.

The first of a series of simultaneous levels this gentleman enters as a back sight, and all the rest, including the last, as fore sights. No intermediate back sights whatever are entered, as in the annexed specimen. The differences between these fore sights and the back sights, give their respective rises or falls. He, however, only reduces the first and last sight, and recommends all the intermediate one to be left to the last, "that the addition or subtractions of them may not be mixed up with the general running levels." He also advises their rises, falls, and reduced levels to be entered in red ink, which will always mark their character; or he otherwise puts a mark against the last fore sight, as for instance, against 1·50 and 4·52 in the following specimen. To find the reduced levels of these intermediate points their rises and falls are separately referred to the former principal reduced level. For example, in the following field-book, we start at an elevation above some point of 240 feet; and therefore 3·35, 1·85, 2·20 are severally added to, and 4·60 subtracted from 240·00 to obtain their respective reduced levels. In the same way 2·80, 4·00, 1·00 are also separately added to, and 2·80 subtracted from 244·50 to have their corresponding reduced levels.

Back Sights.	*Fore Sights.*	*Rise.*	*Fall.*	*Red' d Levels.*	*Dist.*	*Observations.*
Back Sight on Canal.				*Feet.*	*Ch Lk.*	
				+240 00		On Surface of Canal.
6·00	2·65	3·35	....	243·35	4·50	
	4·15	1·85	....	241·85	......	At cor. of hedge on right.
	3·80	2·20	....	242·20	......	20 lks. from house on left.
	10 60	....	4·60	235·40	7 10	In Hollow.
	1·50 ×	4·50	....	244·50	9 00	On Brow of Bank.
9·20	6·40	2·80	....	247·30	12·00	On Line.
	12·00	....	2.80	241·70	13·00	Ditto.
	4·60	4·60	....	249·10	......	To rt. of last dist. 200 lks.
	8·20	1 00	....	245·50	......	To left ditto 150 links.
	4·52 ×	4·68	....	249·18	17·50	On line (at cor of fence.)

By the same method, which is very simple and economical, all the intermediate reduced levels are separate independent reductions, and no succeeding reduced level will afford any test of the truth of the preceding. It is true the operations are very simple and easily gone over again; but always in figures it is considered an object, where errors are so likely to creep in, to make, if possible, the last computation a proof of the accuracy of all the preceding. This is our plan, which is done by entering each of the intermediate sights a fore sight to that one which precedes it, and a back to the one which follows it. We then proceed precisely as in the case of ordinary running sights. Thus we should make 2·65, 4·15, 3 80, 10·60 respectively back observations to 4·15, 3·80, 10·60, 1 50; and so likewise 6·40, 12·00, 4·60, 8 20, respectively back observations to 12·00, 4·60, 8·20, 4·52. In the addition of verification, however, these intermediates would have the pen drawn across them, and be left out. So that we should leave no more figures to add up than the preceding method, while the reduced levels would all be dependent, and betray at the end any error in the previous parts.

We may also save labour in using the rising and falls as verifications, by striking out all but those which stand opposite to the last of the fore observations. By this means our addition in the columns of "rise" and "fall" is reduced to the same as the preceding method. We have described the two, leaving it to our readers to use whichever they prefer. As we said above, we admit the former to be more economical in entries, but we think the latter more uniform and secure against the existence of error.

Cross Sections.

Whenever the country is to be instrumentally examined for a line of railway, it is usual, when carrying on the operations of levelling to take a number of cross sections at various points, connecting them all with the main system of levels, so as to be referable to one common datum line. Some engineers having settled in their own mind nearly the line they intend to follow, simply direct cross sections here and there to be made for short distances, with a view of seeing where and how any little deviation can be made to advantage. Others procure the best maps they can of the country, and order all the roads, lanes, and paths, if laid down, to be levelled for miles round, and the levels of the principal points to be marked on the maps. By this means, they get a pretty correct representation of the face of the country. Others, again, direct a system of reticulated levellings carried through the lowest parts of valleys and the highest ridges of hills, which they also carefully lay down on a map. This is the best possible method next to modelling a country; for the most advantageous line can afterwards be determined in the closet to the greatest nicety, and better than it could in the field.

Where the surface of a country is very irregular, it is not merely cross sections to the principal line of levels that are taken, but cross sections to the cross sections themselves, even to the third, fourth, and higher degrees. In all these cases it will be the best, and in the end the least expensive, as it will be the most correct way, to make a survey of the country first, unless good maps can be obtained, and enter on the plan itself the levels. But these are matters that do not belong to observations on levelling strictly speaking. I merely mention the matter to show young engineers the immense labour that is required for settling the best line between two given points, when the ground is troublesome. Upwards of 1,000 miles, I am informed, were levelled before the line of the Midland Counties was finally fixed on.

Levelling with the Theodolite.—General Description of the Theodolite.

It would take up too much room for us to go into a full description of this very useful instrument. We must therefore refer our readers for details to a neat little work on the "Principal Mathematical Instruments used in Surveying, Levelling," &c., by F. W. Simms. We may observe generally, that the object of a theodolite is to measure vertical and horizontal angles. For this purpose it is constructed on two brass, circular, horizontal plates, chamfered off at the edges, easily sliding on each other, and round a common axis. The circumference of the lower plate is divided into 360 degrees and half degrees, and sometimes into quarter degrees, or less. On the upper is one, and occasionally two or three, noniuses, for the purpose of subdividing the divisions on the lower plate into minutes or less of a degree. With these plates the horizontal angles are measured; the upper one generally carries two small levels at right angles to each other. The telescope has a spirit level attached to it, and is mounted in Ys, as in the common level; but these Ys are fixed to an axis supported on two upright arms on the upper plate, and to a portion of a graduated circle beneath them. A vertical motion is thus given to the telescope, and the graduated circle slides close to a fixed nonius, by which its divisions are subdivided into minutes or less. For moving the instrument very accurately, and by very small quantities, there are various clamps and tangent screws, or rack work to which it is unnecessary more particularly to advert.

On the other side of the graduated arc, there usually is a series of divisions marked "*difference of base and hypothenuse;*" and another marked "*perpendicular in* 100 *of base.*" According to the angle of elevation or depression, the former shows how many the base is of the same denomination less than the hypothenuse, supposed 100, whether it be chains, links, feet, &c. The latter also shows how many of the same denomination the perpendicular is, the base being 100.

We might here observe, that as there is no instrument more useful than the theodolite, so there is none that has been made in a greater variety of shapes and forms, which has arisen from the numerous attempts to improve it.

Rectification and Adjustments.

The first adjustment is to fix the crossing of the wires in the optic axis of the telescope, which is described p. 66 of the last number.

The second is that of determining the error of the vertical reading vernier, or of ascertaining the position of the telescope when its axis is parallel to the plane of the plates. Turn the upper plate round until each of the levels on it is parallel, or nearly so, to a pair of the adjusting screws beneath, like those in the level. Then by aid of these screws, and guided by the said levels, set the plate as correctly as possible level. Turn the intersection of the cross wires now to a particular part of some distant object, and read off the apparent elevation or depression of it on the part of the vertical circle by aid of the nonius. Take the telescope out of the Ys (previously thrown open for fear of disturbance,) and reverse it. Then turn the upper plate half way round, and point the intersection of the cross wires again to the beforementioned particular part of the distant object. The reading of its apparent elevation or depression will now be on the contrary side of zero on the vertical arc. If the two readings are the same, the nonius is correct; if not one-half the difference from the limb zero towards that side on which the greater reading was, is the true position of the zero. In all vertical angles, therefore, this half difference must be added to readings on the opposite side of the limb zero, and subtracted from those on the same side as the true zero is.

Third Adjustment.—Having set the plates level, and brought the true zero of the limb just found to the zero on the vernier, the axis of the principal level, that attached to the telescope, may be set very nearly parallel to the line of collimation of the telescope, by simply turning the screw at one end of it until its bubble settles in the middle. But the accurate adjustment must be made and proved as described in pp. 66 and 67, No. 18.

Fourth Adjustment.—The preceding adjustments enable us to set the axes of the telescope and level parallel to each other, and to a line in the plane of the plate under the telescope. The next and last adjustment we shall notice is that of making the vertical plane in which the telescope moves, truly perpendicular to the plane of its horizontal motion. Ordinary levels have no adjustment of this sort provided: the instrument is supposed to be turned out true in this respect from the hands of the maker. In very fine theodolites the frame carrying the pillars which support the axis round which the Ys turn, is fastened by three screws to the upper plate. With these the adjustment is easily made. When the adjustment is perfect, and the plane of the plates is set truly horizontal, if the intersection of the wires be turned on some well-defined elevated object—the more in reason the elevation the better—and then without moving the instrument the telescope be turned on the horizontal axis, until the said intersection fall on the reflected image of the body in any good liquid, as mercury, it will cut it in precisely the same point. If the intersection passes to the right or the left of the point, the adjustment is not complete, and must be altered.

Practice of Levelling with the Theodolite.

Though of much greater power and capability than the ordinary level, the theodolite is not so much used in practical levelling. This arises partly from its greater expense, partly from its more complex construction and liability to get out of order, and partly from its greater weight and inconvenience.

When the theodolite is substituted for the common spirit level, the point of true zero is brought to the zero on the nonius and clamped to it, after which the operations are precisely the same. But the method peculiar to the theodolite, and that in which it has a decided advantage over other instruments, consists in finding from a single sight the difference of level of any two places within view of each other, whose direct distance is given or can be measured.

For this purpose the theodolite is set up at one end of the stations, and the height of the centre of the level is measured by taking a mean, if the ground inclines much, of the heights of the eye and object ends of the telescope, when turned in the direction to be levelled. Perhaps this mean is best obtained by holding the two staves, one before and the other behind the telescope, with the vanes at the same height on each, and near the guessed height of the telescope, when by inclining it parallel to the vanes, it mean height is immediately seen. The wire crossing the middle of the vane being set to this height, the staff is carried to the other station, and the apparent angle of elevation or depression read off, allowing for the index error, or quantity, the true zero of the arc differs from that marked on it, as before directed.

For the purpose of insuring accuracy, it is best to repeat the operation by reversing the positions of the instrument and staff, taking care to have the vane reset to the true height of the telescope in its new position. The mean of the angles of elevation and depression will be the true angle in either case. By this means any error in the parallelism of the telescope and level, or of the position of the true zero, will be corrected.

To the log-sine of this angle, add the log of the direct distance between the staves in feet, if the difference of level is wanted in feet, and the sum, minus 10 from the index, will be the log of the instrumental difference of levels. Correct this for sphericity and refraction in the way described p. 69, No. 18, and the result will be the true difference of levels.

If an arithmetical operation is wanted, take out the number cut by the bevelled edge of the fixed nonius marked "diff. of hypo. and base," which take from 100. Take out in like manner the number cut by the same bevelled edge of the nonius mark "perp. to 100 of base," and multiply the foregoing remainder by a 10,000th part of the product of the hypothenuse, and the number last taken out; the product will bethe instrumental difference of levels in the denomination of the hypothenuse, which must be corrected as before.

This is a very easy and correct mode when the angles of depression and inclination are such that the divisions exactly coincide with the bevelled edge of the nonius; otherwise it is a mere approximation.

Example.—The vane being adjusted to the height of the level and set up fourteen chains, or 294 feet off, the angle of depression was found to be 1° 9′ and the division corresponding to "perp. in 100 of base" was very exactly 2, that corresponding to "diff. of hypo. and base," not being any thing.

Here, then, we have the base sensibly the same as the hopothenuse, and consequently $\frac{1}{100}$th of 924, or 9·24, multiplied by 2 gives 18·48 feet, the fall sought. By previous levelling with the common spirit level it was found to be 18·64.

Secondly, If to 8·30255 log-sine of 1°9′ we add 2.96567 the log of 924, we shall have 11·26822, and taking away 10 from the index 11, leaves 1.26822 the log. of 18·55 feet, very nearly the same as before, and as it was found by levelling, or thus:—

1° 9′	log sin	8·30255
924	log	2,96567
18·55	log	1·26822

When the theodolite is used for levelling in this way, the field-book contains a column for the angles of elevation and depression, distinguished with an *e* and *d*, or the characters + and — before them; a column for the Hypothenuse lengths; three for the rises, falls, and reduced levels, and another for the base lengths.

Angle of Elevation or Depression.	Hypothenuses.	Rise	Fall.	Reduced Level.	Bases.
° ′	Chains.	Chains.	Chains.	Chains.	Chains.
2 52 *d*	12·73	. . .	·6365	— ·6365	12·71
4 1 *e*	6·29	·4403	. . .	— ·1962	6·27
8 3 *e*	7·34	1·0276	. . .	+ ·8314	7·27
17 28 *d*	11·71	. . .	3·5130	— 2·6816	11·17

The sum of all the bases (here 37·42) is the total base or horizontal length. We have here given the rises, falls, and reduced level to four decimal places, because being given in chains it is needful, if accuracy is required.

In most practical cases I doubt whether it is not quite as short and convenient a process for finding the rises and falls, to take from a table of natural sines the sine of the angle and multiply the hypothenuse by it, according to the rule of contracted multiplication of decimals, as it is to turn out the logarithms, unless the object is to reduce it to any other measure. And the same with respect to finding the bases, which are the products of the cosines of the said angles by the hypothenuses.

We have not made any allowance for sphericity and refraction in the above observations, because in the greatest distance (840 feet) it is hardly worth notice, and our chief object was to elucidate the method rather than to run into minutiæ. In our future observations these details may form a subject for discussion.

OPENING OF THE RAILWAY FROM PARIS TO ST. GERMAIN.

We extract the following amusing account of this event, from the letter of the *Times* correspondent.

St. Germain, Aug. 26.

Paris has put on her seven-leagued boots, and reached St. Germain in a stride! The chateau of Louis le Grand, and the fine terrace sweeping through the forest until it is lost in distance, have kindly consented to approach the metropolis for the gratification of the numerous *quidnuncs* who inhabit it; and St. Germain, with all its interesting scenery, although, if we are to credit the map, it is twelve good English miles from Paris, is now more accessible than the windmills of Montmartre. This *triomphe merveilleuse*, as the Parisians delight to call it, is the work of that grand miracle-monger of the nineteenth century—steam; a trip on the railway is now the "*plaisir inconnu*," the "*emotion sanségal*;" and if there be throughout the length and breadth of Paris a single café or coterie, or in the faubourgs a "Merchand de Vin," *alias* "dramshop," where the praises of railroads in general, and of the railway to St. Germain in particular, has not formed the inexhaustible topic of conversation for the last four and twenty hours, I will suffer myself to be impaled alive like a frog in a gourmand's clutches, and fricaseed without mercy. * * *

The train started at twelve to the instant, and then was the clatter of voices raised tenfold. "*Il part—ce coursier de feu, et de fumée!* He snorts! he snorts! His prodigious tail of vapour floats in the firmament! *La viola!*" Even when the engine had attained its extreme velocity, the rattling of tongues was continued, one person shouting into a second's ear, and a third shrieking at the extreme pitch of his voice, "*Cheval magnifique!* Noble and intrepid horse, which nothing can stop! He devours the way before him—he snorts! *vraiment*, he snorts! He is clothed with thunder, like the horse of Job! *Corbleu!* what a delicious motion —*n'est-ce pas? Oui—c'est le plus grand plaisir du monde!*" Away clattered engines and voices to the same tune, to the end of the journey. If you wish for a genuine speeimen of an enthusiast, you have only to clap a Parisian for the first time in his life in a flying "locomotive." In the carriage in which I fixed myself were some half dozen piquantly-dressed soubrettes and grisettes, distinguishable by the extreme neatness of their *fichus de dentelles a la paysanne*, and their mignonnes lace caps. Of these no fewer than three affected dizziness, faintness, &c., and finished *par s'etre évanouies* on the bosoms of the gallants by whom they were accompanied Altogether it was a most precious living comedy, worthy of a place in Paul de Kock's "*Tourlourou sur les mœurs Parisiennes.*" Until I reached Paris, I laboured, in common with most people, under the absurd misconception, that the true "land of Cockaigne" is London. For genuine Cockneys you must come to France.

An hour's walk in the forest of St. Germain, after my arrival, was positively delightful in the extreme. In no direction could you turn without meeting elegantly-dressed Parisian ladies (and all other dressing is out of the question) moving along as gracefully as swans in the Cydnus, to which their white muslin dresses, which are very much [the rage here, in no small degree assimilated them. What charming bonnets adorned with waving feathers, or with those ambitious, but not less elegant, wreaths of flowers, which are only made to perfection here, and exhibit the very acme of taste! And then the eye is so pleasingly relieved by the graceful contrast presented by an unbonnetted girl, wearing one of those exquisite little caps; or by the outlandish helmet-shaped casquette which some rustic belle delights to select for her coiffure. The Bois de Boulogne never presented a more animated scene.

For statistics, it will be sufficient to state, that the *materiel* is composed of 105 vehicles, capable of containing 4,070 persons, and of transporting the entire population of Paris to St. Germain in the course of one fine Sunday. The railway, 4½ leagues in length, passes through a beautiful country, traversing no fewer than eighteen bridges, three of which are across the Seine. The vehicles are all intended for the transport of passengers, and will be occupied principally on Sundays. There is a tunnel Batignolles, which is divided into two galleries, being about 400 metres, or a quarter of an English mile long. The construction is very solid, the rails being fifteen times heavier than those upon the Liverpool and Manchester road.

(From the Baltimore Gazette, Friday, Jan. 19.)

THE BALTIMORE AND SUSQUEHANNA RAILROAD.

The progress of this road towards completion, is very properly exciting the deep interest and attention of the citizens of Baltimore—and certainly in proportion to its extent and cost, it will be, in usefulness and importance, scarcely second in value to any work of improvement connected with our city. Its progress has been urged on with a steady and persevering energy, which is highly creditable to the officers of the company to whose care and direction it has been entrusted. Within the last two years, the graduation has been nearly completed of that portion of the road which extends from Timonium (eleven miles from Baltimore,) to York in Pennsylvania, a distance of forty-six miles, through a broken country abounding in rocky hills and rapid streams, requiring in its whole extent the construction of numerous, and some of them extensive bridges, and a tunnel more than eighty yards in length; and an immense quantity of rocky and other excavations and embankments. The railway is constructed about two-thirds of the distance between Timonium and York. The rails are of rolled iron weighing nearly sixty pounds to the yard; they rest on wooden sleepers which are laid across the track, and imbedded in stone. The great weight and strength of the rails, and the firm manner in which they are attached to the sleepers, render the construction of the track of railway safe and permanent, and such as will require no repairs for many years, and at any time only such as can be effected with ease and at a small expense.

A continuous track of twenty-seven miles towards York, being completed of the new rails, and fit for use, the President and Directors of the Susquehanna Railroad Company invited several members of the Legislature now in this city, the Mayor and members of both branches of the City Council, and other City Officers, the Presidents, Directors, and Engineers of the other Railroad Companies in this city, to meet them yesterday morning at their depot at the head of North street, and proceed thence on an excursion over the railway as far as completed; and, agreeably to the invitation, a party of nearly two hundred assembled at the appointed time. The following account of the excursion, we copy from the American of this day:—

The party was conveyed the first 11 miles, to Timonium, by horse power. This part of the road is to be renewed with heavy rails, and various highly judicious alterations of the present location have been made, so as to make it conform in all respects with the new portions of the work.

From Timonium the company proceeded in new and elegant cars, the foremost train being drawn by the "Susquehanna," a very splendid new engine constructed at Lowell, Mass., on the English principle, with improvements by G. W. Whistler, Esq., civil engineer.—The second train was drawn by the "Herald."

The admiration of the party was excited as they advanced, as well by the romantic and abrupt character of the country through which they were travelling, as by the manner in which the able engineer, Isaac Trimble, Esq., had made his location, so as to present the most direct and permanent line of road. The succession of rocky ridgees cut through, and lofty embankments filling up the intervening valleys, indicated the extremely difficult character of the work, and gave rise to general wonder that so much could have been effected in so short a time, and with such evident durability. We understand, that notwithstanding the extraordinary difficulties overcome, and the permanent mode in which the rails are laid, the road has cost less per mile than most other great roads to the North, where the edge rail is used.

At noon precisely the foremost train crossed the Pennsylvania line, and a short time after attained the summit level, at an elevation of 850 feet above tide. On arriving at Hise's Mill, (in the neighbourhood of Strasburg, and 16½ miles from York) it was ascertained that that the "Susquehanna) had performed the trip of 28 miles in 1 hour and 31 minutes, exclusive of 11 minutes for stoppages, being an average speed of 18½ miles per hour.

In approaching the summit level, there are two miles, the grade of which is a rise of 84 feet to the mile, over which the "Susquehanna" passed in seven minutes, drawing two heavy cars with 140 passengers, besides the tender, &c.

An excellent dinner and appliances were duly discussed, and in returning the "Susquehanna" reached Timonium in 1 hour 16 minutes, having consumed in running the 56 miles, only one cord and a half of pine wood.

This road is steadily advancing towards completion, and will be among the very best constructed works in the country. The period, we are rejoiced to find, is near at hand, when our city will begin to realise its important advantages, in the results of the easy and rapid communication which it will open to the fertile and productive valley of the Susquehanna.

THE CINCINNATTI AND CHARLESTON AND LOUISVILLE RAILROAD.

Col. B. B. Long has arrived at Charleston, on a mission from Shauneetown, Illinois, to urge the importance of extending the Charleston and Cincinnatti Railroad to some point on the Ohio at or near the junction of that river with the Wabash. This would make then a continuous route with the railroad through Illinois to Alton, opposite the mouth of the Missouri, commanding thus much of the great produce trade north that would otherwise pass down the river. General Hayne communicated to Col. Long the following valuable information of the great project which now interests all the South and West.

"That the Louisville, Cincinnati and Charleston Railroad Company has a charter from the states of North and South Carolina, Tennessee and Kentucky, for the purpose of forming a connexion by a Railroad, between Charlestown and the Ohio River, through those states. The original charter provided that this Road should strike the Ohio at three points, viz. Cincinnati, Louisville, and Maysville. This has been so amended, however, as not to require the Road to be carried farther than Lexington—leaving it to those who are specially interested in these several branches, to unite them with our Road, at Lexington. The Company confidently relies on the combined efforts of all the states granting the charters, for the construction of the Road. South Carolina is prepared to do her part, but it will require the aid of North Carolina and Tennessee to enable her to extend the Road to Knoxville—and of Kentucky to continue it to Lexington. When our Road shall reach Knoxville, it may be, and doubtless will be, extended to Nashville, and eventually to the Mississippi, in that direction.—Tennessee has already caused surveys to be made for a Railroad from Fulton, on the Mississippi, to Knoxville, where our Road will unite with it. A Railroad from Nashville to Evansville, in Indiana, is also in contemplation, from which a very short branch would strike the Missisippi opposite Shawneetown.

THE RAFT IN RED RIVER.

The obstruction originally occupied a space of upwards of two hundred miles; and, there is sufficient evidence that it has existed for ages before the discovery of the country, while its banks exhibit indubitable proof, that it once extended not within fifty miles of the confluence of that river with the Mississippi. The annual increasement has been estimated at two miles; and once formed, the serpenttine course of the stream forbids all possibility of removal, except by artificial measures, or the slow process of decay. In some places the raft is condensed to an astonishing depth, and forms what is called "the sunken raft:" a single strong log removed will sometimes liberate hundreds The raft region may now be considered under three divisions; that from which the raft is entirely removed, extending 140 miles from the commencement; that in which the raft is cut up and pulled in pieces, and not floated off—for which nothing is wanted but a strong current, which must immediately take place—33 miles ni extent; and that, lastly, which has not yet been commenced The water expelled from the channel by the raft into the lakes, parallel to the banks as the obstruction is removed, turns and deepens the bed of the stream. At the commencement of the raft there is little or no current. This has added much to the labour in removing the obstruction; and many of the logs removed, have floated back subsequently by a rise in the Mississippi. The removal now of a few yards of solid raft, causes a fall of eighteen inches above it, and a rise of six feet below. There remains only about four miles of the raft to be removed, and, when the channel is once clear, the current will be powerful and deep, and the banks on either side will be lofty and firm. Capt. Shrieve declares, that all can be accomplished in *three months*, after a suitable appropriation from Congress is made.

The magnitude of this undertaking, and the results which must ensue from its accomplishment, cannot be too highly appreciated. The river is navigable for more than 2000 miles above the raft, and through a region unrivalled in fertility. Though now thinly settled, it is rapidly populating—hundreds await the removal of the raft as a signal for entering the country—and all its vast resources and natural wealth must soon be developed. The result of this undertaking, once involved in doubt, as well as the permanent advantages which must ensue, are no longer problematical. The indefatigable industry, the untiring enterprise—the indomitable perseverance, and the enlarged and truly scientific designs of Captain M. Shrieve, the projector and accomplisher of this noble national work, can never be estimated beyond their merits. His history is identified with that of the empire of the West; and his fame will endure so long as the magnificent streams with which his name is associated, shall continue to roll on their volumed waters to the deep.—*St. Louis Bulletin.*

The annexed Table, showing the comparative durability of various kinds of timber, unprepared and exposed under the most trying circumstances, will be found of constant use for reference.

We should like to ascertain the state of the timber in some of our oldest Railroads. Accurate statements are solicited from those who can afford them.

DURABILITY OF VARIOUS KINDS OF WOOD.

From the Nautical Magazine.

The following are the particulars of experiments made on several kinds of wood, 1 1-2 inch square, and 2 feet long, placed vertically in the ground, and about 1 foot 6 inches exposed to the atmosphere, on the 1st of January, 1831; examined at two different times, viz., the 8th of May, 1833, and the 24th February, 1836:—

Species of Wood.	*Remarks, 8th May, 1833*	*Remarks, 24th February, 1836.*
English Oak	Much decayed and diminished in weight.	Very much decayed, especially those of open grain.
Italian Oak	Good, but decay had commenced on surface.	Do. do. rather less than the English.
Adriatic Oak	Very much decayed.	Very much decayed, excepting one piece, very good.
Leaf or Live Oak	Very good.	Three much decayed, the rest tolerable.
Canada White Oak	Very much decayed.	Very bad and rotten.
Memel do.	Ditto.	Ditto.
Dantzic do.	Ditto.	Exceeding bad.
Mahogany hard	Good.	Tolerably good.
Do soft	Much decayed.	Very bad, totally decayed.
Libanus Cedar	Good.	Tolerably good.
Pencil Cedar	Very good.	All very good, as when put in the ground.
African, No. 1	Very good.	A little decayed, and inclined to doat; better than English oak.
African, No. 2	Very good.	Worse than No. 1.
Teak, heavy	Very good.	Rather soft, but good.
Teak, light	Good.	Soft 1-4, but good.
Teak, part of Hasting's mizen-mast	Good.	Soft 1-4, the rest indifferent.
Fir, Dantzic	Much decayed.	Very much decayed, rotten all through.
Fir, Riga	Much decayed.	As bad as the Dantzic.
Fir, Memel	Much decayed.	Very bad, rotten.
Fir, Red Pine	Much decayed.	Very rotten, much like the Dantzic and Riga.
Fir, Yellow Pine	Very much decayed.	Very rotten.
Do. Virginia Pine	Decayed.	Very rotten.
Do. Pitch Pine, heavy	Decayed 1-2 of an inch, the rest good.	Decayed 1-8 of an inch, the rest tolerably good.
Do. do. light	Very rotten.	Very rotten.
Polish Larch	Decayed 1-4 in the surface, and lost in weight.	Decayed 1-4, the rest a little decayed.
Scotch do. Trenails	Surface 1-4 in, decayed and brittle.	Surface 1-4 in, decayed, the rest brittle.
English Elm	Very rotten.	All rotten.
Canada rock do.	Ditto.	Rotten.
American ash	Ditto.	Ditto.
Locust Trenails	Good and retained their wt.	1-8 in, rotten, the rest as sound as when put in the ground.
Scotch Larch do.	Surface 1-4 decayed, and very brittle.	1-4 in, rotten, the rest brittle.
Stinkwood dark col	Surface not decayed, but very brittle.	This piece was misplaced.
Cowdie	Surface 1-4 decayed, and very brittle.	Rotten.
Stinkwood light co	Surface 1-8 dec., and brit.	Rotten.
Poonah.	Surface a little decayed, and become light.	Surface 1-8 decayed, the rest good, better than African.

Note.—Riga preferable to all the Fir, and Dantzic next.

⁂ Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS Mc NEILL,
Chief Engineer

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.; Atlas, Boston; Philadelpia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment.

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. do. caststeel Shovels & Spades
150 do. do. Gold-mining Shovels
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
Fo. 8 State-street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR.
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry paints. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancocd, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his preseet engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street, NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Istruments made to order and repaired.
1y—14

RAILWAY IRON, LOCOMOTIVES, &c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars; with conntersunk holes and mitred joints,

								lbs	
350	to ns	2	by	⅝,	15 ft in length,	weighing		4 $\frac{60}{100}$	per f
280	"	2	"	½,	"	"	"	3 $\frac{50}{100}$	"
70	"	1½	"	½,	"	"	"	2½	"
80	"	1¼	"	¼,	"	"	"	1 $\frac{25}{100}$	"
90	"	1	"	¼,	"	"	"	⅞	"

witn Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3½, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprictors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEW YORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having conntersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN
RAILROAD JOURNAL,
AND
ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR. and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, SEPTEMBER 30, 1837. (Published February 1, 1838.) VOLUME VI.—No. 39.

CONTENTS.

AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 1, 1838.

AVERY'S ROTARY ENGINE FOR SAW AND FLOURING MILLS.

In reply to the frequent letters received in relation to this Engine for driving mills, we give herewith an extract from a letter written by an experienced miller, who has applied the Rotary both to sawing and grinding—and who therefore speaks from *personal knowledge*, having no further interest in the subject than to have *ample and cheap* power to do his work.

The main shaft of the mill referred to, is over sixty feet in height, driving four run of stones, elevators, smut machine, bolts, and all the machinery necessary for a first-rate Flouring establishment. This letter was written when the mill had been in operation only a few weeks, before the machinery had become perfectly worn to its place.

The great advantages of this Engine are said to be its simplicity, *economy in first outlay*, in *fuel*, in *repairs*, and in *attendance*.

Extract from a letter written by a gentleman who has been long engaged in manufacturing Flour, dated—

Clyde, Wayne Co. N. Y. Nov. 17, 1837.

"Our Mill of four run of stones propelled by "Avery's Rotary Engine" has, with great ease, made 100 bbls. flour, with 5 cords of wood, in twenty-four hours; and it has, without any extraordinary exertion, made 125 bbls. in twenty-four hours.

We do not hesitate to say that after all the difficulties, incident to the first starting, and running a large and extensive Flouring Mill, in getting the Journals and Machinery worn smooth, and to fit their places so as to run regularly, that we can, with the same amount of fuel, and with greater ease, manufacture 150 bbls. flour in twenty-four hours, than do what we have above stated.

Mr. Cook, in his mill with 2 saws, can easily cut 8 thousand feet in twenty-four hours, which requires less than one cord of wood, in addition to the slabs it makes. I built the mill now owned by Mr. Cook, and know it can perform with *great ease*, all I have stated above.

We have full confidence in this kind of Engine, and know that it is altogether ahead of any thing of the kind now in use, in all respects. By giving it the necessary quantity of boiler, the Engine is competent and powerful enough to drive any description of machinery.

Very respectfully yours,

BENJAMIN FORD."

For the Railroad Journal.

A globe, five inches in diameter, presents about 253 inches surface. Now on each inch of the surface we will suppose there is an internal pressure of 1000lbs., and that the metal will bear no more. It will make no difference whether this pressure be produced by bars of steel or columns of steam, each inch has its 1000lbs. These bars must be so shaped and put together as to have a base to rest on, sufficient to sustain them. The shape then required for 253 bars to fill this globe, will be one inch square at the top, two and a half inches long, and reduced to a point at the other end.—The body of the globe thus filled cannot give in any direction, so that an additional force of 50lbs. to any one bar must punch it through. Now a globe 5 feet in diameter will receive 35,558 bars, each one inch square at the top, two feet and a half long, reduced to a point at the other end. Hence it will take an additional force over the 1000lbs. to make one of these bars punch a hole through the vessel. Therefore I reason, that the same strength of metal will sustain steam in a large boiler, as well as in a small one, if the shape be a globe. Now let us suppose this five feet globe cut in two, and a cylinder of the same diameter put in between the parts, so as to form a boiler with circular heads.—To fill this cylindrical part, we must suppose these bars to be the same at the top, that is, one inch square, two and a half feet long, one inch broad at the point, reduced to the shape of a wedge, and the same principle must hold good.

In a discussion the other day with a friend of mine, who is engaged in making some important experiments, I laid it down as a principle, that the thickness of the shells of steam-boat boilers need not be increased in proportion to their size. He said: If I could establish that fact, it would be worth thousands to him. In your valuable paper, I have not seen any illustration of this subject. The general impression is against me, but we of the Far West have to blunder along until we gather knowledge from the scientific at the East, or by accident stumble on it.

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Concluded from our last.

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III. *Estimate of the cost of the Road.*

Two distinct estimates will be presented; one for the completion of one track, and for putting the road in a condition to commence business; the other for the

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS Mc NEILL,
Chief Engineer

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.; Atlas, Boston; Philadelpia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment.

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. do. caststeel Shovels & Spades
150 do. do. Gold-mining Shovels
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CC.
Fo. 8 State-street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR.
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry paints. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancocd, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his preseet engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street,
NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ **Istruments made to order and repaired.**

1y—14

RAILWAY IRON, LOCOMOTIVES, &c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars; with conntersunk holes and mitred joints,

					lbs	
350 tons	2 by	$\frac{5}{8}$,	15 ft in length,	weighing	$4\frac{68}{100}$	per ft
280	" 2	" $\frac{1}{2}$,	"	"	$3\frac{50}{100}$	"
70	" $1\frac{1}{2}$	" $\frac{1}{2}$,	"	"	$2\frac{1}{2}$	"
80	" $1\frac{1}{4}$	" $\frac{1}{4}$,	"	"	$1\frac{25}{100}$	"
90	" 1	" $\frac{1}{2}$,	"	"	$\frac{7}{8}$	"

witn Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, and $3\frac{3}{4}$ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEW YORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, SEPTEMBER 30, 1837. (Published February 1, 1838.) VOLUME VI.—No. 39.

CONTENTS.

AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 1, 1838.

AVERY'S ROTARY ENGINE FOR SAW AND FLOURING MILLS.

In reply to the frequent letters received in relation to this Engine for driving mills, we give herewith an extract from a letter written by an experienced miller, who has applied the Rotary both to sawing and grinding—and who therefore speaks from *personal knowledge*, having no further interest in the subject than to have *ample and cheap* power to do his work.

The main shaft of the mill referred to, is over sixty feet in height, driving four run of stones, elevators, smut machine, bolts, and all the machinery necessary for a first-rate Flouring establishment. This letter was written when the mill had been in operation only a few weeks, before the machinery had become perfectly worn to its place.

The great advantages of this Engine are said to be its simplicity, *economy in first outlay*, in *fuel*, in *repairs*, and in *attendance*.

Extract from a letter written by a gentleman who has been long engaged in manufacturing Flour, dated—

Clyde, Wayne Co. N. Y. Nov. 17, 1837.

"Our Mill of four run of stones propelled by "Avery's Rotary Engine" has, with great ease, made 100 bbls. flour, with 5 cords of wood, in twenty-four hours; and it has, without any extraordinary exertion, made 125 bbls. in twenty-four hours.

We do not hesitate to say that after all the difficulties, incident to the first starting, and running a large and extensive Flouring Mill, in getting the Journals and Machinery worn smooth, and to fit their places so as to run regularly, that we can, with the same amount of fuel, and with greater ease, manufacture 150 bbls. flour in twenty-four hours, than do what we have above stated.

Mr. Cook, in his mill with 2 saws, can easily cut 8 thousand feet in twenty-four hours, which requires less than one cord of wood, in addition to the slabs it makes. I built the mill now owned by Mr. Cook, and know it can perform with *great ease*, all I have stated above.

We have full confidence in this kind of Engine, and know that it is altogether ahead of any thing of the kind now in use, in all respects. By giving it the necessary quantity of boiler, the Engine is competent and powerful enough to drive any description of machinery.

Very respectfully yours,
BENJAMIN FORD."

For the Railroad Journal.

A globe, five inches in diameter, presents about 253 inches surface. Now on each inch of the surface we will suppose there is an internal pressure of 1000lbs., and that the metal will bear no more. It will make no difference whether this pressure be produced by bars of steel or columns of steam, each inch has its 1000lbs. These bars must be so shaped and put together as to have a base to rest on, sufficient to sustain them. The shape then required for 253 bars to fill this globe, will be one inch square at the top, two and a half inches long, and reduced to a point at the other end.—The body of the globe thus filled cannot give in any direction, so that an additional force of 50lbs. to any one bar must punch it through. Now a globe 5 feet in diameter will receive 35,558 bars, each one inch square at the top, two feet and a half long, reduced to a point at the other end. Hence it will take an additional force over the 1000lbs. to make one of these bars punch a hole through the vessel. Therefore I reason, that the same strength of metal will sustain steam in a large boiler, as well as in a small one, if the shape be a globe. Now let us suppose this five feet globe cut in two, and a cylinder of the same diameter put in between the parts, so as to form a boiler with circular heads.—To fill this cylindrical part, we must suppose these bars to be the same at the top, that is, one inch square, two and a half feet long, one inch broad at the point, reduced to the shape of a wedge, and the same principle must hold good.

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III. *Estimate of the cost of the Road.*

Two distinct estimates will be presented; one for the completion of one track, and for putting the road in a condition to commence business; the other for the completion of two tracks, with a full provision for all the accessories, necesary to the successful prosecution of Railroad business on a large scale.

1. Estimate of the cost of completing one track, and putting the road in a condition to commence business; the bridges, except the trestle bridges over ravines, &c., to be built for two tracks.

From DUNKIRK to BUFFALO: 42 miles.

Embankment,	424,733.5 cub. y.	
Excavation,	283,168.3 "	
Total,	707,901.8 "	$77,869 19
Bridging and masonry,		49,310 00

In this item, the following amounts besides others, are included. For a trestle bridge, 2000 feet long, over the valley of Silver Creek, $8000 00; for a bridge over Cattaraugus Creek, $4,500 00; for a trestle bridge, 900 ft. long, over the valley of Mud Creek, $2,700 00; for a bridge, 400 feet long, over Eighteen Mile Creek, $16,000 00; and for a bridge over Buffalo Creek, $2,500 00. Ample provision is made for drainage, but masonry will be used sparingly, owing to the scarcity of good stone.

Superstructure,
For one mile,
Timber,

Longitudinal pieces, delivered round, 10,560 running feet, 1¾ cents per ft., the roadway through woods supplying a considerable proportion,	$184 80
528 cross ties, at 8 cents,	42 24
5,280 feet round timber for props, at ¾ cent per ft.	39 60
Wedges,	50 00
Sawed rail, five inches square, 22,000 feet board measure, at $10 per m.,	220 00
Workmanship,	700 00
Iron,	
Plate rail, 2¼ by ⅝ inches, 26½ tons per mile, at $75 per ton,	1,987 50
705 end plates, at 7 cents each,	49 35
1,320 pounds 4½ inch pressed spikes, at 10 cents per pound,	132 00
Workmanship,	50 00
Making horse path, finishing banks, clearing ditches, distributing materials, &c.,	700 00
Unforeseen expenses,	44 51
Total for one mile.	$4,200 00

45 miles of superstructure, at $4,200 per mile,	189,000 00
Turn-outs, road crossings, &c.	600 00
Land and fencing,	18,450 00
Chopping and grubbing,	2,000 00
Engineering and miscellaneous expenditures,	30,000 00
Depots at Buffalo and Dunkirk,	20,000 00
Water stations,	6,000 00
Total cost averaging $9,362 60 per mile.	$393,229 19
To commence business,	
4 Locomotive Engines,	30,000 00
40 Passenger Cars,	32,000 00
40 Burden Cars,	12,000 00
Total,	$467,229 19

From DUNKIRK to the STATE LINE; 28 miles.

Embankment,	183,274.9 cubic y,	
Excavation,	112,512.0 " "	
Total,	295,786.9	$29,578 69
Bridging and masonry,		23,640 00

In this item the following amounts are included, viz:—For a bridge over Canadaway Creek, $1,590 for a trestle bridge, 600 ft. long, over Little Canadaway Creek, $1,800; and for a bridge over Chautauque Creek, $3,690.

Superstructure: 31 miles, at $4,200, per mile,	130,200 00
Turn-outs, road crossing, &c.	400 00
Land and fencing,	14,000 00
Chopping and grubbing,	1,400 00
Engineering and miscellaneous expenditures,	20,000 00
Depots and water stations,	13,500 00
Total cost, averaging $8,311 38 per mile.	$232,718 69
To extend the business of the road from DUNKIRK to the STATE LINE.	
2 Locomotive Engines,	$15,000 00
20 Passenger Cars,	16 000 00
20 Burden Cars,	6,000 00
Total,	$269,718 69

RECAPITULATION.

Cost of road from Buffalo to Dunkirk,	$393,229 19
Cost of road from Dunkirk to State Line,	232,718 69
Total cost of 70 miles of road, averaging $8,942 11 per mile,	$625,947 88
To commence business.	
6 Locomotive Engines,	$45,000 00
60 Passenger Cars,	48,000 00
60 Burden Cars,	18,000 00
Total expenditure for completing one track, with bridging for two tracks, and for providing ample means for the commencement of business,	$736,947 88

2. Complete estimate of the cost of constructing the road with a double track. This estimate includes the amount of the previous one, and the difference between the two will be expended at a future period, when the business of the road shall require it.

From BUFFALO to the STATE LINE: 70 miles.

Embankment,	900,990.7 cubic y.	
Excavation,	509,850.0 " "	
Total,	1,410,840.7	$151,028 16
Bridging and masonry,		100,950 00
Superstructure, equal to 145 miles of single track, at $4200 pr mile,		609,000 00
Turn outs, road crossings, &c.,		2,000 00
Land and fencing,		32,450 00
Chopping and Grubbing,		4,000 00
Engineering and miscellaneous expenditures,		60,000 00
Depots and Machine shops,		45,000 00
Water stations,		15,000 00
Total cost, averaging $14,563,26 per mile,		$1,019,428 16
For a full business,		
12 Locomotive Engines,		90,000 00
80 Passenger Cars,		64,000 00
150 Burden Cars,		45,000 00
Total,		$1,218,428 16

To inspire confidence in these estimates, it may be stated, that for the most of the items, the cost has been determined by taking the cost of similar items on works actually constructed, and adding a large per centage on account of the present advance of prices. Should there be such a general decline of prices as there seems good reason to anticipate, there can be no doubt that the work ought to be constructed for less than the amount stated in the estimate.

It will have been observed that an estimate has been made of the cost of land, although it is expected that the liberal feeling which will undoubtedly actuate the land holders along the route, towards a work destined to be of immense value to the country through which it is to pass, will relieve the company from all expense for this object.

IV. *Estimate of the probable profit which the Road will yield to the Stockholders.*

Under this head so much must necessarily be left to conjecture, that nothing more than a reasonable approximation can be expected. Feeling sanguine, however, that the work will yield a large return upon the capital invested, I will present briefly, some of the data upon which my opinion is founded, and each stockholder will be enabled to determine for himself, the degree of weight to which the opinion is entitled.

Supposing the road with one track completed from Buffalo to the State line, and provided, according to the estimate above, with ample means for the commencement of operations; the cost of carrying on the business of transporting passengers, and of repairs, and maintenance of way, may be estimated at about $70,000 dollars a year. If we suppose the travel to be on an average only 75 passengers each way per day, the nett profits for a year would be $94,000 dollars, or nearly 13 per cent. On the supposition that there would be 100 passengers each way per day, the profits would be upwards of 20 per cent, and should the number be as great as it is on the Utica and Schenectady Railroad, the annual profits would be between 30 and 40 per cent.

To any one familiar with the rapid increase of population and wealth in the west, it will appear far from extravagant, to expect that within ten years from this time, there will be as much business done on the Buffalo and Erie Railroad as is done at present on the Utica and Schenectady Railroad. The probability is that in much less than ten years, this expectation will be realized. The number of travellers by stage, last year, between Erie and Buffalo, was twice as great as it was the preceding year, and for some time to come the increase will probably go on at almost as great a ratio, as the facilities for travelling are multiplied. The present post road along the Lake shore, from Buffalo westward, is for the first 30 miles, notoriously among the worst in the State. There are few travellers in this region of country who do not dread passing the "Cattaraugus woods;" nevertheless the number of stage passengers upon this road, both ways, during the end ending April 1st, 1837, was about 11,000, besides great numbers by private conveyance, almost the whole of the travelling being done during the suspension of the Lake navigation. If a Railroad had existed, the increased amount oi travel for the winter months alone, would unquestionably have doubled the whole amount for the year. In the present state of things, many who have occasion to pass in the winter from Buffalo to Michigan and to the countries west of it, choose the route through Canada, from the Niagara River to Detroit, notwithstanding all its inconveniences; but when your railroad and those which are to connect with it shall have been completed, nearly the whole of these travellers will prefer to go by the south shore of Lake Erie, through the flourishing country and populous towns of the United States. Great numbers who now travel between the east and the west, in the winter, by the way of Pittsburgh, and through other channels, will prefer the northern route, as soon as the line of communication of which your road forms a part, shall have been thrown open.

The whole number of persons arriving at and departing from Buffalo, by water, during the season of navigation, is probably much more than 200,000. It cannot be considered extravagant to expect, that of this number, at least one-fourth would prefer the railroad to the steamboat. Many having business along the Lake shore, would take the railroad as being most convenient, many would take it on account of the greater rapidity with which they could travel, and very many would be induced to take it from a dread of sea sickness, and the dangers of Lake navigation. These and other considerations, would probably induce a much greater portion than I have stated, to prefer the land conveyance to that by water. If the railroad were at this moment in operation, the number of travellers on it could not be less than from 60 to 80 thousand in a year, which would produce a profit of from 12 to 20 per cent., but before the work can be constructed these numbers will be greatly increased. By the time your road is finished, those which are to connect with it both at its eastern and western extremities, will also be in operation, and the amount of travelling in the winter season will thereby be much augmented.

When the New-York and Erie Railroad shall have been constructed, your road will derive from it also a large accession of business; and that operations on that great work will speedily be resumed, no one aware of its vital importance to the City of New-York and to more than half the territory of the State, can for a moment doubt.

In addition to the revenue from passengers, there must likewise be very considerable receipts on account of freight. Of this no estimate will be attempted, but it may be suggested that the freighting business of Chautauque County alone, which already numbers about 50,000 souls and is rapidly increasing in population, would go a considerable way towards defraying the expenses of the road. In the spring and fall, just before the opening of the Lake navigation, and just after it has closed, the business on the railroad will be particularly active. and there will always at those times be much freight to be conveyed.

The transportation of the United States Mail will afford another important source of revenue. The receipts on this account will probably be from $10,000 to $15,000 a year.

The general result of the whole of these imperfect views is, that the Stockholders are entitled to indulge, with confidence the most sanguine expectations of handsome profits from their investment.

Accompanying this Report, I lay before the Board of Directors thirteen maps drawn by Mr. R S. Moore, which embrace plans and profiles of the whole of the routes surveyed.

I received my appointment last October, and on the first of November the preliminary surveys were continued in the field through the most severe part of the winter, until the end of January, during which time, careful instrumental examinations were made of upwards of 155 miles of line. I should do great injustice to all the gentlemen engaged with me, did I not bear testimony to the zeal and energy with which I was seconded by them, in carrying into effect the wishes of the company. Very respectfully,

Your obedient servant,

T. S. Brown.

Chief Engineer of the Buffalo and Erie Railroad.

Dunkirk, N. Y. May 1st. 1837.

DREYER'S PATENT RAIL.

The superiority of rail road transportation in regard to speed, cheapness, comfort and pleasure, before any other mode of conveyances, seems to be fully established; and the moving power by the application of steam and the invention of excellent locomotives within a very short time has been brought to such admirable perfection, that nothing else appears to be wanting, but to remove some defects, inconveniences and dangers, still arising from the construction of the rail road itself, and by lessening the cost of the building and reparing to give this branch of industry an internal improvement a greater extension and utility. However, amongst all the improvements already made and displaying so much ingenuity and talent, the construction of the road has been rather neglected and until this day we are exposed, not only to the disagreeable jarring and noise, but also to those dangers, which are inseparable from the present mode of fastening the rails, which does not and cannot give them the proper and so much desired smoothness and continuity. It has, therefore, for several years been my study, to remedy these evils and obtain such a desirable object by finding a new, simple and cheap mode of laying and securing the iron superstructure of the road; and having, in my humble opinion, at last perfected my ideas and constructed a new form of the rails, which by several bolts and plates of peculiar shape are to be fastened on the stringpiece, I do not hesitate no longer, to request your attention to the following description of my invention, which has met with the approbation of several scientific gentlemen, eminent mechanics and rail road builders.

My rolled iron rails, whose strength is optional, but require in my opinion only a thickness of one inch, are inside dovetail grooved, and consequently present a perfectly smooth and even surface. To fasten them on the stringpiece, I use for every bar of fifteen feet length.

First. Four wrought iron bolts, which have a top, dovetailed one way and straight the other, with an eye in their round lower parts, to receive wrought iron wedge keys.

Secondly. Two cast iron dovetailed plates, to be screwed to the timber, one at the end of each bar, and one in its middle, whose dovetails fit to the dovetailed groove of the rail, and

Thirdly. Four cast iron small plates, having a round hole in the middle, one for each bolt, to be slipped over them up to the timber; the bolts to be turned to fit the dovetail groove in the rail, and then secured by the wrought iron wedge key through the eye of the bolt and the two flanges on the plate; as the wedge key is forced in, it secures firmly the rail to the stringpiece.

To give a clearer and more satisfactory view of the whole, permit me briefly to explain the manner I intend to lay the superstructure, and then point out some of the advantages of my plan.

After the mudsills, sleepers and stringpiece of the road are laid and every thing is fully prepared for the rails, I commence, by first fitting the dovetailed cast iron plates, according to their thickness on the timber of the stringpiece in their proper places, at the junction of every two rails and where each rail will find its middle, and shall have then the bolt holes bored, four inches from the ends wherever the rails or bars meet and at half the space between the middle dovetailed plate and the said first bolt holes, being a distance of three feet, seven inches; whereupon the bolts can be driven into their holes, with their straight top sides in a line with the stringpiece. Hereafter the dovetail plates must be slipped into the dovetail groove of the rail and so placed, that they may be let down, where they have been previously fitted on the stringpiece and can now be screwed into its timber. When this is done, the bolts are so far turned (ninety degrees) that their dovetailed heads fit in the dovetailed groove of the rail, and finally the bolt plates are slipped on and the wedges placed in the eyes of the bolts through the grooves of their plates, by whose power when wedged up tight, the iron rail is pressed to the timber and kept in its due position.

I believe this will be sufficient to give a full idea of my plan, without any drawings or model, which however may be seen in the Patent Office at Washington, or here in New York in the offices of the Long Island Rail Road Company. I shall now state some of the advantages of this new mode of constructing and fastening the rails.

1. The continuity of the rails is maintained in all cases, whether the road should yield to the weight passing over it or not, as the dovetails of the end, and middleplates and of the wedged bolts must keep them down and together, so that there is no possibility of their rising.

2. The superstructure of the road has always a smooth and even surface with the greatest solidity, which in combination will prove the best remedy against that continual disagreeable jarring and noise, interrupting and destroying so often the pleasure of this otherwise comfortable and speedy mode of travelling, and reminding the passengers of the dangers connected with a badly constructed road.

3. The adoption of this invemtion will give not only the road itself, but also the locomotives and cars a longer durability, because

a. A smooth and uninterrupted surface of the rails and their being wedged down tightly on the timber, prevents the rain and snow from penetrating into the wood and the interior parts of the iron superstructure, whereto the spikes of the flat and edge rails expose them and bring on early rottenness of the timber and oxydation of the iron.

b. The rails cannot give away towards the sides, when the stringpiece is properly laid, and consequently the track must remain in its due position and the motion of the engine and cars become more regular.

c. The timber does not suffer and wear out by the driving in, (and when repairs are necessary,) pulling out of spikes, which frequently splits the wood, and by bending or cracking injures the rails.

d. The much easier and more regular motion on a smooth and solid surface which remains in its proper place, preserves, as there is less friction and shaking, the wheels, machinery and body of the locomotives and cars. And

e. There is less moving power required in proportion as there is less friction and a greater regularity of the road.

4. The rails can be laid from six to nine inches higher, than in the present mode of constructing and fastening the edge rails, which is of vast importance for the northern parts of the country, where early and much snow falls, and contributes to lessen the moving power for a certain weight.

5. This new mode saves considerable expenses in laying and reparing the superstructure, as

a. No spikes need to be driven in or drawn out, and very little earth is to be removed, when the rails must be taken up, so that one man can do more, than three at present are able to perform; and as

b. The timber will answer until it is entirely rotten, being always kept to the rail by the power of the wedge key. But principally is to be considered

6. The very great difference in the first costs, in consequence of a large reduction of the weight of the necessary iron, which the following comparative statement will show. One mile railway require on both sides of the track

3520 yards of rolled iron edge rails, weighing per yard 56½ lbs. and per mile — 198,880 lbs.
3520 yards dovetail grooved rolled iron rails, 1 inch thick and 2¼ inches wide, weighing per yard 24 lbs., and per mile — 84,480 lbs.

which gives a difference of weight, of not less than — 114,400 lbs.

3520 yards edge rail require 10,560 wrought iron spikes of 1 lb., per mile — 10,560 lbs.
3520 yards dovetail grooved rail require
2816 dovetailed wrought iron bolts of ¾ lb., per mile — 2,112 lbs.
2816 wrought iron wedge keys of 11 oz., per mile — 1,584 lbs.
— 3,696 lbs.

giving a difference of weight of wrought iron of — 6,864 lbs.

3520 yards edge rail require 2,112 cast iron plates of 6¼ lbs., per mile — 13,200 lbs.
3520 yards dovetail grooved rail require
1408 dovetailed cast iron plates of 3 lbs. 11 oz., per mile — 5,192 lbs.
2816 cast iron wedge plates of 11 oz, per mile — 1,936 lbs.
— 7,128 lbs.

making a difference in weight of cast iron of 6,072 lbs.

However, if a rail, of 1½ inches thickness (weighing 36 lbs. per yard) should be preferred, the difference of the rails in the weight of rolled iron, would stand thus:—

3520 yards, or one mile edge rails — 198,880 lbs.
3520 yards, or one mile dovetail grooved rails — 126,720 lbs.

still leaving a difference of — 72,160 lbs.

the other differences remaining the same.

Before I conclude my circular, I wish to observe that the rolling of rails, in their dovetail grooved form, can be done in any of the British iron works; and that in regard of my Patent Right, which is secured by Letters Patent of the United States, every company or individual, who resolve to adopt and use my invention, will find me very reasonable in my charges, offering at the same time, to undertake in connexion with Mr. James I Shipman, Civil Engineer, the building of rail roads or laying their superstructure, according to my new mode, to whom or myself letters, requesting further information, may be forwarded, through the New York Post Office.

Most respectfully yours,
PETER HENRY DREYER.

For the United States Gazette.

Render unto Cæsar the things which be Cæsar's.

My attention was directed a few days back to the following communication in he Boston Atlas:

GREAT PERFORMANCE OF A LOCOMOTIVE.

We learn from the Philadelphia Sentinel, that a few days since a locomotive engine, constructed by their enterprising fellow citizen, M. W. Baldwin, Esq. drew upon the Philadelphia and Columbia Railroad from Columbia to Philadelphia, a train of 35 merchandise cars, being, exclusive of the engine and its tender, the enormous weight of 163 tons, 13 cwt. 1 qr. 4 lbs., at the usual rate of speed.

This is nothing to what our Yankee locomotives can accomplish. On the 25th March last, the following load was drawn on the Boston and Lowell Railroad by the "Stonington" locomotive, built by the proprietors of the Locks and Canals at Lowell, for the Stonington Railroad.

49 cars, loaded with cotton, wool, groceries, coal, &c. weighing	333,428 lbs.
Weight of 45 cars, at 3,800 lbs. each	171,000
Weight of 4 cars, at 5,000 lbs. each	20,000
Weight of tender	14,400
	538,828 lbs.

Or 269 tons.

Distance 10 miles. Time $51\frac{1}{2}$ minutes, or about 12 miles an hour. Train 826 feet long.

The engine stopped and started the train on a rise of 10 feet to the mile.

Now without meaning any thing offensive to the writer of the above article, truth compels me to remark, that as in a lady's letter, the most important item of information lies in the postscript—for if the last quoted paragraph had been omitted, we simple minded Philadelphians must have acknowledged defeat and have yielded the palm to our Yankee brethren; unless perchance some of us had been down east and "had taken notes to print at home." But we are very fortunately spared this trouble by the aforesaid paragraph, which informs us that the engine started her train on a grade of 10 *feet to the mile.*

Mr. Baldwin's engine carried its train over a grade of 32 feet and rising to 50 *feet to the mile*, and around curves of 600 feet radius. After stating this fact it will only be necessary to refer the intelligent writer in the Atlas, to what I have no doubt he well understands, namely, the statical law of inclined planes and the dynamical expression for the modulus of friction of railroad trains, in order that he may perceive that Philadelphia need not tremble yet for the well merited fame of her mechanics and manufacturers.

From the known results of the best experiments we may assume that the friction or which is the same for our purpose the traction on dead levels is 1-224 of the load, or 10 lb. to the ton.

It is an acknowledged statical principle that the force impelling a body down an inclined plane bears the same proportion to the weight of the body as the height of the plane to its length.

A calculation founded upon these data will show that the Lowell engine must have exerted a force of traction equal to 3420 in drawing 240 tons on a grade of 10 feet to a mile, or 1 in 528, the friction being 10 lb. and gravity 4 1-4 lb. to each ton and 14 1-4 × 240=3420.

By a similar calculation it will be seen that the Philadelphia engine exerted a force equal to 5270 lb. in drawing 170 tons, which was the load, including the tender, on a grade of 50 feet to the mile, or 1 in 106.

The friction being as before 10lb. and gravity 21 lb. to ton, and 31 × 170=5270.

So that supposing the Philadelphia and Columbia road is in as good order as the Boston and Lowell road, which I am informed is far from being the case, the latter being considered one of the most perfect in the country, and the former one of the most defective. Mr. Baldwin's engine appears to have performed fifty per cent. more work than her Yankee rival, as it will be seen that the power exerted on the Columbia road would have drawn 360 tons on the Boston and Lowell road.

It is but just to say that the load drawn on the Columbia road was not a mere experiment of 10 miles, but being a regular every day business; those machines have drawn much more when they have been put on trial. I must therefore whisper to my New England friends, try again. C.

VIRGINIA IMPROVEMENTS.

We find the following extract from a report made to the Legislature of Virginia, by the Committee on Roads and Internal Navigation, in the Courier and Enquirer. It evinces a spirit which will render the "Old Dominion" again, at no distant day, as distinguished as in days past. Let her but improve her natural advantages—which are inferior to no state in the Union—and she will stand in the front rank of the Union.

Will New York, after her glorious commencement of a more glorious system of internal improvement, stand with folded arms and see other states going so far ahead of her? We shall see:—

Virginia.—The Committee on Roads and internal Navigation in the Virginia Legislature, have made a report, accompanied by a bill, proposing to make various improvements on account of the state; the cost of which is thus estimated:

Rail road from the Tennessee line to Evansham,	1,200,000
Parkersburgh and Staunton Road,	160,000
Staunton and James River Turnpike,	200,000
Valley Turnpike,	500,000
North Western Improvements,	250,000
Improvement of James River below Richmond,	100,000
	$2,410,000

Add to this sum three-fifths of the sum necessary to extend the Rail Road to Danville, whole capital, $3,500,000,	1,500,000	
Amount of state subscription to road from Evansham to James River,	1,200,000	2,700,000
Aggregate amount to be raised by the state,		$5,110,000

The report concludes with the following resolutions:

1. *Resolved*, as the opinion of this Committee, That it is expedient to construct the works specified in the annexed report, upon the principles therein indicated.

2. *Resolved*, that it is expedient to authorise the Board of Public Works, by law, to borrow from time to time, such sums of money as may be necessary to complete those works which are recommended as proper to be undertaken on state account; and also the sum necessary to subscribe the state's proportion of the capital, of the Joint Stock Companies recommended, whenever the individual subscription shall have been made.

MEMORIAL TO CONGRESS FOR THE IMPROVEMENT OF THE ALLEGANY RIVER.

To the Honorable the Senate and House of Representatives of the United States, in Congress assembled:

The practicability of the improvement of the Allegany River, for Steam-Boat navigation between Pittsburg, Pa., and Orlean, New-York, being fully established, the undersigned, your memorialists, would respectfully solicit from your Honorable Bodies, an immediate appropriation for that object. An enlightened observer need but examine the geographical position of the Allegany from its entrance into the State of New-York, to its confluence with the Ohio, and with a knowledge of the characteristicks of the stream, the conviction must be irresistable, that the improvement of such an avenue for the purpose of commerce and communication, must be of great national importance. This becomes more clearly apparent when it is considered, that upon the completion of the Genesee Valley Canal, in the State of New-York, (a work now in progress,) which is to unite the Grand Erie Canal at Rochester, with the Allegany at Orlean, a chain of inland water communication is completed from New-York city to the valley of the Mississippi, which a glance at the map will show is more direct, and experience will prove is more safe, cheap and expeditious than any other which can be obtained between these important portions of the Union. From the surveys made of the Allegany at different periods, particularly by the one made during the past summer, under the direction of Major G. W. Hughes, U. S. Topographical Engineer, by authority of Congress, (to whose report your memorialists would refer,) its improvement for steam navigation is found can be effected at an expense extremely limited, compared with the general benefits it would confer.

That it is a stream susceptible of improvement at a moderate expense, will appear from a general description. After its entrance into the State of New-York, many tributaries contribute to swell the channel, until it becomes a smooth, deep, and capacious River, and for the entire distance between Orlean and Pittsburg, flows over a pebbled bottom, unobstructed by rocks or sand-bars, with a uniform descent, and without one perpendicular fall, and is in its natural state, susceptible of being navigated by steam and other boats, during the most of the fall and spring months. Its importance as a channel of trade is enhanced by the fact that it is closed but a short time in the winter, is generally open for the purposes of navigation during the first weeks in March, and while other important water communications which connect the eastern with the south-western border, and now chiefly used for the conveyance of merchandize, are closed by ice, the Allegany remains open, through which goods, &c. may be transported and delivered at the different markets upon the Ohio, and its tributaries, several weeks earlier in the season, than by any other route;—to which consideration, when the advantages of increased cheapness, security, and expedition are added, your memorialists feel warranted in the statement—that this improvement would be attended with important practical blessings, and by facilitating the commercial intercourse of remote parts of the Union, would greatly contribute to the general good of a large portion of your fellow-citizens.

Let us for a moment imagine, what in a very short period will be reality,—the Genessee Valley Canal and the New-York and Erie Railroad completed, and merchandize, &c. from the commercial emporiums of the east designed for the Mississippi Valley, to be transported through this channel, arrives at the Allegany. How vast a country accessible by navigable waters without another transshipment here opens to the view of the trader! To the highest point of Steam-Boat navigation on the Mississippi River, is nearly five thousand miles. If this be taken as one continued chain, and the mighty streams which diverge from it, and which penetrate each of the States in the Mississippi Valley, be regarded as branches, one uninterrupted course of steam navigation is exhibited, of not less than twelve thousand miles. When in addition, we look at the Canals and Railroads contemplated and in progress within the several States connecting with these waters and extending to the Atlantic Ocean, the Great Lakes, the Hudson and the Connecticut, and other navigable waters, we extend the sphere of Steam-Boat, Canal and Railroad communication to not less than eighteen thousand miles, embracing in their extent almost every State in our Great Confederacy. To this extensive inland channel of communication, the Allegany, as a connecting link, is of vast importance.

The improvement under consideration being so clearly of a national character, would contribute so largely to the general welfare of your fellow-citizens in facilitating trade between the States, in time of peace, and in time of war by affording government a highly important avenue for the transmission of troops and munitions of war, your memorialists confidently believe that few improvements of a similar nature to which your attention will be called, will have equal claims, and none superior—for a liberal appropriation from your Honorable Bodies. Not only would this improvement greatly subserve the purposes of commerce between different and distant parts of the Union, and all the advantages of increased wealth and enterprize to every branch of industry be experienced, but by it a community of interest, of feeling, and of friendship will be more directly cemented and perpetuated, and the citizens of twelve at least of the States and Territories brought as by enchantment, into one common neighborhood, and become directly partakers in the advantages it would confer. The improvement of the Allegany between Pittsburg, Pennsylvania, and Orlean, New-York, is respectfully submitted to your Honorable Bodies, and as so large a portion of the People of the United States, being within the range of its benefits, must feel a lively solicitude in this subject, it is confidently hoped that in view of its national bearings, the prayer of your memorialists will be granted, by an immediate appropriation sufficient to accomplish the work. And your memorialists will ever pray, &c.

From the Baltimore Gazette.

MR. EDITOR:—It is a matter of very great astonishment to me, that the public will continue to submit to the inconvenience of having hydrants subject to being closed up by the frost, when they could so easily remedy it, not by adopting the new fashioned kind lately imported from Philadelphia by the Water Company, and which they propose to put down at a cheap first cost, but which in the end will be found to be exceedingly dear, but by the adoption of the one upon the principle invented by our fellow citizen, Sater T. Walker, Esq. The writer of this is personally acquainted with the fact, that this invention has been tested during the last two winters in the yards of John Scott, Esq. Fielding Lucas, Esq. James L. Ridgely, Esq. Walter Ball, Esq. and Edward Cockey, Esq; and in every instance it has been found to answer the end proposed by the inventor, viz. furnishing, during the most severe weather, a free and unobstructed supply of water. In addition to this great desideratum, such is the construction of the works that friction to as great an extent as is practicable has been avoided, so that their duration may be considered equal to about one hundred of those down on the Philadelphia plan. The Assignee of the patent will, I feel assured, if applied to, put them at a reasonable cost to any of our citizens.

THE RAISING OF THE WILLIAM.

Much interest has been excited by the various methods adopted for raising the two vessels, the Apollo steamer and the William of Sunderland, both sunk near this town. The first was to have been raised by means of air bags, and the latter by cylindrical air cones. Through Mr. Kemp, the inventor of the latter apparatus, a number of scientific gentlemen, who take a great interest in the success of this novel means of raising vessels of any magnitude, have inspected not only the working models, but the whole apparatus by which the William is to be brought up. The William was run down by one of the foreign steamers last winter—she was 400 tons burden, and not being considered worth raising, was abandoned by her owners, and became a ruinous impediment to the navigation. The Lord Mayor, as conservator of the Thames, put out notices for tenders for the removal of the wreck, and Mr. Kemp's plan was accepted, his offer being 500*l.* A large schooner was brought to the spot, containing 32 cylindrical vessels each six feet high, by four and a half diameter, lined through with zinc, and having only one head. Across the opening is a strong iron, which is firmly attached to the machine, with a hook in the centre. The first step resorted to was to ascertain the precise situation of the vessel. This was done by means of Dean's diving apparatus, which merely consists of a copper helmet, with a glass front, supplied with air from a pump in the vessel above. The divers then proceeded to pass entirely round the vessel from head to stern a chain cable of tremendous strength. To this at intervening distances of six feet is attached short bridle chains; and to the end of each of these is a rope with a buoy attached to it, which floats on the surface. When everything below is complete, this rope is passed through the eye at the open end of the cone. The cone is then cast overboard and immediately fills with water, and descends exactly to the bridle chain. The diver then goes down and secures the two together. As soon as a sufficient number are attached, a tube connected with the air pump is placed under the open end; and the air is then forced from the pump into the cone, and as soon as it leaves the tube, rises naturally inside the vessel and displaces the water by taking its place at the upper end. The cylinders are filled in this manner by degrees, taking the alternate sides of the head and stern first. Water being a non-elastic fluid, will naturally cause a body that may be sunk to rise to the surface as soon as it shall be made lighter by the elastic fluid confined in the cylinders. Therefore it is quite clear that any body must be raised if only sufficient air attached to it, and this was the case in the experiment tried on a small vessel loaded with iron we had the pleasure of witnessing, and which it was the opinion of every person present must raise the William, it were not for the numerous impediments and obstructions that have been thrown in the way. The vessel lying in mid-chanel is being continually run over by other vessels; and several times the iron chain round the bottom of the wreck has been carried away by the anchors of colliers and others getting foul of it. The buoys attached to the bridle chains have been over and over again destroyed by the paddle-wheels of the steamers, whose masters really appear bent on doing the machinery as much injury as possible. Two of the large cylinders were last week carried completely away, and have not since been found. The Lord Mayor has sent down a lighter, which is moored, to warn vessels from the spot, and the city flag is hoisted on board Mr. Kemp's schooner; fires are also kept burning the whole of the night; even this is to no purpose, for on Sunday afternoon last, just as every thing was prepared for weighing, down came a collier, damaged the schooner to the amount of 200*l.*, and carried away a large number of tanks. It is evident, unless some better protection is afforded Mr. Kemp, he must abandon this ingenious plan, at considerable loss to himself, and the almost total destruction of his property. The working model exhibited is thtt of a vessel about three feet long, loaded with iron, which was raised to the top of the water in the tank with the greatest possible ease, as was also a large lump of iron, and every person present seemed perfectly satisfied that this plan must succeed in deep water, where every other method would fail. —*Gravesend Journal.*

THE NEW GOVERNMENT STEAMER "GORDON."

The new steamer "Gordon," now lying in Woolwich Basin, is the largest steamer in her Majesty's service; she is of 1150 tons, builders measurement—37 feet 6 inches beam; and her depth of hold 22 ft. 9 in. She has sponsons on each side, which make the deck 10 ft. more, say 47 ft. 6 in.; length between perpendiculars, 179 ft.; over all 210 ft. She will carry a tier of 36-pounders on her main deck, and two large 84-pounders. At each end on the upper deck there are swivel guns that will range 290° round the horizon. The vessel is constructed from the designs of Sir William Symonds, Surveyer of the Navy, and is, without exception, as regards her build and form, the finest steamer afloat. She will carry twenty days coal—1000 troops; 136 crew; and stores and provisions for all, for six months. The engines, which are of 320 horse power, are now making by Messrs. Seaward & Co., with their patent slide valves, now coming into such general use on board of steam vessels. The cylinders are 64 inches in diameter; wheels 26 feet; boilers all of copper, and the coal-boxes in the engine room will contain 360 tons of coal. The boilers, cylinders, and all the vulnerable parts of the engine will be four feet under the water line, besides having on each side from end to end of the engine room, a depth of coals in the boxes 7 feet thick. The whole of the steam machinery, may be said to be invulnerable from shot.—*London Mechanics Magazine.*

MANUFACTURES OF LANCHASHIRE.

Probably the largest entire room for manufacture in this county, and if so, in Europe, is that of Messrs T. & E. Grundy, at Heap-bridge, near Bury. It is appropriated to the manufacture of woollens, and is 85 yards in length by 75 in width, and 12 feet in height; is supported by 253 pillars, some of which also bear gearing; it has 65 large windows, and 253 skylights; 672 feet of steam piping run through it, and about 2,688 feet of shafting are at work. Ii contains, or will contain, eight cardling engines, probably the largest in this county; eight gigantic slubbing frames; 40 mules; 200 looms, some for weaving prials, three in width; 450 gas jets; will be worked by one engine of comparatively small power, and is surmounted by a funnel of 69 yards and two feet.—*Bolton Free Press.*

TELESCOPES.

A correspondent of the *Hereford Journal*, in reference to the inconvenience experienced from the condensation of moisture which is apt to take place upon the object glasses of telescopes in the atmosphere of the evening, says that it may be obviated by the employment of a tube of pasteboard 12 or 18 inches in length, so constructed as to fit upon the object end of the instrument. The invention, he says, was that of the celebrated astronomer De la Hire.—*London Mechanic's Magazine.*

ARTIFICIAL RUBIES.

M. Gaudin has presented a report to the Institute of Paris, detailing his mode of proceeding in the preparation of ficticious rubies, which in every respect resemble those found in nature. He submits aluminium, with a small quantity of chromate of potash, previously calcined, to the influence of a powerful oxy-hydrogen blow-pipe, by the action of which the material is melted, and no cooling, the crystel presents all the characteristics of the ruby. The Accademy appointed M. Becquerel to examine into the merit of the discovery, and his report being deemed conclusive, presented their *thanks* to the author.—*Ib.*

A GOOD HEARING FOR DR. REID.

Dr. Reid of Edinburgh, who gave evidence before the House of Commons' Committee on the best way of constructing a building for the purpose of hearing, with reference to the new House of Parliament, is now on an acoustic tour through Europe, in order to examine the principal buildings with reference to their capabilities in that point of view. He lately paid a visit to Berlin and Potsdam—to the latter, it appears, for the purpose of examining the acoustic properties of the barraks. Our readers may be surprised at his pushing the ardour of research so far, but their wonder will cease when they learn that Dr. Reid is an Accoustic Commissioner, and travels at the expense of Government.—*Ib.*

FUR IN STEAM BOILERS.

Messers Neron and Kurtz of Brussels have advertised an invention for dissolving the "fur" which collects in kettles and boilers, and is found so serious a nuisance in all operations conducted by steam. For this they require a yearly subscription from those who avail themselves of it, of so high an amount as, in the case of steam engines, eight franks per annum for every horse-power. The German papers in taking notice of this, remark, that Mr. Bornschein of Frankfort on the Maine, announced a somewhat similar discovery in the early part of this year, but that by his plan, the "fur" is not dissolved when accumulated, but absolutely prevented from accumulating. For the disclosure of his method he only requires the sum of ten ducats, not yearly, but once for all. We should think that when this information reaches Brussels, Messrs. Neron and Kurtz will have few customers for their expensive wares, unless Bornschein's discovery be discovered to be useless.—*London Mechanics Mag.*

SILK WORMS.

The cultivation of the mulberry-tree, and the raising of silk-worms, has been adopted in Switzerland with great success. At Basle August, in particular, this new source of wealth has been astonishingly productive.—*Mining Jour.*

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

⁂ Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL,

AND

ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, OCTOBER 7, 1837. (Published February 3, 1838.) VOLUME VI.—No. 40.

CONTENTS.

AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 3, 1838.

We acknowledge the receipt of the following Reports:

Proceedings of the Stockholders of the Louisville, Cincinnati and Charleston Railroad Co., at their Second Meeting held at Flat Rock, N. C., October, 1837.

Report upon the plan of Construction of several of the principal Railroads in the Northern and Middle States, and upon a Railway structure for a new track on the Baltimore and Ohio Railroad, by J. Knight, Chief Engineer, and Ben. H. Latrobe, Engineer of Location and Construction.

[We return thanks for this copy, and would be much obliged by the receipt of another. If the work is not intended for sale, we desire to make public, through our columns, some of the information contained therein; it is highly valuable to the Engineers of this country.]

Report of the Jefferson and New Albany Canal Co., Thos. F. Purcell, Chief Engineer.

