J.H.Bufford's Lith. 313 Washington St. Boston.

FIRST POWER FLAX SPINNING MILL IN AMERICA.

RESIDENCE OF COL. JEREMIAH GILMAN, ALBANY N.H.

Plate I.

FLAX STALKS

Linum usitatissimum

J. H. Bufford's Lith. 313 Washington St. Boston.

All about
Londonderry, NH
pp 35 — 75

FIBRILIA:

A PRACTICAL AND ECONOMICAL

SUBSTITUTE FOR COTTON.

EMBRACING A FULL DESCRIPTION OF THE PROCESS OF COTTONIZING FLAX, HEMP, JUTE, CHINA GRASS, AND OTHER FIBRE, SO THAT THE SAME MAY BE SPUN OR WOVEN UPON EITHER COTTON OR WOOLLEN MACHINERY.

TOGETHER WITH A HISTORY OF THE

GROWTH AND MANUFACTURE OF WOOL, COTTON, FLAX, ETC., IN EUROPE AND AMERICA.

With Illustrations from Microscopical Examinations.

BOSTON:

L. BURNETT AND COMPANY,

No. 22 Phœnix Building.

1861.

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16 Devonshire Street.

DEDICATION.

To the Farmers and Mechanics of the American Union, whose hearts and hands support the dignity of manual labor; whose efforts gave life, birth, and vigor to the Republic; whose patriotism has ever sustained its laws; and whose blood is ever ready to flow in maintaining its political integrity, — this volume is respectfully dedicated by the

AUTHOR.

NEW DEFINITIONS.

FIBRILIA. — An article made from the fibres of flax, hemp, jute, China-grass, and similar vegetable products.

GLUMIEN. — The compound of gum, resin, albumen, gluten, and other like substances, which cements the fibres of flax, hemp, jute, China-grass, &c., together, and which remains after the filaments of these plants are separated from the stalk on which they grew.

LINTEN. — The short fibres of flax, hemp, jute, &c., in their brown state, and reduced to an equal length by machinery, preparatory to being bleached, cottonized, &c.

FIBRILIZED, OR COTTONIZED. — The result of processes by which fibrous material is reduced to the appearance and consistency of cotton at the time the latter is ready for the spinner, and hence capable of being worked along with or upon the same machinery as that wellknown staple.

ACTIEN. — A supposed primary principle, more subtile than either electricity or magnetism, emanating from the sun towards its planets, — producing a constant crystallization of matter, and reducing it to its utmost density; creating light, heat, color, &c., in its combustion with the atmosphere.

A SUBSTITUTE FOR COTTON.

As this work goes to press, the civilized world is beholding with astonishment the spectacle of one of the largest, most intelligent, energetic, and wealthy republics which has ever existed being suddenly checked in her prosperous career; her industry, exchanges, and commerce almost paralyzed; and her empire in process of being rent asunder, or broken into frag ments, — all at a time when plenty exists within her borders, and no enemies threaten or assail her from without.

This picture becomes more startling in its political contrast, from the fact that it opens at a time when Italy is being regenerated, imperial France is heading towards liberalism, and Russia has proclaimed the total abolition of serfdom; while the United States seem evincing to the world that the very best form of government for universal freedom which human wisdom has yet devised, and which promised to become a model for other nations, is unable to hold together the most intelligent and enterprising people on the western continent for even a century. The political economist, the merchant, the manufacturer, and the farmer of our own country join in one voice of inquiry as to the cause of this commotion within our midst, and which is so paralyzing in its results.

From tracing cause to effect, the free thinker reduces the whole subject to one word, and that is "Cotton!" The next

question which naturally arises is, — Is there any relief; is there any practical substitute for this fibre, which can be used by the manufacturers of the Northern States?

The object of putting forth this treatise is to show that there is such a substitute within the reach of every northern manufacturer, and that it can be produced in large quantities in every State of the Union, from Maine to Texas, at a profit both to the farmer and manufacturer. The sudden and almost prostrating influence of the late panic on the manufacturing interests of the North has been deeply felt by most every class of the community. Three months ago that interest seemed the most permanent and prosperous of the large elements which contribute to the individual and national prosperity; now, at first sight, all would seem darkness and gloom in that direction. Such depressions *should* not exist, — and *need* not, providing, that, before we give them place in our minds, we reflect upon the real nature and permanency of the blessings which surround us in abundance, still unimproved.

The agricultural interests of any country become the more important when the questions of life become narrowed down to a bare individual subsistence: the manufacturing interest comes next, and then the mercantile. All three of these seem inseparably connected; and no one of them should be so overstrained as to lose its balance for such causes as have produced the recent distress in the public mind. The soil of every State in the Union is equal to the production of sufficient bread and meat for the support of its inhabitants, if properly cultivated; and the mechanical advantages and appliances of each are sufficient to manufacture for all of its requirements: these interests, united, will create a commerce adequate to the support of the others.

The Northern States have neglected agriculture too much, and perhaps have pressed manufactures and commerce too far for a permanent success, in view of purchasing their raw material from without their own limits. A drain of from twelve to fourteen millions of dollars annually, from one State to another, is a large sum, and must produce a disjointure of some of the elements of prosperity sooner or later. An equilibrium should be maintained in every section of country, State or Nation, without which confusion in some shape will follow the course of trade.

The author, for many years past, has been of the opinion that the trade between the North and South would have to find a new equipoise, or it would be broken up. The feeling by Massachusetts that she had the advantage over any other State for manufactures, and sought to maintain her superiority in that respect by legislation; or that South Carolina should in the same way assert her claim to the exclusive growth of cotton, and demand that she should be protected in that monopoly by legal enactments, — would, in time, prove a subject for all kinds of discord and mercantile confusion. There is no doubt in the author's mind that greater harmony would prevail, if Massachusetts could raise her own cotton, and that South Carolina should manufacture a portion at least of hers at home. An equilibrium is wanted; and, while we may safely leave South Carolina to choose her own, we may claim the same right and privilege. A substitute for cotton may answer that purpose for the Northern States. If so, may it not prove a blessing to the nation and the world? Will not its production create that equipoise between states and nations, now needed to produce the harmony required for permanent commercial success?

What, for instance, would be the result to Massachusetts in a

pecuniary and political sense, if she raised her own cotton for twenty-five years, and consequently retained the value of what she now uses from abroad within her own limits? The difference in agricultural labor for that purpose would employ all her surplus laborers, now half the year idle, which of itself would be a great gain; while the saving of money would be at least twelve millions of dollars per annum, which, in twenty-five years, with interest, would double the amount of her valuation for 1860. Would not this sum, saved within her own borders, make her the most wealthy and independent State in the world, according to her population? Would she not feel, if permitted to enjoy the simple political rights guaranteed to her under the Constitution, politically independent of all the rest of the world? And yet with the same capital she now has, the same population, the same manufacturing and agricultural interests that she now possesses, she can save all this sum annually, whether she uses or sells the product of her farms.

If she turned but two hundred and fifty thousand acres of her tillable land, out of her two million one hundred thousand acres, to the culture of flax, which would pay a greater average profit than any thing she now raises, the product, when made into fibrilia, would be two hundred and fifty to three hundred thousand bales, which would be more valuable than the same quantity of cotton.

This amount could be doubled, if need be, within a very few years. From an intimate acquaintance with fibrous manufactures from childhood, as well as the growth of the prominent fibres herein treated, which are found in the United States, the author early became convinced that a fair substitute for cotton could be produced in the Northern and Western States, and that

this substitute would prove alike profitable to the farmer and manufacturer, when fairly brought out.

Several visits to all of the Southern States, save Texas and Florida, and a large number through the North-western States, convinced him, that, although the crop of cotton would measurably be confined to a few of the Southern States, flax and hemp were more advantageously raised in the North-west, and these in time would become more valuable than the cotton crops.

Experience has proved that flax can be raised at a profit in any of the New England States, and that the price of cottonizing the fibre, added to the cost on the farm, will still leave the product below the price of cotton at the mills.

In the North-west there are hundreds of thousands of tons of flax raised simply for the seed, while the straw is thrown away; and when this straw is saved, and made into fibrilia, the profit to the farmer for the additional price paid for the flax will make his crop of that fibre one of the best he can raise. The amount of hemp and flax that will be raised for cottonizing, when the process becomes thoroughly understood, and the machinery is fully introduced, will be equal to the demand, and more than the annual crop of cotton in the South. At present the straw can be brought from Ohio, and the fibre cottonized in Massachusetts, at a prime cost of less than eight cents per lb. When all the appliances are properly made, it *ought* to be produced by each manufacturer of cotton or wool, at his own factory, for six or seven cents per lb.

The following treatise has been prepared in view of answering some of the questions daily asked by the public, as to what the Northern States are to do for cotton, in case of a serious

rupture with the South. A much larger work was contemplated by the author, touching the manufactures of Europe and America, as well as the means of supply of fibrous material for their use, and the influences which both the agricultural and manufacturing interests of a country exert in maintaining its integrity, and permanency of government among the nations of the earth.

In abridging this, it has been somewhat difficult to maintain that harmony through a whole work, thus shortened and cut down, which would have come in in natural order if the original idea had been carried out.

In this hastily written work are presented the results of a variety of experiments and investigations, having the object above stated in view. Whether these are of value or not, the public can judge, and time will disclose. Man creates nothing; he but discovers and supplies what already exists. There never yet was a pressing universal want, but some bold investigator discovered that Nature had some hidden store in reserve for it. The route to such discovery is open to all; and if, in this work, the author shall have but *pointed the way* to the treasure, which is so much needed to give increased income to the farmer, independence to the manufacturer, wealth to all sections of the country, and peace to the nation, he will be content. And in this spirit he cheerfully invites the co-operation of all who have given attention to the discovery of a practical substitute for cotton.

FIBRES OF NATURAL FLAX

Diameter magnified 500

J. H. Rufford's Lith.

FIBRILIA.

FIBRILIA is a name given to a new article for textile fabrics, procured by new, peculiar, and patented processes, from various kinds of long, fibrous, vegetable substances, reduced to a short stapled fibril, like cotton and wool, so that the same may be mixed with either of these, or can be spun and woven separately on either cotton or woollen machinery.

To a certain extent, it may become a substitute for either cotton or wool.

When twenty-five per cent fibrilia is mixed with seventy-five per cent fine wool, and the same is properly manufactured into broadcloth, the cloth is absolutely more valuable than though the same was pure wool.

The reasons for this are, that the real strength of the cloth is enhanced; it becomes more impervious to water; is warmer; and through its tenacity and flexibility, its cementing and uniting properties, and its electrical adhesiveness, the fibrilia not only imparts preservative qualities to the wool, and increased durability to the cloth, but gives to the latter a gloss and finish it could not have if fibrilia were not combined with it.

A change in proportion, either above or below the per centage named, for many other kinds of goods, may be made to great advantage.

There are few articles of manufacture, now made from wool, but what might be improved in value by adding a proper proportion of fibrilia.

The specific gravity of fibrilia is a little greater than cotton, and its ultimate fibril is much stronger; so that, when mixed with cotton, and woven into any kind of fabrics, the cloth will be both heavier and stronger than though the same was pure cotton.

The superior lustre of fibrilia in cloth will distinctly maintain itself through the mixture. And, whether the same be used in fine bleached white, or shall be put in colors, the distinction holds good in wear.

Fibrilia goods thus take a better color, and hold the same with more tenacity and brilliancy, than cotton. It follows, then, that any mixture of fibrilia with cotton, in whatever manner the same may be used, will add to its strength, beauty, and consequent value.

The *mechanical* action in the *manufacture* and *blending* of fibrilia with either *cotton* or *wool* is most harmonious; the fibrilia mixing with either, and spinning with equal facility on the respective machinery adapted to them.

When fibrilia is spun and woven pure, it makes an article of cloth different from any now used. The lustre and beauty of linen is maintained in its finish, with the softness and flexibility of the finest cotton.

Its natural shade and appearance, when simply dressed, would be something like a mixture of cotton and silk, with a small proportion of the finest wool; while its touch would somewhat resemble a fabric of the finest cotton, with a small per cent of wool.

The facilities now at hand for the growth and manufacture of this new article, in the United States, warrants the

supposition that it will soon be brought into market in large quantities, to contribute towards an unqualified demand which cannot be supplied at present with any other material.

The ultimate or original fibriles, which in the agregate compose fibrilia, may be found in many plants grown in the United States, both wild and cultivated. And the same principle will apply to most parts of the globe, with less restrictions from the influences of climate and soil than any other class of fibres used in their natural state for manufactures.

The most prominent of these plants which are now cultivated as articles of commerce and manufactures, and which at the present time can be most easily brought into practical and profitable use, are Flax, Hemp, Jute, and China Grass, — the two former of which can be grown in nearly every part of the United States with success and profit.

Among other plants yielding a good fibre for certain kinds of manufacture, some of which are capable of being reduced to fibrilia, are the Banana, Nettle, Palm Leaves, Ferns, Stalks of Beans, Peas, Hops, Buckwheat, Potatoes, Heather, Broom, Cotton ; the straws of the cereals, if taken before ripened ; many grasses and sedges ; common rushes ; leaves which cover the ears of Indian Corn ; the Pita, or great Aloe ; Pine Apple, Wild Rue, Thistle, Wild Indigo, Hollyhock, Mallow, Althea, Black and White Mulberry Yellow Willow, Sugar Cane, Grape Vine, and American Papyrus.

Most of these stalks differ more from each other in their external architectural and physical structure, than in the real condition of their fibre or fibrils. Many of these,

which appear coarse and harsh when separated only down to their filaments or fibres, show a very distinct and silky substance when reduced to their ultimate fibrils. Some of them, which make very strong fibres for coarse manufactures, cannot be separated into fibrils for making fibrilia without great trouble and expense, — too much, in fact, to be practical, even though, when thus separated, they may form the most beautiful fibrils known.

The mechanical structures of the original stalks differ very much from each other, and the chemical properties which cement the fibres together also vary in different plants. In some, the woody substances predominate much farther than is necessary to create a practical value to the fibre or seed; while, in others, there is barely woody matter enough to sustain the weight of the stalk, in its growth, in producing a valuable crop of either seed or fibre.

In some plants, the abundance of seed seems to be the main object of the growth and value of the stalk; in which case, the properties of the cement which holds the fibres together are quite different. In all cases there appears to be one law manifest in the formation and arrangement of the chemical juices and substances which cement the various parts of the stalk, bark, filaments, fibres, and fibrils together.

Each department, in maintenance of its own mechanical structure and position, for the time being, calls for precisely the same compound of attraction to enable it to sustain itself in the different stages of its growth. These properties or juices may change their location from the inner to the outer, or the outer to the inner, during the process of growth; but this does not take place until, for the time being, they are actually changed by the absorption of gases from the earth below or the air above.

The process of their growth may be watched with thrilling interest during the full term; and the anatomical developments of each day open a new world of vision, perfect in all its laws, to the microscopical eye.

One period develops the hydraulic or hydrodynamic principle; another shows gaseous affinities in distillation; another proves the value of electrical currents; while the last change before the plant is ripe seems to be of oxydization. Distinct forcible propulsion of the juices from cells below to higher ones above are visible, leaving at each stopping-place a small ring or circle in the fibril, having the appearance of a joint; while the changing form of the crystalization of colors is apparent from hour to hour, and day by day, according to the variations of light and heat upon the plant, and the secretions of oxygen in its support. Gradually, as the plant becomes ripened, the electrical affinities decrease, and the hardened juices become more negative in their conductive powers.