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IMPROVED TURN-OUTS.

We acknowledge ourselves indebted to the writer of the following communication, describing the improved *turn-out*, now in use on the Liverpool and Manchester Railroad.

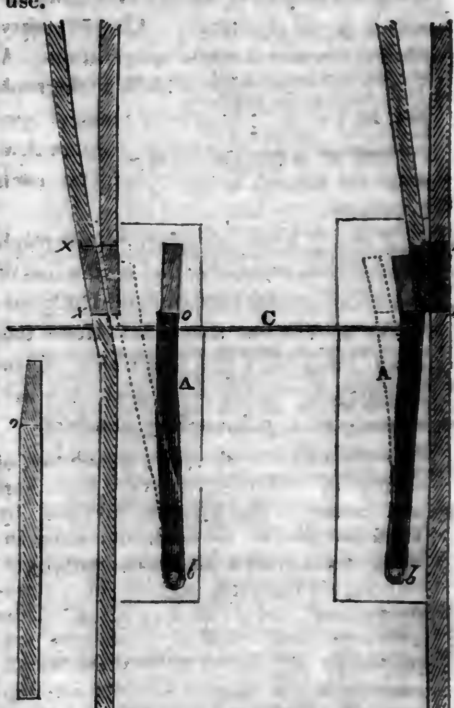
To the Editors of the Railroad Journal:

GENTLEMEN—The frequent occurrence of dangerous accidents on Railways, produced by the trains running off the track, which in most instances is caused either by neglect, or inaccuracy, in the working of the switches in turn-outs, induces me through the medium of your Journal, to suggest to Engineers and Railroad proprietors the adoption of the following plan of working turn-outs, lately introduced on the Liverpool and Manchester Road, by which all possible accidents from this source are avoided, and even the grossest neglect of the attendant, or wilful derangement of the switch, cannot jeopardize the lives of passengers, or the safety of the engines and cars.

The present method of changing the direction of the engine and train from one track to the other, is to have the rails moveable for a distance of about 15 feet, and to make this line of rails serve in common for both tracks. Thus, one track is at all times interrupted, and consequently, the train liable to run off, if by accident or neglect, the switch should not be exactly in the right position.

The accompanying sketch of the new method shows that the lines of rails in the main track, as well as turn-out, are perfectly *uninterrupted*. The change of direction of engine and train from one track to the other, is effected by two guides, AA, moveable upon hinge bolts, *bb*, and connected by the rod C, which passes under the main rail, and is worked by a simple lever, as in the present system. That portion between the letters *xx*, where the rails approach each other within 1½ inches, so as to allow a free passage for the flanges of the wheels, should be made in one casting; the joints of the inner two rails, against which the guides close, should not be less than half an inch wide, and may be made of cast steel.

The guides must be of wrought iron. 2½ inches wide, 4 inches thick, and about 5 feet long. The top of the guides must be level with the top of the rails; but from the point *o*, where they close against the casting, they should taper down in a distance of 9 inches, to 2¼ in. thick, leaving the ends of the guides 1¾ inches below the top of the rails—(see section of the guide). The object of this is, that if the train should come down on either track, and the guides by neglect or accident left so as to close it up, then the flanges of the engine and carwheels on one side would gradually mount on this incline, and passing over the guide drop again between it and the main rail, and thus regain the track without in the least endangering the lives of the passengers, or the safety of the engine and cars. The cost of working turn-outs in the manner described, differs but little from those now generally in use.



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G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL,

AND

ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, OCTOBER 7, 1837. (Published February 3, 1838.) VOLUME VI.—No. 40.

CONTENTS.

AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 3, 1838.

We acknowledge the receipt of the following Reports:

Proceedings of the Stockholders of the Louisville, Cincinnati and Charleston Railroad Co., at their Second Meeting held at Flat Rock, N. C., October, 1837.

Report upon the plan of Construction of several of the principal Railroads in the Northern and Middle States, and upon a Railway structure for a new track on the Baltimore and Ohio Railroad, by J. Knight, Chief Engineer, and Ben. H. Latrobe, Engineer of Location and Construction.

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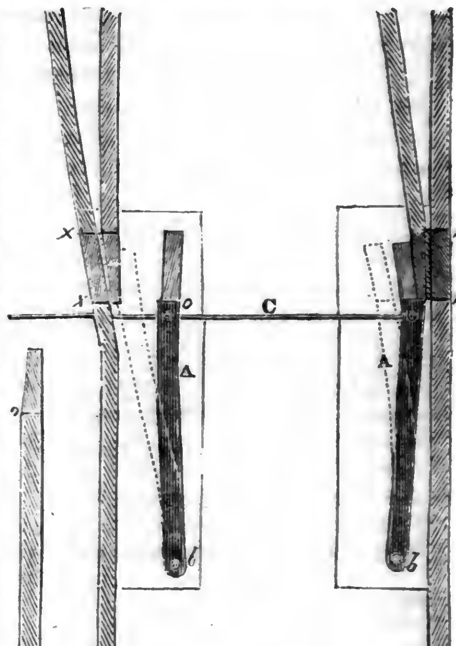

The advantages of this new method over the old are too palpable to require further comment; and I have no hesitation in saying that it would be a good economy on any Railroad already in operation, to adopt this plan, for one accident caused by the other, would involve a Company, probably, in more expense, than a change of all the turn-outs would amount to.

C. E. Detmold, Civil Engineer.

ELECTRICAL TELEGRAPH.

Among the Electrical novelties of the day, and they are numerous, the Telegraph of Prof. S. F. B. Morse, of the New-York University, is one that has excited much admiration, from its simplicity and immediate application to use.

We have not ourselves had the pleasure of examining it; we give a description from the Commercial Advertiser.

The only difficulties consist in the perfect insulating of the wire in situations where it will be exposed to the contact of water. The numerous waterproof inventions of the day can certainly furnish a cheap and perfect process for insulation. We do not attach much weight to the objection advanced by some, that through design the wire may be divided at a time when most needed, and in such a manner as not to leave indications at what point, in a line of many miles, this may have been done. It would require but very little contrivance to place it entirely out of the power of one unacquainted with the location, to determine the exact line of the position of so small a chain as the wire and its insulating covering would constitute. The necessary search could not elude observation. A very great advantage in such a telegraph will be found in the private mode of operation, even the moment of communicating cannot be known except at each terminus.

A much more complicated telegraph has been successfully tried on the line of the London and Birmingham Railroad.

We understand that Prof. Morse has much simplified the operations of the machine, by the discovery of an alphabet, instead of the reference by numbers.

"We had the pleasure, yesterday, of seeing in operation the very ingenious and beautiful contrivance invented by Professor Morse, for communicating intelligence at great distances, with light-like rapidity, by the agency of electro-magnetism, as it used to be called, the galvanic fluid. The machinery employed by Mr. Morse is far from complicated, yet not easy to describe intelligibly. It consists of a galvanic battery, any required length of coated wire, a font of type, two dictionaries, a small apparatus at one end of the line for breaking and renewing the galvanic chains of communication, regulated by the type set up, and at the other end of the line another set of apparatus, by which a brass pen is made to strike upon a sheet of paper, rolled round a small revolving cylinder—a stroke of the pen being given at every renewal of the galvanic communication. The length of wire through which the signals were conveyed, was ten miles; this wire being wound for convenience, around some three or four large wooden rollers. In attempting to give our readers some idea of this admirably ingenious machinery, we will begin at what printers very naturally consider the beginning—to wit, the types.

"These are thin pieces of metal, about two-thirds or three-quarters of an inch in width, one of the longer edges being notched to the depth of about half an inch—the number of notches being from one to nine, representing the nine numerals; the cypher is represented by a long notch, or indentation of about three-quarters of an inch. With these ten types, it is evident, therefore, that any given amount in figures may be represented.

"Next come the gallies, which are pieces of wood about an inch square and 80 inches long, having cogs on the under-side, and on the upper a slit, extending throughout the length, and deep enough to receive half the width of the types above described, which are sent into the slit in line, as required to represent the numbers.

Every word in the language is represented by a number, the whole dictionary containing some 50,000. The two dictionaries are of course precisely similar, one being for use at either end of the telegraphic line. Every word has its number placed before it, so that the number for the word or the word for the number may be found with ease and expedition.

The apparatus for breaking and renewing the galvanic communication is simple and efficient. It consists merely of a lever, about three feet long, moving on a pivot at one end, and having at the other a pair of copper points, which fall into as many small cups containing quicksilver, and are raised again, according as the end of the lever is depressed or deviated. The cups communicate by wires with the galvanic battery, and to the lever is attached the end of the ten mile wire. Connected with the lever is a small winch, working a toothed wheel, which plays in the cogs of the galley, so as to make it pass along, under the lever.

Upon the under side of the lever, not far from the pivot on which it moves up or down, is a brass tooth, fitting the notches in the types. So that the operation is, when the winch is turned and the galley moves along under the lever, to make this rise and fall alternately, as the tooth falls into the notches in succession. Thus the communication is broken and renewed in a succession exactly corresponding with the notches of the types, which notches in their order represent a given sum in figures. This is the contrivance at one end of the line—the end from which intelligence is to be communicated.

The apparatus at the other end is somewhat more complex, and we shall not attempt to describe it farther than by saying, that its object is, first, to attract attention by striking a bell, acted upon by the galvanic stroke or shock from the other end, through the ten mile wire next to set a motion, the cylinder around which the paper is wound, and lastly, to make the brass pen strike this paper at every renewal of the communication, and rise from it at every break. It is obvious, therefore, that the succession of dots on the paper, the cylinder all the while slowly revolving, will correspond exactly with the notches in the types, as the galley passes under and acts upon the lever at the other end. Thus, suppose notches to represent the numbers 22, 47, 121 and 236. The dots on the paper will stand thus: oo oo oooo ooooooo o oo o oo ooo ooooo the long spaces indicating that the number is complete, and that a new one is to be commenced. A cypher is indicated by a dash, thus;———; the communication remaining unbroken while the long indention in the edge of the types passes under the tooth of the lever.

Such is the contrivances—if our readers can understand the description—by which Professor Morse proposes to communicate any required information, between points however distant, in a space of time much less than must be necessary by any other mode ever devised, or suggested. We have not the requisite science to offer an opinion whether it is or not liable to objection; but so far as the experiments we saw may be taken in evidence, the result is perfectly satisfactory and convincing. A communication of our own suggesting, and only known to Mr. Morse by the numbers representing the words, was communicated in eight minutes from the time at which he commenced setting the type; and this too, under all the disadvantages arising from want of practice, and from the presence of a curious and eager throng of spectators.

That the galvanic stroke was communicated through the whole ten miles of wire, was abundantly demonstrated—and we understood from gentlemen present, more capable than ourselves of appreciating the evidence; and we also understood from them, that it would have communicated through a hundred miles with the same rapidity and certainty. The rapidity, by the way, is that of light; the keenest eye can perceive no interval between the fall of the lever at one end, and that of the brass pen at the other.

It is proper to say that the dictionaries used are the common octavos of Walker, and contain multitudes of words which would never be required. Professor

Morse said that he entertained no doubt of being able to reduce the words to 30,000, or perhaps to 20,000. Our own opinion is that a much smaller number could be made sufficient.

We understand that Professor Morse goes to Washington immediately with his apparatus, where it will doubtless attract wondering attention.

NOTE.—A more *obviously* satisfactory experiment might be made perhaps, by stretching out the line of wire between two points as distant as convenience would permit; as for instance, between the Battery and 40th street—which might be done, we should think, by stations on the tops of houses.

RAIL ROADS IN CAROLINA.

SIR—On all accounts, the opening of roads South is of the first importance in the Northern Cities. So important, that I trust you will insert the following observations, as written by a Carolinian, who has recently been on the spot, and thinks himself qualified to offer a few hints as to the proper method of filling up the gap between Waynesboro', N. C., and Charleston, S. C., and thus completing the road from the North. He believes his calculations to be *generally* correct, but if not *exactly* right, the errors can be easily rectified. X Y. Z.

A New York Journal having stated that the Baltimorians, by means of the Railroad to Philadelphia, are anticipating the express mail; and, also that the Washington and Roanoke Railroad, is in a state of rapid progress, it is to be presumed that a continuance of the Railroad from Waynesboro,' N. C. to Charleston, would operate in the same manner; therefore, the object of this paper is to show that such a line must be a source of profit to the proprietors; and, if the Government would advance two-fifths, or any proportion to be hereafter determined, incalculable benefit will be derived by the people of the United States, in the means it would afford of carrying all its crops, mails, &c , &c., free of any further charge.

In a calculation of the profits of the Louisville, &c., Railroad, based on the results of the Charleston and Hamburg road, General Hayne makes it for 620 miles, 177,142 passengers, paying $669,825. In a short time, he thinks it will be "doubled." The freight he estimates at $1,000,000. Half of this would be receivable on a road, commencing at Summerville, 24 miles from Charleston, and proceeding across the Santee to Waynesboro, N. C., via ———, below Manchester, Summerville, Darlington and Fayetteville—or, in length, 200 miles.

The Cost.

260 miles at $10,000 per mile	$2,000,000
Locomotive power $327,-000, say	400,000
	$3,000,000

Annual Expenses.

200 miles at $7,00 per mile	182,000
Passengers	462,000
Leaves a balance of	$280,000

Of the $5,00,000 for freight, no notice is taken. The calculation is confined to passengers. On the subject of the Summerville and Waynesboro road, let us takes the receipts of the 135 miles of the Charleston road, over which, in 1836, 39,216 passengers passed, paying $129,-982,34 —— the freight amounting to $129,633,84—they making a total of $269,016,18. The cotton that year, would produce $35,000—thus leaving $234,016,18, for 135 miles of road. The Summerville and Waynesboro road is 200 miles. Increasing $234,016,18 to $240,000, and allowing for the difference of distance, the receipts of the new road would be $462,000.

But the importance of this subject, exemplified as it is by the actual results of the Charleston road, has led us into an investigation of the relative value of domestic and foreign communication—the general idea having been that the benefit derived from that road, proceeded principally from the passage *through*, rather than the communication *within* the state; therefore, on a reference to the otherwise *variously* stated and gloriously confused topsy turvy official documents of the Company, I have been induced to ask

Who Paid the Passage Money?

1836.

	Passengers		Per Capitem
July	2857	$7252 64	$2 85
August	2380	7092 32	2 85
September	1891	6678 04	3 53
October	2782	16 577 51	3 76
November	3294	10 537 57	3 18
December	4007	10 441 18	2 61
	17 205	$52 579 26	$18 47
Month av.	2867	7 763 21	3 07

1837.

January	2 916	$8 537 74	$2 93
February	3 786	12 383 93	2 61
March	4 695	16 614 25	3 32
April	4009	12 385 95	3 08
May	4009	12 977 69	3 23
June	3092	9 300 56	3 00
	22 506	$71 202 12	$18 23
Month av.	3 757	11 867 02	3 04

Conjectural Analysis.

From Augusta 335 m	5626	a $675	$37 976
Branchville 62 m	5626	a 300	16 878
Inabinets 30 m			
Fm Charleston	11 254	1 50	16 381
	22 506		$71 235
First six months	22 506 in 1837		71 202

The latter is but conjectural, and as the *actual* report will be highly satisfactory, it is to be hoped that as the Company is at market and should make a fair display of its situation, it will let the public have a correct detail of the lands whence its receipts have arisen. If it turns out that the mass is received from *within* instead of *without* the state, it will prove very encouraging to all Railroads, and especially those in S. C.

I will look a little farther into the subject.

In 1836, 39,216 passengers paid $129,982,34 and the freight paid $139,033,84. Total 269,016,18.

In 1st half of 1837, there were 9,248 passengers *up* against 7500 in the 2nd half of 1836, showing an increase of 1748.

In 1st half of 1837, there were 13,258 passengers *down* against 9705 in the 2nd half of 1836, showing an increase of 3553.

In 1st half of 1837, there were 22,506 passengers *up and down* against 17,205 in the 2nd half of 1836, showiug an increase of 5,301.

Monies received for Passengers.

First half of 1837	$71 202 12
Last half of 1836	52 570 26
Showing an increase in six months of	$18 622 86

Monies received for Freight.

In 2nd half of 1836	*np*	$49 428 96
In 1st half of 1837		35 038 02
	Diminution	$14 390 94
In 2nd half of 1836	*down*	19 410 75
In 1st half of 1837		10 543 24
	Diminution	$68 839 71
	Up and down	$68 839 71
In 1st half of 1837		45 581 26
Showing a *Diminution* in 6 months of		$23 258 85

If to the *decrease* of freight, we oppose the *increase* of passage money, there will be left a balance of $4,635 59; but, if the increase next year in passage money be similar to that of the last, there will still be an augmentation in the increase of $14,000, or enough to pay half the interest of the Company's debt—nearly $500,000.

I see also a notice "of the Cincinnati and Charleston Railroad having offered to purchase the shares of the Charleston and Hamburg road, &c., &c." This is an error. Like the road (to the west,) it is as yet but *a subject of conversation.* But on any calculation, the purchase appears to be out of the question.

Charges attending the Purchase of the Charleston and Hamburg Road.

1. Cost of *doubling* 62 miles road from Branchville to the City $4000 pr. m.	$250 000
62 miles from Columbia to Branchville $10,000 pr. m.	620 000
34 miles from Columbia to Camden $10,000 pr. m.	340 000
Of 12,000 shares of the old Company *a a* $125 p. s.	1 500 000
Crossing the Cangaree	
	$2 710 00

Estimate of a New Road.

2. Cost of 110 miles from Charleston, *via.* Santee and Rockland Fall to Columbia, Erie, $10,000 pr. m.	$1. 100.000
Of making 34 miles of road from ———, below Manchester to	

Camden at 10,000 pr. m.	340 000
	$1 440 000
Crossing Wateree Santee	
Leaving a difference between No. 18. No 29	1 270 000

If the Congaree is passed at Columbia, it is at the expense of the Western Company, and for the benefit of the Bridge Company. The mere ordinary travel of the country will first pay a small, and eventually a good interest on the structures upon the Santee and Wateree.

But let us look to the

Annual Expenses.

No. 1. 62 miles a $1106 per. m.	$68 575 00
96 miles 700 per m.	67 200 00
	$135 772 00
No. 2. 144 miles a $700 per m.	$100 800
Saving 34 972	135 777 09

Total Saved.

In 20 years $34,972	$699 440
Difference of purchase and Construction	1 270 000
	$1 969 440
197 miles of road, a $10,000 per. mile	1 970 000
Actual expenses July to December, 1836	125 646 63
January to June 1837	74 700 12
	$200 346 75
Thus for 135 miles, making an annual charge per mile of	1 484 85
And at the same time the Engineer only calculated it	1 2337 00
The Anti-Peedlee road	1 132 00
The Savannah and Macon	700 00
The Metropolitan	600 00

SEMI-ANNUAL REPORT OF THE DIRECTION OF THE SOUTH CAROLINA CANAL AND RAILROAD COMPANY.

To the Stockholders of the South Carolina Canal and Rail Road Company.

July 10, 1837.

The statement of the affairs of the Company herewith presented, show the income of the last half-year, ending 30th June, 1837, to be $122,077 52

From which the current expenses deducted,	74,700 12
There remains	$47,347 40
From this amount a dividend is declared of three dollars per share on 12,000 shares, is	36,000 00
Leaving a balance unappropriated of	$11,377 40

to be carried to the ensuing half-year's accounts.

The *debts* of the Company will necessarily be increased until October, when the remaining instalments of the new stock, amounting to six hundred and forty thousand dollars may be called in—eighty thousand dollars per month—with which all the debts of the Company may be liquidated, (except the State loan of one hundred thousand dollars, not payable before the year 1847) and a sufficient capital remain to finish the improvements now in progress. A liberal course has been pursued by the Banks during the present scarcity of money. A little further indulgence on their part will carry the Company forward to its own resources.

The *Road* has gradually improved for the last year—a large portion of the wood work has been renewed. This work is going on, and by the time the embankment is made, and the new iron placed upon the road, the whole surface will be as good as new. Accidents are comparatively harmless where the road is thus improved, and their recurrence is decreased in proportion to the extension of these works.

The *Embankment* is now all under contract, except a few small places not exceeding two miles, to be done by the road hands—the whole to be finished by the month of October, 1838. Many of the worst places are now nearly completed, viz. 9 Mile Bottom, 4 Hole Swamp, Edisto River Swamp, &c. About 100 miles of the road is surface construction—less than 40 miles remain to be embanked.

The *new Iron* is now extended over about 54 miles of the road—441 tons have just arrived—and 1000 tons more is finished and ready for shipment, by last advices from London. This when received will complete nearly 40 miles more, and before placed upon the road it is likely the balance to complete the whole line, will be contracted for and coming forward. The first contract of 2500 tons was made at £11 10s; the second of 1000 tons at £10; and it is reasonable to expect a further decline before it is necessary to contract for the balance.

The *old Iron*, when replaced by new, may be sold, and would no doubt bring 120 to $130,000.

Turnouts have been and are to be placed between all the stations more than seven miles apart; six of which have been completed in the last six months, and six more are about to be constructed, which will increase the whole number to thirty, making the average distance between them about 4½ miles. New tracks and sliding sections have been made at several of the stations to accommodate an increased business. Fences and gates have been put up, the more effectually to secure the property at principal stations.

Houses have been purchased and built at several of the principal stations, in all ten, (and others to be built soon) to be occupied by the resident carpenters. These will afford a shelter to passengers, if accidentally delayed in their vicinity.

The *Machinery* of every kind has been increased, and will continue to be increased, till an adequate supply is procured. Five new engines have been received since January last; two more are in progress, and four more are ordered, all to be completed early in the present season: and three which had been laid aside, requiring large and expensive repairs, are given out, to be completed as soon as possible, by competent machinists, instead of building new ones, believing they can be made as good as new. These, with those now on the road, will swell the number to twenty-seven Engines, besides several that have been condemned, parts of which will answer for repairing others. If one half of this power can be kept constantly in running order, more can be done in a given time than ever has been heretofore; and it is hoped will in some measure meet the expectation of the stockholders, and the demands of the public.

There is now a new class of cars building on eight wheels, and it is expected by October to have twenty or more freight cars, four passenger cars, and four servant, mail and baggage cars, all on eight wheels, besides keeping in repair those on four wheels—say 250 freight, 16 passenger and 4 baggage cars. The eight-wheeled cars, of which there are about 18 ready for service, (a part to be mounted as soon as wheels arrive) carry more than double the weight than can be carried on those on four wheels, and with more ease to the cars, the load and the road. Those appropriated to the passengers add much to their comfort, being fitted up at a considerable expense, costing about two thousand dollars each.

The carpenters are about equally divided in repairing old cars on four wheels, and building new ones on eight wheels.

The engines and cars all suffer much less in going over the road improved by embankment and new iron, and when these improvements are completed, it is believed that double the amount of running machinery may be kept in order by the present force in the shops.

The same saving of labour is calculated upon in keeping the road in repair. A carpenter's gang having in charge six miles, is extended over twelve miles when thus finished off.

The *landed property* of the Company has continued to increase in value, particularly the wood lands. Those which cost 37½ to 50 cents per acre a few years since, would now sell for $1 to $5 per acre; and in places where villages are located, $100 to $500 per acre. The Company have about ten thousand acres acquired by purchase, and over three thousand acres by locating vacant lands granted by the State. In this business there is a competent surveyor constantly employed. These possessions have carried the necessities of the Company for fuel and timber beyond the control of those who would otherwise take advantage of the continual demand for these articles, and has kept the prices down to a lower rate than was at first expected—the general prices of timber being 4 cents a lineal foot, and wood $1.50 per cord.

To give some idea of the advantages derived by those not immediately connected with the Company by the passage of the road through so great an extent of pine barren, a moderate estimate has been made of the additional value of these lands since the road was located, and it has been found that the advance within one mile of the road, and beyond the influence of the towns at either end, not including any within 15 miles of either extremity, has been equal to the cost of the original construction of the whole road.

The constant supply of timber for repairs, and wood for consumption, gives employment to hundreds of inhabitants on the line—these and those with their families engaged about the road, in all the departments, would increase the number to *thousands* who have their support from this institution. The knowledge of this fact should enlist the good feelings of the community towards the Company, and must be viewed by the stockholders as not the least interesting feature in the enterprise.

It will be received with pleasure by all having a feeling for the moral condition of society, to learn that great improvement in this respect has been observed in all the varied departments of this extensive establishment, (although some few exceptions.) The general character is maintained only by the claim each can lay to a moral course, a correct deportment.

The Directors of the Louisville, Cincinnati, and Charleston Railroad Company residing in Charleston, have asked and had a conference with a committee of the Board of this Company on the subject of connecting the two roads. A report on this subject is annexed, and at the disposal of the Company. The plan of uniting the two, by the purchase, by that Company, of the stock of this, adds to the magnificence of the scheme of this gigantic enterprise, and gives proof on the part of the Directors of the Louisville, Cincinnati and Charleston Railroad Company, of their determination to place this grand undertaking beyond the possibility of failure. Possessed of this road, about half their line is finished to the mountains, and then with the capital subscribed in this State, will carry them to its extreme boundary.

The interest of the stockholders of this Company in this matter is another subject, to which each has a right to look and act for himself individually.

Respectfully submitted by
TRISTRAM TUPPER, President.
July 10, 1837.

(To be continued.)

To the Editor of the Baltimore Gazette.

TRANSACTIONS OF THE MARYLAND ACADEMY OF SCIENCE AND LITERATURE, vol. I. pp. 190.

This volume has just left the press of J. D. Toy, of this city, and I presume has not yet been extensively circulated, and as it is really a phenomenon in our literary horizon, it seems to demand particular attention. It will, doubtless, appear extraordinary to foreigners, when they are informed that this is the first volume of its transactions that any scientific association has ever published in Baltimore, whilst the societies of other cities of our country have for many years been favoring the community with the results of their learned labors. This book, then, whilst it reflects great honor on the Academy, is by no means creditable to the Scientific character of the city, for being too late in its appearance, and for having too few collaborators to contribute to its pages. But it is never too late to begin, and accordingly we congratulate the Academy on its publication, and hope that it may hereafter be able to issue an annual of its transactions, and thus in some measure, redeem the depreciated Scientific reputation of our city.

The volume contains thirteen articles, each of which deserves special mention.

I. Biographical notice of L. H. Girardin, L. L. D. First President of the Academy, &c. by J. T. D.

This is an interesting paper, and shows that the accomplished writer possesses talent not only for describing the usually dry details of rock formations and metallic ores, with Scientific accuracy, but also for adorning a purely literary subject with the graces of an elegant diction and a classical taste. We are indebted to this gentleman for rescuing from oblivion many interesting facts in the life of M. Girardin, and it well became him, who is the successor of the subject of his memoir in the Presidency of the Academy, to accomplish the pleasing task.

II. Outlines in the Physical Geography of Maryland, embracing its prominent Geological features, by J. T. Ducatel, State Geologist, &c.

An article exhibiting extensive investigation and indefatigable energy in the pursuit of his favorite studies, and at the same time displaying his high qualification for the responsible trust confided to him by the Legislature. It shows the resources of the State in almost every department of nature, and communicates much valuable information on a subject heretofore little understood.

III. Catalogue of Phænogemous Plants and Ferns, growing in the vicinity of Baltimore, by W. E. A. Aikin, M. D.

This does not profess to be complete, but shows that the author is asiduous in his attentions to Flora, and well qualified for the arduous work he has undertaken.

IV. A description of the Frostburg Coal Formation of Alleghany County, with an account of its Geological position, by Philip T. Tyson, accompanied with a map of the District.

There we discover *deep* research in more than one sense. Mr. T. has gone to the very *bottom* of his subject, and brought up an abundance of coal. It is a subject about which a man might grow *warm*, for his District seems to be particularly *coaled*. The speculators in lands will be obliged to him for his investigations.

V. Descriptive Catalogue of the Minerals of Maryland, by P. T. Tyson.

The Mineral resources of the State are here pointed out in a very satisfactory manner. The tourist can now ascertain the locality of the object of his search, and he will find his labors vastly facilitated by a perusal of this learned article.

VII. The detection of Arsenic in Medico Legal Investigations, by Wm. R. Fisher.

Any person who desires to see a difficult subject well treated, must read this paper. It abundantly justifies the high reputation which the writer bears as a profound Analytical Chemist.

VIII. The Latitude of Annapolis, by H. Humphreys, D. D.—President of St. John's College.

IX. Report of the Meteorological Committee, with tables of observations made at the Academy.

X. Directions for Preparing Specimens of Natural History.

XI. On the Metallic Coating for Electric Rubbers, by W. R. Fisher.

A short, but good article, exhibiting an improved plan, with minute directions for the use of the article recommended.

XII. Extracts from the proceedings of the Academy.

XIII. Donations to the Library.

This institution, which is really an ornament to the city, has for several years been noiselessly pursuing its way, and the only regret is, that more persons are not found to take an interest in its prosperity. It affords uncommon advantages for the attainment of scientific knowledge. It has an excellent and constantly growing library, an extensive and increasing cabinet, comfortable rooms, and other attractions of no ordinary character. And yet, I have reason to know, there are very few who take an active interest in the institution. There seems to be a want of taste, of intellectual cultivation, of literary, or scientific ambition in our city, which renders it exceedingly difficult to sustain such societies as the Maryland Academy professes to be. There are doubtless many persons who have scientific books, or objects of Natural History of no use or interest to them, which if deposited in the rooms of the Academy would contribute materially to the promotion of science, and there are many who by joining such an Association would be vastly benefited themselves.

BALTIMORIENSIS.

CLEVELAND AND PITTSBURG RAIL-ROAD.

The Cleveland Intelligencer of the 22d inst. says:—Mr. Foot presented the petion of the citizens of this place on the 16th, praying the passage of a law authorising the city to borrow a sum of money to be applied to the construction of Cleveland and Pittsburg rail road. He reported, on the same day, a bill, which was read the first time, authorising a loan of $200,000. On the day following it was considered and ordered to be engrossed for its third reading and final passage on the 18th.

AUTOMATON VIOLINIST.

Galignani's Messenger, published at Paris, furnishes the following interesting account of a new musical wonder, in the shape of Monsieur Mareppe's automaton violin player, which was not long since exhibited before the Royal Conservatory at Paris—and caused much admiration.

"On entering the saloon, I saw a well dressed handsome figure of a man, apparently between 40 and 50, standing with a violin in his hand, as if contemplating a piece of music, which lay on a desk before him; and had I not gone to see an automaton, I should have believed the object before me to have been endowed with life and reason, so perfectly natural and easy were the attitudes and expression of countenance of the figure. I had but little time for observation before the orchestra was filled with musicians, and on the leader taking his seat, the figure instantly raised itself erect, bowed with much elegance two or three times, and then turning to the leader nodded, as if to say he was ready, and placed his violin to his shoulder. At the given signal he raised his bow, and applying it to the instrument, produced a la Paganinni, one of the most thrilling and extraordinary flourishes I ever heard, in which scarcely a semi-tone within the compass of the instrument was omitted, and this executed with a degree of rapidity and clearness perfectly astonishing. The orchestra then played a short symphony, in which the automaton occasionally joined in beautiful style; he then played a most brilliant fantasia in E. natural with accompaniments, including a movement allegro mollo on the fourth string solo, which was perfectly indescribable. The tones produced were like any thing but a violin, the expression beyond conception. I felt as if lifted from my seat, and burst into tears, in which predicament I saw most persons in the room. Suddenly he struck into a cadenza, in which the harmonics double and single, arpeggios on the four strings, and saltos, for which Paganini was so justly celebrated, were introduced with the greatest effect; after a close shake of eight bars duration, commenced the coda, a prentissina movement played in three parts throughout.

This part of the performance was perfectly magical. I have heard the great Italian, I have heard the still greater Norwegian, I have heard the best of music, but I have never heard such sounds as then saluted my ear. It commenced p p p, rising by a gradual crescendo to a pitch almost beyond belief; and then by a gradual motendo and calendo died away, leaving the audience absolutely enchanted. Monsieur Mareppe, who is a player of no mean order, then came forward amidst the most deafening acclamations, and stated that emulated by the example of Vaucaoson's flute player, he had conceived the project of constructing this figure, which had cost him many years of study and labor before he could bring it to completion. He then showed the company the interior of the figure, which was completely filled with small cranks, by which the motions are given to the several parts of the automaton at the will of the conductor, who has the machine so perfectly under control, that Mons. Mareppe proposes that the automaton shall perform any piece of music that shall be laid before him within a fortnight. He also showed that to a certain extent the figure was self acting, as on winding up a string, several of the most beautiful airs were played, among which were "Nel cor piu," "Partant pour la Syrie," "Weber's last Waltz," and "La ci d'arem la mana," all with brilliant embellishments. But the chef d'ouvre is the manner in which the figure is made to obey the direction of the conductor, whereby it is endowed with a sort of semi-reason.

HANCOCK'S PATENT CAOUTCHOUC BOOK-BINDING.

While numerous very important improvements have recently taken place in every other department of the mechanics of book making, that part of binding, which consists of attaching the leaves together, has hitherto remained stationary, if indeed it has not retrograded. That this want of progress in the march of improvement, is not to be ascribed to any perfection in the art as usually practised in the present day, will readily be admitted by every one who is familiar with its details, who has a library, reads a book, or is in the practice of making entries in ledgers or other account books. Mr. Hancock, in his patent process of binding books with caoutchouc, or India rubber, (an article which has made such rapid strides in usefulness within these few years,) is the first that has effected any improvement in the operation in question; and that improvement is a most important one. The qualities of caoutchouc, its elasticity, its adhesiveness, and its being impervious to the ravages of damp or insects render it an article admirably adapted for the purpose to which it has in this instance been applied; and we think there is little doubt, but that it will in a short time totally supersede the use of stitching, paste and glue.

Mr. Hancock's invention consists in the binding of the leaves of books together by a solution of caoutchouc, or India rubber, by various methods, the books being composed of either single leaves, or sheets of any number of folds; dispensing altogether with the operations either of stitching, sewing, or sawing-in, and of the use of paste or glue in the backs. Instead of the leaves only being bound together by stitches at two or three points, the caoutchouc takes hold of the whole length of the leaf, in some of the varieties of Mr. Hancock's patented methods, and of a greater portion of it in others. The caoutchouc may also be used in conjunction with stitching, a back, however formed in this way, although of course stronger than with the caoutchouc alone, will not open quite so freely.

The advantages resulting from the adoption of Mr. Hancock's patent caoutchouc bookbinding are numerous;—the following are stated by the patentee, to be amongst the most obvious. As regards books for the library—bound in the patented manner, they will open with much greater facility, and when opened lie perfectly flat, or more nearly so than books bound in the ordinary way; thus preventing all strain on the backs, as well as obviating the necessity of keeping the leaves apart by force while reading, either with the hand, a weight, or otherwise.

In many expensive public and private libraries, the ravages of the insect produced in the paste, and by damp, have been most troublesome and destructive. Caoutchouc is impervious to both these evils. As regards collections of costly engravings, particularly when of large dimensions, and atlases, to these, the caoutchouc binding is particularly applicable, each leaf being attached with great tenacity. A large map, or chart, or even an engraving, may be doubled, and bound into a book half its size, and the fold at the back of the book, when open, be scarcely perceptible. For music books, the leaves when bound with caoutchouc, will not fly back after the V. S. operation, as they now very frequently do to the interruption of the performer, and often to the marring of a fine passage of music. Manuscripts and collections of letters, where, in the writing of them no margin is left at the back by which they can be stitched, may be bound without the least encroachment upon the writing. And, more particularly as regards ledgers and other account books—every one having any thing to do with book-keeping must have experienced the inconvenience of writing in a day book or ledger, towards the inner parts of the leaves especially, when the back, as is usually the case with such books, is of considerable thickness. The impossibility of obtaining a flat surface with ledgers, &c. bound in the ordinary way, not only retards the operation of writing, but renders it extremely tiresome, besides producing blots and stains from the difficulty of applying the pen to the paper at a proper angle; in many cases also a portion of the breadth of the sheet of paper being wasted. Mr. Hancock's patent method of binding, he states, produces such an elasticity in every part of the back, that it is eqnally convenient and easy to write, whether the book contain fifty or five hundred leaves. That these advantages are duly appreciated, may be learned from the fact, of the approval of the invention by all the great mercantile establishments to which it has been introduced, and by the first account book makers in the trade.—*London Mechanics' Magazine.*

LOCOMOTIVES FOR AMERICA.

We were highly gratified at witnessing, in the course of the week, a trial of the locomotive engines manufactured by Messrs. Braithwaite, Milner, and Company. The workmanship of the engines is of a first rate character. We are glad to know that the late commercial difficulties, which put so serious a check upon the enterprise of our translantic brethren, have so far been overcome that confidence is restored, and our railway manufactures for the American market are again in active operation.—*Railway Times.*

LITERATURE IN TURKEY.

The Turkish Penny Magazine, whose appearance we noticed some time ago, is a reprint of our own Penny Magizine, of which the printing and press work are executed at the expense of the Grand Seignor. It is expected soon to equal in circulation the Turkish newspaper which has been established for some time. This now amounts to nearly five thousand, and is expected to be quadrupled as soon as *the new post office* arrangements are completed throughout the empire.—*Ib.*

RENDERING THATCH INCOMBUSTIBLE.

A. M. G. Barentin of Leipsic, lately invented a method of preparing thatched roofs in such a manner as not to be liable to danger from fire. The Saxon government has had M. Barentin's thatch tried, and has approved of it so much as to order it to be generally made use of. (*Scotsman*, Sept. 20, 1837.) Alum would have some effect, both in preserving thatch, and in rendering it incombustible. We know an instance of a gentleman Kyanising the thatch to be used on an ornamental cottage roof, and we hope to be able in a few years to state the result. In the mean time we should be glad to learn if any of our readers know the German secret; and whether any have tried Kyanising with thatch, and what has been the expense per superficial yard of thatched roof, or per truss or load of thatch.—*Architectural Magazine.*

MEDITERRANEAN STEAMERS.

A Russian steamer leaves Constantinople for Odessa, on the 20th of each month. Charge 22 dollars. This route, and thence by way of Hamburgh, is the most expeditious and economical way of reaching England.

For the conveyance of travellers going to Persia, an English steamer has been for some time running from Constantinople to Trebizond, at the beginning and middle of each month. The distance is 530 miles, and the fare 30 dollars. An Austrian steamer, however, having been built and placed upon this station in May, 1837, the passage will now be probably made once a week, and at a reduced charge.

A steamboat (the Maria Dorothea,) leaves Constantinople for Smyrna every Monday at 5 o'clock, and makes the voyage in thirty-six hours. An English steamer, the Crescent, proceeds on the same voyage in thirty hours. The charge for a passage in either boat is 13 dollars, including provisions. To visit the plains of Troy and the ruins of Assos, the traveller should take his place in the Maria Dorothea only to Mytilene, in the Dardanelles, where he will be landed on the morning of the day after leaving Constantinople; and having explored these classic spots, he may, on the following morning, take the Crescent steamer, which will have arrived in the Dardanelles.

The Levant steamer, which has hitherto run between Smyrna and Athens twice a week, making the voyage in about forty-eight hours, at a charge of 20 dollars for the passage, has been discontinued for some months, in consequence of a dispute with the Greek Government; but there is no doubt that several other steamers are by this time on the station.

The Ionian steamers leave Corfu for Zante on the 8th and 26th of each month, and return on the 12th and 29th. The charge is 2*l.*, the voyage being made in about fourteen hours. The steamers for Ancona leave on the 16th, and arrive there on the 18th. They leave Ancona, on their return, on the 21st or 22d. Charge 6*l.*

The English steamer leaves Corfu on the 29th, touches at Patras on the 31st, to take her mail, and thence proceeds to Malta, touching at Zante, and on to Falmouth; making the voyage of 1900 miles in about twenty days.

Those who wish to proceed to Egypt or Syria, take the English steamer at Zante, on the 31st of the month. It reaches Malta in three days; the charge being 8*l.* Another steamer leaves Malta on the 20th, and arrives at Alexandria in six days; the charge being 12*l.*; and thence it immediately proceeds to Beyroot, in Syria, which it reaches in two days. The charge is 6*l.*—*Guide along the Danube.*

CHILDREN.

A bill has been introduced into the Legislature of Pennsylvania, providing for the education of children, which is very important to factory owners, and is alike interesting to the poor and the rich. The following is an abstract of the bill:

"That no child of a less age than ten years shall be employed in a factory.

That no child of a less age than sixteen years shall be allowed to labour more than ten hours per day.

That all children employed in factories, not sufficiently well educated to be able to read, write, and keep an account, shall be sent to school at least three months in each and every year, while they are so employed, or until they are so far advanced in the rudiments of education as above mentioned."

Penalties are imposed on parents, guardians, or other persons, having charge of children, who neglect or refuse to comply with the above requisitions.

Penalties are also imposed on employers, for employing or allowing to be employed in their factories, children who come under any of the above mentioned provisions.

NEW WEIGH LOCK.

We are happy to announce the completion of the new weigh lock, at Mount Carbon. It is a first rate specimen of workmanship, and reflects great credit on the skilful mechanic under whose able superintendence the work has been constructed. In weighing a ton, the variation does not exceed a pound or a pound and a half, and half an ounce will turn the scale. This scale is built on a different principle from any of this state, the lock being subject to the rise and fall of water in the dam, and the scale is so constructed that it can be raised or lowered according to the height of the water. We have ascertained the dimensions of the scale, and amount of iron in the same, from Mr. Cole, which are as follows:

Length of the scale,	59 feet,
Width,	16 "
Weight of the cast iron,	19,943 lbs.,
do. of wrought iron and steel,	7,416 "

We have before alluded to the accuracy of the scale. It will weigh from 3 lbs. to 100 tons.—*Miner's Journal.*

UTICA AND SCHENECTADY RAIL ROAD.

Statement for the year 1837:

Total receipts for transporting passengers,		$315,361 61
Total expenditures on acc't of transportation,	$117,396 17	
Do. construction,	$93,555 95	
		210,952 12
Balance		$104,409 49

The locomotive engines have run 150,000 miles, and the total number of passengers transported, 138,949.—*N. Y. Express.*

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

⁂ Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

AGENCY.

The Subscriber offers his services as Agent, to procure *Machinery for Mills, Steam Engines, Locomotives, Printing Machines, Presses, Types and Fixtures.*

He will give prompt attention to all orders entrusted to him for execution; and pledges himself to those who may employ him, that no effort on his part shall be wanting to procure the best articles to be had in the city—and to give satisfaction.

He will also employ Millwrights and Engineers to erect Mills, and put the Engines and Machinery in operation.

Orders accompanied with the necessary funds, or satisfactory city acceptances, should be addressed to D. K. MINOR, 30 Wall-st. N.Y.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS Mc NEILL,
Chief Engineer.

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.; Atlas, Boston; Philadelphia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment.

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. do. cast steel Shovels & Spades
150 do. do. Gold-mining Shovels
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
Fo. 8 State-street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR,

Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR,
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancoed, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakichill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his preseet engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street,
NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Istruments made to order and repaired.
1y—14

RAILWAY IRON, LOCOMOTIVES,

&c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars, with countersunk holes and mitred joints, lbs

350 tons 2 by 1, 15 ft in length, weighing 4 $\frac{63}{100}$ per
280 " 2 " ½, " " " 3 $\frac{75}{100}$ "
70 " 1½ " ½, " " " 2½ "
80 " 1¼ " ½, " " " 1 $\frac{25}{100}$ "
90 " 1 " ½, " " " ⅞ "

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NewYork, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having conntersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.]

SATURDAY, OCTOBER 14, 1837. (Published February 8, 1838.)

VOLUME VI.—No. 41.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 8, 1838.

For the Railroad Journal.

Messrs. Minor & Schaeffer:

GENTLEMEN,—I congratulate you, and the public, that the RAILROAD JOURNAL has again made its appearance. I cannot doubt, and I persuade myself the intelligent public will think with me, that a paper such as yours, conducted with knowledge and spirit, must be eminently useful in advancing Internal Improvements throughout our country. May your patronage equal your best wishes, and enable you to go on your way with renewed zeal.

I write from Wilkesbarre, the heart of Wyoming—the centre of the Great Anthracite Valley, on the Susquehanna. "Very well!" methinks you say—"what have you to tell us about Internal Improvements going on in that quarter?" Much, Gentlemen; Good news! Rare news! The Lehigh Navigation Company have completed their water communication from Mauk Chunk, up the Lehigh to White-Haven, within 15 miles of the Susquehanna at Wilkesbarre. A work of immense labor, and noted as the everlasting hills. The navigation is now complete from New-York by the Morris Canal to Easton, hence to Mauk Chunk—up to White-Haven, within 15 miles of our beautiful valley. How is this mountain to be got over? Who is to make the perfecting link in this grand chain of communication? The answer is ready. Last winter the Lehigh Company obtained an amendment of their Charter, authorizing them to construct a Railroad across—increasing their Capital Stock $600,000, and releasing them from some work which would have been more burdensome to them, than useful to the public. Under this law the Railroad has been carefully surveyed; and it will require 20 miles to obtain proper advantages of the ground to reach the borough of Wilkesbarre. One or two tunnels will be requisite—three inclined planes will be necessary. The cost is estimated at about $3,500 a mile. You will see they mean no child's play. Here are to be no white pine sleepers, and hemlock rails, but materials and workmanship durable as time. Mr. Douglas, the Engineer, may have equals; but we affirm confidently, that he must be a man of extraordinary science and skill, to justly claim to be his superior. The work is all under contract, and co d as it is, the enterprising contractors are building shantees all along the line, and two thousand men will be at work at the earliest opening of spring. So you see, Gentlemen, that *White & Hazard*, the leaders in this great field of Northern Improvement, have "neither slumbered nor slept." Troublesome as times, and deranged as the money market has been. Pennsylvania owes them much, and New-York is their debtor. In a very short period boats will leave New-York, hop across this Railroad, for such is the intention, and following up our State Canal, enter the Small Lake, strike your grand Canal, and if they please, go down to Albany, and so home; surrounding a vast Island. In eighteen months the Anthracite Coal Mines of Luzerne, will be fairly open to your city market. CLINTON.

SEMI-ANNUAL REPORT OF THE DIRECTION OF THE SOUTH CAROLINA CANAL AND RAILROAD COMPANY.

Concluded from our last.

The Committee to whom was referred a communication from the Directors of the Cincinnati Railroad Company in relation to the terms upon which the said Company would unite their interests with the Charleston and Hamburg Railroad Company, beg leave to report:—

That a conference was held by your committee wtih Gens. Hayne and Hamilton and Mitchell King, Esq. who appeared on behalf of the Cincinnati Company.

That a free interchange of views and opinions was had, the result of which was an unanimous opinion of the members of both committees that a union of the interests of the two companies was impracticable. Your committee then proceeded to the discussion of the question—Would it be expedient to sell the Charleston and Hamburg Railroad to the Cincinnati Company? Upon this question, so interesting to the stockholders, your committee came to the conclusion, that the Charleston and Hamburg Railroad had been so much improved by the expenditure of large sums under its present able executive; that its facilities of transportation had been so much increased, and its prospects of doing a more extended business so clearly developed, that each share was worth at least $125; and that it would be inexpedient to effect a sale and transfer to the Cincinnati Company under that price. They were, however, of opinion, that it would be for the interest of all concerned to open a negociation between the two companies, whenever full powers were granted by the stockholders of the respective companies to their agents. Your committee are of opinion that the Cincinnati Company should pay each stockholder of the Charleston and Hamburg Company $125 per share, (both old and new subscription;) should assume all responsibilities, and be entitled to all our rights. That for every share so purchased by the Cincinnati Company of a stockholder in the Charleston and Hamburg Company, the said stockholder shall subscribe for a share in the Cincinnati Company, and pay down the sum of five dollars. The stock of the Cincinnati Company will thus be rendered immediately profitable; the immense resources of that Company will enable them to put the road in complete order, and convey all the freight which may be offered. They may erect branches forthwith to Columbia and Camden, and likewise be enabled to open the subscription books for a bank. Upon the books being opened, every Railroad subscriber will be entitled to subscribe for a share in the bank, and as banking privileges are valuable, a corresponding value will be imparted to the Railroad shares of the Cincinnati Company, so that each subscriber may retain his share, or sell it at an advance.

Finally, the Committee of the Cincinnati Company agreed to recommend to the stockholders who may assemble at Flat Rock in October, a purchase of the Charleston and Hamburg Railroad.—Whilst your Committee concluded to recommend to the Stockholders of our Company, a transfer of the road at the price above stated.

They therefore recommend that a Committee be appointed to collect the sentiments of each subscriber to the Charleston and Hamburg Railroad Company, upon the propriety of transferring by sale said Railroad to the Cincinnati Company.

All which is respectfully recommended.

I. E. Holmes,
T. Street,
G. Gibbon.

Mr. Gibbon moved the following resolution which was on motion adopted

Resolved, That a Committee of Inquiry be appointed to ascertain the views of each individual stockholder, as to what price and terms they would be willing to dispose of their stock in this Company to the L. C. and Charleston Railroad Company, and to report an adjourned meeting of this Company.

On motion of Samuel Paterson, Esq., the following gentlemen were appointed the Committee: I. E. Holmes, Thaddeus Street, and George Gibbon.

Dr. *South Carolina Canal and Railroad Company, June 30th*, 1837. Cr

Dr.	
To State of South Carolina,	$100,000 00
Interest on State Loan,	25,723 53
Bonds payable,	3,500 00
Loans from Individuals,	10,005 00
Bills Payable,	278,720 00
Arrears of Dividends,	1002 00
George Wildes & Co., London,	13,531 55
Individuals, for articles furnished, per Ledger,	10,804 13
Officers of the Company, for arrears of salary,	3,108 29
Amount due on Pay-Rolls,	12,314 97
Bills, of which $6,767,42 are on embankment,	14,100 00
Amount due Mrs. Belser, for land on Charleston Neck,	450 00
for interest on Loans, Bonds, &c.	479 55
	473,739 02
To Balance,	442,468 10

Cr.	
By cash,	4,277 89
Bills Receivable,	11,914 48
Post Office Department,	2,500 00
John King, Jr., Cash Agent for Balances due by Agents,	6,250 16
Wm Robertson, Jr., Agent of Transportation for Disbursement,	491 09
Amounts due on sales of Lots at Aiken,	22,48 05
Mc Leesh & Smith, and others, for advances to them on contracts, &c,	3,589 25
Balance,	442,468 10
	473,739 02

The Debt of the Company, 30th June, 1837,	$442,468 10
31st December, 1836,	390,082 97
Increase of Debt in the last six months,	52,385 13
Add income from Business of the Road, Rents, &c., $122,077,52.	
Am't rec'd from additional Stock, 120,850.00	242,927 52
Expenditure in the six months,	295,312 65
From this amount deduct, for the increase of property in the last six months, (as estimated by a Special Committee of the Board in their Report) in embankment, new rail iron, buildings, and other improvements,	220,612 53
Making the current expenses of the six months,	74,700 12

Income for the last six months,	$122,077 52
Deduct current expenses for same time,	74,700 12
Leaving as divisable,	47,377 40

Henry Ravenel,
Secretary and Treasurer.

1837		
June 30	To amount of Capital paid in full this day,	$1,200,000 00
	amount paid on additional Stock subscribed,	120,850 00
	amount to be received for instalments on additional Stocks,	679,150 00
		2,000,000 00
	To am'nt brought forward as above,	236,681 00
	old Iron, estimated to be worth,	120,000 00
	As the State debt is not payable for 10 years, the Company will have the use of the money for that time, to complete Road & Machinery,	100,000 00
	Showing this amount available to complete the improvements of the road, after paying all the present debts of the Company, except the State Loan,	456,681 90

1837			
June 30	By amount paid for constructions and outfit,		$1,320,850 00
	amount for construction and outfit for which the Company owes a debt, as follows.		
	To the State of South Carolina, payable in April, 1847,	$100,000 00	
	To Banks and individuals,	342,468 10	
	By balance carried forward, being the amount to be received beyond the liabilities of the Company from additional Stock,		236,681 90
			2,000,000 00

Statement of the number of Passengers conveyed upon the Railroad, the number of Bales of Cotton brought down upon it to Charleston, with the amount received from Freight and Passage, from the 1st of January to the 30th of June, 1837.

	PASSAGE.						FREIGHT.			
	UP.		DOWN.		UP AND DOWN.		UP	DOWN	Up&Down	Tot. Am't.
	No. Pass.	Amount Pass.	No Pass.	Amount Pass.	No. Pass	Amount Pass	Amount Freight	Amount Freight	Amount Freight	Passengers & Freight
January,	1079	3,684 07	1837	4,855 67	2916	8,539 74	4 404 63	2,073 84	6,478 47	15,018 21
February,	1553	5,352 67	2233	7,031 26	3786	12,383 93	7,632 35	3,242 29	10,874 64	23,258 57
March,	2110	8,262 10	2585	7,352 15	4695	15,614 25	7,904 28	2,264 17	10,168 45	25,782 70
April,	1728	5,917 34	2281	6,468 61	4009	12,385 95	5,458 93	918 45	6,377 38	18,763 33
May,	1606	5,393 89	2402	7,583 80	4008	12,977 69	4,943 24	1,112 79	6,056 03	19,033 72
June,	1172	3,601 38	1920	5,699 18	3092	9,300 56	4,694 59	931 70	5,626 29	14,926 85
Total	9248	32,211 45	13258	33,990 67	22506	71,202 12	35,038 02	10,543 24	45,581 26	116,783 38
Mon. Av	1541	5,368 57	2210	6,498 45	3751	11,867 02	5,839 67	1,757 21	7,596 88	19,463 90

	The number of Bales of Cotton received in Charleston from the different stations on the road, from 1st Jan. to 30 June, 1837							Arrivals and Departures with Freight and Passengers.		
	Hamburg	Aiken	Blackville	Midway	Br'nhville	way	Total	Departures	Arrivals	Total
January,	447	277	146	123	115	22	1,130	43	39	82
February,	258	651	432	305	375	25	2,046	46	41	87
March,	251	377	259	407	221	43	1,558	53	45	98
April,	242	31	8	114	109	22	526	45	37	82
May,	471			65			536	47	34	81
June,	364	33	7	18	2		424	39	31	70
Total	2033	1369	852	1032	822	112	6,220	273	227	500
Mon. Av	339	228	142	172	137	18	1,036	45	38	83

Charleston, June 30, 1837. HENRY RAVENEL, *Secretary and Treasurer.*

SECOND ANNUAL REPORT OF THE PHILADELPHIA, WILMINGTON AND BALTIMORE RAILROAD COMPANY.

Philadelphia, Jan. 15, 1837.

To the Stockholders of the Philadelphia, Wilmington and Baltimore Railroad Co.

In compliance with the requisition of the 9th Section of your charter, the President and Directors of the Philadelphia, Wilmington and Baltimore Railroad Company, respectfully submit the following as their second annual report.

In performing the duties entrusted to your board of directors, they considered the early completion of the road and its readiness for transportation and travel of great importance to the interests of the company, they therefore determined on the prosecution of their works with energy and perseverance. Daily encouraged by the continued favor and patronage which the public bestowed on the connecting companies since they have been in operation, your directors have been stimulated in their exertions to terminate their operations this winter, that there might be no suspension or diversion of that patronage; but that this company by affording increased facilities, comforts and convenience, might in conjunction with the adjoining companies, win and share increasing favor and profit. The late general convulsien of financial concerns throughout the Union, threatened to embarrass their exertions, and paralyze their designs; but that difficulty they have, with your aid surmounted, and from a lamented public calamity is owed, perhaps the success of their efforts—as the discontinuance of many of the public works and improvements from that cause, depriving persons of employment, yielded more than an ample supply of laborers and material for the construction of this road, and at much lower rates than otherwise could have been obtained.

In the last annual report it was stated that an agreement had been made with the owners of the Gray's Ferry Estate, for the purchase of the old floating bridge ferry rights and appurtenances, together with two tracks of land adjoining on each side of the river Schuylkill, for which the Company were to pay them $50,000. The purchase has since been concluded, the proper deeds of conveyance executed, and the title is now vested in this company. The old bridge is still maintained there and will remain until the erection of the new one, and has yielded in nett tolls for the last six months $2,588, being more than ten per cent. per annum on the whole amount of the purchase money,

You were apprised by that report that an application had been made to the legislature of this State, for the right of constructing a new bridge over the Schuylkill, at or near Gray's Ferry, for the purposes of railroad and other travelling: such an enactment has since been obtained, and the construction of the new bridge, in strict accordance with the restrictions of the law, commenced, and its erection hastened as much as the care and prudence which such an operation required, would permit. The plan submitted by the chief engineer of the company, of sinking strong wooden foundation cribs, at the distance of forty-two feet apart at their bases, for the building thereon of the draw-piers, and increasing the width of the draw to fifty feet instead of being only thirty-three in width, as required by the Act of Assembly, met with the sanction of your directors, as it would greatly facilitate the navigation of the stream. Many of our citizens unacquainted, perhaps, with the intentions or plans of the directors were alarmed at their operations, in the preparations of the foundations of the piers; and fearful less the river should be obstructed and its navigation impeded, the city councils and port wardens were induced to inquire into the designs of the company. As the navigation of the river and the interest of the city had always been of the first importance, in the consideration and adoption of their plans of the viaduct, they willingly gave the information desired, and by so doing, they believe, they have effectually quieted alarm and silenced complaint. All the masonry work of the bridge is completed, excepting the two draw-piers, part of the superstructure is raised, and the whole of that work it is confidently anticipated will be entirely finished by the first of next May. The care necessarily required in the construction of this bridge forbade haste, and rendered its completion this season impracticable, and of course the finishing of the whole track to this city unnecessary. The directors therefore confined their exertions to the grading of the road, and laying of the rails to the western abutment of the bridge. From thence (being within two miles of this city) to the city of Wilmington they have entirely completed one track of the railway, and tested its utility, and fitness for immediate use, by the frequent passage during the last week of locomotive engines, with trains of cars, over the track; and they are pleased in now being able to congratulate you on the successful consummation of their wishes.

From the Eastern abutment of the bridge to the junction of the Gray's Ferry road and Federal street the line of the road is located, the grading completed and ready for the reception of the rails; from that point to Broad street the route has not yet been decided, the location, however, can soon be determined, and the whole line of the road completed early in the ensuing spring.

The requisite enactments having been obtained from the Legislature of the State of Delaware, the Wilmington and Susquehanna Railroad Company have ceded to this Company, by proper deeds of conveyance, all the rights and privileges they possessed under their charter, for the construction and maintenance of that portion of the Railroad situate between the city of Wilmington and the Pennsylvania State line, in consideration that this company lay and complete that portion of the road. The whole of that section was placed under contract last June, and has been, as before stated, completed. It has long been an anxious desire with our commercial community to keep, if possible, the navigation of the Delaware open during the winter, that vessels may not be detained until the opening of the river in the spring, before they can approach the city and discharge their cargoes. Your directors are of opinion that on this section of the road, about three miles from Wilmington, and where the line of the road approximates close to the shore of the river Delaware, by the construction of wharves and erection of a commodious storehouse there, the interests of the company and the commercial interests of this city can be greatly benefitted, and the delays and embarrassments which our merchants have heretofore suffered by the obstruction of our river with ice entirely obviated. As in the severest winters, and at times when the river is impassable above, or access on nearer approach to the city hazardous, vessels can easily approach that place, be enabled to discharge their cargoes, transmit them immediately by the railway to this city, receive their freight, and without delay depart on another voyage.

The necessary motive power has been obtained, the engines being of the most approved manufacture, large and commodious eight-wheeled passenger cars have been built, and are in readiness, on which all the new improvements that skill, ingenuity and forethought could devise, for comfort and convenience, has been successfully effected.

Arrangements have been made for the conveyance of passengers in omnibusses to and from the depot of the company. No. 280 Market street and Gray's Ferry Bridge; and as soon as the navigation of the river is obstructed with ice, this road can be opened at a few hours' notice for general travel and transportation, and notwithstanding the change of seasons, a rapid, safe and comfortable communication, daily maintained between this city and Baltimore.

A contract has been concluded by this company with the U. S. Post Office Department, for the transportation of one mail daily to and from this city to Baltimore, the compensation to be $27,500 per annum, the company having agreed to run in connexion with the Washington and New York mails, and deliver the mail from this city daily in Baltimore, by half past 3 o'clock, P. M., and the southern mail in this city daily by 5 o'clock, P. M.

Having thus far finished our operations and successfully established a chain of rail road communication between this city and Baltimore, our security, and the common interests of the companies constituting the line, require that we should promptly and carefully consider the proper means of preventing any disturbance of the present harmony, now existing between the co-operating companies, or distraction of their united efforts for the accommodation of the public.

Extending as the line of communication does, through three different states, composed of three separate and independent corporations, and each incorporated by different Legislatures. Thus situated, sectional differences, conflicting interests, local jealousies, and the machinations of the designing and inimical, may engender disunion; or, so far interfere with our arrangements, as to hinder, retard, or perhaps destroy the very objects of our creation. To guard against, and prevent such evils has been the subject of serious consideration with your board of directors.

The stockholders and directors of the two adjoining companies have made it the subject of their deliberations, and they have resolved on the union of the three companies, making the whole but one body corporate, and politic, their respective stocks, a common stock, and their separate interests a joint and common interest; for that purpose they have obtained from their different State Legislatures, the requisite enactments, and now only await the assent of the Stockholders of the company, to unite, and make their interests and efforts with ours but *one* in all permanent and indivisible.

Your directors consider such an union of the utmost importance to the interests of all concerned, as it would render the whole line subject to the direction of few instead of many, prevent intestine confusion and dissension, diminish the expense, as united there will be no necessity of the present large number of officers and agents, nor of each company separately purchasing and maintaining motive power, machinery, and cars, for the use of the respective roads, premising that the stockholders would cheerfully assent to such an arrangement. Your Directors have applied to the Legislature of this State, this session, and have obtained a law empowering this company to form a Union with the Wilmington and Susquehanna Railroad company of the State of Delaware, and the Baltimore and Port Deposite Railroad company, of the State of Maryland, under such terms and conditions as they shall agree on, and determine. Your sanction alone is wanted to effect immediately such an union, your early notice and consideration of the subject therefore is earnestly solicited.

In closing this report, your directors feel that that they would incur the imputations of injustice were they to pass unnoticed the industry, skill and perseverance of the Engineers, agents, and contractors employed in the execution of their duties. To their indefatigable exertions, the directors are indebted for the successful and speedy termination of their labors, to them is justly due the honor of having satisfactorily fulfilled their engagements and executed in a short space of time, an aggregate amount of labor almost incredible, and certainly unprecedented in America.

Herewith is annexed the annual report of the Treasurer of the company, all of which is respectfully submitted for your consideration.

In behalf of the Directors,

MATTHEW NEWKIRK, Pres't.

J. Wilson Wallace, Secretary.

U. S. Gazette.

THIRD ANNUAL REPORT ON THE SANDY AND BEAVER CANAL COMPANY.

E. W. Gill, Chief Engineer.

August, 1837.

The President and Directors of the Sandy and Beaver Canal Company, in compliance with their duty, present to the Stockholders their Third Annual Report.

In presenting this Report, we cannot suppress the expression of the regret we feel, in having on the first of April last, had to curtail operations which were in progress for the completion of the whole line of Canal, when owing, principally as we conceive, to the exceeding pressure of the money market, it was deemed advisable to adopt this course; since which time a small force has been continued in the employ of the Company, principally on the Eastern Division.

In curtailing operations the Board consider it due to those Contractors who surrendered their jobs, to state that with very few exceptions, they appreciated the difficulties to which this, with many other similar works, had been subjected, and compromised on terms deemed honorable to themselves and satisfactory to the Board.

Relying upon the accuracy of the Report of D. B. Douglass, the Board had supposed that funds sufficient for the completion of the work had been provided; but shortly after their last annual report, from the amount of the monthly estimates compared with the progress of the work, together with the increased prices of labour and provisions, fears began to be entertained that some additional funds would be necessary. Accordingly the Chief Engineer was requested after the letting in October, to make an estimate of the whole cost of the work at the contract prices, as early as his other business would permit.—Owing to the multiplicity of his duties this was not furnished the Board till January last—the amount considerably exceeded the estimate of Major Douglass.

As Philadelphia was depended upon in the outset for the principal amount of funds, and the chief part of the Stock being held there, the Report was forwarded to our commissioners in that city.

The difference between Major Douglass' estimate and E. H. Gill's may, in some measure, be accounted for by the advance in price of provisions, labor, materials, and the substantial manner in which the work is executed.

With the advice of the Stockholders in Philadelphia, a further sale of Stock has been ordered by the Board, an amount sufficient, it is believed, to complete the Canal, the certificates for which have been issued and forwarded to a committee in Philadelphia who have been appointed by the Board to dispose of them. The board have not been advised, by this committee what progress they have made, nor what the prospects are, but are daily expecting to be informed upon this subject. A considerable amount in the expenditures has been caused by the purchase of Real Estate, for the sites of the Reservoirs on the summit, for the convenient and economical construction of the canal, and for hydraulic purposes—amounting in all to 86,600 dollars.

The opinion expressed in the last annual report is reiterated, that when the canal shall be completed, retaining so much as may be necessary for its construction and the works connected therewith, the residue, including the donations from individuals, can be sold for a sum sufficient to cover the purchase money of the whole.

In the last annual report reference was made to a contemplated connection from Bolivar, the connecting point of the Sandy and Beaver with the Ohio Canal, to the mouth of the Auglaize, the connecting point of the Miami with the Wabash and Erie Canal. Since that time the Engineer designated by the State for examining this contemplated connection, has made a report recommending the continuation of the Wolhounding Canal from the Ohio Canal by the waters of the Maheigan to the town of Mansfield in the county of Richland, and from thence by Railroad to the mouth of the Auglaize.

At the last Session of the Legislature of Ohio, appropriations were made for extending the Walhounding branch to the Moheigan, there are therefore strong reasons to believe the work will be finally accomplished to the town of Mansfield, and from thence the connection completed by Railroad to the Auglaize, as the report of the Engineer is highly favorable for a cheap construction of a Road from Mansfield to the last named point.

Hence the Board congratulate the Stockholders, that the State of Ohio has commenced the important work of forming an entire connection throughout the interior of the State by canal and railroad from the Ohio to the Miami, Wabash and Erie Canals, which, with the canals and railroads, now made and making by the States of Indiana and Illinois, will be extended to the Mississippi and the Southern extremity of Lake Michigan. Another circumstance equally important to the Stockholders of the Company, has transpired since the last annual meeting. By the action of Pennsylvania, it has been ascertained that a continued water communication can be formed across the Allegany mountains at a reasonable expense. From the vast importance of such a connection it is apprehended the time is not distant when it will be accomplished.

The Board conceive these facts taken in connection with the rapid increase of trade on the Ohio Canal, as shown by the reports of the commissioners, to be upwards of $20,000 in tolls annually, and the fact that more than three-fourths of the trade on that canal is south of the town of Masillon, and will in all probability pass through the Sandy and Beaver Canal, when it shall be finished, *ought* to unite the stockholders in using every exertion for the final completion of the work, and induce them to forego all minor considerations, not only on account of the public weal, but their own private interests. We then say, notwithstanding the many difficulties which have been encountered, and are still to be encountered, is there not great cause for congratulation? and shall we not, relying upon the continued favor of the giver of all good, persevere, until we have completed that work, to which our efforts have been and are still directed, and which when finished, will be a link in the great chain of artificial communication between the waters of the Atlantic and the great waters of the far west. Since the last annual meeting, the Board have had to lament, deeply, the loss of one of its members in the decease of Judge Christmas, an ardent and persevering friend, to whom the Company is much indebted for his zealous efforts in its behalf. The vacancy occasioned thereby has been filled by electing Dr. Horace Potter.

For a more particular account of the situation of the work entrusted to their care, the Board refer to the report of the Engineer, which is annexed, who has so fully comprised all important facts that little else is required in order to give a concise account of the proceedings, not only for the past year, but also for the whole period since active operations commenced on the line. We add that our confidence in his ability is unabated.

Gentlemen,—We now surrender to you the trust reposed in us for the year past, and we desire that your selection of Directors may be such that, with persevering and undivided efforts, they will carry on to completion the work which is the cause of your assembling this day.

By order of the Board,

BENJAMIN HANNA, President.

August 9, 1837.

Engineer's Report.

To the President and Directors of the Sandy and Beaver Canal Company.

GENTLEMEN,—The period having arrived when it becomes my duty to lay before you, a synopsis of the condition and progress made in the construction of the work placed under my direction, I have the honor to present you the following report.

Since the date of my last annual report, the work progressed with spirit and energy, until checked by the paralyzing shock, which nearly all the improvements in our country have encountered, from the present very unexampled deranged state of the money market.

The excavation of the canal, and formation of the towing paths along the pools on the Eastern Division from New Lisbon to the Ohio River, a distance of about twenty-five miles are now completed, with the exceptions of portions of a few sections, not exceeding in all two miles in extent. On the same division the masonry of nineteen locks is completed, and of several more nearly so; four dams are finished and four others require but the plank and ice guards laid, to render them complete; the entire amount of lock and dam masonry, now constructed on the division, exceeds thirty-one thousand perches, in addition to which, eleven thousand perches of stone partly cut, two hundred and fifty-three thousand feet of timber, and one hundred and seventy thousand feet of plank are prepared and delivered for the construction of locks and dams. Pains have been taken to render the towing paths and embankments, secure from abrasion or injury by ice freshets, to accomplish which, about fifty thousand cubic yards of slope and rip rap wall have been formed; the division could be rendered navigable, should the funds of the company permit, in fourteen months.

The summit or middle division is in a state of forwardness, twelve sections or five and a half miles of it are finished; 547,680 cubic yards of earth have been removed from the Western deep cut, and has cost the company $70,237; there still remains to be taken out 150,000 cubic yards.

The tunnel in consequence of the great difficulty the contractors had to encounter, in procuring suitable miners conversant with that description of work has not progressed as rapidly as was anticipated, and it was found necessary last February to declare the contract abandoned. 4,400 cubic yards of rock have been removed from the drift of the tunnel, and about five hundred feet in extent are now completed: the excavation of the tunnel was contracted for at two dollars and thirty seven and one half cents per cubic yard, but the contractors having abandoned the work, the usual per centage was retained, in consequence of which the work done has cost the company but one dollar and ninety cents per cubic yard.

The reservoir mound on Cold Run is completed, excepting a small opening left for the water to pass through, till the land intended to be inundated, shall have been cleared. This piece of work has cost, including the iron conduit pipes, $8,400, or $3,340 less than my estimate. The West fork resevoir mound is two thirds done, and has already cost about $27,000, and will require $14,000, more to complete it. I originally estimated it to cost $19,244, but the level of the summit was raised four and a half feet higher than the level adopted by Mr. Hage and myself, in 1834, (which was pointed out to us as the level fixed on by Maj. Douglass) causing a reduction in the cost of that of at least $120,000. I deemed it advisable to increase the dimentions of the West fork reservoir, for the purpose of compensating for the loss of water, that the change in the summit level might produce; according to its present plan, it will flood five hundred acres of land, and contains upwards of 200,000,000 of cubic feet of water, or more than double the quantity it would have contained, if constructed on the original plan. In order to obtain the result, it was of course necessary to increase the length and height of the mound, which will satisfactorily explain the cause of the discrepancy between the estimated and actual cost. Nearly all the ground occupied by the reservoir has been cleared, the conduit pipes, and stop cocks are prepared, and nothing remains but the completion of the mound to render it ready for use.

Operations were commenced on nearly the whole of the Western division immediately after the letting in October last, and a very large amount of work would have been done this season, had not the difficulties heretofore alluded to occurred. At present about twelve miles of canal on that division, 3 locks and one dam are completed; in addition to which 615 perches of masonry are laid, 5800 perches of cut stone and backing. 69,000 feet of timber and 62,000 feet of plank for locks and dams are prepared and delivered on the ground. The entire amount of lock and dam masonry constructed on the division is 3,924 perches.

The heavy sections bordering on the Sandy Creek from Williams' Mill to Bolivar are, with one exception, either completed or nearly so, and much commendation is due to the contractors for their energy, perseverance and attention. If the dam and guard lock at Williams' mill were constructed, an expense not exceeding $10,000 would complete those sections, and bring into operation the Company's very valuable water power at Bolivar. This power I have estimated in a former report, equal to work twenty pair of mill stones in a dry period. If to it is added the Company's mill privileges on the Eastern Division, viz: at Dams, 1, 4, 10 and 14, it will be found that they possess a water power by purchase, equal at least to work 33 pair of mill stones.

But little injury has thus far been sustained by any of the works on the line, although one or two heavy floods have occurred during the last winter and spring; the works being incomplete, and in some cases, from that circumstance, unavoidably exposed to the action of ice freshets, danger was to be apprehended, but the entire injury received from such causes is trifling; considerable injury, however, from wash has been sustained on the Western deep cut near Hanover, and the only method of effectually guarding against it, and at the same time prevent sediment from being carried into the deep cut, and avoid unnecessary expense, is to construct a ditch 10 feet wide on bottom, on the back or north side of the spoil bank, and conduct the waters that collect from Brown's Run and the other streams, in time of rain, through it till they reach the low ground at the western extremity of the cut where they can be discharged without injury into the canal; a ditch of this description 3 feet deep, with the customary slopes on the sides, and a descent of 2 feet in every 3,100 feet, (which the present head race or ditch from the Run to the mill,) would discharge 9,100 cubic feet of water per minute, and can be constructed for $2,200. These streams at their highest stage, will not afford over 4,000 cubic feet of water per minute. I had early in the spring given directions to have a ditch of the above description commenced and completed: the workmen, you are aware, were stopped by a writ of injunction, served at the instance of the owner of a small tract of land through which the ditch was located,* and as the matter has not yet been finally adjudicated, and he being made responsible for the injury should the injunction be removed, no other measures to prevent the wash, have been resorted to. The method suggested by the complainant for discharging the water into the canal, is to construct a slope wall or paved way, on the slope of the canal bank at or near the mouth of Brown's Run, and pass the water over it into the canal: the cutting or depth of excavation at that point, is upwards of 30 feet, and to discharge 4,000 cubic feet of water per minute, into the canal, down a descent of that description, acquiring as it would by gravitation a velocity of nearly forty feet per second, is preposterous in the extreme; independent of numerous other objections, it would be highly dangerous, if not impossible, during floods for boats to pass it. This objection might be surmounted, by excavating a basin and discharging the water into it 60 or 100 feet back from the canal. A device of this description, constructed on the most economical plan, would cost at least $5,000. The water of those streams, you are aware, prior to the excavation of the canal, was the property of the owners of the Hanover Mill, and was there used, and constituted about one-half of the entire water power; in conducting it, as contemplated, along the back of the spoil bank, it will not be diverted from the mill, so that no claim for damages of that description, would be encountered; but if it is thrown into the canal at Brown's Run, as heretofore described, the mill will be rendered useless and the company subjected to claims for damages. Another reason for conveying the water along the back and keeping it out of the deep cut is, that it will reduce the cost of excavating the canal, at least $4,000.