In separating these fibres for practical use, the same law must be observed in extracting the chemical properties of the plant that existed in their first combination; great care being taken to treat each property of matter according to its own condition and nature, without making an attempted solution of the whole at once, which would fail in the desired result. When all the elements of the cementing compound in the fibres are treated simply and separately, they can be easily controlled; but, when dealt with otherwise, each step will be one of retrogression in fact. The solvents to be used in the process of separation are those most natural to the combination of the gases and of fluids in the growth of the plant, and may be used in connection with the proper mechanical operation with harmonious success.

Where resinous bodies prevail, and it is found hard to solve them without the adoption of the old mode of treatment by a strong solution of acids, an emulsion of spirits of turpentine and water may be used with success. The spirits, having been distilled from the rosin originally, will have the proper solving affinity when again applied in the form of original distillation. A species of the fixed oils in the dry fibres of flax may be solved by the same mechanical process, using linseed oil instead of spirits of turpentine; showing the same mechanical affinity that existed in the previous illustration, the principle holding good in case of all fibrous plants.

The same principle must be carried out in the solution of all the cementing compounds which hold the fibres together. In some stages of the process of disintegrating fibres, a certain form of magnetism and electricity can be used with success.

The full development of this principle in a practical use of all fibrous plants will prove much that has not yet been attempted; and it remains for practical illustrations of such experiments to show to the world which of the plants is the most valuable under this treatment, and what new systems may be adopted in the management of fibrous substances not at present used in the manufacture of textile fabrics.

FIBRILIA FROM FLAX.

The object to be attained in making fibrilia from flax is the most natural and easy method of extracting the glumien from the filaments and fibres, disintegrating them from each other longitudinally, and stranding the fibres at their

natural points of cohesion, where the ends overlap each other. This requires that simple solving process which shall soften the glumien to such a consistency that the proper mechanical application of machinery will separate them naturally, and without breaking them in transverse sections across their solid longitudinal plane, which would thus leave blunt ends, that would not easily unite with each other in spinning. At the same time it must dissolve the glumien, which has a tendency to gather in small crystals on both the inner and outer side of the tube, or fibril; rendering them inflexible and rough upon the external surface, and unattractive to each other. This accomplished, the electrical power of the fibril is changed from a negative to a positive conductor; and an entire alteration is apparent in the flexibility and softness of the yarn or cloth made from the same, and the degree of warmth it may appear to convey to the flesh when worn in direct contact with the skin.

The length of the fibrils differing, and it being very desirable to have them of a uniform length for spinning, they can be very easily separated from each other by a simple comb card, with three sections, which will deposit the fibrilia in corresponding lengths, in separate places. This mode of treatment is not applicable to the manufacture of linen under the old process, as in that case the fibrils are not separated, the fibre itself being used long line in forming the thread.

The expense of preparing the fibre by the old method is much greater than in the manufacture of fibrilia; while a thread cannot be made so evenly; and, the glumien not having been extracted, a tedious and expensive process is necessary for bleaching, which to a certain extent, by great

mechanical manipulation, may in some measure disintegrate the fibrils when in cloth, though not enough to change the electrical affinities of the glumien remaining, leaving the linen in that perpetual chilling state so apparent when first brought in contact with the skin.

To carry out this principle practically, in making fibrilia, it is necessary to keep in view the cost of the production, as well as the quality of the goods.

Every saving that can be made, in labor and expense to the farmer, is so much gain to the manufacturer and consumer. Of these saving principles belonging to the agricultural department in making fibrilia, the following may be named as important to his interest: First, the mowing or cradling of the flax, instead of pulling it by hand according to the old method. Second, threshing the straw in a machine, if need be, instead of rippling it, or beating it with sticks, when great care is rendered necessary to keep the straw straight, and from getting entangled. Third, by avoiding the old-fashioned and tedious process of rotting, which, though indispensable in some form for spinning long-line flax, is of no value, but rather an injury, in making a perfect article of fibrilia.

These changes, in favor of the cost to the farmer in raising flax, will enable him to afford the fibre to the manufacturer at such a rate that he can produce a better article of commerce than cotton, at the same or even a less price.

The great value of linseed in the United States for oil and oil cake, together with the fibre of flax, will render a crop of that plant one of the most profitable that can be raised in the Northern, Western, or Middle States. The principal value of the old method of rotting the flax straw as now used, in some of the Western States, for manufac-

Plate 3

FIBRES OF FLAX
PARTLY ELIMINATED
Diameter magnified 200

J. E. Bufford's Lith. 313 Washington St. Boston.

turing fibrilia, is in the great reduction of weight of the straw, which is quite an item where the same has to be carted ten or fifteen miles to the mills. This useless trouble and expenditure for carting so much waste woody matter can be avoided, by breaking the flax on the farm, under the new process; although the farmer says he can now raise flax at great profit to himself, over raising some other crops, though the present price of the straw is very low, from the fact of the inability of farmers to supply themselves at once with the proper brakes for the purpose. When thus supplied with brakes, which can be turned by horse-power, and which can be used with more facility in a neighborhood than an ordinary threshing-machine, he will be enabled to break the straw unrotted, saving the shives on the farm as a valuable food for his stock; and can send the fibre or linten, cleaned and fit for use, in bales to market, with as much certainty of a sale, and good remuneration, as the southern planter can now do with his cotton.

SOLVING PROCESS.

When the fibre of flax, or linten, as it is called, is cleaned and shortened under the new process, by the brake, from *unrotted* straw, and the same has been sent to the manufacturer, the first change it undergoes in the making of fibrilia is as follows: —

When placed in a proper vessel for the purpose, the linten is subjected to the action of heated air, charged with water, up to its point of saturation.

The action of this saturated air produces an effect upon the fibre which cannot be done either by immersing the same in water or by ordinary vapor. It softens and sepa-

rates the elements that hold the fibre together, without destroying or injuring its natural structure, and opens the capillary tube, so that the albumen, gluten, gelatine, and resins, and coloring matters, can be readily reached and removed by water. When the saturation of air, by water alone, is not sufficient to soften the glumien, thus acted upon, other substances corresponding with the peculiar matters to be solved, such as spirits of turpentine, linseed oil, and other solvents, may be used by an emulsion with water.

The air can be sufficiently heated by forcing the same through hot water connected with the kier, or retort, in which the linten is placed, or an emulsion of the solvents with water by an ordinary bellows: the air passing through the water, thus saturated, gradually ascends through the body of linten in the kier, till it pervades every nook and corner of the same, displacing the air in fibrils by capillary attraction, softening the glumien, and rendering the whole substance more easy of other solution than can possibly be effected if the fibre was completely covered with water. After having thus deposited its moisture, the air passes out through an opening in the top of the retort. If thus covered, the air could not be so readily expelled from the tube of the fibril; while the action of the oxygen upon the glumien could not be so perfect in effect, as though acting in connection with the saturated air, as before named. There is a great difference between heated vapor, and air at the same temperature, when charged with water, up to its point of saturation; as air thus charged is much more penetrative, from the diminished volume of its globules, and its solving powers increased to a wonderful extent. The finest fibrils, thus treated, become filled with water, as

may be observed with the aid of a powerful microscope. Exposure to watery vapor will produce no such effect, as the vapor will condense on the surface of fibrous material. After this air-bath, the glumien will be found in a molecular, soluble condition; and the fibres should then be exposed to boiled water, cooled down to about 140° to 160°, and should be kept at that heat a proper length of time, say from three to five hours, when a large per centage of the glumien, or cementing matters, especially the albumen and green coloring matter, will be dissolved. If the water is suffered to rise to the boiling point, it will fix the albumen and coloring matter, with the more insoluble parts of the glumien, such as gum, resin, &c., and prevent the accomplishment of the very object sought in opening the pores of the fibres; namely, a removal of a large portion of the coloring matter and glumien, under a proper system of filtration by water. When this steeping process is complete, the cocks in the bottom of the retort, or kier, may be opened, and the liquids suffered to flow out; care being taken to let in an equal amount of pure soft water at the top, that in the process of filtration, or washing, the water shall not at any time get below the top of the fibre in the kier, so as to admit a free action of air in and upon the same. This form of filtration should be kept up, until as much of the coloring matter is displaced as is practicable, when the same may be followed by a weak solution of alkalies, in which the fibre may be either steeped or boiled until sufficiently pure, by the solution of that part of the glumien which water alone will not dissolve.

The time necessary for this steeping process in alkalies and the kind and strength of the material of the same, will vary according to circumstances. Generally, about three

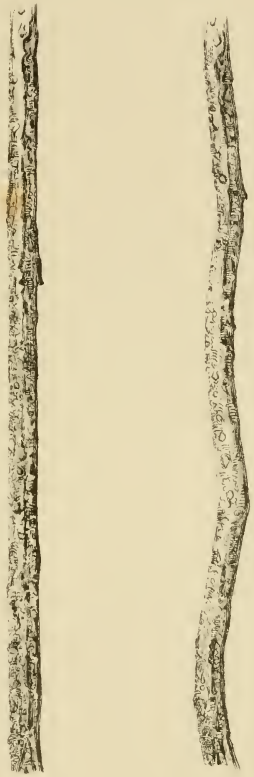
hours is sufficient; and a solution of soda ash, of the strength of one to one and a half degrees of Twaddle, is found to be the most effectual solvent in this stage of preparation. In getting the test strength of the liquid, if Twaddle's hydrometer is used, the water should be prepared from 60° Fahrenheit. When the fibre is in this state, magnetism has a very searching and penetrative effect upon it, and if applied by the use of an ordinary galvanic battery, in a convenient and proper manner, would refine the fibril to a degree not practicable in any other way.

The alkalies may be washed out by a stream of water through the retort, as before described in filtration; and, if a retort is used that will sustain a high steam pressure, it can be very effectually done by letting in a column of steam under pressure, and thus forcing the water out with great rapidity.

The retort may be thus filled with water, which may be expelled by steam, a sufficient number of times to purify and clean the fibre effectually.

If the fibre is not white enough for spinning and weaving with unbleached cotton for printing cloth, after the ordinary alkalies have been removed, a weak solution of chlorine may be used in the retort to bleach the same; although as a general thing the alkalies thus used under a pressure will be sufficient, in which case no regular system of bleaching is necessary before the cloth reaches the finisher or calico-printer. If chlorine is used in the retort, it must be thoroughly removed from the fibre by the proper acids or sours.

All this process may be carried through without once removing the linten from the retort, from the time it is once fed into the same by machinery, to the removing of the fibre finished by the mechanical means.



FIBRILS OF FLAX PREPARED

Diameter magnified 1000

J.H Bufford's Lith.

A profusion of pure soft water, however, must be used under pressure of steam, as before named, in order to thoroughly wash the fibre. The alkalies and acids may be drawn off and saved for further use, a number of times, with small additions for strength, if proper care is taken to preserve them. If a jet of steam is not sufficient to dry the fibre by passing through the retort from top to bottom, thus forcing out the water, a screw, or hydraulic press, may be arranged on the top of the retort, to force the water out. Then, if not sufficiently dry, the fibre may be dried in the sun, or by currents of warm air, or steam rollers, as used in ordinary drying-houses. If the fibre is to be colored, it may be done while in the retort, by applying the colors, under pressure of steam, as before described, or by either compressed air or water. An ordinary retort or kier, made properly for this purpose, would hold from two to three thousand pounds of fibre; and one retort can be arranged to turn out this amount of fibre once in twenty-four hours. A similar, and in some respects more important, result, in refining the fibre, can be obtained by a revolving boiler capable of sustaining a high pressure of steam, with a counter motion of a shaft with arms passing through the same, which shall alternately plunge the fibre beneath the alkalies in the bottom of the boiler, and through the steam rising from the same to the top of the boiler; thereby subjecting it to a combined action of fluid and steam, as well as to the peculiar electrical power only known to exist in a steam boiler under great pressure.

The principle of the air-bath and steeping process, as before described, is as applicable to the separating of the fibre from the straw of the flax plant as to dissolving the glumien in the fibre, when made from unrotted straw; and

this process, even for preparing long-line flax for linen, would be better than any of the old rotting systems now practised in Europe. The air-bath may be omitted in the use of fibre that has been rotted, unless it is required to be refined to the utmost extent possible.

MECHANICAL PROCESS.

The mechanical part of the process of making fibrilia is no less important in its character than the chemical, or solving process; and, as before named, needs to be properly blended with the latter, to insure success. It necessarily begins on the farm, in the use of the proper brake to separate the fibre from the woody stalk on which it grew. This machine can be turned by horse power, and is portable, and can be readily transported from one farm-yard to another, so as to answer the purposes of a whole neighborhood. It consists of five or more sets of double peculiarly fluted rollers, properly secured and geared in a strong frame, with springs to govern the compression of the rollers, so arranged, as to the speed of their revolutions, that each succeeding pair of rollers shall revolve faster than the preceding, with a graduated decrease in the size of the rollers, as well as of the conical flutes; so that, as the straw passes through, it shall not only crush out the shives, or woody harl of the straw, but at the same time separate the fibre at its natural points of cohesion by a tensile strain, stranding the same in regular order, according to the freedom with which the adhesiveness can be overcome. The effect of the operation of the constant strain of the fibres, and their friction against each other, as well as the shives, in passing between the rolls, is to clean

Plate 5

FILAMENTS OF FLAX

ELIMINATED

Diameter magnified 100.

J H Bufford's Lith. 313 Washington St Boston

them more perfectly than has ever been done before by any known process. It leaves the fibre in lengths of from two to four inches; and so perfect is the disjointure, that the ends of the fibrils show themselves expanded, like the two points of a stranded rope, and readily unite in spinning. After passing through the brake, the fibre saved is called linten, and the same should be passed through a picker or coarse card, which also should be used on the farm, which cleans the fibre sufficiently for baling for market. One of the best brakes for this purpose now in use is the invention of Mr. Stephen Randal, of Centreville, Rhode Island, who spent many years in perfecting its operations. The mechanical part of the process of making fibrilia has been so arranged, that it extends to the drawing head upon the spinning frame, which converts it into thread; while the soluble part of the process is comprehended within a very distinct period of its history. The form of both necessarily varies, according to the condition of the fibre in the start. For instance, if rotted straw is used, the principle of the vaporizing process will not so closely apply to the anatomical condition of the fibre as in unrotted straw; and in some cases may be laid aside for the adoption of a more stringent application of the other parts of the soluble process.

After the linten in its semi-bleached condition is removed from the retort, and the drying process has been completed, it is again passed through a peculiar form of picker, or coarse card, which fits it for the lapper and finishing card; after which it passes through a railway head with a positive draft, the rollers of which are arranged to draw the same in a similar manner to the operation of the original brake; the fibres being stranded to their original length, or as nearly so as is desirable, according to the length of staple

required. These finishing heads, together with the separator, or comb card, will give any length of staple, and separate the same in any form required for the successful spinning of the same, either separately or mixed with cotton or wool, on their respective machinery adapted to the manufacture of either of those substances.

The system of making fibrilia bears no comparison in difficulty and expense to the old method of manufacturing linen. The different grades of fibre for the manufacturing of linen were somewhat established from the interception of the flax stalk at different periods of its growth; and when not suffered to ripen, so far that its seed could be saved, the cost of the fibre was enhanced in proportion to the loss of this valuable product.

The reasons for thus cutting the straw before it was ripe, although seemingly unknown to the old manufacturer of linen, were, the easier control of the ultimate fibril, and the ability to refine the same, from the fact that the juices of the stalk were more susceptible of distillation, they not having become hardened by crystallization. Even the advantage thus gained was measurably lost under the old system of rotting, which had a tendency to fix some portions of the glumien, and precipitate the same upon the harder and less soluble parts of that cementing compound. To remove this in its hardened state, strong alkalies, acids, and other solvents, were used in the first instance, which, to some extent, made the fibre more harsh and inflexible than before.