Last season much delay was experienced in consequence of not being able to have a sufficient quantity of hydraulic cement ground, to supply the wants of the contractors. In order to prevent a recurrence of a similar nature, several additional mills were, during the last winter, rented and fitted up for the purpose; and there is now ground and on hand about 76,000 bushels of this article, and 35,000 bushels burned and ready for grinding. Although the stone from which it is manufactured, is abundant, and of the finest quality on the Eastern and Middle divisions of the line, thus far, notwithstanding strict examinations have been made, no quarry of hydraulic limestone worth opening, has been discovered on the Western division. This circumstance, and being sensible of the vast importance of it in the construction of canal locks, led me to make numerous experiments, for the purpose of arriving at a substitute, and I am pleased to state the result of my experiments is exceedingly satisfactory. The ingredients used in the formation of the artificial cement, are cheap and abundant on the Western division. A contract has been entered into for manufacturing it, and a large amount delivered at twenty-five cents per bushel: the article proves fully equal to the best natural hydraulic cement. There are also prepared and on hand about $9,000 worth of iron and iron work, such as lock irons, reservoir pipes, stop cocks, &c.

The whole amount expended for canal construction, independent of real estate, damages or incidental expenditures, is $823,000. $383,000 of which have been applied on the Eastern division, $259,805 on the Middle, and the residue on the Western division. Settlements having been effected with nearly all the contractors, when it was found necessary to curtail operations, the company at present is but slightly indebted for work done. The aggregate amount of contractors claims unsettled, including the retained per centage, will not exceed $25,000. The force employed on the line is at present reduced to 220 men, 170 of whom are on the Eastern division. Most of the contractors hold themselves in readiness to commence operations, as soon as the state of the company's finances will permit.

The partial suspension of the work has caused me to diminish the engineer corps, and consequently part with many gentlemen of skill and ability. The Eastern division is under the direction of James Bradley, Assistant Engineer, aided by Washington Gill, Junior Assistant; B. S. Dibble, target bearer, and William Smith, axeman. The Western division under the superintendence of Roger Morledge, Assistant Engineer, assisted by Lot Dixon and P. Hoagland, Junior Assistants; J. R. Straughn, target bearer, and Hugh Miller, axeman. The masonry is under the charge of Walter Scott, and the carpentry, L. Reynolds, and J. Counover: to all these gentlemen I am indebted for their prompt attention to the duties assigned them.

In closing this report, I would respectfully call your attention to that portion of the Eastern division, extending from the town of New Lisbon to the Ohio River. $356,000 have been expended on it, and $420,000 will render it navigable and complete. New Lisbon has a population of about 2,000 inhabitants; it contains twenty-three stores, independent of shops and groceries, and four daily lines of stages pass through it: numerous thriving villages are contiguous, and the land in its vicinity is rich and fertile; and I feel convinced it is the interest of the company to complete, without delay, thence to the Ohio River, feeling satisfied it would afford business sufficient to pay the interest on the expenditure.

All of which is respectfully submitted.

E. H. GILL, *Chief Engineer.*

Engineer's Office, Sandy and Beaver Canal, Aug. 7, 1837.

MINERAL WEALTH OF MISSOURI.

Each successive day sheds new light upon the vast resources of our country. By no other perhaps, it is excelled in the amount and variety of its mineral productions. Among the States most remarkable for their metallic wealth, Missouri, we believe, occupies the first place. Not to speak of the *famous iron mountain*, its mines of lead, copper, etc., are unsurpassed in extent and quality. Their developement has been trifling as yet compared to that of which they are susceptible. Some of them indeed have been worked for nearly a century, particularly those of lead. This is the case especially with *Mine la Motte*, which has yielded, from a distant period, large quantities of that metal, and has been a source of great prosperity to the surrounding country, notwithstanding the inefficient manner in which it was worked. This most extensive and valuable property has been recently sold by a decree of court, with the view of distributing the proceeds among the respective heirs. It had been previously rented for the annual sum of 6,000 dollars to parties by whom it was worked in a careless and clumsy manner. We are pleased to learn that it has now passed into the hands of an intelligent and enterprising company, embracing, with three others, Dr. Linn, the worthy Senator from Missouri, who are determined to do full justice to its resources. We are glad to learn this, not only on their account, but for the interest of the country, as we have understood from an authentic source, that the most valuable of its ores have been neglected from an ignorance of their nature and value. This was particularly the case with the *carbonate of lead*, which is found there in abundance. Large quantities of rich *pyritous ores of copper* were also thrown away, because of their not containing lead, the only metal which was searched for. A valuable ore of *cobalt* also is said to have been obtained from this mine by Professor Froost of Nashville. These general facts are confirmed by the statements of the commissioners appointed by the court, who sum up their observations with the remark, "that they are of opinion, founded on experience and observation, that the mineral resources consisting of lead and copper, within the said tract of land, are of immense value."

The *Mine la Motte* properly comprises about 24,000 acres, situated in the southern part of Missouri, in Madison county, about twenty-five miles from the Mississippi river, in the midst of a healthy and well peopled country. It is in the immediate route of a contemplated Railroad between the northern and southern extremes of the State, and lies about eighteen miles from the celebrated *iron mountain*, in the adjoining county of Washington. One of the branches of the river St. Francis runs through the tract, which is also intersected, in various directions, by several minor streams of sufficient magnitude to propel mills or any requisite machinery. The soil throughout is fair; and at least one-third of it of a very superior quality; the whole being plentifully furnished with timber, and well supplied with unfailing springs; thus offering every facility for the prosecution of mining operations. We have been induced to offer a brief description of this important property to the public, as it presents facts and suggests considerations of general interest. We are informed that it is about to be revisited by Mr. Clemson, the eminent mineralogist and geologist, whose examination of the property, last summer, resulted in an impression highly flattering, and who goes out a second time for the purpose of making more comprehensive and minute researches, with reference to the prosecution of mining operations of the most approved kind, and upon a scale commensurate with the magnitude of its resources. We wish these gentlemen all success in their enlightened and public spirited enterprise.—*Globe.*

OHIO CANALS.

The Ohio canal has been navigable from the 20th April to the 1st December. The amount of tolls for 1837, is $293,-428 79. The receipts for 1836, were $211,823 32, showing an increase in one year of $81,605 47. The Ohio canal is 310 miles long, reaching from Cleveland on Lake Erie, to the Ohio River. This canal has been open part of the present month, and a large quantity of produce carried down to be shipped from New Orleans. Ohio has eight canals completed, or in a state of forwardness, the aggregate length amounting to 812 miles. —*N. Y. Express.*

REEFING TOPSAILS.

We learn from the Zion's Herald that Captain John Wade, recently of this city, but now of New Orleans, has hit upon a simple contrivance, by which all the sails of a vessel can be reefed in a speedy and perfect manner, while standing on the deck. He had just taken out a patent for it at Washington.—*U. S. Gazette.*

The attention of the public is called particularly to the proceedings of a meeting held in this town last evening. The importance of the subjects embraced in the resolutions is great, and indeed involves the immediate prosperity of Milwaukee, and we would earnestly call the attention of Congress to the subject. The scarcity of harbors on Lake Michigan, and the great natural advantages of the bay and harbor of Milwaukee, are strong arguments in favour of the project. The number of vessels stranded and utterly lost on our shores for the want of harbors, are wretched monuments of the necessity of doing something.

The necessity of a good road from Chicago to Green Bay, passing through Milwaukee, is so obvious as not to admit of demonstration.

The division of the Territory is also a matter of importance. The subject is now before Congress, and all we have to say about the matter is that the wishes of the people, so far as we have been able to learn them, coincide with the views expressed in the resolutions.—*Milwaukee Adv.*

The Northern Railroad in Michigan will commence its eastern terminatioe at Fort Huron, on the Lake of the same name, and pass through the heart of the State to Grand River. This will be a continuation of the great Western Road through Canada, commencing at the head of Lake Ontario and ending at the foot of Lake Huron. The three Railroads through Michigan will be the one above named, the middle from Detroit to St. Joseph, and the southern from Monroe to New Buffalo. Intersected by such channels of trade this young member of the confederacy will enjoy to the fullest extent the benefits arising from the fertility of her soil, and industry of her population.—*Baltimore American.*

TOLEDO AND MICHIGAN CITY RAILROAD.

The entire survey of this road is now completed, and the part from Michigan City to Laporte, we are informed, is in the progress of construction. Its whole length is 178 miles; 64 in Ohio, and 114 in Indiana. The Ohio line has been run. The western country is probably the first in the word for Railroads; and the resources of the above described section of the country richly deserve such a communication.—*Chicago Citizen.*

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

⁂ Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

AGENCY.

The Subscriber offers his services as Agent, to procure *Machinery for Mills, Steam Engines, Locomotives, Printing Machines, Presses, Types and Fixtures.*

He will give prompt attention to all orders entrusted to him for execution; and pledges himself to those who may employ him, that no effort on his part shall be wanting to procure the best articles to be had in the city—and to give satisfaction.

He will also employ Millwrights and Engineers, to erect Mills, and put the Engines and Machinery in operation.

Orders accompanied with the necessary funds, or satisfactory city acceptances, should be addressed to D. K. MINOR, 30 Wall-st. N.Y.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS McNEILL,
Chief Engineer.

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.; Atlas, Boston; Philadelpia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment.

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. do. caststeel Shovels & Spades
150 do. do. Gold-mining Shovels.
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR.
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street,
NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Instruments made to order and repaired.

1y—14

RAILWAY IRON, LOCOMOTIVES, &c. &c.

THE subscribers offer the following articles for sale viz:

Railway Iron, flat bars; with countersunk holes and mitred joints,

					lbs
350 tons	2 by 1,	15 ft in length,	weighing	$4\frac{63}{100}$	per
280 "	2 " $\frac{1}{2}$,	"	"	$3\frac{50}{100}$	"
70 "	$1\frac{1}{2}$ " $\frac{1}{2}$,	"	"	$2\frac{1}{2}$	"
80 "	$1\frac{1}{4}$ " $\frac{1}{2}$,	"	"	$1\frac{25}{100}$	"
90 "	1 " $\frac{1}{2}$,	"	"	$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, and $3\frac{3}{4}$ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEW YORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

*** All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, OCTOBER 21, 1837. (Published February 10, 1838.) VOLUME VI.—No. 42.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 10, 1838.

We are indebted to the kindness of Messrs. Curtis and Scoles, for Congressional and Legislative documents.

Also, to J. E. Bloomfield, Esq., for the Report of the Canal Commissioners.

In placing the communication of "Veritas" before our readers, we feel that we cannot too strongly insist upon the correction of an error of so great magnitude as that animadverted upon by our correspondent. In so far as facts are concerned, the erroneous statements in this case happen to be diametrically opposite to the truth. Moreover, we have heard experienced engineers state, that the exceedingly rapid transit of passage cars actually injured the road more than the trains of burden cars moving at a more moderate rate.

To bolster up a foolish proposition by distorted, or rather entirely false statements, is no way to aid the cause of Internal Improvements.

For the Railroad Journal.

UTICA AND SCHENECTADY RAILROAD, &C.—AND THE UTICA OBSERVER.

In a recent number of the Utica Observer, (January 30th,) the Editor of that paper holds the following language:—"So far as the Railroad companies are concerned," (speaking of those on the line from Albany to Buffalo) "*we are informed* that they consider the carriage of freight as rather *detrimental* than *beneficial* to their interests. The experience of the Liverpool and Manchester Road in England confirms this opinion. It has *long* been employed for the transportation of merchandize as well as passengers—but heavy trains engaged in the former service are found to be so destructive to the road, that they have been discontinued."

It is fortunate for the cause of truth and Internal Improvements, that the Railroad Journal has been revived, and that one of the last numbers, (the 37th,) contains a full refutation of the statements above quoted from the Observer.

The evidence to which I refer, is the Report of the Liverpool and Manchester Railroad Co. for the half year ending June 30, 1837, being the latest Report emanating from that company received in this country.

By that Report it appears that the gross receipts, or income, for the half year mentioned, is as follows:—

Transportation of Passengers,	£59,956	4	6
Do. *Merchandize* and *Coal*,	45,995	11	6
Total receipts,	£105,951	16	0

The Report states, that being "*intimately connected* with the *trade* and *commerce* of the country, the *traffic* by the Railway in the *merchandize department* has diminished with the diminished trade of this great commercial and manufacturing district." It speaks, also, of the "general depression in *trade*, which had occasioned a *serious diminution* in the *traffic* by the Railway," and of the misfortune, "that when the Company were prepared to meet an enlarged business, the aggregate *traffic* should have been curtailed."

This, certainly, does not look much like a discontinuance of the transportation of Merchandize upon that Road, as asserted by the Editor of the Observer; neither is there evinced any intention of relinquishing a branch of their business from which, as appears by the receipts above given, they derive nearly *one-half of their income*. On the contrary, the Company deprecate as a calamity, the loss of a portion of that business resulting from the pressure of the times, which the Editor of the Observer, says, they were not only anxious to relinquish, but had *absolutely discountenanced*.

From my knowledge of the character of the Editor of the Utica Observer, I feel confident he would never knowingly attempt, either directly, or indirectly, to deceive the public on a question affecting so vitally their interests. He has, undoubtedly, been misinformed by ignorant or designing persons, who are aiming, it is believed, to accomplish two objects.

The first is to induce the State of New-York to relieve the Railroad Companies along the line of the Erie Canal, from the restrictions at present imposed upon them in respect to the carriage of freight. The second, and probably the leading object, is to produce an impression unfavorable to the adaptation of Railroads as a medium for the conveyance of freight, and thereby prejudice the success of the application now pending before the New-York Legislature, in behalf of the New-York and Erie Railroad.

As to the propriety of the State imposing restrictions upon private enterprize, as is now done on a large portion of the line of Railway from Albany to Buffalo, in prohibiting either entirely, or conditionally, the carriage of freight, I presume no difference of opinion will be found to exist among reflecting and liberal-minded men. It is, however, too much the practice in these days of speculation and "humbuggery," to endeavor to accomplish by finesse, and misrepresentation, what should be done openly and above board. Had the "informants" of the Observer come out frankly, and acknowledged that the transportation of merchandize was a desirable object with the Companies located along the line of the Canal, and that they were anxious to have the present restrictions removed, we should with pleasure, *when the proper time arrived for action*, have seconded this request. But when they aim to accomplish their object by indirect and improper means, which from their character are calculated, and probably intended, to prejudice other and more important interests, we must be excused for speaking out plainly, and placing the whole matter in its true light before the public. VERITAS.

REPORT OF THE SUPERINTENDENT OF THE LANCASTER & HARRISBURG RAILROAD.

To Samuel Wonderly, Esq. President of the Lancaster and Harrisburg Railroad Company.

SIR,—In presenting to you a detailed account of the operations and condition of the road, which in some measure, has for the last year been entrusted to my care and management, I feel no ordinary degree of pride and pleasure in being able to present to you a statement of its condition, because when we reflect upon the various disadvantages and difficulties with which we have been surrounded almost from the onset, it is truly a flattering one, not only to those who have had the general direction of its affairs, but also to those whose money has been so liberally advanced for its construction.

To say nothing of the opposition, *from a powerful source*, which the Board was compelled to contend with, from the very commencement of their operations, and which was only overcome by a *determination* and industry that few men would have been capable of exercising, it is enough to draw the attention of yourself and those associated with you in the management of the Company, to the fact, that ever since the first division of the road went into operation, there has been an almost regularly organized, and I might say, *pensioned* set of people, acting in perfect unison to *misrepresent*, and by every species of management injure the business and reputation of the road. This course of treatment towards any particular portion of the improvements of the country by any set of individuals, I am aware, may to you, and still more so to others havnig a deep interest in the road, appear rather singular and almost impossible. But when they reflect that the entire business of the improvements of the state, had for years been regularly flowing through their different channels to centre at one particular point, they will not think it strange to see the people whose hopes and prospects were likely to be destroyed by another improvement, rise *en masse* to cross its progress. Such was the state of things at the commencement of this road. The town of Columbia is peopled with an active, industrious, intelligent and enterprising people. They saw at the commencement of the system of internal improvements what they believed the *interest of their town;* and unlike people of other towns and villages, possessing a greater extent of boundary and advantages, acted in concert and effected their object,—the location of the canal and railroad so as to make *their town* the point at which every thing must centre, was the result.

The commencement of the Harrisburg and Lancaster Railroad, was a blow aimed at the towering prospects which they had naturally built upon, and which they were realizing from the fruits of their former good management. To prevent its construction was the only hope of a set of men who knew too well its effect upon themselves, if once it went into successful operation. This, then, was the grand cause of the many difficulties which were thrown in the way of the first operations of the Board, and which have still continued to extend themselves from one branch of operation to another. And it is the same feeling and interest which, being unable to effect any thing else, is endeavoring to operate upon the Legislature to authorize the making of another, or *opposition* road. All this, however, will avail them nothing. The Harrisburg and Lancaster Railroad has been made in despite of all opposition, and is now I am proud to say, in the full tide of successful and *profitable business.* And before taking leave of this subject, permit me to say, that the location of the state improvements is one of the strongest evidences to prove the important fact, that nothing short of a straight-forward, disinterested discharge of duty by any man or set of men, entrusted with the direction of any public improvement, will sustain them to the end. Had the public agents kept an eye solely to the interests of the commonwealth, or the public, there never would have been a canal from Middletown to Columbia, and a railroad from Lancaster to Columbia. No, the canal would have ended at its junction with the Union canal, and the railroad, instead of being pronounced *impracticable*, would have been made upon precisely the ground upon which it was located by the talented young gentleman, Mr. Roberts, who stands at the head of your engineer corps. It is true that the construction of this road has been an expensive business to those whose means have been compelled to bear the burthen, but the past sufficiently proves that the most sanguine anticipations of its friends will be more than realized.

The first nine miles of the road went into operation about the 16th of September, 1836. Business was partially commenced upon the fifteen miles next Lancaster about the 1st January, 1837. Soon after this second division went into operation, I commenced my duties upon the road. Of the situation of things at that time it is scarcely necessary for me to say a word. To you they are familiar. I found two strips of disconnected road, that had most of it been hurried down at a season of the year when it was impossible to make good work. We had no facilities at either end of the road We had no workshops; no tools to make the most trifling repairs, either to the road or to the engines. We had no water stations; no turnrounds at either end; no sidings, or turnouts, at any one point on the road. In short, we had nothing but two unconnected portions of road, with but one engine fit to run, the "*Middletown*," upon the upper end of the road. One other engine was in use at Lancaster, the "*Dutchman*" but in such condition as to be unfit for duty had there been any other. In this situation it was not to be expected that much could, or would be done. But what was the result? Notwithstanding we had no facilities, and in despite of every difficulty, we succeeded in carrying on the regular business of the road.

So well, too, were the community satisfied with the accommodations afforded them, that the business continued to increase almost daily, from the very day of our operations. To establish this fact, it is only necessary to refer you to the extraordinary exertions made at the opening of the Canal, to induce those gentlemen doing business upon the road, to leave it for the state canal and railroad. To effect this, every inducement was held out by all whose interests lead them another direction. But finding that Messrs. Colder and Poters understood their *ultimate* interests too well, to be dazzled by a temporary saving of a few dollars, a powerful and determined opposition was got up, called the "*Express Line*," headed by Mr. Leech, a gentleman of industry and great experience in business, and as a "*blow* kept *in reserve*," the state agent presented to the public a large argumentative advertisement, in favor of Mr. Leech's line, which ran upon the state improvements. But all would not do. The "EXPRESS LINE" was soon compelled to fly to the *two little bits* of unconnected road, which with all its disadvantages, was capable of satisfying the public that it was the direction which nature had intended as the line of communication between the metropolis and seat of government of the commonwealth. Situated as we then were, with an enormous travelling business, and little means of accommodating it, the only wonder is that we were able to succeed at all. But, although the situation of every one connected with the road, and particularly my own, was such as I should never wish to undergo again, I felt myself fully compensated when I reflect that great as the difficulties were, they have all been overcome. And powerful too, as was the oppositfon, it has been compelled to yield to the force of public opinion, and to seek other means of effecting its object. But how different is our situation now? We have struggled on until we have the whole line of our road in operation. The tunnel, it is true, is not finished. But it is in a state of forwardness which warrants the belief, that we shall in a very short time, be able to pass through it, and thus afford our stockholders an opportunity of realizing the proud gratification of having effected that which the *Commonwealth* with her *millions* had *pronounced impracticable.*—Here permit me to say, that the operations at the tunnel are highly creditable to every one connected with it. Every facility is afforded the contractor by the different members of the engineer corps; all being anxious to do every thing in their power to finish that in which they feel the Company have so deep an interest. The contractor is pushing his operations with no ordinary degree of skill and determined industry. There are now about 130 men at work on it, and a portion of them at work *all night.* But the increasing demands of persons wishing to commence business on the road, made it necessary to make a still greater effort to accommodate, and a temporary track is now about being finished *over the hill.* By this we are enabled to do a very large transportation business, which I feel confident will be found a source of considerable profit to the company, and which could, otherwise not have been had, to say nothing of the effect it is calculated to have upon the public mind.

During the past summer and fall, much time has been devoted in making such conveniences as were indispensable to the business of the road. Among these, were the water houses and wells at the different stations, turn-rounds to turn the engines, one at Harrisburg, one at Elizabethtown, one on the east side of the tunnel, and one at Dillerville. We have also been compelled at each of the other points, to have turnouts or sidings, all of which have required much time, attention and considerable expense. We have also been compelled to construct separate sidings, in which the three different weigh scales have been placed.—The scales have been put down, and the one at Dillerville, is now ready for use. We have had in use for the last three months a very convenient little smith shop at the eastern end of the road, at which the repairs of the engines at that end of the road have been done at an expense much below that which they would have have cost, had they been taken to a strange shop. Since then, the permanent machine shop has been built at the same place, where all repairs of the machines can be done to a much greater advantage than they have been heretofore done. The depot house too, is about being finished. In speaking of these buildings, it is but just to say, that I believe they will compete with any other in the country, and from their neatness and convenience in answering the different purposes for which they are severally intended, reflect much credit upon him who designed them.

In conducting the business of the road, it will be recollected, it became necessary for the superintendent of the road to direct many things, and attend to the construction of many more, which under other circumstances would not have been part of his duty. But as above stated, we commenced business without any preparations, and having turned the travelling public upon the road, it would not do to suffer them to leave with a promise that we would be prepared to accommodate them at some future period. In this state of things, there was no alternative for the superintendent, but to exert himself to authorize and attend to the construction of such facilities as the business and the interest of the road required. This, in every instance, was done as speedily as possible. Thus it was that we were able to continue our operations. And it is but right to say, that any other course than the one adopted, and pursued under the direction of the president, would have been found insufficient to meet the many difficulties which were daily presenting themselves. This course of management, which became indispensable from the situation of the road, and the want of funds by the company, from which the engineer could draw, has been the cause of a large amount of money being expended, which otherwise would now be in the treasury. This will be seen by a reference to the regular statement of the expenditures, as properly arranged under their proper heads.

But as we have travelled through the worst of our difficulties with which we were for a time surrounded, permit me now to draw the attention of the Board to a more pleasing picture. The whole road is now in use. It is not like some other improvements which have been made at a very heavy expense, only ready for use, but it is actually being used by the great body of the travelling community. It is now not only the means of accommodating the traveller, but the man of business finds it his interest to prosecute his business upon it. Many gentlemen engaged in the transportation of merchandise, have commenced using their cars upon the road, and many more are making arrangements to commence in a few days. From what has already been done, I feel confident in the belief, that before the first of May next, we shall have onr road lined with business of every description, yielding profit to the stockholders far above their greatest anticipations.

The expenditures or payments, by my order, for all expenses since the commencement of business upon the road, being over 16 months, will be found as follows: For motive power, including repairs of engine, $11,573 39. For repairs of the road, $2,457 98. For permanent constructions, $6,219 00.

Thus it will be seen that a considerable amount of money has been expended for motive power, when compared with the amount expended for the repairs of the road. But to explain this, it is only necessary to remind the Board that owing to the unfinished state of the road, very nearly double the expense has been incurred which would have been necessary for the same amount of business on a finished or continuous road. Being compelled to stop at different points on the road, and return with the engine, made it necessary to keep up a double set of engines, engineers and firemen, and in the article of fuel the expense has been more than double, because during the whole time the engine is standing, waiting, turning, or changing, nearly the same consumption of fuel is going on as though the machine was performing her regular labor. Owing too, to this consumption of fuel, a double set of workmen became necessary to saw wood and pump water. But let us see how it will compare with the expense of the same department upon the state road. Upon the Columbia and Philadelphia road has been run during the most of the last year, eight locomotives per day. The amount of cost of motive power as taken from the superintendent's report is $115,000, or thereabouts. The two-eighths of this amount would be 128,748, and our expenses were as above stated only $11,673 39 !! Thus we see that on that road with every facility that skill, experience and money could devise and construct, the expense has been within a fraction of treble what it cost on our road, with all our disadvantages.

But I am pleased in being able to present to you so small a sum of money expended for the repairs of the road. This I think will argue but little in favor of the doctrine that is advanced by a few, that the State ought to have the management of all the improvements. The Columbia and Philadelphia road is about eighty miles long, and by a reference to the late report of the canal commissioners it will be found that $51,553 22 has been expended during the whole time it has been in use, is but $3,457 98. In addition to this money, repairs became necessary during the last summer, that otherwise would not have been, had it not been that a large portion of the road was hurried down during the previous winter, and which had to be taken up so soon as the frost had left the ground. Next year it is confidently believed that the actual repairs of the road will be much less than they have been the year just ended. And again let it be remembered, that the state road is said to be a permanent road; to avoid much repairs, was made of iron and stone, at a cost of about $60,000 per mile, while our road is called a perishable road, and has been made at a cost of about $19,000 per mile. So it will be seen from the above fact, that the difference in expense of the repairs will in a few years leave in the treasury a sum sufficient to replace the whole superstructure of the road.

JAMES CAMERON, Superintendent.
January 6, 1838.

REPORT OF THE JEFFERSONVILLE AND NEW ALBANY CANAL COMPANY.

To the President and Directors of the Jeffersonville and New Albany Canal Co.

Gentlemen—It having pleased you to entrust the undersigned with the duty of ascertaining by actual surveys and estimates, the practicability and probable cost of constructing a navigable canal around the falls of the Ohio on the Indiana side of the river, adapted to the use of steamboats, he has the honor to inform you that he has fulfilled the task thus confided to him, and now presents for your consideration the following report:

On entering upon the examination of the ground to be occupied by the proposed work, two routes presented themselves to the consideration of the undersigned. By the first it was proposed to commence at a point on the Ohio river immediately above Jeffersonville, and near the boat yard; from this point a straight line was to be run to the valley of Mill run—thence curving into the valley of that creek, it was proposed to occupy it to its mouth in the "Basin" below the falls opposite Clarksville. It required but a partial examination of this route to discover, that it neither offered the inducements of diminished distance, usefulness when completed, or superior economy in its first cost of construction.

This route was obnoxious to the objections of greater length, greater depth, and quantity of excavation of earth and rock, and greater inconvenience was likely to be experienced after its completion from the water of the two creeks, which it was thus rendered necessary to cross, if this route was occupied by the canal:—yielding therefore to the force of these considerations, another route was sought for, found, and is recommended to you as the most favourable of the two examined to the achievement of economy in the construction of the proposed work, and usefulness when it shall have been completed.

This route has its point of beginning on the Ohio river above Jeffersonville, near the boat yard, and pursues a straight course for about one mile—thence it curves into the valley of Cane run, and occupies the valley of that run to its mouth, thence it crosses the "Big Eddy," in the river by an embankment, which will form a large, convenient basin—thence following the margin of the river, the canal descends to the river by two locks, the lower one of which is placed in the river, nearly opposite the mouth of Mill run—and in such a position that boats can enter it at the lowest stage of the water. The length of the canal on the proposed route is two miles and 3,200 feet, and the fall is twenty-five feet between the upper and lower mitre sills. After the determination of the proper route for the canal, the subject which next engaged the attention of the undersigned, was the determination of the dimensions appropriate for the proposed work. It would seem at the first view that the maximum usefulness of the canal would be obtained when its width when finished, was such that two boats of the largest class could pass each other unobstructed. But it is manifest on reflection that to dimensions so extended in breadth, as would be requisite to pass two boats abreast, there would be countervailing objections in the enhanced first cost of the work, and the increased difficulty and expense necessary after its completion to keep it free from the obstructions incident to sedimentary deposite. Nature in forming and regulating the rivers, which drain the great western valley, has assigned to each a velocity sufficient to carry off to the ocean the sediment with which the waters are abundantly charged during the periodical inundations to which they are liable.

The Ohio, although it has not mingled with its waters as much solid matter as either the Mississippi or Missouri—yet experience has abundantly shown that during the spring and autumnal freshets, it contains a sufficient quantity of this sediment to obstruct the free use of a canal, unless means is applied either to prevent its subsidence, or to effect its removal after its deposition—(which happens at every considerable rise of the river.) As the perfection of human skill consists in wielding nature's laws and natural agents for the achievement and preservation in perfect repair of the works of art, it has occurred to the undersigned that the same means must be used for keeping your canal free from sedimentary obstructions, that nature has applied so successfully to the river, for the long lapse of ages that has intervened since its creation, and which yet continues, and probably ever will continue to enable it to move on in its course of unobstructed and unceasing usefulness. It is evident therefore that you must create in the canal during periods of high water a current equal to the average velocity in the river; or at least such a current as will be sufficient to keep light alluvial matter in suspension and progressive motion.

This desirable effect will be produced with more ease on a narrow than on a broad canal, for inasmuch as this current must be created by the water of the canal being made to flow through gateways placed at the lower end of the canal; of course, the more contracted the cross section of the canal, the less will the amount of gateway necessary to create a given velocity. Combining all the considerations of economy of construction, with facility of cleansing the canal when in use, the undersigned has established the breadth of the canal at eighty feet—the sides to be walled up vertically to the height of thirty feet when the excavation exceeds that depth. These vertical sides have been found by experience to be much better adapted to the free passage of steamboats through the canal than when they are made sloping. This width will enable two boats of the small and middle class, to move abreast in the canal. For the accommodation of boats of the large class, it is proposed to provide at suitable intervals, two basins, or passing places, in addition to the spacious one which will be made at the "Big Eddy."

The canal now in use on the Kentucky side of the river, is not equally deep throughout its entire length: the undersigned was informed, that it is not so deep up at the entrance of the canal as it is at the head of the upper lock, by more than one foot, and hence the frequent grounding of boats observed at that point:—to remedy this in your canal, it is proposed to sink its entire bottom level, one foot below the mitre sill at the head of the upper lock before mentioned; this will give you, at the lowest stage of the river, five feet depth of water in your canal.

It might seem at first view that this will furnish a greater depth of water than is necessary—for it may be said, that at the same time you are providing for five feet depth in the canal, there will be only two and a half feet on the Flint Island and French Island bars.

This would be true were it not rendered otherwise by the difference in height above and below the falls, to which the river rises during freshets—thus: when the river is at its lowest stage the fall is twenty-four feet from the surface of the water above to the surface of the water below the falls, and then there is four feet depth of water on the upper mitre sill of the upper lock in the Louisville and Portland Canal.

When the water rises two feet at the head of the falls (and of course in the canal) the fall is reduced to eighteen feet, there is about eight and one-half feet depth of water below on the French Island Bar, when there is only about six feet depth in the canal. It is therefore in the medium stage of water in the river, that greater depth is found to be requisite in the canal.

The dimensions assumed for the locks are as follows—width in the clear, fifty-eight feet, and length from the upper to the lower hollow quoin 240 feet. Such a lock will pass a boat 225 feet long and 57 feet wide. It is not probable that a boat exceeding these dimensions will ever pass the falls, except when the water is at its greatest height, and then she can pass over the falls in the bed of the river. It is farther proposed by the undersigned to overcome the whole fall by two locks instead of three, as now used on the Louisville and Portland Canal—also it has been arranged to separate the two locks by an intervening basin. In this manner a greater number of boats can be passed in the same time and with a less expenditure of water. The cost of the lower lock is very greatly enhanced by the necessity which exists, of locating it out some distance in the river, where coffer dams, and much pumping of water will be required, together with embankment and walling. This is occasioned by the extreme shallowness of the water at its low stage, by reason of which it is necessary to place the outlet of the lock some 300 feet into the river to obtain the requisite depth for the purposes of navigation. In order to maintain a current in the canal at high water so as to keep the sediment in motion, and prevent its subsidence in the canal, it is proposed to erect a wier, with a number of gates in the bottom of it, and to be of such a height that the water will run freely over it, when the river is in the condition that boats can pass over the falls.

Having thus detailed the general plan

of the canal and its incidental construction—it remains to submit the estimated expense attendant on the execution of the work in the manner proposed—to wit:

For		
1,322,100	Cubic yards of excavation of common earth, gravel, &c., at 30 cents per yard,	$396,630 00
382,384	Cubic yards of excavation of solid rock at $1,50 per cubic yard,	573,576 00
219,924	Cubic yards of embankment from the canal at 10 cents per yard,	21,992 40
228,508	Cubic yards of embankment not from the canal at 20 cents per yard,	45,701 60
158,512	Perches of walling at 50 cents per perch,	79,236 00
	For two bridges,	13,000 00
	For a waste wier and gates,	11,580 00
	For two locks with the necessary coffer dams. excavations of pits, gates, &c.,	320,908 00
	Totol cost	$1.462,644

The cost of the Louisville and Portland Canal up to the present time is $953,300, and on this amount the directors have declared a dividend for the past year of thirteen per cent—which if divided on the capital stock necessary to construct your canal would have been a dividend of 8 47-100 per cent.

It is clearly manifest that if a canal of large dimensions and greater depth were now constructed on the Indiana shore, the business would forsake the present canal, and seek the facilities offered by this enlarged and improved avenue of trade.

To counteract this operation, injurious to its interest, the Louisville and Portland Canal company would most probably seek to restore its business, by a reduction of the tariff of tolls at present imposed.

But aside from considerations of this sort predicated on the present trade of the Ohio river, it requires but slight forecast to predict with the certainty of its fulfilment, that the period is not far distant when the trade of the Ohio valley will furnish to both canals as much business as they will be competent to perform.

To verify the truth of this assertion, it is only necessary to examine the magnitude of the country dependant on the Ohio river as the avenue on which its commerce is to be conducted. A very large portion of the inhabitants of twelve states in the union are immediately interested in the navigation of this river. The country inhabited by these people was but a few years ago the home of the savage; and even now, the greater portion of it is a wooded wilderness or an uninhabited prairie.

But when the swelling tide of population shall have peopled this fair and fertile land, with an industrious and hardy race, then the requisitions on the Ohio river as a channel of commerce will be coextensive with a nation's growth, and will be limited only by a nation's wants.

In speculating on the probabilities of the future, the facts furnished by the experience of the past may be profitably consulted—and accordingly the undersigned has collated the following tabular statement from the 13th annual report of the president and directors of the Louisville and Portland Canal Company to the stockholders. This statement shows the increase of trade on the canal from the year 1831 to 1837 as follows:

	Steamboats.	Flat and Keel boats.	Tons
1831	406	421	76323
'32	453	179	70109
'33	875	710	169885
'34	938	623	162000
'35	1256	355	200413
'36	1182	260	182220
1837	1501	165	242374
Totals,	6611	2713	1,103,324

Taking the period from 1833 to 1837 as indicating the future rate of increase of the trade, it will be thirty-five per cent. per annum; and at this rate of increase the number of tons which will pass the Louisville and Portland Canal in the year 1847 will amount to 848,309, and if the price of tolls is kept at the same rate now charged, the company could then divide forty-five per cent. per annum on the capital stock. This calculation, which is by no means extravagant, will exhibit clearly to the directors that the stock of the Jeffersonville and New Albany Canal will yield more than six per cent per annum: because, as the dividend on the stock of the Louisville and Portland Canal is limited by the charter to eighteen per cent., it has been shown that in 1847 there will be tonnage enough to pay this dividend and leave twelve per cent. for your canal. But yours being the larger work, offering greater facilities to the passage of boats, would probably command the major part of the trade.

The application of the water power which will be created by the construction of the proposed work, may also be made a source of revenue to the company. The Louisville and Portland Canal Company has caused to be kept a daily register of the comparative rise of the water at the head and foot of the falls—with a copy of which I have been politely furnished by the secretary of the board.

It contains the following statement:

"When there is four feet of water in "the canal, the fall is twenty four feet, "and at the highest water ever known "giving forty feet in the canal, the fall "was one foot and four inches."

The following table shows the falls for all stages of the river:

Depth in the Canal.	*Fall in the River.*	
Feet.	Feet.	In.
4	24	
5	21	
6	18	
7	16	6
8	15	
9	14	
10	13	6
11	13	
12	12	
13	11	
14	10	
15	9	4
16	8	6
17	7	10
18	7	4
19	6	10
20	6	4
21	6	
22	5	8
23	5	4
24	4	10
25	4	6
26	4	4
27	4	
28	3	10
29	3	8
30	3	6
31	3	4

"And up to forty feet in the canal "gives 12-10 inches less fall in each foot.

"It is further remarked, that the rises "of the water in the river are not uniform, "but vary almost every season, and it "does not attain its maximum height "oftener than once in ten years.

"The annual rise that reduces the fall "to six feet may be calculated upon—it "sometimes rises above that, but the "high water so as to reduce the fall below six feet, will not average ten days "in the average of each year, for the last "twelve years. A safe calculation may "be made on eighteen feet fall for eight "months in each year, twelve feet for two "months, and from eight to six feet, for "the remaining two months."

This is a statement derived from observation through a long series of years—it is entitled to respect, and abundantly proves that there will be a large hydraulic power created by the construction of your canal; and as the retarding influences which have probably operated to prevent the use of this power on the Kentucky shore, will not exist on the northern side of the river—It is fair to infer that its use will be commensurate with the wants of an already dense and constantly increasing population, and that the receipts from this source will swell the annual profits of the enterprise in which you propose to engage.

In conclusion, the undersigned will take occasion to remark, that in submitting the estimates for the probable cost of the canal, he has endeavored to present an undisguised statement of its real cost on the plan proposed. It has been a setled rule in his professional career, never to suffer himself to be made accessary to the propagation of error, or to the purposes of deception—even though it were for the attainment of a desirable object.

The estimates which have been frequently submitted for proposed works—in some instances being less than a moiety of the actual cost—have operated injuriously on the cause of internal improvement, and is a reproach to the profession from which they emanated.

With the expression of his best wishes for the success of your enterprise, the undersigned has the honor to subscribe himself,

Very respectfully, your ob't,

THO'S. F. PURCELL,
Civil Engineer.

Louisville, Jan. 8, 1838.

RAILROADS AND STEAMBOATS.

From Blackwood's "World we Live in."

It might be a curious speculation to inquire into the probable effects of the railroad system on mankind. Certainly no system ever became so popular, and so suddenly and so widely popular.—France has begun to fling out those gigantic arms of communication over her noble country. Belgium exults in the commencement of a web of railroads, in which it expects to catch all the stray dollars and centimes of the Continent. The transit from Ostend to the Rhine will, in the course of a year or two, be an affair of a couple of hours. Germany is shaking off her sleep, her blacksmiths are lightning their Hercynian forges, and from the mountains of the Hartz to the Tyrol, huge men, with antediluvian visages and Cyclopean arms, are hammering at iron wedges, rail, and gear for "fire horses." Prussia is laying down railroads from her capital to France, to Poland, and to Austria. The puzzling question of her politicians being, whether she thus invites invasion, or proposes defence. But politicians are blockheads on all matters of common-sense; and of all blockheads, the German politician is the most profound, headstrong and hopeless. The merchant, the traveller, and the tinker know better things. They could tell them, that the roughest of royal rough-riders, was never able to whip and spur either Frenchman, Belgian, Prussian, or Austrian into belligerency, more than fifty years out of every hundred. But, thanks to the growing common-sene of mankind, they never will be able to do even this again, and that the world is beginning to discover that fifty years of victory are not worth one year of peace. In short, the world is evidently become a buying and selling world, a vast spinning and weaving community, a vast aggregate of hands and heads, busy about the main chance, and much more inclined to eat, drink, and be happy, than to burn each other's warehouses, or blow out each other's brains. That war will never cease out of the world, is a theorem founded on the fact that the countless majority of mankind have a strong tendency to be fools; but we may establish another theorem, that the more difficult it is to make war, the less likely it is to be made. The more mechanical dexterity, personal ingenuity, and natural expense that is required to make war, the more will success be out of the power of brute force, and the more in the power of intellectual superiority.

Let war come to a conflict of steam engines, and all the barbarian rabble of the world, Turks and Tartars, Arabs and Indians, Africans and Chinese, must obviously be out of the question as once. They may massacre each other, but they must fly from the master of the mechanics. All the half barbarians, Russian, Greek, Pole, Swede, and Austrian, must make the attempt only to be shattered, and Field-Marshal Stephenson, with his squadron of fire-horses, galloping at a rate of eighty miles an hour, must consume their battalia with the breath of his nostrils. Thus England, instead of feeling alarmed at the sudden passion of foreigners for mechanism, should rejoice to see the passion spreading, should encourage them to throw all their powers into mechanical rivalry, and exult in every railroad that shoots its serpent line among the hills and valleys of the Continent, and hail the smoke of every steam-engine that trails its murky line along its sky, as not merely an emblem, but an instrument of their own superiority.—Mechanism, the great power of art, is as exhaustless as any of the great powers of Nature, for it is only the exhaustless vigor of intellect combining with and commanding the secrets of nature.

Ten thousand years might roll on, and every year see a new advance of every kingdom of Europe in invention, and England keeping ahead of them all, and, like one of her own engines, showing her speed by the sparks that lighten the road behind. The steam-engine in its effective state, is but little more than half a century old, for its invention, in the time of Charles II., left it for upwards of half a century little more than a toy. In half a century more, its present perfection may be looked upon as little else than that of an ingenious plaything. It is scarcely ten years since the steam-boat first ventured to sea. Thirty years ago the late Lord Stanhope was laughed at by all London for his attempt to swim the steam-boat from London Bridge to Greenwich. It now dashes from the Tower to Constantinople; or shoots down the Read Sea, fights the monsoon on its own ground; sweeps to Bombay, Ceylon, and Bengal, and astonishes the Mogul and the Emperor of China, the same morning, with the month's newspapers from London. The railway in its present power, is not ten years old, yet is already spreading, not merely over Europe, but over the vast savannahs of the New World. What will all this come to in the next fifty years? What must be the effects of this gigantic strider over the ways of this world? What the mighty influence of that mighty communication which, even in its feeblest state, has been in every age, the grand instrument of civilization! Throw down the smallest barrier between two nations, and from that hour both become more civilized. Open the close shut coast of China or Japan to mankind, and from that hour the condition of the people will be in progress of improvement. The barbarian and the despot hate the stranger. Yet for the fullest civilization, freedom, and enjoyment of which earth is capable, the one thing needful is the fullest intercourse of nation with nation, and of man with man.

The European passion for the railroad is certainly one of the most singular as it is one of the most cheering characteristics of the age. Like all instruments of national power, it may be made an instrument of evil. It may give additional strength to the tyrannical, and accumulate force against the weak, pour resistless invasion against the unprepared, and smite the helpless with unexampled rapidity of ruin. But its faculties are made for peace, its tendency is to make nations feel the value of peace; and unless some other magnificent invention shall come to supersede its use, and obliterate the memory of its services, we cannot suffer ourselves to doubt that the whole system which is now in the course of adoption with such ardor throughont Europe, will yet be acknowledged as having given the mightiest propulsion to the general improvement of mankind.

POET WORKMEN.

It is singular enough, that Mr. Miller, the basket maker, and author of "A Day in the Woods," has a namesake now in London, who is likewise both a workman and a poet. Nicholas Miller, a printer of Stuttgard, is author of a volume of poems which have attracted considerable notice in his own country,—Wirtemberg. He is now following his trade in London, where, although we can pretend no rivalry to the gigantic operations of the Parisian press in appropriating the works of foreign countries, there is still employment for some few printers of French and German. The king of Wirtemburg, in his recent visit to England, took notice of Miller, and presented him with what the Hamburgh correspondent calls a "truly royal" contribution to his support, and "further education." From the latter expression, it appears that Miller is following the old and approved fashion of the German, travelling to perfect himself in his trade. Those who are thus enabled, are, it is well known, often slenderly furnished with money, and looked upon as entitled, without any forfeiture of their respectability, even to begon the road.—*Ib.*

EGYPTIAN MODE OF MOVING COLOSSI.

In the King's library at Berlin is an interesting papyrus representing the Egyptian mode of moving Colossi. The Sphynx being upon a sledge, the first line of laborers are placed very close to it, and the rope is ramified, after passing under each man's arm, so that every rank in advance doubles the number in the former line, just in the way that foreign heralds exemplify quarters of descent. A drummer appears to be giving time for a simultaneous pull, a process facilitated by several attendants pouring oil where the tire of the sledge is about to pass. The latter circumstance would lead to the supposition that Egypt in prosperity was not deep in sand, as at present, or else that the ingenious inhabitants used a temporary railroad for conveying their prodigious monuments, the oil alluded to being poured upon the flange or groove that received it. The former may perhaps, solve the means by which the huge stones at Stonehenge and other ancient monuments in this country were placed in their situations.—*Lon. Mechanic's Mag.*

BELGIAN RAIDROADS.

The lines by which the Belgians propose to connect their western boundary looking on the sea, with their eastern, bordering on Germany, is already so far completed, as to be opened from Termonde to Ghent. The ceremony took place on the 29th September: five locomotives drew a hundred carriages; music, fireworks, illuminations, and a banquet to king Leopold augmented the pleasure of the day. When the line is completed to Ostend, and a fast-going packet placed on that station, the journey from London to Brussels may be effected in sixteen hours. Just double the time, or thirty-two hours will be required for the passage from London to Paris, by a new route proposed by a French steam packet company, which intends to convey its passengers from London to Havre by a steamer, from Havre to St. Germain by the Seine, by a small boat, and from St. Germain to Paris by the new railway.—*Ib.*

RELEASING STOPPERS FROM BOTTLES.

Sir,—As I have no doubt that others of your readers, as well as myself, have frequently been inconvenienced by the stoppers of glass bottles becoming fixed, perhaps the following method of extracting them may prove useful to them. It was communicated to me by Mr. H. H. Clark of Sheffield, with whom it originated, and has, I believe, never been made public. Having wiped the neck of the bottles perfectly dry, and seen that the little groove or channel between the stopper and the neck is quite clean, pour into the groove a few drops of *spirit of wine*, and having set it on fire, let it burn out, and then immediately give the stopper a few gentle taps with a light wooden instrument, as the handle of a small spatula or chisel, and try to turn the stopper in an upward direction from *right to left*. I have in most cases found this effectual, but if it is not so the first time, it must be repeated.—J. Fordred.—*Ib.*

PIRATES OF ANTWERP.

From the port of Antwerp alone, and in the month of September alone, printed books were exported to the value of 97,822 francs, or not a thousand pounds short of four thousand, and it is supposed, that a much larger exportation takes place by land than by sea from Belgium, principally to Italy, Germany and Holland. Not one in a hundred of these works is of Belgian authorship or public property—they are almost all piratical reprints of Parisian copyrights, while the reading public of the continent is supplied with piratical reprints of all *but* Parisian copyrights by the Parisians themselves. The gunner is here indeed "hoist with his own petard."—*Ib.*

THE ARTESIAN WELL AT PARIS.

On the Place de Grenelle, near Paris, they have already bored to the depth of 1830 feet, in the hitherto vain attempt to form an Artesian Well. At this depth Reaumur's thermometer stands 23 degrees (48 of Fahrenheit.) According to M. Arago's calculation, water at a depth of 700 metres (2155 feet) ought to have a temperature of 36 degrees of Reaumur, or 110 Fahrenheit.—*Times.*

FIRE-PROOF FABRICS.

A French gentleman named Durais, has discovered a process by which linens, woollens, and even fine muslins, may be rendered fire proof. It appears that he exhibited the effects of his discovery to a number of scientific men, who witnessed gauses and muslins pass through a fierce fire without being in the slightest degree burnt or injured.—*Ib.*

FORD'S FIRE ESCAPE.

During the week, Mr. Ford had the honor of exhibiting his ingenious fire-escape at the Castle. One of his machines was erected in the quadrangle, in the presence of several of the chief officers of the household, the Queen viewing it from the corridor. Her Majesty, the Duchess of Kent, and some of the Royal suite, we understand had before witnessed it. The machine (if a very simple contrivance can be so called,) is unquestionably superior to anything we have before witnessed. It has all the attributes which we conceive ii posseble to blend together for the purpose of saving life and property, and such seems to be the opinion of every person in Windsor who has witnessed it. Already we understand, have Mr. Ford's machines been supplied to the Castle, where the experiments made with one this week have been highly eulogised, especially by Sir Jeffery Wyatville. They are used for cleaning the windows, for which, as well as for their service in cases of fire, they are admirably adapted.—*Windsor and Eaton Express, September* 30, 1837.

FRENCH SUBSTITUTE FOR INDIGO.

Public attention has been latterly attracted in France by the reported perfection to which the discovery of a substitute for indigo has been brought, and by the establishment of dye-works on a large scale for applying the process to the dying of wool and woollen cloths, for which it is more especially suited. This new product is called French blue *(blue de France,)* and its advantages are thus described:—1st. Its colour in all its shades, is of very superior beauty to any thing yet known. 2d. It is perfectly unchangeable by air, acids, soaps, &c. 3d. It never whitens at the seams, like indigo. 4th. It dyes in or penetrates the piece in the most perfect manner, which cannot be done with indigo. 5th. It preserves the quality of the cloth with all its softness and suppleness, without in any way altering the texture or nap. 6th. It facilitates the reproduction of the same shades, which is so difficult with indigo. 7th. Its results in the execution are so sure, that an exact estimate may be made beforehand of the expense and product. 8th. It offers a very considerable saving upon the value of the raw material (prussiate of potash,) which is an indigenous product of moderate price, susceptible of a reduction to a value still less, and by which, according to the quality of the cloth, it may be dyed at from 25 to 50 per cent. less expense than from indigo. 9th. It is said to be of great advantage for furniture, carriage and livery cloths, and for tartans, merinos, cachemires, &c. on account of the superior clearness and lustre of its colours. 10th. It produces an economy of 12 to 15 per cent. in the manufacture of the cloth, by the solid application of the colouring matter in piece, which has only been effected till now in black and scarlet. Such are the large results promised by this discovery, which appears to be looked upon by the parties originating it, as well as by several of the first woollen manufacturers of France, as likely to render France independent of foreign countries for the supply of indigo, of which she now consumes to the amount of 20,000,000 francs per annum.—*London Times.*

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

⁂ Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

AGENCY.

The Subscriber offers his services as Agent, to procure *Machinery for Mills, Steam Engines, Locomotives, Printing Machines, Presses, Types and Fixtures.*

He will give prompt attention to all orders entrusted to him for execution; and pledges himself to those who may employ him, that no effort on his part shall be wanting to procure the best articles to be had in the city—and to give satisfaction.

He will also employ Millwrights and Engineers to erect Mills, and put the Engines and Machinery in operation.

Orders accompanied with the necessary funds, or satisfactory city acceptances, should be addressed to D. K. MINOR, 30 Wall-st. N.Y.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS Mc NEILL,
Chief Engineer.

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.: Atlas, Boston; Philadelpia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment.

Jan. 12 fmw6.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. cast steel Shovels & Spades
150 do. do. Gold-mining Shovels
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
Fo. 8 State-street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally, Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR.
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his preseet engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG,
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street,
NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York. will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own mannfacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Istruments made to order and repaired.
1y—14

RAILWAY IRON, LOCOMOTIVES, &c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars; with countersunk holes and mitred joints,

350 tons	2 by $\frac{5}{8}$,	15 ft. in length,	weighing			$4\frac{60}{100}$ lbs per	
280	" 2	" $\frac{1}{2}$,	"	"	"	$3\frac{50}{100}$	"
70	" $1\frac{1}{2}$	" $\frac{1}{2}$,	"	"	"	$2\frac{1}{2}$	"
80	" $1\frac{1}{4}$	" $\frac{1}{4}$,	"	"	"	$1\frac{25}{100}$	"
90	" 1	" $\frac{1}{4}$,	"	"	"	$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, and $3\frac{1}{2}$ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEW YORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN
RAILROAD JOURNAL,
AND
ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, OCTOBER 28, 1837. (Published February 15, 1838.) VOLUME VI.—No. 43.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 15, 1838.

[The Report on a Road playing so important a part as this does in our chain of communication westward, merits particular attention.]

REPORT OF THE OSWEGO AND UTICA RAILROAD COMPANY.

J. D. Allen, Esq., Ch. Engineer.

To the President and Directors of the Oswego and Utica Railroad Co.:

GENTLEMEN,—In obedience to instructions, I herewith present a general statement of operations in the Engineer Department of your Company, from the period of the commencement of the surveys to the present time.

It being late the past autumn when the Department was organized and the surveys were commenced, the services of the field were considerably impeded by the unfavorable weather, and other embarrassments incident to the lateness of the season, and the peculiar character of the country, which is to a considerable extent unimproved, presenting many of the obstacles to a rapid and successful execution of the surveys, common to a region in a state of nature. The field duties were continued until December, when they were suspended for the winter, were again resumed in April and continued to the last of May.

The examination of the country has been very thorough. The extent of the lines instrumentally traversed, amount in the aggregate to not less than about four hundred and fifty miles. The most prominent of which, including those only which possess a decided superiority over others, are delineated upon the maps, which together with the profiles will be found on inspection to exhibit a very perfect view of the topographical features of the country, and of the ground over which the several lines are traced.

A comparative estimate of cost, &c. of these different lines has been prepared in a statement of an earlier date, which is at the service of the company.

The section embraced in the examination, extends from the city of Utica westward along the valley of the Mohawk, fourteen and a half miles to the village of Rome, and thence passing north of Lake Oneida to the termination at Oswego on Lake Ontario.

Lake Oneida, which is twenty-one miles long, with an average breadth of five miles, is situated about midway between Utica and Oswego, having a longitudinal direction nearly east and west. A right line from Utica to Oswego, connecting the extremes of the Railroad, passes Lake Oneida about half a mile northward of its eastern extremity. The most direct line of communication it is therefore obvious passes through the section explored, and it has been deemed an important object as well to the public who are to give it support, as to the stockholders by whose enterprize and means the work is to be constructed, to reduce its length to the shortest practicable distance, which the nature of the intervening ground, a just regard to economy, and the business accommodations of the country, would permit.

The valley of the Mohawk between Utica and Rome, clearly indicates the most judicious route for that portion of the distance. Its surface is even and regular, with an inclination of about two feet per mile, nearly uniform.

Proceeding west from the Mohawk valley, the country descends towards Lake Ontario; the drainage in that direction being conducted off by the tributaries of Oneida Lake, the Oneida and Oswego rivers, and the streams which run northerly into Lake Ontario. The streams intersected by the surveys are all, with the exception of Fish Creek and the Mohawk, of small dimensions. The latter is crossed twice, and the former once, at favorable points for the erection of bridges, the linear extent of which in the aggregate, does not exceed 440 feet, and are the only expensive structures of the kind required upon any portion of the route.

The country between Lakes Oneida and Ontario is limited in extent, and hence the several channels which conduct off the drainage are small. They are also in general moderately inclined and free from those obstacles often encountered in the passage of streams, such as wide and deep beds, unfavorable position of banks, &c. which tend to enhance the expense of crossing.

The elevated ground separating Lakes Oneida and Ontario is about equidistant from each. It extends from Fish Creek to the vicinity of Oswego, in a direction nearly parallel with the course of the surveys. Within about twelve miles of Oswego village, a branch or spur of this elevated ground, bears off southwesterly, towards the fall of Oswego river, and is separated from the main ridge by the valley of Black Creek, which while it also winds around in a southwesterly direction, affords favorable ground for descending to Oswego.

Between Utica and Rome, the range presented for a choice of ground was limited, but between Rome and Oswego a wider field was offered for examination. In the latter distance several routes existed of a feasible character, more or less varying from each other in their relative features and position, but requiring much labor in the instrumental examinations to determine their relative merits.

From Rome to Oswego two *principal routes* are exhibited on the maps. The one passing northerly, along the valley of Little River, a branch of Fish Creek, and the other near to Lake Oneida. As these routes approach Oswego and descend towards Lake Ontario, several branch lines present themselves, and it is gratifying to find in the result, that a highly eligible line may be obtained between Utica and Oswego, with the advantage of being able to vary its location according as the business interests of the Road, or the success in procuring cession of land for the right of way, or other incidental considerations may render it expedient. The distance by the longest of the two principal routes is 77¾ miles. By the other, pursuing the shortest of its branch lines, is 73¼ miles, the mean distance by the several lines surveyed in this latter route is 75½ miles.

Upon the more eligible routes, the maximum inclination of the grade line does not exceed 25 feet per mile. The heavier grades occur in descending from the grounds which separate the basin of Lake Oneida from that of Lake Ontario is 120 feet, and the distance between them should the route in that direction be pursued, would be from 25 to 27 miles, giving an average inclination of less than five feet per mile, but in consequence of undulations and a want of uniformity in the general inclination of the surface, it is necessary to adopt a grade of 25 feet per mile for a short distance.

The relative extent of grades of different inclinations, taking the average of the more favorable routes, is represented as follows :

Level, or below 10 feet per m.		42 m.
Between 10 & 15	"	14 "
" 15 " 20	"	12 "
" 20 " 25	"	7½ "
Total,		75½ m.

The character of the grades exhibits a line which may be advantageously compared with almost any of the roads of like extent, in progress or in operation throughout the country. More than four-sevenths of the distance is either level or below an inclination of ten feet per mile, and over five-sevenths is under fifteen feet. The average inclination of the grade line, were it made uniform throughout the whole distance, would be less than 9 feet per mile.

The maximum grade, is confined to less than two miles of the distance, and does not differ materially from the maximum upon the Utica and Schenectady Railroad, and of that portion of the Mohawk and Hudson Road between the inclined planes—and is considerably less than that upon the Camden and Amboy, and Boston and Providence Roads.

It is apparent that with a very slight reduction of speed upon the grades which are most inclined, the power of the engines for the traction of heavy loads, will be as effective as it would be upon a road uniformly inclined. In the conveyance of passengers, as the engines are seldom tasked to the full extent of their power, the limit to the speed will be that rate which is consistent with safety.

Twenty miles per hour will be easily attained in either direction, as the ordinary business rate for passengers, making the total time of passing between the extremes, not more than four hours.

In the conveyance of freight, with an average speed of 13 miles per hour in either direction, the best engines will convey an average net load of 100 to 130 tons, the time of transit not exceeding six hours.

Comparing the portion of straight line with that comprised in the curves, and the former is more than double the latter, embracing more than two thirds of the whole distance. The minimum radius of curviture is 1500 feet and the radii of the majority of the curves will range from 3500 to 8000 feet.

The ground through nearly the whole route, is exceedingly well adapted for forming a substantial and durable road bed. No rock of consequence will be encountered in the excavations. Timber of a suitable quality for the superstructures, can be obtained near the line of the road, and whatever may be needed for the different structures in forming the road bed. A very considerable portion of the timber contemplated to be used will be derived from the clearing of the Roadway, which will contribute to lessen the cost of that material.

Mills for cutting the timber are numerous in the vicinity of the routes. As an evidence of the facilities afforded by the region of country through which the route passes for furnishing suitable timber, it will be sufficient to state that much of the timber entering into the construction of other roads, some of which are situated as far south as New-Jersey, is obtained from the vicinity of the Oneida Lake, and the Oneida and Oswego rivers.

It is supposed from the interest manifested, and the benefits to be conferred upon the adjacent country by the construction of the Road, that the necessary ground for the use of the Road, will be obtained at a reasonable rate. A considerable extent has already been gratuitously surrendered for this purpose—much it is understood has been obtained by negociations, which are still in progress.

From the competition and the wide field for negociation, which the several routes present, it cannot be doubted that a favorable result in that respect will be realized.

In regard to the cost of the Road, a very precise estimate cannot be made. Estimates which are based upon preliminary surveys, without a careful revision to adapt the line to the ground in the best manner in all its parts, serve only as near approximations to the truth. It may not be improper further to remark, that estimates of cost which have been made for public works from preliminary surveys, have in many instances proved insufficient—resulting in a great degree from a change or imperfection of the plans which had been contemplated, and the occurrence of difficulties which were either overlooked, or could not well be foreseen. It is however believed that the present examinations have been made with the care requisite for a very near approximation to the probable cost of the work.

The country traversed by the most feasible line, presents none of those greater obstacles or points of excessive expense, often encountered upon many of the public works of the country ; and I cannot doubt, from the information before me, *that the Road can be well constructed at a cost considerably below that of many of the Roads forming main lines of communication now in operation.*

Adopting the ordinary plan of Road-bed, substantially built and graded to a width which will serve for a *double* track, and surmounted with a wood superstructure for a single track with iron plates, and it is believed the cost will not exceed on an average $11.000 per mile, all expenses included, making for

75½ miles,		$830,500
Add for a second track of superstructure, say 10 miles, required to facilitate the passage of trains in opposite directions,		45,000
Total on ac't of construc.		$875,500
Add also for capital invested on transportation account on the opening of the Road, which will require to be augmented as the business increases,		
5 engines	at $7,300	36,500
36 passenger cars,	800	28,800
50 freight and bag. c.	200	10,000
Depot ground and buildings		40,000
Cost prepared for oper'n		$990,800

The plan of Road upon which this estimate is based, is of the kind most commonly in use. A plan essentially different may be adopted for a considerable portion of the distance, at a much less expense. By this plan, instead of embankments and cuttings for the formation of a Road-bed, piles of adequate size are substantially driven to receive the superstructure.

This plan is more especially applicable to grounds of a low or marshy character—yet from its comparative cheapness, it becomes a question whether upon the score of economy, it may not be well to apply it upon all grounds where cuttings are not required, and materials for embankments are not at hand ; and where also, the natural surface is not too far below the grade line of the Road.

A Road thus constructed, resting upon *piles* from four to eight feet above the surface of the ground, would possess all the necessary firmness and strength, and would doubtless be easily maintained in good adjustment, at a comparatively small expense.

This plan, it is understood, has been adopted for some of the railroads of the country now in course of construction ; its merits will therefore soon be practically tested.

In the plan above-mentioned, the first cost will be less, and economy, which is a desideratum in the construction of railroads, will, it is believed, be consulted. In regard to its durability, it will be seen that a larger portion of perishable material enters into the construction, than is employed in the ordinary plan, yet if this can be renewed at an expense less than the interest upon the difference in the first cost, an advantage will result in an ultimate saving of expense.

The probable cost of the Road, adopting the plan last referred to in part, may be estimated as follows:

35½ miles graded in the ordinary manner for a double track, with single track superstructure at $11,000	$390,500
40 miles constructed upon piles for a single track, all expenses at $7,300, per mile,*	292,000
Superstructure for second track 10 miles,	45,000
Total on account of construction,	$727,500
Add expenses on transportation account, for engines, cars, buildings, &c. as before,	115,300
Cost prepared for oper'n	$842,800

An estimate of cost upon both plans of construction for a double track complete, would show a difference less favorable to a piled road.

An inspection of the map of the north-west portion of New-York, the neighboring Province of Upper Canada, and the north-western states and territories, will indicate the importance of this line of communication. The Oswego and Utica Railroad forms an important link in the great chain of railway and steamboat communication from the Atlantic to the Lakes, and to the states and territories west. Much of the trade and travel of Upper Canada will be tributary to it, embracing the wide, fertile, and populous region of country bordering upon the upper part of the St. Lawrence and the Great Lakes, extending over a distance of more than 500 miles

The business intercourse between Upper Canada, and the State and City of New-York, already great, is steadily increasing with the advance in population and internal improvements. Numerous steam-boats and other craft are daily plying from the harbor of Oswego, to every important place upon the shores of the Ontario. The ease and rapidity afforded by means of these facilities, with still greater in preparation, will secure to the railroad a large amount of travel, which must be greatly augmented when the several avenues centering upon Lake Ontario at different points are opened and in operation.

Individual enterprise strengthened by the aid of the provincial and parent governments, has recently placed the improvements of the province upon a prosperous footing, and she is now advancing in the construction of *Railroads, McAdam roads, and navigable communications;* all tending to develope her resources, and increase her trade with her neighbors.

* Propositions, it is understood, have been received for the construction of a single track on *piles*, so far as the character of the ground will admit of an adoption of the plan, at the rate of $5,000 per mile, including iron for rail-plates, and all the materials and labor requisite for its completion.

It has been remarked by the provincial press, in reference to the improvements in New-York, that "the next step will be to continue the railroad from Utica to Oswego. Then the traveller, or the mail bag, will be enabled to reach us by means of American capital, industry and enterprise, from New-York, by steamers and railroad cars in thirty hours. *Every day will render Upper Canada more and more dependant on, and commercially connected with, the state and city of New-York.*"

A further and important cause, which will doubtless soon operate to greatly increase the travel and commercial interchange between the provinces and this state, will be experienced in the passage of the contemplated law of congress (favorably considered and reported upon by the late United States Comptroller) extending the draw back system, to the transit of goods through our country under bonds.

This measure, from its reciprocal advantage to the province and to this state, has been earnestly petitioned for by each, as well as by other states; and its sanction by Congress, it is but reasonable to believe, will not long be delayed. This is indeed a subject of growing interest, in reference to our internal trade—and the question may well be asked, why should not the benefits attendant on the drawback system, be as freely extended to the western states, and to our merchants on the borders of our inland seas, as to their favored brethren upon the Atlantic coast?

When the chain of communication shall be completed to Detroit, and to Huron, by the construction of the railway across the Canada Peninsula, from the head of Lake Ontario—together with the two lines of road across the State of Michigan, the one from Detroit, by the valley of the St. Josephs, and another from Huron or Fort Gratiot, by Grand river, in the direction of Milwauky;* all of which are now in progress or under survey; a communication will be opened to the public from the states and territories west, to the Atlantic—to the great market of New-York, and to that of Boston, also via the Railroad through Massachusetts from the Hudson; the advantages of which, in point of expedition, comfort and economy to the traveller, it is believed cannot be rivalled.

It will possess a great superiority from its directness, and from its peculiar character—formed as it is, of successive portions of steam-boat and railroad conveyance—each of almost equal, or of such convenient extent, that while the traveller enjoys the benefit of the great practicable celerity in his progress, he will realize in the well timed variety, that degree of ease and comfort, and that relief from fatigue, so desirable upon so great a distance, which cannot be equally secured upon any other route.

* A central and direct line of railroad from Detroit, via Kalamazoo to Lake Michigan, is also in progress.

The passage may be made from New-York to the city of Detroit, or to Huron and thence to Chicago, within the space of about 65 hours, including the necessary delays for morning and evening meals at each change of conveyance.—From Boston to the Hudson by railroad, the time will not materially vary from that required from New-York to Albany.

	Miles.		Hours.
From N.Y. to Albany	150	by night steamboat	10½
" Albany to Oswego	168	by day railroad,	10
" Oswego to Hamilton	160	by night steamboat	13½
" Hamilton to Detroit	192	by day railroad	11
or " to Huron	136		
" Detroit to Chicago, or Huron to Chicago	260	day and night railroad & steamboat	16½
		Total travelling time	61½

In a further time of ten hours, the traveller may reach the Mississippi, or some of its chief tributaries in less time, and may complete the journey by the river to New-Orleans, within eight days from the time of his departure from the city of New-York, or from Boston.

The route from Oswego westward, may be varied in a direction towards Niagara and Buffalo, and thence to the region south and west of Lake Erie, without materially increasing the distance from Albany over the other route, with the advantage of passing by steam-boat through Ontario (from Oswego to Lewiston) rather than remain on a parallel route by night, upon a long line of continuous railroad, subject to its greater fatigue, and attended during night, in the view of many, with less safety. A great portion of the pleasure travel, will doubtless from considerations of change, and a greater variety, be induced to take this route either going or returning, in their visits to the Falls of Niagara and other places of interest west.

In regard to the travel between Albany and Detroit, and of course the whole country north and west of the latter place, the route by this railroad, and thence by the railroad now constructing from the head of Lake Ontario across the peninsula of Canada, will be found altogether the most eligible, producing an important saving in distance, time and expense: it is clearly the best commercial route from the Hudson to that region of country.

From Albany to Buffalo by railroad, the distance will not materially vary from	320 miles.
From Buffalo to Detroit, by steam-boat on Lake Erie, route as generally navigated, about	340 "

Total, Albany to Detroit, by Buffalo,	miles 660
From Albany to Oswego by railroad, the distance will be	168 m.
" Oswego to Hamilton, head of Lake Ontario, by steamboat	160 "
" Hamilton to Detroit by railroad, per recent surveys	192 "
Total, Albany to Detroit, by Oswego and Hamilton	520

Difference in favor of the route by Oswego and Hamilton, 140 miles, making a saving of more than one-fifth in distance.

The difference in time by the two routes, supposing the average rate of motion on the railroad to be 17 miles per hour, and upon the Lakes 12 miles per hour, will be as follows:

Albany to Buffalo, by railroad	19 hours.
Buffalo to Detroit, by steamboat	$28\frac{1}{3}$ "
Total, Albany to Detroit, by Buffalo	$47\frac{1}{3}$
Albany to Oswego, by railroad	10 h
Oswego to Hamilton, by steam-boat	$13\frac{1}{3}$ "
Hamilton to Detroit, by railroad	$11\frac{1}{3}$ "
Total, Albany to Detroit, by Oswego and Hamilton	$34\frac{2}{3}$

Difference in time, in favor of the Oswego and Hamilton route, $12\frac{2}{3}$ hours, making a saving of over one fourth,

The difference, supposing the cost by railroad and steamboat to be four cents per mile, is $5.60, or over one-fifth less, upon the route by Oswego and Hamilton.

When in addition to the advantageous character and location of this line of communication, as illustrated above, it be further considered that the position which, by nature, Oswego occupies, is most favorable for concentrating the trade and travel of all the country bordering upon Lake Ontario, and the upper part of the St. Lawrence, there can remain little doubt of the Oswego and Utica railroad becoming one of the most useful and necessary, among the leading thoroughfares of the country.*

* The Hudson River and Lake Ontario are usually open in the spring of the year ready for navigation, by the latter part of March. The navigation of the Erie Canal generally commences between the middle and last of April, being retarded until that time by obstructions from ice, and the making of necessary repairs. The transportation of merchandise may therefore be effected by means of the Railroad from Albany to Oswego and thence by Lake Ontario to Port Dalhousie at the mouth of the Welland Canal, through which it may be continued; or to Hamilton whence it may be conveyed by Railroad to a western destination, about three weeks earlier than it can pass through the Erie Canal. An advantage will also to some extent be offered by this line of communication, for the transportation of western produce to market during the late season, after the closing of canal navigation, and previous to the closing of the Hudson.

It is somewhat difficult at this time to form an accurate estimate of the travel and business which may be expected upon the road. The wide region of country which is intended to be accommodated, is undergoing a rapid improvement, the population doubling upon the average each ten or fifteen years, and the business increasing in a much greater ratio than the population. This rapid advance is taking place under circumstances which will ensure its future continuance, being the combined result of superior advantages of soil and climate, of liberal institutions, of intelligence, and a spirit of enterprise—persevering and untiring in its efforts.

It appears by statements of business upon the Utica and Schenectady road, for the past year, that the amount of receipts upon that road for passengers and the mail only, (the Company not being permitted to carry freight)

amount to	$340,000
The annual expenses amount to	140,000
Leaving the nett receipts equal to	$200,000

As the Oswego and Utica road is nearly of the same length with the Utica and Schenectady, the expenditures and receipts under the same amount of business would be nearly the same; and as the cost of the former will not exceed $1,000,000, the annual dividend would be much greater, varying from 15 to 20 per cent—or otherwise, it would be equally profitable with a much less amount of business, in consequence of the smaller amount of capital invested in the construction and transportation.

That the *future* receipts upon the Oswego and Utica road will be as great as the *present* receipts upon the Utica and Schenectady, cannot, it is believed, under a view of all the circumstances, be doubted. The present travel through Oswego, is stated to be more than half that upon the Utica and Schenectady road. It must eventually be equal to, and even exceed the present travel on that line. In addition to this, the Oswego and Utica Rail road, has the privilege not possessed by the other road, of carrying freight during the period of suspended navigation; and the privilege also of carrying freight the remainder of the year, subject to a tax equivalent to the canal tolls. The advantage resulting from this privilege of carrying freight, is further increased by the disparity in distance between the canal and railway. From Oswego to Utica via Syracuse, on the canal, it is 98 miles; by railroad, it will not exceed 73 to 75 miles. This difference will secure to the railroad a much greater proportion of the whole travel and business, than is enjoyed by the Utica and Schenectady railroad, as that road does not differ materially in length from the Canal between the same points. It is confidently be-lived that when the tax above referred to, levied upon private enterprise, is removed, as it surely will be under a more enlightened view of the subject, the railway will be enabled, under the great saving in distance, to compete successfully with the canal (as the same is now navigated by way of Syracuse) in the carriage of freight.

With regard to the sources of business in the immediate vicinity of the road, it may be stated that it passes through a region of country well adapted to all the purposes of agriculture, and abounding in valuable timber. The hydraulic power also, which exists on the Oswego river, is without a parallel, when considered in reference to its favorable position on navigable waters; its extent, its safety, and durability; being the drainage of the whole of the Seneca and Oneida valleys, embracing en extent of 4000 square miles; the numerous lakes in these valleys serving as reservoirs to retain the flood waters, and equalize the discharge at all seasons. This power is already to a considerable extent improved, and eventually a vast amount of capital will be concentrated upon it, for manufacturing purposes.

The most prominent source of business to the road, and that from which it derives its greatest importance, results from its peculiar position as already described, for constituting one of the great thoroughfares between the Atlantic and the West, thereby placing it in the foremost rank of similar works in the country.

A more particular reference to present or prospective sources of business may not be necessary. I would however refer such as are desirous of more minute information of the general topographical features of the section of country between Utica and Oswego, and a more full exposition of the existing and prospective increase in trade of that region of country, the surplus production and travel of which will naturally find its way to market along the great thoroughfares from the Lakes to the Hudson, to the able Report of E. F. Johnson, Esq. Civil Engineer, made to the Legislature of New-York in 1835, on the subject of the proposed Ontario and Hudson Canal. That Report exhibits in a convincing manner, the general principles of the advance of the country in population and wealth; and by inferences and elucidations derivable from the past, presented in a manner so clear as not to be controverted, satisfactorily demonstrates what must be the result for the future.

Proportionate to the increase of population, and the extension of facilities serving to encourage the efforts of the enterprising to profitable ends, so will the business energies of the country be called forth, the many useful applications of industry, and the various departments of trade, be extended. In the trade and intercourse between the seaboard and the west, daily augmentations are witnessed, yet the vast accessions of the future, from the increase of population and growing commerce of the country, can scarcely now be justly calculated, and will only be fully realized when our chief avenues of exchange are opened, and the capabilities and wants of the extensive region to be accommodated, shall be fully developed.

Respectfully submitted by
your obedient,
JOSEPH D. ALLEN,
Chief Engineer.

Oswego, Sept. 1837.

OHIO INTERNAL IMPROVEMENTS.

We are indebted to our representative for the Report of the Board of Public Works, which shows the condition of the works of internal improvement in the State. It covers twenty six octavo pages. We will endeavor to condense it so as to give the *substance* without the *verbiage*.

1. *The Ohio Canal* has been navigable from the 20th of April to the 1st December, with the exception of 20 miles at the South end. The navigation of this part was suspended in consequence of the destruction of a stone aqueduct of about 50 feet span, 16 miles from Portsmouth, occasioned by the sudden rise of Camp Creek. From the difficulty of obtaining hands, the overflowing of the Scioto, and the continual fevers prevalent in that region, the repairs of the aqueduct were not completed until late last fall. The consequence has been a serious detriment to the interests of the people of the Sciota valley, and a loss to the State in tolls. The amount received for tolls, fines, and water rents, &c., for the year ending December 1, 1837, is $293,428 79. The receipts for 1836, were 211,823 32—showing an increase for 1837 over 1836 of $71,605 47. Taking into consideration the general depression in the business operations of the country and the time lost in repairs, this result is highly gratifying. The Ohio Canal, we believe is 310 miles long, reaching from Portsmouth on the Ohio River, to Cleveland on Lake Erie.

The Walhonding and Mohican Canal, as far as located, is twenty-three miles in length, extending from the Ohio Canal, near Roscoe, to a point on the Mohican, about four miles above the junction formed by the Vernon and Mohican Rivers. Eighteen miles are now under contract, and the work is progressing with much spirit. Its estimated cost is, $387,467 14. The Board propose the extension of it to some feasible point in Richland County: up Vernon river to Mount Vernon in Knox county; and up the Killbuck to Millersburgh, in the county of Holmes.

Wabash and Erie Canal.—This important work, eighty-nine miles in length, extending from its eastern termination near Manhattan, to the Indiana line, is now under contract, and when finished will be of immense advantage to the people of Ohio and Indiana. It will form when completed, a continuous canal communication from Lafayette, on the Wabash river, to the town of Manhattan, a distance we believe, of about two hundred miles. It passes through a fertile and delightful region of country, mostly of spare population, and some of it a *wilderness*, which, we have no doubt in a few years, will become the habitation of an enterprising, industrious and intelligent population, who will cleave down the forests and erect cities, towns and villages, and promote, on a few fields, all the arts of civilized life. The estimated cost of Ohio's proportion of this Canal, is $1,968,540. The funds for its construction are derived from the sale of the "Wabash and Erie Canal Lands." Sales to the amount of $223,000 have already been made. The Board is of opinion, that no further sales should take place until the lands are enhanced in value by the construction of the Canal, and that the State can more advantageously borrow money for its present prosecution.

The Miami Canal.—Business commenced on this Canal about the 19th of February, but its navigation, since that period, has been suspended for six or eight weeks, owing to the time lost in repairing an extensive breach near Cincinnati; in cleaning out the Canal; repairing two locks in the vicinity of Hamilton; erecting aqueduct across Crane's Run and Dick's Creek; building a new and permanent structure across Gregory's Creek, and in improving the abutments of the Miami dam at Middleton, and extending the Mad River feeder at Dayton. It is now rendered navigable from Cincinnati to the mouth of Lorami's creek, a distance of ninety-nine miles. Fifty-three miles remain to be completed to where it forms a junction with the Wabash and Erie Canal, a few miles above Defiance. The tolls, water rents, &c., last year amounted to 62,994 40—being an excess over the preceding year of $11,822 88.

Warren County Canal.—The Board apologise for the delay in the prosecution of this work, which is attributable, they say, *entirely to circumstances beyond their control!* Many of the contracts have been finished; and the opinion is expressed, that the Canal will be completed to the first lock near the town of Lebanon, by the first of August next. The payments made on the canal amount to $63,626 28.

The Hocking Valley Canal, it is contemplated, will be completed in about three years. The Board propose the purchase of the Lancaster Lateral Canal, by the State, in view of difficulties that may arise out of the conflicting interests of the two canals.

IMPROVEMENT OF THE MUSKIN GUM RIVER.

The work on this improvement is progressing rapidly, and the fullest confidence entertained of its completion within the time specified by the contracts.

There has been paid out of the funds appropriated for making this improvement, during the year ending Dec. 1st., 1837, by William Wall, Acting Commissioner. $139,444 00

For the wages of engineers and their assistants, for subsistence, and for incidental expenses, out of funds subject to the unrestricted check of the acting Commissioner. 12,252 24

There has been paid on awards of damages, on the improvement of Muskingum river, at Zanesville, by William Wall, Acting Commissioner, $14,432 14, of which sum, $9,048 92, was, in part, for damages sustained by the Zanesville Canal and Manufacturing Company, and assessed several years ago. The remaining sum of $5,383 22, was in consideration of the value of the West Zanesville Mills.

Nothing has been done with regard to the Wills Creek improvement, because the Board are unwilling to say that it will yield five per cent, on the cost of making it. Some modification of the present law on the subject will be necessary, before the board can believe it their duty to have any further action on that work, other than to make the additional examination and survey ordered.

NATIONAL ROAD.

In May last, contracts were let for rebuilding the bridge over Salt Creek, for erecting toll gates, and toll houses, on so much of the road as was received last winter; and for putting full cover on all that part which lies between the beginning of the 7th and end of the 22d mile. At a subsequent letting, in June, contracts were made for slight repairs on that section of the road which lies between the end of the 22d and 83d miles; for repairing various places between the 107th and 116th miles; and by means of an arrangement with the Warden of the Penitentiary, considerable repairs have been made on the 117th, 118th, and 119th miles—while a good and substantial full cover, of the best quality of limestone, well prepared, has been put upon the 120th and 121st miles. The great slip on the 2d mile, at Bridgeport, has also been repaired, in such a manner as to prevent the difficulty heretofore witnessed at this point, from again occurring.

Four dilapidated culverts have been rebuilt, and one has been extensively repaired. One of these is on the 13th, two on the 14th, and one on the 26th mile. The stone on the old yards, both broken and unbroken, has been collected and taken care of for future use.

Most of the contracts let were finished within the time specified; some of them however, were necessarily extended beyond the time, and a few are not yet completed. By anticipating the tolls to be collected between this time and the first of March, all the liabilities resulting from present contracts, when finished, can be discharged, leaving the road fund on the first day of April next, about what it was at the beginning of the same month last year: so that contracts to the same amount can be safely entered into in May next, which were in May last. This being the case, it is believed that a full covering on the road can be obtained during the coming season, extending as far as Washington, in Guernsey county, at the end of the 41st mile. In addition to this, sufficient repairs can be made on the road generally to keep it in good running order; and the system of permanent repairs adopted by the arrangement with the warden of the Penitentiary can be continued to a considerable extent.—*Lebanon Star.*

ANNAPOLIS AND ELK RIDGE RAILROAD.

We are indebted to the politeness of *Mr. Hughes*, the Chief Engineer, who has surveyed and located the route of the contemplated Railroad, which is to connect this place with the cities of Baltimore and Washington, for a glimpse at his final report which is about to be submitted. We cannot resist the opportunity of laying before our readers some of its prominent features, as well to congratulate all that are interested at the result, which establishes that the road can certainly be constructed for the sum provided by the subscriptions made on the part of individuals and those authorised on the part of the State, as will be seen by the following recapitulation of the calculations of its cost---made as we are assured upon very liberal estimates:

Graduation and masonry,	$233,666 18
Superstructure,	70,000 00
	303,666 18
Contingencies and superintendence,	30,366 79
	$334,032 97

This is upon the presumption that an edge rail of 30 pounds to the yard be used. Should a *heavy* rail be adopted, it may increase the cost to $363,072 79.

Mr. H. received the appointment of Engineer to the company in June last, and commenced his field operations on the 28th July. The great number of experimental surveys which he made for ascertaining the minute features of the ground, so as to decide upon the best location, are sufficiently exhibited upon the large map, which he has constructed on a scale of six inches to the mile, and which show those lines covering the surface of the country from the Patuxent to the Severn, and from Annapolis to the Baltimore and Washington Railroad.

There are but two grades on this road as high as 40 feet to the mile, and only three grades between 30 and 40 feet. All these high grades are but for short distances. By reference to the accompanying table of curves, we find one of 1795, which is the shortest on the line; the next is 3000, most of them exceed 5000, and from that to 10,560, two miles. —*Maryland Republican.*

EXCURSION TO THE NORTHWICH SALT MINES BY THE BRITISH ASSOCIATION.

Mr. Deck, the intelligent practical chemist of Cambridge, has published the following interesting narrative:

To the Editor of the Cambridge Chron.

Sir—Being one of the favoured few of the members of the British Association, during its late meeting at Liverpool, who were included in the geological excursion to the Marston Salt-mines at Northwich, I feel anxious that a more explicit detail should appear than has yet been given of the very liberal conduct of the proprietors, and the extreme interest and novelty of the excursion. As the number was obliged to be limited, about 60 from a long list of members who had entered their names were selected out, and at eight o'clock on Saturday morning last they assembled at the Railway station, where a beautiful locomotive engine, "The Spitfire," and a train of carriages, were placed at their disposal by the Railroad Company; and, in the space of one hour and ten minutes, it arrived in great style at the Hartford station, a distance of 32 miles, being the nearest point of the road to Northwich. Here carriages of all descriptions were provided by the liberality of the gentlemen through whose kindness this delightful trip emanated, and conveyed the party four miles to the mine, through a country whose thick population were on the alert to view the "*curious larned men*," as they were termed. Every preparation had been previously made by lining the bucket and rope with cloth for a clean and safe descent, which was effected down a shaft of 400 feet by means of steam power, four individuals descending at a time, under the careful superintendence and watchful eye of a principal overlooker. All being safely landed, a scene of wonder and astonishment opened to view that will not easily be effaced from the memory of any one present. The extent of the excavations amount to 50 superficial acres, the principal parts of which were illuminated by upwards of 4000 candles, tastefully displayed against the glittering rock, and some arranged in devices of "V. R." with a crown, also "B. A." The effect was magical, and the unexpected combustion of some crimson fire and blue lights (which a lover of the pyrotechnic art luckily possessed) upon the sparkling crystals of the mine, brought to mind scenes in the well-known and oft-read tales of *Sinbad* and *Aladdin;* the enchantment of which was much increased by the moving trains of salt, drawn by horses from various parts of the mine towards the shaft, illuminated by candles, in honour of the visit, which produced an extraordinary and beautiful effect. Sixty men are employed, and upwards of 1,000 tons of salt annually raised in these pits. After a gratification, not to be described, in viewing the wonders of these subterraneous treasures, the company were shewn to a part of the mine, where (as if raised by the hand of magic) appeared a most sumptuous repast—a table with every delicacy, and decorated with beautiful flowers, wax-lights, and a profusion of the choicest wines; and it may be believed that, from previous exertion and the extreme novelty of the *dejeuner*, full justice was done to the viands, and the interest of the scene was considerably heightened by the attendance, in such a situation, of four female servants to wait upon the company. C. Worthington, Esq., and T. Firth, Esq., (the spirited and liberal proprietors of the mine,) acted as president and vice president, and proposed the health of "The Queen," with three times three, and which was honored by the discharge of some small pieces of cannon, the effect of which, reverberating for a considerable time through the extent of the mine, was very striking and extraordinary.

The health of "Professor Sedgwick" was given with great applause, as likewise "Success to the British Association," for which latter toast thanks were returned in a neat and elegant speech, by a gentleman who afterwards proposed "Our excellent and liberal hosts, the proprietors of the mine," with nine times nine; and if gratitude could be evinced by hearty cheers, it was here most vociferously testified. The compliment was acknowledged by one of the proprietors, who made some beautiful allusions to the situation in which the company were then placed, and suggested that as it would be prudent, from the peculiar journey we had to take, that the head should be kept cool and the hand steady, we drank to "Our friends above," and all then adjourned from the festive board, and proceeded to the shaft, where "God save the Queen" was sung by the whole company in full chorus. Just previous to the ascent, a rev. gentleman in the company most aptly proposed that, as we had sung the praises of our earthly sovereign, it would not be inappropriate to sing praises to our heavenly one, particularly after viewing the stupendous and wonderful works of His creation, where we were then assembled, and suggested that the beautiful and appropriate lines of

"Praise God from whom all blessings flow,
Praise him all creatures here *below*"

should be sung. All voices quickly responded to the call, and it was reverently and devoutly sung to the tune of the 100th psalm. By the same judicious and careful arrangement all were safely raised to the surface, and quickly conveyed to the steam carriages, where instructions were given to show the effect of railway speed; and in an hour we were delightfully conveyed the thirty-two miles to Liverpool, having effected, in the course of eight hours, a distance of twenty-seven miles, and spent five hours in the mine—concluding an excursion of intellectual enjoyment which will long be remembered with delight by those who were fortunate enough to be present.

I remain, Sir, your's, &c.

I. Deck.

King's Parade, Cambridge, Sept. 21.

BELGIAN AND FRENCH RAILROADS.

Brussels, Sept. 17.

The receipts of the iron railroad fully justify the expectations that were formed of it. The receipts from a certain period, when only one section of the railroad, that from Mechlin to Brussels, was completed, being ascertained, it was calculated, that when two sections were in use, the amount would be tripled. This might have been thought rather a sanguine expectation, but it has been realized. The receipts for eight months on the first section were 241,456 francs 10 centimes. Triple this sum 724,355 francs 14 centimes. This may be considered as highly satisfactory; for the third section, that to Tersmonde, is of far less importance than those of Brussels and Antwerp. Three new sections will be opened in the month of September, and we shall then see the product of six sections. Sept. 18. We are informed that the commissioners assembled at Arras, to consider the best direction to be given to the iron railroads, have nearly agreed on the following basis. The communication between France and Belgium, Amiens, Arras, and Douai, with a branch from Douai to Valenciennes and Cambrai, and from Lisle to Belgium on the other; to be by a line, which proceeding from Amiens, passing by Abbeville, Estaples, Boulogne, Calais, Watten, St. Omer, Aire and Merville, with a branch from Watten to Dunkirk, would join the principal line at Lisle.—*Brussels papers.*

SAFETY VESSELS.

The *Liverpool Standard* announces that the subject of the safety ships proposed by Mr. Williams in his paper before the last meeting of the British Association, has at length engaged the attention of government, and they are about constructing a series of steam vessels for the home and foreign service on this plan. The interior of these vessels being divided by numerous bulk heads, and not intended for merchandise, they may without inconvenience adopt this arrangement. Separate portions of the vessel, each water tight, will be appropriated to the engine, boilers, cabins, store department, and for the accommodation of the crew, &c. An additional advantage arising out of this arrangement is, that in case of being fired into, they will not be in danger of that destruction which would inevitably follow a casualty of the kind to the present class of steam vessels. A very fine steamer, fitted up with three safety bulkheads, was this week launched from the yard of Laird and Co., at Birkenhead.

THE ELGIN MARBLES AND THE PUBLIC TASTE.

In the report of the parliamentary committee on arts and manufactures, it is recommended that casts of the best specimens of sculpture be transmitted from the metropolis to other towns, at the lowest possible cost, in order to facilitate the formation of galleries at various institutions, and thereby disseminate good taste. This object has been opportunely advanced by the request of the French government to ours, for permission to have the Elgin marbles cast for the benefit of their national exhibitions. It was not considered advisable to trust the operation to any but the moulder usually employed by the British Museum; but, in order to meet the wishes of our enthusiastic neighbours, Mr. Sarti has received orders to cast those valuable remains of antiquity; and the recommendation of the committee on arts is to be carried into effect by the sale of copies of those admired relics of Grecian taste, at the price of plaster and labour. This looks like encouragement to taste, and it is hoped that the managers of literary and scientific institutions will not neglect the advantage offered.—*Sunday paper.*

ACOUSTIC TELEGRAPH.

A new telegraph has been invented in Austria by a M. Kfeninger. It is an acoustic telegraph, consisting of a tube in the form of a speaking trumpet six feet five inches long, which conveys the sound in 11 and 1-10th seconds to a distance of 12,000 feet. A trial made of this instrument at Vienna proved very satisfactory. The government intends to employ it in the army for the purpose of conveying military orders to troops dispersed over a great tract of land, &c.—*National.*

IMPROVEMENT IN THE JACQUARD LOOM.

A great improvement has just been effected in the jacquard loom, by which all the weights are dispensed with, and steam power is used to work the machinery. By this new machine silks of any pattern, of superior texture to the French, of the most even fabric, can be made by children or women. Springs are used to regulate the yard beam without reference to its diameter, and by a simple and ingenious contrivance, the yarn and cloth beams can be instantly stopped should the weight break.—*Ib.*

BRUSSELS IMPROVEMENT SOCIETY.

A company has just been formed under the name of "Civil Society for the Enlargement of the Capital of Belgium." The object of this new company is to build new quarters within or without the city of Brussels, particularly a quarter between the Louvian and Namur gates, to be called the Quarter Leopold. The affairs of the society are to be managed by seven directors without salary, and a secretary.—*Brussels paper.*

The Mexican papers speaking of the contemplated rail road between Mexico and Vera Cruz, represent it as a project which is to be immediately put in execution, the consequences of which will be of immense advantage to the general prosperity of the country.

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

⁂ Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

AGENCY.

The Subscriber offers his services as Agent, to procure *Machinery for Mills, Steam Engines, Locomotives, Printing Machines, Presses, Types and Fixtures.*

He will give prompt attention to all orders entrusted to him for execution; and pledges himself to those who may employ him, that no effort on his part shall be wanting to procure the best articles to be had in the city—and to give satisfaction.

He will also employ Millwrights and Engineers, to erect Mills, and put the Engines and Machinery in operation.

Orders accompanied with the necessary funds, or satisfactory city acceptances, should be addressed to D. K. MINOR, 30 Wall-st. N.Y.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS Mc NEILL,
Chief Engineer.

☞The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.; Atlas, Boston; Philadelpia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment.

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durlee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. do. cast steel Shovels & Spades
150 do. do. Gold-mining Shovels.
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
Fo. 8 State-street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR,
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cattaraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG,
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street,
NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Istruments made to order and repaired.
1y—14

RAILWAY IRON, LOCOMOTIVES,

&c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars; with conntersunk holes and mitred joints,

					lbs
350 tons	2 by $\frac{5}{8}$,	15 ft in length,	weighing	$4\frac{68}{100}$	per
280 "	2 " $\frac{1}{2}$,	"	"	$3\frac{50}{100}$	"
70 "	$1\frac{1}{2}$ " $\frac{1}{2}$,	"	"	$2\frac{1}{2}$	"
80 "	$1\frac{1}{4}$ " $\frac{1}{4}$,	"	"	$1\frac{25}{100}$	"
90 "	1 " $\frac{1}{2}$,	"	"	$\frac{7}{8}$	"

witn Spikes and Splicing Plates adapted thereto To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{2}$, $2\frac{3}{8}$, 3, $3\frac{1}{8}$, $3\frac{1}{4}$, $3\frac{1}{2}$, and $3\frac{3}{4}$ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of onr partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEWYORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having conntersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, NOVEMBER 4, 1837. (Published February 17, 1838.) VOLUME VI.—No. 44.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 17, 1838.

☞ The delay in forwarding Nos. 39 and 40, has arisen from the sickness and death of the young man whose duty it was to put them up for the mail.

REPORT ON THE SURVEY OF THE VALLEY RAILROAD.

A. C. Twining, Ch. Engineer.

To Hon. David M. Camp and John C. Holbrook, Esq. Commissioners of the State of Vermont for the Survey of the Valley Railroad.

GENTLEMEN,—In the Report which I have the honor to present, it will be my object to give a compendious view of all the operations in the valleys of the Connecticut and Passumpsic rivers, which, in obedience to your instructions, I have undertaken and executed, and of the results of these operations.

You will recollect that, between the middle and end of May last, I made a reconnoisance of the general route, in company with Erastus Fairbanks and John C. Holbrook, Esqrs., the then Commissioners for the survey. It may be well to take, in the first place, a rapid glance at the prominent subjects which were, at that time, brought to view, and which are connected with the project in hand.

Having designed to commence the field operations at the south extremity of the State, the first subject of attention naturally was, to find the proper spot upon the boundary line between Vermont and Massachusetts at which to fix the point of departure. For this purpose a reconnoisance was made, in the first place, from Brattleboro', southward, along the turnpike leading through Bernardston to Greenfield. Upon a slight view, it soon became evident that the hills between the two places first mentioned, have an elevation too great to admit of a railroad along that tract. There exists a second route between Brattleboro' and Greenfield, leading down the river from the former place towards Vernon and then turning to the west into Bernardston. This route I did not particularly examine; being satisfied that, whether practicable or not for a railroad, an examination was not necessary for the present survey,—the object of which is not to fix, in every place, the exact line upon which the proposed railroad ought to be constructed, but to develope the facilities which the valley offers, and the difficulties which it presents in reference to such a project, together with the general features, properties and expense of the contemplated work. It was finally thought expedient to adopt a point of commencement upon the high plain immediately west of the Connecticut river, at the south line in the town of Vernon. From this place it seemed to be practicable to conduct a railroad southward into the heart of Massachusetts, without meeting any formidable obstacle. A considerable expense might be unavoidable in crossing low grounds in the town of Gill; and it would, not improbably, be necessary, in approaching Miller's Falls, to cross the Connecticut a mile or two above these falls, and run for a distance up the valley of Miller's river;—thereby avoiding the circuit which the river makes below the mouth of that tributary, by a short cut back of the highlands which come down to the Connecticut and form its Eastern bank. Examinations having been made, sufficient, as was supposed, to determine the practicability of a union between our contemplated line and a line coming upward through Massachusetts to meet it, no farther delay was made in prosecuting our reconnoisance northward from the point of departure along the route, whose general features I come now to describe.

It is frequent that a stream like the Connecticut flows between banks that slope, on both sides, from a moderate height above the water's edge to a much greater height one or two miles back in the country,—thus offering the engineer a choice of ground on which to arrange at pleasure the necessary ascents and descents of his line. The formation of the Connecticut valley, however, differs widely from this, and is, in some respects, strikingly marked in its features. Through the entire distance from Miller's Falls up to the mouth of the Passumpsic, wherever a space intervenes between the river and the mountains, that space is generally occupied by a succession of tables rising back of each other—often to the number of five. First, there is the low interval of the river, and to this adjoins a steep sandy slope, forming the edge of a table generally from forty to seventy feet above the interval; presenting on its top a plain almost perfectly level, and one which, as well as each of the succeeding tables, appears to have formed at some ancient period the interval of the river, which must then of course have been elevated above its present channel as far as the table now lies above the flat. In some instances the low interval is wanting, and the first high table comes directly upon the river, presenting a steep hill slope, generally formed of clay at the foot and of light sand at the top. These slopes, although steep, are, for the most part, well timbered, but sometimes present an unstable mass continually sliding down by the effect of the weather, and forming a base that is ever shifting and totally insecure for a road, if made upon any common plan. To such localities, therefore, it will be necessary to adopt a peculiar construction. On their top these tables offer an even and beautiful surface for the bed of a railroad, so far as a line upon them can be maintained; but they are generally deeply channeled by ravines difficult to cross, and are besides interrupted by sudden bays and turns of the river, and its flats, so as to break off upon the present low interval, without any intermediate ground to sustain a descent from one to the other. Frequently there is found neither low interval nor table; but the mountain-side comes close upon the water's edge, forming there a precipitous and sometimes an irregular ledge. The intervals also are often too deeply flooded by high freshets to admit of laying our line in a direct course across them without encountering a high embankment.

The difficulties, therefore, which were evident from the reconnoisance of this part of our survey, (from the south State line to the mouth of the Passumpsic,) but which, it will presently be seen, are in a great measure balanced by corresponding facilities and advantages, may be classed as follows. First, the number and magnitude of the ravines which intersect the table lands: Second—the flooding of the low grounds: Third—the sliding banks: Fourth—the ledges adjoining the river: and Fifth—the projecting table lands putting out into the stream.

The effect, on the other hand, of these unfavorable circumstances is counteracted, to a greater or less extent, by circumstances of an opposite character.

For, first—the excavations, both for the road-bed and for the material of embankments, are generally of the very lightest and easiest character. Second—the aggregate amount of rock excavation will be small for such an extent of line. Third—the abundance of timber of different kinds on the spot, or near at hand, renders it practicable to cross ravines by wooden structures, at moderate expense; to pass low flats upon trestles, to run along steep slopes and sliding banks by a structure resting upon piles; and it will materially favor, also, the cost of the smaller bridges and of the superstructure for the road. Fourth—the level character of the tables and of the intervals, gives opportunity, sometimes, for long reaches of line very cheaply made. These favorable and important circumstances will be found, as already mentioned, to reduce items of expense that would otherwise be great to a moderate amount. The appropriateness of all the foregoing considerations, may be made, by and by, yet farther manifest by an inspection of the estimate to be embodied in this report.

The valley of the Passumpsic, through which our route, after leaving the Connecticut, is continued, is not remarkable in any of its features, when considered with reference to the project in hand. The entrance to it is made difficult by the occurrence of steep and irregular rocky ledges, reaching to a great height. Passing up the valley, fourteen miles, we meet the great falls in the town of Lyndon, having an abrupt descent of about sixty-one feet between precipices of rock, and presenting a difficulty at first view formidable, but one which may be overcome with more ease than was at first anticipated. Between these falls and the mouth of the Passumpsic, and also for a few miles above the falls, the river must be crossed repeatedly, in consequence of its winding channel, in connexion with the occasionally bold and high formation of its banks. In the town of Lyndon and the town north adjoining, the Passumpsic divides into several branches, along some one of which it was necessary to search for a passage through the main ridge dividing the waters that flow southward from those which flow to the St. Lawrence. These branches are separated from one another by immense ridges, broad on the top and sloping gently to either side, but thrown upward to a great height so as to leave between them enormous gulfs, in the lowest parts of which the respective branches flow to their junction. The current of these streams is in every case lively—indicating the rapid descent of their valleys and the necessity of a considerable inclination of the railroad in order to surmount the different summits lying at the respective valley-heads. That preliminary reconnoisance of which, now, I am particularly speaking, was confined to an examination and comparison of the Barton and the Willoughby routes; but at a subsequent period, and during the continuance of the field-work, I visited, in turn, every other, that could be supposed to offer any considerable advantages for a location. It may be well to present in one view the results of all my examinations, made at different times, and the reasons for selecting that particular route which was ultimately pursued.

Choice of Routes.

North of the point in the central parts of the town of Lyndon, at which the Passumpsic divides into branches, four routes present themselves for consideration, viz.: The *Eastern Passumpsic route;* the *Willoughby Lake route;* the *Barton route;* and the *Glover route.* In the preliminary comparison of all these, much assistance was derived from the published report of the Canal survey made by De Witt Clinton, Esq., in the year 1825; which fixed definitely the height of the Barton summit—of the Willoughby Lake—of the Clyde river, at certain localities; and of other useful points of reference. In stating the comparative merits of the routes, I shall proceed from east to west, and shall describe, *First:* The *Eastern Passumpsic route.* This would pass up the main branch of the Passumpsic river, through the towns of Burke, East Haven, and Newark, to the beaver meadow lying in the north part of the last named town, at the head of the "Babylon Gulf," a long rocky ravine which goes by that name, and which gives passage to the head waters of the East Passumpsic. From this meadow the line descends about three miles to the Clyde river in the town of Brighton; and then following the valley of the Clyde, passes through Charleston, Salem and Derby, to the Beebe Plain, or to the Stanstead Plain, at the boundary between the United States and Canada. These plains lie at the head of waters that run in opposite directions; and from either of them, as I learn from good authority, the continuance of our line northward to the St. Lawrence river, or even to Montreal, is settled, by an actual reconnoisance, to be practicable.

The lower part of this East Passumpsic route, for twelve or thirteen miles above the junction of the streams in Lyndon, is possessed of the most desirable qualities for a railroad. Some difficulty might be experienced from a sudden bend at the junction, near the house of Mr. David McGaffey; but, from that spot onward, the valley is direct and even, and regularly ascending. Thus far, the expense of grading would be small, and the inclinations uniform and gentle. This character continues to prevail up to the foot of the "Babylon Gulf;" but from that spot onward, for three-fourths of a mile, the stream comes down with such rapidity as demonstrates the impossibility of crossing this summit without an objectionable trade---probably one of over one hundred feet to the mile. At the summit, a level meadow, out of which flows southward the East Passumpsic, interlocks with a pond that discharges northward into the Clyde river; the two being separated only by a ridge of moderate height. This last mentioned stream, in flowing about three miles, from its head pond to its junction with the Clyde in the town of Brighton, appears to fall from 350 to 400 feet. The Clyde river, at the junction in Brighton, being known from Mr. Clinton's minutes, to be not more than about fifty-six feet below the summit of the Barton route, it was evident, (even allowing for inaccuracy of judgment,) that the summit of this Eastern Passumpsic route must lie far above the Barton summit, (probably more than 300 feet.) This consideration alone, especially when we take into view the abrupt rise of ground towards the summit from either the southern or the northern quarter, formed in my judgment a decisive reason against entering upon a minute instrumental examination of the region I had already thus carefully reconnoitred.

Having thus disposed of the foregoing route, to my entire conviction, the next in order, proceeding westerly, was the *Willoughby Lake route.* To follow this, we must return to the centre of the town of Lyndon, and thence—neglecting the East Passumpsic, must go northward up the Middle Passumpsic, towards the town of Burke, as far as Trull's mills in the last named town. Here the Middle Passumpsic turns west of north towards Sutton; while our route, leaving that stream, follows a gulf making north towards the Willoughby Lake. The ascent of this gulf is very rapid. It soon runs out at the top of the southern abutment of the Lake; which abutment, at the lowest place, is over ninety feet above the lake surface, and thirty-six feet more elevated than the Barton summit heretofore named. The line must now avoid the Lake by taking the mountain side which forms the east shore; and, after casting around to the north end of the Lake, will follow down the Willoughby river about one mile; after which taking the valley of a small tributary, it will ascend in a direction east of north to a summit swamp which discharges its waters both southward and northward. The swamp probably, (but this is matter of judgment merely,) lies about 150 feet above the Lake, and about 90 feet higher than the Barton summit. From this swamp the descent is rapid into the Charleston and Brownington swamp, through which the line must pass on its way to Pensioner's pond, in the town of Charleston,—where it would unite with the Eastern route, already described, and, like that, pass through Salem and Derby, to the Beebe Plain, or to the Stanstead Plain.

The foregoing statement has already set forth the prominent defects of the route under consideration. These are,—*First;* that the height of the land to be overcome, both southward and northward of the Lake, is in one instance 36 feet, and in another instance probably 90 feet—higher than the Barton summit. *Secondly;* that the ascent to the south abutment of the Lake and the descent north into the Charleston and Browington swamp, must be made by the use of heavy and long inclinations, more objectionable than any necessarily used upon the Barton route, with which this comes into comparison and competition. This is inferred with certainty from the fact the line from Trull's mills in Burke to the Willoughby Lake, when compared with a line from Trull's mills to the ground north of the Savanna pond, shows a greater ascent to be gained, and a less distance in which to gain it. But, if considered aside from these two objections, this route would possess one distinguishing and valuable property,—that of greater directness and smaller distance than any other. On account of this favorable circumstance it would, in my opinion, be suitable in any future explorations, having reference to the actual location and construction of a railroad, to give this route an accurate instrumental examination; but it was evident that all the purposes of the present preliminary survey could be fulfilled with equal precision, and with greater certainty of immediate success, by following the route next to be named and described.

We have now come to the third route in order, progressing westward, viz:—the *Barton route.* To enter upon this, we must return to Trull's mills upon the Middle Passumpsic, in the town of Burke, and follow up the stream, which there inclines, about 30 degrees west of north, as we go towards Sutton. In approaching the summit, which lies just northwest of the Savanna pond and $6\frac{3}{8}$ miles above Trull's mills, the ground is found to rise at the rate of 50 feet to the mile. On the first running of the line, it was supposed to be practicable to dispose of the entire descent from the Savanna pond to Trull's mills in one inclination, not exceeding 50 feet to the mile. In the actual arrangement of grades however, in the office, I have, at certain points exceeded this inclination, still however keeping within the limit which is considered admissible upon prominent and important works of the same kind in this country. In like manner the descent from the Bean pond, about one mile north of the summit, to the Bellwater pond at Barton, which descent it was intended, at first, to dispose in an uniform inclination, not exceeding 50 feet to the mile, I have found it necessary to dispose somewhat irregularly—so as, in certain reaches, to fall below that degree of inclination, and in other reaches to exceed it—only, however, to an extent not inadmissible in practice.

In continuing the route north from Barton village, the most obvious idea was to run down the Barton river valley, and terminate at some point east of the Memphremagog Lake. With this object in view I explored, in the first instance, a route along the eastern slope of that valley to the east shore of the Lake—expecting, after having reached that point, to coast around on the eastern shore, and assuming the valley of John's brook to terminate at the Beebe Plain. A reconnoisance exhibited this route to be a difficult one, although practicable; for in addition to a rapid descent of the country, (being 236 feet in seven or eight miles,) the entire region exhibits a broken surface, very unfavorable for the bed of a railroad. Subsequently, a second route was examined, passing northeast from Barton village into Brownington, crossing the Willoughby river from half a mile to one mile above the mouth of the Beaver brook, and thence passing through the Charlestown and Brownington swamp, to intersect, near Pensioner's pond in the town of Charleston, our two routes formerly described as there meeting and proceeding onward to the Beebe plain, through Salem and Derby. The crossing of the Willoughby river seemed to present the only obstacle to the success of this route; and this obstacle itself proved, in the end, less serious by far than had been anticipated. The Barton route last described, passing through the towns of Sutton, Sheffield, Barton, Brownington, Charleston, Salem and Derby, and terminating on the Beebe plain, is the one which was finally selected for our instrumental examination.

A fourth route which, it was thought, might claim some attention, was *the Glover route.* This would have left the main Passumpsic at Lyndon Centre,—would have passed up the valley of Miller's run, which there joins the former stream, to the town of Sheffield,—after which it would have pursued a course parallel to the travelled road from Sheffield to Glover, but south and west of it, and having its summit in a hollow about 75 feet lower than the summit of the road,—and thence to the village of Glover, and down the valley of the Barton river. The descent, however, from this summit to Glover village, must, in my judgment, considerably exceed 500 feet; and, if we suppose Glover to have about the elevation of Barton, it would seem that the Glover summit is elevated about 250 feet above the Barton summit. On account of this elevation, as well as from the circumstance that the summit cannot be crossed by grades of less than 100 feet to the mile, this route is decidedly inferior, in the comparison with the Barton route. With these remarks, I conclude all that I design to say on the subject of the preliminary reconnoisance, and of the comparative merits of the rival routes that were inspected.

Field Operations.

Having, therefore, fixed upon the route by way of the middle branch of the Passumpsic,—by way also of Barton, Brownington, Charleston and Derby, as the one which offered the greatest advantages for the particular purposes of this survey, I commenced the field operations, on the second day of June, with two parties at different points. The southern party, which began its operations at the south line of the State, was placed under the direction of Harvey Smith, Esq., Assistant Engineer; while the northern party, under the direction of Elizur Goodrich, Esq., took its point of departure 34 miles farther north at Bellows Falls. On the 17th day of June, Mr. Smith had joined his line to Mr. Goodrich's at Bellows Falls; after which the party under his charge was transferred northward on to the Passumpsic, opposite to St. Johnsbury, with a view to finish the survey of the northern section to Canada, while the other party should be advancing their operations up to St. Johnsbury from the south. This object was accordingly effected; and both divisions of the survey were completed about the 20th of July,—soon after which time both parties were discharged at St. Johnsbury, having surveyed (including double lines,) 209 miles in fifty days.

(To be continued.)

PROCEEDINGS OF THE STOCKHOLDERS OF THE RALEIGH AND GASTON RAILROAD CO.

At a general meeting of the Stockholders of the Raleigh and Gaston Railroad Company, held at the Banking house of the State Bank, on Monday, the 22d of January, 1833, on motion of D. Cameron, Esq., John D. Hawkins, Esq., was called to the Chair, and E. B. Freeman appointed Secretary.

Upon its being ascertained that a majority of the Stock was represented, the meeting proceeded to business.

The Report of the President and Directors, together with that of the Chief Engineer, were submitted, and, on motion of Charles F. Osborne, Esq., ordered to be received and printed, with accompanying documents, under the direction of the President and Directors.

The following resolutions were offered by C. F. Osborne, Esq.:

Resolved, That the President and Directors be instructed to receive such subscriptions of Stock in the Raleigh and Gaston Railroad Company, as may be offered; provided such subscriptions do not in all exceed one million of dollars.

2. *Resolved*, That in the event of the whole amount of the capital not being subscribed, the President and Directors be authorised to negotiate a loan for the deficiency, (convertable or otherwise, as they may think proper.) on such terms as they may deem most advantageous to the interest of the Stockholders; and that they be further empowered to pledge the property of the Company for the guaranty of said loan, and the payment of its interest, and to employ suitable agents.

3. *Resolved*, That the proceedings of the President and Directors, in letting out the remainder of the road to Raleigh, is unanimously approved, and that they be desired to prosecute the work as rapidly as possible, consistently with its durability and the interests of the Stockholders.

4. *Resolved*, That the President and Directors be requested to apply to the next Session of the Legislature of North Carolina for an increase of the Capital Stock of the Company, to the amount of one million and a half of dollars, and for such other aid as they may deem most consistent with the interests of the Stockholders.

5. *Resolved*, as the opinion of the Stockholders, that it is of the greatest importance to the success of this work, that the Road should be extended to Columbia, South Carolina, and that they will use their utmost efforts to insure its extension to the South Carolina line.

6. *Resolved*, That the Report of the Committee appointed to examine the accounts and vouchers of the President, be approved and adopted, and that he be directed to balance the books, pursuant to the recommendations of said Committee.

7. *Resolved*, That in future the annual meeting of the Stockholders be held on the first Monday in June in each and every year.

Which were unanimously adopted.

The meeting then proceeded, on motion of Mr. Osborne, to the election of a President and five Directors. William Boylan and Samuel S. Downey were appointed to superintend the balloting.

The Committee reported that the following persons were elected: Geo. W. Mordecai, President; Duncan Cameron, William Boylan, Joseph W. Hawkins, Charles Manly, and Thomas P. Devereux, Directors.

On motion of Duncan Cameron, Esq., a Committee consisting of Wm. Robards, Wm. Peace, and Alfred Jones, or a majority of them, was appointed to examine the acconnts of the President, and report to the next annual meeting.

On motion of Mr. Garnett, the following resolution was adopted:

That we feel a lively interest in establishing a communication by Railroad with the West, and invite the co-operation of our fellow citizens of Salisbury and the adjacent country, in procuring a charter from the Legislature for that purpose.

The meeting then adjourned.

Report of the President.

In submitting to the Stockholders the following Report of their proceedings since the last annual meeting, the President and Directors deem it not amiss, briefly to advert to the state of affairs and the condition of the work at that time. It will be seen on reference to the Report then made, that the Road had been located as far as Tar River, and the greater part placed under contract. From the severity of the winter, but little work had then been done. As soon, however, as the spring opened, the work was vigorously prosecuted, and we have the satisfaction of stating that, with a single exception, the contractors have thus far complied with their engagements. The grading of 48 miles of the Road is now completed, with the exception of a few hundred yards, and the work executed in a manner highly creditable to the contractors and the engineers entrusted with its supervision. The soil is admirably adapted to the construction of a Railroad; and the cuts are generally free from water. The banks on the first nine miles of the road, from Gaston to Littleton, having been thrown up a sufficient time to become firm, it was thought advisable to lay down the superstructure on this section at once; so, that it is now ready for use as soon as the bridge across the Roanoke shall be completed. On the remaining 38 miles, the timber has all been delivered and dressed, ready to be laid down as soon as the embankments shall have become sufficiently settled, from exposure to the winter's frost.

The bridge at Gaston, which had just been commenced at the last meeting, is now completed within a span and a half, and would have been ready for the cars on the first of January, but for our disappointment in receiving timber which had been contracted for and procured on the lower Roanoke; but, owing to the low water in the river, and the difficulty in obtaining means of transportation, it could not be brought up in time, notwithstanding every effort to do so. This difficulty is now removed, and the bridge will be speedily completed. The iron, which was ordered, has all arrived, and is ready to be laid; and we see no reason why the whole 48 miles should not be ready for transportation by the first of June, though experience has made us somewhat cautious in giving any pledges to the public on this subject.

On the road between Roanoke and Rar River, there are five depots, viz: at Littleton; at Brown's five miles north of Warrenton; at Lampkin's, opposite Warrenton; at Twitty's, and at Henderson, about three miles south of the Chalk Level: all of which, with the water stations and wood houses, are nearly finished.

The land damages have, with one or two exceptions, been liquidated in the counties of Warren and Granville; but in Halifax, though proceedings have been institnted, the difficulty of procuring suitable Commissioners to act, has, as yet, prevented their being adjusted. This has been increased, by the omission in our charter to provide compensation for the services of the Commissioners. We hope, however, they will soon be settled, and that those who, for the purpose of enhancing their damages, have pretended such hostility to this work, will then cease their opposition. In Franklin and Wake, steps will be taken at the ensuing courts to condemn the lands of those with whom we cannot effect compromises.

The line from Tar River to Raleigh has been located. After crossing the river below Chavis' Ford, it runs by Presley Person's, near Winston and Kearney's store, crosses Cedar Creek and the two Brandies, runs through Wake Forest, along by the Baptiste Institute and Alston's store, crosses Neuse River, near Wm. B. Dunn's, thence by Robert Jeffreys', crosses Crabtree about 250 yards below Jones' Bridge, thence crossing the stage road at the Pigeon House, it enters Raleigh in the rear of Thomas P. Devereux's, and terminates at Halifax street, in the ravine between Mr. Devereux's and the Eagle Hotel. For a more particular and minute description of this location, we beg to refer to the detailed Report of the Chief Engineer, which accompanies this. Believing that the interest of the Stockholders would be greatly promoted by the speedy completion of the road to Raleigh, and finding that contracts could be made on more favourable terms at that time than any subsequent period, immediately on the completion of the grading on the first division, it was determined to go on with the work. The whole line to Raleigh is now under contract, and the contractors have commenced operations. This course will, we hope, meet the unanimous approbation of the Stockholders.

It was never contemplated or expected by any one, acquainted with the work, that the sum originally subscribed would be sufficient to complete this undertaking; and it is now evident, that the whole capital of one million will be insufficient for that purpose. It will be necessary, therefore, for the Stockholders, at the present meeting, to adopt some measures for the increase of the capital, to enable us to comply with our contracts.

As the scheme would be incomplete, were we now to stop short, and the value of the Stock be thereby materially affected, we cannot doubt that they will adopt any practicable plan which can be devised for raising the means of carrying on the work. To effect this, three modes have suggested themselves. By the terms of our charter, the original subscribers are first entitled to take the residue of Stock unsubscribed. The first plan then would be, to offer to apportion the remaining Stock among the present solvent Stockholders, according to the amount already held by them. This would, in some instances, operate unjustly and oppressively, as many may have made as large investments in the first instance as their means would enable them to do; besides, we think this could only be done by the unanimous vote and consent of the Stockholders, and it is on that account further objectionable, as it would be difficult, if not impracticable, to obtain this. To comply, however, with the provisions of our charter, the offer can be made to the respective Stockholders, who can then accept or reject it at their option.

The next and most obvious plan, is to re-open books of subscription for filling up the amount unsubscribed. Had the condition of the country continued as prosperous and flourishing, and the facilities for obtaining money as great, as at the commencement of this work, we might calculate with certainty upon the success of this measure, and that the same anxiety to possess our Stock, which characterized our first movements, would be again manifested: for nothing has occurred to diminish our confidence in the ultimate success of the undertaking. But owing to the sudden and unfortunate revulsion which has taken place in the pecuniary affairs of the country, (from causes unnecessary to be here alluded to,) Stocks of every description have undergone a very considerable decline; and, from the difficulty of procuring money, are no longer sought for with the same avidity as formerly. Our largest capitalists find it inconvenient to meet their existing engagements, and those having the command of money have so many opportunities of making investments affording immediate and exorbitant profits, that but few can be found to take Stock in incorporated Companies, however flattering their prospects may be. From these causes we apprehend here may be some difficulty in obtaining subscriptions for the whole remaining Stock. This can, however, be attempted, and in the event of its not succeeding, it is then recommended to the Stockholders to vest the Board of Directors with authority to make a convertible loan or loans, to the amount of the residue of the Capital Stock, and to pledge the property of the Company for the payment thereof. This plan, if sanctioned by the Stockholders, is believed to be more practicable than either of the others; for, while the scarcity of money is so great in the United States, it appears to be abundant in England, and capitalists there are seeking investments far less profitable than this would be. As soon as confidence in American credit shall be restored, which we are pleased to say is daily increasing, and a sufficient portion of our road shall be in operation to afford a guaranty for the loan and the payment of its interest, we have every assurance that it can be effected there, if not in this country, and we are confirmed in this belief by our knowledge of the fact that several Railroad Companies in the United States have already negotiated loans in England to a considerable amount, none of them giving better security than we can offer. We would, therefore, recommend that the President and Directors be instructed, in the first place, to receive additional subscriptions for Stock to an amount, not exceeding in all one million of dollars; and, in the event of the whole not being subscribed, that they be authorised to negotiate loans convertible, or otherwise, as they may think proper, for such sum as may be required to increase the whole capital of the Company to one million of dollars; and, for that purpose, that they be empowered to employ suitable agents. The interest of the Stockholders, regarding them merely as such, the benefit to the country and the whole success of the work demand its extension, and we are therefore satisfied that the Stockholders will adopt any means in their power to effect this.

A line of coaches commenced running between Gaston and Fayetteville during the last spring, and, although the change of times has caused a considerable reduction in the number of travellers, it has received a fair proportion of public patronage. From the experience gained from this, we are satisfied that the want of facilities is the only obstacle to the diversion of the greater part of the southern travel along this route. These will be greatly increased by the completion of our road to Raleigh, and if two good lines of coaches shall then be established, the one leading south to Columbia and Augusta, and the other, westwardly to Salisbury, there to connect with the Tennessee and Piedmont lines, we have little doubt that the principal part of the southern and western travel will find its way to this road. It may not be irrelevant or improper here, to draw a comparison between the present travelled routes from the south and southwest to Baltimore, shewing the difference in the distance by them respectively. Taking Milledgeville, Geo., as the starting point, the distance from that place to Baltimore, by the Piedmont, the most direct route, is 692 miles —the whole of which journey, as far as Potomac Creed, is performed in coaches. The distance from Milledgeville, via. Augusta, Columbia, Fayetteville, via. Charleston, Wilmington, Halifax, Portsmouth, &c., to Baltimore, is 862 miles, being 170 miles greater than by the Piedmont or nearest, and 151 miles than by the road via. Raleigh. Should the contemplated scheme of connecting Raleigh with Columbia and Augusta, by Railroad, be carried into effect, which we are satisfied must be done in the course of a few years, it will place this route beyond competition; and the Stock of our road must become as valuable as any in the Union.

In the prosecution of this, and pursuant to the authority given by the Stockholders at their last meeting, a reconnoisance of the route from Raleigh to Columbia was made by the Chief Engineer of this Company, whose highly satisfactory report shows that a very favourable route may be obtained. Books of subscriptipn for Stock in the Raleigh and Columbia road were opened during the past year, and a large amount subscribed—the greater part in the city of Raleigh—but not sufficient to secure the charter. As we still regard the construction of this road of vital importance to the success of our own, it is thought proper to bring it again before the Stockholders that such measures may be adopted by them as they may deem advisable.

Whenever this road shall be commenced, we are assured that the Legislature of South Carolina will, with their accustomed liberality and spirit of enterprise, incorporate a Company for the further extension of the Road to Columbia; and, we learn, that the Charleston and Cincinnati Road has been located with a view to that connexion. We are still of opinion that the route originally contemplated through the Counties of Chatham, Moore and Richmond, is the proper direction for this Road, both as regards the directness of the communication, for the accommodation of the Northern and Southern travel, and the probability of its ultimate extension Westwardly, so as to connect us with Salisbury and the whole Western section of the State; for we cannot yet abandon the hope, that the citizens of this fertile section of our State, cut off as they are from all facilities for transportation to market for their varied and valuable products, will, ere long, find it to their interest to unite with us in accomplishing this object, so desirable to themselves, and tending so manifestly to the improvement of the internal condition of our State, and the developement of its various resources. Ours appears to us now, the only feasible scheme; and although, heretofore, disappointed in our expectation of interesting them in our project, we are still disposed to extend to them the hand of good fellowship, and will most cheerfully unite in procuring for them at least one good outlet for their produce. This we shall be enabled to do, by diverging at Haywood, or some other suitable point in the county of Chatham, extending thence Westwardly, along the borders of Randolph and Guilford, to the Yadkin, whence, if desirable, it can be continued so as to intersect the Charleston and Cincinnati Road at some favorable point within the State.

Since the last Annual Meeting, the heavy expenditures incident to a work of this magnitude, and the rapidity of its progress, have compelled us to call largely upon the Stockholders for contributions. Instalments of *ten per cent.* have been required to be paid on the first days of March, July, October, December, January and February, which, together with the amount previously paid, have produced up to the first of January, 1838, the sum of $406,126 85.

Although the difficulties of the past year have caused some little delay in the collections, and produced some failures among the Stockholders, yet upon the whole, we believe the payments have been generally made with more punctuality than to any other Road now progressing. To relieve the Stockholders, as far as possible, at a season when the pressure was greatest, a loan was made from the Bank of the State, to whom the Company is now indebted in the sum of $70,000, which is to be provided for and refunded out of the Instalments now due, unless some other arrangement is made by the Stockholders.

A detailed statement of our Receipts and Disbursements will be found appended to this Report, to which we beg to refer. The accounts and vouchers have been examined by the Committee appointed for that purpose, whose Report is herewith submitted.

By order of the Board of Directors,
GEO. W. MORDECAI, Prest.

COMMON SCHOOLS IN PRUSSIA.

Here we have a charming portrait of a benevolent monarch—a philanthropist clothed with the prerogatives of an absolute throne, and exercising them all for the advancement of society, and the good of his race. We copy it from Professor Stowe's recent "Report on Elementary Public Instruction in Europe," to the Ohio Legislature, by which he was commissioned. It is an interesting pamphlet of some 60 pages, and we shall draw copiously from it hereafter.—*Newark Daily Adv.*

When Frederick William III. ascended the throne of Prussia in 1797, the condition of the people was in many respects truly deplorable. But immediately upon his accession, he set about reforming abuses, and introducing improvements. The odious religious edict was abolished—the administration of justice was thoroughly reformed, and rigid economy introduced into the royal household. The exclusive privileges of the nobles were taken away, and their power so completely broken, that there is now no hereditary aristocracy which can interfere with the sovereign, or oppress the people.

In 1810 the peasantry, who before had no ownership in the soil which they cultivated, and consequently no independence of character, by royal decree became freeholders on the following terms, viz: those who held their lands on perpetual lease by giving up one third, and those who held them on limited or life leases, by giving up one half to the landlord became the owners in fee simple of the rest. The military is now so modelled that every citizen between the age of 18 and 21, is in actual service in the standing army, where he is instructed in all that pertains to the military life, and then returns to his peaceful occupations. Thus the army is made up entirely of citizens—and every citizen is a soldier; and there is no such thing as a standing army at the entire devotion of the sovereign, and independent of the people.

The prime minister, Hardenberg, in a circular published at the time when these reformers were in process, declares, that "the system is based upon the principle, that every subject, personally free, be able to raise himself, and develope his powers freely, without let or hindrance from any other; that the public burdens be borne in common and in just proportions; that equality before the law, be secured to every subject; that justice be rigidly and punctually administered; that merit in whatever rank it may be found, be enabled to rise without obstacle; that the government be carried on with unity, order, and power; that, by education of the people, and the spread of true religion, the general interests, and a national spirit be promoted, as the only secure basis of a national welfare.

Another European king of Roman Catholic faith, Louis of Bavaria, who is connected by marriage with the royal house of Prussia, moved by this example, and excited by emulation in behalf both of his church and kingdom, is now zealously pushing forward the same experiment among his people, and already the Bavarian schools begin to rival the Prussian; and the University of Berlin finds its only equal in that of Munich. Louis has in one thing gone even beyond his brother of Prussia, in that he has granted to his people a real constitutional representation in the government, a privilege and a right which the Prussians, have labored in vain to extort from Frederick William.

Even the Autocrat, Nicholas of Russia, (married a daughter of the Prussian monarch, who inherits much of her father's spirit,) has been induced to commence a similar system throughout his vast dominions; and from the reports to the Emperor of M. d'Ouvaroff, the Russian minister of public instruction, it appears that already from Poland to Siberia, and from the White Sea to the regions beyond the Caucasus, including the provinces so recently wrested from Persia, there are the beginnings of a complete system of common school instruction for the whole people, to be carried into full execution as fast as it is possible to be carried into full execution, and to provide the requisite number of qualified teachers.

Thus three sovereigns, representing the three great divisions of Christendom, the Protestant, the Romish, and the Greek, are now zealously engaged in doing what despotic sovereigns have seldom done before—enlightening and educating their people; and that too with better plans of instruction, and a more efficient accomplishment in practice than the world has ever before witnessed. Nor is the spirit of education confined to these nations. The kingdom of Wirtemberg, and the grand duchy of Baden, are not behind Prussia or Bavaria. The smaller states of Germany, and even old Austria, are pushing forward in the same career; France is all awake; Spain and Italy are begining to open their eyes; the government of England—which has hitherto neglected the education of the common people more than any other protestant country of Europe—is begining to bestir itself; and even the Sultan of Turkey, and the Pacha of Egypt, are looking around for well qualified teachers to go among their people. In London and Paris, I saw Turks, Arabs, and Greeks, who had been sent by their respective governments to these cities for the express purpose of being educated for teachers in their native countries, if not for the whole people, at least for the favored few. At Constantinople a society has been formed for the promotion of useful knowledge, which publishes a monthly journal edited by one of the Turks who studied in Paris; and the Sultan now employs a French teacher in his capital whom he especially invited from France. And here too in our own country, in the movements of New England, New York, Pennsylvania, Ohio, Michigan, and several other of the States, we are strongly reminded of the educational zeal of the age.

And in short the whole world seems to be awake and combining in one simultaneous effort for the spread of education; and sad indeed will be the condition of that community which lags behind the universal march.

The sovereigns to whom I have alluded, are not only educating the people, but they are laying aside the pomp, the trappings, and the lavish expenses of royalty, and by simplicity, by rigid economy, by an energitic and impartial administration of the government, are endeavoring to establish their thrones in the hearts of their people.

Frederick William, in his dress, appearance and whole deportment, is as simple and unostentatious as an Ohio farmer; and few of our wealthy merchants ride in so plain a carriage, or sleep on so homely a bed, as the monarch of Prussia. After witnessing the pageantry, the pomp and ostentation of the limited monarchy of England, one is astonished at the rigid simplicity of the great military despotism of central Europe.

In every stage of instruction it is made a prominent object, and one which is repeatedly and strenuously insisted on in all the laws pertaining to education, to awaken a *national spirit*—to create in the youthful mind, a warm attachment to his native land, and its institutions; and to fix in his affections a decided preference for the peculiarities of his own country.

INTERNAL IMPROVEMENTS.

The following is a brief synopsis of the most important proceedings of the

Board, in relation to the ensuing six months operations.

1st. On the Central Railroad. From Cairo northerly 20 miles. From the Illinois, where the Central Railroad crosses the same, 11 miles northerly, and 11 miles southerly, making 22; and from Galena southerly 20 miles, making in the whole on the Central Railroad, 62 miles.

2d. On the Alton and Shawneetown Railroad. From Shawneetown to Equality, 12 miles.

3d. On the Alton and Mount Carmel Railroad. From Alton to the diverging point of the Mount Carmel and Shawneetown Railroads at or near Edwardsville, 15 miles. From Mount Carmel to Albion, 18 miles.

4th. On the Alton, Shelbyville and Paris Railroad. From Alton, via Upper Alton, north-easterly 10 miles. From the State line, westwardly to Paris, 18 miles.

5th. On the Northern Cross Railroad. From Quincy to Columbia, in Adams county, 15 miles. From Danville westwardly, 18 miles. Sixty-four miles between these points have been heretofore let, making in the whole on this route 97 miles.

6th. On the Peoria and Warsaw Railroad. From Peoria west, 12 miles, and from Warsaw east, 12 miles.

7th. On the Pekin and Bloomington Railroad. From Pekin to Bloomington, previously let, 10 miles. Making in all 266 miles, of which as is shown, the Northern Cross Railroad has 97.—*Van. Free Press.*

WINCHESTER AND POTOMAC RAILROAD.

An act has passed the House of Delegates by a large majority, authorising a loan of one hundred and fifty thousand dollars, to be applied to the payment of the debts of the Winchester and Potomac Railroad Company. The Whig says the bill was handsomely and energetically supported by Messrs. Venable, Murdaugh, and Sherrard, and opposed by Mr. Smith, of the Isle of Wight. The opposition of Mr. Smith was not to the object of relief, but to the manner of raising the funds.

The Whig also remarks that the exhibits and prospects of the Company were cheering, and proved that the work well deserved the fostering care of the Commonwealth.

Since this road has been completed, there has not been raised in the Valley, nor in other parts of the country whose produce finds a market here, one crop of our great staple which might be said to approach an average; nearly every road from this place, in every direction, is almost impassable at some seasons of the year, and never in good travelling condition; and yet, with all these obstacles to contend with, the Company has done a respectable business. There can now be no doubt, even with the most sceptical, that should the Legislature adopt a liberal system for improving the thoroughfares of the Valley, and our farmers should be favoured with average crops, the investments in the stock of this road will yield a profit second to none in the state. —*Winchester Republican.*

UTICA AND SYRACUSE RAIL ROAD.

We learn from Syracuse, that the directors of this important improvement have commenced the construction of the road. The route is uncommonly favorable. There are but four sections upon the road, requiring any considerable labor or expense in the excavation and grading. These have all been contracted on very favourable terms. The bridges have all been contracted, and also the superstructure, at favourable prices, and to good contractors. The company have obtained title to about three fourths of the land required, either by purchase or by donation.

A careful estimate of the cost of the road, made since these contracts have been entered into, produces a cost of about $600,000. It is supposed that it may be completed during the summer of 1839. When completed, it will run in connection with the Utica and Schenectady Railroad.—*American Adv.*

SPEED OF THE THAMES STEAMERS.

It is a fact, not more strange than true, that, while Dr. Lardner and his opponents on the question of the navigation of the Atlantic by steam, have been disputing as to the rate of speed attained by the American steamers on the Hudson—the one party asserting that they reached sixteen miles an hour; and the other, more than doubting the practicability of the feat—a reference close home would have settled the dispute, without the necessity of sifting the veracity of people some thousands of miles off. Dr. Lardner, after treating the assertion as a Munchausenism, observed that, even if it were true, it would prove nothing to the point, as the Hudson steamers are, of course, exclusively river going vessels. But what could he have said to the fact, that at the very time he was so dogmatically laying down the law at the British Association meeting, some of our half-river and half sea-going Margate steamers were performing the distance between London Bridge and Margate Pier, at least *eighty miles*, in very little more than *five hours?* Yet no one was found to supersede the debate about the Hudson steamers, by referring to those of the Thames! Truly, as the eastern proverb has it—"There is darkness under the lamp!"

ST. PETERSBURG AND ZARSKOJESELO RAILWAY.

The first public trial of the iron railroad to Zorskojeselo was made Oct. 7. It was five wersts in length, and begins in the midst of the city, near the church and parade of the Semenow Regiment of the Guards. The price of 2½ rubles for seats in the first and second carriages is considered to be much too high for such a short distance. A private trial of the two engines lately received from England was made on Tuesday. Though but a short notice was given and only to the police, many thousand persons had collected to see this novel sight. Many persons crossed themselves at the sight of these gigantic machines, as if they had been demons.—*Hamburgh paper.*

BALTIMORE, WILMINGTON AND PHILADELPHIA RAILROAD.

The Wilmington Journal says—"We learn that articles of union were agreed upon and executed yesterday, between the Wilmington and Susquehanna Railroad Company, the Baltimore and Port Deposite Railroad Company, and the Philadelphia, Wilmington and Baltimore Railroad Company—the three roads extending from Philadelphia to Baltimore—by virtue of which they have become one corporation, under the name of the Philadelphia, Wilmington and Baltimore Railroad Company."

LAKE ERIE.

The number of ships, brigs, &c., navigating the waters of Lake Erie, is 300, of steamboats 42, and of canal-boats 256. On board of these vessels, 5,152 men are employed.—*Ohio Adv.*

It is said that 50,000 persons are employed on the navigation of the Mississippi and Ohio, working 638 steamboats, and 6000 flat and keel boats.

Steam navigation has greatly altered the nature of the cattle trade in Scotland. All the superfluous fat cattle and sheep which used to spend weeks on the hot and dusty roads, are now transported, in the course of a few hours, to the metropolitan market.

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

⁂ Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

AGENCY.

The Subscriber offers his services as Agent, to procure *Machinery for Mills, Steam Engines, Locomotives, Printing Machines, Presses, Types and Fixtures.*

He will give prompt attention to all orders entrusted to him for execution; and pledges himself to those who may employ him, that no effort on his part shall be wanting to procure the best articles to be had in the city—and to give satisfaction.

He will also employ Millwrights and Engineers, to erect Mills, and put the Engines and Machinery in operation.

Orders accompanied with the necessary funds, or satisfactory city acceptances, should be addressed to D. K. MINOR, 30 Wall-st. N.Y.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS Mc NEILL,
Chief Engineer.

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.; Atlas, Boston; Philadelphia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment.

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. caststeel Shovels & Spades
150 do. do. Gold-mining Shovels
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
Fo. 8 State-street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY, Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR.
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N.Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his preseet engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG,
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street,
NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Istruments made to order and repaired.
1y—14

RAILWAY IRON, LOCOMOTIVES, &c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars; with conntersunk holes and mitred joints,

350 tons	2 by		, 15 ft in length,	weighing		$4\frac{62}{100}$	lbs per
280 "	2 "	$\frac{1}{2}$,	"	"	"	$3\frac{50}{100}$	"
70 "	$1\frac{1}{2}$ "	$\frac{1}{2}$,	"	"	"	$2\frac{1}{2}$	"
80 "	$1\frac{1}{4}$ "	$\frac{1}{4}$,	"	"	"	$1\frac{25}{100}$	"
90 "	1 "	$\frac{1}{4}$,	"	"	"	$\frac{7}{8}$	"

witn Spikes and Splicing Plates adapted thereto To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, and $3\frac{3}{4}$ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEW YORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having conntersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN
RAILROAD JOURNAL,
AND
ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, NOVEMBER 11, 1837. (Published February 22, 1838) VOLUME VI.—No. 45.

CONTENTS.

NEW-YORK, FEBRUARY 22, 1838.

REPORT ON THE SURVEY OF THE VALLEY RAILROAD.

(Continued from p. 619.)

Description of the Line of Survey.

Commencing at the boundary of Massachusetts and Vermont, fifty rods west of Connecticut river, and at an elevation of 81 feet above low water, our line rests upon the surface of the first table for four miles and a quarter, when we reach the village of Vernon. In this distance several deep ravines must be encountered. At Vernon village the line deviates, first westward, and in passing the village, again eastward—copying the sudden winding of the Connecticut, at this place. After running upon the steep declivities and across the low grounds just north of Vernon, we ascend again upon the first table, and pass just west of the dwelling of the late Governor Hunt. As this table fails us, one mile and a half farther north, we are obliged afterward to descend, along the side slope which bounds the table, down upon the low grounds adjoining the river; and upon this low level our line is arranged quite to the town of Brattleboro'. In the distance thus far reviewed, two large streams will require bridges—the Salmon brook at Vernon, and Broad brook nearly two miles and a half south of Brattleboro'.

At Brattleboro', the construction will be expensive. Here the line, after crossing on a level the street leading to Brattleboro' bridge, at a point westward, a few rods of the bridge, passes the mouth of Whetstone brook, with an elevation of 25 feet above its bed; and, for 600 feet, continues in the deep water of the river, although out of its current. Here will be an embankment of 30 feet high, protected on the outer slope by a crating of stone and loose rocks brought from the opposite mountain. The projecting sandy point, north of the cove, occasions a deep cut, which will furnish ample material for our embankment. About one mile north of the village, our line will cross the mouth of West river by a single span of 150 feet.

Through the towns of Dummerston and Putney, we keep every where near to the river—sometimes upon the narrow flats, and sometimes upon the steep hillslopes. Besides crossing a second "Salmon brook," and other small streams, the Canoe brook, which occurs in Dummerston at the bend of the river, presents in its north bank a formidable sliding hill of clay; and, still north of that, our railroad will require protection against the current and the floating ice and driftwood of the river. Through both these towns, but especially through Putney, the abrupt character of the river-banks compels us to follow all the windings of the stream, and often with curves of a small radius—in one instance, of 550 feet. At the sudden bend, one mile and a half south of Westmoreland bridge, we are compelled to cross the projecting high table with a deep cut; and again, immediately north of the table, to cross extensive low grounds with a high embankment. In these towns four considerable brooks must be crossed, viz: Salmon, Canoe, and two Underwood brooks, so called.

Through Westminster we meet a succession of side hill and of meadow, with an absence of high table land. Just as we approach the borders of this town, the extensive Putney Flats give an opportunity for a straight line one mile long, and very cheaply made. This is soon followed, however, for a considerable distance (one half mile) by sliding banks of clay; after which we enter upon the flats south of Westminster. In passing this last named place, we are compelled to make around at the foot of the high table upon which the settlement is situated, and which not only rises abruptly before us, but also falls off again suddenly upon the flats to the north of the town.

At Bellows Falls, in the south part of the town of Rockingham, the land rises rapidly by an amount equal to the fall of the stream—or between 50 and 60 feet. Between the North Westmister Flats, however, and this place, there is interposed, very favorably, a succession of tables, into the surfaces of which we are able successively to ascend, and to conduct the railroad into the village, with an inclination of no more than 45 feet to the mile. Even this, however, is a higher inclination than any which must necessarily have place south of that village; or, I may add, north of it, as far as Fairlee. The crossing of Saxton's river, south of the village, and just south also of the town line, cannot be effected without a bridge elevated 50 feet above the stream; consisting, however, of no more than a single span, and estimated accordingly, at $5,200. Through the village of Bellows Falls, two lines were tried—one on the plain behind the main village, and the other upon the river bank and along the main street. The former line is the more direct of the two; but the latter is the least expensive. Two lines were also run at the mouth of Williams river, in the same town—one crossing the stream considerably above its mouth; then crossing the flats in a direct line, and ascending upon the table land beyond with a deep cut;—the other crossing the river at its mouth, and maintaining a course upon the alluvial swell immediately adjoining the river. My estimate has been based upon the latter line, as involving the least expense, by reason of its avoiding both the low flats, which are, at times, deeply flooded, and the high table beyond, with its necessarily deep cut. The bridge at Williams river has been estimated upon the idea of one span of 100 feet—the road-way to be elevated 25 feet above the bed of the stream.

It would be superfluous to detail with minuteness the arrangement of our line through the towns of Springfield and Weathersfield. The bridge over Black river in the first named town, will consist of two spans of 100 feet each—the roadway being elevated 25 feet above the bed of the channel. In Weathersfield, the circuit of the river which forms what is called "the Bow," was avoided by ascending upon the first table above the flats and continuing across, in a line nearly direct, and at a long distance from the river. Between the residence of Consul Jarvis and the Claremont bridge, we find some ground broken by ravines, and must lay the line upon the side hill. The hill slopes, however, are not sliding.

Through the township of Windsor, the ground was generally favorable. Our line, in passing the village, was run upon the meadows to the east of it. In less than two miles north of this, we encounter the sliding sand banks called "the Hour Glass." Opposite these, the railroad, for eighty rods, must be constructed by an embankment in the edge of the river, protected by a slope wall through the entire distance.

One mile and a half still farther north, in the town of Hartland, just south of Sumner's bridge, a difficulty of some magnitude must be encountered. At this place, Hart's island divides the stream into two courses. The current upon the Vermont side, as it comes down past Sumner's bridge, turns abruptly west; while at the same spot, the table land which forms the river bank, projects out towards the east, with a corresponding bend, and interposes its bulk directly in the way of a line coming up along the bluffs of the river bank, opposite Hart's island. This projecting table is too high to be passable, except at the expense of an enormous cut. On the other hand, by crossing the Vermont channel on to the south end of the island—then continuing upon the island and recrossing at its north end, we may gain by a very gentle curve the steep bank of the river at the Vermont end of Sumner's bridge. This mode of meeting the difficulty was preferred without hesitation, although it requires two bridges of long spans in crossing to the island and recrossing to the Vermont bank.

Through the remaining part of the town of Hartland, as well as the towns of Hartford, Norwich and Thetford, there is little to distinguish the character of the route; which proceeds in turn upon flats and side slopes, and, in Hartford, often upon rocky bluffs. Three considerable streams occur in that distance—the Queeche, the White and the Ompompanoosuc rivers, besides smaller streams, as for instance, Blood and Broad brooks. In the middle of the town last named, opposite Johnson's island, there will be required an amount of rock excavation unusual upon this line; and, at one projecting point still north of that island, a short distance (400 feet) will present a rock cut of 25 feet in depth. Above Hanover bridge, the route becomes more level; although possessing the general features already mentioned.

After entering Fairlee, and crossing the brook that comes from Fairlee pond, we ascend the Fairlee plain and soon reach Sawyer's mountain. This may be passed without embarrassment above the road, upon the loose rock at the mountain base. We now leave the river, which bears off to the east, and follow up the plain—keeping near the travelled road; and having between us and the river the isolated mountain which occasions the bend until we strike again the stream, one-third of a mile north of the line between Fairlee and Bradford. In passing Bradford, we leave the village one half mile to the west; and, crossing Wait's river near the mouth, by a span of 150 feet, we find for the most part, a flat and favorable base for our road, interrupted only by a single bluff of rocks about one mile and a half north of Wait's river.

In approaching the town of Newbury, an attempt was made to shun the low meadows in its vicinity, by commencing a grade at Col. Chamberlain's, near the Haverhill bridge, and gaining the table land on which Newbury is situated. After this we could, it was thought, by running back of the village and along the mountain slope, descend upon the "Cow meadow," which puts in behind the village. But the table land was found elevated to 91 feet above the river; and the mountain slope is, besides, exceedingly steep and rocky, so that this attempt was abandoned. We therefore continued awhile upon the meadows, which are, in general, sufficiently elevated without high embanking; but which are notwithstanding, in certain parts overflowed ten feet deep, and for short distances, fifteen feet deep, by the freshets. Our grade, however, is every where so arranged as to be above the highest water; and heavy embankments may be avoided by the employment of trestles. Immediately upon passing the village, and just south of Mr. Hazleton's house, we cut through the ridge upon which the road now runs, and thus come upon the flat surface of the "Cow meadow." Two miles north of the village, the rock which is known as "Ingalls' Point," juts out abruptly into the river, with a deep cove above it. I have here arranged the line with a view to pass directly through the rock by a tunnel 338 feet long The tunnel, at its north extremity, will leave the hill at a point west of the road. After this we shall occupy the present road for 24 rods, and, on leaving that, take the meadow.

Near the boundary between this town and Ryegate, occurs a difficulty as serious as any we have hitherto met. The spot at which it occurs, lies in the south part of Ryegate, and is called "the Narrows." Here the river bank is high and rocky, and too much indented by bays and windings, to permit a passage along the shore. At the same time the table which constitutes the shore, is elevated to the height of 140 feet. The travelled road now passes through this table in a gulley made by waters that fall into the Wells' river; but although this gully may be made, in part, available for the bed of our proposed improvement, it is, for the most part, too circuitous to be thus used. Unless, therefore, we cross the river, (which is of doubtful expediency) it will be necessary, for a distance of 20 rods, to cut 80 feet deep, besides other deep cutting—or (what is more expedient) to tunnel underneath the table for 475 feet. Upon the idea of this tunnel I have based my estimate at this locality, which it will be seen hereafter, amounts to $26,000.

Excepting for a moderate distance, where the bank is steep, and, in part, sliding, and where a slope piling must be resorted to in the manner already mentioned, no farther difficulty was experienced up to Dodge's Falls in Ryegate. Here it becomes necessary to rise rapidly in order to gain the level and high table land to the west, for the purpose both of avoiding the circuit of the river and of shunning McIndoe's Falls in Barnet, which it is impossible to pass with a lower level, if continuing upon the Vermont side. A grade of 53 feet to the mile, ascending for 200 rods, enables us to command this plain; and, after passing McIndoe's Falls, we are able to descend again upon the low grounds beyond, with a short, similar grade. In passing Baird's Falls, south of Steven's Village, the rocky hill at that place will occasion only a moderate expense; after which we may keep upon ground generally level, nearly to the entrance of the Passumpsic valley.

At the mouth of the Passumpsic, the western bank, both of that river and of the Connecticut, are irregular, precipitous and rocky. It will be necessary, in psssing one of the projecting cliffs, to use a curve of the smallest radius I have admitted any where upon the route—that is of 550 feet. But after having left the Connecticut and arrived in the Passumpsic valley, the character of our line experiences some changes, when compared with that in the other valley. We no longer meet with the high tables, presenting steep side slopes, and crowding the railroad into the stream; nor do we, at least above McLeran's dam, encounter, except in a single instance, (that of Lyndon Falls) any high mountain ledges. We are more generally upon the river flats, or upon ground either moderately sloping, or of no great elevation above the stream. On the other hand, however, we are compelled to resort to frequent crossings of the stream; and our line in this, as it had been in the Connecticut valley, is winding, and sometimes with curves of a small radius. Between McLeran's dam and St. Johnsbury village, our line was laid across the stream six times. Between the place last mentioned and Trull's mills, eighteen miles above, there are also four crossings of the main Passumpsic, and seven crossings of its branches. In this distance there occurs no extraordinary difficulty. The Lyndon Falls, which, in a distance of two miles—that is, from above Cahoon's to the foot of Allen's dam—descend 101 feet, can be surmounted without a remarkable expense, by using a timber construction, with occasional walls, and by a grade of 50 feet to the mile.

We have now advanced our line up to Trull's mills in the town of Burke; whence, as was formerly mentioned, it deviates westward in its course to Barton. From Trull's mills to the summit, is nearly six miles and a half; and the elevation of the summit is 1043 feet above low water in the Connecticut, at the south line of the State, and about 1215 feet above the mean level of the ocean. In approaching the summit, and also after having passed it, I have arranged the grade at 80 feet to the mile for nearly three miles in all. These grades, however, I am satisfied, upon reflection, might be moderated, in the actual location, and perhaps reduced to 66 feet to the mile. The reduction must be expected to involve additional expense. In approaching the summit, a cut will also be made that will drain the shallow waters of the Savanna Pond. Our line continues northward from the summit—sometimes in the valley and sometimes on the mountain slope—to the village of Barton, where the outlet of Bellwater Pond was crossed, to gain the east slope of the Barton river valley. In the descent from the summit to Barton village, although rough ground is found occasionally, no prominent obstacle will be encountered.