The albumen becomes fixed in water heated to 212°, and, like the white of an egg, will grow harder and harder the more it is boiled; while gluten cannot easily be solved after being exposed to boiling alkalies. It was not at-

tempted to separate the fibrils to their own natural lengths; but the contrary effect was sought, in preserving the length of the fibre to as great an extent as possible.

This fact, as has been before remarked, rendered the fibres of uncertain size and strength; making an uneven thread, and showing its inequality through the finest linen. To spin a thread composed of such unnatural component parts was quite difficult, as may be readily conceived; and of late years a system has been used of passing the same through warm water in connection with the spindle, which softened it for the time being, and fixed the twist of the thread more tenaciously. To carry out this system, the trouble and expense of raising the flax was much enhanced; for the flax stalk had to be pulled, and to be kept straight from entanglement in bundles; while the expense of rotting, rippling, breaking, and scutching, was peculiar to the system, and much more expensive than the new process of making fibrilia.

The rotting part of the process is particularly troublesome to the farmer, as it involves much labor, and disproportionate with the same in other periods of its growth. The practicability of profitably raising a large amount of flax must depend somewhat upon the uniformity of the amount of labor required throughout the whole season, as any crop of so important and universal a character in its aggregate must depend somewhat on the ability to command labor just when it is needed for the particular departments of its growth. If the annual growth of a certain amount of flax upon a farm would require a specific number of hands to cultivate and break it under one mode of treatment, and if those hands could be evenly and profitably employed all the time, it would materially affect the value and practica

bility of the crop, provided some portion of the system did not harmonize with the rest, and that double the amount of hands should be required at particular seasons to secure the crop. One of the reasons for the great trouble and expense to the farmer heretofore in raising flax, has been the inequality of labor required throughout the season in perfecting the crop.

Natural History of Flax. — According to the learned accounts which have been given by Lindly, Wilson, MacAdam, and others, "Flax belongs to the order *Lineæ*, in the natural system, which is equivalent to the order *Pentandria Pentaginia* in the Linnæan, — a small order, containing three genera and ninety species, which are met with, scattered irregularly over the greater part of the world. The botanical characters of the order are well marked, and render it easily distinguished from all others. It possesses four, or more commonly five, sepals; the petals are always equal in number, and alternate with them. It has five stigmas and an ovarium, with ten divisions, or rather five perfect cells, which are separated again, by an imperfect partition, extending from an outer wall. In each of these cells is found a single seed, of a flattened, oval shape, and of a more or less dark brown color, — mucilaginous to the taste, and containing a large proportion of a brownish yellow oil, known as linseed oil. This oil is readily obtained, by pressure, from the seed; the residuum being the well-known feeding substance termed linseed cake. The members of this new order, generally, are remarkable for the tenacity of their fibre; the elegance of their shape; the beauty of their flowers, which are blue, red, or white; and the emollient and demulcent properties of their seed."

Although there are many kinds of flax known to botanists

as possessing fibres suitable for textile fabrics, the *Linum Usitatissimum* appears to be the only one which has been employed in cultivation. Of this Dr. Lindly tells us there are two very different forms, namely: "1. The *Linum Humile*, or *Crepitans*, a plant somewhat shorter and more inclined to branch than the other, and possessing larger capsules, twice as long as the calyx, which burst with considerable elasticity when ripe; its seeds, too, are both larger and of a paler color. 2. The *Linum Usitatissimum* or true winter flax, which has smaller capsules, scarcely longer than the calyx, not bursting with elasticity, but firmly retaining their seeds, which are of a dark brown color." The cultivation of the plant by the ancients was by a preparation of the soil, in the manner corresponding with that for a crop of grain; and it was left to grow very much the same as wheat, rye, or oats.

Sometimes the lands were irrigated; but, in most cases, the crop was raised without this preliminary process.

When ripe, the stalks were pulled, dried, and rippled by hand; and the seeds thus separated were saved in a condition either to sow again, or to be used for making oil.

The plant was then spread upon the ground for rotting, which process tended to separate the woody parts of the stalk from the fibre, though it crystallized the cementing compound which bound the fibres together, rendering it more insoluble and harder to extract. When the process of rotting was finished, the flax was broken by an ordinary hand-brake, and scutched or swingled, by beating it with a wooden knife over the end of a stand-board. Under this system the fibre or filaments of the flax were preserved as near as possible to the whole length of the original stalk, and were spun by an ordinary hand-wheel. This process

of manufacture followed the plant from Egypt to Greece, Rome, Britain, and the United States; and, until within a few years, but little improvement has been made, save in substituting power spinning-frames for the old linen-wheel. The filaments of flax, as they are torn by the old process from the natural stalk which they covered, like the bark of a tree, average, like the stalk itself, some eighteen to twenty-four inches long, and are of a dark green color. They are composed of the natural fibres of the plant, cemented together like a bundle of sticks, with a compound which fills the interstices between, showing to the naked eye a continuous thread, of large or small proportions, according to the number of fibres the filament contains. These fibres are composed longitudinally, of a great number of fibrils, from one to three inches long, which overlap each other, and are cemented together at the ends, with the same glutinous substance. Each fibril is a perfect tube in itself, which, when freed from the external deposit of resinous matter, becomes transparent. The ends of these fibrils seem thinner than the centre, thereby rendering them better adapted to the splice created in the formation of the continuous fibre; and which, when exposed to certain simple solving influences, will expand and separate, so that they present interlacing points at each end, numbering from five to seven, which readily unite and twist with each other in spinning. These small points seem of themselves to be tubes, like the parent fibril, in the form of segments of circles, that, when united, form a tube as before named, with an apparent frame or brace work between, connecting with a central support or pillar. [See Plate 6.] Appearances indicate that these tubes are open during the growing period of the stalk, and act as lungs,

or cells of circulation from the heart, or woody core, within, to the atmosphere without.

This tube is not destroyed in the process of manufacture, but, unlike cotton, retains, both within and on the outer surface, the lees of the oil and sap, which it helps transmit to the ripening seed while on the original stem. These juices, combining different chemical properties, crystallize under the influences of the sun, and form that cementing compound which bind the fibres together, and which has heretofore baffled the efforts of the manufacturer to remove. To this general cementing compound, the specific name of "Glumien" has been given, representing its diversified character in one word. When dealt with simply and naturally, it is readily controlled. To accomplish this object, however, it requires both a mechanical and chemical process combined: neither will do it alone.

When we take into consideration the peculiar properties combining any one of these compound principles, we are left in a labyrinth of uncertainty as to a perfect specific solution, or independent action of any one of the same. Gluten itself contains nitrogen, and has been called the *vegito-animal* principle. When subjected to distinctive distillation, it yields ammonia; which of itself affords again a very large proportion of hydrogen, and a small proportion of nitrogen. Albumen affords a still more complicated subject of analysis. It differs but little as an animal or vegetable production. Carbon forms more than one-half of its substance; oxygen, some twenty-five per cent; nitrogen, a little more than fifteen per cent; and hydrogen, a little more than seven per cent.

The subdivisions of these properties, in turn, again mystify the way to specific action in its final disposition.

Enough, however, may be learned, from a careful examination of this subject, to prove that the rotting or fermenting principle is inconsistent with the proper preparation of flax, for an easy and profitable system of manufacture; and it has only been used for fibrilia, because as yet machinery has not been adopted to break the flax on the farm, and because the rotting process shrinks the straw in weight about one-quarter, which saves so much in transportation.

ROTTING PROCESS.

The rotting, or retting process, as sometimes called, has been divided into three departments, each of which assumes to answer the same purpose in the preparation of the fibre for manufacture. The first is termed dew-rotting; the second, pool-rotting; and the third, stream-rotting. The two former are a species of fermentation, very analogous in the result, but different in the mechanical action. The latter is more after the form of filtration, and the result is very different. Some other plans have been adopted from time to time to hasten the separation of the glumien from the fibre; but, as the result is different, they cannot properly be called the rotting or retting process.

Dew-Rotting. — In what is termed dew-rotting, the flax straw is spread thinly and evenly upon the ground, and is subjected to the changes of the temperature and density of the atmosphere for some three to six weeks; the same being turned over once or twice during the time. The real changes in the glumien are various, according to the influences which operate for the time being upon the substances which compose the same. The sun, with its accustomed and mysterious brilliancy, acting upon the dew that

lies upon the straw, exhales the same; and, true to its penetrative law, follows the wake of the receding globules into the fibre, opens the way for a gaseous attack upon the different elements of the glumien, which, from their peculiar composition, and attractive and repulsive qualities for each other, carry on a war for precedence and ascendency in the race for a new chemical affiliation. This race is checked again by the decrease of light and heat, which calls down the falling dew, and changes the form of combustion from an active to a dormant negative action, which nourishes the generative life-power, almost congealed for want of it, — again to be dispersed with the heat of another sun.

The albumen, thus alternately moistened and dried again, is attacked by the gluten, which, acting as organs of genera in creating or hastening the functions of life, would, if suffered to go on in that form, produce myriads of living insects from the infinitessimal globules which pervade the albuminous compound. This generative principle of life is generally checked during this term by the inharmonious action of these changes; the oxygen of the atmosphere so controlling the little eggs of life that they congeal or crystallize, affiliating with the more insoluble substances of the glumien and coloring matter, thereby becoming harder to solve than before rotting, — although this action may have evaporated a good deal of the watery substance in the straw, and loosed the fibre from the woody boon or stalk of the plant. If the temperature is sufficiently low during this process to produce frost, the changes are again peculiarized; but nothing like the specific variations observable in the action of the sun, either in the production of animal life or the chemical changes in the glumien. From the

action of this, — one of the smallest laboratories of Nature's great arcanum, in its specific observance, — we should be persuaded to doubt the correctness of generally received theories of light and heat. While neither of these seeming principles is in action, there is a dormancy pervading this process, harmonizing very closely with the natural world without, at night, when darkness seems to intercept all principles of combustion as carried on in the day-time. When the moment arrives in which the sun's rays penetrate the workshops of nature, a new life and action is given to all things within his influence. Form, size, color, and action are all generated at a glance of his mystic eye; while light and heat would seem to be produced from causes inconsistent and conflicting with the present received theories of the historical age.

The powers of attraction and gravitation, as well as the density and crystallization and congealation of matter, would find a new law if this be true, and would open to the world, or comprehension of man, a fundamental principle commanding a subtile fluid yet unknown, which would place electricity and magnetism in the line of secondary agents, and thus fill up that space now existing in the gravitating principles of countless worlds, as well as in the smallest particles of matter. Thus, from such an apparent insignificant point as the workings of light and shade, combining color, in a small fibril of the flax plant, we may instantly be led to draw analogies which control in their compass the sphere of worlds and the comprehension of organic matter.

Water or Pool Rotting. — In pool-rotting, stagnant water has been used; and it hastens the process, but is more hazardous, and stains the fibre more, than stream-rotting, where

pure running water is used. Artificial tanks or pits are made in the ground, of sizes corresponding with the amount of fibre required to be done, which are dug generally to the depth of five or six feet. Sometimes stagnant ponds of water are used for the same purpose. The flax is bound up in sheaves, and placed in the water, sometimes in layers over each other, and sometimes upright, with the roots downward. It is immersed about a foot beneath the surface, and has to be pressed down under water, as it has a tendency to rise to the surface, especially when fermentation takes place, and the gases make it buoyant. The warmer the water, till it gets to about 80°, by the action of the sun or by artificial means, the sooner fermentation takes place, and the process will be finished. The first action seems to be acetous fermentation, or the disengagement of carbonic acid gas, forming acetic acid or vinegar. The gluten, absorbing a little oxygen from the air, becomes insoluble, and induces subsequent changes with the albumen and other substances. A continuance of the steeping, however, will cause a reduction of the acid in the water, which, to a certain degree, becomes alkaline, from the production of ammonia, and will be fetid, from a separation of sulphurated hydrogen gas with carbonic acid, the acetous fermentation being changed to putrid. Sometimes the flax is taken out before the acetous fermentation ceases, as there is great danger of its remaining long in the putrid; giving the fibre a bad color, and shortening the same, yielding a large proportion of tow or waste. When the flax has been immersed for some little time, especially if the water is warm, the process of the expulsion of the air in the fibre is commenced; and, in time, sufficient will be disengaged to cause the fibre to

sink to the bottom. This, however, is governed very much by the rapidity of fermentation.

The rotting of flax is deemed sufficient when the stalks readily sink to the bottom in being thrown into the water, and when the boon easily separates from the harl, and becomes so brittle when dry that the boon will break without bending. The length of time necessary to accomplish this object varies according to the character of the fibre, and the temperature of the water in which it is placed ; but generally it is done in from eight to fifteen days. After rotting, and washing in clean water, the flax should be dried in an airy situation by the sun, or some mechanical means. Flax straw when properly dried, after mowing, will shrink in weight from twenty to thirty per cent, principally in the boon and harl.

Stream-Rotting.—This process consists in placing the straw in a running stream of pure water, which acts readily upon the more soluble portions of the cementing compound or glumien, softening and disengaging it from the stalk. The coloring matter is more easily extracted in this manner than by pool-rotting ; and, though the process may be more difficult to control, the fibre is left in a much better condition than in pool-rotting. The chemical action, however, varies in each of these three processes ; and neither is harmonious with a perfect solution of the glumien. In order to control this singular compound, each element must be dealt with separately in its order, and by the proper soluble agents. The action under fermentation and putrefaction is a compound one ; and each specific element in its own action, even if itself favorable, produces a counteraction in its neighbor. Thus a perfect inconsistency is wrought out, in the attempt to accomplish a favorable object. The fetid

SECTION THROUGH FIBRIL OF FLAX.

SECTION THROUGH FILAMENTS OF FLAX.

magnified 2000.

J.H.Buffords Lith. 313 Washington St. Boston.

and noxious exhalations, from vegetable matter, are very unhealthy; but they differ from the animal from the more abundant presence of nitrogen in the animal. Vegetables which abound in nitrogeniforous principles exhale peculiarly nauseous effluvia. Rapidity of putrefaction is much influenced by temperature, moisture, and access of air. If it falls below the freezing point, or is exposed to strong drying influences, or if oxygen is excluded, the process becomes checked at once. There is a counteracting influence in the volatile oils of the glumien, — such especially as creosote and empyreumatic products, which are produced in some measure by the distillation of the woody part of the stalk, which would yield a small amount of pyroligneous acid. Another counteracting influence is the astringent property, or tanin principle, which pervades vegetable fibres, and which would act as counter agent in preserving organic tissues. It enters into chemical combination with the albuminous and gelatinous membranes and fibres, and renders the ultimate fibril less liable to decay through long wear, when in cloth, than though this principle did not remain in the same.

FLAX COTTON.

The first attempts to prepare flax to resemble cotton, in appearance and texture, were made in Europe more than one hundred years ago. Experiments were made by Palmquist, in the year 1745. In the Swedish Transactions for the year 1747, a description of the method and agencies employed for the purpose are published. They proved too tedious and imperfect, however, for practical use.

In 1775, Lady Moira prepared specimens from both

hemp and flax fibre, so as to resemble cotton, which was followed by the experiments of Baron Meidingen, in 1777; by those of Haag, in 1778; by those of Kreutzer, in 1801; by those of Göbelli, in 1803; by those of Stadler, Haupfner, and Segalla, in 1811; and those of Sokou, in 1816. All the above experiments, together with those of a more recent date in Europe, have failed of a practical result.

Chevalier Claussen, in his experiments in 1851, electrified the manufacturing world by his announcement that flax could be manufactured, under his process, into a cotton suitable for practicable spinning and weaving on the ordinary cotton machinery.