It has been mentioned in a former part of this report, that our line turns northeast from Barton towards Brownington and Charleston. In following this course, it becomes necessary to ascend at first with a gentle inclination, for one and a half miles, and afterwards, for more than a mile, with an inclination of 75 feet—as at present arranged—to gain the height of 122 feet above Barton village, at a point nearly one half mile northeast from Mr. Jonathan Robinson's house. After this, no considerable inclination occurs for twelves miles, to Charleston. By taking this course, we avoid the broken slope of the Barton river valley, and come upon favorable ground. It is not necessary to enter into any details respecting the line from Robinson's house to Pensioner's pond in Charleston. The only point worthy of special notice is the crossing of the Willoughby river. This rapid stream, running between high banks, will be spanned by a bridge 66 feet high above the stream, and consisting of two reaches—each 165 feet long. Soon after this, our line finds a very even surface to rest upon in the Brownington and Charleston swamp.

The slope of the hollow, west of Charleston, upon which we commence descending towards the Clyde river and the Salem pond, is exceedingly broken and channelled by ravines and irregular gravel ridges; but after striking the valley of the Clyde, no impediment occurs till we reach Lunge brook in the town of Salem, where there is a broad valley to be crossed with an embankment; or, more economically, by a trestle work. The descent from Pensioner's pond to the outlet of Salem pond is disposed in easy grades—excepting one of 59 feet for two and a half miles from the causeway at the head of the Charleston hollow. But before passing Dodge's hill in Derby, and for one mile and a half before reaching John's brook, the country descends with great rapidity. The fall to Beebe Plain is disposed with difficulty even into grades of 55 and 69 feet, extending together one mile and a half. In crossing on to this Plain, a tributary of the John's brook, interposes a broad gulf, 70 feet below our grade at the deepest; which I propose to cross by means of a trestle bridge, bearing upon their walls, which cannot settle, raised to a certain height above the bottom of the gulf, and secured by being embedded in an embankment.

It has been already mentioned that the line meets the Canada boundary upon this plain; and that the plain forms the height of land between waters running in opposite directions; from which height there has been found by actual reconnoisance an easy route to the St. Francis lake, or, if preferred, to the city of Montreal.

Thus I have attempted a description of our surveyed line as particular as these limits allow, and sufficiently full, I trust, to have embodied the prominent features of the route and all its points of principal interest or difficulty. For more detailed information concerning the expense of the whole line, or of distinct portions of the line, as well as concerning the curvatures, grades and other circumstances pertaining to the route, I refer to the parts of this report which yet remain.

General Observations.

The entire length of the route from Massachusetts to Canada is found to be 191 83-100 miles. Its general character, so far as relates to the formation of the ground, is expensive; but this is counterbalanced by other natural advantages,—so that the entire line (as the estimate will show) may be made at a moderate expense by the mile. In respect of directness, the line embraces a large portion of curved lines. The curvatures are generally moderate. It will be seen, in the table given below, that a small portion—two miles only, in all—is arranged in curves turned upon a radius less than 750 feet, and from that to 550 feet, which is our smallest radius. In respect of inclination the parts below St. Johnsbury are more favorable than the parts above. From Well's river down to the south line of the State, grades of 45 and 50 feet occur in two instances only; once at Bellows Falls, and once, south of Fairlee plain. Between Wells' river and St. Johnsbury, grades of a trifle more than 50 feet have been resorted to in several instances. Above St. Johnsbury grades still more inclined occur at certain places. The table of grades given below exhibits the arrangements of the line upon which my estimate is founded. I do not consider that table a fair exhibition of the best possible arrangement upon the ground as it lies; because I am confident that more extended examination would develope lines superior, in this respect to my own lines, although probably more expensive. It may fairly be considered, however, that the ground above St. Johnbury will not admit of a location embracing no grades as high as 66 feet to the mile. The table, however, as it stands, does not include any grade that is inadmissible in practice—although higher for short distances than would be esteemed perfectly free from inconvenience. The two tables that follow will explain their own object.

TABLE I,

Showing the aggregate length of grades as arranged for the estimate.

Inclination, ft. per. mile.	Miles ascending north.	M's. descending north.	Total miles.
Level.	::::::::	::::::::	80,98
0 to 10	5,59	1,50	7,09
10 " 20	9,79	3,19	12,98
20 " 30	20,10	14,59	34,69
30 " 40	16,31	10,95	27,26
40 " 50	3,45	1,95	5,40
50 " 60	7,65	7,61	15,26
60 " 70	1,72	2,17	3,89
70 " 80*	2,74	1,54	4,28
* May probably be reduced.		Total	191,83

TABLE II.

Showing the aggregate of different curves.

550 feet radius.	0,30 miles.
600 " "	0,90 "
650 " "	0,58 "
700 " "	0,28 "
750 " "	2,83 "
800 to 900	4,17 "
900 to 1000	3,77 "
above 1000 and straight lines.	179,00 "
Total	191,83 "

Before entering upon the subject of the actual expense of the contemplated improvement, it is necessary to state the exact plan with reference to which the calculations have been made. This being done, it will be possible for such as are versed in subjects of this kind to form their own judgment respecting the expense of the construction made upon any plan different from the particular one which has been made the basis of these calculations.

I remark, therefore, that I have adopted the contemplated plan of improvement to the condition of the valley which is to be benefitted by it. This is a widely extended and fertile region, abounding in water power and the means of abundant produce,—but now ill supplied with communication to market. The great point to be aimed at is to open an outlet to the sea-board, as well as one susceptible also of being extended by the inhabitants of Canada to the St. Lawrence, and, if desired, to Montreal. For this purpose it is not essential to adopt a very expensive plan of improvement. On the contrary, as the character of a considerable part of the country interested is new, it is obviously essential that we avail ourselves of the natural advantages of such a region, so as to make the best use of the materials to be procured on the spot. I have therefore aimed specifically at two things: In the first place, to make the plan *substantial* in its character, and sufficiently durable to subsist in its first form for a period of years—say eight or ten years,—after which the perishable parts may be renewed or changed at pleasure. In the second place, I have aimed at the very cheapest plan consistent with such an object. The following distinct specifications will give a complete view of the manner in which I propose to accomplish and unite these objects.

First: I propose a single track, both for grading and superstructure. The embankment surface is to be fourteen feet wide on the top, and the excavations eighteen feet wide on the bottom,—a width sufficient to give space for drainage at the sides. It is contemplated to construct at certain distances—say at each fifteen miles—portions of a double track, half a mile in length, with turnouts at each end. By such a duplication of the track, at particular locations, the capacity of a single railway for transportation may be enlarged at a moderate cost. This of course should be done at places where the grading would be easiest. Other mere passing places are to be supplied at suitable intervals.

Second: I have contemplated, not only for the superstructure and the smaller bridges, but in other ways, a free use of the timber which is abundant along the track,—such as chestnut, pine, tamarac, spruce and cedar, and in certain situations, hemlock. Thus in running along the steep side slopes of the lofty tables which it is impossible to excavate in the least without caving down an enormous mass of sand and growing timber, I would contemplate the plan of sinking piles eight feet into the solid earth, to project several feet above the surface, and there to be crossed and bound together, and secured from springing by a long timber to be embedded and secured in the hill slope above. In the same manner I would pass the sliding hills—lifting our track so far above the surface that the slips may pass underneath, and thus only embed the piles deeper and deeper. The small ravines are generally to be embanked; but sometimes are to be crossed by a firm trestle work deeply embedded in embankments at the foot. Low meadows also are to be crossed by similar trestles five feet apart; embedded, first, two feet in the solid earth, and then embanked from three to eight feet in addition, according to the elevation of the roadway. In like manner, deeper ravines may be crossed, by embanking with sand or gravel to a certain moderate height—then leaving the bank to settle nearly solid, and erecting trestles raised purposely too high; after which by filling, from above, a few feet additional, the settling and embedding may be completed, and the trestles finally adjusted to the grade. In two instances I have supposed deep gulfs to be crossed by a simple bridge work, supported upon trestles, thirty feet apart, braced in every direction, and resting upon thin and rough but substantial walls of dry masonry, raised to a moderate height and embedded in embankment. The use of trestle work is well adapted to a winter road—especially in a climate so far north as the upper parts of Vermont, in consequence of its projecting above the deep snows; and, inasmuch as cedar is very abundant in the northern quarter, work of that kind may there be made very durable. It is obvious that such a road is to be worked by engines alone without the employment of horses, it being destitute of a horse path.

Third: I propose, upon the embankments and in the excavated portions, a wooden superstructure of the common kind—that is, with a wood rail and a flat iron bar spiked upon it. In the case of trestle work and slope piling, it is obvious that an important part of the structure—all the bearing parts—will have been already supplied, and that little will remain but to adjust and secure the rail. This may be made of spruce, tamarac, or chestnut. The usual cost of a superstructure upon this plan is about $4000; but, taking into view all the circumstances, I have found a safe estimate for this road to be $3,250.

We omit the details of the estimate and give the sum total.—Ed. R. R. J.

Total cost of grading the Railroad; being 191 83-100 miles at $6,022 63,	$1,155,319 84
Flat rail superstructure at $3,250,	623,447 50
Additional track at each 15 miles, to be graded and laid, in all 6½ miles at $9,272 63,	60,272 10
Turnouts,	20,000 00
Depots, Engine and Carriage Houses, Shops, and watering stations,	50,000 00
Engines, Passenger and Burden Carriages,	185,000 00
Engineering and Superintendents,	100,000 00
Contingencies,	90,960 56
Total cost of improvement,	$2,285,00 000

General Remarks.

The estimate presented above, shows an average expense of the improvement, when finished and completely furnished for action, of a fraction less than $12,000 a mile. This sum,—while I give it as abundantly competent to meet the cost of the contemplated work,—is, itself, moderate, when compared, either with the known expense of other great routes, or with the magnitude of the object which this is designed to effect. With regard to the resources of this railroad, as a means of profitable income, they are already, in a measure, before the public in the Report of the convention holden at Windsor, in January 1836; and there is neither occasion nor opportunity for me here to do more than allude to that document. Neither can I dwell upon the inducements offered by the scenery of the Connecticut and its valley, and of the fine mountains and lakes of northern Vermont, to invite northern travellers to a choice of this line of passage. One consideration alone, of a public nature, and of pressing importance, I may be allowed to introduce. It is this.—The limited territory of the New England States has not hitherto withholden the amount and the moral force of their population from sustaining a weight in the national confederation disproportionate, indeed, to their extent of domain, but—for that very reason—of vital importance to the secure condition of their public interests. But the time is at hand when New England may be forced to struggle against the prospect of being overgrown by those immense new states, to some of which she has furnished largely both the population and the institutions. The very greatness of those states inspirits them to make the most of their natural advantages. But, with regard to ourselves, nothing can hold up these individual states of New England from sinking into an insignificance proportioned to the diminutiveness of their territory, but the policy of nurturing the amount and the moral force of their people, not merely by institutions of intellectual and moral excellence, but by opening, every where, the great channels of intercommunication, as the first step to the effectual promotion of industry and the arts. The route which I have had the pleasure to survey is one of the most prominent that can fix the attention, as opening to occupation and to enterprise a large region fertile in soil, and eminent for the amount of mechanical power upon its streams. Considered with reference to the foregoing ideas, it is an improvement, to the encouragement of which our citizens may justly feel impelled, not merely by the prospect of immediate profit, but by a principle analagous to that of self-preservation.—All of which is respectfully submitted,

Alex. C. Twining, *Engineer.*
New Haven, Sept. 25th, 1837.

MONROE RAILROAD AND BANKING CO.

At an annual meeting of the Stockholders of this Institution, held on the 25th day of January, 1838, the whole of the Stockholders attended, either in person or by proxy, with but very few exceptions. The Company assembled at their banking house, and after an organization of the convention, Gen. L. L. Griffin proceeded to make a few clear, able and pointed prefatory remarks, and then submitted a full, ample, and satisfactory statement of the Bank, together with the report of the Chief Engineer, Mr. Daniel Griffin. He then submitted the books, vouchers, &c., to the inspection of the convention, which gave *general satisfaction* to all who were present—which will more fully appear by the following resolutions which were offered and almost unanimously adopted:

Whereas, at the last Convention of the Stockholders, held on the 21st day of August last, a resolution was passed by the Convention, "that no discount should be made until the discounted paper owned by the bank should be reduced by payment to a less sum than $200,000, and after the discounted paper should be thus reduced, the whole amount of discounts should not be carried beyond the sum of $200,000, until otherwise ordered by the Stockholders in Convention." And whereas that resolution has proved to be inexpedient, and a clog to the prosperity of this Institution, it is therefore Resolved, that said resolution be and the samo is hereby repealed. And be it further Resolved, that this Convention approve the order of the Board of Directors rescinding said restraining resolution.

And be it further Resolved, That this Convention approve and approbate the course pursued by the President and Directors of the Institution since the last Convention, in faithfully and vigilantly protecting and promoting the interest of the Company in the Banking department, and facilitating the completion of the road.

After the adoption of these resolutions, the Convention then proceeded to an election of a President and six Directors for the year 1838, which resulted as follows:

Gen. L. L. Griffin,	4164
Henry Solomon,	4164
A. Brooks,	4039
John Martin,	4164
B. T. Obar,	4039
Peter G. Thompson,	4139
Dr. M. Bartlett,	4064

The Convention then adjourned.

ENGINEER'S REPORT.

To the President, Directors, and Stockholders of Monroe Railroad and Banking Company.

Gentlemen—I again appear before you to report the condition and progress of the operative department of the Monroe Railroad, under more auspicious circumstances, than when I last had the honor to address you on this subject. The recommendations I then made being adopted by you and fully carried into effect by the Board of Directors, have attained for your enterprise that state of forwardness which was contemplated by these measures; and I may confidently say, insure its completion by the first of November next, the dangers of the sea to the importation of your iron being alone excepted as the only circumstance involving a doubtful issue.

Being aware that it would be inconvenient to occupy much of your time on the present occasion, I will as concisely as possible notice the leading measures taken since your last convention; and will add a short summary of the disbursements attendant on the progress of the work.

The necessary quantity of iron has been (through my agency,) contracted for in Philadelphia at a cost of about forty thousand dollars, when delivered in Darien. The first cargo has already arrived, on which twelve thousand dollars has been paid. The entire cost when delivered in Macon will be about forty-eight thousand dollars, all charges included.

We have to regret that about three-fourths of this iron is smaller than that originally ordered, being to that iron in the proportion of 10 to 14; but the Direction were left without choice in the matter, there being nothing better to be had on this side of the Atlantic, and any other alternative involved a year's delay, which of course was inadmissable.

Active operations have been resumed on all the unfinished work by the recall of the contractors who had suspended, and by re-letting the vacant sections to efficient persons. I am happy to be able to add, that the abandoned mile within the limits of Macon is included in this letting, the citizens have under more enlarged views of their interest and duty, retracted their former course, in relation to this improvement, and this part of the work now presents a most active scene.

Thirteen miles of the line are prepared for the reception of the superstructure, and five more will be completed by the first of March. The remaining six miles, with the exception of the deep cut through Singier's Hill, will be prepared by the first of June: and arrangements are now on foot to divide the deep cut into two contracts, for the purpose of doubling its force of labour so as to bring it to completion by the first of July at farthest.

Contracts have been made for cross ties and mud sills for nearly all parts of the line where it would be desirable to let out that work—and the steam saw-mill, together with the mills of Samuel B. Hunter, Williamson Mims, and Frederick H. Reeves, are actively engaged in sawing railing to be delivered at different points of the line, some will also be prepared with whip saws.

A limited outfit of machinery is now in preparation in Philadelphia, consisting of locomotive engines, two eight wheeled passenger cars, and the iron work of eight wheeled burthen cars, these with turning platforms and other smaller machinery are to be delivered at Darien by the first of June, their cost will be about twenty-five thousand dollars delivered in Macon.

The following summary of expenditures will not form a correct criterion by which to judge of the progress of the work, as some heavy sums including retained per centage will fall due on the first of February and first of March, for work now completed or nearly so, which are not embraced by it, and there are large quantities of material prepared and preparing, on which (by the terms of contract) there will be nothing due under 12 months, neither will it give the actual amount paid out at the bank, paid interest for the accommodation given by the contractors of which I take no account, believing it not properly chargeable to the railway.

The expenditures without interest would stand thus:

Paid on graduation and masonry,	$131,937 41
" Material for superstructure,	16,763 21
" Right of way and expenses of assessment,	4,070 46
" Engineer's services and its contingencies,	12,488 78
Aggregate,	$165,259 66

I have the satisfaction of stating that the cost of the sections already completed, and the prices at which the others are let, are such as to establish full confidence in former estimates, so that I have no hesitation in assuring you that the aggregate cost of the work embraced in these estimates will not exceed that already reported.

In conclusion, I will add that I have no recommendations to offer but that the present designs be steadily pursued to their accomplishment, as I am confident that they lack nothing either of congruity or comprehensiveness requisite for securing the successful achievement of your undertaking.

Respectfully submitted,

DANIEL L. GRIFFIN.

BRICK AND CEMENT BEAMS.

A fresh series of experiments have been trying during the present week at the Royal Engineer establishment, Chatham, by authority from the Board of Ordnance. Three experimental brick beams, each resting on piers of brick, were constructed and broken by weights, which were applied over the centre of each. The piers were 2 feet 6 inches high and 18 inches square. The beams were 10 feet long, of the same width as the piers, and 1 foot thick. No. 1 beam was built of pure cement. No. 2 was also built of pure cement, with the addition of five longitudinal pieces of hoop iron, one of which was in the centre joint, and two others in each of the remaining joints. No. 3 was built with mortar, composed of three parts clean sharp sand, and one part of Halling Lime, and had also hoop iron in the joints. The wood work for supporting Nos. 1 and 2 was removed in nine days, and that for supporting No 3, in six weeks after they were finished. No. 1. beam was broken down, but it yielded sooner than it was expected; but it proved that for buildings where beams are usually used, it may be safely applied. No 2 also was a satisfactory experiment. No. 3 was tried on Saturday. The object of the experiment was to ascertain the use of cement-bond in the walls of buildings, as a substitute for bond and chain timbers; and also for ascertaining what additional strength is added to the bond by using hoop iron in the joints. Mr Brunel first tried some very interesting experiments, proving the extraordinary strength of brick work, laid in pure cement with hoop iron in the lower joints, but the same thing had not been tried without hoop iron, which led to the experiments under Colonel Pasley.

We have since been favoured with the following correct report of the results of these experiments, by a gentleman who was present on the occasion. The reader will refer to the paragraph in our last number (p. 16) for the description of the construction of each beam.

No. 1 beam was broken on the 27th at 2 P. M., with a weight of 298 lbs.; the break was not in the centre, but extended in two vertical seams, the one about 6 inches, the other 18 from the centre.

The strength was in favour of the cement, for in no direction did it give way; but on the other hand, the bricks were rent with an even fracture.

Another experiment was then made with the largest piece remaining, which measured about 4 feet over the piers: this required a weight of 2356 lbs., and the fracture was similar to the former.

No. 2 beam was tried on the next day, and was found capable of supporting 4723 lbs.. but gave way on the addition of 56 lbs. ∴ 4723—498 (weight required without the longitudinal bonds)=4225, the amount of strength gained by the use of iron bonds.

No. 3 gave way with the pressure of between 400 and 500 lbs. There was nothing remarkable in this experiment.

The above experiments were necessarily imperfect, the power not being applied as it would be in practice; for it is evident, that with a wall of from 10 to 15, or even 20 feet of solid work, the pressure, instead of acting merely on the centre, would be diffused throughout the whole beam. Upon clearing away the bricks from the middle of No. 2 beam, the two lower bars were found drawn asunder, the middle one remained of the same length, and the upper pair found, what is called buckled, or folded on themselves, showing the neutral centre to be in the middle bar.

We may take this opportunity to observe, that the foundations of the new Judges' Chambers in Chancery Lane, are being constructed after the manner of the beam No. 2, having a length of hoop iron to every row of bricks, and bedded in Roman cement.

On Monday some further experiments were made by Colonel Pasley at Chatham, in the presence of the heads of the Naval and Military departments there, and many scientific gentlemen, upon the strength of cement. The first experiment was to ascertain whether a safe staircase might be made with artificial stones formed with bricks and tiles, and other small materials united with pure cement, strengthened by hoop iron bond.

A portion of the brick beam used in No. 2 experiment detailed in our last Number, in length 4 feet 4 inches, was inserted 9 inches into the wall of a stable; it consisted of four courses (two more than is used in a geometrical staircase;) the extreme end of this step had no support whatever, so that we had the novel exhibition of a horizontal column of brick, retained together by cement and iron bars. Being loaded, it sustained the weight of 3566 lbs. Beneath the extreme end of the beam was placed a block to break the fall; when the weights were removed, and the block withdrawn, the column remained at the angle at which it fell, and required great purchase to remove it finally from the wall. Not one of the iron bars had given way.

The second experiment was for the purpose of ascertaining the force with which the hoop iron strengthened the brick beams, by weights acting on a piece of hoop in a state of tension. In this case a piece of hoop iron, 12 inches long, similar to that used in the above experiment, sustained a weight of 6163 lbs., then yielded with a fair fracture; it was elongated $\frac{1}{8}$ of an inch, and its temperature sensibly increased.

The third experiment was upon the remaining portion of the brick beam, built with Halling lime mortar, and strengthened with hoop iron, which was broken on the 28th ult., but one end of which was little injured. This beam was placed across two piers two feet asunder, so that the bars had very little room for extension; the experiment, however, was remarkable, for the beam sustained the weight of 4887 lbs. It did not give way suddenly; two bricks fell from the lower course many minutes before the final crash, and this did not occur till it had been yielding with a slow gradual motion. The fall was so tremendous that one of the piers were overturned, and scarcely two bricks were found together. So much for mortar. None of the bars were broken in this experiment.

It appeared in these experiments that the iron was corroded in the mortar, but not in the cement, another security of the latter over the former.

Correspondence of the N. Y. Daily Express.

FROM EGYPT.

Extract of a letter from an American gentleman, now traveling in the East, to a friend in this city, dated

Grand Cairo, Nov. 10, 1837.

You will no doubt be greatly surprised to receive a letter from me dated at this distant part of the globe, but accident more than design is the cause of my being here. On my reaching Malta, I found the communication to Egypt so rapid by the British steamers to Alexandria, that I determined to extend my travels altogether in a different course from that originally intended, and you need not be surprised should my future letters be dated at points unthought of by me and our friends, when I left the United States—I am now entirely undetermined whether I shall proceed by steamboats up the Nile into Nubia, and even into Abyssinia, or go down the Red Sea into India. Cairo is now becoming one of the most important cities in the world. It bids fair under the present enterprising Pacha, to rival its ancient splendor. In former times, when the navigation round the Cape of Good Hope was unknown, the whole commerce between the African shores of the Mediterranean, and Persia, Arabia and India, was carried on by immense caravans, through Cairo to Suez. For many ages past this intercourse has greatly ceased. The present Pacha of Egypt is a man of extraordinary character, and would be deemed such in any country. As an evidence of his energy and liberal spirit, he has offered every facility to the English, to extend through his dominions their line of communication with India. He has a steamboat of his own, called the Egyptian, running from here into Upper Egypt. She arrived here a few days ago from Miniah, full of passengers, a distance of two hundred and fifty miles up the Euphrates.

The route is now so easy compared with what it was a short time since, when, aside from employing guards, travellers were compelled to go on camels and asses, or in small boats—that I may take a steamboat to Nubia and pass on to Thebes. But before I travel north or east, I must say something in relation to this, which has been termed throughout the east, the queen of cities, and has no rival either in Egypt or Arabia. The grand city it is called, in contradistinction to old Cairo, is surrounded by high walls, with magnificent gates. The streets narrow, dark and winding. The principal street traverses and winds through the whole city. No pavements, and the consequence is, that the dust which is raised by the crowds of men from all countries, and camels and asses which pass through them, is most annoying. The houses are from two to three stories high, but being lighted from the courts within, and then walled up on the street, present a dark and prison-like appearance. There are, however, open squares upon which are built some very fine dwellings. The baths, the great places of resort, are tombs of the Mamelukes, are of marble, and being painted with gilded domes, have a most magnificent appearance. The Pacha resides in the citadel, which is said to have splendid apartments. The population is supposed to be from two to three hundred thousand, but no correct enumeration can be given. There is probably no place on the globe where the population is more transient. Thousands are on the move constantly, to and from Africa into Asia, and from the shores of the Mediterranean into Upper Egypt. I have not had time to attend to the sale of the male and female slaves that are exhibited in the street, of them I shall write to you in my next.

I fortunately reached here just in time to witness a scene of extraordinary gaiety and feasting. It is called the Feast of the Circumcision, and has lasted for the last eight days. On this occasion nearly two thousand children, including the sons of Pachas and men in the highest offices of the government, have been circumcised.—The ceremony, or operation, was performed in the most public manner, and subject to the gaze of the crowd. At the palace, hundreds of camel loads of provisions were cooked for the thousands and thousands that attended. Fireworks of the most brilliant description were set off, and a large amount of money distributed to the crowd. All has been music, dancing, &c.

Should I pass into Upper Egypt, I will endeavour to give you a description of the wonderful ruins of tombs, and temples of ancient times, and of the Pyramids, which are in fact among the greatest wonders of the world. The British steam vessel Atalanta, is running regularly from Suez to Bombay. She stops at a number of places in Arabia, on the shores of the Red Sea, and at Mocha, and passes through the Straits of Babelmandel into the Indian Ocean. This is the new route for travellers, and no doubt will be taken by many English as well as Americans. Yours, &c.

THE RAILROAD.

An ordinance is circulating through the city in pamphlet form, from which we perceive that the City Council of Columbus are taking steps towards the great enterprise of connecting Columbus with the Tennessee Railroad. Books of subscription are to be opened in the several counties concerned on the first Monday in March; subscribers to pledge property by mortgage sufficient to ensure payment; the council is then to issue bonds which are to be sold to the best advantage, the proceeds to be loaned by the city to the company, and the work to commence.

Without pretending to decide upon the merits of the mode, (which by the bye, seems at first view to be the only practicable one in the present deranged state of the money market,) we most heartily rejoice to find our enterprising board moving forward towards this great work. The only thing that can prevent its prosecution is want of zeal. A man with foresight sufficient to transact ordinary business, must at once acknowledge the practicability of the work, and one with half a head must see at a glance its momentous importance to the very existence of Columbus. Is there enterprise enough in our section to undertake it and carry it forward? For the honour of our country we would not question it.

We have before this given our views of the matter. It can do no harm to repeat them. Without the fear of contradiction, we assert that there is no place in Georgia affords half the natural advantages for commerce, as does Columbus. Her location, her relative position and the natural obstructions to passways in a different direction, almost compel the up country trade to come to her wharves—we care not whether it is done by canals or railways, the expense of bringing here the trade of Cherokee, Tennessee, the western part of North Carolina, and all intermediate counties in Georgia, must be one-third less than to take it to any other market; if done by a canal, we would say one-half would do it. Now it is reduced to a certainty, that other sections, with all their disabilities, are seeking this trade—and unless we put in our claim soon they will have it. If then, it is worth their trouble and expense (so much greater than ours,) may we not well afford to take up the project? But it is useless to offer arguments. Those who have examined the subject know we can profitably embark—and as this is perhaps a sufficient motive, we most earnestly hope that all who can do so, will go into the plan with spirit and unanimity. Let every man feel that he is interested, and act accordingly—for every man in and around the route will share the benefits, if it be completed, and none will escape the loss if it fails. If she does not move with energy in the works she may soon bid farewell to her prosperity—and if she will open up her stores by this communication to the rich and immense products of the country alluded to, the man who owns an acre of her soil may be a Nabob.—*Columbus Enquirer.*

LEGISLATIVE PRUSSIAN IMPROVEMENTS.

With the coming year a singular new law will come into operation in Prussia. It is expressly intended for the "restriction of freedom of trade." For the future it will be necessary to procure a licence to set up in business, and this is not to be granted till the applicant has undergone an examination with regard to his qualifications for the trade he has chosen, and shows that he possesses sufficient property to carry it on. The object of the law is said to be to prevent swindling, and the ruin often caused by the hazardous speculations of those who, possessing no property themselves, are indifferent about risking the property of others. The effect of it will obviously be to keep classes where they are, and to bring every one into still stricter subjection than hitherto, to the powers that be.—*London Mechanics' Magazine.*

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

*** Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

AGENCY.

The Subscriber offers his services as Agent, to procure *Machinery for Mills, Steam Engines, Locomotives, Printing Machines, Presses, Types and Fixtures.*

He will give prompt attention to all orders entrusted to him for execution; and pledges himself to those who may employ him, that no effort on his part shall be wanting to procure the best articles to be had in the city—and to give satisfaction.

He will also employ Millwrights and Engineers, to erect Mills, and put the Engines and Machinery in operation.

Orders accompanied with the necessary funds, or satisfactory city acceptances, should be addressed to D. K. MINOR, 30 Wall-st. N.Y.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, t at part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS Mc NEILL,
Chief Engineer.

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.; Atlas, Boston; Philadelpia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. do. cast steel Shovels & Spades
150 do. do. Gold-mining Shovels.
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State-street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR,
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakichill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street,
NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Istruments made to order and repaired.
1y—14

RAILWAY IRON, LOCOMOTIVES, &c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars; with countersunk holes and mitred joints, lbs.

350 tons 2 by [illegible], 15 ft in length, weighing 4 [illegible] per
280 " 2 " ½ " " " 3 $\frac{55}{100}$ "
70 " 1½ " ½ " " " 2½ "
80 " 1¼ " ¼ " " " 1 $\frac{25}{100}$ "
90 " 1 " ¼ " " " ⅞ "

witn Spikes and Splicing Plates adapted thereto To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEW YORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN
RAILROAD JOURNAL,
AND
ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, NOVEMBER 18, 1837. (Published February 24, 1838) VOLUME VI.—No. 46.

CONTENTS.

AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 21, 1838.

We are indebted to the Hon. Daniel Webster, for the Report on the Survey of the Western and Atlantic Railroad of the State of Georgia; to the Hon. E. Curtis, for Congressional papers; and to Col. H. W. Childs, for the Report of the Committee on Agriculture, and the draft of the Bill now before the Legislature of this State.

Also, to an unknown friend, for the Second Annual Report of the Raleigh and Gaston Railroad Company.

WESTERN RAILROAD.

The Bill granting aid to this Road, has passed the Massachusetts House of Representatives by a handsome majority. A motion to re-consider was negatived by a stronger vote than the original one in favor of the Bill.

The Bill provides for the raising of nearly two millions of dollars in aid of the Road.

RALEIGH AND GASTON RAILROAD CO.

(Continued from p. 622.)

Report of the Ch. Engineer.

Raleigh, January 19, 1838.

GENTLEMEN,—In accordance with established usage, I beg leave to submit to you, on the occasion of the approaching Meeting of the Stockholders, the following Report of the progress and present state of the work committed to your charge. And I shall combine therewith, as requested, a general description of the Road, as now located. This was not done previous to the last Annual Meeting, because the location was incomplete, and it was thought unnecessary to make any report on the subject until it was completed.

Before entering on this description, I will briefly advert to the circumstances which led to a choice of routes. One of the earliest duties assigned to me, as your Engineer, was to make a reconnoissance and a survey, if it was found necessary, of two routes which presented themselves—the one passing up the ridge which separates the waters of Roanoke from those of Tar River, and crossing the last named River above Louisburg; and the other taking a more direct course to Raleigh, and consequently passing all the streams lower down. The result of this reconnoissance was given in detail in my letter of May, 1836. The Board agreed with me in preferring the upper or Western route, and all my subsequent observations on this line have gone to confirm me in my former impressions in its favor. The elevations and depressions found, equalled my most sanguine expectations: though it was believed expedient, in some cases, to adopt grades with higher rates of ascent than were at first contemplated.

To proceed with my account of the Road: It consists of two divisions—the first commencing at Gaston, and extending to a point in the vicinity of Chalk Level, 39½ miles from the south side of Roanoke river; and the second, extending from that point to Raleigh. Beginning with the first division, the line, as located, and in part constructed, is an extension of the long straight line terminating the Greensville and Roanoke Railroad; which is continued across the river, and for one mile up the ravine, on the south side. Thus the Valley of the Roanoke is passed by a straight line, or between three and four miles in length. This is a matter of some moment, when we consider that there are two steep inclined planes, descending towards the same point, and separated by the intervention of a short level It may be important, as a safeguard against accidents, that the Engine man on the Locomotive, coming down one of these planes, should be able to see some distance up the other. The grade on the Greensville and Roanoke Railroad is 94 feet per mile; that on your's is 63 feet per mile.

The river is crossed by means of a bridge of 1040 feet in length, consisting of six spans, the greatest of which is 169 feet. The abutments and piers are of substantial masonry, coursed and dressed above water. Three of the piers, together with the abutments, are built by means of coffer dams, upon the solid rock in the bed of the stream. The other two piers are built on cribs, made of large timbers strongly framed together, which are filled and surrounded with rip-raps. These cribs rest in like manner on the solid rock, and the timber work is raised to a point sufficiently below the surface of the water to avoid the danger of decay. We were fortunate in procuring for this work a granite which, for beauty and durability, I believe to be unsurpassed by any in the world. The stones used, frequently present natural faces, which are almost perfect planes. I have seen a mass, thrown from the quarry by a single blast, which presented a natural plane surface of almost 100 superficial feet. The superstructure of the bridge is of the Susquehanna white pine, built on the plan of TOWN, but with the number of lattice pieces doubled, and an extra set of chords.

After crossing the river, the Road ascends for a distance of 14,045 feet, at the rate of 63 feet per mile—a rate of ascent which is never afterwards reached on your work. The line then continues along the ridge before mentioned, which divides the waters of Roanoke and Tar rivers, until it descends towards the latter.

This ridge, though comparatively uniform, is indented by numerous heads of streams, which, though so small as to require little else than dry stone drains to vent them, frequently occasion embankments of 30 feet, and more rarely, of 50 feet in height. The number of drains is so great, as to have added considerably to the cost of the work. The cuts, necessary to equalize the excavation and embankment, are frequently 20, and sometimes 30 feet in depth. The highest point of this ridge is 500 feet above tide water, and, as is always the case in such elevated countries, the inequalities in the surface are much greater than a casual observation would lead us to suppose. The character of the soil on this division of the road, and indeed throughout the whole extent of the work, is such that the repairs, usually so heavy a tax on the profits of Railroads, will be far less than on any Railroad with which I am acquainted. Most of the cuts will be easily kept dry, and the earth is, in general, of sufficient consistency, to stand at the slopes given in constructing the work.

In adjusting the grades on this portion of the road, a view was had to the great accession of trade which may be expected at Henderson Depot. As far as was consistent with a just regard to economy, an effort was made to preserve the rates of ascent and descent, especially when opposing the heavy trade, at the lowest possible *maximum*. The accompanying Table, marked B, will give you the grades adopted. It will be seen that the grades opposing the heavy trade constitute only about one-fourth of the whole length of the Division, and of these, 4½ miles are at the rate of 10 feet per mile and under—4½ at the rate of 20 feet per mile and under, and 2½ at the rate of 25 feet per mile and under. They are most of them so short, that the *momentum* alone of the train will overcome them. On the whole, we may consider these grades sufficiently gentle for great useful effect. With regard to direction likewise, the line is decidedly favorable, as will be seen by reference to the accompanying table, marked B. This table, as well as the one marked A, commences on the south bank of Roanoke river, nearly half a mile from the point where the Raleigh and Gaston Railroad leaves the Greensville and Roanoke Road. For this distance, the grade rises at the rate of 25 feet per mile. After leaving the bridge, nearly 29, out of the 39½ miles, consist of straight lines, and the curves are all sufficiently gentle, their radii varying from 11,460 feet to 1,910 feet.

Along the line, at the points most likely to concentrate the trade of the adjacent country, suitable Depots have been erected. The first Depot, at Littleton about nine miles from the river is the most convenient point for receiving the produce of all the country lying on Little Fishing Creek, and on Great Fishing Creek, near their junction. The next Warehouse, at Edgerton's will be the point of delivery for many very productive plantations between the Road and the Roanoke river. Opposite to Warrenton, a Depot has been erected, solely with a view to accommodate the trade of that place. The next Depot is fixed at the distance from Edgerton's which is usually allowed between stopping places, without reference to the Warrington Depot. It is at the house of Mr. John E. Twitty, where the road from Williamsboro' comes into the Raleigh road. This Warehouse will receive the products of the country for a considerable distance, on each side of the Railroad. A large quantity of tobacco may be expected at this point.

The second division of the road commences, as I have before stated, near Chalk Level. At one mile and three quarters from its commencement, Henderson Depot is placed.—This is by far, the most important intermediate Depot on the line. The Tobacco and other agricultural products of Granville, Person, Caswell, and a part of Franklin counties, will be brought here. The trade from this fertile country will add largely to the receipts of your Road. Oxford is but ten miles from Henderson. The house erected here is of the same size with the other Depots on the line, but it is so arranged, that it may be at any time enlarged to any extent. It will probably be necessary to enlarge it considerably, but this can be better done when a short trial has shown us what will be required.

On the first eight miles of the second division, the work is very light. As the lines descends to Tar river, the surface of the country becomes more broken, and deep cutting and filling often occurs, and in the excavations near the river, a great deal of rock has been found. The work at Tar river will be costly. The road crosses the river at an elevation of ninety-four feet above the surface of the water. Although a span of 300 feet would have been ample for the passage of this stream, it has been found economical to use a bridge of 825 feet in length. After thus extending the bridge, the embankment at each abutment still exceeds fifty feet feet in height. The abutments are of strong rubble masonry laid without cement—the piers, four in number, are of *coursed rock work*. This character of work combines a great degree of strength with a handsome appearance. Granite, of a suitable quality, has been found in great abundance near the site of the Bridge. This structure will be on the Lattice plan also; but, in this case, the roadway will be about four feet below the top of the Bridge instead of being near the bottom as at Roanoke. Yellow Pine for this work can be obobtained within a reasonable distance. The line, after leaving Tar river, ascends for more than three miles at the rate of 39 6-10ths feet per mile, attaining the ridge between Tar river and Cedar creek, without meeting with any serious obstruction. About four miles from Tar river, at the point where the railroad crosses the road leading from Hillsboro' to Louisburg and Tarboro', it has been determined to place a Depot. The road running from this point to Hillsboro', is remarkably level and good, and leads, as you are aware, to a rich agricultural country. Tobacco and other articles will be received here from the greater part of Orange and Guilford, and Cotton from the country below. The merchandise for Louisburg will probably be brought here as the cheapest and most expeditious route.

After passing this ridge, the line descends to Cedar creek, where another deep valley is encountered. Indeed, throughout the whole extent of this division of the road, the streams are very much depressed below the general level of the country. So, that grades, suited to Locomotive power, cannot be obtained without having very high embankments. The grade at Cedar creek is about 70 feet above the surface of the water. Here it is contemplated to have a Bridge of about 600 feet in length. The ground, after passing Cedar creek, is very broken, and continues so for the greater part of the distance to Neuse river. The two forks of Brandy creek, Richland creek, and many other streams of less note, require heavy embankments. The line for the ten miles next to Neuse, runs always not far distant from the road leading from Simms' Bridge to Powell's Bridge, and crosses Neuse between Powell's and the Falls Bridge. The crossing at Neuse will be less expensive than that of any other stream of similar size on the road. It is passed at a moderate height, and a favorable bluff on the south side will greatly facilitate the graduation. I cannot omit to mention here the valuable water power afforded by the Falls of the river, a short distance above our bridge. Doubtless, this will be turned to some useful purpose when the resources of this country have been more clearly developed, and the spirit of enterprise stimulated by the completion of your work. Any use which can be made of it will add to the transportation on the road.

To proceed: After leaving Neuse, we encounter a great deal of expensive work. At first, heavy cutting, and afterwards a continual transition from cutting to embankment, and the reverse. At Jeffreys' creek, Manning's and Marsh creek, we shall require expensive structures of masonry and high embankments. The last large stream to cross is Crabtree, over which it is contemplated to build a Lattice Bridge. After leaving Crabtree, the line will ascend to Raleigh at rates which can easily be overcome by Locomotive power. The road will terminate at Halifax-street, between Mrs. Miller's and Mr. T. P. Devereux's, on a suitable site for a Depot. It is intended to erect here, some time during the present year, a commodious Warehouse and the necessary work shops.

There has not been sufficient time to collect the necessary information for locating any of the Depots, between the one mentioned, four miles south of Tar river and Raleigh.

It could not be expected that where the streams are so numerous and the dividing ridges so high, very moderate grades could be obtained. Those adopted, however, will be found to oppose no serious obstacle to the transportation on your road. The accompanying Table marked C, shews the grades used, and the Table D, the direction of the lines.

With regard to the progress and present condition of the work, I have to say—

That the Bridge, at Gaston, is in a state of forwardness, and will probably be passed early in March. It had been foreseen that there would be great difficulty in procuring timber for this Bridge in proper time. It was impossible to get Yellow Pine nearer than in the vicinity of Jackson, on the Portsmouth Railroad, or near the Roanoke, below the town of Halifax. Long experience had taught me to dread the delays which would occur in transporting timber from either of these points. This, together with the consideration of the superior value of the White Pine for this kind of structure, induced me to procure nearly all the timber from Port Deposite in Maryland. A contract was made for this timber with Mr. Isaac Brown and Messrs. Jones & Reinehart, which was promptly and faithfully executed. I have no cause to regret having gone to such a distance for timber; for, though the cost was somewhat increased, it was not so much so as to counterbalance the advantages gained in the quality of the timber and in the early delivery. I contracted for a few of the larger pieces, to be gotten of Yellow Pine from the vicinity of Hill's Ferry on the Roanoke.—Every effort has been, hitherto, ineffectually made, to get these pieces delivered. But, for this delay, the bridge might have been passed on the first day of January. The whole of the timber, however, will now soon be on the ground, and the work will be pressed with the utmost vigour. Ten miles of the road will be ready for use on the completion of the Bridge. The graduation is finished for a distance of 48 miles, with the exception of a very small amount of work at two points, which will soon be completed. The timber for this division of the Road is nearly all delivered, and the superstructure is in rapid progress. Five Depots will be finished in a short time. There can be no doubt that the 48 miles will be ready for use, by the first day of July next, and possibly at a much earlier date. The grading of about 15 miles beyond this is well advanced. A large force is at work on the Bridge at Tar river--the masonry is progressing rapidly. One contractor is at work with an ample force, getting the timber for the superstructure, and another is engaged to construct the Bridge at soon as the timber shall be ready. It is hoped, though not expected with certainty, that the Road will go into operation to the Hillsboro' Road Depot, 4 miles south of Tar river, by the close of the year. Its completion cannot possibly be delayed much beyond that period.

All of the excavation, and embankment, and superstructure, from Tar river to Raleigh, are now under contract, and the contractors are commencing their work. The greater part of the masonry and Bridges are under contract likewise. All the arrangements have been made with a view to complete the work in eighteen months from this date. Should our anticipations be realized, (and the progress of the work up to this time encourages us to hope that they will,) this work will be finished in as short a period as any of the same magnitude ever has been completed in the Southern country. On the works in the Middle and Northern States, any number of laborers may be collected; but here, whites cannot be induced to remain, and it is difficult to procure enough slave labor to execute work rapidly. But for the great exertions used, and the many inducements held out to persuade the owners of slaves to hire them on the Road, we would not have been able to collect a force during the past year. Now, however, since they have tried the experiment, the profits are sufficient to induce them to continue it

I deem it due to myself to say, that before the plan of Superstructure used on this Road was adopted, the subject was well weighed, and all the plans which have been proposed by others were carefully examined. But none, in my opinion, combined as many advantages as the one adopted. This is the plan used on the Petersburg and other railroads; which I have adhered to, although it might render me obnoxious to the charge of want of originality. I thought it very desirable to use a thicker Iron, experience having clearly shown its advantage: but when the iron was purchased, the price was very high, and it was thought inexpedient at that time to swell the cost of the work by procuring a more expensive Rail. It may be found best (the price having fallen) to use iron $\frac{5}{8}$ or $\frac{3}{4}$ of an inch thick, for the remainder of your Road.

It remains to give you an estimate of the cost of the Road. This can be done for the first Division with some degree of accuracy, the work being so nearly finished. Before doing so, however, I beg leave to call your attention to the circumstances which have affected the cost of this work.

At the time that the first Division was let, in October 1836, the rage for speculation was at its highest pitch, and the price of every thing had gone higher, perhaps, than was ever known before in our country. There was a great deal more work offered in all parts of the United States, than contractors could be found to take. It was particularly difficult to procure contractors here, where no work had been going on previous to this time. The effect of this state of things was counteracted, in some measure, by promising the contractors facilities which they could not obtain elsewhere. Still the cost of your work has been increased by the high prices, beyond what it would have been under ordinary circumstances. There has been something, too, sacrificed for expedition. It was impossible to execute a work so rapidly, at the same cost as if the usual time had been allowed. It should be considered, also, that this is probably the heaviest work which has been hitherto constructed South of Potomac River.

But with all these difficulties, I challenge comparison with any other work in our country.

Estimate of the cost of the First Division, 40 miles in length.

Graduation and Masonry, including Gaston Bridge,	$277,000
Superstructure, $4,000 per mile,	160,000
Depots,	12,000
Superintendence and Contingencies,	50,000
	$499,000

Which is at the rate of $12,475 per mile, or $10,975 per mile, exclusive of the cost of Gaston Bridge.

Cost of the Second Division, 44½ miles.

Graduation and Masonry, including Bridges,	$493,000
Superstructure, $4,000 per mile,	170,000
Depots,	25,000
Superintendence, &c.	20,000
	$716,000

Making the aggregate cost of $1,215,000, for the whole 84½ miles. The estimate of the cost of the Second Division is not to be considered as accurate, but is believed to be sufficiently so, for our present purpose. We may safely take this sum as the limit which will not be exceeded.

All which is respectfully submitted.

CHAS. F. M. GARNETT, C. E.

To the President and Directors of the Raleigh and Gaston R. R. Company.

Table A, referred in the Engineer's Report.

TABLE OF GRADES—FIRST GREAT DIVISION OF THE RALEIGH AND GASTON RAILROAD

Length of Grades.	RATE PER MILE. Ascent.	RATE PER MILE. Descent.	Total Ascent.	Total Descent.	Total. Level.
550	-	-	-	-	Level.
14,045	62.99	-	165.40	-	
1,400	-	-	-	-	Level.
8,665	-	5.28	-	8.70	
500	-	-	-	-	Level.
2,918	29.57	-	16.00	-	
1,300	-	-	-	-	Level.
1,100	-	19.53	-	3.90	
1,100	-	-	-	-	Level.
2,200	29.56	-	11.56	-	
2,300	-	-	-	-	Level.
8,100	39-07	-	59.94	-	
1,800	-	-	-	-	Level.
7,811	-	24.81	-	37.00	
14,758	-	-	-	-	Level.
2,100	18.48	-	7.70	-	
3,130	-	-	-	-	Level.
2,413	-	20.06	-	8.70	
800	-	-	-	-	Level.
4,384	26.40	-	22.50	-	
1,400	-	-	-	-	Level.
5,727	-	22.17	-	24.48	
400	-	-	-	-	Level.
2,300	12,18	-	5.29	-	
2,800	29.56	-	15.68	-	
1,800	-	-	-	-	Level.
5,000	13.73	-	13.00	-	
4,200	-	-	-	-	Level.
7,600	39.00	-	56.24	-	
300	-	-	-	-	Level.
2,700	-	15.84	-	8.10	
700	-	-	-	-	Level.
5,700	25.87	-	27.92	-	
3,100	-	-	-	-	Level.
3,100	-	20.00	-	11.78	
4,600	-	-	-	-	Level.
7,800	-	12.67	-	18.72	
5,500					Level.
900		18.48		3.15	
2,100					Level.
1,300		20.00		4.94	
3,800					Level.
1,200	35.38		8.04		
8,225					Level.
5,400	39.07		39.96		
1,000					Level.
3,500		8.45		5.60	
500					Level.
5,800	23.76		26.10		
600					Level.
1,500		6.86		1.95	
604					Level.
1,500	29.56		8.40		
400					Level.
4,558		7.92		6.83	
2,100					Level.
1,300		15.84		3.90	
600	38.01		4.32		
816					Level.
1,700	38.54		12.41		
2,200					Level.
700		31,68		4.20	
300					Level.
2,198	38.54		16.04		
2,575					Level.
1,100	29,56		6.16		
300					Level.
3,600		20.00		13.68	
400	8.45		0.64		

Table B, referred to in Engineer's Report.

TABLE OF DIRECTION—FIRST GREAT DIVISION OF RALEIGH AND GASTON RAILROAD.

Total length of straight line.	Total length of curvature. Radius 11,460 feet.	Radius 5,730 feet.	Radius 3,820 feet.	Radius 2,865 feet.	Radius 10,783 feet.
152,665	6,850	14,275	2,000	22,020	19,10

TABLE OF DIRECTION.

SECOND GREAT DIVISION OF THE RALEIGH AND GASTON RAILROAD.

Total length of straight line.	Total length of curvature. Radius 11.825	Radius 11.	Radius, 7.640	Radius [illegible]	Radius 3.820	Radius 2.865	Radius 2.547	Radius 1910
140,230.7	4075	4.176.5	98 9365	17203.7	8013.9	35386.8	2788.0	16160.00

Table C, referred to in Engineer's Report.

TABLE OF GRADES—SECOND GREAT DIVISION OF RALEIGH AND GASTON RAILROAD.

Length of Grades.	RATE PER MILE. Ascent.	Descent.	Total Ascent.	Total Descent.	Total Level.
1,400	33.94		9.00		
9,825					Level.
1,575		16.76		5.00	
5,300	11.94		12.00		
2,400		20.90		9.50	
300					Level.
1,600	19.80		6.00		
5,280					Level.
7,958		35.00		52.75	
3,800		30.00		21.28	
300					Level.
2,461	38.00		17.72		
300					Level.
1,600		17.00		5.12	
4,760		35.00		31.89	
400					Level.
900	30.00		5.04		
400					Level.
2,100	30.00		11.96		
2,100		29.538		11.76	
15,080		34 843		99.512	
1,030					Level.
17,675	39.60		132.599		
200					Level.
4,600		14.322		12.65	
3,000					Level.
7,000		34.848		46-20	
800					Level.
8,045	39.60		60.338		
600	39.60		4.50		
213,63					Level.
1186,4		34.84		7.83	
300					Level.
750	39.60		5.62		
1,404					Level.
2224,8		34.84		14.68	
317,9					Level.
3424,3	34.84		22.6		
379					Level.
2100	34.84		13.86		
300					Level.
2600		34.84		17.16	
300					Level.
2700	39.60		20.25		
735	31.68		4.41		
365					Level.
2819,5		31.68		16.91	
4813,8					Level.
6700		39.60		50.25	
2766,6					Level.
4900		31.68		29.40	
1000					Level.
2000		39.60		15.00	
41,00		31.68		24.60	
1100					Level.
5304		39.60		39.78	
929,3					Level.
8966,7		34.84		58.56	
300					Level.
5,300	39.60		39.75		
1,700					Level.
1,227		34.848		8.10	
173					Level.
2,417	39.60		18.13		
1,283					Level,
1,260		35.904		8.56	
640					Level.
6,537	50.16		62.10		
263					Level.
4,100		39.60		30.75	

Raleigh, January 20, 1838.

In pursuance of the order made by the Stockholders, at the last annual meeting, the undersigned have examined the Books kept by the President, and find the accounts so arranged as to present the receipts and disbursements under the appropriate and proper head.

RECEIPTS.

The receipts from the Stockholders, to the first of January 1838, amount to	$406,125 85
Amount obtained from the Bank of the State of North Carolina on loan	70.000 00
	$476,125 85

EXPENDITURES.

The aggregate expenditures, supported by proper vouchers amount to	456,199 76
Showing a balance in the hands of the President, to be accounted for of	$19,926 09

The account hereunto appended, marked A, will shew the different Receipts and Expenditures. The Expenditures under the different heads, in the Exhibit, show the amount of the cost of the operations on the various contracts, and will be found on examination, by each Stockholder, to be supported by proper and satisfactory vouchers on file in the Office of the President. In passing on the accounts, we required vouchers in support of the different charges. They were readily produced, and, as far as we are competent to judge, we are of opinion, that, in every respect, the management of the operations by the President, and other disbursing Officers, has been judicious and proper.

We submit the foregoing, respectfully, as our Report, and suggest that, if the same should be approved, that the President be directed to balance the Books accordingly.

Respectfully submitted,

WM. ROBARDS.
WM. PEACE.

To the Stockholders of the Raleigh and Gaston R. R. Company.

Length of Grades.	Rate per mile. Ascent	Descent.	Total Ascent.	Total Descent.	Total Level.
200					Level.
1,100	21.12		4.40		
200					Level.
1000		10.56		2.00	
200					Level.
600	26.40		3.00		
200					Level.
2,800		39 60		21.00	
200					Level.
900	34.848		5.83		
1,500					Level.
7,100		50.16		66.75	
500					Level.
2,100	50.16		19.95		
200					Level.
1,400		44.88.		11.90	
300					Level.
8,400	50.16		79.54		
1,000					Level.

Account A, referred to in the Report of the Committee.

RECEIPTS AND EXPENDITURES OF THE RALEIGH AND GASTON RAILROAD COMPANY, TO JANUARY 1, 1838.

Capital Stock, being Cash received on account of Instalments, to Jan. 1, 1838,	- - -	$406,125 85
Borrowed of the Bank of the State,	- - -	70,000 00
Expended on account of Surveys,	$31,632 01	$476,125 85
" " " Salaries,	11,112 32	
" " " Land Damages,	10,790 47	
" " " Horses,	740 00	
" " " Gaston Bridge,	48,903 69	
" " " Masonry,	12,516 72	
" " " Superstructure, [&c.,	70,260 07	
" " " Depots, water stations,	3,425 08	
" " " Contingent exxpenses,	1,751 32	
" " " Excavation and Embankment,	222,103 03	
" " " Iron,	40,996 17	
" " " Tar River Bridge,	1,929 88	
" " " Cars, &c.,	40 00	
Total amount of expenditures to Jan. 1, 1838,	$156,199 76	$456,199 76
Balance of cash on hand, Jan. 1, 1838,	- - -	$19,926 00

THE INTERIOR OF A COAL MINE.
Translated from the Courier des etats Unis.

St. Ettienne is, properly speaking, one great workshop. Its busy prosperity, continually increasing, has not yet acted in a perceptible manner, upon the primitive disposition of its inhabitants. The population of this city, in the space of thirty years, has increased three fold—its size has increased in proportion. At St. Ettienne no one is idle. Both sexes, all ages, all conditions give themselves up to labor. From the cellar to the garret, by day and by night, the ears are stunned by the confused tumult that the ringing of anvils, the screeching of files, and the simultaneous noise the different trades produce.

Men, women and children forge iron or weave silk, the alliance of which two trades is not the least wonderful phenomenon of this singular city. At fifty fathoms beneath the soil, even they labor—the bowels of the earth conceal another mass of courageous, devoted, indefatigable laborers; and whose profession is but one continual wrestling with death.

Some travellers have given us an account of the salt mines of Poland, and the copper mines of Dalecarlia. The picture that has been given us is such as the most fantastic imagination would have fancied. We might believe ourselves in an ideal world, a creation of fairies and genii. These subterraneous cities, these streets, straight to a line, and shining with a brilliancy continually equal—this population radiant with health and contentment, which resembles, in every sense, the hours of repose, in courts and houses—this spectacle of life, motion, abundance, and even of luxury, where a ray of the sun has never pierced, or a trace of vegetation ever animated—all this, we say, is singularly proper to awaken curiosity. How much difference there is in this description, from that of a coal mine! Here on the contrary, all is sombre, all is isolated, every thing breathes forth sadness and horror—but if its appearance seems less poetical, it leaves upon the soul of the observer an impression more deep, more magical. It remains astonished with the resignation, intrepidity, and even heroism which necessarily belongs to these men, who, true martyrs to labor, bring themselves voluntarily in gloomy darkness.

The coal mines that surround the basin of the Loire do not communicate with one another—they have each their own issue in the form of a well. As soon as the foot is placed without the city, a building of wood is met with, here and there, blackened with soot, enveloped in smoke almost as largo as the Morgue. It is called Vargue.

To imagine what must be the descent into a coal mine, it is necessary to call to mind the summit of one of the towers of Notre Dame. A little vessel of a circular form, constructed of planks, and scarcely two cubic feet in depth, descends before you, balancing itself on the extremity of a cord, and about the length of an arm distant from the wall. The moment of embarking comes—you look up to the heavens and the clouds—you lean forward over the gulf, so as to lose the equilibrium beneath your feet. It is a horrible moment. You must place one foot in the vessel, and but one—place it quickly, and you are plunged whirling into the abyss. In proportion as the vessel sinks, the opening grows smaller, the light is enfeebled, the air becomes more rare, the temperature more elevated—your chest sinks with uneasiness, and raises itself in spasms for breath. The walls of the well are wet with dampness, you meet, at first, with some marshy plants, afterwards nothing, not a blade of grass. In the midst of the confused murmur which fills your ears, you distinguish the noise of some drops of water, which fall into the well at measured intervals, like the noise of a pendulum of a clock. In the midst of the journey, you meet the ascending vessel, the contact of which is dangerous. You repulse it with the foot remaining outwards—if this motion makes you totter—if you have the misfortune to support your hand upon the smutty and oily wall, your hand slips, the vessel turns over, and you are launched into eternity, as the English say.

You may now ask, what is it, in comparison with such a descent, to venture in a bark, to feel beneath your feet, while flying from the shore, but a moving plank between you and the sea. Oh! how glad you would be, when plunging for the first time into a mine, to find yourself upon the sea, rolling in its foam, beholding the sun, and breathing the air freely! You may there enjoy the light, the air, and your arms, upon the waves—but in a dark and narrow well, close as a prison, deep as a whirlpool, and horrible as annihilation, it is far different—yet a miner hastens down as gaily as a sailor on ship board; and those have been seen, who, either by bravado or an indifference to danger, descend two hundred metres, holding themselves by griping a cord, without any support under their feet. One trembles to relate such a trial of strength, more common than is imagined! What is it then to see it?

Arrived at the bottom, you are placed upon a narrow plank, which covers, in the form of a bridge, the bottom of the well, a deep basin filled with thick and muddy water. When you let go the cord, your feet are tottering like those of a drunken man—your heart beats, and your head grows heavy. The heaven is to your eye but one resplendent point. Before you, opens a gallery, then another, then a pandemonium of narrow corridors, dark and damp, which increase, mingle and grow entangled, like the windings of a labyrinth. You see, afar off, some red glimmers that light up, by their reflection the drops of water which hang from the roof, and the veins of gold that streak the coal like ribands. You creep an hour, sometimes upon your knees, sometimes upon your breast, and meeting at each step only pools of ice, an infectious air that suffocates you, and, moreover in the midst of the joyous chants that reach you from all sides, across the thousand mouths of the galleries, like the magic choirs of *Robert the Devil*, or the *Temptation*. Whilst you listen to this invisible harmony, you are elbowed by a minor, who passes, bent double with a bag of coal on his back, holding a lamp in one hand, and supporting himself with the other, upon a little staff of iron. At length you arrive at the places where they are at work. Ten laborers are there, half naked, kneeling upon the ground, and cutting laboriously, enormous masses of coal, the surface of which sparkles with blue and gilded spangles.

The state of a minor is hereditary:—this is a privilege that no one dreams of attacking. Ordinarily he knows neither how to read or to write; for what use, what has he do beneath the sun? Speak to him of sending his children to school, he will not understand you; he works from the age of six years; his father died in the mine, he will die there also. Sunday is the only day of the week on which he can see the sun—on that day he rises before the dawn. To dirty and torn garments succeed a jacket of velvet, a grey hat with large flaps; and for his wife, a calico petticoat embroidered with flowers and lace. Touch the hand of the miner, he salutes you, he speaks to you, he smiles upon you, he raises his hat, he speaks, he smiles upon everybody. How pround he is giving his arm to his wife, whom he leads to mass, and from mass to the inn, according to ancient custom! For the miner is a free thinker; new ideas have not shaken his old belief; in his ignorant simplicity, he believes, he practices what his ancestors have believed and practised; and if he consecrates some hours to the enjoyments of the inn, it is not to contract there a taste for idleness and dissipation. The week is so long in a mine, that one need not reproach him for the few moments that he spends in refreshing and making himself merry! Besides, it is rare that he abuses them; he is in the midst of his family, and his brothers, for so he calls his fellow-laborers.

To be continued.

IMPORTANT INVENTION.

We have been informed that there is to be seen at the iron foundry of Messrs. Baugher & Wolf, of this borough, something new in the matter of wheels for railroad cars. It is an invention by Mr. Wolf of that very useful article, on a principle which we believe is entirely new, and, although it has not yet been tested, promises fairly to be a valuable matter with respect to the preservation of property and human life. It is a cast iron wheel without spokes, of about the same shape as the common Railroad car wheel—hollow in the middle—the outer side or rim convex—weighing but about 30 pounds more than the common wheel, and so strong that a friend of ours, who tried the experiment, assures us that, although accustomed to quarrying heavy stone, he could not break it by a succession of *bona fide* beatings with a sledge hammer. Numbers of other persons have tried it with the same success. Many accidents have occurred in consequence of the incapacity of the wheels of Railroad cars to sustain the weight with which they are burthened, and we trust that this invention (for such we believe it is,) may prove a sufficient preventive against any thing of the kind.—*Columbia (Pa.) Spy.*

MISSISSIPPI AND ROCK RIVER CANAL COMPANY.

The proposed canal is intended to connect the Mississippi with Rock River by a cut of about five miles from Rock River *above the Rapids*, to the Mississippi. We know this country well; and by this cut, an inland navigation of great extent will at once be secured through the most fertile region of Wisconsin Territory. We venture to hazard the opinion that no western enterprise before the public, offers more inducements for safe investment of capital than this; and we hazard this opinion upon an accurate knowledge of the country, which will be rendered accessable to steamboat navigation by this improvement.—*Cour. and Enq.*

The survey of a Railroad route from Nashua, N. H., to Worcester, Mass., was commenced on the 5th inst. We understand that it is the project of a New York Company. By this route passengers and goods may be landed at Stonington, Conn., in five hours.—*Cour. and Enquirer.*

The first trip of the cars on the Detroit and St. Joseph's Railroad was to be made on the 3d inst. The road is completed from Detroit to Ypsilanti, thirty miles.—*Commercial Adv.*

CLEVELAND AND PITTSBURGH RAILROAD.

It will be seen, by an extract from the Cleveland Intelligencer, that the Legislature of Ohio has given that city power to borrow two hundred thousand dollars, to be applied to this road. This is a very important move towards the advancement of this work; and there is great reason to hope, that it will soon be rapidly advancing towards completion. When this work, and the Cross Cut Canal are completed, Buffalo may tremble for her title of chief city of the Lake. Indeed, we have no doubt, that every succeeding year will bring Cleveland nearer to an equality with her rival Lake city.

The more southern and western position of the former city, gives it advantages which no art or human exertion can counteract—more especially, while those natural advantages are improved by a people so clear-sighted and enterprising as the Clevelanders.—*Pittsburgh Adv.*

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

⁂ Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

For Sale.—A Level, made to order by Brown & Hunt, and in first rate order. Enquire at this office.

Wanted on a Lease.—A good country place, with suitable out-houses, and from 5 to 15 acres of land, a short distance of the city. Enquire at this office.

DIED—On the 13th February inst., Mr. Austin Maine, aged about 24 years, son of Stephen Maine, Esq., of Hartland, Vt. His disease, the *Small Pox*, was taken without his being knowingly exposed to its influence; and its results should be a warning to those who have neglected to avail themselves of that mild and *sure preventive*—if thoroughly taken—vaccination.

Mr. Maine had chosen the profession of Engineering, to the studies of which he was directing the energies of a sound mind and untiring industry. Modest and retiring in his manners, he had but few associates; those few, however, appreciate highly his integrity and virtues.

AGENCY.

The Subscriber offers his services as Agent, to procure *Machinery for Mills, Steam Engines, Locomotives, Printing Machines, Presses, Types and Fixtures.*

He will give prompt attention to all orders entrusted to him for execution; and pledges himself to those who may employ him, that no effort on his part shall be wanting to procure the best articles to be had in the city—and to give satisfaction.

He will also employ Millwrights and Engineers to erect Mills, and put the Engines and Machinery in operation.

Orders accompanied with the necessary funds, or satisfactory city acceptances, should be addressed to D. K. MINOR, 30 Wall-st. N.Y.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, t at part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS McNEILL,
Chief Engineer.

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.; Atlas, Boston; Philadelpia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for paym nt.

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back strap shovels.
150 do. do. do. plain do.
150 do. do. do. caststeel Shovels & Spades
150 do. do. Gold-mining Shovels
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State-street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined iron. v4-tf

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR,

Paterson, New-Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR,
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge ever built* in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street, NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harleem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Instruments made to order and repaired.

1y—14

RAILWAY IRON, LOCOMOTIVES, &c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars, with countersunk holes and mitred joints,

350 tons	2 by	1, 15 ft. in length, weighing	$4\frac{6}{12}$	lbs. per ft.
280 "	2 "	$\frac{1}{2}$, " " "	$3\frac{11}{12}$	"
70 "	$1\frac{1}{2}$ "	$\frac{1}{2}$, " " "	$2\frac{1}{2}$	"
80 "	$1\frac{1}{4}$ "	$\frac{1}{2}$, " " "	$1\frac{1}{12}$	"
90 "	1 "	$\frac{1}{2}$, " " "	$\frac{1}{2}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf. Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N. Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEW YORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

*** All orders directed to the Agent, Troy, N.Y, will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL,

AND

ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, NOVEMBER 25, 1837. (Published February 28, 1838) VOLUME VI.—No. 47

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NEW-YORK, FEBRUARY 28, 1838.

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Also, to J. B. Jervis, Esq. for the Report of the Water Commissioners.

INTERNAL IMPROVEMENTS IN NEW-YORK.

Much as we have seen and heard of the rapid advance of our neighboring State of Pennsylvania in the cause of Internal Improvements, and often as we have foretold the advantage and profit about to result to her, and the loss and detriment to us, we were hardly prepared for the numerical statements, that recently fell under our notice, by which we found that the shipping in Philadelphia has nearly doubled during the past year, while the revenue received in this port has fallen off most fearfully. The statement in Mr. Scoles' Report, which we publish on another page, shows the same result in the revenue derived from Internal Improvements. "*While the tolls of Pennsylvania have increased one hundred and thirty-seven thousand, five hundred and fifty-four dollars, those of our own State have diminished to the amount of two hundred and seventeen thousand, three hundred and thirty-six dollars, and the annual receipts from her public works and those of private companies exceed our own by half a million.*"

This does not look much like the "Empire State." The fact cannot be denied, that our neighbors are drawing off from us in every direction that business which has been the source of all our prosperity. Of what use to us are natural advantages, if we do not follow them up by an intelligent and enterprising system of Improvements?

If natural advantages, such as those of location, climate, &c., are to be solely relied upon, the Indians on the Pacific might indulge a reasonable hope of obtaining and holding, to our exclusion, the whole China and Pacific trade.

New-York can and must maintain her superiority in public works, or she must yield it in commerce, in agriculture, and manufactures.

REPORT

Of the Committee on Railroads, upon several petitions for legislative aid to the Canajoharie and Catskill Railroad Company.

Mr. Scoles, from the committee on railroads, to which were referred a number of petitions of inhabitants of several counties of this State, praying for legislative aid to enable the Canajoharie and Catskill railroad company to bring their work to a speedy completion, reports:—

That your committee are of opinion, that among the subjects which should command the attention, and call forth the energies of the state of New-York, with her large, increasing, enterprising population, her exhaustless resources, and unrivalled commercial advantages; one of the first and most important, is that of INTERNAL IMPROVEMENTS. It must be conceded with whatever reluctance, that this subject has not received from former Legislatures, a due degree of attention and encouragement. The efforts of the State of New-York have not been commensurate with her own necessities and her obvious advantages, nor in accordance with the active spirit and individual enterprize of her population. The movements of legislation have not satisfied the wishes, nor realized the expectations of the constituent. The voice of complaint has been heard, and we have felt that it was deserved. Since the completion of that great work of internal improvement, the Erie Canal; a work, the vast and augmenting utility of which will preserve to distant posterity, the name of the illustrious individual to whose keen sagacity, sound judgment and fostering perseverance, the original design and its final success are mainly attributable; since the completion of that great work, we ask, what has been done towards the full developement of our manifold resources, the increase of the facilities of internal communication, and the expansion of the means of mercantile enterprize? What has been done towards stimulating and rewarding within the range of our ability, the active industry of all classes of our people, and fairly testing the unequalled capabilities of our State? We answer, comparatively nothing. Have any great works of internal improvement been projected by the "Empire State," in demonstration of her wisdom and foresight? Has any judicious plan of general benefit been presented by her Legislatures to the consideration of the people? Has any promptness of co-operation, any liberality of appropriation encouraged the efforts and extended the sphere of individual exertion? To all these inquiries, the same uniform, unvarying answer must be given. She has done comparatively nothing; nothing to what she might and ought to have done; nothing compared with what other States have done and are now doing.

While New-York has been thus supine and indifferent to her own interest, what has been the course of policy adopted and pursued by other States? Diametrically the reverse. Look at the appropriations made by the States of Maryland, South Carolina and Virginia. Look at those of the Western States. Indiana setting apart ten millions of dollars for internal improvements; Illinois making similar appropriations; and the infant State of Michigan, pledging her credit to the extent of five millions. But without giving further attention to the conduct of other States, let us devote a little consideration to the example furnished us by our near neighbor and indefatigable rival, the State of Pennsylvania. Her exertions and their results are well calculated to mortify our pride, alarm our fears, and kindle our emulation.

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She has planned, and is pushing forward a system of internal improvements, which is no less to the honor of her public spirit, than it is to our detriment and our shame. She has come forth in her strength, and not only bared her own arm to rear her works of wide spread and incalculable benefit; but she has infused an aspiring spirit and promoted a salutary rivalry among her citizens. She has nerved the arm of individual enterprise, and administered aliment to that eagerness of competition, which is the life spring of trade, and the fertile source of wealth and prosperity. Since the year 1825, Pennsylvania has expended from her treasury for railroads and canals, the sum of twenty-five millions of dollars. Their aggregate length, including those constructed by the public and by private companies, approach nearly to an extent of two thousand miles. She has already in progress, a communication from her only port on Lake Erie, intersecting her great line of internal improvements; this, together with her continuous line of canals and railroads, between Philadelphia and Pittsburgh, aims at diverting from us our southern and western trade: and her chief magistrate, in his annual message, confidently prognosticates, that "the completion of the Erie extension to the noble harbor of Erie, will give Pennsylvania the undisputed command of the lake trade." That same message also gives us the unwelcome information, that while the tolls of Pennsylvania have the last year increased one hundred and thirty-seven thousand, five hundred and fifty-four dollars, those of our own State have diminished to the amount of two hundred and seventeen thousand, three hundred and thirty-six dollars: and that the annual receipts from her public works and those of private companies exceed our own by half a million. With a quick perception of her interest, and a prompt and ready application of the necessary means of promoting it, Pennsylvania has proceeded onward; putting in requisition every mode in which her internal improvements could be efficiently encouraged and their completion secured; constructing railroads and canals herself, and loaning her funds to incorporated companies; guaranteeing to the stockholders an interest on their investments; and requiring as a condition for granting a charter to the greatest monied institution of the country, a large direct bonus appropriated to her public works, and a liberal subscription to private companies in every section of the State.

As a natural consequence of this liberal and enlightened policy on the part of the State of Pennsylvania—the contrast between her internal condition and our own, is to us humiliating in the extreme. The same desolating tornado which has swept over us has reached her also: for no corner of our land has escaped its baneful influence, but she has gathered up her strength, and wielded the energy of her resources as an interposing barrier to the progress of destruction; and if the statements of those who have looked through her population with critical eye and discerning mind can be relied upon, while we are prostrate and enduring every variety of commercial disaster attendant upon blasted credit, general embarrassment and pecuniary distress, she is rejoicing in the cheerful hum of business, displaying the life and animation of universal activity, and looking forward with reasonable well grounded hope to the profitable returns of an extended commercial intercourse, and the steady employment of her working classes.

Is not this picture of Pennsylvanian enterprise and prosperity, this acknowledgment of her ambitious aims and confident expectation, amply sufficient to rouse New York from her long, her deep, and her destructive slumber? How long will she remain thus inactive? Until her internal commerce is taken from her, her western and southern trade diverted into those channels which Pennsylvania has prepared for it; the empire State rendered tributary to one far inferior to herself in natural advantages; and her own great city, the commercial emporium of the western world, so fallen from its high estate, as to be to Philadelphia "what Hava is to Paris"—a mere port of entry? Is she willing that Philadelphia shall be "the great distributing city of the union," and be hailed hereafter, and that ere long, as the metropolis "of the richest and most prosperous of the States?" Will the great State of New York remain inactive in the slumber of forgetfulness, until she wakes and finds herself in the condition of an inferior? Is she content to be thus "shorn of her strength," without a struggle? Will she tamely resign her boasted sceptre of supremacy, without making a single effort to retain it? And will her legislature—will those who should be her prompt and faithful sentinels, remain passive and indifferent to her wants and her danger—taking no steps to relieve the one, and giving their constituents no intimation of the other? We trust not. We believe that the time has arrived, when we may embark in the good cause of internal improvements, so long and so injuriously neglected, with the firm conviction that it will meet with general approbation, and be crowned with triumphant success. The people from every part of our State call upon us to press onward. They believe internal improvements are necessary to relieve their distress, to revive the drooping spirit of trade, to give employment to those who need it, and to circulate through the community those moneys which are now locked up in the coffers of capitalists for want of the appropriate channels in which they would find their way to those who are pining and perishing from a destitution of employment. We are satisfied that the people require that we should adopt a liberal policy of internal improvements, and act upon it immediately; and as republicans, we believe it our duty to obey the popular voice, particularly when that voice calls upon us to do what calm consideration and careful investigation convince us, is both right and necessary.

But while we are decidedly in favor of a liberal and enlightened policy upon the subject of internal improvements, (which all experience teaches us to be the only true one,) we would at the same time avoid every thing which could justly bring upon us the imputation of extravagance, or which would indicate the least inclination for improvident expenditure. We would be liberal but prudent; so cautiously and discreetly shaping our measures, as not needlessly to conflict or interfere with any well considered policy of the State.

In considering the various works of internal improvement rendered necessary by our wants, and the rival efforts of our neighbours, the railroads leading through our territory, strike us as peculiarly important, overcoming as they do the evils incident to the severity of our winters, and affording the benefit of their unparalleled celerity of communication, when other roads are impeded by the snows, and the canals are frozen up for several months. Among the railroads which may justly claim the highest degree of our attention and encouragement, are all those which form a chain of communication between the extremities of our State. Each of these railroads, whatever its abstract extent, becomes of importance when viewed with a reference to that great whole of which it constitutes a part; and as such, it presents an undertaking of general utility, and worthy of the public assistance. The Canajoharie and Catskill railroad, now making application for such public assistance in the shape of a loan from the State, is one of the most important of the links in that chain of communication to which we have referred.