The following description of Mr. Claussen's process is taken from "Ure's Dictionary of Arts and Manufactures." He says, —

"In the following exemplifications of my improved modes of preparation, I shall throughout suppose flax or hemp to be the material operated upon.

"If I have to deal with the plant from the time of its being first cut down or pulled for use, I take it in the state of straw (after the seed has been stripped from it), and subject it to the following, which I call my 'primary process:' —

"I first steep the straw in a solution of a caustic alkali, of about 1° of Twaddle's hydrometer, and for such a length of time as may be most convenient. If dispatch is required, I use the solution in a boiling state; in which case an immersion of about six hours is sufficient. If more time can be conveniently allowed, I employ a solution of a temperature of about 150° Fahr., and prolong the immersion for about twelve hours; and so in proportion to the degree of

temperature. The solution may be even used at a lower temperature, with a corresponding prolongation of time; but in no case need the immersion exceed a couple of days at the utmost.

"The object of the preceding treatment is twofold: First, to decompose, dissolve, or remove (more or less, as required) the glutinous, gummy, or other matters, which connect the fibre with the woody portions of the plants; and, second, to discharge or decompose any oleaginous, coloring, or extraneous matter contained in the straw, without allowing the matters so discharged to stain the fibre. And these results are obtained by the action of the alkaline solution. In the preceding mode of preparing vegetable materials, I generally use a solution of caustic soda; but other alkaline liquors will answer the purpose, — such as a solution of caustic potash, or of lime dissolved in or diffused in water, or indeed any substance having the like power of removing, discharging, or decomposing the coloring, glutinous, gummy, or other foreign matters contained in the straw, and which would interfere with the whiteness of the fibre, or with its ready separation and manufacture.

"If the fibre is required to be long, like that now commonly spun in flax machinery, I subject the straw to a second process for the purpose of getting rid of any of the alkali still adhering to the straw or fibre, and for the purpose of completing (if necessary) the removal of any glutinous, gummy, coloring, or extraneous matters.

"To this end, I will take the straw from the alkaline solution, and steep it for about two hours in water acidulated by sulphuric acid, in the proportion of about one part of the acid to from two to five hundred parts of water. Some other dilute acids will also answer this purpose, such as

dilute muriatic acid, &c.; but sulphuric acid is to be preferred. Or I transfer the straw, while yet wet with the alkaline solution, to a suitable chamber or stove, where I subject it to the action of sulphurous acid, or the fumes produced by the slow combustion of sulphur. In both cases, the acid combines with any free alkali remaining on the straw or fibre to form a sulphite or sulphate, according to the acid employed; while an excess of either sulphuric or of sulphurous acid will complete the decomposition, discharge, or removal of the glutinous, coloring, and other matters.

"I next remove the straw from the acid bath, or sulphur chamber or stove, and wash or otherwise treat it with water till all soluble matters are removed.

"If the fibre is required to be discolorised, the straw may now be exposed to one of the bleaching processes which I have already described, or to any of the other known bleaching processes. It may then be dried, and made ready for breaking and crushing by the means ordinarily followed in the manufacture of long flax.

"I would mention here, that in some cases it will be found advantageous to pass the straw between rollers, or to break it roughly or partially, before subjecting it to the process above described, for the purpose of facilitating the action of the chemical agents upon it.

"By the aforesaid method, I am enabled to remove from the straw certain matters which water alone can discharge. The fibre thus prepared is also freer to heckle, and the straw more easy to scutch, than fibre or straw treated in the ordinary way. Much time and much material are also saved; while the noxious exhalations attendant upon the water-rotting system are wholly prevented. If the fibre is

required to be short, so that it may be felted or carded, and adapted for spinning on cotton, silk, wool, worsted, or tow spinning machinery, either alone or in combination with cotton, hair, fur, silk, or shoddy, I take the fibre, after treating it by the processes just described, and divide it in proper lengths by some suitable instrument or machine. I then transfer the straw or fibre to a bath containing a strong solution of bicarbonate, or even carbonate, of soda, or any other similar compound; but the first two of these are to be preferred, as most abounding in carbonic acid. In this bath I allow it to remain for about three or four hours, during which time the fibre becomes well saturated with the salt. I then immerse the materials, impregnated with the solution of the carbonates before named, for about a couple of hours, in water acidulated by sulphuric acid of about the strength of one part of acid to two hundred parts of water. Or, instead thereof, I expose the saturated materials while wet to the action of burning sulphur in a suitable chamber or stove. In this operation it appears that a certain portion of gas, being developed in the fibrous tubes, splits and divides them by its expansive power into filaments having the character and appearance of fine cotton wool; in which state they may be dyed and manufactured like cotton or wool.

"The same means of effecting the splitting of the fibre may, of course, be employed in the preparation of long fibre; and I do not limit myself to its use for the preparation of short fibres alone: but, when the fibre is of its original length, the solution employed takes a longer time to penetrate the interior.

"The decomposition of the bicarbonate of soda, or other suitable compound with which the fibre is saturated, may

be also effected by means of electric agency, when a like evolution of gas and splitting up of the fibre will take place. After the fibre has been subjected to the splitting process, it must be carefully washed to remove all soluble matters, and then dried.

"The splitting process may be applied to the plant either in the straw (the wood of which is to be afterward removed by proper means and machinery) or in the state of long fibre, whether prepared by my before-described process or by any of the usual and known processes.

"Thirdly, my invention, in so far as it relates to improvements in yarns and felts, consists in composing the same of the following new combination of materials: I manufacture a yarn which I call 'flax-cotton yarn,' composed partly of flax fibre prepared and cut into short lengths as aforesaid, and partly of cotton, varying the proportions at pleasure. This yarn is much stronger than yarn composed of cotton alone, and also much whiter and more glossy; while it is eqally capable of being spun in the ordinary cotton-spinning machinery.

"I also manufacture yarns composed, in like manner, partly of hemp fibre or of jute, or of *phormium tenax*, or of other like vegetable fibre (china grass excepted), prepared and cut into short lengths as aforesaid, and partly of cotton; which yarns each possess the same properties (more or less) as the flax-cotton yarn.

"I manufacture also a yarn which I call 'flax-wool yarn,' composed partly of flax prepared and cut into short lengths as aforesaid, or of any other like vegetable fibre (cotton and china grass excepted), and partly of wool, or of that description of it called 'tschudy,' or partly of fur or hair, or partly of any two or more of the said materials; which

yarn is stronger than any yarn composed of wool alone. Some wools also, which are too short to be spun by themselves, may, by being mixed with flax fibre cut into short lengths, form a material very suitable for spinning.

"I manufacture also a yarn composed partly of flax or other like vegetable fibre (china grass excepted), prepared and cut into short lengths, as aforesaid, and partly of waste silk, that is, silk of the short lengths in which it exists before reeling, or silk rags cut into short lengths and carded.

"Lastly, flax felts, of a firmness and softness equal to the best felts composed wholly of wool, and superior to them in point of durability, are also produced by a mixture of flax fibre, prepared and cut into short lengths as aforesaid, with wool, fur, hair, or any other feltable material.

"And I declare that what I claim as secured to me by the said letters patent is as follows:—

"*First.* I claim the method of bleaching by double decomposition, before described, whereby the various bleaching agents and compounds used may be recovered and economised.

"*Second.* I claim the method of bleaching by the combined action of chlorides or carbonates or chromates, or any other bleaching agent, with fumes of sulphur, as before described.

"*Third.* I claim the preparing of flax and hemp, and of all vegetable fibre capable of being spun or felted, from whatever description of plants obtainable, by steeping the plant from which the fibre is derived, while in the state of straw, stem, leaf, or fibre, first in a solution of caustic soda, or other solution of like properties, and then in a bath of dilute sulphuric or other acid, as before exemplified and described.