Our State is probably not yet prepared to imitate the example of Pennsylvania, so far as to take upon herself the sole construction of works, which, extensive in the range of their utility and benefit, are yet startling from their magnitude.—Where works of this character have been commenced by individual energy and enterprise, your committee would recommend the extension of such assistance by the State as may be necessary to prevent the delay, and insure the success of the undertaking. When meritorious works of more limited usefulness are commenced or contemplated, and the aid of the State may be essential to their completion, we would not desire to see that needful aid withheld. While we would have the application for assistance scrutinized with careful eye, and its merits subjected to strict investigation, we would still avoid that narrow parsimonious economy, which shrinks from moderate expenditure even when connected with the almost certain prospect of future profits.

Your committee have no intention of recommending to the Lesislature to expose the people of this State to any taxation for the purpose of carrying out what they believe to be the great and necessary policy of internal improvements. By assisting incorporated companies with moderate loans, taking such mortgages upon their roads as shall be justly deemed an adequate and sufficient security; the State having no concern in the profit or loss, need make no expenditures, and will run no risk. It will be a mere substitution of the credit of the State for that of the companies; and if, as your committee would recommend, the premium which may be obtained upon the sales of State stock created for this purpose, is required to be paid by the companies to the State, for the increase of the school fund, or some other public appropriation of equal importance, a benefit may be derived to the State from this species of negociation, separate and distinct from that which will flow to her citizens as the necessary operation of valuable internal improvements.

By a policy, liberal but judicious—encouraging, yet prudent and discriminating, your committee believe that new avenues will be opened to commercial enterprise; unknown and unappreciated sources of wealth will offer themselves to youthful activity and ambition; a new vitality will be infused into parts of our country now lying inert and dormant, because their resources have never been developed, or from the absence of a market for their products; a healthy animation will be diffused throughout our community; the wheels of business will be set in motion; the laborer will find employment; the trader, the jobber, the importer, the manufacturer, and the mechanic—all will participate in one common benefit; and the cheerful aspect and improved condition of our population will be hailed as the harbinger of returning prosperity.

Your committee will not undertake to say what would be, in every instance, the most judicious mode of extending relief to such incorporated companies as may petition for it; but as a general rule, they are inclined respectfully to recommend, that in works of minor importance, at least, the State should yield its aid in the shape of loans, taking, as security, mortgages upon the property of the companies, in preference to becoming connected with such companies in the capacity of stockholder.

As these preliminary observations upon that course of general policy on the subject of internal improvements, which appears to them just and prudent, and the adoption of which by the Legislature they most respectfully recommend, your committee would direct the attention of the House to the particular subject of the application now under consideration.

The Canajoharie and Catskill railroad company put the whole line of their work under contract for construction for a single track, in June, 1836. It was to be completed in 1837, if practicable; at furthest by the month of May, 1838, at the gross amount of $550,000, exclusive of iron turning-plates, which were to be furnished by the company. Nearly the whole of the land required for the use of the company has been obtained by gratuitous releases. For a full statement of the cost of the road, its probable value, and amount of income, its sufficiency as a security to the State, and its usefulness and importance as an internal improvement, your committee ask leave to refer the House to the reports of Judge Wright and Ephraim Beach, Esq., which your committee have annexed to this report.

The work has been and is still in progress, but owing to the unparalleled pressure of the times, the pecuniary distress, and the utter prostration of every branch of business, many of the holders of the stock of this company, as has been the case with those of nearly if not of all the other companies, could not promptly pay the calls made upon them; and although several have recently paid, yet owing to the circumstances mentioned, it is believed that the company will not be able to proceed and complete their work as speedily as the great interests of an important and neglected section of the State demand.

Your committee are also fully persuaded that other and still more important interests than those of the section through which this road is to pass, and intimately connected therewith. That inasmuch as the road terminates at a point on the Erie canal, west of what is called the Nose, where the canal is closed by ice earlier in the fall, and opens later in the spring than elsewhere, much property which otherwise must remain behind for months, would pass upon this road to Catskill and thus find its way directly to the city of New-York; while property on its way to the west, would be landed at Catskill, and by this road, speedily reach Canajoharie, and arrive at its destination, which must otherwise await the opening of the canal in the spring. This avenue must also prove essentially convenient and beneficial to those both in the west and in the city of New-York, who are interested in the transportation of property whenever the navigation of the canal may be obstructed east of the western termination.

Your committee would further observe, that numerous railroads, turnpikes, and other roads are now open, in progress of construction, and in contemplation, to connect with this road. Several of them are already chartered, and applications for others are now upon your table.—These, together with the numerous petitions from many and distant counties of the State in favor of the application of this company, clearly indicate the estimation in which this project is held, and the importance of the immediate completion of the work, which for the want of assistance, has been already too long delayed.

A large portion of the section of country bordering upon the line of this road is highly productive, which, with the fertility of that extent of country that must necessarily become tributary to this road, can scarcely fail to secure to the stockholders a sure and satisfactory revenue. In support of this opinion, your committee will here introduce an extract from a letter written to the president of the company, by W. G. McNeil, Esq., civil engineer, after having explored the country, with a view to obtain the requisite information to enable him to decide upon the propriety of prosecuting this work. "The question, then, it would seem to me, is rather the amount of trade to be expected, than the efficiency and reasonable cost of the proposed road.—Looking at the fertility and extent of country that would usually seek this road as an avenue to market, I would almost advance the opinion that it could scarcely fail to be profitable, even should it divert no portion of the trade of the Erie canal." It is also a circumstance worthy of remembrance, that at the date of this letter, (June 4, 1831,) it was not expected that a route could be discovered requiring less than seven planes to be overcome only by the application of stationary power, whereas no such power will be necessary on the route now selected.

The Unadilla and Schoharie rail-road company were chartered, and their road surveyed some time since. It passes through Susquehanna, Schenevous, and Cobbleskill valleys, a most fertile section of the State, from Schoharie to Nineveh, or Bettsburgh, connecting the New-York and Erie railroad with this work. This important and necessary avenue cannot be constructed, or if constructed, must be useless, without the Canajoharie and Catskill railroad. Your committee are persuaded, that an examination of the map must satisfy the House that the necessity and importance of this work is such, that the interest and prosperity of the whole State requires that it should not be delayed.

Your committee find, by referring to the report of the chief engineer, that the amount expended by the Canajoharie and Catskill company, including iron and timber purchased, but not yet used, is $176,460 21; exceeding the amount set forth in their petition by $26,400, a portion of which has been expended subsequent to the date of the petitions.

Before dismissing the report of the chief engineer from further consideration, your committee beg leave to submit the following extracts. After setting forth the causes of the tardy progress of the work to which your committee have previously adverted, he says: "Yet, while the progress of every other public work in the State, (save that belonging to the State itself,) has been suspended, this work through the commendable and unremitted exertions of a few of the directors and stockholders to sustain it, has kept steadily on, and notwithstanding the variety of impediments interposed by the unfortunate state of the times, I am enabled to state, that the eastern and most expensive twelve miles of the road are graded and prepared for the reception of the superstructure; on the west nine miles considerable grading is done; the eastern six miles of superstructure are laid and ready for use; large quantities of materials purchased and on hand; one passenger and two transportation cars have been purchased, and are used on the six miles completed."

"Could ample funds be procured for an early commencement and vigorous prosecution of the work in the spring, I have no doubt but it may be completed in two years; and probably (should the season prove favourable) in time to do some of the fall business of 1839. The importance of facilitating this work, and of enlarging the plan for a double track, is too well known and appreciated by those whom I address, to require from me any further comment." Your committee annex to their report, the estimate of expenditures furnished by the chief engineer.

In conclusion your committee would observe, that the section of the State which now comes forward with an application for assistance, has never participated in the benefits of its munificence. Its population have given their countenance and support to great works which have extensively enriched others, and are justly regarded as the pride of the State; but upon them and their interests, these works have invariably operated most injuriously. By a little exercise of candid investigation, it will be discovered that the village of Catskill has had diverted from her market by our improvements, a large portion, perhaps two-thirds of that business, which would otherwise of necessity have found its way to it. This consideration alone, in the estimation of your committee, ought to be sufficient to incline the house to listen favourably to the prayer of the petitioners.

For the reasons which your committee have above set forth, and from the full conviction that the Canajoharie and Catskill Railroad is a work of necessity to one section of the State, and of value to the whole, your committee are desirous that it should be urged forward with all convenient speed to its final completion; and as it appears from their investigation, that this cannot be accomplished without the assistance of the State, your committee do respectfully recommend, that the aggregate amount of three hundred thousand dollars be loaned by the State to said Company, in such manner, upon such conditions, and with such security, as are particularly set forth in the bill which they now ask leave to present.

ESTIMATE

Of expenditures on the Catskill and Canajoharie railroad.

Catskill, January 1, 1838.

Estimate of expenditures on the Catskill and Canajoharie railroad.

For grading the 1st mile, including bridges,	$20,022 66
do 2d do do	11,068 60
do 3d do do	14,499 64
do 4th do in Oct. est.	6,272 09
do 5th do do	6,327 75
do 6th do do	1,825 53
do 7th do do	3,666 67
do 8th do do	4,063 34
do 9th do do	1,940 00
do 10th do do	3,056 67
do 11th do do	6,644 47
do 12th do do	3,681 34
do 13 to 21 m. inclusive	7,848 50
For six miles superstructure, (exclusive of iron plates,)	15,000 00
250 tons iron plates, &c. purchased and delivered,	17,500 00
Bal. of Smith & Bostwick, timber purchas'd	5,264 30
" Boyd, $2,437.20, Holters, $5,196, Danforth, $1.218.80=	8,852 00
Ties at Cairo, $1,500, Canajoharie, $600, Springfield, $800,=	2,900 00
One passenger and two transportation cars,	1,500 00
Expenses of engineering department,	19,526 65
	$161,460 21
For original surveys, costs and expenses of procuring right of way, &c.,	15,000 00
	$176,460 21

EPH. BEACH, *Engineer.*

Thos. B. Cooke, Esq. *President.*

Note.—The amount for "original surveys, costs and expenses of procuring right of way, &c." was communicated to me by the treasurer of the company.

E. B.

Letter from Ephraim Beach, Engineer.

February 10, 1838.

Hon. THOS. B. COOKE, President Canajoharie and Catskill railroad company.

SIR:—In compliance with your request to be furnished with a statement of the extent, probable cost, value and importance of the contemplated Canajoharie and Catskill railroad in the absence of documents necessary to present the subject in detail, I beg leave to submit the following general statement.

The Canajoharie and Catskill railroad, when completed, will be about seventy miles in length; its cost, if graded and completed with a single track, will be about $750,000; to which add for depots, cars, &c., to prepare the road for successful operation, $150,000; aggregate cost for single track and road, $900,000; if graded for a double track and completed with a single track, about $1,000,000; add for depots, cars, &c., $150,000; cost of single track, with double grade, with depots, cars, &c., $1,150,000.

The line of this road runs through a fertile and densely populated district of country, rich in agricultural and mechanical products. Flourishing villages are situated in the vicinity and along the line, within from four to six miles of each other, the whole extent, which now, with their products find their way to market by teams, for which this road, when completed, will be the main channel of communication; the business of which alone would afford a rich profit upon an investment necessary for the construction of a single track railroad. And when we consider the extent of country to be accommodated by this road, the immense tanneries, and other manufacturing establishments in the counties of Greene, Schoharie, Delaware and Otsego, it being the most convenient communication to market for the upper valley of the Susquehanna. Add to which, the prospect of a speedy communication with the southern tier of counties of this State, by the New York and Erie railroad, connected with this by the Unadilla and Schoharie. Also, the probable diversion of business from the Erie canal, when the eastern section is choked by the influx of produce from the west. Also, late in the fall and early in the spring, when the navigation of the Erie canal is closed by ice east of the intersection of this road, and open west of it, we are admonished of the propriety of grading for a double track, with the view of being prepared to accomodate the wants of the public by constructing a second immediately after the first is put in successful operation.

From the above, some faint idea may be formed of its "value and importance." When to the extensive district to be immediately accommodated, we add the more distant and extensive districts, the produce of which will be brought upon this by intersecting railroads, making this the main channel of communication, not a doubt can exist but that the stock of the Canajoharie and Catskill railroad will be profitable; hence it will be good security for the investment necessary for its construction.

It will be observed, that the estimate of the cost of this road is much less than the cost of any other railroad of equal extent that has been constructed in this State. The reasons are, first: The lands necessary for the road are principally gratuitously given, consequently no estimate is made for damages. Second: The line generally runs in the direction of the streams following their valleys; very few ridges are to be crossed requiring deep excavations, or valleys requiring heavy embankments. Yours, &c.

EPHRAIM BEACH, *Engineer.*

Letter from Benj. Wright, Engineer.

THOS. B. COOKE, Esq. President Catskill and Canajoharie railroad.

DEAR SIR:—Having been employed and associated with Capt. McNeil, as directing engineer of the Catskill and Canajoharie railroad, in the year 1831, I am well acquainted with the country through the whole line of road, and am knowning to all the facts as stated by Major Beach, in the annexed paper, as he was the engineer in 1831, and passed over the whole line, and is now the chief engineer on this work.

In the course of my duty in examining the route of the road at the period before named, I became satisfied of the great importance of this improvement, and its superior advantages by the main line and branches, to accommodate the various counties on the Scoharie and Susquehanna rivers and its tributaries, and which I can say will be better accommodated by this work than by any other which can be devised.

I concur fully in the statement herein given by Major Beach, in his views of the cost of the road, and also as to its profits; and subscribe to all his statements from my knowledge of the facts.

Very respectfully, your ob't servant,
BENJ. WRIGHT, *Civil Engineer.*
February 10*th*, 1838.

An Act to aid in the Construction of the Canajoharie and Catskill Railroad.

The people of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION I. Whenever the Canajoharie and Catskill Railroad Company shall have expended one hundred thousand dollars in the construction of their road, and shall produce to the comptroller satisfactory evidence thereof, by the affidavits of their chief, or other principal engineer, and two of the directors of the said company, and by the affidavits of such other engineers, directors or agents of the said company, as the comptroller shall reasonably require, he shall issue and deliver to the said company special certificates of stock to the amount of one hundred thousand dollars, bearing an interest of five per cent., payable quarter yearly. And whenever and as often as the said company shall have in like manner expended the further sum of fifty thousand dollars, and shall produce the like evidence thereof to the comptroller, he shall issue and deliver to the said company like certificates of stock for the sum of fifty thousand dollars, until he shall have issued and delivered said company such stock, to the amount of and not exceeding in the aggregate, the sum of three hundred thousand dollars.

§ 2. No part of the said stock shall be delivered to the said company, until the acceptance thereof shall be signified to the comptroller, by the filing in his office of a certificate of such acceptance under the corporate seal of the company and the signature of their president.

§ 3. Each certificate of acceptance, so executed and filed as aforesaid, shall be recorded in the office of the secretary of state, and shall thereupon become and be to all intents and purposes a mortgage of the said road and every part and section thereof, and its appurtenances, to the people of this state, for securing the payment of the principal and interest of the sums of money for which such stock shall from time to time be issued and accepted as aforesaid.

§ 4. The said stock shall be denominated "The Canajoharie and Catskill Railroad State Stock," and the faith and credit of the people of this state are hereby pledged for the payment of the interest and the redemption of the principal thereof.

§ 5. The said stock shall be issued in certificates not exceeding one thousand dollars each in amount, payable to the said company or their order, and may be assigned and transferred by the said company on books to be kept for that purpose at such bank as the comptroller may select, in the city of New York, or such other place in the said city as the Legislature shall at any time direct.

§ 6. The said stock shall be reimbursable at the pleasure of the Legislature, at any time after twenty years from the date of the respective issues thereof; and the interest thereon shall be payable quarterly at the office of transfer, on the first days of January, April, July and October, in each and every year.

§ 7. The said company shall, within three months after the receipt of the respective certificates for the several instalments of said stock, sell the same under the direction of the comptroller, at public auction in the city of New York, giving at least three weeks previous notice of the time and place of such sale in the state paper, and in two of the daily papers published in the city of New York; and the premium raised on any sale of the said stock, shall be paid into the treasury, for the use of the school fund.

§ 8 If the stock, or any part thereof, when offered for sale within the time above limited for that purpose, shall not be saleable at par, the said company may, with the advice and consent of the comptroller, defer the sale thereof for such other time as, by the comptroller, may be deemed expedient.

§ 9. The said company shall make provision for the punctual redemption of the said stock, and for the punctual payment of the interest which shall accrue thereon, in such manner as to exonerate the treasury of this state from any advances of money for that purpose: and the tolls and income which shall accrue from the use of the said road, when the same or any part thereof shall be constructed, after paying repairs and the necessary expenses of conducting the business thereof, shall be, and are hereby, pledged for the payment of said interest.

§ 10. No part of the stock so authorised as aforesaid, shall be issued to the said company until full and satisfactory evidence shall have been given to the comptroller and approved by the attorney-general, that no prior lien or incumbrance has been created or exists on said road or its appurtenances, except such lien or incumbrance as may have been created under this act.

§ 11. In case the said company shall make default in payment of either the interest or principal of the said stock, or any part thereof, it shall be lawful for the comptroller to sell the said road and appurtenances at auction to the highest bidder, giving at least six months notice of the time and place of such sale, by advertisement to be published once in each week in the state paper, and in two public newspapers printed in the city of New York; or to buy in the same at such sale, for the use and benefit of the state, subject to such disposition, in respect to the road or its proceeds, as the Legislature may thereafter direct.

THE INTERIOR OF A COAL MINE.

Translated from the Courier des etats Unis.
(Continued from p 610.)

This class of workmen, is filled only by those upon the spot; very few foreigners embrace this profession. How could it be otherwise? One can scarcely believe that the daily salary of the miner rarely exceeds the rate of two francs, and that it is for so trifling a sum that he subjects himself to privation and unheard of fatigues; that he exposes himself to dangers of every kind, and to numerous chances of violent death.

When he works, he has for clothing only a shirt and trowsers of blue cloth, open upon the breast, and the sleeves of which are raised to the shoulder; a hat of iron, wooden shoes and no stockings. The whole of his body is covered with a coat of thick and muddy soot, which leaves open to sight only eyes made red by incessant labor, and between his lips teeth white enough to excite envy in a woman. The layer of coal is not more than three feet in thickness; it is almost as high as the gallery. He extends himself face downwards, digs a furrow as deep as the layer, while uttering sighs which tear his breast, like a baker kneading. By the aid of a wedge that he buries to its depth with tremendous blows of a club, he succeeds in detaching from it enormous fragments; perspiration bathes his forehead, all his limbs tremble; his body is often even bruised in many places by blows from a mass of coal, or some splinters which have reached him, but there is no cession; he has under his eyes a rigid and pitiless overseer. There is a workman chosen among the oldest and most experienced to superintend the work. They give him the name of governor. This chief, almost as absolute as a captain on board ship, has not the habit of spoiling by excess of indulgence his subordinates so lately his equals. Some of the workmen called drawers carry away the coal as fast as it is broken up, in carts or in bags, which are loaded upon their backs.

The general work in the mine is interrupted one hour in the day; it is the hour of repast. When this hour arrives, every arm stops with wonderful agreement;—the pickaxes remain in the blocks almost falling out; the loads are let fall half way; every one moves; the most industrious have quitted their work; in two minutes the innumerable galleries are as full as our streets on feast day. From all quarters of the mine they assemble under a dripping roof, in a kind of square where many galleries cross and meet—an irregular and inclined polygon that they call a room—a magnificent room, in truth, with its polished pillars, where gold and azure are mingled with ebony; with its roof hung with drops of water like pearls of dew; with its thousand torches, which throw upon this scene a light as brilliant as that of the lustures and candelabra of our opera; a magnificent apartment, but where it is impossible to remain standing. All the miners seat themselves upon the damp ground in a circle, suspend their lamps to the roof, and draw their provisions from their sacks. Alas, with the trivial wages that are given, one may judge of the quality of their repast; it consists almost always of brown bread, milk, and cheese. Wine is an object of luxury; if any one among them have brought with them by chance, the fruit of their savings, or a present from their wives from some anniversary, do not think that they reserve it for themselves alone; they offer it to their comrades, and each bottle passes from hand to hand around the circle;—each one drinking and giving it up to his neighbor, each one wiping his mouth with his thumb; for their exists among miners an equality of affection as great as between brothers, and, as we have said, they never call one another by any other name. There is something noble and touching in this simplicity of name.

It is in the midst of these brave people, more than in the bosom of our proud cities, more than in the counting houses and saloons of the happy people of our time, the privileged of society, it is in the midst of these poor workmen, we say, that we find the spontaneous and disinterested practice of the two most beautiful precepts of the Gospel, labor and charity! How many virtues, how many acts of courage, self-denial and devotion have remained buried in these depths, where they flourish and the world will always be ignorant of it! The cloister have had their chronicles, their histories, but the mines, have they ever had them?

There is nothing in the world, not even the sombre and majestic appearance of an old cathedral, which awakens such severe, such solemn thoughts, as the interior of a mine. There every drop of water that falls, every echo that sounds, every light that shines, warn you as eloquently of your nothingness, as the funeral marble that is trodden beneath the foot, or the death-knell of a neighboring church. In a mine, man in vain attempts to master his emotions, to arm himself with a pretended courage; he feels that he is in the presence of death, and if the spectacle is new to him, it is difficult not to allow himself to be overcome by an involuntary error.

It is not there assuredly that a trappist would dream of digging his ditch; for it is the nature of man to cling to life closer, the nearer death approaches. Now, in the bottom of these infernal regions, death threatens him on all sides; it is at his feet; it is above his head; it is all around him; water, fire, earth, it clothes itself in every form; it borrows of all the elements to vary its means of destruction. Let one grain of sand detach itself; let a current of water break through the narrow layer of soil that restrains it; let a hollow and distant explosion interrupt the silence of the subterraneous echoes, and behold a troop of unfortunates belong no longer to the living! These galleries, so low that it is necessary to pass through them creeping, owe their foundation to late convulsions; strong pillars bend already under the weight of galleries that to-night, to-morrow, or later, will crush them like shattered glass. The heaps of earth that are seen on the surface of this mine indicate perhaps as many tombs; no cross, no stones, no imperishable garlands reveal them to the indifferent traveller;—but often towards evening, a mother, a widow, or orphans come to kneel there piously on the soil, bare and entirely denuded of grass.

This species of the earthquake is only the least of the dangers that threaten the miner; he has to dread more from the sudden inflammation of the gas; for the empire that holds rule over him, prevents him in many places, from making use of the beautiful and inappreciable discovery of Davy. If this meteorological phenomenon is not to his eyes the work of a secret power, or an infernal spirit, it is still in his superstitious belief, an accident that is not in the power of man to prevent the signal of almost certain death. But all these dangers are not the more real, because they are not beyond the knowledge of man; science and learning will soon succeed in preventing them entirely, or in rendering them infinitely more rare. It is not the same with instantaneous inundations. In a moment, at one blow of the pickaxe, one blow made carelessly, might inundate the mine, and this without any one having time to take one step backwards, to utter one regret for life, one thought for his family, one prayer to God. The existence of one hundred, and sometimes two hundred men, is thus thrown at the mercy of one imprudent laborer. Ask the miners to relate to you any of these catastrophes, all will make the sign of the cross. This mine where they work is a theatre of them; the youngest has been witness to them; not a single one among all who has not one of his friends to weep for.

A MUNIFICENT LEGISLATURE.

The Legislature of Tennessee has just closed its biennial session, the measures of which, it is truly remarked by the Nashville Whig, render it one of the most important and interesting that has been held for many years past.

First among the important measures of the late session stands by common consent, the establishment of the BANK OF TENNESSEE, (a *State* Bank) connected as it is with the magnificent appropriation of $4,000,000 to works of INTERNAL IMPROVEMENT, and $100,000 per annum to COMMON SCHOOLS.

Among the funds which will constitute the capital of the State Bank, are about one million and a half of dollars, received on account of the surplus Revenue; and the proceeds of the sales of the valuable lands in Ocoee district, acquired under the Cherokee treaty of 1836.

The State interest in works of Internal Improvement was apportioned by an appropriation of $650,000 to the Charleston and Cincinnati Rail Road; $650,000 to the Hiwassee road (running from the Georgia line to Knoxville;) $1,600,000 to roads in Middle Tennessee, and $1,000 000 to roads in the Western District; and in addition to these appropriations, $300,000 were apportioned to the improvement of the navigation of the rivers in each of the three divisions of the State. To ensure the prompt payment of the interest on the bonds to be issued by the State for purposes of Internal Improvements to enable the road companies to realize the investment without difficulty, the Bank of Tennessee was made the fiscal agent of the State.

Out of the nett profits of the Bank the handsome annuity of $100,000 is guaranteed to Common-Schools, and $18, 000 per annum to the county academies; and by the same act two half townships of lands in the Ocoee District are set apart for the university of Nashville and East Tennessee college, in consideration of the claims of those institutions on the State for lands south of French, Broad and Holston.—*Fredonian.*

COAL.

We are informed by a Pittsburg paper, that one thousand flat-boats have left that place the past year loaded with coal, worth it is supposed one million of dollars. The coal trade is very fast rising into importance. The quantity received in this city in 1831, was but 41,437 bushels, while in 1837 it amounted to 322,275. The coal of this vicinity is said to be of the best description for the production of Gas, which we hope to find shedding its mild radiance over our streets within a year from the present time. As some encouragement to this undertaking, it may be remarked that Gas shares stand higher in the market at the present time, than those of any other description of stock whatsoever. The Astor House pays five hundred dollars per month, or six thousand per year for Gas, which is far more economical even at that price, than sperm oil, or candles.

It might be amusing to some of the Eastern Railroad Directors, to take a view of the Locomotives which are in operation for the purpose of transporting coal from the mines in this vicinity, into the city. They are generally sixty feet in length, five feet wide, and seven feet in height, bearing the similitude of a wagon and four yoke of oxen. Occasionally, however, we meet with an improvement npon the common construction, in which the moving power consists of horses, oxen, jacks, jenneys, and mules; and all sizes and colors, intermingled at random.

One of this construction which might be called the "Novelty," passed us yesterday on Main street, composed, in part, of eight oxen, one horse and three mules, forming according to the best estimate we could make, a twelve horse power, sufficient on the rail way, to move one hundred tons at the rate of ten miles an hour, while here the power was expended in moving three tons at the rate of two miles an hour, which is not far from the average velocity of our improved locomotives when under full headway.—*From the St. Louis Argus.*

INTERNAL IMPROVEMENT CONVENTION.

We always take pleasure in giving publicity to any plan of operations recommended by the people, for internal improvement purposes: and especially so, when they come to us clothed in the same spirit of candor that we find in the proceedings of this convention. We are indebted to the Olean Times for a copy of the proceedings. The convention was composed of delegates from the western counties of this state and Pensylvania, and was held at Ellicottville, Cattaraugus county.

Mr. Bacon, in behalf of the committee appointed for that purpose, reported the following resolutions, which were unanimously adopted:

Resolved, That when experience has so fully proved the great benefits which result to all classes of community from liberal appropriations for works of internal improvement, both in this and other states of the Union, in the opinion of this convention our legislature should vigorously prosecute the system within her limits, and should extend to those sections of the state which have not been the recipient of its favors—the "justice so long deferred," and proceed to the speedy completion of the works now authorised by law.

Resolved, That the New York and Erie Railroad is one of the most gigantic projects of the age—in importance, second to none in the state or nation, and that owing to the magnitude of the work and the unparalleled commercial embarrassments of the country, delays and difficulties must continue to impede its progress by the company—an enlightened policy should therefore dictate to our legislature, to extend such aid as may be requisite for its immediate prosecution, or to assume its construction, and become the owners of the work—and this too as a permanent act of justice to the southern tier of counties in the state.

Resolved, That our legislature be petitioned to amend the act authorising the construction of the Genesee Valley Canal, that the locks of the said canal may be built of the same dimensions and of similar construction with the locks upon the enlarged Erie canal.

Resolved, That the early completion of the Genesee Valley canal is of vital importance to this section of the state, and that the people interested have reason to complain of the delays which have hitherto attended its progress, and that it is expedient that through the legislature an enquiry may be had into the causes of delay, the progress actually made, and the intentions of the canal commissioners in regard to the same—and as the funds are now appropriated for its construction, that our citizens have a right to expect that the canal commissioners will locate and put under contract the remaining portions of the work early the ensuing season, and vigorously prosecute the same to its final completion.

Resolved, That we learn with pleasure that the report of Major G. W. Hughs, Topographical Engineer, to Congress on the subject of the improvement of the Allegany river will be highly favorable to its improvement for steamboat navigation, and that in view of the advantages which are to unite with it, we regard it as one of the most important links in the whole chain of internal inland communication in the Union—and as such we confidently hope and believe Congress will appreciate its national importance, and make a liberal appropriation for the accomplishment of the object.

Resolved, That in the opinion of this convention the interests of this state and of the Union would be greatly promoted by the immediate completion of these three works, that while we have a deep sectional interest in their construction, we view them as national in their character and general in the blessings which they would bestow—to none injurious in their operation, but extensively beneficial to all—and that we rely upon the wisdom of an enlightened State and National Legislature, to adopt efficient measures for their speedy accomplishment.

Resolved, That the proceedings of this convention be forwarded to our Members of the Legislature, and Representatives in Congress, and the Canal Commissioners.

Upon the adoption of the resolutions, the convention was addressed by the President, Messrs. Crooker, Bacon, Almy, King, Leavenworth, and other gentlemen, and great unanimity of spirit prevailed in the proceedings.

MICAH BROOKS, *President.*

Joseph Wait,
B. Chamberlain, } *Vice Presidents.*

D. R. Bacon,
S. M. Russel, } *Secretaries.*

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

*** Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL,

AND

ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, DECEMBER 2, 1837. (Published March 3, 1838) VOLUME VI.—No. 48.

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SEMI-ANNUAL REPORT OF THE SOUTH-CAROLINA CANAL AND RAILROAD COMPANY, TO DECEMBER 31, 1837.

The statement of the affairs of the Company, by the Secretary and Treasurer herewith presented, shows the income of the half year ending the 31st December, 1837, to be $158,137 36

From which deduct the current expenses,	117,897 60
There remains,	$40,239 76
From this a dividend is declared of three dollars per share on 12,072 shares paid in full on or before the 1st July last, amounting to	36,216 00
Leaving a balance,	$4,023 76

The debts of the Company amounting to $501,674 81 will be paid from the instalments yet to be received on the stock issued in February last, except the State loan, and interest, not due before the year 1847.

The payment of these instalments will, it is believed, be greatly facilitated by the large transfers of the stock about to take place.

The road and machinery are now in better order than at any former period; and the anticipation of the public as regards its usefulness, is now in some degree realized, though the profits to the stockholders has not been in proportion to the increase of business on the road—it having arisen principally from the freight of cotton down, without an equal proportion of freight upward, and passengers.

By comparing the last half year's accounts with those of the preceding half year, ending 30th June last, it will be seen that while there has been a gain in the downward freights of $32,225 92
There has been a loss in the receipt for passengers of 11,121 63

The quantity of embankment in the last half year is quite as much as was expected when the July report was made—and its progress gives assurance that the whole may be completed by October next; their being sufficient force under responsible contractors to have it done by that time.

The whole extent to be embanked, not exceeding twenty-five miles, all parts of which are in progress—in detached spaces all throughout the line, and divided among twenty-five different contractors, with twenty to one hundred hands each, so distributed as not to interfere with each other. Nine Mile Bottom, Four Hole Swamp, Polk Swamp, Cattle Creek, and Edisto River Swamp, besides many extensive high places on the upper division of the road are all about completed—from the hundredth mile upward (36 miles,) there is not three miles in extent to be embanked; and by July next it is believed there will not be over three or four miles high work to be finished.

The embankment yet to be made is estimated by the superintendent of the road at 745,000 yards, at a cost of 20 cents per yard, will amount to $149,000.

The progress with *new Iron* has not been so great. All that was imported and not laid on the road before the first of July last, has since been put on, covering about twenty miles more than was at that time laid down.

About 700 tons more which has been imported this fall, is now going up for distribution on the worst parts of the road, particularly on the curves between Aiken and Hamburg. This will complete about eighty-six miles, and leave to be done fifty miles; requiring two thousand tons at a cost of about $150,000.

This Iron should be ordered as soon as possible, as it cannot be too soon placed upon the road.

The very respectable house in London, who had the last order of the company, for a sufficient quantity to complete the whole work, have sent forward one thousand tons, (300 of which was lost on the passage out, on acoount of the underwriters,)—the balance of the order they suspended, in consequence of the great commercial embarrassments which so generally pervaded that as well as this country.

Other improvements have been made by extending tracks to make room for receiving and delivering freight—sliding sections for eight wheeled cars—and increasing the number of turnouts which average within four to five miles of each other, with two yet to be built, through the whole line.

Several of the houses for carpenters have been finished, and others purchased, so that nearly all the divisions, (18) are furnished with a house for the carpenter, and another for the negroes, on land belonging to the company.

A large importation of wheels and axles has been made to supply the place of defective ones under the freight cars, which have been frequently giving way. The new pattern are formed very superior, and give much security to the cars supported by them.

Since the destruction of Eason & Dotterer's Foundry, we have found it necessary to establish a small one, which has been very successfully employed in turning out boxes, and other small work, both of iron and brass.

Two large passenger cars, on eight wheels, have been built since July last, capable of carrying 40 passengers each—making four of this class—which adds much to the ease and comfort of the passengers.

Several eight wheeled freight and baggage cars have also been completed, which, with those nearly finished, will increase the number to twenty-seven. These carry more than double the quantity of the load of the small cars, and with much more safety against fire and water.

The number of freight and passenger cars has been fully equal to the demand for them in the most pressing season of business.

The power on the road has been fully equal to the business offered, except cotton down, while the rivers were too low for steamboat navigation.

For the last three months we have been obliged to send up empty cars to bring down cotton, there not being freight enough to load them all. This has increased the receipts without adequate profit, the expenses being about equal to the amount received when the cars are only loaded with cotton down.

After it was found that there would be disappointment in getting the Engines contracted for with Eason & Dotterer's—two were obtained from Philadelphia, and two were re-built by M'Leish and Smith; these four, with those which the large force in our shops were able to keep in order, have been as many as could be employed advantageously, and equal, if constantly engaged, to swell the business to $500,000 per year. The amount received in the last quarter being $103,923 81 including mail, and 25 per cent more could have been earned if the passengers and upward freight had offered as freely as did the cotton down.

It is a source of much satisfaction that we have been able to perform the trip with passengers through each way daily with as little inconvenience, thus far, this winter, as in the summer months; starting at 6 A. M. and arriving frequently by half past 4 to 5 P. M.

This gives assurance that when the new iron is on the whole length of the road, the trip may be performed between sunrise and sunset in the shortest days.

It has been found practicable to make the run through in the most severe weather, in storms and freshets, when the travelling on the common roads was entirely broken up, and even the mails did not reach the city on other routes for several successive days, our cars came in and went out, losing but a single trip from these causes for the season.

A source of much greater satisfaction is in the fact that a passenger's life has not yet been lost upon our road, although the number carried upon it, the last seven years, has been nearly equal to the whole white population of the State; and in the last year, exceeding the whole population of the city, being nearly 42,000. No other mode of conveyance over the same distance, ever presented equal safety to passengers.

In making these remarks, we have not forgotten the loss of several valuable lives of those in the company's service; every means is taken to render their safety as perfect as that of the passengers. We look much to the good character and prudent management manifested in those engaged in the employ of the company, to render their duties pleasant, as well as secure against accident.

Much has been said of the necessity of constructing a double track to enable the company to convey all the freight that may be offered, without interfering with the passenger trains.

Double the business now done might be carried over the road on a single track, when the slidings or turnouts now being completed are all open for use. And it will only require a system of arrangement, which a little experience will suggest. Less interruption in passin has occurred the present season, when 5 or 6 trains are met on the road, than with half the number, in years past, when the subject was not so well understood, and the accommodations incomplete.

Economy, too, would forbid the construction of another track, while it can possibly be avoided—as the timber destroyed on the line for the purpose, would so diminish the quantity as to increase much the cost of repairs—the quantity of repairs too would be doubled; therefore the expense of keeping up the double road might be fairly estimated at three times the present cost.

It is now found that about one-fifth of the railsills are required to be replaced with new annually, at a cost of about one hundred thousand dollars.

There is another fact important to be remembered, that the decay of a wooden road is much less when frequently used, than when it is seldom passed over—this has been proved by the state of the timber in the turnouts least used, compared with that in the main track, immediately opposite. The jarring caused by the passing trains keeps out the worms, and otherwise prevents decomposition, which would take place when left at rest in the earth.

This is as clear in the vegetable as in the *animal* kingdom, which cannot have escaped the notice of every man of observation, that both unemployed soon become a worthless material.

Mr. E. R. Dorrill, who has been employed locating vacant land for the company, has brought in plats of all he could find, and also of such as belongs to the State road, which would be desirable for the company to own; also of lands purchased this side of Branchville and connecting plats of adjoining lands in the neighborhood.

The vacant lands run is 3212 acres.
That belong. to State r'd 1150 "

Believing that Mr. Dorrill's services could not be employed advantageously for a further time, we have closed the engagement with him.

The land purchased and paid for in the last six montas is,

On the 19, 20th	Miles,	450 A.	$675
81, 82	"	17 "	100
109, 110, 111	"	1650 "	1650
House and lot, 129	"	5 "	395
86	"	10 "	50

The company has been indicted for using steam below Line-street on Charleston Neck, it being regarded as a nuisance by some of the inhabitants of that neighborhood.

Should this case be finally decided against the Company, it will be a matter of consideration whether the Depository be removed beyond Line-street, or the great expense of horse power be incurred, which could not be less than from $8 to 10,000 per year, and the despatch of trains much retarded both in coming in and going out, and by this change, a greater inconvenience would be experienced by the public in having the *cross-roads* constantly occupied by passing and re-passing cars.

The Committee appointed in July last to confer with the Stockholders individually, respecting the sale of their shares in this company to the Louisville, Cincinnati and Charleston Rail Road Company, have reported to an adjourned meeting, that they had obtained the sanction of a large majority to a sale of their stock on the following terms:

"$125 per share on the old stock, and $25 per share advance on the new stock, payable in for every share we sell, one share in the L. C. & C. Company stock with $5 paid thereon, and for the balance, one third in cash, one third in one year, and one third in two years, with interest from date of transfer secured by a mortgage of the property."

To which that company by its President has agreed.

This change of stock is intended to give that company the control of this road, so that they can progress with their great work, and connect it with the city of Charleston by means of this road, and to commence a line to Columbia which the South Carolina Canal and Rail Road Company are authorised to do by their charter, but have not had the means to accomplish; nor did the company think it advisable to progress with it till the line to Hamburg was further improved by completing the embankment, and putting upon the rail the heavy class of iron, which will take another year to complete, and neither means nor labor should be detracted from its early accomplishment.

Respectfully submitted,
TRISTRAM TUPPER, *President.*

In pursuance with a resolution adopted, the following Preamble and Resolution offered by Alfred Hugher, Esq., and adopted by the meeting was ordered to be published:

The Stockholders of the South Carolina Rail Road Company, aware of the importance of the occasion which calls them together, not only as the owners of this stock, but as citizens of the State, desire now to avail themselves of the opportunity afforded of placing upon record those feelings which the day is well calculated to excite. Like their forefathers, the authors of the greatest and noblest revolution that the world ever saw, they have witnessed the commencement of a work, the grandeur and magnificence of which seemed at first too striking to authorise even a faltering anticipation of success. In a region of perfect freedom, where no power but the power of the common good is felt, and where no despotism is known but that of which public opinion holds the sceptre, it has been boldly undertaken to accomplish an object which the rulers of nations have never conceived. To surmount the difficulties of nature, and thus to become entitled to her protection and reward, has excited our people to this vast enterprize. To do what man has never done before, and to enjoy what man had never hoped to attain, is now the purpose which we are assembled to consider, in compliance with our own aspiration, that the aid of heaven will sustain us, and thus sustained, with our own solemn convictions that success is certain, we now take the decisive and all-important step which is to insure to South-Carolina the blessings of that wealth and prosperity which are the results of an industry that never tires, and of a spirit that never quails. Under the full and uncontrolled influence of these sentiments.

Be it Resolved, That the Stockholders of the South-Carolina Canal and Rail Road Company, tender to the Committee who have acted in their behalf, their warmest thanks and the expression of their entire approbation, for the able and enlightened report which has just been submitted, and to the same Committe their sincere congratulation at having thus been the successful agents in performance of a duty which is identified with the glory and the happiness of their country.

NOTE.—Income derived from passengers,	$152,768 40
To which add Mail, Rent and Storage,	5,368 96
Total	$158,137 36

REPORT

Of the committee on railroads, on the petitions of the president, directors and company of the New-York and Erie railroad company, and of sundry citizens.

Mr. Holley, from the committee on railroads, to which was referred the petition of the New-York and Erie railroad company, of sundry citizens of the counties of Allegany, Broome, Cattaraugus, Chautauque, Chemung, Delaware, Oneida, Orange, Otsego, Rockland, Steuben, Tioga and Tompkins, of the chamber of commerce of the city of New-York, and the memorial of the mayor, aldermen and commonalty of the same city, praying the State to subscribe three millions of dollars to the stock of that company, reports:

That the New-York and Erie railroad company was chartered by an act of the Legislature, passed on the 24th day of April, 1832, with a capital of $10,000,000 with power to construct a single, double or treble railway, from the city of New-York, or some eligible point in its vicinity, through the southern tier of counties, by way of Owego, to the shore of Lake Erie, at some eligible point between the Cattaraugus creek and the Pennsylvania line, and with power to transport thereon property and persons, for the term of fifty years from the passage of the said act. By an amendment to the charter, passed April 19, 1833, the company is empowered to commence operations whenever one million of its stock shall have been subscribed.

The charter reserve to the State the right, after the expiration of ten and within fifteen years from the completion of the road, to take it with its fixtures, for the public use, on paying the cost thereof to the company, with interest at the rate of fourteen per cent per annum.

In July, 1833, one million of dollars was subscribed to the stock of the company, and further subscriptions have been since made, at different times, making the whole amount of subscriptions to the stock at the present time equal to about $2,583,200. The total amount of money received by the company since its organization to the 31st December, 1837, is $338,637 15.

In 1834, in anticipation of the ultimate participation of the State in this great enterprise, which was desirable, as well to ensure the more speedy completion of the work, as of assuring protection to the individuals who might embark their means in the undertaking, the company applied to the Legislature to authorize a survey of the route of the road by engineers under the direction of the State authorities. In pursuance of this application, a law was passed in that year appropriating $15,000 for the survey, and directing the Governor to designate an engineer.—Benjamin Wright was the individual selected by the Governor to perform the service, and under his direction a survey of the whole line was completed in December of that year. The survey was careful and thorough, and its results were signally favorable to the success of the enterprise. The board of directors thereupon felt authorized to enter upon the actual construction of the work, and accordingly, in October, 1835, placed a section of the road 40½ miles in extent under contract, at prices much below the estimate of the engineer. Anxious, however, to ensure a more speedy completion of the whole work than could reasonably be expected, considering its magnitude, from the unaided efforts of private stockholders, the company, in conjunction with numerous citizens of the southern counties, made an application for aid to the Legislature of 1836, which resulted in the passage of a law, loaning the credit of the State to the company, for an amount not exceeding three millions of dollars. By the conditions of this act, however, the company was required to make large preliminary disbursements, before any part of the loan could be used; and before these disbursements could be made, the untoward events which produced the present unfortunate condition of the currency of the country, put it entirely beyond the power of the company to avail itself of the provisions of the law.

The company has, therefore, been obliged, after an expenditure exceeding three hundred thousand dollars, to arrest entirely the prosecution of the work, and to discharge the laborers and engineers. The work being thus suspended, the intended aid of the Legislature of 1836 being rendered unavailable by the circumstances of the times, and the whole enterprise being subjected to most injurious delays, if not to entire failure, without the further assistance of the State, the directors, in conjunction with a large number of citizens of all the southern counties, pray the Legislature to authorize a subscription on the part of the State to the stock of the company, for an amount not less than three millions of dollars.

Your committee are unanimously of opinion, that the aid of the State ought, in some mode, to be extended to this company, either by a subscription to its stock, as prayed for, or by such a modification of the law of 1836, as shall render the loan therein provided for effectual towards aiding in the construction of the work.

It is evident that the Legislature of 1834, by authorizing the appropriation of $15,000 for a survey of the route of this road, regarded the enterprise as one of such public importance as to require and justify the interference of the State in promoting its accomplishment; and the law of 1836, authorizing a loan of three millions of dollars to the company, upon certain terms and conditions, in the judgment of your committee, is a deliberate legislative sanction, as well of the necessity and practicability of the undertaking, as of the propriety of lending the credit of the State to ensure its completion.

The law of 1836 provided that when the company should have completed a single track of railroad from the Delaware and Hudson canal, to the point where the road should cross the Chenango canal, a distance of about 145 miles, the Comptroller should issue special certificates of stock to the company, to the amount of $600,000: that when the company should have in like manner completed a continuous line of such road from the Chenango canal to the Allegany river, a distance of about 180 miles, it should receive the like certificates $700,000: that when it should in like manner have completed a continuous line from the Allegany river to Lake Erie, a distance of about 65 miles, it should receive like certificates for $300,000: that when it should in like manner have completed such continuous line from the Hudson river in Rockland county, to the Delaware and Hudson canal, a distance of about 77 miles, it should receive like certificates for $400,000: and that when it should in like manner, have completed a continuous line of double track railroad in this State, from the Hudson river to Lake Erie, it should receive like certificates for one million of dollars.

Independently of the disasters above alluded to, which rendered this law unavailable, its provisions are evidently so rigorous, requiring each portion of the road, and those very large and expensive, to be completed, before the several amounts of stock should be actually used, that even in ordinary times, private or corporate capital would be very likely to prove unequal to the exigency. Under the existing circumstances of the country, the work must probably be either wholly abandoned, or the aid of the public credit must be so liberally and efficiently extended to it as to insure its prosecution.

The length of this road from the Hudson river to Lake Erie, as given by Judge Wright's survey is 483 miles. More recent examinations have already reduced the distance on particular sections, and it is altogether probable that the length of the road, as it shall be finally established, will not exceed 450 miles.

The difficulties originally apprehended in the graduation of the road, from the undulating and elevated character of the country to be traversed by it, were most strikingly diminished by the examinations of Judge Wright, which disclosed the important fact, that far the largest portion of the road could be carried along the valleys of streams intersecting that region, through all of which the acclivities are gentle, and perfectly easy of ascent. By that survey it appears, that one continuous section of 125 miles in length is situated on the margin of the Susquehannah and its tributaries; one of 69 and another of 39 miles along the Delaware and its principal confluents; and that other minor sections along the smaller streams, including 19 miles in the valley of the Ramapo, make up a total amount of at least 400 miles, in which the route of the road obtains the important advantage of following the margin of water-courses. Of the remaining portions of the line, the ascents are more severe, and the graduation more expensive. Yet, with one exception, the difficulties here are not formidable in the way of the construction of the road, or of its advantageous use. The exception alluded to, is the passage of the Shawangunk ridge, in the county of Orange, on the east side of the Delaware and Hudson canal, where a descent of 350 feet must be overcome in three miles. This obstacle may be surmounted by a deep cut in the ridge, at an expense of about $70,000, or by a tunnel 900 yards in length, and cost $175,000. Whatever plan for passing this ridge may be adopted, the total expenditure in constructing the whole section will not exceed from two hundred to two hundred and fifty thousand dollars. The steepest grade required on this section, and of course on the whole line of the road, will not exceed eighty feet to the mile.

The expense of constructing the road for the whole distance from the Hudson to Lake Erie, with a single track of rail way, according to the estimate of Judge Wright, would be $4,762,260. This sum, it will be seen in the annexed report of Edwin F. Johnson, Esq., an engineer of great intelligence and experience, is increased by the addition of extra expense for iron rails on 70 miles of steeper grade, and of 25 per cent. for advance in prices, superintendence, &c., to the sum of $6,390,325, for a single track.

For information in relation to the practicability of the proposed work, the probable returns of revenue, and the general benefits to result from it as a great thoroughfare of communication, your committee refer to the report of Mr. Johnson, which has, at their request, been put into their hands, and which they have made an appendix to this report. The facts, statements and conclusions furnished therein, have been carefully considered by the committee, and they have full confidence in their correctness, and beg leave to refer the House to it, not only for all necessary lights in relation to the subject in hand, but for much valuable information touching the whole subject of Railroads as a means of internal improvement.

In reference to the general importance of this road as a great public improvement, affecting most deeply the prosperity of this State, as having become indispensable, in consequence of the public works, completed and in progress, of rival States, to secure to ourselves our just share of the western trade, and as being called for by a just and equal regard to the claims of the southern counties, the committee will not enlarge further than to express their thorough conviction, that every consideration connected with this subject requires, that a fostering care of this great enterprise should be regarded as part of the settled policy of the State, to be executed with vigor and without delay.

The committee are of opinion, that a proper modification of the law of 1836 will afford to the petitioners the aid required, and have instructed their chairman to ask leave to bring in a bill amending that act, so as to authorise the Comptroller to issue the special State stock therein provided for, in smaller and more convenient sums, upon satisfactory proof being made to him of the previous payment by the stockholders in good faith of sums from time to time, equal to the amount of State stock to be issued.

An Act to amend the act entitled "An act to expedite the construction of a Railroad from New York to Lake Erie," passed April 23d, 1836.

The people of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. When the New York and Erie Railroad Company shall produce to the comptroller satisfactory evidence by the affidavits of the treasurer and two of the directors of the said company, that the sum of three hundred thousand dollars has been expended in the survey and construction of their Railroad, he shall issue and deliver to the said company, special certificates of stock to the amount of three hundred thousand dollars, bearing an interest of four and a half per cent., payable quarter yearly. And it shall be the duty of the comptroller to issue and deliver to the said company from time to time, further like certificates of stock, amounting at each delivery to not less than one hundred thousand dollars, whenever satisfactory evidence shall in like manner be furnished to him that the proceeds of the stock previously delivered has been expended in the construction of the said Railroad; and also, that further instalments on the capital stock of the said company have been paid to their treasurer, amounting in each and every instance to the full amount of the stock to be from time to time applied for and delivered as aforesaid, until the stock so to be issued and delivered by the comptroller, shall amount to the sum of three millions of dollars.

§ 2. The first section of the act hereby amended, is repealed; and the first section of this act is substituted in its place.

From the Bridgeport Farmer.

In a recent communication published in your columns, I proposed to consider at some future period, the benefits of the Housatonic Railroad to the city of Bridgeport, its bearing on the interests of the citizens generally, (should she be so fortunate as to secure it,) as also the danger of her losing it through apathy or indifference. To enter into a minute detail of all the benefits that would result to the city from this Railroad, which if carried into effect is to connect Bridgeport with West Stockbridge, in Massachusetts, where it will unite with three important roads, the Albany, Hudson and Boston, would require more room than could well be assigned to a newspaper communication. Indeed a long course of years will be required to develope to their full extent, the vast resources of the rich, fertile valley of the Housatonic, through which this road is located, for more than 70 miles. The present trade of this extensive and interesting section of country, now diverges in almost every direction from the valley, and thus does much for the support of several towns on the Hudson, particularly Hudson and Poughkeepsie. It also furnishes a large amount of aid to the several towns east and south, from Springfield, on the Connecticut River, to Norwalk, on the Sound. The amount of trade that Bridgeport now enjoys with the Valley, is very limited, and does not exceed much beyond the town of New Milford. Indeed, the trade of New Milford itself is also divided between several markets on the coast and North River, while it is well known, by all who are acquainted with the business operations of the Valley, that its present trade is north of that township.

By comparing the present internal resources of Bridgeport with what they will inevitably be when this Road is accomplished, we cannot fail to perceive, that all the anticipations of the most sanguine friends of the project in reference to the prosperity of the city of Bridgeport, will be realized. The distance from Bridgeport to the north line of New Mil ford, is about 40 miles. Nearly the whole internal trade of Bridgeport is drawn from the area of country lying between those two points, and extending from east to west on the average not to exceed ten miles distance, making together 400 square miles. It will doubtless be admitted on all hands, that no more than one half of the trade of this section is with Bridgeport, leaving her in possession of 200 square miles for her support.

Let us now examine the resources she would enjoy provided the Railroad should be completed and put in successful operation to the city. From a point in Newtown (where an important depot will be established for the accommodation of the surrounding country,) to a few miles south of West Stockbridge, a distance of say 70 miles, with an average width of at least 20 miles, viz: 10 miles on each side of the road, the business of the country will as naturally and certainly flow on it, and be carried to Bridgeport, as the tributary streams of the Housatonic will continue to empty themselves into its bed, and pass off to the Sound. Here is an area of 1400 square miles; to which add one half of the country south of Newtown. 10 miles in width, and you have about 1800 square miles. All this can be relied on with certainty at all seasons of the year, and is a section of country highly productive, even at present, in its agricultural and mineral resources. Much matter has already been laid before the public on the subject of the mineral resources of the Valley, and its hydraulic powers. The great expense of transportation to tide water, has hitherto prevented a developement of many of its most valuable minerals, such as granite, porcelain marble, clay, and all of which are of superior quality, but are lying dormant for want of the facilities of transportation. The immense water power is also lying dormant from the same cause, except so much as is used for the manufacture of iron. I believe I hazard nothing in saying, that no valley or section of country in New England, of the same extent, contains as much real wealth as Housatonic Valley, or that can furnish the same amount of local support to a Railroad in the transportation of tonnage. Much of the produce of the country north, east, and west of the northern termination of the road, will find its way to Bridgeport for a market, in the winter months, by means of the junction of the Housatonic with the three roads above named. In a word, it will form the great thoroughfare and grand outlet for all the trade and travel, north, east, and west, of its northern termination for a great distance, for at least four months in the year.

From the material now before us, we see that with the benefit of the Railroad, Bridgeport would enjoy a communication with an interior of country, at all seasons of the year, at least seven and a half times greater than at present; while the produce and transportation of the Valley will increase with astonishing rapidity, in consequence of the facilities the Road will afford, and that the four months suspension of navigation on the Hudson River would be the harvest season of business in the city of Bridgeport.

Possessing, as Bridgeport certainly does, one of the most delightful and healthy locations in the country, with a safe and commodious harbor, and a guarantee already given that it will be made navigable at the expense of the general government for vessels of the large class, and with the prospect of so extensive a communication with an interior so abundant in its resources, who can doubt for a moment that in a few years she will outstript in business, population and wealth, the largest and most flourishing cities in the State? For who does not see that she would stand without a rival in the extent of her internal resources? The common sense of mankind, and the experience of all civilized nations, concur in establishing beyond the reach of controversy this great truth, that all commercial cities in all ages, have had, and ever must have, their origin in, and drive their constitutional support and prosperity, mainly from, the agricultural and mineral productions of the earth, and that ordinarily their prosperity and wealth are increased in exact proportion to the extent of those resources, and the facilities given to their transportation.

Commerce is nothing more or less than the exchange of one thing or commodity for another. The commerce or trade of a city, is of two kinds, internal and external. Its internal communication and trade are the basis of its external commerce; all the surplus produce of the country, which is developed by labor and enterprize, whether agricultural or mineral, is carried to some commercial town or city by some mode or other, and exchanged for other commodities and things, of which the country stands in need, while the city favorably located for carrying on an extensive trade supplies itself with the means of procuring the foreign article, by the very commodity that she secures by her internal trade; hence one of the causes of a more rapid advance in the wealth and prosperity of the city than the country, that while the country only enjoys the benefit of the internal trade, the city, from the very nature of her position, unites the foreign and domestic both in one, and renders them equally subservient to the general good. Now let us apply these truths to the case in question. In the comparison that I have drawn between the present resources of Bridgeport, and what they would be with the Railroad and its several connections, it appears that her resources during the whole year, would be nearly eight times what they now are; and including the extra winter trade, would doubtless increase to ten times its present amount; or that her present internal resources are derived from 200 square miles of country; whereas, she would by means of the Road, secure what would be equal to 2000 square miles. If for example, 200 square miles will produce a trade between the country and city of $500,000 annually, (which is by far too low an estimate,) and the profit on the trade is laid at 10 per cent, producing an income of $50,000; then 2000 square miles equally productive, would afford a trade amounting to $5,000,000, which at the same rate of profit would produce an income of $500,000, from which deduct the supposed profits of the present trade, and you have remaining the sum of $450,000. Allow 50 per cent of that amount for the services of the dealers and the use of their capital, and you have remaining $225,000 as the nett annual proceeds arising from the improvement in question.

It will be seen that the foregoing estimate, is based solely on the domestic trade, and that no allowance has been made for the profits of a foreign commerce. Now $225,000 nett annual income, would be equal to an increase of the wealth and permanent capital of the city, of $3,750,000; whereas the whole amount necessary to accomplish this great and desirable object is but $1,000,000. I am aware that various objections are raised to this project, and what great project was ever commenced that did not find its opposers? the Erie canal was opposed and ridiculed at one time, and was considered by a vast majority of the people as utterly impracticable. Clinton, the great benefactor of his country, and the father of the system of internal improvements, received even the curses of those, who, when the project had succeeded, were compelled to do him honor; and that work which, during its progress was stigmatized with the appellation of Clinton's big ditch, has already been the source of millions of wealth, both to the metropolis, and the interior; is the pride and boast of the empire state, and imperishable monument of Clinton's well earned fame. It has been the fate of almost every useful project, not only to meet with honourable opposition, but to be compelled to resist the torrents of ridicule, and brook the finger of scorn. Ridicule is not unfrequently successful in accomplishing its object, but is nevertheless a dangerous weapon to him who uses it; as when it fails of success, it invariably recoils upon its author. Let us suppose for a moment, that all the world had hitherto entertained the same views of projects, as are entertained by some of the citizens of Bridgeport, of the project in question; what would have been the condition of the world at the present day? Say they, we desire to pursue the course that was adopted by our forefathers, and do not approve of new projects that break in upon old established habits and customs, while all the blessings they enjoy above the savage, are the fruit of projects which were once innovations upon old established maxims, habits and modes of thinking; opposition therefore to any given project, argues neither for nor against its practicability or its usefulness, as good and bad projects have alike met with the same opposition. Reason is the standard, to the bar of which, all projects should be summoned; to this standard I ask the reader to bring the facts and arguments herein submitted, and decide whether the project in question is worthy of the attention and support of the city of Bridgeport. The danger of the road being lost to this city, is a subject that should awaken the anxious inquiry of all the citizens, and induce them to simultaneous action. The question with Bridgeport *was*, shall we have a Railroad built or not? The question *now is*, shall the Railroad which will *certainly be built*, come to Bridgeport or not? This subject I shall discuss in a subseqnent communication. In conclusion, I beg every citizen to calmly and dispassionately weigh the subject in all its bearings. the question now presented is a great and important question, and on a right decision depends much of the future good of this most interesting city.

NEW YORK CANALS.

The receipts for tolls on the New York Canals during the year 1837, were as follows:

Erie and Champlain Canal,	$1,274,403 94
Oswego Canal,	24,884 97
Cayuga and Seneca Canal,	16,648 77
Chenango Canal,	4,955 89
Chemung Canal,	4,342 99
Crooked Lake Canal,	1,547 61
Total receipts,	$1,326,781 17

PENNSYLVANIA CANALS AND RAILROADS.

During the year 1837, the receipts for tolls were as follows, viz:

State Canals,	$473,261 11
Railroads,	285,504 01
Schuylkill Canal,	604,189 57
Lehigh Canal,	147,266 74
Union Canal,	107,590 37
Total receipts, Pennsylvania,	$1,619,814 80
Total do. New York,	1,326,781 17
Balance in favor of Pennsylvania Works,	$293,030 63

In the above statement we have included the tolls taken on the seven New York State Canals, and those on the Pennsylvania Canals, the Columbia and Portage Railroads, and the Schuylkill, Lehigh and Union Canals, as forming the great chain of communication with the West. It will be perceived that although the improvements in the latter State are still incomplete, the revenue derived from them in 1837, exceeds those of our rival sister, New York, nearly 300,000 dollars.—*Phil. Com. List.*

The following are among some resolutions passed on motion of H. Crocker, Esq., at a public meeting recently held at Milwaukee:

Whereas the people of Milwaukee have repeatedly petitioned to Congress for appropriations for the construction of a Harbor at this place, and also for the opening and improving the Military Road from Chicago to Green Bay; and whereas said petitions have been heretofore unsuccessful; and whereas the completion of the said improvements is a matter of great consequence to the shipping and commerce of the Lakes and to the Eastern portion of our Territory—There fore—

Resolved, That we will not desist from memorialising and petitioning Congress and presenting our just rights and claims until we shall have finally accomplished our objects.

Resolved, That the Hon. G. W. Jones, our Delegate in Congress, be requested to use his exertions to procure appropriations for the immediate construction of a Harbor at this place and for the opening and improving the Military Road from Chicago to Green Bay, passing through Milwaukee.

Resolved, That a committee of five be appointed to draft memorials to Congress for the above purposes and forward the same to our Delegate at Washington.

TOLEDO RAILROAD.

The following abstract from the returns of the Erie and Kalamazoo railroad to the 31st December last, is from a correspondent, on whose accuracy, as well as in the returns themselves, entire reliance may be placed:

Abstract of statement of the Erie and Kalamazoo Railroad, from Toledo, Ohio, to Adrian, in Michigan, 33 miles.

Cost of Railroad, buildings, two engines, cars, wells, well houses, and everything, to 31st December, 1837,		$257,659 72
(About $7,807 87 per mile.)		
The expense of repairs, and running, up to same time, 31st December, 1837,		$14,181 52
Earnings of road,	$55,821 62	
Deduct expenses, &c.	14,181 52	
Leaving profits for dividend,		$41,604 00

or about 16 1-6 per cent. on the whole cost of road, engines, property and fixtures.

It may be remarked, that this road is made through a new country, and when constructed, the route was an almost entire wilderness, as it is now for a considerable part of the way.

That after it was put in operation it was used with horse power only, till some time in June last, when one locomotive was placed on the road, and a second one in September last.

The profits of the road have principally, if not entirely, accrued since the locomotive was put on, as the expense of running with horses, during the autumn of 1836, and the spring of 1837, (with the small amount of business before the navigation of last spring opened on Lake Erie,) was about equal to its earnings.

If business shall revive with the opening of navigation next spring, and shall continue as prosperous as may reasonably be expected during next season, it is believed that the road will pay all expenses, and earn 50 per cent., or nearly so, of its cost, by the 31st December next.—*Journal of Commerce.*

The State of Pennsylvania has just completed a noble bridge across the Susquehanna, at Duncan's Island, (mouth of the Juniata) which combines the double purpose of a tow path bridge for the towing of canal boats, and one for wagons, carriages and other vehicles. The formal opening was duly celebrated on Saturday last, in the presence of the Governor, Canal Commissioners, and a large number of citizens. The Harrisburg Telegraph furnishes the following notice of the dimensions of the structure:

It stands on nine piers and two abutments, founded on the solid rock. The span next the eastern abutment is 160 feet in the clear—the remaining nine spans each 200 feet in the clear. The thickness of the piers on top 12 feet, making the whole length of the bridge, from abutment to abutment, 2068 feet.

The length of the piers on top 34 feet, (with ice breakers at the head, sloping 2 to 1,) supporting segments of lines of truss, on the principle of the combined arch and truss, apart in the clear, for the accommodation of common travelling. The fourth truss is put in to support a double towing path, to be placed one above the other, forming two balconies on the south side of the bridge. The whole is constructed on a grand scale, unsurpassed in the execution of the workmanship, or in the materials. It is less than twelve months since the old bridge was swept away. The present one takes its place for the accommodation of the public in this short period of time—a beautiful and, at the same time, a durable structure.

The wood work and mason work of the bridge have been executed in the best and most substantial manner, and with the best materials. As a structure, the State, the Engineer, the Contractors and the Supervisor, have reason to be proud. It is believed not to be surpassed by any job of the kind in the Union.—*Baltimore Gazette.*

RAILROAD SAFETIES.

The superintendent of the Providence and Boston Railroad has made a communication to the public upon the death of Mr. Perry, caused by the train of cars coming in contact with his wagon. Mr. Perry was crossing the road, but did not hear the bell, as he was *deaf.* If a man is *deaf,* we suppose he could not hear "bell or book;" but we have sometimes thought that *horses* might take the hint, if given with a less pleasant instrument than a bell. The steam whistle has not succeeded entirely, but we understand that Mr. Norris, of this city, has invented a new instrument, or rather has applied a new instrument to steam locomotives, viz: a *trombone*, which we are told is played with such a gusto by the steam, that it can be heard many squares, tooting away above the noise of the steam engine cars. Not content with a single pipe, Mr. N. is about to add several of different keys, so that there may be a concert of steam instruments; and instead of quiet citzens, who may have got upon the wrong track, being "whistled off," as they have been, or hearing their own knell in the *locomotive* bell, they will hear the "caveat monitor" of the trombones "far o'er hill and dale," and may scamper off beyond the reach of harm—unless, indeed, the music should attract, rather than dissipate, travellers.—*U. S. Gazette.*

NIAGARA SHIP CANAL.

The following bill, making an appropriation for this important national work, was introduced by Mr. Grant into the House of Representatives on the 25th ult., and was read twice and committed.

A Bill to provide for the construction of the Niagara Ship Canal.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the sum of five hundred thousand dollars be, and the same is hereby appropriated, out of any moneys in the Treasury not otherwise appropriated, to be expended, under the direction of the Secretary of War, towards the construction of a ship canal around the Falls of Niagara, to connect the navigable waters of Lake Erie and the Ontario, on such one of the surveys and plans made by Captain W. G. Williams, one of the United States topographical engineers, communicated in his report under the order of the House of Representatives of the third of February, in the year of our Lord eighteen hundred and thirty-six, as the Secretary of War, upon full examination, shall think will best tend to promote the military defence and commercial interest of the country: *Provided, always,* That this act shall not take effect until the State of New York, by law, shall authorise the construction of said canal within its territorial limits, and shall make such provisions applicable thereto as are made in regard to other canals constructed in said state; and shall provide, also, that such toll may be collected thereon as, in the opinion of the Secretary of War, may be sufficient to keep said canal in repair, and to defray the expenses of lock-keepers and other incidental expenses.

QUANTITY AND COST OF FUEL CONSUMED IN THIS CITY IN THE YEARS 1836 AND 1837.

From the City Inspector's annual report to the corporation, it appears that in the year 1836 there was sold in this city 243,798½ loads of fire wood, costing $691,347 83½ cents; and that in 1837 there was sold 298,427½ loads, costing $625,471 84½ cents. From which it appears that though the quantity sold in 1837 was greater than in 1836 by 54,629 loads, yet the total cost was $65,876 80 cents less.

The quantity of charcoal sold in 1836 was 291,886 tubs, at a cost of $112,211 20 cents. In the year 1837 there was sold 284,110 tubs, which cost $83,200 59 cents; being 7,776 tubs less than were sold in 1836. Less cost for charcoal in 1837, $26,020 24 cents.

The amount of Anthracite coal returned, is 5,609 tons less than in 1836.

The report states that the aggregate saving to the city in 1837 as compared with 1836, on the above articles of fuel, is $248,682 25.—*Journal of Commerce.*

THE PACHA OF EGYPT.

In speaking of the present Pascha of Egypt, and the rapidity with which he causes works of improvement to be completed, Mr. Catherwood mentioned in his lecture of Friday that a canal connecting Alexandria with a point on the Delta forty-four miles distant, and suited for vessels of forty tons burthen, had been completed in nine months. With such energy in the sovereign there is no wonder that Egypt is rapidly regaining its former consequence.—*Balt. Amer.*

The following gentlemen were elected directors of the Long Island Railroad Company on the 19th instant, for the ensuing year: Valentine Hicks, Leffert Lefferts, John L. Graham, David S. Jones, Benjamin Curtis, Henry Wyckoff, George D. Strong, John H. Hicks, Henry F. Tallmadge, Isaac E. Haviland, John Delafield, Walter R. Jones, Silas Carle.

At a subsequent meeting of the board, Valentine Hicks was unanimously reelected President of the company.

A PRAISEWORTHY ACT.

We understand that the managers of the West Branch Railroad Company have appropriated the money received for fines and penalties for the infringement of their rules and regulations, as a fund subject to the order of the board in favor of such persons as may be disabled or injured in the service of the company, or in the mining or transportation connected with the road.—*Miner's Journal.*

Mr. Purcell, Civil Engineer, has made a report in favor of making another canal at the falls of the Ohio, on the Indiana side of the river. He estimates the cost at $1,462,644. The Indiana members in Congress are making an effort to get an appropriation from the general government in favour of the work, and a resolution has been introduced into the House of Representatives for this purpose.—*Balt. Chron.*

PRIVATE ENTERPRISE.

The Miner's Journal, as an argument against the incorporation of a coal mining company at Pottsville, states as a fact, three individual coal operators have mined a greater amount of coal during the last season, than the aggregate quantity of the three coal companies in that region combined, with capitals amounting to about six hundred thousand dollars; and that these men came to that region, a few years since, with little or no capital.—*Commercial Journal.*

A RAILROAD FACT.

A large manufacturer belonging to Worcester, with a view of laying in his winter's stock of coal, gave an early order to have a cargo delivered at Providence, so that it might reach him in good season, via Blackstone Canal. It happened, however, owing to the dry season, that the waters were so low that the coal could not be carried on the canal. After waiting as long as the season would permit, his only resource was to order another cargo from Philadelphia to Boston; this he did, and ordered the vessel on arrival to haul at once to the Worcester Railroad wharf. The coal arrived, and in TEN HOURS AFTER the vessel had reported herself at the Custom House, the whole cargo of coal was at his door in Worcester!—*Boston Gaz.*

IMPORTANT TO TANNERS.

It is stated that Dr. W. Zollikoffer, of Middleburgh, Md, has obtained a patent for a new discovery in the art of tanning, being an improved process of *bating* all kinds of hides and skins in one to nine hours. The texture and complexion of the leather that is tanned after the operation of this bate is said to lose nothing in comparison with that which has been bated in the old way.—*Balt. Patriot.*

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

*** Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

AGENCY.

The Subscriber offers his services as Agent, to procure *Machinery for Mills, Steam Engines, Locomotives, Printing Machines, Presses, Types and Fixtures.*

He will give prompt attention to all orders entrusted to him for execution; and pledges himself to those who may employ him, that no effort on his part shall be wanting to procure the best articles to be had in the city—and to give satisfaction.

He will also employ Millwrights and Engineers, to erect Mills, and put the Engines and Machinery in operation.

Orders accompanied with the necessary funds, or satisfactory city acceptances, should be addressed to D. K. MINOR, 30 Wall-st. N.Y.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congareo River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS Mc NEILL,
Chief Engineer.

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.: Atlas, Boston; Philadelpia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month. 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. do. cast steel Shovels & Spades
150 do. do. Gold-mining Shovels
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
Fo. 8 State-street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR.
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson end Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancocd, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakichill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his presect engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street, NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Istruments made to order and repaired.
1y—14

RAILWAY IRON, LOCOMOTIVES, &c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars; with conntersunk holes and mitred joints,

								lbs	
350 tons	2by		, 15 ft in length,	weighing				$4\frac{68}{100}$	per
280	"	2	" ½,	"	"	"		$3\frac{50}{100}$	"
70	"	1½	" ½,	"	"	"		2½	"
80	"	1¼	" ¼,	"	"	"		$1\frac{25}{100}$	"
90	"	1	" ¼,	"	"	"		⅞	"

witn Spikes and Splicing Plates adapted thereto To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of onr partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEW YORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having conntersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y, July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, DECEMBER 9, 1837. (Published March 7, 1838) VOLUME VI.—No. 49.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MARCH 7, 1838.

AN APPENDIX

To the Report of the Committee on Railroads, on the petition of the New-York and Erie Railroad Company.

MR. JOHNSON'S REPORT.

To the President and Directors of the New-York and Erie Railroad Company:

GENTLEMEN—In compliance with your wishes, that I should communicate my views upon the character and importance of Railroads, as a means of intercommunication, and also of the merits of the New-York and Erie railroad route, compared with others which have been projected from New-York city to the St. Lawrence and Mississippi Valleys, I present the following statement, drawn up with some haste, and which though in consequence, somewhat imperfect, will be found, it is believed to contain facts and information on this interesting subject not generally understood, and in consequence not duly appreciated.

Railroads, as a means for transportation, have been long in use upon a limited scale; but it is only within the short period of ten or twelve years, that they have been successfully applied to purposes of general traffic.

The great importance which they have so recently acquired, is mainly the result of the successful application of the power of steam to locomotion, and which is found to transcend in economy, speed and useful effect, the most successful application of animal power.

The important part which the locomotive engine has thus performed, in imparting to the railroad system its present degree of perfection, and which may possibly yet give it the ascendancy as a general means of inland communication, will constitute a sufficient excuse for bestowing upon the principles of its construction and operation, a little attention.—In the progressive movement of the engine upon the railroad, the several resistances which it encounters, and which must be overcome by the elastic force or pressure of the steam in the cylinders, consist of the following:

1. The resistance of the engine itself, comprising the friction of the pistons, steam-valves, connecting rods, water-pump, &c. with the power to work the latter; the additional friction caused by the re-action of the load drawn, also the friction of the axles and at the surface of the rails, and resistance of the air, the latter of which is principally encountered by the engine in consequence of its position in advance of the train. To these must be added the atmospheric resistance to the movement of the pistons in the cylinders, which takes place in all engines that do not condense their steam, and the increase in the elastic force or pressure of the steam required by the greater velocity of the engine and its load over that of the pistons.

2. The resistance arising from the friction at the axles, and surface of the rails of the carriages composing the train, and also of the tender to the engine.

The preceding comprise the more prominent of the resistances to the movement of the locomotive engine upon a straight and level railroad.

Upon such portions of the road as are curved, an additional resistance is encountered, which depends for its amount upon the radius or degree of curvature, but which is obviated in a great measure by the superior elevation given to the outside rail of the curve, and the conical shape of the rims of the wheels, and does not constitute any very great impediment upon curves which exceed one thousand feet radius.

Upon roads that are not level, the force of gravity, if the engine is ascending, presents another cause of resistance. In descending, this force operates in aid of the impelling power of the engine.

The force with which gravity operates, whether in aid or to retard the movement of the engine and its load, varies with the inclination of the road, and by the established principles of mechanics, bears the same relation to the weight nearly on the planes of moderate inclination, as the elevation of the plane to its base or horizontal extent.

The above resistances, when accurately determined and resolved into their combined effect upon the pistons in the cylinders of the engine, constitute the true measure of the elastic force or pressure of the steam required to propel the engine and its train.

The amount of this elastic force or pressure is dependent upon various circumstances, all of which have been determined by experiment, and the influence of each separately and combined very nearly ascertained. These consist of the intensity of the heat. The extent of surface in the boiler exposed to the radiant and communicative action of the heat or total extent of effective evaporating surface, involving the expenditure of fuel and water, rate of the expansion of steam in the cylinders, dimensions of the steam pipes, steam valves, water pumps, smoke pipes, &c.

It is only within a little more than three years, that experiments have been made on a sufficiently large scale, to determine the relative value of the several causes which influence the operation of the locomotive steam engine upon railways.

These were performed by the Chev. F. M. G. De Pambour, upon the Liverpool and Manchester railway, with the aid of that company, and the results were arranged and analyzed by him, from which formulæ are deduced for determining the power of traction of engines of different dimensions and plans of construction under various rates of speed and degrees of the pressure of the steam, &c., which, with the exception, perhaps, of a few slight inaccuracies in the mode of conducting and analyzing the experiments, may be relied upon as approaching very near the truth.

From these formulæ may be determined the powers of the improved American engines, under a knowledge of the dimensions of their several parts, and a series of results obtained, adapted to various rates of speed and degrees of acclivity of the road.

These results I have computed for two engines of different weights and dimensions, and arranged in a tabular form as follows:

A PRACTICAL TABLE of the power of traction of Locomotive Engines, exhibiting the gross load in tons, including the tender at different rates of speed, and upon inclinations varying from a level to one hundred feet per mile. Deduced from the formula of De Pambour.

	Weight of engine, 13 tons. Evaporating power, 55 cubic feet. Cylinders, 1.16 feet dia.									Weight of engine, 10 tons. Evaporating power, 42 cubic feet. Cylinders, one foot dia.								
	VELOCITY IN MILES PER HOUR.									VELOCITY IN MILES PER HOUR.								
Ascent in feet per mile.	VII½	X	XII½	XV	XVII½	XX	XXII½	XXV	XXVII½	VII½	X	XII½	XV	XVII½	XX	XXII½	XXV	XXVII½
	tons.	tons.	tons.	tons.	tons.	tons	tons.	tons.	tons.	tons	tons.	tons.	tons.	tons.	tons.	tons.	tons.	tons.
Level.	584	406	299	228	177	138	108	85	66	448	311	230	175	137	108	85	67	52
X	375	251	190	144	111	86	66	51	39	280	201	148	113	87	68	53	41	32
XX	275	183	138	104	79	61	46	35	26	204	145	106	80	61	47	37	28	20
XXX	216	144	108	81	62	46	34	26	18	162	114	82	63	47	36	28	20	14
XL	178	117	87	65	48	36	26	19	13	132	93	67	50	37	28	21	15	10
L	147	97	71	52	39	29	21	15	9	111	77	55	40	30	22	16	11	7
LX	131	85	63	46	34	24	17	12	7	97	68	48	35	26	19	13	9	
LXX	112	73	53	38	28	20	13	9		84	57	41	29	21	15	11	7	
LXXX	102	65	47	34	24	17	12	7		75	52	36	25	19	13	9		
XC	90	58	42	29	21	14	9			67	46	32	23	16	11	7		
C	81	52	36	27	18	12				61	42	29	21	14	9	6		

Total pressure of steam upon the square inch in the boiler, 70 lbs.; dia. of driving wheels 4. 5 feet; length of stroke in feet, 1.33; friction of engine, 14 lbs. per ton; friction of carriages, plus, additional friction upon engine from load drawn, 8 lbs. per ton; the ton employed equals 2,000 lbs; the wheels of the engine are supposed to be coupled, if necessary, when drawing the maximum loads, or otherwise so arranged as to bring the weight of the tender upon the driving wheels.

The decrease of the load under an increase of velocity, as indicated in the table, is not so much the consequence of any great increase of the resistance, as of the diminished power of the engine, or its inability to generate steam to correspond with the increased consumption under a greater velocity.

By augmenting the intensity of the heat, the force of traction under an increase of velocity will be increased. It is a consequence of the particular construction of the locomotive steam engine, by which the steam from the cylinders is discharged into the smoke-pipe, that an increase of draught, and consequent augmentation of the intensity of the heat, is produced to a certain extent, by a greater velocity; and it is from this cause that the powers of the engine are so well sustained under the higher velocities.

It is the rapid generation of steam, occurring under the higher velocities which usually takes place upon the more level portions of a road, that causes the blowing or escape of steam at the valves, whenever the motion of the engine, and consequently the consumption of steam is checked by encountering grades of greater acclivities. In such cases, the fire being greatly excited, the pressure in the boiler is augmented, and continues in this state until the steam generated, no longer exceeds the consumption.

It is from this cause that the performances of the locomotive engines, upon short ascents, *are known to exceed very considerably* the results given in the table.

It will be noticed by a comparison of results in the table, that a great similarity exists in the general law which governs the operntion of steam and animal power. There is a speed at which the locomotive, like the horse, can do no more than convey its own weight. This limit does not however depend as in the case of the horse upon any inherent power of action which cannot be exceeded, but is governed mainly by the size of the boiler, and evaporating power and weight of the engine.

It will be seen also, that the loads drawn increase in a greater ratio than the decrease in the velocity, and that so far as it regards the conveyance of the greatest weight over a given distance in a given time, on roads having a uniform grade, the advantage is greatly in favor of a diminished rate of speed. A saving also in the wear and tear and cost of traction is usually the result under such a diminution.

This range of the power of the locomotive engine, under differtent rates of speed, is of the greatest importance in reference to economy of transportation, combined with the cost of construction of railroads, enabling it, without a sacrifice of power, to overcome considerable variations in the grades; which are necessary to conform the road to the shape of the ground, and which would require in many cases an immense expenditure to reduce to a level, or to an uniform inclination.

An examination of the table will show, that the load which an engine can convey at the rate of twenty-five miles per hour upon a level, can be drawn by the same engine up an inclination of 90 feet per mile at 7½ miles per hour; also, that the load on a level at 20 miles per hour, is equal to that on an ascent of 52 feet per mile, at 7½ miles per hour, and that the load on a level at 15 miles per hour is equal to that on an ascent of about 27 feet per mile, at 7½ miles per hour.

It must not be forgotten, that the adhesion of the driving-wheels of the engine to the rails, is supposed sufficient in each case to enable the engine to exert its whole power in propelling its load.

In consequence of this great range of power of the locomotive engine under different velocities, loads adapted to the full capacity of the engine upon the level or less elevated parts of a road, at the higher or medium rates of speed, can be conveyed over the more elevated portions, occasioning no other inconvenience than arises from a loss of time by the reduced speed in ascending acclivities. Thus the same load which would be conveyed at the rate of 20 miles per hour on a level, can be moved only at the rate of 15 miles per hour on a continued acclivity of 12 feet in a mile, or at the rate of 10 miles per hour on an acclivity a little exceeding 30 feet per mile, or 7½ miles per hour an ascent of 50 feet per mile.

The ability of the locomotive engines to convey heavy loads with the velocities above mentioned, is fully demonstrated by experience.

In the report of the superintendent of motive power of the Philadelphia and Columbia railroad for the year ending Nov. 30th, 1837, it is stated that "*one of the heavy engines drew* 35 *cars, constituting a gross load of* 190 *tons, on a road with grades running up to* 50 *feet per mile,*" and that the average rate of speed in performing the distance of 82 miles, was 10 to 12 miles per hour. The Canal Commissioners of Pennsylvania, in their last report to the Legislature, speak in decided terms of "the approximation to perfection, which the construction of locomotive engines, and the economy and system in their use, has reached;" and add, in confirmation of the preceding, that "as an instance of extraordinary performance, some of the engines have drawn a gross weight of 190 tons over the Philadelphia and Columbia road, within the usual time for performing a trip."

Other instances may be adduced of equal or greater performances, but as this is derived from an official statement made to the Legislature of Pennsylvania, on the condition of one of the most prominent roads in the country, and which is now doing a constant and profitable business in the conveyance of freight and passengers, I have concluded that any further evidence would not be necessary.

In addition to those improvements which have conferred greater powers upon the locomotive engine, others have been made, by which the expense of operating is materially lessened.

In 1834, the average cost of the repairs and renewal of engines upon the Liverpool and Manchester railroad amounted to nearly $3,000 each per annum. This item, being a prominent one in the expense of locomotive power, has been considerably reduced by improvements in the proportions and connexion of the different parts of the engine, giving it greater strength and ability to resist the strains and injuries to which it is subjected. Their management is also better understood. Upon the Philadelphia and Columbia road, the cost for the past year has fallen considerably below $800 for each engine. As an instance of remarkable performance on this road, it is stated in the report of the Canal Commissioners already referred to, "*that one engine made 175 successive trips of 77 miles each, with the regularity of the return of day, making a total of thirteen thousand one hundred and seventy-five miles, without a dollar's worth of repairs.*" The diminished cost upon the latter road, compared with the former, is owing in part, in addition to the circumstances mentioned, to the less average rate of speed, which is only about three-fourths that upon the Liverpool and Manchester road at the time mentioned.

In respect to the resistances presented fr the movement of an engine, arising toom the shape or particular arrangement of the road itself, it is believed much misapprehension exists, particularly in reference to vertical changes in the aliguments or in the ascents or descents necessary to be overcome.

The principal difference betwèen level or uniformly inclined, and ascending and descending lines, is in the inflnence of gravity produced by these changes. The resistance at the surface of the rails is the same. That arising from curvature is the same, the ascents and descents not necessarily involving any increase in curvature. The resistance from the atmosphere is also the same, and that presented by the friction at the axles is nearly the same, if any dfference, it is less.

In respect to gravity, this power is a resistance only in ascending. In descending, it acts with a similar energy in *favor* as in ascending it operates *against* the movement of the engine and its train. If a balance be struck between the sum total of the aiding and retarting effects of this power, on a road having an irregular profile, it is found to be nearly the same under all practicable variations of the grades, whether the irregularities are diminished or increased.

This is the theoretical view—practically the aid derived from gravity cannot in the great majority of cases be applied to neutralize, or be used in offset to its resistance.

In descending, no practical benefit is derived from it beyond that point where the inclination of the road is such as to enable it to overcome the friction, and other resistances encountered by the engine and its train, and impart to the latter the velocity which is consistent with safety. Beyond this, the motion upon long slopes, when the rails are in good condition, becomes too great for safety, and must be counteracted. The full benefit of the aid afforded by gravity in descending, is likewise not experienced, if the length of time occupied in the descent is such, as either to cause an escape of surplus steam or render impracticable a reduction of the heat, so that no more steam may be generated than can be profitably passed through the cylinders.

Again, if the ascents or deviations from a level or an uniform inclination require to overcome them, a greater range of power than is possessed by the engine by varying its velocity, or a greater degree of adhesion than is afforded by the driving wheels, a loss is incurred, either by the necessary diminution of the load to enable it to overcome the greatest acclivities, or auxiliary power must be employed at an additional expense for that purpose. If the steeper grades are concentrated, and their length and degree of acclivity such as to give full and profitable employment to the auxiliary power, the disadvantage in the economy of traction is much less than it would be under a different arrangement, when those grades are detached and distributed irregularly upon different portions of the road.

Although inequalities in the grades are, as a general rule, to be avoided, if possible, yet, to a certain extent, they are not very objectionable. To suppose a very favorable case—a case, which it must be acknowledged, is scarcely likely to occur in practice—it can be demonstrated, that it is possible, under a *suitable arrangement of the grades* of a railroad, to convey by locomotive steam power a load, over a straight road, having a rise and fall of 20 to 25 feet per mile throughout its whole extent, in nearly the same time, and at an expense no greater than the same load can be conveyed by the same engine, over the same road, reduced to a level.

It may be remarked farther, that the influence of ascending and descending grades upon the economy of transportation, is subject to modifications, arising from the preponderance or difference in the relative amount of trade passing in opposite directions. In cases where this preponderance is great, the cost of transportation will be lessened or increased according as the arrangement or position of the steeper grades is favorable or unfortunate to that preponderance. The *total* cost of transportation upon railways is also affected by the greater or less expense incurred, or amount of fixed capital invested for the purpose of equalizing or reducing the grades in the construction of the road. This involves the consideration of the value of labor and materials, quality, amount and cost of excavation and embankment, mechanical work, and other expences necessarily incurred in the several positions which the grade line may be permitted to assume upon the ground; also the difference in the distance involving the cost of additional extent of superstructure upon the long lines, repairs and maintenance of the same, and extra wear and tear of engines, carriages, &c.

The location of a railroad is usually a more difficult operation, requiring more calculation and more extensive examinations and measurements than the location of a canal. In tracing a route for the latter, little or no deviation from a level line is called for, or can be permitted, except at suitable places for inserting locks, or inclined planes, where the transition is made from one level to another. The horizontal changes in direction or curvatures upon a canal do not, moreover, require to be traced with any great degree of accuracy, the line in this respect being allowed usually to conform nearly to the particular shape of the ground. Upon railroads, the grades may be permitted to assume, according as local and other circumstances may require, every variety of position, varying from a level to that degree of inclination either ascending or descending, which is the measure of the useful effect of the locomotive engine, whether operating alone or aided in its efforts by auxiliary power. Such is the character of railways also, that the straight and curved portions must be arranged so as to harmonize completely with each other, presenting no abrupt changes in the continuity of the line, and requiring in consequence, that the curves be traced with the greatest practicable degree of precision.

I mention these circumstances, to show how much the efficiency of railroads, and consequent cost of transportation upon them, depends upon the particular arrangement of the grades and other causes, and to show how important it is, in es imating the expense of transportation, that all the attending circumstances should be duly considered; and also how essential it is in the location of railroads, that the principles of their operation should be scientifically and practically understood and applied, since any error or defect in this respect, which shall lessen the efficiency of the road or the economy of transportation upon it, is in most cases irremediable, except at great expense, extending its injurious influence through all future operations of the road.

I allude to these circumstances, also, to show that any effort to establish a definite or fixed ratio between a given vertical rise or fall and its equivalent horizontal distance, in reference to economy of transportation, is futile, so far as railroads are concerned. In regard to canals, a much nearer approximation can be made to a fixed standard in this respect, it being usually assumed that about 25 feet vertical rise or fall is equivalent to one mile horizontal distance, upon the supposition that the cost of locks for transferring boats from one level to another is about equal to three miles in length of canal; and the delay and expense in passing, about equal to the time and expense in traversing the mile of canal; thus rendering the one nearly equivalent to the other. Upon railways the circumstances are so entirely different, that no fixed rule, applicable in all cases, can be established.

The character of railways, and the general principles of their operation having been, it is believed, sufficiently explained, I will next proceed to make some remarks in relation to their capacity for conveying passengers and the various articles of commerce, and the cost of transportation.

The Philadelphia and Columbia railroad, to which I have already alluded, is the property of the Commonwealth of Pennsylvania. It extends from Philadelphia to the Susquehannah river, a distance of 82 miles, and is part of the main line of State improvements reaching to Pittsburgh. Its highest grade, as already stated, is 50 feet per mile, for a short distance, and there is a continuous slope of 9 miles in succession, at the rate of 30 feet per mile.

The loads drawn by the locomotives are of necessity graduated to the lowest velocity admissable upon the maximum grade, and do not exceed, probably, the one-half or one-third part of what could be conveyed upon a level. Indeed, the superintendent, in his report, states, with perhaps too much confidence, that, "if the Warren grade should be dispensed with, by the avoidance of the Schuylkill plane, and the Gap grade reduced, there would be *no limit* in practice to the loads that could be hauled."

The Philadelphia and Columbia railroad was constructed at a cost of $3,330,127. The superstructure for both tracks is laid throughout, and is composed principally of rails of iron laid upon a stone and timber foundation. There are two inclined planes upon it, operated with stationary steam power, situated near the extremities of the road, one of which is soon to be dispensed with, at an estimated animal saving of $17,400.

In conducting the transportation upon this road, the State furnishes the motive power only, and consequently has nothing to do with the business of purchasing and maintaining carriages, receiving and distributing freight, &c. This latter is performed by individuals or companies, who associate for the purpose. The report to which I have alluded, states that the total charge for *rail-way* and *motive power* tolls received of each passenger travelling the whole length of the road, or 82 miles, is $1.74, equal to $2\frac{1}{8}$ cents per mile; and that the average total charge per ton for freight is $3, equal to about $3\frac{2}{3}$ per mile.

With these charges, it is stated that the road has defrayed all expenses of motive power and repairs, together with the interest upon the cost of construction; and this notwithstanding much unnecessary expense was incurred in preparing for a considerable increase of business, which was not reallzed, owing to the change in the times, the force not having been brought down to an equality with the trade until as late as the first of July.

The whole cost per ton per mile of transporting freight upon the road the past year, exclusive of profit or tolls, is not stated in the report.

The charge for motive power only, per ton per mile, is 12 mills, which probably includes some profit, for, "after defraying all expenses of this department, it has paid the interest at 7 per cent. on the original cost of all the locomotives, ($326,103.41) 50 in number, that have been put upon the road." It will not, it is believed, be placing it too low to consider the whole expense of transportation, exclusive of railway tolls and profit, at 2. 2 cents per ton per mile.

Independent of any prospective improvements in the application of steam or other power upon railroads, the increase of business, from the growing trade and increasing population of the country, will produce in a short time, a material reduction in the costs of transportation.

Should the business be doubled, the expense upon the Philadelphia and Columbia railroad would probably not exceed $1\frac{1}{2}$ cents per ton per mile, particularly if we take into consideration the saving to be made by dispensing with the inclined plains. This, upon a railroad with grades and curvatures as unfavorable as that of the Columbia, would probably be still farther considerably reduced upon a level railroad of the same extent.

Results similar to the preceding are derived from the experience upon the Baltimore and Ohio road, showing that the cost of transporting freight upon roads of 70 to 80 miles in length, with ordinary grades, and doing a full business, will not probably exceed $1\frac{1}{2}$ cents per ton per mile, at a velocity of 10 to 12 miles per hour, being a speed four to five times greater than is attainable upon a canal where boats are moved by animal power.

The superiority which railroads possess, as a medium for the transit of passengers, gives them great advantages in the transportation of freight. Upon a road doing a large passenger business, sufficient to maintain itself and pay the interest on its cost, freight may be carried, if necessary, in the event of competition, at an expense, without loss, not exceeding the actual cost of transportation, independent of profit or tolls; or, if the conclusions above stated are correct, at a total cost to the merchant or farmer, not exceeding $1\frac{1}{3}$ cents por ton per mile.

This is an important view of the subject, and will have a great bearing upon the future importance and success of the railroad system.

In a report presented to the Legislature of New York, in March, 1835, by engineers in the service of the State, it is stated, p. 27, that the "actual cost of transportation upon the Mohawk and Hudson railroad, for freight, exclusive of profit or toll, is $3\frac{1}{2}$ cents per ton per mile, and for passengers $1\frac{7}{10}$ cents each per mile;" and the conclusion, p. 33, is drawn that "experience thus far has settled the cost at $3\frac{1}{2}$ cents per ton per mile for freight upon a level road."

The Mohawk and Hudson railroad is $15\frac{7}{8}$ miles in length, and has a total rise and fall of 439 feet, overcome in part by two inclined planes with stationary engines situated near the extremities of the road. The peculiar arrangement of this road required the use of three kinds of power, viz: the horse-power, stationary steam-power and locomotive steam-power. The maintenance of these several descriptions of motive power upon so short a road, and the inferior character of the locomotives employed, necessarily enhanced very much the expense. The same number of agents, superintendents, &c. and the same amount of capital invested in engines, carriages, &c. would probably have sufficed for a much longer road, and for the transportation of a much larger quantity of freight, which, at the time, from particular causes, was limited in amount.

The cost of transportation upon the Mohawk and Hudson railroad was, therefore, no evidence of what could have been accomplished on extended lines of railway, properly located, at the time the report alluded to was written, and consequently is no indication of what can now be accomplished upon similar lines, under the great improvements which have since taken place.

The following is a statement of the power of traction of locomotive engines upon different inclinations of road, as exhibited in the report referred to, p. 33:

Ascent in feet per mile.	Gross load exclusive of tender—tons, (2,000 lbs.)	Cost of motive power per ton per mile—cents.
Level.	75.25	3.50
10	49.53	4.20
20	37.35	4.90
30	27.24	5.95
40	20.22	7.28
50	17.04	8.19
60	13.92	9.66
70	11.31	11.41

"Weight of engine $6\frac{1}{2}$ tons (13,000 lbs.); 7,000 lbs. on *working* wheels; adhesion at 10; weight of tender, 7,000 lbs; resistance from friction $\frac{1}{250}$. The load carried is exclusive of the tender, and includes freight and waggons." Velocity not stated.

I will not stop to compare the above results with what is now accomplished. The contrast is very great, as will be obvious from what has already been stated.

In respect to the useful and profitable adaptation of well constructed railroads to the conveyance of various descriptions of freight, there is now no doubt. On their first introduction, they were in general expressly designed for the conveyance of heavy commodities, such as coal, stone, &c., and since they have been used for purposes of general traffic, experience has shown that they are exceedingly well adapted to this object.

Upon most of the railroads in operation in the United States, freight of all descriptions is now carried, embracing merchandize, cotton, flour, and produce of every description, including live stock, lumber, mineral coal, &c. Upon the Baltimore and Ohio road, in addition to the usual varieties of freight, yards and spars, and other timber are conveyed.—Upon the Philadelphia and Columbia railroad, notwithstanding there is a navigation connecting the waters of the Schuylkill at Philadelphia, with the Susquehannah, by means of the Union and Schuylkill canals, large amounts of lumber and of heavy and bulky articles of various descriptions are transported. Indeed, the superintendent of the latter road, in a late report, states that "though the passenger department is that in which the greatest number of citizens are directly interested, and to which, on account of the number of lives risked, the officers of the road are bound to pay the first and most strict attention; yet the transportation of goods and produce is the chief source of revenue to the State."

Upon the Boston and Worcester railroad, the conveyance of freight constitutes a prominent part of the business of the road. The receipts from freight upon this road for the year which has just passed, equal in amount about two-thirds of the gross receipts from passengers. The increase in the former over the preceding year is 30 per cent, while the latter has advanced only $1\frac{1}{2}$ per cent; showing that the transportation of freight is a growing and important part of the business of that road.

The capacity of a well constructed and well managed railroad for the transit of passengers, merchandize, produce, &c. is very great. With a double track complete, and trains of carriages upon each moving in opposite directions, at the rate of ten to twelve miles per hour, continued throughout the year, with trains arriving and departing hourly or half hourly, which is possible under a systematic arrangement, provided the business is sufficiently extensive to require it, and the whole amount will exceed what may be required upon any of the leading thoroughfares of the country for many years to come.

The additional expense of accommodating an increased amount of business upon a railroad, is confined principally to the transportation department, and not to the maintenance of way, the durability of which is affected, mainly by exposure to frosts, floods, and to natural decay, rather than by the severity of the service to which it may be subjected.

That railroads can be successfully used throughout the year in temperate latitudes, with little or no interruption, is now satisfactorily determined. An estimate derived from the experience upon several roads in the northern states, shows an average interruption through the year caused by obstructions from snow, of only two days.

The business upon the Philadelphia and Columbia railroad was interrupted but three days the past year, viz. the 22d, 23d and 24th of January, at which time there occurred an unusually severe snow storm. According to the report of the superintendent of motive power, "many of the deep cuts were wholly filled up, and the road was generally covered with three feet of snow; yet with the combined force of only three locomotive engines it was cleared off, and the road in use in the time stated."

Upon the Utica and Schenectady railroad, little or no interruption has been experienced from this cause since the road went into operation. The snow in the latitude of New-York does not fall on an average more than about 20 to 25 days in the year; and upon a road doing a constant business, is in most cases removed before it accumulates so as to offer much resistance. The interruption arising from this cause to railroads doing a regular business with a locomotive steam power, cannot be said to exceed the ordinary interruptions to the transportation upon canals from breaches in the banks, repairs and floods, and other failures during the season of navigation.

In severe cold weather, the efficiency of the engine is sometimes lessened by the effect of the cold, in reducing the temperature and diminishing the elasticity of the steam. The adhesion of the driving wheels of the engine is also sometimes considerably impaired by frost and ice upon the rails, rendering the engine incapable of applying its full power to the propulsion of its load. The inconvenience experienced from these causes is however much lessened from the circumstance that the natural diminution of the business in the winter does not demand at that season so great an expenditure of power.

It is true, that the cost of traction per ton or per passenger will be somewhat enhanced; yet if conducted with less profit or advantage to the company, the public are benefited by the great accommodation which good winter communications must ever afford.

In addition to the advantages possessed by rail-roads over canals, in being available at all seasons, there are others when viewed as a general means of intercommunication, to which it may not be improper in this place to allude.

They can be made to traverse the more elevated sections of the country, for the accommodation of mines, villages, &c. where canals would be impracticable, or if practicable, could only be constructed at great expense.

Branch rail-ways, connecting with a main line for local accommodation, can be constructed with greater facility, and at an expense generally less, than branch canals for effecting the same object.

The average attainable speed upon rail-ways is from four to six times greater than is practicable upon canals, the latter supplying very imperfectly the wants of the public, for the purposes of travel, and the conveyance of the mails, while railways are alike adapted to freight or passage.

The great superiority of steam over animal power, in respect to economy, gives to rail-roads a corresponding advantage over canals of small dimensions, where steam cannot be used. The former are being constantly benefited by improvements in the economy and efficiency of the power in use upon them, which cannot be anticipated from the power at present employed upon canals. On the contrary, there is reason to believe, that as the country advances in population, the expense of animal power will in consequence be rather increased than diminished.

In reference to the general defence or military strength of the country, railways present great advantages in affording the means of a rapid concentration of forces at particular points, and are not as readily destroyed or rendered useless by the incursions and assaults of an enemy. They contribute, in the rapidity of their transit and availability at all seasons, to the suppression of monopolies in trade, the rapid diffusion of intelligence, the increase in the population and wealth of the country, and in the general economy and comforts of living. They in fine, may perhaps be said to promote in a higher degree the great benefits resulting from common and turnpike roads and canals, the advantages of which have with great justice been ranked next in importance to the genial influences of the seasons.

In a review of the project for the New-York and Erie Railroad, written nearly ten years since, I had occasion to point out, as I have done above, some of the prominent points of difference between railroads and canals, and I then ventured the opinion that railways possess properties which in most situations would render them more desirable than canals. Subsequent experience has contributed to confirm the correctness of the views then entertained and expressed. The whole extent of railways at present in progress or contemplated in the United States, is treble or quadruple that of canals.

The peculiar advantages derived from the railroad system in its accommodation to the travel and business of a country, is strikingly exemplified in what is now taking place in England, where notwithstanding there are few places of importance farther removed from navigation of some kind, either natural or artificial, than twelve to fifteen miles, and notwithstanding the advantages possessed by that country in the great perfection of its public roads, lines of railway are being constructed and extended in various directions throughout the island, and with abundant promise of benefit, both to the stockholders and the public.

As an illustration of the practical advantages of the railroad system, I will instance the case of the Utica and Schenectady railroad.

The number of passengers carried upon this road has thus far been equivalent to about 105,000, passing over the whole road annually. The charges being $3 for each passenger, the total annual receipts amount to $315,000.

The charges for conveying the same number of passengers in stage coaches between the same points, at 4½ cents each per mile, for 80 miles, amounts to,	$378,000
The time occupied in passing between the two places in stage coaches at the average rate for all seasons, of 5 miles per hour, including stoppages, is 16 hours. Upon the railway it is 5 hours; making a saving in time by the railway to each passenger of 11 hours. Estimating the average value of this time to each passenger at $1,50, and it amounts to,	157,500
Add for extra expense of meals saved to each passenger by the reduction in the time, say 25 cents,	26,250
Making a total of	$561,750
From which deduct the expense per railway as above, leaves,	$246,750

Showing an annual saving to the travelling public by the railway, compared with stage-coaches, of $246,750. This is the saving in time and expense on account of locomotion only to the individuals using the road, and does not therefore include the great advantages of the road in enhancing the value of property, and its beneficial influences in a commercial point of view, upon the business interests of the country generally.

(To be completed in the next.)

We extract from the American Railroad Journal a communication from a correspondent, with the prefatory remarks of the editor. We do so for two reasons; first, to correct an error into which it seems we fell a few weeks since in stating that the Directors of the Liverpool and Manchester Railroad had determined to discontinue the carriage of freight; a circumstance which was stated 'without book' and upon the information of an intelligent friend, who learned it, directly, or indirectly, from a source that even the suspicious Veritas of the Railroad Journal would not incline to suspect; and next to repel the impeachment of the motives of those by whom the correspondent of the Journal fancies we are surrounded.

While we claim without any scruple on the point of delicacy, all that Veritas allows to the 'editor of the Observer' for sincerity of purpose, we disclaim with all modesty the less flattering insinuation that we are weak enough to be deluded, without knowing it, into the schemes of those who seek covertly, as intimated by Veritas, to favor their own interests at the expense of others. The paragraph which has called forth his criticism, was penned upon our own mere motion; and the fact which is deemed of so much importance, if uncorrected, as to stand in the way of his favorite project, was inserted in it some time after it came to our knowledge, which was casually and probably without a thought of its being summoned as evidence of a monstrous design to embarrass and obstruct the New York and Erie Railroad.

Whether the directors and stockholders of the several railroads along the line of the Erie Canal are desirous on their own account to be privileged to carry freight, or not; that the business men of the interior, of all classes, desire it, is, we believe, past a doubt. It was in their behalf—in behalf of the public convenience, during the season of suspended navigation, and in truth at all seasons—that we ventured to call attention to the subject; and in so doing, we assure Veritas, that the New York and Erie Railroad was not thought of as a rival to any existing improvement, or as likely to be unfavorably affected by the change of policy suggested.

'Veritas' admits the propriety of the change; but not without qualification as to time, which savors very strongly of those interested and selfish motives which, when they are presumed to govern other men's conduct, appear so heinous in his eyes. Does he intend to convey the idea that the change referred to will be designedly delayed to favor the N. Y. and Erie Railroad; and if so, does he speak by authority of those who are particularly interested in that great plan of improvement? If he does, he is very likely to excite hostility to it in quarters where it does not at present really exist.

We regret to observe a spirit of rivalry in regard to actual or projected improvements, promoting those who are interested in them to charge to corrupt motives and sinister influence every suggestion which may be made through the press or otherwise, upon points in which the whole public have a concern. When we pen a paragraph without special consultation or advisement, we cannot readily believe that we are imposed on, although we may chance to be mistaken both in fact and opinion? And when we think it prudent or reasonable to consult others, we shall always endeavor to consult those whose sincerity and disinterestedness cannot be impeached. Hostility to the N. Y. and Erie Road is not we believe a common sentiment here; and we doubt if the paragraph which has given rise to so much animadversion was ever considered as having the remotest reference to that improvement, except by the easily alarmed and suspecting Veritas.—*Utica Observer.*

METAMORPHOSES OF THE MUSQUITO.

The musquito, (says Mr. Gilchrist, surgeon) has three stages of existence, in two of which it is a water insect; in the third, the well-known winged one.

I observed several musquitos on the surface of some stagnant water, each in close proximity to a yellowish substance, which, when viewed through the microscope, proved to be a collection of eggs which the musquitos were depositing; each collection, though not consisting of fewer than 100 eggs, did not exceed 3-20ths of an inch in length, and 1-20th in breadth. The eggs were arranged in lines standing on end, and were each 1-40th of an inch long.

A few of those collections of ova were placed, with some of the water on which they floated, into a tumbler, and placed under a glass shade. In two days and a half the water was found to swarm with animalcules, the shells of the ova were still adherent, as when first observed on examining one minutely, the larger or under end was found to have opened like a lid, to allow the insect to escape into the water.

The body of the newly hatched insect is semi-transparent. In the thorax the heart is seen furnished with four projections; from this organ two blood vessels proceeded down the centre of the body to the end of the tail, which is to be always seen just above the surface of the water, the animalcule having its head downwards.

Between the heart and the elongated tail an active circulation is to be observed, indicating probably that the latter constitutes the lungs or gills, it being always above the surface of the water.

Its motion is quick, and it always goes tail foremost; when in search of food it throws out a couple of brush-like tentacula, which move circularly, and create a vortex, by which the food is attracted within the reach of the depredator. The food appears to be principally decomposing vegetable matter. They occasionally devour their own kind, and their recently quitted shells, &c.

At the termination of 21 days, during which the water was thrice changed, they had attained to three or four twentieths of an inch in diameter. On attaining this age they underwent a second metamorphosis. The shape is materially altered, but the greatest change is that which regards the seat of the gills.—These organs are now situated in the thorax, their former site, the tail being absorbed; and the channel of communication between them and the air consists in two small tubes attached to the upper part of the thorax. In this stage of existence the insects are much less active than in their former state. They do not require food, and have no mouth, resembling in this respect the chrysalis of the butterfly. They seldom leave the surface, and when they do so, speedily return to it.

The insects remain in this stage about 48 hours, towards the termination of which the legs and proboscis of the winged musquito can be plainly seen through the thin membrane that surrounds it. This in due course bursts, when the musquito draws itself out, stands on the surface of the water a few minutes, to dry and expand its wings, then flies to a dry situation.

If the musquito, in either of the two first stages, be then taken out of the water, it speedily dies, and it is as quickly killed by immersing in that fluid after becoming the winged insect.

We learn from the above details that the musquito is a most prolific insect, and that, as stagnant water is necessary to its propagation, all such ought to be kept as distant as possible from our dwellings. —*Madras Journal of Literature.*

PROSPECTS OF CHICAGO.

The boats that leave Buffalo for Chicago start with from 200 to 800 passengers, which they distribute throughout the Lakes. The price of passage from Buffalo to Chicago, in the cabin and found, is $25; deck passengers half price. The price of freight on board schooners is $1 per bbl bulk; on board steamboat it is $1 50.

The amount of various kinds of merchandise transported from the East, principally from the city of New York, may be estimated as follows for 1836:—Amount sold in Chicago say $1,000,000—destined for the interior an equal amount.

Chicago will be connected with the waters of the Mississippi by the Illinois and Michigan canal, now being constructed. The length of the canal is about 100 miles, 60 feet wide at top and 6 feet deep. Its estimated cost is $7,000,000. This canal is a State work, and will be vigorously prosecuted. The U. S. have appropriated every alternate section of land for 5 miles, on each side of it, to aid in its construction. Its terminating points are Chicago, and Peru on the Illinois river. It will be supplied with water from Lake Michigan.

A large number of laborers are now and will continue to be wanted on the line of the Illinois and Michigan canal. $20 per month with board is the price which has generally been paid during the past summer, a portion of the time $26 per month was paid. Mechanics' wages are now about $2 per day at Chicago. Last year they obtained much higher prices. Labor of all kinds has always been in brisk demand.

The steamboat Michigan cost $69,000—her gross receipts in 1836 were $75,000. The nett profit declared on her stock for that year was 50 per cent.—Her receipts for one trip from Buffalo to Chicago and back were $14,500. All the well managed vessels and steamboats on the Lake where no serious accident occurred are supposed to have paid an average profit of 50 per cent. on their cost in 1836.

Up to the spring of 1833 Chicago was simply an Indian trading post, occasionally protected with a small garrison of United States troops. At that time an appropriation was made for a harbor at the mouth of the Chicago river. This gave the first impulse to the growth of the place. It then contained about 300 inhabitants: last autumn it numbered about 5000.

The commanding advantages which Chicago possesses as a commercial position arise from the fact that it stands at the head of the great chain of American Lakes, at a point from which a water communication can be made with the waters of the Mississippi with comparatively little artificial navigation.—*Balt. American.*

GERMAN RAILROADS.

The great conception relative to the establishment of a great continental line of Railroads across North Germany is in progress of execution. The line of Railroads in Belgium extend to the frontiers of France and Prussia, from Ghent to Aix-la-Chapelle. France is hesitating; but Prussia is opening 20 German miles of Railroad, which will afterwards be extended to her capital. The company of Railroads of the Rhine and the Wester have obtained the concession, and are setting to work upon it. Doubts and obstacles disappear. It was said, indeed, that in Germany the expense of Railroads would be enormous and the profits small. And the expense of 233,000 thalers per mile extended on the Belgian Railroad was cited, with the trifling profit of 13 per cent. But these were easily answered. In Belgium they counted only on 70,000 passengers, yet they were obliged to make a second line to accommodate the increased number. In North Germany, too, the country is much flatter, and the cost per German mile will not exceed one-half of the expense in Belgium.—*Minturn Cour.*

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

*** Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

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D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, DECEMBER 16, 1837. (Published March 10, 1838) VOLUME VI.—No. 50

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MARCH 10, 1838.

AN APPENDIX

To the Report of the Committee on Railroads, on the petition of the New-York and Erie Railroad Company.

MR. JOHNSON'S REPORT.

(Concluded from p. 652)

Having, it is believed, dwelt sufficiently upon the character of railways, as a general means of transit, I will next proceed to notice, in a cursory manner, the leading features of the several lines which are projected from the city of New-York, to the St. Lawrence and Mississippi valleys.

There exists, probably, no point upon the Atlantic seaboard of the United States, in all respects so favorably situated for a great national emporium of commerce, as the city of New-York. It possesses a spacious and secure harbor, accessible at all seasons, communicating with the sea by three channels, two of which have sufficient depth of water to float the larger class of vessels employed in commerce, and is connected with the great basin, or valley, of the St. Lawrence, by a chain of natural or artificial navigation which cannot be excelled by similar communications proceeding from any other point on the seaboard. It is, therefore, so far as those channels are concerned, the point to which the trade of a very great portion of the St. Lawrence and adjacent portions of the Mississippi valleys will be directed.

In addition to this, it is before all others, the point on the seaboard for the concentration and distribution of the trade of the New-England States with the west and south, which, if it does not exceed, equals probably, at the present time in value and importance, the whole European trade with New-York.

In respect to the trade of the Mississippi valley, the local position of New-York city, if not fully equal is but little inferior to other points on the seaboard; with however, the advantages it possesses from the peculiarity of its position as above described, together with the precedence it has already acquired in the trade and business of the country, there can be little doubt that with proper precautions and a liberal spirit of enterprize in respect to public improvements, it will preserve its ascendancy and continue as heretofore, notwithstanding the strenuous exertions which are making to divert business in other directions, to be the leading commercial emporium of the United States.

In this view, the city of New-York may justly be considered as a point from which it is required that continuous lines of railway should emanate, extending to prominent points on the navigable waters of the St. Lawrence and Mississippi. These points are Whitehall on Lake Champlain; Oswego, Rochester, &c., on Lake Ontario; Buffalo, Dunkirk and Erie on Lake Erie; and Beaver, at the mouth of the Great Beaver on the Ohio river. This latter place is situated 26 miles below Pittsburgh, within the State of Pennsylvania. It is selected in preference to the former place, because it is the one to which the several lines which are brought into the comparison, will most conveniently and naturally converge, and because, also, it possesses some advantage in the navigation of the Ohio river, as indicated by the proposed extension to it of the Pennsylvania canal.

In the table below, are inserted the distances, with the average rise and fall per mile, of the several routes connecting New-York with the points referred to, with the exception of those leading to Lakes Champlain and Ontario, which as they are not so important to the present object, are omitted.

NAME OF ROUTE.	Distance in miles.	Average rise and fall in ft. per mile.
New-York to Buffalo via N.Y. & E.R.R. to Angelica, &c.	464	17.1
New-York to Buffalo, via W. Stockbridge, Albany, &c.,	483	10.
Do. do. Goshen, Catskill, Canajoharie, &c.	460	15.9
New-York to Dunkirk, via N.Y. & E.R. Road	483	17.4
Do. do. Goshen, Catskill, Canajoharie, &c.	500	14.7
New-York to Dunkirk, via W. Stockbridge, Albany, &c.	523	10.
Do. Erie, Pa. via N.Y. & E.R.R. to Dunkirk,	533	15.7
Do. do. Philadelphia, Columbia and Sunbury, &c.	610	8.7
New-York to Erie, via Philadelphia, Pottsville, and Sunbury, &c.,	605	10.
New-York to Beaver, via N. Y. & E. R. R. to Olean, Franklin, &c.	608	13.3
New-York to Beaver, via Philadelphia, Columbia, Sunbury, &c.	592	9.33
New-York to Beaver, via Philadelphia, Columbia, Juniata valley, &c.	525	11.03
New-York to Beaver, via Philadelphia, Columbia, Gettysburgh, and B. & O. R. R.	505	18.
New-York to Beaver, via Baltimore and B. & O. R. R.	530	13.0

The distances and rise and fall per mile given in the table, are in most cases derived from authentic surveys. In some few instances, however, they are approximations from the best evidence that could be obtained. They are nevertheless, believed to be near the truth. The average rise and fall is derived from the main features only of each route, and does not therefore include the minor inequalities in the grades. This average, as already explained, does not afford conclusive evidence of the relative merits of the several routes in respect to cost of conducting the transportation upon them, but is given merely as an indication of their general character.

It will be observed by an inspection of the table, that there is, with the exception of the route via Catskill and Canajoharie to Buffalo, a saving in distance by the New-York and Erie Railroad, to the several places mentioned on Lake Erie.

From New-York to Buffalo, the distance is less than by the way of Albany to the same point, 19 miles, while the average rise and fall exceeds 7 feet per mile. This difference of rise and fall in favor of the Albany route may be considered as in a measure counterbalanced by the saving in the cost of transportation, resulting from the shortening of the distance and the advantage which an extended line of road, managed by one, or at most two companies, possesses over a similar line, controlled by eight or ten different incorporations, each of which, if a separate organization is maintained, must incur the extra expense of a greater number of engines, carriages, ware houses, machine-shops, agents, &c. with occasional delays and expense of transfer of freight.

Longer lines possess, also, some advantage over a series of shorter ones, which in the aggregate have a like extent, in the economy and efficiency with which the transportation can be conducted, arising out of the inequality in the business upon the latter, compelling such as are less favourably situated, in consequence of being farther removed from the central points of business, or other causes, to labor under the disadvantage of conducting their business with less profit, and with a more limited means of infusing energy and punctuality into their operations. The saving, likewise, in expense of repairs and maintenance of way, resulting from the shortening of the distance on the line of the New York and Erie road, and the comparative cheapness of timber in that section, as also of fuel for the engines, which, whether it be wood or bituminous or anthracite coal, will be obtained at a much lower rate in the southern than in the more northern sections of the State.

These remarks will apply with nearly equal force to connexions with other prominent points in the western part of New York, as well as to Buffalo. They apply, also, in like manner, but with greater force, to the extension of the main line to Dunkirk. The distance of this latter point from New York city, by the route of the New York and Erie Railroad, is 40 miles less than by the way of Albany, and does not exceed the distance by the latter route to Buffalo.

In addition to the considerations mentioned above, by which an advantage to a certain extent is anticipated in the cost of transportation, it is believed that the line from the Hudson river to Lake Erie, on the route of the New York and Erie Railroad, will cost less in proportion to its length, than the line from New York by the way of Albany.

The reasons for this belief are the following:

1. Being under the direction of one company instead of nine, (the number of incorporations by the way of Albany) the cost will be less in proportion for engineering, superintendence, salaries of officers, &c.

2. Upon so much of the line via Albany as is already constructed, the cost of land, for road way and depot grounds, and farm and turnpike damages, &c. will not probably average less than $2,500 to $3,000 per mile; and there is no sufficient reason to suppose, unless a radical change shall be effected in the mode of making the appraisements, that the average of the whole distance when completed, will be less than from $1,500 to $2,000 per mile. The land upon the route of the New York and Erie road, in the majority of cases, with the exception of a portion of the line in the vicinity of the Hudson river, will either cost nothing, or the assessments will be light, owing to the sequestered position of that section of the country, and the great benefit anticipated from the opening of a direct communication to market.

3. The donations of land to the New York and Erie Railroad company, to aid in the construction of their road, independent of what is required for road-way and depot grounds, are larger, and when appropriated as intended, will serve to diminish materially the expense of the road to the stockholders. Upon the line via Albany to Buffalo, donations of land, even for the road-way, have thus far been comparatively rare, and no great assistance has been rendered, or can be anticipated in the way of donations, to aid in the construction of the road.

4. The cost of fencing, which is an important item, amounting to not less, usually, than $800 to $1,000 per mile, (if the cost of construction and capital required for maintenance is considered) will be much less upon the New York and Erie road.

5. The cost of timber for the superstructure or rail-track, and for bridges, &c., will be less. The line of the New York and Erie road passes for much of the distance through a timber region, being the same region from whence is derived a portion of the timber for constructing the line of Railway via Albany to Buffalo.

In respect to physical obstacles, or those growing out of the topographical features of the country, I am not aware that the route of the New York and Erie Railroad, under a judicious location, presents, with the exception of the passage of the Shawangunk ridge, and a portion of the line on the Delaware, any more points of difficulty or of excessive expense, in proportion to its length, than are encountered upon the line by the way of Albany to Buffalo. In the matter of business, the termination at Dunkirk possesses some advantage over that at Buffalo, in the earlier disappearance of the ice in the lake at that point, and opening of the navigation in the spring, and being forty miles farther west, is more favorably situated for accommodating the western travel.

The comparison with the line by the way of Albany, is not made with a view to detract, in the least, from the very great importance of that route as a medium of communication with the north and west. The very favorable position which it occupies, must ensure to it a liberal support, enabling it to maintain, against all opposition, a high rank in the great leading thoroughfares of the country. It is referred to solely for the purpose of exhibiting some of the leading traits of difference between it and the New York and Erie road, with the view of removing any erroneous impressions which may still exist in respect to the practicability of the latter work.

Comparing the line of the New-York and Erie railroad with other routes on the south, and the one which appears to come more directly in competition with it for the Lake Erie trade, is that by the way of Philadelphia, Sunbury, and the west branch of the Susquehannah, to the port of Erie, on Lake Erie. The distance from Philadelphia via Columbia to Erie, by this route, as deduced from the State surveys for the West Branch canal, (there having, as yet, been no survey made for a railway) is 523 miles, and from New-York, 610 miles, from which 5 miles should be deducted, if the route via Pottsville is taken.

The rise and fall is comparatively moderate, averaging for the whole distance from New-York, 8.7 feet per mile, via Columbia; and 10 feet via Pottsville. 8.7 feet, and 7.4 feet less than the New York and Erie road to Dunkirk.

The increase of distance to Lake Erie (127 miles) by these lines, and the circumstance of their being under the control of several different incorporations, renders it improbable that they can be brought into successful competition with the New-York and Erie road. The port of Erie, it is true, possesses an advantage over that of Dunkirk, in the superiority of its harbor, not sufficient, however, to counterbalance the great superiority possessed by New-York over Philadelphia, as a commercial mart.

As it respects the trade of the Ohio valley, the route via Philadelphia and the Juniata valley terminating at Beaver, possesses an advantage in distance, and in the average rise and fall over the New-York and Erie route. The distance, 525 miles, given in the table, exceeds, by 18 miles, the present travelled distance on that route. This 18 miles is the amount to which the line would be lengthened agreeably to a recent survey, supposing the inclined planes upon the Portage railroad to be dispensed with, and grades suited to locomotive power of 44 feet per mile on the west, and 50 feet per mile upon the east side of the mountain, to be adopted in their stead.

By the New-York and Erie road, the distance to Beaver is estimated at 608 miles. The continuation, however, of the two routes to the Ohio canal, with a view of accommodating the trade and travel of the more central portions of Ohio, with the advantages which that canal will present in relation to the trade of the Ohio valley, during those portions of the year when the river is not navigable, from the low state of the water, will, by increasing the distance of one in a greater proportion than the other, lessen somewhat the disparity between them.

The New-York and Erie road, from its location, intersecting, as it does, the waters of the Allegany within the limits of New-York, possesses advantages in the transmission of merchandize and other freight westward into that valley, and that of the Ohio below, which will enable it to compete successfully with the more southern routes. This advantage is derived from the descending navigation of the Allegany, by which freight can be transmitted, according to statements which are entitled to credit, from Olean to Pittsburg, at an expense of from $2.50 to $3.50 per ton, or to other points lower down on the Ohio river, at rates less in proportion than would be required from Olean to Pittsburg. By this channel, merchandize can be forwarded some weeks earlier in the season than the opening of the Pennsylvania Canals.

As it regards the route from New-York by the way of Baltimore and the Baltimore and Ohio railroad, to the Ohio valley, it will be seen, by referring to the table of distances, &c., that it is less advantageous than the route through Pennsylvania, and does not, therefore, require a more particular notice.

The preceding comparison does not anticipate the aid to be derived from auxiliary lines, so located as to take advantage of the more favorable ground, situated near to, but without the limits of the State. The effect of these lines will be to diminish the actual distance, 18 miles, and the average rise and fall per mile 2 to 3 feet, on each of the several lines from New-York via the New-York and Erie railroad, to Buffalo, and the other points mentioned.

This being so important a difference, and the prospect of those auxiliary lines being eventually constructed so very probable, it would not, it is believed, be safe, in estimating the future importance and relative value of the New-York and Erie route, as a leading thoroughfare between the east and the west, to rest upon any calculations, in which the aid to be derived from those auxiliary lines was not fully anticipated.

A similar remark may, perhaps, with propriety, be made, although possessing less force, in reference to the western portion of the route, via Albany to Buffalo. The route supposed in the comparison is that covered by the charters already granted. Should charters ultimately be obtained, and a line of railway be constructed along the lower and more level ground, in the vicinity of the Erie canal, it would lessen the average rise and fall per mile 1¼ feet on that route, and would probably somewhat shorten the distance.

On the subject of the probable cost of transportation upon the New-York and Erie railroad, the most satisfactory information will be derived from the experience upon the Philadelphia and Columbia railroad, to which I have already had occasion to refer.

The average rise and fall per mile upon that road, is 15 per cent greater than upon the New-York and Erie, supposing the latter to be located upon the most favorable ground.

The maximum grade upon the Philadelphia and Columbia road is 50 feet per mile;* but the general range of the higher grades does not much exceed 30 or 35 feet per mile. Upon the New-York and Erie, under a favorable location, it need not exceed 70, or at most, 80 feet, per mile, and that for a very short distance. The higher grades upon the latter road are concentrated at particular points, and arranged so as to be overcome with the greatest economy. Those exceeding 40 feet per mile, embrace but one ninth part of the whole distance, leaving an extent of more than 400 miles upon which the average rise and fall does not exceed 12 feet per mile.

The Philadelphia and Columbia railroad has also two inclined planes operated by stationary power. Upon the New-York and Erie road, planes will be avoided. The latter is, moreover, the straightest road, having no curvatures of a less radius than 700 feet. Upon the former road, the minimum radius is as low as 500 feet. In proceeding from tide-water westward, the three great valleys, viz: the Delaware, the Susquehannah and the Allegany, through which the line of the New-York and Erie road passes, are elevated, the first 600, the second 850 and the latter 1,300 feet above tide, giving a general inclination to the whole line eastward, favorable to the preponderance in the trade. This feature is an important one in reference to the economy of transportation, upon all that portion of the road lying between the Hudson river and the table land which separates the Allegany from Lake Erie, embracing more than nineteen-twentieths of the whole route, and on which full nineteen-twentieths of the whole business of the road will be conducted.

The expenses of transportation upon the New-York and Erie road, so far as it is influenced by the shape or profile of the road, will, therefore, it is believed, rather fall short than exceed the cost upon the Philadelphia and Columbia road.

Upon the latter road, the gross receipts for the year ending Oct. 31, 1837, including railway and motive power tolls, as per report of superintendent, amount to	$353,566 38
The total expenditure for the same time including supervision, cost of repairs and maintenance of road, and expense of motive power, together with interest upon cost of engines, as per report, amounts to	$198,891 89
Leaving annual nett income equal to	$154,674 49
Upon the Philadelphia and Columbia railroad, there are two inclined planes, the annual saving to the State, as estimated by the superintendent, by avoiding one of which, is $17,400. For the two in the same proportion, it would amount to $34,800; which, as there are no inclined planes upon the New-York and Erie road, should be added to the preceding,	34,800 00
Giving a total annual nett income, by avoiding the planes of	$189,474 49
The New-York and Erie railroad being 5.9 times the length of the Philadelphia and Columbia railroad, the nett annual income, supposing it to be in the same proportion, will amount to	$1,117,899 49
The Philadelphia and Columbia railroad has a double track throughout; rails principally of iron, with a stone and wood foundation. The cost of repair & maintenance per mile, for a double track the past year, has been $750. Supposing the New-York and Erie road to have a timber structure, plated with iron, after the ordinary plan, with the exception of 70 miles of the steeper grades, and that the cost of repairs, upon the portion where timber is used, is $1,100 per mile, it will be necessary to add to the expenditures, or deduct from the estimated income, $350 per mile, for 483—70=413 miles equal to	$144,550 00
Leaving the estimated nett annual income New-York and Erie railroad,	$973,349 49
The total cost of grading, masonry and bridging, for a double track, and superstructure for a single track, including clearing, grubbing, fencing, &c. of 483 miles the New-York and Erie railroad, according to the engineer's report of the State survey, which is the only estimate yet made of the whole line, amounts to, allowing 10 per cent for contingencies,	$4,762,260 00
Carried forward	$

* The maximum grade, where the Schuylkill plane is avoided by the West Philadelphia branch, will be 56.8 feet per mile.

To which, add extra expense of iron rails, on 70 miles of steeper grade,	350,000 00
	$5,112,260 00
Adding to this 25 per cent for advance in prices, superintendence, &c.,	1,278,065 00
Gives for total cost of road, with single track,	$6,390,325 00
Adding for the second track, in the same proportion, in order to compare with the Philadelphia and Columbia road, gives a total of	$8,880,575 00

To which, if the annual income, as obtained above, is applied, there results an annual dividend of nearly 11 per cent.

If the proceeds of the sale of land donations to aid in the construction of the road, be applied to diminish the amount of capital paid in, the annual dividends will be increased in a corresponding degree beyond the amount estimated.

In the preceding calculations, no allowance is made for the greater economy with which the transportation can be conducted upon a long line of road in proportion than a short one, which, upon two roads, differing as much in length as those under consideration, will undoubtedly have an important bearing upon the expenditures.

It should be recollected that upon the Philadelphia and Columbia railroad, the state has nothing to do with the business of transportation, except to furnish the motive power. In addition therefore to the profits made by the State, there are other profits accruing to the forwarders, which in the case of the New-York and Erie railroad, under the same charges and amount of business, would serve to swell the income derived from the road beyond the amount estimated. It is proper also to remark that the State, furnishing as it does nothing but the motive power in the business of conveyance, is under the necessity of providing that power to suit the convenience of forwarders. Hence it happens, oftener than would otherwise be the case, that the engines are not fully loaded, occasioning a greater loss in this respect than would be experienced by a company having the entire control of the road and of the transportation.

It will be perceived from the above, that the New-York and Erie railroad company will be enabled with the same amount of business as is now done upon the Philadelphia and Columbia road, to reduce materially the charges for transportation below what they now are upon that road, and still make a handsome dividend upon the capital invested. If I am correct also in the views taken in another part of this communication, a still farther reduction in the cost of transportation may be expected eventually to take place, from an increase in business over and above what is now being done upon the Philadelphia and Columbia road.

The prominent position which the New-York and Erie Railroad will occupy as a great thoroughfare between the east and the west, will enable it to participate largely in the growing trade and increasing travel of the country. Its location likewise through a region of country which admits of no rival route in its immediate vicinity, and the important connexions to be formed by it with other lines of communication which must to a considerable extent be tributary to it, give to it advantages which will contribute largely to its importance as a public work.

On the north it connects with the Chenango and Chemung canals, and the Ithaca and Owego railroad, and on the south the Delaware and Hudson and Lackawaxen canals, all of which are completed and in operation. On the south also it connects with the Pennsylvanian north branch canal, and the Blossburgh and Painted-Post railroad, and upon the north with the Genesee valley canal, all of which are in in a course of construction, and will soon be completed and in operation. It will connect also on the north with several contemplated railroads, one leading from Orange county to Catskill, another to Utica, a third to Syracuse, a fourth to Rochester, and a fifth to Buffalo; and on the south it will receive as tributaries the proposed Delaware and Hudson, Lackawana and Great Bend, and Williamsport and Elmira railroads; and will form likewise a connexion with the Allegany river, which, with the aid of the contemplated improvements, and the advantages presented by the descending navigation in that river, will secure to it in a great measure the trade and travel of the Allegany valley. By means also of the contemplated Ithaca and Auburn railroad, and the steamboat navigation upon the Seneca and Cayuga lakes, and the line of railway from Auburn to Buffalo, a direct communication will be opened with the rich and flourishing counties in that portion of the State. The interest taken by these counties in the New York and Erie railroad, it may reasonably be presumed, will continue to increase in proportion as its beneficial effects, in affording a continuous line of railway to the city of New York, available at all seasons, and its advantages as a rival route in suppressing monopolies upon other lines, are better understood.

The number of branch lines of communication which are either now, or will soon be in operation, gives to the New York and Erie railroad, in ensuring to it an early increase of business, peculiar advantages, which are not possessed by most other main lines of communication.

In the conveyance of freight, the road will find permanent sources of business in the connexions to be formed with the inexhaustible anthracite coal fields of Lackawana valley, and with the bituminous coal strata, that are known to extend through the northern counties of Pennsylvania, from the Susquehannah to the Allegany.

It will also find a constant and profitable source of business in the transportation of lumber, with which large portions of the country through which the road passes, abounds, and which, from the waters of the Susquehannah to Lake Erie, includes the finest timber region within the limits of the State.

Salt and plaster, from the central, or northern portions of the State, will be distributed along the line of the road, and the agricultural and other productions of the range of counties on either side, from the Hudson to Lake Erie will be, to a considerable extent, tributary to it.

Adapted as railroads peculiary are, to the transportation of passengers, it is an important fact, and of itself conclusive, in relation to the future value of the road, that the aggregate population of the counties, which will naturally be tributary to it in the States of New York and Pennsylvania, when all the branch lines connecting with it are formed, falls only about one-fifth short of the population in the counties tributary to the main line of railroad from Albany to Buffalo, and is now increasing in a more rapid ratio than the population of the latter counties.* In this estimate the population of New York city and the cities and villages upon the Hudson, is not included. If, however, a fair proportion of the latter be added, as, also, that portion of the travel between New England and the west, which usually passes New York city in its course, and which, in consequence, would most naturally pursue this route, and there can be no doubt but the business will, in a very short time from the period of the opening of the road, be sufficiently ample to sustain it.

By an examination of the map, it will be seen that the New York and Erie railroad occupies middle ground between the main line of communication from Albany to Buffalo, on the north, and the Pennsylvania improvements on the south. In its course west, it avoids the main range of the Allegany mountains, which enter the State of New York much diminished in elevation, losing, in consequence, much of their formidable character. It is probably the most direct course for a continuous line of railway communication from the city of New York to the northern portions of Ohio, Indiana, &c., thus penetrating to the heart of the most fertile portion of the Mississippi valley; and as such, was first advocated and brought into notice as a great public improvement.

From the surveys and examinations which have since been made, and facts developed, it has lost none of its importance, but has been daily acquiring more consequence in the estimation of the pub-

*See table annexed.

lic. It is evidently destined to become a great national thoroughfare, and as such is especially entitled to the attention and patronage of the State.

To the city of New York in particular, it assumes an importance second only in its anticipated influence upon its commercial prosperity to the Erie canal. While other cities upon the seaboard, Boston, Philadelphia and Baltimore, have opened to themselves railway communications, extending into the interior, by which supplies of provisions, fuel, &c., can be procured at all seasons, New York is as yet unprovided with any such communication.

From the period of the closing of the canals to the opening of navigation in the spring, embracing more than one-third of the year, she is dependent mainly for her supplies upon the accumulations during the seasons of navigation, and the contributions of the adjacent country, which are usually reserved to the period when they will command the highest prices.

The opening of a continuous line of rail way, leading into the fertile regions of the interior, will remedy, to a very considerable extent, this evil, and serve to prevent the existence of those monopolies which so easily spring up under the present limited sources of supply, and which will continue to be more severely felt in proportion as the population of the city and the adjacent country is augmented.

In conclusion, I will add, that this great interest possessed by the city of New York in the construction of the New York and Erie railroad, necessarily induces a reciprocal interest on the part of those portions of the interior of the State which are so situated as to be able to avail themselves of the road when constructed. The benefits accruing to those portions, in being able to communicate with the city at all seasons, with the great additional value which the road will impart to lands and other property wherever its influence shall be felt, cannot, from their magnitude, be easily calculated. As a public enterprise, in this view alone, it will richly repay to the people of the State of New York any favors it may be so fortunate as to receive at their hands in aid of its construction.

Respectfully submitted,

EDWIN F. JOHNSON, *Civil Engineer.*
Albany, January, 1838.

COMPARATIVE STATEMENT *of the population of the counties situated between the Hudson River and Lake Erie, tributary respectively to the two lines of railway, one extending from Albany to Buffalo, and the other from New York through the southern tier of counties to Dunkirk.*

NEW YORK AND ERIE RAILROAD.

Counties.	Population in 1830.	Population in 1835.
Chautauque,	34,671	44,869
Cataraugus,	16,724	24,996
One-fourth of Erie,	8,930	14,398
One-fourth of Genesee,	13,037	14,647
Allegany,	26,276	35,214
One-fourth of Livingston,	6,930	7,773
Steuben,	33,851	41,435
One-fourth of Ontario,	10,042	10,217
One-half of Yates,	9,504	9,898
One-fourth of Seneca,	5,260	5,656
One-fourth of Cayuga,	11,987	12,302
Tompkins,	36,545	38,008
Chemung,		17,465
Tioga,	27,690	16,535
Cortland,	23,791	24,168
Broome,	17,579	20,190
Chenango,	37,238	40,762
Three-fourths of Delaware,	24,768	25,644
One-half of Otsego,	25,686	25,214
Sullivan,	12,364	13,755
Two-thirds of Orange,	30,244	30,064
Total in New York,	413,017	473,199
Add for counties in Pennsylvania,	92,795	107,000
	505,812	580,199

Increase from 1830 to 1835, is $14\frac{7}{10}$ per cent.

ALBANY TO BUFFALO.

Counties.	Population in 1830.	Population in 1835.
Three-fourths of Erie,	26,789	43,196
Niagara,	18,485	26,490
Three-fourths of Genesee,	39,110	43,941
Orleans,	18,773	22,893
Three-fourths of Livingston,	20,789	23,319
Monroe,	49,862	58,085
Three-fourths of Ontario,	30,125	30,653
Wayne,	33,643	37,788
One-half of Yates,	9,504	9,898
Three-fourths of Seneca,	15,781	16,970
Three-fourths of Cayuga,	35,961	36,900
Onondaga,	58,974	60,908
Oswego,	27,104	38,245
Madison,	39,037	41,741
Oneida,	71,326	77,518
Jefferson,	48,515	53,088
Lewis,	14,958	16,093
Herkimer,	35,869	36,201
Montgomery,	43,595	46,705
One-fourth of Otsego,	12,843	12,607
Schenectady,	12,347	16,238
	663,390	749,477

Increase, from 1830 to 1835, is 13 per cent.

WESTERN AND ATLANTIC RAILROAD.

The interesting event of breaking ground in this magnificent enterprise, was celebrated on the 1st of January. One of the contractors, Mr. Neleigh, had arrived a few days previously, and Gen. Brisbane, then in command, in consequence of the absence of Col. Long, with characteristic energy, determined that the work should open with the new year. Accordingly, on the first day of January, 1838, the citizens of the neighborhood were assembled on the very summit of the Blue Ridge, and the laborers, with barrows, carts, picks, and spades, prepared to attack this mountain barrier to the west at its topmost elevation. The 1st and 3d brigades of the corps of engineers, were also in attendance; and on the bosom of the Allatoona heights, for the first time, was assembled, a portion of the privileged few about to divide the honor of levelling the rugged obstacles of nature, opposed to the moral and commercial advancement of mankind. All seemed impressed with the solemn dignity of the occasion, and every heart responded to the animated eloquence that now echoed through the hills—sensible that the very paucity of their numbers only increased the share of honor to each participator.

Before the turning of the first sod, Gen. Brisbane, who had been requested to address the assembly, commenced his subject by cogratulating them, that although vanity as well as ptide, was usually enlisted upon similar occasions, the nobler sentiment would, in the present instance, require no aid of the lesser. A recurrence to difficulties already encountered—a glance at obstacles still crowded around—a single appeal to that spirit of enterprise which had, from the lofty summit of the Alleganies, dared to grapple by one stroke of policy, the interests of a continent immeasurably broad, inexhaustibly fertile, and incalculably populous, would, of itself, afford a sufficient guarantee for the favor with which the celebration of the day would be entered upon. He observed, that, in the remote ages of the world, this service would have been offered to some heathen god, as a propitiation for his favor. That at a more recent date, we should have felt through the pomp and circumstances of the occasion, the august powers of some principal potentate. But that, in our own glorious day, we establish, by these ceremonials, the epochs merely of our historic eras.

It was his duty, he said, to exhibit, through the various objects, the character and the previous story of the work before us—its claim to a prominent page, not only on the records of America, but upon those of the world. He regarded it as revolutionary of the whole political, social, and commercial character of society.

* * * * *

On the first day of 1836, an act of the General Assembly of Georgia was published, declaring her interested in the then contemplated road to Cincinnati. At a convention of delegates held at Knoxville, East Tennessee, on the 4th of July, following, the Georgia representation, from the reports of her engineers, and the negociations of her statesmen, discovered, that while her position resembled that of New York, as to her domestic improvements, her intercourse with the west could be reduced to the most accurate and satisfactory calculations—the exports of Cincinnati being deliverable at the western terminus of her road upon the Tennessee river, with the additional expense of railroad transportation to the sea-board, at a more reasonable cost than the trade from the same place to New York—the southern markets for the sale of these exports, being excluded in the estimate. The result of these conclusions, was a convention of the state; and on the first day of 1837, an act to survey, locate and construct, a railroad, to be an exclusive state work, was published by the Legislature.

On the 4th of July following, a twelve month from the discussion of the policy at Knoxville, the whole was put under survey; and to-day, the first of 1838, two years from the earliest legislation on the subject, more than a million of the surplus revenue of the state is enlisted in the actual construction of the work. Nor is this all, he exclaimed turning to the engineer department already had the influence of practical knowledge shed its rich lights upon the different interests of the people, their opinions were as sensibly modified. In 1825, Dr. Fort of Milledgeville, introduced into the Legislature of the state, a bill, purporting objects similar to the present enterprise—'tis true, he said the bill had become a law, and the subject entered upon; but for the want of support on the part of public opinion, had been suffered to decline. At the present day, he was happy to say, no such thing could be. In the college of this state, a professorship of practical science had been established, and among the corps present, we not only found the sons of Georgia's most distinguished citizens, but the graduates of her classic institution, were ambitious to take part in the actual operations of the field. He observed, that the high prerogatives of the southern ancestry had been ere this most wofully curtailed; and yet, while the whole world was engaged in extending the principles of science to the minutest application of labor, our southern youths were ushered into active life, with the same closet love that constituted the power of the high priest of some heathen temple. He finished his address, by calling upon all present to exert their influence in whatever sphere, upon a principle of duty—that from our distinguished chief to the least operatives on the work, a spirit of subordination and diligence should actuate us in the fulfilment of our respective functions. He trusted that a high-toned confidence in each other, would altogether dispense with that contemptible habit of insolent control, which was so utterly inconsistent with the spirit of our institutions. He himself never had occasion to issue an order, although often exposed to the most appaling contingencies. He felt a sympathy, he declared, which satisfied him, that the enthusiasm of the day would, of itself, engraft upon each, the proud resolve, "to dare to do," and the people of Georgia, although anxiously intent upon the progress of their undertaking, would still discover in them an energy altogether equal to the success of the enterprise.—*Washington (Ga.) Spy.*

From the Grand River Times.

GRAND RIVER COUNTRY.

Almost the entire Grand River country lies south of the 43d degree of latitude, south of the line of the Erie Canal, and is as much warmer than the country bordering upon the Atlantic coast in the same latitude, as is the valley of the Mississippi. It is not subject to severe frosts or heavy snows. During the last winter the snow fell to the depth of 18 inches, and we are informed by a gentleman who has been engaged in the Indian trade for nearly twenty years, that he never knew it as deep before. During the coldest days the thermometer sunk to zero, while in Albany, if we recollect, it was more than 20 below. The frost of August, 1836, that so destroyed corn throughout the whole country, was no more severe here, than it was 100 miles south.

During the present winter we have not had more than four or five inches of snow, and since New Year none at all. The weather has been uncommonly warm, and farmers have been ploughing since this month commenced.

We subjoin for the gratification of the curious, a statement of the temperature as taken from a thermometer record, kept by a gentleman of this place. The time of observation was 10 o'clock, A.M.

We commence with January 3.

	Jan. 3.	Jan. 7.	Jan. 15
Sunday,		38	39
Monday,		25	40
Tuesday,		22	45
Wednesday,	70	13	41
Thursday,	57	58	34
Friday,	32	30	25
Saturday,	40	39	17

There being few marshes and little stagnant water, the air is free from that miasma to which some sections of the country is subject, consequently there is little sickness of any kind, as little as in any part of the western country.

The soil is generally rich, producing a magnificent growth of timber, and is finely adapted for the growth of wheat, corn, oats, and the grasses. There are but few prairies, and those are mostly at the mouths of important tributaries of the Grand River, as the Maple, Flat, Thorn Apple and Rouge rivers. These, however, are unsurpassed in richness and beauty. The western part of Clinton is mostly timbered land of the first character, and we venture to say, there is no part of Michigan that is better fitted for a rich agricultural region than this. There are no marshes, no ponds, no waste lands, and the numerous running streams with which it abounds, and its immediate vicinity to navigable waters, gives it advantages that are not and should not be overlooked. The Maple and Looking-glass rivers, and Stony Creek, are the most important streams in this section.

The eastern part of Ionia, bordering on Maple and Grand rivers, presents some of the finest tracts of "openings" that we have seen in the State. The soil is good as can be, as its appearance and its products alike testify.

As you descend Grand River you find more "oak openings," as in that part of Kent county lying east of the Thorn Apple, and the soil is more light but produces good wheat, as well as grass. That part lying west of the Thorn Apple and south of Grand river, is mostly timbered land, producing fine growth of black walnut, white wood, sugar maple, &c. That part of Kent county lying north of Grand river, (as yet unsold) presents one of the finest tracts of farming land that we have any where seen, and numerous and fast increasing settlements upon it, show that we are not alone in believing it so.

The eastern part of Ottawa county is of the same character, possessed of a fine soil and is well watered. The southern and western part is principally valuable for its pine timber which is found in great abundance, and of an excellent quality. As a whole, we are confident that no section of the State presents stronger inducements to the agriculturist, than Grand river country. Although it has not the inviting prairies of the southern section of the State, its rich and durable soil, its freedom from marshes and ponds, and the thousand clear and rapid brooklets that every where meet the observers eye, gives it at least equal advantages.

CHICAGO AND NEW YORK UNITED BY INTERNAL IMPROVEMENTS.

By the report and estimates of J. D. Allen, Esq., it is estimated by calculating Railroad speed at 17, and steamboat at 12 miles an hour, that the transportation of passengers can be effected, from New York via Albany, Utica, Oswego, &c., to Chicago, in sixty-one and a half hours, thus:

Distance and Time.

From	N. Y. to Albany, 150 miles, by night boat,	10½ hours
"	Albany to Oswego, 168 miles, by day Railroad,	10 "
"	Oswego to Hamilton 160 miles, by night boat,	13½ "
"	Hamilton to Detroit 191 miles, or to Huron, 136 miles, by day Railroad,	11 "
"	Detroit to Chicago, and from Huron to Chicago, 250 miles, by day and night Railroad & steamboat,	16½ "
	Total	61½ "

From Boston—time the same.

The report adds: "In a further time of ten hours, the traveller may reach the Mississippi, or some of its chief tributaries, in less time, and may complete the journey by the river to New Orleans, within eight days from his departure from the city of New York, or from Boston," and this too, without losing a meal, or a night's rest.—*Chicago Democrat.*

VALUABLE DISCOVERY.

The Richmond Enquirer of Thursday says: "There seems to be no end to the mineral treasures of Virginia. Yesterday we heard of another discovery, which, according to present appearances, is destined to prove of incalculable service.

The reader will recollect that during last autumn we spoke of a rich vein of iron ore, which was in a course of exploration, on the south side of James river, near the coal pits, and from two to three miles of the river. The ore has been further opened, and we are happy to learn promises to be of great value. It is under the auspices of John Heth, Esq., and is immediately on the new Railroad, which will soon be opened, from the coal pits to the river. But the discovery embraces a new object—a large rich bed of *natural* Coke, which is just below the iron ore, and is suspected of being in a large field, and of being near 17 feet thick.

The coke was first discovered by those who are engaged in laying down the Railroad. They thought of burning it as fuel, and the experiment has answered.

It is said that Professor Rogers has pronounced it natural coke—and we understand that Mr. Deane is about to try its virtues in his iron rolling mill.

Should it correspond with the indications which have so far transpired, it will prove a source of great wealth to its worthy, liberal and enterprising proprietor, as well as advantage to the rising manufactures of Richmond."

WHISHAW'S HYDRAULIC TELEGRAPH.

We have long ago heard it suggested, and we think by Mr. Vallance, that a column of water could be conveniently employed to transmit information. Mr. Francis Whishaw has conveyed a column of water through sixty yards of pipe in the most convoluted form, and the two ends of the column being on a level, motion is no sooner given to one end than it is communicated through the whole sixty yards to the other end of the column. No perceptible interval elapses between the time of impressing motion on one end of the column and communicating it to the other. To each end of a column he attaches a float board with an index, and depression of any given number of figures on one index, will be immediately followed by a corresponding rise of the float board and index at the other end It is supposed that this simple longitudinal motion can be made to convey all kinds of information. It appears to us that the amount of information which can be conveyed by the motion in one direction only, of the water, or backward and forward, must be limited. To make the mere motion backwards and forwards of a float board, indicated on a graduated index, convey a great number of words or letters, is the difficulty to be overcome. Mr. Whishaw has exerted his ingenuity in this way, with a promise of success, and by-and-bye, the hydraulic telegraph may supersede the semaphore and the galvanic telegraph.—*Courier.*

NEW YORK CANAL TOLLS.

The following table shows the annual amount of receipts for tolls on the New York, Erie and Champlain Canals, and also the total receipts on all the New York State Canals, from January 1st, 1820, to January 1st, 1838.

Note.—In the total amount is included the receipts on the Erie, Champlain, Oswego, Cayuga, Seneca, Chemung, Crooked Lake and Chenango canals.—The tabular statement is from the Journal of Commerce.

Years.	Erie & Champlain canal,	Total receipts.
1820	5,437 34	5,437 34
1821	14,388 47	14 388 47
1822	64,072 40	64,072 40
1823	152,958 33	152,958 33
1824	340,761 07	340.761 07
1825	566,112 97	566,112 97
1826	762 003 69	762,003 69
1827	859,058 48	859,058 48
1828	835.407 28	838 444 69
1829	795,054 52	813.137 45
1830	1,032.599 13	1,056.922 12
1831	1,194,610 49	1,223,801 98
1832	1,195,804 23	1,229,483 47
1833	1,422,695 22	1,463.715 22
1834	1,294.649 66	1,339,799 56
1835	1.492,811 59	1,548.972 39
1836	1,556.269 37	1.614,680 38
1837	1,239,052 49	1,293,129 80
	$14,823,746 64	$15,191,879 68

ANOTHER EVIDENCE OF THE WEALTH OF N. CAROLINA.

It was stated in this paper a few months ago, that a lot of copper had been sent here from Guilford county, on its way to New York, to be tested in quality—the mine having been then recently discovered. We understand that the test was highly satisfactory, showing the metal to be of a superior kind, and that a quantity of the same has been shipped from this port to England.—*Wilmington Advertiser.*

ECONOMY OF LABOR.

One great superiority of the manufacturers of England over the agriculturists, is attributable to their attention to the economy of labor. In my earliest remembrance, the farmers were too ignorant to think of it, afterwards they were too prosperous, and now they are too much bent on seeking relief from other sources than their own energies. What might be done in time by a combination of mechanical and chemical science, it is as impossible to calculate beforehand, as it would have been fifty years since to have foretold what would be the present state of spinning, weaving, bleaching, and transport.—*Walker's Original.*

For Sale.—A Level, made to order by Brown & Hunt, and in first rate order. Enquire at this office.

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

⁂ Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

Wanted on a Lease.—A good country place, with suitable out-houses, and from 5 to 15 acres of land, a short distance of the city. Enquire at this office.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS Mc NEILL,
Chief Engineer.

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.; Atlas, Boston; Philadelpia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment

Jan. 12 fmw6

G. Mitchell, Printer, 265 Bowery, N.Y.

AMERICAN
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AND
ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, DECEMBER 23, 1837. (Published March 21, 1838) VOLUME VI.—No. 51.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MARCH 21, 1838.

REPORT TO THE DIRECTORS OF THE AUBURN AND ROCHESTER RAILROAD COMPANY. BY R. HIGHAM, ENGINEER, &C.

To the President and Directors of the Auburn and Rochester Railroad Company:

GENTLEMEN,—Fully appreciating the importance of an early completion of so important a work as this Railroad must be, and to satisfy the anxiety of the travelling public, and those interested in the stock, in relation to what progress has been made towards so desirable an object; I am induced thus early to submit the following report, and estimates of the cost, together with the accompanying rough map and profile.

Not conceiving it good policy to make a comparative estimate of the several routes surveyed, at this early stage of the work, I do not recommend that on which the estimates are made, as the best or cheapest route that can be selected, or that has been surveyed; but as one that can be taken, provided none of the others should prove more advantageous to the Company.

We shall be able to pass the whole distance, between Auburn and Rochester, without having any grade to exceed twenty-eight feet ascent or descent, per mile, and that without any very deep cuttings on the summits, or high embankments in the valleys. The curves, generally, will be of a large radius, only one being as low as 1000 feet.

The route estimated upon, commences at the termination of the Auburn and Syracuse Railroad, and passes through the several places mentioned in the charter, to wit: Seneca Falls, Waterloo, Geneva, Vienna, Canandaigua and Victor, and extending to a point on the west side of the Genesee river, in the central part of the city of Rochester—where the Tonawonda Railroad can be connected with it, by a route that admits of using locomotive power to the junction of the two Roads, and without crossing or passing through any important street in that city. The distance from the village of Auburn to the city of Rochester, by this route, will be 78½ miles.

The work throughout, will be of a plain and easy character, without any heavy rock excavation, or expensive river walling, and with as little perishable structure as perhaps any Road of the same extent in the United States. The superstructure of bridges over the Erie and Seneca canals, the Seneca and Genesee rivers, and some others of minor importance, (the cost of the whole amounting to $19,190,) in fact, constituting the only perishable part of the road; and allowing that this will require an expenditure equal to ten per cent. per annum, on its cost, to renew and keep it in repair, will only amount to $1,919—a mere nominal sum for repairs, on so great a work. This permanency in the character of the work, will unquestionably be a consideration of great importance, with those who wish to have their money invested in stocks that will yield them an annual return of profits, instead of having it consumed in continual repairs.

The grading for that portion of the route which lies between the village of Auburn and Seneca Falls, is through gravel and clay soils; for the remainder of the distance it is generally through loam, sand and gravel, and at three several points some slight lime-rock cuttings, but not more than will furnish the necessary quantity of stone to be used for culverts and bridge abutments, in their vicinity.

The character of the masonry, I have estimated to be of plain, rough, hammer-dressed stone work, laid in quicklime mortar. [The quantity and prices, as per the accompanying estimates, D. E. F. and G.]

The item of Land for the road-way, usually a heavy one, I am confident can, on this route, be procured at a reasonable rate. This is evident, from the progress already made in procuring releases, the favorable character of the country admitting of the selection of various routes of about the same feasibility, whereby sections can be avoided in which combinations to extort exorbitant prices from the Company might be formed, (but which I am happy to say, there is no apparent disposition to do;) and also from the peculiar circumstances of the country, which require greater facilities for carrying off its surplus produce, and making the location of the road a desirable object to every section, and the interest of individuals to give, or sell their land to the company at a very moderate price. Through the progress of the surveys, where opportunity and time admitted, conditional releases and contracts have been procured on the different routes. On the route estimated, there are 233 Landholders, (exclusive of owners of village lots,) of whom 89 have released, or contracted for prices not exceeding the value per acre of their whole farms. In the city of Rochester, grounds have been secured to the Company (gratuitously) for a depot at the termination of either of the routes surveyed; and throughout the line at the several villages, the importance of the location of the depot, for a great freight and passenger Railroad, it is thought, will create competition among different interests that will secure to the Company a sufficiency of lands, at a reasonable compensation. The prices estimated for the several depots, are considered sufficient to include the necessary lands.

The following estimates are made for grading and masonry for a double track —the first track to be laid immediately, the second track as soon after as requisite. Considering this as one of the links in the great chain of Western Railroads, from Boston to Buffalo and the "far West," the estimates are made on a scale of corresponding character and magnitude, to accommodate the business of this great and increasing thoroughfare; and nothing short of a double track will, in my opinion, be adequate for any great period.—This is indicated by the fact, that the travel on the Utica and Schenectady Railroad, (which forms another link in this same chain,) already requires the second track, to do the business of carrying passengers only; and the fact, that the Tonawanda Railroad, (from Rochester to Batavia,) with its presen accommod tions, having only a single track, is inadequate to the business, although trains of cars run day and night.

The subject of wooden superstructure, from its importance, has occupied much attention. From the experience of the present day, there can be no question, that a combination of timber and iron makes, under all circumstances, the preferable road for this climate. The greatest objection to roads of this character, is the large amount of perishable materials used in their construction, as all the different kinds of timber that can be procured in sufficient size and quantities for rails, are not of a durable nature; and from their exposed situation near the surface of the ground, they must decay very rapidly. It is found, that in ordinary cases, the common timber of the country will require replacing, on an average, every six or seven years.

The following plan for a durable superstructure, is suggested for your consideration, as a better and cheaper road than the common modes: The sills to be 4 by 12 inches, well bedded; the top surface four inches below the grade of the road: on the sills are spiked cross-ties of red cedar, three inches thick, of any width not less than 4 inches, and two feet from centre to centre. Between the cross-ties are red cedar blocks, 3 by 6 inches, and one foot long, leaving spaces between the ties and blocks, not exceeding 8 inches. Upon the blocks and ties, and under the rail plates, is a locust ribbon, one inch thick and three inches wide, to raise the iron rail, and clear the flanges of the wheels from the ties. Upon the locust ribbon is placed the rail plate, one inch thick, 2½ inches wide on the bottom, and two inches wide on the top. The spikes to pass through the iron plate, the locust ribbon and the ties, into the sills, confining the whole together.

The locust and cedar being durable beyond any experience, may be considered, practically, as permanent as the iron. The sills may be of any timber of the country; being bedded in the earth, and remaining moist and free from the action of the atmosphere, they will last for a great length of time. The bearing between the ties and blocks being so small, the plate and ribbon will be abundantly strong for any weight that can at any one time be brought upon them. Their spikes being one foot from centre to centre, and passing into the ties and sills, would have an equal or greater hold to keep the rail in its place, than in the common wooden rails. It is believed that the increased size of the rail-plate will be materially important in giving stability to the road, and will be more than sufficient to compensate for the large wooden rails, in keeping the road firm and in place.

The accompanying estimates show that at the same prices for materials, a permanent road, after this plan, can be constructed for less money than the ordinary road, and will not require more repairs than an iron and stone road.

The following tabular estimates give an aggregate.*

For excavation and embankment, (3,398,014 cubic yards,)	$373,272.27
" Masonry in Culverts and Bridges, (6,192 cubic yards,)	35,213.00
"Superstructure in Bridges, (1,865 Linear ft.)	19,190.00
For Grubbing & Clearing,	7,365 00
" Lands, damages for remov'g buildings, &c	50,990 00
" Road crossings and cattle guards,	6,885.00
Making a total for Grading, Masonry, &c. of	$492,915.27
For 156 miles of fencing	37,440.00
" 78½ miles of superstructure for a single track, at $1,369,70 per mile,	343,021.45
Total amount for grading, fencing, and superstructure,	$873,376.72

Depot Buildings and Machinery.

Depot in the village of Auburn,	$10,000
" in the villages of Cayuga Lake, Seneca Falls, Waterloo, Geneva, Vienna, Manchester, Canandaigua and Victor,	32,000
" in the city of Rochester,	10,000
	$52,000,000
8 Locomotive Engines at $7,000,	56,000
50 Passenger Cars, at $1,000	50,000
100 Freight Cars, at $250,	25,000
	131,000.00
Engineering and Superintendence,	45,000.00
Making a total for 78½ miles, of or $ 14,030.27 per mile, graded for a double track, and a single track laid; or $18,399 97 per mile for a double track complete and a total of	$1,101,376.72 $1,444,398.17

* Note.—The detailed estimates, being very voluminous, are omitted in this publication. The excavation and embankments average 11 cents per yard. The masonry averages nearly $6 per yard, including foundations. The bridging, $10.50 per Linear foot.

Some time has been expended in collecting data from which to form an estimate of the number of passengers, and the amount of freight which must be conveyed over this road. The number of passengers in stages has been ascertained from the books of the stage proprietors—the amount of freight, generally, from the persons receiving it. The estimate of the number of passengers that pass in freight boats, a large proportion of which will be drawn to this road, was furnished by the politeness of John Allen, Esq., forwarding merchant, of Rochester. The number on the packet-boats between Rochester and Syracuse is from the books of the Packet Boat Company.

The way-passengers not ascertained, and those travelling in private carriages, that would take this road when completed, have been estimated by those who have long been conversant with the travel of the country, and from my own observation; and certainly may be considered as not overrated. The increased travel on this route has been, for the last 30 years, 20 per cent a year; this must continue to increase from year to year, and will more than compensate for any diversion that may be made in the travel from this great thoroughfare to other routes of less natural advantages. The natural business of the country, independent of that which the facilities of this road would invite from other points, would in a few years be amply sufficient to justify a more expensive structure.

It must be borne in mind, that these estimates are made from the actual travel and tonnage for the past year. It is not a speculative view of what might be done on the road, but that which is now being done, and which the great facility furnished by this road, will draw to itself. The time for which these estimates are made, embraces a portion of one season from Sept. 1836, to Jan. 1837, which was perhaps more than an average of the usual business for any corresponding period; but for the remainder of the year, to Sept. 1837, it was enough less to make up for any excess in the early part of the year; and this time was selected as furnishing probably the nearest approximation to the actual travel and tonnage that could be had.

Estimated Revenue.

8,776 passengers west (ascertained from the stage offices) that would pass over the road at $3.00	$26,328.00
8,046 ditto passing east, at $3.00	24,138.00
4,000 ditto passing east from Rochester as above at $3.00	12,000.00
4,000 ditto passing west from Rochester, at $3.00	12,000.00
3,000 ditto passing east from Rochester by Palmyra to Geneva, 50	

miles, at $2,00	6,000.00
3,000 ditto west from Geneva, as above, at $2,00	6,000.00
2,400 ditto from Geneva to Palmyra by stage to take canal west, (50 miles per Railroad to Rochester at $2,00)	4,800.00
3,800 passengers in packet boats to and from Geneva east, 25 miles, at $1,	3,800.00
19,500 passengers, by 3 lines of packet boats between Rochester and Syracuse that would take the railroad, at $3,	58,500.00
The number of passengers per annum, as per Mr. Allen's statement, in line boats on the Canal, amounts to 94,500. Allowing that one-fourth of this number, or 23,625 will take the first class of cars, at $3,00,	70,875.00
Say one-fourth more will take the 2d class cars at $1,50,	35,437.50
(It is found on the Canal from Schenectady to Utica, that more than three-fourths of the travellers take the Railroad in the first class of cars.)	
The way passengers from the villages along the route, are estimated at 4 per day each way, and 4 more that travel in private carriages, will make 5,840. Admit they travel on an average over half the road, $1,50 each,	8,760.00
Making a total for pass'gers	$268,638.50

FREIGHT.

Freight ascertained to have been transported from the Canal to points on the Railroad, and which would take the Railroad when completed, the prices the same as now paid.

10,604 tons to the village of Vienna, as (per statement) at $1,00,	10,604.00
45,000 barrels of flour, pork & whiskey, from Bates's, Chapin's and Short's mills, to the Canal, at 12½ cents,	5,625.00
705 tons merchandise to Canandaigua, at $2,00	1,410.00
2,000 barrels of salt to Canandaigua, at 22 cents,	440.00
100,000 bushels of wheat from Canandaigua to Chapin's, Bates's, and Short's mills and to the canal, at 3 cents,	3,000.00
12,600 barrels flour, whiskey, &c. from Victor and Fredon, at 12½ cts.	1,575.00
110 tons merchandise to do. do. at $1,25,	137.00
700 barrels of salt to do. do. at $12½ cents.	87.50
Add to this, for plaster to be consumed along the line of the Road, and also for the towns of Bloomfield, Mendon, &c. to which this road would be the nearest channel, estimated at 20,000 tons annually, at $1,00 per ton.	20,000.00
10,000 tons merchandise, wheat, &c. as above, at $1,00,	10,000.00
As soon as the Blossburgh Railroad is completed, a large amount of coal will be furnished at Geneva for the places bordering on the Road, which may be estimated at 20,000 tons annually, at $1,00 per ton,	20,000 00
Transporting great western and side mails,	20,000.00
Making a total for freight and passengers of	$361,517.50

The numerous items, and the many incidental expenses embraced in the expenditures for managing a railroad, which cannot be foreseen or calculated with accuracy, may be estimated from the experience of other roads. The Utica and Schenectady Railroad Company have, as appears from a report of the President to the stockholders, taken some pains to keep an accurate account of the expense of managing their road, which amounts to $72,000 per annum.

This road being of about the same extent as the Utica and Schenectady, I have calculated that the expense would be nearly the same.

Deducting from the above revenue,

For managing Road per annum,	$72,000.00
" clearing ditches, renewing bridges, and leveling Road in the spring,	10.000.00
" any incidental expenses	8.000.00
Total for managing Road,	90,000.00
Which deduct from revenue,	361,517.50
Leaves an income of	$271,517.50

or nearly nineteen per cent. on the estimated cost of the Road, for a double track complete.

These estimates are made with confidence, and may be relied upon by the stockholders, who cannot but be satisfied with the prospects of the Company; and should feel confidence in prosecuting the work with the utmost energy to a final completion.

Respectfully submitted,
R. HIGHAM,
Engineer and Commissioner.
Canandaigua, Oct. 3, 1837.

FIRST ANNUAL REPORT OF THE STOCKHOLDERS OF THE EASTERN RAILROAD CO.

To the Stockholders of the Eastern Railroad Co:

In submitting their first annual report, the Directors have pleasure in assuring you that the requisites of the charter, and other enactments relating thereto, have been strictly complied with in good faith, as will appear by reference being had to the archives of the Executive and Treasury departments of the State—and that appropriations have been made, out of the funds received from the private Stockholders, to pay the expenses incident to the subscription, and the organization of the Company agreeably to law.

The Directors have also contracted for a portion of the real estate required for the uses of the corporation, *on lease*, including buildings sufficient for the convenient accommodation of the board, and the business of the several offices of the Secretary, Treasurer and Agent, as well as for those of the Engineering department, and spacious cellars and store rooms for the *material* of the Company to a large extent. This was esteemed the most eligible arrangement, as a considerable capital would thereby be reserved for any possible deficiency—and the property being altogether appropriate, and immediately ready, the valuable time which would otherwise be consumed in the construction, and the cost of supervision, would be avoided. So that the Directors will be prepared, after having received the first payment on the State's subscription for one million of dollars, to proceed in the work with alacrity and vigor to its earliest practicable completion, which is considered as highly important to the interests of all concerned—and they cannot doubt of that continued observance of the public faith, which has heretofore characterized the fiscal concerns of Maryland, in its engagements under all the obligations of a solemn contract.

The Directors have been cheered by intelligence of the interest taken in their operations by enlightened individuals in charge of kindred improvements, and liberal capitalists in various parts of the Union, and, with a view to demonstrate the natural advantages of the work, and the peculiar benefits conferred by the charter, and other enactments relating thereto, which give to it stronger assurances of extraordinary profit than are presented by any similar enterprise known in the country, they respectfully submit the subjoined illustration:—

In the first place the location has been made, after surveying several routes, and critically taking the levels, by two brigades of Engineers under the immediate direction and supervision of Col. Kearney, the senior of the Topographical Department of the United States—an officer of great experience, and approved intelligence—and without cost to the Company—the entire expense having been defrayed by the State and General Governments. A view of the map will show that *it is the most direct line along* *the maritime coast from Florida to Philadelphia*—and the report of the Engineer in Chief proves it to be the *most exdeditious, comfortable and cheap.* By referring to the enactments it will appear that the granted powers are free and ample. They are *perpetual*, and forever *exempt from taxation*—but a peculiar benefit is to be found in the fact that although the State is apparently a stockholder, for four-fifths of the capital, she is in effect no stockholder at all—but a liberal furnisher of four-fifths of the funds at common interest, and *that charge is not to commence until the expiration of three years* from their being so furnished—the one-fifth only, belonging to the private proprietors, being in truth *the actual capital for dividends*—and as the work, with its motive power, and all appurtenances, (including the steamboat distance of eighty-six miles from Portsmouth in Virginia to the Southern terminus of the Eastern Shore peninsula of Maryland, *which is provided by nature*,) according to the estimate of the Engineer adopted by the Company and approved by the Executive of the State, will cost but six thousand dollars per mile, of which the proportion of the private proprietors, (one-fifth part thereof,) is *twelve hundred dollars*, being only about *a twentieth part of the cost of several existing Railroads*—consequently the receipts would yield to them a dividend of *five* per centum would give the Eastern Shore improvement *one hundred*, or an annual duplication of the capital.

The following table will exhibit the distribution of interest and dividends according to the act of 1835, chap. 395, which authorises the investment on behalf of the State—in the concluding sentence of section 9 of which act it is declared that "*any excess of dividends on the capital stock of the State, above six per centum, shall be distributed to the other stockholders of the Company.*"

TABLE I.

Assumed per cent.	Gross Capital.	Amount of Liabilities.	Interest to State.	Dividends.
6	1,250,000	75,000	60,000	15,000
12	1,250,000	150,000	60,000	90,000
24	1,250,000	300,000	60,000	240,000

So that the proportion distributed as *interest* to the State being *limited* at 6 per cent. remains *stationary*, whilst the dividends of *profits* to "the other stockholders" *increases rapidly.* In this statement the capital is fixed at an even sum, and will be so throughout for the greater facility of demonstration.

Seventy-five passengers per trip each way per day at ten dollars will give for the year five hundred and forty-seven thousand and five hundred dollars—say $547,500

Which being apportioned according to the act referred to, will be as follows—to wit :—

To the State for interest on $1,000,000—at 6 per cent. 60,000

"the other stockholders" on 250,000—

" 100 " —250,000—310,000

Will leave a surplus of two hundred and thirty-seven thousand and five hundred dollars— $237,500

for expenses and contingencies.

Assuming ten dollars (including the toll, or transportation, from its northern termination, to be paid by the Company) as sufficient for *the entire distance from Norfolk to Philadelphia*, which is cheaper than can be afforded on any other route, the following statement will show the result of certain numbers of passengers per trip each way for the year—to wit :—

TABLE II.

Passengers	Amount	Per cent. on 250,000	Excess
25	182,500	25	120,000
50	365,000	50	240,000
75	547,500	100	237,500
100	730,000	200	230,000
200	1,460,000	500	210,000
400	2,920,000	1000	420,000

The above, it is to be observed, is exclusive of avails to be received from the transmission of the mail, the transportation of troops, seamen, munitions of war, and other public property—(which may be sufficient, at least, to defray the charge of toll, or transportation, for persons or tonnage, from its northern termination)—and also from merchandize and produce. Of the latter it is believed by intelligent gentlemen of the South, and South-West, from whom communications have been received, that a large proportion of the cotton and other productions of Virginia, the Carolinas, Alabama, Tennesee, and even Mississippi, would pass on *this cheap and expeditious route* for exportation, or for manufacturing, in the North and East. The receipts from tonage of such produce might cover the cost of repairs—and pay, perhaps, the six per cent. on the capital furnished by the Treasury.

The million of dollars supplied by the State might in fact, be regarded as a donation, as the *interest* reserved, is less than the *tax* imposed on some Railroads, it amounts to only about two hundred and fifty dollars per mile, whilst that on the branch from Baltimore to Washington exceeds a thousand.

The cost of repairs of the Eastern Shore Railroad will, as well, be comparatively small—being built of durable timber, which abounds along the line, it will need but little reparation for several years. And being *on the level surface, its structure will be always visible and accessible.* And, being without deep cuts, it will be exempt from slips and slides, and other vexatious causes of heavy expenditure and embarrassment.

By recent information from high authority it appears that upwards of fifty-six thousand persons travelled in the steam packets between Charleston and Norfolk in 1835, with a subsequent annual increase of some eight or ten thousand persons—and the Chief Engineer, in his general report, states that the travel between Charleston and Savannah and the northern cities alone amounted to between sixty and seventy thousand—these accounts are corroborative.

Many believe that the travel of the Peninsula alone will of itself be twenty-five per day. Such passengers, however, would not pay the full ten dollars—but the transportation of the local produce might make up the difference.

Persons coming from the South and South-west and going to the North, (besides those in the lines from Savannah and Charleston, who would of course proceed direct to Portsmouth or Norfolk,) will concentrate at Roanoke, and there decide between the Western and Eastern shore routes—that decision, as the Engineer remarks, "*the friends of the latter will willingly leave to the traveller*"—as from the defections both vertical and horizontal of a considerable part of the former, and the detention by stoppages at the different towns—it may be safely affirmed that Philadelphia may be sooner reached by the Eastern shore than Baltimore by the Western, and at *much less expense*—and more particularly in winter, when the Potomac creek is rendered impassable by ice, whilst that from Portsmouth to Tangier is open and free, with very rare exceptions. The actual distance to Philadelphia is considerably greater by the Western than the Eastern shore—and the difference is *virtually* increased more than *four-fold by the deflections and interruptions mentioned.*

A winter port for shipping, especially with a view to deliveries of merchandise for early spring sales, has long been desired by those engaged in that commerce. This may be found at the Southern depot where vessels of burden may moor in safety near the shore, and where return cargoes may be in readiness, or speedily procured. The approach is in the direct line from Norfolk, and is plain and practicable at all seasons. So eligible a harbor, indeed, is rarely to be seen in this section of the Union. It is near to Tangier Cod, that beautiful basin in which the British fleet lay during the late war.—From this point goods may be sent by the cars in a few hours to Philadelphia, and cargoes, if not already there, may be brought from any of the ports of the Chesapeake, and particularly from Baltimore to load a ship without delay—and at an expense, for transportation, perhaps, but little exceeding the drayage from the latter city to the "Point," or place of loading—as, of the fleets of fine schooners belonging to the waters of this county there are *scores*, and often *hundreds*, at Baltimore; many of which are always ready to return in ballast, and will bring flour, tobacco, naval stores, or other produce at moderate freights, or charter by the day, so that the rate may not exceed from five to ten cents per barrel.

Commodious wharves and warehouses

will be constructed at the aforesaid southern depot.

The final report of the Engineer, made to the Commissioners for superintending the surveys and location, takes a minute and specific view of sundry matters immediately connected with the subject, accompanied by estimates and illustrative drawings, as well of the line proper, as of the several improvements either completed, or in the course of construction, or projected, which are calculated to contribute to its productive operations. This document has been reported by the Commissioners to the executive, and by that department to the Legislature, by order of which it has been printed. Col. Kearney was also ordered by the Senate of the United States, through the Secretary of War, to report to the General Government, and the maps, drawings and illustrations have been engraved to accompany his report to that Government.

The following extract of a letter from the Chief Engineer is submitted for the purpose of presenting the opinion of that officer on the proposed improvement—to wit: "I congratulate you on the prompt completion of the subscription to the capital of '*the Eastern Shore Railroad Company*.' It is, indeed, a great adventure, and there can be no reason to doubt of the ultimate, and ample, reward of those who have taken the shares of stock.—The work has nothing to fear from competition—it must attract a very large proportion of the Southern and South-Western travelling—laying as it does, *directly in their route*, it will offer to them *the cheapest, the most expeditious*, and *the most comfortable conveyance*—and every traveller knows the influence of these temptations. The people south of the Chesapeake are *alive to the success of the enterprise*. The road will certainly pay largely with a comparatively small amount of business, as it has none of these severe absorbents of its receipts which characterise so many others—besides the cost of its motive power will be diminished in due degree to the graduation—which may be reduced to a perfect level, or nearly so."

It may well be noted that the proposed connection of the great line of intercommunication between the north and the south, whilst incalculably benefitting the Eastern Shore, would not be without advantages to Baltimore, as it is well known that the mass of travellers, before arriving at that emporium, are transferred, on the Patapsco, from one steamboat to another—and it may be fairly anticipated that the increase of trade and navigation, to arise from the consequent improvement of the Peninsula by the operations of the Company, would infinitely exceed any probable diversion of personal intercourse.

An estimate of the time of travelling from Roanoke to Philadelphia is annexed, to wit:

A train of cars will leave Halifax, in North Carolina, at 3 A. M., and arrive at Portsmouth, in Virginia, at 8 A. M., (84 miles,) allowing an hour for embarking baggage, &c., in the steamer,	6 hours
A steam packet will leave Portsmouth at 9 A. M., and the passengers, refreshed by breakfast and dinner, on board, will arrive at Winter Port, Tangier, at 6 P. M., (86 miles,)	10 hours.
And allowing an hour for debarking and moving baggage, &c.,—a train of cars will leave the Port, and city of Tangier, at 7 P. M., and arrive in Philadelphia at 3 A. M., (160 miles,)	8 hours.
Total time of travelling 330 miles—13¾ per hour—one day, or	24 hours.

Respectfully,
In behalf of the Directors,
JOHN U. DENNIS, President *pro. tem.*
LITTLETON DENNIS TEACKLE,
Secretary *pro. tem.*

From the Evening Post.

I noticed in your paper of the 9th the proceedings of a meeting of the citizens of Westchester county in relation to the crossing of Harlaem River with the Croton aqueduct by inverted syphons. The ostensible ground of complaint set forth by the remonstrators, is that the proposed plan will destroy the navigation of the river, and thereby materially injure their interests. They state that the difference in the cost to the city between the original project and that now in contemplation will be only $509,718, of which "your memorialists insist that it would be inequitable in the extreme, for the purpose of saving to the taxable inhabitants of the city of New York the payment of $509,718 to be divided among them—that some of your memorialists should be compelled to lose the large amounts of difference of value of their lands and farms being bounded upon navigable water." I have some considerable acquaintance with the value of lands bounded by the Harlem river, and also with the persons who have put their names to the remonstrance, and I hazard nothing in saying that the sum of money proposed to be saved by the commissioners would have purchased all the land in fee any way affected by the river, previous to its being purchased by a band of speculators in anticipation of this very difficulty of which they hope to avail themselves in the manner usual in such cases. This fact is notorious, and it is equally notorious that assessments for damages to many of the individuals who complain has in many instances been exorbitant and unreasonable. It is said by many intelligent people that almost every man who has been paid damages as assessed, would have rather given the land than it should have taken a different direction. Every land-holder doubled his valuation as soon as the surveyor's marks indicated the route through his ground; because he knew a great outcry would produce a great award of damages. The commissioners have fought their way through great difficulty; impositions of the most glaring description have been attempted, and their partial defeat has caused a rancorous feeling against them. But it is hoped they will not be turned aside from their intrepid defence of their constituents against the rapacity of a band of hungry speculators, who desire the citizens of New York to make up by a donation of a "few dollars each, their probable losses in rash speculation." Of course my remarks do not apply to that portion of the remonstrants who "derived their lands from their ancestors long previous to the revolutionary war." But of this very class I will say, that they are now at their own expense creating an impediment to the navigation of the river, in the shape of a new bridge* much more worthy of complaint than the syphons. And if you take them from the list of complainants, the sum of $509,718 will now buy the soil owned by every signer of the instrument, provided you take the taxable assessment roll as the measure of value, or appraise the same at its sale value previous to the speculation in consequence of the anticipated increase by the passage of the aqueduct through that part of the county. MORE ANON.

*A new bridge has been commenced, and is being built, for the exclusive accommodation of the inhabitants of "Morrisania."

CROTON AQUEDUCT.

The attention of this community has been called to the plan recommended by the Water Commissioners, for carrying the Croton Aqueduct across Harlem River; and in an article published in the American of the 9th inst., they are charged, together with their engineer, with incapacity and want of skill, in recommending iron pipes in preference to a high bridge of masonry. This is a work of too great importance to the welfare of our city, to allow any reasonable doubts to exist in the minds of our citizens of the efficiency of the plans the commissioners may adopt: and as experience is the best guide, we have thought the opinion of men of experience would be useful at this time. We have therefore been permitted to make the following extract from a letter written the 21st ultimo, by Frederick Graff, Esq., the superintendent and engineer of the Philadelphia water works, to the chief engineer of the New York water works. It will be recollected that Mr. Graff has been more than twenty years engaged on the Philadelphia water works, during which period they have erected the works of Fair Mount, which have justly been the pride of that city.

Mr. Gaff has probably had more experience in laying down iron pipes than any other man in this country, and as he has received the unqualified approbation of his fellow citizens, his opinion, expressed without any reference to this controversy, and altogether unsolicited, must be entitled to great consideration.

"It is with much pleasure I acknowledge the receipt of your interesting report on the progress of your great work, and feel gratified that your plans meet the approbation of your citizens, who, I flatter myself, will, by your exertions, enjoy, in the course of four or five years, an abundant supply of pure water; the magnitude of your reservoirs, together with the various connections in the whole chain of the works, are such as cannot fail.

"The plan you have adopted in passing over Harlem River with iron pipes, is, in my opinion, preferable to the high aqueduct: the manner you have planned the whole structure, together with the arrangement of the pipes cannot but succeed to give a copious supply of water."

RAFT OF THE ST. FRANCIS.

(*Abstract of a report in Congress by the Hon. A. G. Harrison.*)

About three hundred miles up the St. Francis, from its discharge into the Mississippi, commence the rafts of timber by which its navigation is obstructed. These rafts are three in number, the most extensive not exceeding one mile. They commence at the head of the back water on the St. Francis, from the overflow of the Mississippi; and if once properly removed, they would not probably again obstruct the channel. Like all other obstacles of a similar character on the western rivers, these rafts are formed of immense masses of heavy timber, piled up and driven compactly together; and in some portions, by the deposite of alluvion, and the decay of vegetation, a soil of some depth has been formed upon them, supporting living trees, underbrush and herbage. In some places a person may cross the St. Francis without beholding any indication of the stream, or being conscious that he is in its vicinity. The river enters above, flows beneath the raft, and again issues below, as if it had just risen from the ground. Some of the rafts rise and fall with the variations of the stream, like a floating bridge. The principal obstruction is opposite the lower extremity of West Prairie; but there are several smaller ones lower upon the stream, and on its various tributaries. In the vicinity of this raft lies an extensive swamp, some eighty miles in length, which, it is thought, may be reclaimed by a canal, which would cost $250,000. A short distance below the raft, an extent of country fifty miles in length, and about thirty in breadth, was sunk to the depth of one hundred feet, perpendicular, by the earthquakes of 1811 and 1812. The effect of this was completely to destroy the channel of the St. Francis for thirty miles, its waters being divided into a number of small streams, none of sufficient depth for navigation. By filling up all those channels excepting one, and cutting that deeper, a good navigation might be obtained, it is thought, most of the year for steamboats. The expense of this undertaking is estimated at $50,000.

There is said to be something remarkable in the vast inundation between the St. Francis and the Mississippi. Prior to the earthquakes of 1811 and '12, these bottoms were not flooded; but by that event, this whole section of country was so shaken and depressed, that the freshets of the St. Francis found their way across the interval to the Mississippi; yet, as a general thing, the banks of the latter stream exceed those of the former in height, by sixteen feet—a levee of a few feet altitude would therefore be amply sufficient for every variation of the waters. The eastern bank of the St. Francis, it is believed, should also be leveed, for a distance of one hundred miles from its mouth, to prevent the back water of the Mississippi from overflowing the bottoms that lie between the streams, in time of flood. The probable expense of removing the rafts and other obstructions to the navigation of the St. Francis, as well as of constructing the necessary levees is estimated at less than $200,000, and the value of the territory redeemed at nearly *eight millions!* When the St. Francis is once cleared from obstructions to its navigation, it will present one of the noblest streams in the western valley—navigable for a distance of four or five hundred miles through lands of unrivalled fertility. The redemption of this extensive tract—three hundred miles in length, and upwards of thirty in breadth, is a subject of deep interest to the State of Missouri. All her southern counties would be greatly profited; a navigable stream would flow past every farm—the health of that region would be improved—the agricultural interests would be advanced, and 36,000 new families could be settled on lands, now deemed worse than valueless. This subject, we repeat, is one of vital importance to the southern sections of Missouri, and we trust that her representatives at Washington, will duly consider those measures, which may be introduced before our national councils, most conducive to her interests.

INUNDATED LANDS.

The point at which the Inundated Lands upon the Western waters, may not prove uninteresting. The point at which the Inundated Lands on the Mississippi commence, is in the vicinity of Cape Girardeau, extending South—distance of one hundred and thirty-five miles parallel with, the river, at a mean breadth of twenty-two miles, and embracing an area of about two millions of acres. These lands are overflowed by the floods of the Mississippi; but it is believed they may be drained by a canal, and rendered fit for cultivation at an expense of $100,000. To effect this, it will not be necessary to levee the banks along the whole extent of the Mississippi; but only at the head of La Croix Creek, one or two miles in length, and at an expense of $2,500.

With respect to the lands between St. Francis and the Mississippi, to which we have alluded in a former article—in order to secure them from inundation it is deemed necessary, that a levee be constructed along the eastern bank of the latter stream, for one hundred miles, at an expense probably of $128,000. The aggregate cost for works thought necessary to drain this extensive swamp, is estimated at $281,000, and the extent of territory fit for cultivation reclaimed, would be about two millions of acres.—Between the town of Cape Girardeau and Helena in Arkansas Territory, there is a distance of two hundred and fifteen miles, not provided for in the estimate already made, along which levees will be necessary at an expense of $500,000, and the land reclaimed will amount to nearly five millions of acres.—The construction of a levee from Helena to the mouth of the Arkansas, along the White and the Mississippi rivers, will cost $300,000, and reclaim about two millions of acres.

The extent of country between the Mississippi and the Pine Bluffs on the Arkansas, which is inundated at present is utterly valueless, is estimated at the enormous amount of about ten millions of acres. This immense tract may be redeemed by a levee on the Arkansas and Mississippi at an estimated expense of $600,000.—A levee from the mouth of Red River to the northern boundary line of Louisiana, a distance of three-hundred miles, would reclaim a large extent of Territory. As we descend the Mississippi the increase of inundated lands is so great, that an exact estimate of their extent is impossible; but an appropriation of one million of dollars, it is believed, will reclaim three and a half millions of acres.—There is said to be a tract of country embracing 675,000 acres of land lying between the Atchafalaya and Mississippi Rivers, two thirds of which belongs to the United States, which may be reclaimed and rendered fit for cultivation by a levee at an expense of $125,000. Between the northern boundary of Louisiana, and the Gulf of Mexico, the superficial area of inundated lands is estimated at five and a half millions of acres, a very inconsiderable portion of which has been reclaimed. By embankments of sufficient strength and canals, this tract could be reclaimed, at an expense of about $200,000.—On the Mississippi above its confluence with the Missouri, there is a large body of land subject to inundation, extending more or less along its whole course with the State of Missouri, which can be easily reclaimed at an expense $100,000. The quantity of land would probably amount to 300,000 acres, and of the most fertile character. The Missouri does not overflow its banks to a sufficient extent to deserve attention; and the most serious kifficulty attending the stream, is found in the numerous snags and drift heaps in its channel. An appropriation of $50, 000, it is believed, would render the navigation safe.

The aggregate quantity of inundated lands on the Mississippi, according to the estimates pointed in this Report, amounts to 23,469,260 acres; of which about 11,234, 630 acres belong to the United States, and can be redeemed from its present worthless state, at an expense at the highest estimate of about $4.4000, 000. The minimum value of the lands reclaimed would be about $56,000,000, leaving a balance of 52,000,000. The quality of the land is said to be the finest on the globe, and the effect of draining them upon the health of the country, cannot be estimated too highly.—*St. Louis Bulletin.*

TRANSIT OBSERVATIONS AT ST. JOHN'S COLLEGE.

Preparations have been made at St. John's for the determination of the longitude, from the eclipse of the sun, on the 18th of September next. This eclipse will be *annular*, at Annapolis, and will afford the best possible opportunity to find the accurate longitude of as many places in the United States, as may be favored by competent observers with the necessary instruments. A chronometer by *Berthoud* has been provided, and the Theodolite is used, as a transit instrument, to ascertain its rate. Any occultations of standard fixed stars, which may occur, before the eclipse of the sun, will also be carefully observed. The telescope of the Theodolite, was placed in the plane of the meridian, by calculated transits of *Sirius*, the actual time having been found from previous observations on the sun and stars by one of Troughton's sextants, with a perfect mercury horizon. The star was bisected by the vertical hair at the instant of its culmination. The position was afterwards verified by taking small equal azimuths and altitudes of the star, east and west of the meridian, and then bisecting the intervening arc of the horizontal circle. This course was adopted merely for the convenience of observing at a southern window in the building, from which a favorable view can be had, only of stars having considerable south declination. The method of Lunar distances has already given the longitude of St. John's as 76 deg. 33 m. approximately, or 5 h. 6 m. 12 sec. in time, west of Greenwich. The following is the method of applying the transits to the chronometer:

	h.	m.	sec.	
Example—Right ascension of Sirius, March 5th, 1838, increased by 24 hours,	30	38	01	32
Sidereal time, corrected to this meridian,	22	51	58	92
Passage in Sidereal time,	7	46	02	40
Accelerating for the interval,		1	16	56
Mean time of passage,	7	44	45	84
Time by the chronometer,	7	44	54	
Chronometer too fast,			8	16

The calculations for the time, from altitudes taken by the sextant, will be made by James P. Archer, of the class of Civil Engineers.—*N. J. Republican.*

SPECIMEN OF FRENCH INVENTION.

Among the new joint-stock companies which are starting up thick and threefold in the French capital, there is one of rather a more novel character than usual. This is a "Navigation Company," which proposes to introduce into France those improved methods of communication in which, as the prospectus observes, she is far behind many other countries, but more especially England and America: to effect this object, or even to go beyond it, it is proposed to build a number of steam-towing vessels, some of a large size for the open sea, and others of smaller dimensions for the French rivers, with an immense fleet of ships and barges to be propelled by the former. The grand feature of the scheme is, that these vessels are to be constructed as to serve the purposes of conveyance by land as well as by water: the towing ships, when required, are to mount the railways as locomotives, while their convoy are to follow in the character of a "train."—*London Mechanic's Mag.*

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

*** Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

G. Mitchell, Printer, 265 *Bowery, N.Y*

AMERICAN
RAILROAD JOURNAL,
AND
ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, DECEMBER 30, 1837. (Published March 24, 1838) VOLUME VI.—No. 52

CONTENTS.

AMERICAN RAILROAD JOURNAL.

NEW-YORK, MARCH 24, 1838.

We are indebted to A. H. Wilson, Esq., for the Reports of the Canal Commissioners, of Pennsylvania, and of the Committee on the Gettysburgh Railroad.

Also, to Col. Childs, J. E. Bloomfield, and E. F. Johnson, Esqrs., for Legislative Documents, and to Joseph D. Allen, for Report to the Oswego and Utica Railroad Co.

Also, to Mr. Morton, for his Report to the Directors of the Cleaveland, Warren and Pittsburgh Railroad Co.

☞ See Notice to Contractors, by the Chief Engineer of the James River and Kanawha Company, Va., among the Advertisements.

TO SUBSCRIBERS.

Before the end of the present month, we intend to lay before our Subscribers the first number of a new volume.

As we desire to introduce considerable improvements into the new volume, we most earnestly call upon all our subscribers to remit upon the receipt of the first number.

To those indebted for past years, we must decline sending. It is but a sorry compliment to subscribe for, and read the Journal, without paying for even the paper.

To those of our friends who have done their part, we return our sincere thanks, and beg them to consider the completion of the present volume, at a considerable disadvantage, as our guarantee for the future performance of our duty.

WATER COMMISSIONERS' REPORT.

We have delayed the publication of this voluminous Report, until we should be able to do it justice. Owing to its great length, and the importance of the subject, we prefer giving it to our readers in as short a compass as possible, which we shall be able to do in two or three numbers more.

We exceedingly regret that the discussion on this subject in our daily papers has been, in some instances, of a very personal and unfair character.

We do not object to the fair criticism of an Engineer's plans—but roundly to deny his capability or experience, contrary to the fact, is most unwarrantable.

DEATH OF BOWDITCH.

It is with feelings of the deepest regret that we announce the death of this distinguished man. Of the merits of Dr. Bowditch, as a mathematician, it is needless to inform our readers. His labors in both the practical and the theoretical departments of the science are well known.

His translation of, and commentary upon the "*Mecanique Celeste*" remains unfinished—a monument of his high talent not likely to be completed by another hand.

Dr. B. died at his residence in Boston, on Friday, the 16th instant. We are not informed as to the nature of his complaint.

RAILROADS IN CHURCHES.

It is remarked by Chevalier that the Americans are emphatically a people for Railroads. When he entered the cabin of the packet at Liverpool, the first American paper that caught his eye was the "*Railroad Journal.*" During his sickness, which lasted through the voyage, he says, he remembers of the conversation on board only the word "*Railroad.*" When he arrived in New-York, he was shown among other things, a "*Marine Railroad,*" for hauling up ships for repair. In the lead mines in Pennsylvania, he saw a "*Railroad*" under ground. At a Southern Manufactory of a very extensive character, one of the chief curiosities, was a "*Railroad suspended in the air*" (after the manner of those used in some of our large printing establishments, for transportation from the higher stories of one building, to those of another). When he visited one of the *prisons*, in Philadelphia, we believe, after having gone the rounds, the overseer exclaimed, "but you have not yet seen my "Railroad."

Railroads in churches had not yet been imagined, certainly not introduced, or the quick observation of Mons. Chevalier would have discovered them. They are, undoubtedly, an invention of a date later than the visit of Mons. C. to this country.

Not to exhaust the patience of our readers, we should say that the Railroad the subject of our notice is located in the chancel of St. Peter's Church, in this city, and is used for moving the pulpit from before the altar, to a place provided at one side, and out of the way of the other services.

The operation is performed with the utmost ease, while it prevents the one-sided, and to us unpleasant, permanent location of the pulpit, in most Catholic Churches.

While on the subject, we must not neglect the opportunity to do justice to the perfect neatness and good taste displayed in the design of St. Peter's. The exterior is not quite completed. The interior, for chasteness and correct proportion, is without a rival in this city. It requires some art to fill up a space of eight thousand superficial feet, without leaving voids, or overloading with ornament in any part. The organ, built by Mr. Henry Erben, of this city, is the largest we have in New-York, and is so powerful as to fill this immense building with ease.

We understand that another church in this city has a Railroad, and that the pulpit on it is a locomotive, as no *primum mobile* can be discovered while it is in motion.

BENNET'S STEAMBOAT.

We understand that Mr. Bennet has completed the alteration in the valves of his new steamboat, and has met with such success as to encourage his highest expectations. We have been informed of the result of a very satisfactory trial, but do not wish to make any statements, as Mr. Bennet intends in a few days to invite a critical examination, which will give results in a form more generally useful, than those derived from a partial trial.

This is right—Mr. B. knows what can be done; all he asks is fair play, and an impartial trial. We wish all manner of success to such ready ingenuity and indomitable perseverance, as he possesses, in whatever way he may choose to show it.

LAST NUMBER OF THE PRESENT VOLUME.

Our readers are reminded that this is the last number of the volume for the year 1837. We have, at much cost and pains, succeeded in fulfilling our engagements to our subscribers. We wish them to do the same for us.

Hereafter, the American Railroad Journal will be published semi-monthly, in a large octavo form, including an extra advertising cover, independent of the usual quantity of matter. The work will thus contain as much matter, when bound, as heretofore.

The Mechanic's Magazine, which we formerly published, contained only a certain portion of the matter of the Railroad Journal. The work in that form is discontinued. Subscribers who have paid for the year, will be supplied with the Railroad Journal to complete their year—after which time we intend to publish but the one work; subscriptions Five Dollars a year, payable in advance.

In asking the indulgence of our readers, for the delay in completing this volume, we need but remind them of the trial of the past year to excite their sympathy.

We are doing every thing in our power to make the next volume highly interesting and useful, both to the practical and scientific man. No pains will be spared in obtaining the latest and best information in our own country and abroad.

Our foreign papers and journals enable us to give our readers such information as cannot be obtained in any other way, unless at a great cost—while in our own country, our friends do not often give us time to enquire after Reports, at least, before they are on our table.

But we would particularly invite the attention of Manufacturers to the Journal, as the best means of communicating the results of their respective establishments. Whenever anything worthy of notice is offered, we will make it our particular business personally to attend and examine it.

But while we are devoting time and labor to the advancement of internal improvements, we must remind our readers that we incur heavy expenses, and it is consequently necessary that they should be punctual in their remittances. "A word to the wise——."

We commend our readers to the following article as containing some notions on the subject of railroads. We desire to see more from New England.

RAILROADS IN NEW ENGLAND.

An impression exists, to some extent, that Railroads are not fitted for the Eastern States, or at all events, that they are not as necessary or as profitable as in other parts of the country. This impression is, we are satisfied, entirely erroneous, and as it is one which has a very important bearing upon the prosecution of these works in the New England States, especially upon their receiving the countenance of the Legislatures of those States, I deem it proper to occupy some space in showing how entirely unfounded is this idea.

First, It is notorious that there is no part of the country as populous as New England. Its whole territory is studded with villages and cultivated farms, and a Railroad passing through the heart of such a region as this for any considerable distance, must receive a very large amount of local support.

Second, There is no section of country where in the same distance the amount of articles to be transported is so great. Without considering the large amounts of building and flagging stone, ship timber, &c. &c., the supply of the numerous manufacturing villages, with the raw material for manufacture, and the many articles for consumption by the operatives, and the transportation of the manufactured article, affords a very large business to a railroad passing through a country abounding in manufacturing establishments.

Third, A New England population is eminently a *travelling* population. They are constantly in motion, and are always ready to avail themselves of any improved mode of intercourse, and that portion of population connected with manufacturing establishments, are peculiarly locomotive in their character.

Fourth, Although the face of the country is generally very rough and uneven, yet it is practicable often by pursuing the valleys of rivers to obtain as favorable a route as in any portion of the West, both in point of elevation and curvature.

Fifth, The main support of any Railroad passing for any considerable distance through a populous country with a large amount of articles to be transported, must be derived from the business upon its borders. The common opinion on this subject is altogether erroneous, as experience in other modes of conveyance has most fully shown. On the Erie Canal, as appears by official returns to the year 1828, the receipts of the transportation of goods, and passengers carried only a portion of the distance between Albany and Buffalo, were thirty-nine fortieths of the whole receipts—that is, only one fortieth part of the receipts were for persons or goods passing through the entire line of the Canal. And on the Hudson river, it is an ascertained fact that there are very many more passengers who go only a part of the way in steamboats between Albany and New-York, than through from one of those cities to the other. Of the passengers on board the New-York and Providence steamboats, not one half, as we are informed, pass over the Providence and Boston Railroad; the number to, and from Providence, and the interior, being greater than the number passing between Boston and New York. Facts of this kind might be multiplied indefinitely, all showing that the border support, the local business, is the most valuable from its certainty, and most important in amount.

Sixth, As the business upon all Railroads increases *geometrically*, as you add to its length, it is of course important that these roads should be extended through a large tract of country: such will be the case in New England. Already from Boston the Railroads are extending rapidly East, and South by way of the Providence and Stonington Railroads, and the Worcester Railroad, and the Norwich Road, (rapidly constructing,) to Long Island Sound, and all these connected with each other, and by means of the Western Railroad from Worcester to Albany, with the great avenues at the

West. So that each one of these Rail roads is a part of a long line of communication, and will enjoy all the benefits of such a connection.

As an illustration of the peculiar advantages attending the construction of Railroads in New England, and in proof of the statements above made, I will advert to a road not yet completed, (although far advanced and in the course of rapid construction,) and therefore not universally known.

The Norwich and Worcester Railroad extends from the steamboat navigation of the Thames at Norwich to Worcester, a distance of 59 miles. In this whole route there is no inclination exceeding 20 feet to the mile, and the road is very easily constructed and at moderate expense. Within five miles of the route between Norwich and Worcester, excluding those two towns, there are 75 cotton mills, 27 woollen mills, and numerous manufactories of iron, paper, &c. By official returns collected under the authority of the state, and just published, it appears that there are in the county of Worcester, into the heart of which this road runs, 74 cotton mills, with 124,720 spindles, making goods annually of the value of $1,991,024; 66 woollen mills with 160 sets of machinery, manufacturing 3,748,852 lbs. of wool into 2,740,467 yards of cloth, worth $3,695,321. Also the enormous sum of $2,791,298 the value of boots and shoes annually manufactured; $387,038 the value of hides tanned; $321,100 in chairs and cabinet furniture; $411,554 in palm leaf hats; $118,971 in straw bonnets; $331,200 in machinery and various other manufactured articles, amounting in the whole to more than $12,000,000. Indeed, in the counties of New London and Windham, in Connecticut, through the heart of which this railroad passes, and the county of Worcester in Massachusetts, there are not less than 230 cotton and woollen mills, besides very numerous manufactures of other kinds, in the aggregate of even greater value.

But this is not all, at Worcester this railroad connects with the Boston and Worcester Railroad, and a large number of manufacturing establishments are near that road, and a portion of their business would take this route to New-York.—What is however more important, this connection furnishes a route between Boston and New-York as expeditious and pleasant as any other. From Boston to Norwich is 102 miles, and thence to New-York 130, by steamboat. The time from Boston to New-York, by this route, will be fourteen or fifteen hours.

Again, from Worcester a route has been surveyed for a railroad to Nashua, N. H., and been found to be exceedingly favorable. The distance is 40 miles, and no elevation is greater than 33 feet to a mile, and a great portion entirely level This will open an entirely new course of travel and transportation, not only from Nashua and the intermediate points, but even from Lowell, this is a few miles the nearest, and by far the best route to New York, as there will be but one transhipment, and that at Norwich on board a steamboat. Of the immense business of Lowell nothing need be said, farther than that from these same official returns it appears that aside from articles of transportation from all other sources, the cotton manufactured and cotton goods, wools and woollen goods, anthracite coal used in the cotton and woollen mills, and iron and coal in the manufacture of machinery, are together equal to 29,350 tons annually. It is apparent also, that passengers and goods from New Hampshire, destined for New-York would, on arriving at Nashua, find this far the shortest, cheapest, and best route to that city.

By its connection with the great Western Railroad at Worcester, on the completion of that road, (which is now put beyond a doubt,) a communication is at once opened with Albany and the West, forming a most important connection, mutually beneficial to both roads.

A slight examination of the map will show the importance of this road and its connexions, and in view of these facts, and in the further fact, that it is ascertained that it will cost less than one half as much per mile as any other road heretofore constructed in New England, I would enquire in what respect any Railroad at the West is superior to this, or where one is to be found out of New-England uniting so many advantages?

I make these remarks in reference to the Norwich and Worcester Railroad, not for the purpose of making any invidious comparison between that road and any other in New England, but because I am best acquainted with the facts in relation to it.

New England.

THE RAILROAD STEAMER.

BY JAMES JOHNSON, M D.

Were any of the ancients to rise from their tombs, and to behold a steam ship, full of passengers, darting up the Thames, or a train of carriages, with a thousand people flying along a Railroad, at the rate of thirty miles an hour, they would be very apt to doubt the fact of their revisit to the same planet they had left—since a thousand years in the grave may probably seem no longer than a short siesta after dinner. Their surprise would not be much lessened by the sight of a brilliant flame springing up from the middle of a street, or issuing from ten thousand metallic tubes, and turning the darkness of night into the glare of day! If, while gazing at these phenomena, they saw a man, or even a monkey, descend from the clo[illegible]s suspended as the pendulum of a huge umbrella, they would no longer doubt that they had got into "another if [illegible] a better world" than that of their bi[illegible] and death!

But t[illegible] return to the Railroad Steamer. Without rudder or rein—without tug or tow rope—without chart or compass—without impulse from man, or traction from beast—this maximum of power in minimum of space—this magic automaton darts forward on iron pinions, like an arrow from a bow, along its destined course. Devised by science, but devoted to industry—harmless as a dove, if unopposed; but fatal as a thunderbolt if obstructed in its career—this astonishing offspring of human invention—this giant in strength, though a dwarf in stature, drags along, apparently without effort, whole cargoes of commerce—merchants and their merchandize, artizans and their arts, travellers and their traffic, tourists and their tours, (some of them *heavy* enough)—in short, every thing that can be chained to the tail of this Herculean velocipede!

The steam carriage nearly annihilates distance between inhabitants of a state, and thereby converts, as it were, a whole country into a city, securing all the good effects of combination and concentration, without the detrimental consequences of a crowded population. By the Railroad, Liverpool, Manchester, Birmingham, and the Metropolis, are constituted *contiguous* cities, while wide and fertile tracts of country intervene! Thus steam multiplies the product of human labor, by increasing their sale and diminishing their price. It will enable us to convert millions of acres from pasturage into cornfields, and consequently the provender of horses into food for man.

The whole transit of a Railroad steamer is a series of miracles, which, in former days, would have been attributed to angels or demons. At starting, the mighty automaton suddenly suppresses his torrent of hissing steam, and belches forth a deep and hollow cough, which is reiterated at shorter and shorter periods, like a huge animal panting for breath, as the engine, with its train, labors up the Euston square. These belchings more nearly resemble the panting of a lion or tiger than any other sound that I know of. With a slow motion, on any considerable ascent, the breathing of the animated machine appears to become more lab[illegible], and the explosion more distin[illegible] till at length the animal seems exhausted, and groans, as it were, under the tremendous effort. But the engine, having mastered the difficulty, acquires velocity before it plunges into the dark abyss of the tunnel under Primrose hill. There the peal of thunder—the sudden immersion into cimmerian darkness—the clash of reverberated sounds in confined space—the atmospheric chill that rushes over the frame—all combine to induce a momentary shudder at the thought of some possible collision or catastrophe in this subterranean transit, which is increased rather than diminished by the gleams of dubious light that occasionally break in from above, or the sparks of fire that issue every instant from the chimney, rendering "darkness visible." On emerging from the gloomy and gelid cavern, every thing appears of dazzling brightness, and we breathe with delight the pure atmosphere of Heaven.

The moment the highest point of elevation on any part of the road is gained, and a descent commences, the engine with its long train, starts off with augmenting velocity, dashing along like lightning, and with a uniform growl or roar, like a continuous discharge of distant artillery or thunder. The scene is now grand—I had almost said terrific. Although it may be a complete calm, the wind appears like a hurricane; and, while the train is flying along the raised embankments, as near Waterford, it is impossible not to feel some sense of danger, or an apprehension that some unexpected impediment may hurl the whole cavalcade into the yawning gulf below!

The meeting of the trains flying in opposite directions are scarcely less agitating to the nerves than the transit through the tunnels. The velocity of their course—the propinquity, or apparent identity of the iron trajets along which these hissing meteors move, raise the involuntary but frightful thought of a possible collision, with all its horrible consequences! The period of suspense, however, is but momentary. An electrifying concussion, as it were, of sense, sight, and sound takes place, and, in a few seconds, the object of terror is out of view behind.

But such Herculean labor cannot be carried on in so small a compass, without great expenditure. The AUTOMATON thirsts—he knows the place of refreshment—utters a loud and piercing whistle or note of preparation—slackens his pace—halts at the fountain, and ingurgitates a deluge of water to quench his burning draught. In five minutes he is able to renew his gigantic task!

The steam-shriek is a new phenomenon on the railroad, and a very startling one it is. By opening a small valve in the boiler, a volume of steam is driven with tremendous force and velocity, through a narrow aperture, in imitation of a throat, causing a shrill shriek, unlike the voice of man, or any known animal, but so loud as to be heard two miles off. It is a most unearthly yell, or scream, or whistle, which was compared by a distinguished poet, who sat beside me,* to the cry of some monstrous animal while being gored to death. It forms an excellent alarum, to clear the road for the train, and apprize those at the stations, that the engine approaches.

The railroad travelling possesses many peculiarities, as well as advantages, over the common mode of conveyance. The velocity with which the train moves through the air is very refreshing, even in the hottest weather, where the run is for some miles. The vibratory, or rather oscillatory motion communicated to the human frame, is very different from the jolting and swinging motions of the stage-coach, and is productive of more salutary effects. It equalizes the circulation, promotes digestion, tranquilizes the nerves, (after the open country is gained,) and often causes sound sleep during the succeeding night, the exercise of this kind of travelling being unaccompanied by that lassitude, aching, and fatigue which, in weakly constitutions, prevents the nightly repose. The railroad bids fair to be a powerful remedial agent in many ailments to which the metropolitan and civic inhabitants are subject.

To those who are curious, and not very timid, the open carriages are far preferable to the closed ones, especially in fine weather. In bad weather, and particularly at first, invalids may travel with more advantage under cover. I have no doubt, that to thousands and tens of thousands of valetudinarians in this overgrown Babylon, the run to Boxmoor, or Tring and back, twice or thrice a week, will prove a means of preserving health and prolonging life, more powerful than all the drugs in Apothecaries' Hall.

In fine, a man may travel from the pole to the equator—

"A Gadibus usque ad Gangem,"

without seeing any thing half so astonishing as the wonders of the railroad. The pangs of Ætna, and the convulsions of the elements excite a feeling of horror and terror, without any thing of pride. The magic—the miracles of the railroad engender an exulting consciousness of superiority in the genius of man, more intense and conclusive than any effort of poet, painter, or philosopher.

The railroad journey, however, is not without its inconveniences, many of which may be prevented by a little ingenuity. The greatest is the discharge of cinders, some of them ignited, from the chimney, which are not only disagreeable but occasionally dangerous to the eyes of those in the open carriages. This might be prevented by an awning—a protection which is adopted on some railroads, and one that must ultimately be adopted on all. It is a protection from the elements of fire and water which every company is bound to afford to the passengers, and is attended with trifling expense. Till then, glasses or a veil are the necessary guards for the eyes.

The transits of the tunnels, in hot weather, causing a sudden vicissitude of temperature, to the extent of 20 degrees of the thermometer, or thereabouts, require some precaution on the part of sensitive invalids. A shawl or large handkerchief, thrown over the head is a sufficient protection, and those who do not take this measure, should keep their eyes shut during the passage, since sparks and cinders are unavoidably thrown in closer showers over the passengers here than in the open space.

To speculate on the moral, physical, political and economical effects and consequences of railroads and steam navigation, when carried to their full extent is beyond my province—perhaps beyond the bounds of human foresight. If the semi-civilized peasants of the remotest isles of the Hebrides, of Orkney, and of Shetland can even now, transmit, in a few hours the produce of their huts, their mountains, their moors, and their farm yards, to the markets of Glasgow and Edinburgh, so as in three or four days to pay the annual rents of their tenements and wildernesses, what may we not expect from the extension and perfection of this facility of intercommunication? In days of yore, the imponderable products of the intellect travelled as slowly as the material merchandize of mankind. They will now be diffused, from the centre to the periphery—from the remotest outlines to the foci of society, with a rapidity little less than that of *thought* itself!! The ultimate *consequences* cannot be appreciated at present; but we may safely conclude that the benevolent Author of our existence did not endow the mind of MAN with such extraordinary powers of invention, without the design of final advantage to his physical wants, his social relations, and his spiritual nature.—*From the Medico Chirurgical Review, and Journal of Practical Medicine.*

* Campbell.

FUEL COAL, &c.

In this climate, a supply of fuel is of the first necessity; without it, the country could not be inhabited. Hitherto, the forests have afforded this supply, and will continue to do so, for years to come. But the time will arrive, when we must look to other sources, for this indispensable article. The remark has often been made, that Western New-York is one of the most favored portions of the earth; the climate, the soil, the beautiful surface, the lakes, the water power, the saline springs, and various other natural advantages combined, with the improvements of art, render it one of the most desirable lands for the residence of an enlightened and happy people. Confining our view to this immediate vicinity, and marking the rapid destruction of the forests, we should find reasons to apprehend that the inhabitants of this beautiful land must, in progress of time, suffer great inconvenience from the want of that supply of fuel, which the temperature of the climate demands, as a necessary of life; unless, indeed, the people should turn their attention to the preservation and culture of trees, as they have done in some parts of Europe, particularly in Great Britain. This undoubtedly would be in our climate, too uncertain; and beside, when the plains and gentle slopes of the country are once brought into cultivation, it would be too unprofitable to convert them again into forests No reason but the necessity of the case, can justify the farmer in retaining any large portion of his land in an unproductive state. If the whole country were cultivated, it requires no sagacity to discover, that its exports would be greatly increased, and of course, the value of farms enhanced to a corresponding extent.

The Legislature have directed that the persons employed to take the State Census, shall ascertain the quantity of improved land in the several towns. It is supposed the town of Seneca presents about a fair average of improved land among the old towns of Ontario County. By the census of 1825, the whole quantity of land in the town is 46,100 acres, of which 24,676 were improved, and 21,424 unimproved. The census of 1835 does not throw any light on this inquiry, but every one conversant with the country knows that the quantity of improved land now is greater than in 1825. If the same rule in taking the enumerations every ten years was adhered to, the result would show, with some approach to certainty, how long the forests in this town, keeping in view their increase by natural growth, would supply the inhabitants with fuel and timber for other uses.

Is it unreasonable to suppose that one-fourth part of the land in this town is now in woods? If that be assumed as the proportion, we have now about 11,500 acres of wood land; which, at 60 cords to the acre, would afford 690,000 cords of wood. In 1835, the town of Seneca, including the village or Geneva, contained 6,608 inhabitants, divided into about 1,100 families; allowing each family to consume 30 cords of wood annually, (and which is thought by some to be below the average,) and the whole of the present stock of timber would be consumed in 21 years, except as it might be restored by natural growth; and what the increase of maple, beech, and oak timber, such as generally grows in this town, may be estimated at, others better informed can decide.

It is not presumed that this estimate is correct. Enough to say, that judicious men think it so near the truth, as to be worth throwing before the public, that minds better informed on the subject, may be called to it, while there is time and opportunity for its consideration.

Reflection upon it at this time, will produce a general benefit. Even if men should become convinced that the forests cannot supply, at the present rate of consumption, fuel and timber for more than 25 or 30 years, there is no need of alarm. Coal of good quality, and in inexhaustible quantities, is within our reach, and can be afforded here at a very reasonable price.

It has been the policy of this State to extend her Canals toward the deposites of coal in Pennsylvania, and that State is also constructing Canals and Railroads in this direction, and up to her line. In a few years, various avenues through the Chemung Canal, and Williamsport and Blossburg Railroads, will be opened, affording to us supplies of coal, sufficient for our consumption, even if our woods were entirely exhausted.

With a view of showing the quantity of this coal at one point, the following extracts from a Surrey of the Coal region near Blossburg, made by Dr. Taylor, a scientific Mineralogist, are submitted:

Estimated Supply.

"Before dismissing the important subject of Coal, it were well to offer, in this place, some approach to an estimate of the quantity capable of being worked within this district, and of which the entire bulk is accessible by means of the projected railroad, and by the numerous lateral branches which may hereafter proceed from it.

"Leaving out the remoter positions where Coal and Iron Ore have been observed, we will confine our estimate within the circuit of a few miles. There now exists sufficient evidence for concluding that twenty thousand acres, surrounding Blossburg, are within the denomination of Coal lands. These are intersected longitudinally by the main valley of the Tioga, and transversely by numerous deep ravines, descending to that river, at almost every point of the compass. This area is equal to about 32¾ square miles, comprised within an oblong or oval, five miles broad by six and a half miles long. We will compute on ten thousand acres, or one-half only, as necessary or available to the intended project. Enough has now been ascertained of the geological structure of the country, to show that no serious impediments to practical operations, can be contemplated from the prevailing inclination of the strata. On the contrary, it is well known that such a depression is as likely to facilitate as to retard an extensive system of mining, where the sites for commencing these operations, are judiciously selected.

"But to escape all risk of exaggeration from such a cause, and to allow for vacant and inaccessible ground, we will admit one-half of this latter quantity to be under those circumstances, and the remainder will be that area which can furnish its mineral products upon the cheapest and simplest method of working. We have then to calculate on five thousand acres only. It has been shown that the gross contents of an acre of Coal land in Coal Run and Bear Creek, supposing every vein to be worked, and to be no thicker than it shows in the out-crop, is more than thirty thousand tons, or 23,500 tons clear produce, deducting one-fourth for waste and obstacles. In order to reduce it yet further within the limits of effective operations, we will reduce this amount below one-half, and calculate only upon ten thousand tons of coal per acre, on an average. We will assume that one hundred thousand tons of coal per annum, will be the ultimate demand. Then, with these data before us, the result is, that ten acres per annum would furnish the requisite supply of coal; and that, on the same ratio, it would be five hundred years before that area was exhausted.

"This statement will scarcely appear unreasonable, when it is considered as has been previously shown, that the clear produce of twelve acres from one vein only, namely, that at Morris's Run, will supply the same amount; being of sufficient capacity to furnish an article of tonnage and freight for many years, adequate to defray the interest of the entire capital invested in the proposed undertaking, and to provide a fund for the supervision, repairs, and ultimate renewal, of the whole line of railroad."

This deposite is 40 miles south from the Chemung Canal. A Company in Pennsylvania have commenced a railroad, 26 miles long, to the State line, and another Company in this State have also commenced one from the Canal to connect with the other at the State line. Both are now suspended on acconnt of the pressure of the times. The Company in this State, have petitioned the Legislature for aid in constructing their road, and independent of the necessity of this coal to the public, it is manifest that the trade in the article will add greatly to the tolls of the Canals, especially to those of the Chemung and Cayuga and Seneca. These Canals are now unproductive, and if by the loan of a moderate amount, the construction of these roads is insured, the State will reap a benefit through the increase of tolls on these Canals, far beyond the interest upon the money. When this communication is open, coal will be afforded at such a price as it is believed, will enable the farmer near the lakes, canals or railroads, to clear nearly the whole of his land, without fear of subjecting himself to the want of fuel.

It is of great consequence to have these works completed at an early date. If it be true, that one-fourth of the country is now kept in an unproductive state, to afford a present and future supply of fuel, when there is an article equally good, so near to us, and to be had at a moderate expense, it is a matter of deep concern to the country, that this coal should be brought among us; then every one can make the trial, and elect whether he will clear his land and depend on coal, or reject it, and retain his woods. If the coal is found to answer the purpose, it is manifest that the productions of the country will be increased—the business of our lakes and canals extended, and the general wealth enlarged.

If land is valued at $30 per acre, the man who retains 25 acres for his fuel, loses the interest on $750 per annum; or, in other words a capital to that amount is required to furnish the material of fuel upon which the labor of cutting and hauling is to be expended. Coal requires no labor but hauling, and is then ready for the grate. So far, coal for blacksmith's use and furnaces, is not mentioned. It is a fact, ascertained by the Agent of the Pennsylvania Company, (Mr. Dibblee, of New-York,) that blacksmiths draw this coal from the mines a distance of 60 miles, in preference to buying charcoal at four cents a bushel. In the manufacture of Salt, also, it will soon be found indispensable. Were it not for our ability to obtain coal, the price of salt would increase, as fuel became scarcer and dearer, but having this article at uniform prices, there is no danger of salt being very dear as wood becomes scarce.

These coal deposites, so near to our country, presents a most interesting subject for reflection. Without them, a large portion of the land must always be kept in woods, for fuel. Now, nearly the whole land may be improved, and a small portion of the gain in productions will pay for the coal. We are insured a perpetual supply of salt at a cheap rate. The lakes and valleys stretch toward the coal, rendering its transportation cheap by canals and railroads. Iron, also, in inexhaustible quantities, is found by the side of the coal. Our country abounds in Plaster, which is denied to the coal and iron region. Wheat is congenial to our soil, and is not produced in large quantities near the mines; so that, while we shall take from that region their coal and iron, we shall send them our salt, plaster and bread stuffs. And thus the bounties of Providence will become equalized, while thousands of persons will find employment and maintenance in effecting the exchange. Our position creates a natural relation to the coal region, which mutual interest requires to be perfected at the earliest practicable time because the prosperity of both regions will be the immediate consequence—*Gen va Gaz.*

ADAMS'S EQUIROTAL CARRIAGES.

There are at present to be seen at Tattersall's some wheel carriages constructed on a principle which seems to us to possess great advantages over the wheel carriages now in use. They are called Patent Equirotal Carriages, and are suspended on regulating bow springs.

The front wheels are as large as the hind ones. The springs are very flexible, and readily yield when the wheels are passing over obstacles. The two axles are capable of adjusting themselves by the traction of the carriage, either in parallel or radiating lines, with each other, according as the carriage advances, either on straight lines or curves; and thus the friction arising from the unequal tracking of ordinary carriages is avoided. In consequence of the frame work—technically called the "under carriage"—and, also, much of the iron work used in ordinary vehicles being dispensed with, and the springs reduced in weight one half, the total weight is materially lessened.—When turning a corner, the weight is equally poised over the two axles, as when moving in a straight line. In ordinary carriages, the weight is frequently on three wheels, with the centre of gravity nearly over the base. In consequence of the power of radiation in both axles, sufficient friction may be obtained without injury to the carriage to arrest its motion down the steepest hill, or to stop it altogether on any slope without the aid of the cumbrous drag chain and shoe.—The driver may by backing stop his horses on a hill slope as easily as on a level. Owing to the peculiar mode of locking, the driver's seat turns with the horses, and thus he is always square behind them when turning, with his full power exerted in a straight line, instead of losing his purchase by a sideway pull. The carriages may, if required, be so fitted up that all four wheels can, at the pleasure of the driver or sitters, be deprived of their free rolling movement, and converted into drags, in case of the horses running away. By the substitution of smooth turning centres, instead of the ordinary wheel plate and perch bolt, which rattle, and by the total absence of any other moving joints, such as spring bolts and shackles, and by the springs being each composed of a single plate of steel, they are very free from noise and concussion. They are also very easy to the sitters from the peculiar construction of the springs, which permit a universal action both laterally and vertically, and also in a direction with the advancing motion of the carriage. And, by the flexible braces, the vibrating motion so frequently complained of, is entirely removed.

We have seen several of them, which are elegant in form, and we think they are likely to answer the expectations of the inventor, and be of advantage to the public. The principle on which they are constructed is applicable to railroad carriages as well as those on common roads; and by enabling the two axles to adjust themselves with each other, either in parallel or radiating lines, will allow railroads to be safely and conveniently constructed in curves of comparatively short diameter, as well as in straight lines. The principle on which this is done seems to be the total separation of the axle of the fore wheels from that of the hind ones, so that each part moves freely on its own centre, while the connection of the parts of the carriage is preserved independently of the perch or axletrees. Where the body of the coach admits of it, or when it is composed of two parts, each part may be said to have its separate pair of wheelt, while the connection between the parts is established by a ball and socket-joint, which admits of free yet safe motion.—*English paper.*

WILFUL INJURIES TO RAIL ROADS.

We are pleased to see that the Senate of this state is disposed to pass an enactment for the severe punishment of those who are wicked enough to endanger the lives of innocent travellers, for the insignificant purpose of injuring a rail road company to the amount of a few dollars. One would suppose that no human being *could* be guilty of such despicable acts. But facts prove to the contrary. Last summer, when the Utica and Schenectady Company sent a train of cars through in the night, some individual or individuals removed the rails of the road near an embankment; and had not a person gone and met the cars, and told the engineer of the circumstances no one can form an idea how many lives, would have been lost. No punishment could be too severe for men guilty of such a horrible act. It is a malicious attempt at cold blooded murder—not of the persons against whom hostility is entertained, but of innocent, inoffensive strangers.

"The committee of the whole, Mr. E. P. Livingston in the chair, took up the bill to punish wilful injuries to railroads. [The bill declares every person who shall wilfully, with malicious intent, remove, break down or destroy any part of a railroad, or embankment, &c., or place obstructions on the track, with like malicious intent, guilty of a misdemeanor, punishable by imprisonment in the state prison not exceeding—years, or in a county jail not less than one year. The bill not to apply to cases where death to a human being shall result from the commission of either of those offences Makes the offender liable to the company, for treble damages.]—*Rochester Republican.*

REMINISCENCES.

The town of Newport, Rhode Island, was formerly the handsomest and most flourishing town in the United States. It has the finest harbor in the country, and seventy years ago, was the second town in the country, inferior in wealth and commerce only to Boston.

In 1769, Newport contained 11,000 inhabitants, now it has only 6,000. At that period, although the country trade of New York was greater than that of Newport, yet the latter far exceeded New York, as to foreign and domestic navigation. There were then employed at Newport, about 150 vessels in the foreign trade, and about 300 on coasting voyages. A line of London packets sailed from there, and Aaron Lopez, an eminent Jew merchant, first prosecuted the whaling business beyond the Falkland Islands, and was the owner of thirty vessels.

About 14,000 hhds. of molasses were annually imported into the town, and distilled into rum in the twenty-two distilleries then in operation at that place. The rum was sent to Africa and exchanged for slaves. Newport grew rich by the slave trade. Her merchants lived like princes, with slaves to fan them while they slept, and wait on their capricious desires when awake. A few fragments of the shattered fabric of ancient pomp still remain to show us that luxury and extravagance had taken deep hold on the habits and customs of the people of Newport. But an end cometh to all things. The present condition of some of the descendants of those rich men, furnishes a striking commentary on the folly of human expectations. The almshouse in that place is the gloomy home of many of the poor, broken and friendless descendents of men who strutted through life with all the ostentation of immense wealth.—*Newburyport Herald.*

REPORT ON INTERNAL IMPROVEMENT.

The able report of Mr. Ruggles, on this subject, in our State Legislature, has excited universal attention and admiration. Nothing can be more gratifying than to find that able and intelligent men take so warm and active interest in this subject. We may yet see our state regain her former rank in magnificence and utility of internal improvement.

The report is on our table and shall appear as early as possible.

CLEANIMG WINDOWS.

The best and most effectual method of cleaning windows, looking-glasses, &c. is stated by M. Fromont, a French philosopher, to be, first, to wash the window, and then, when it is nearly dry, to rub it with blotting paper.

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☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

⁂ Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

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