"*Fourth.* I claim the preparing of the said vegetable fibre for spinning in cotton and silk machinery, and for being confined with cotton, wool, raw silk, or other materials of short staple, by firmly steeping the same in a solution of caustic soda, or other solution of like properties; secondly, steeping them in a bath of dilute sulphuric or other suitable acid, or exposing them to the fumes of sulphur; thirdly, saturating them with a solution of bicarbonate of soda, or any other like agent, and then decomposing such salt, however such decomposition may be effected; and, fourthly, cutting them up into short lengths,—all as before exemplified and described.

"*Fifth.* I claim the employment generally, in the preparation of flax, hemp, and other sorts of vegetable fibre, of the mode of splitting by gaseous expansion, as before described, whether the fibre is long or short, and whatever may be the purpose to which the same is to be applied.

"*Sixth.* I claim the manufacture of yarns and felts from a combination of flax, or like vegetable fibre (china grass excepted), prepared and mixed, as aforesaid, with cotton, wool, tschudy, silk waste, fur, and hair, all or any of them, as before exemplified and described."

Mr. Claussen's announcement to the public was received everywhere with great satisfaction, as the growing wants of the world for cotton goods were known to be far beyond any possible supply within the comprehension and experience of agriculturalists. The American Minister, who at home was a leading manufacturer of cotton, became much interested in the subject; and, from specimens of the product sent to America, but little doubt existed that the long-looked-for and much-desired substitute for cotton was at hand.

The Legislature of Massachusetts was then in session, and specimens of the new article were passed round to members, who took much interest in the invention; and the subject was formally brought before the House by the author, then a member, according to the following order, the late chief executive officer of the State being speaker:

HOUSE OF REPRESENTATIVES, Feb. 24, 1851.

Ordered, — That the Committee on Agriculture collect and report to this Legislature such information as they can procure concerning the culture and growth of flax, and its probable substitution for cotton in the manufacture of cheap fabrics.

Sent up for concurrence. LEWIS JOSSELYN, *Clerk.*

IN SENATE, Feb. 25, 1851.

Concurred. C. L. KNAPP, *Clerk.*

In pursuance, the author was requested by the Committee on Agriculture to prepare a report on the subject, which was submitted in the following form: —

COMMONWEALTH OF MASSACHUSETTS.

The Joint Standing Committee on Agriculture, to whom was referred the Order "to collect such information as could be procured concerning the culture and growth of flax, and its probable substitution for cotton in the manufacture of cheap fabrics," would report the accompanying papers, as containing their views on the subject.

LUKE WELLINGTON, *Chairman.*

"HOUSE OF REPRESENTATIVES, Boston, April 15, 1851.

"*To the Committee on Agriculture:*

"Gentlemen, — Agreeably to your request, I herewith transmit such information as I have been able to obtain, in relation to the culture and growth of flax in this country, and to its probable substitution for cotton, to a certain extent, in the manufacture of cheap fabrics.

"For the facts I now present to you, I am indebted to various historical and statistical authorities; to much incidental though reliable data, which has not hitherto been published; to the practical experience of many kind and scientific friends of agricultural progress; and to the deeply interesting experiments, in England, by the Chevalier Claussen himself, who may appropriately be termed the operative pioneer in the preparation of flax cotton.

"The introduction of flax into America seems to have been coeval with the earliest settlement of the country. The plant itself appears to have been originally a native of the East; although it is probably indigenous, in some of its varieties, in other parts of the earth. There are no records or traditions upon which to depend, with certainty, for a knowledge of the date when its properties were first revealed, and its fibrous threads practically applied to the construction of textile fabrics. The Egyptians, it is thought, were foremost in its adaptation to the manufacture of cloth; but the precise period, at which its employment for that purpose commenced, is lost in the abyss of by-gone ages. The culture of flax, however, for various purposes, has been extensively pursued in most of the European and Asiatic countries, as well as in the north of Africa, from the remotest point of time that can be reached by the light of history. The medical virtues of its seeds, and the value of the oils expressed therefrom, especially as agents in the art of painting, were probably known anterior to the fabrication of drapery from its fibres. But the use of the plant for the latter purpose can be traced to the earliest annals of the Egyptians, who enveloped their mummies in vestments of this material, and who continue to manufacture it in large quantities, and to wear it almost universally, to this day. From them, doubtless, the ancient Greeks and Romans derived their knowledge on the subjects; and the latter, in turn, when they invaded Britain, carried thither the results of their own experience, and planted that germ which has since grown into an important branch of national industry and prosperity.

"Although, for centuries, Great Britain has been the

largest manufacturer of flaxen fabrics, she has been constantly dependent on her imports from other quarters for a great portion of her supply of the raw material, notwithstanding the liberal encouragement afforded by her government to its growth within her own dominions. Of this foreign stock, up to the year 1832, Russia furnished about two-thirds; Prussia and the Netherlands, about one-twelfth each; and France, Italy, and New South Wales, the residue. At the present time, the value of the flax fibre imported into Great Britain, for manufacturing purposes, amounts annually to upwards of five millions of pounds sterling. And the value of imported flax-seed, for crushing or sowing, and of oil-cake as food for cattle, is estimated at £2,600,000 annually, viz.: of seed for crushing, £1,800,000; ditto for sowing, £200,000; oil-cake, £600,000. The proportion of flax-seed contributed by different foreign countries towards this supply may be deduced from the following statement: of 2,759,103 bushels imported in 1831, 2,210,702 were brought from Russia, 179,099 from Prussia, 106,294 from the United States, 105,448 from Italy, 98,847 from Egypt, and 53,738 from the Netherlands, &c. The increase from the United States, since the above date, has probably been very great.

"It would appear then, that, while Great Britain has been the greatest consumer, Russia has been by far the greatest producer of that article for the English markets. Of this fact the British government have long been aware, and have resorted to every expedient, by a system of bounties, premiums, &c., with a view of meeting, in a comparatively larger measure, the home demand. This demand, however, annually increases, greatly surpassing all the additional contributions of home-grown flax yet obtained through the efforts of government. The causes which have hitherto affected thus unfavorably these attempts to encourage a more general culture of flax in Great Britain are chiefly these: First, a want of suitable apparatus for preparing it for use; and, second, a prejudice which has always prevailed in regard to its supposed injury to the soil. Both of these reasons, undoubtedly, are now in course of removal; for

the new light lately thrown on the subject of adapting the fibre to manufacturing purposes, by means already in use, or which may readily be contrived, will dissolve the first objection; and the second must soon be overcome by a diffusion of facts relating to the management of the crops.

"Within the last twenty years, the attention of large portions of the American people has been more earnestly directed than at former periods to the raising of flax; but, for the most part, the seed has been the exclusive object. The two reasons, existing or imagined, in Great Britain, against the cultivation of flax, are to a certain extent applicable to the United States. But, if our necessities had been like hers, involving our manufacturing interests, and we were alike indebted to foreign sources for the supply of our wants, it is quite certain that the ingenuity of our countrymen would have seasonably provided all requisite means for preparing the fibre for the spindle and the loom. And when it is considered that flax may be raised as easily and profusely as any other crop, and that, with due care, the refuse may be converted into compost, to be consumed on the land, it becomes evident that its cultivation must prove extremely profitable, — the soil being enriched thereby, rather than impoverished.

"But the extraordinary discoveries recently made, whereby it is claimed that the fibrous texture of the plant may be brought into a condition as suitable for the manufacturer's use, in all respects, as cotton, must soon engage the most active solicitude of political economists throughout the world. The landholders and agriculturists of both Europe and America will shortly be apprised of the immense importance of the subject, and will be stimulated to renewed zeal in prosecuting the flax culture. It is not for a moment to be doubted that all needful facilities for fitting the fibrous substance for market, so far as mechanical appliances may be concerned, will be duly provided by skilful and enterprising artisans. Indeed, the late experiments in the premises have been watched through every stage of their progress, and their truly wonderful results regarded with intense interest, by men of science in both hemispheres.

"The flax crop in the United States is of much greater magnitude than is apparent from mere superficial observation. It is somewhat difficult to ascertain, exactly, its aggregate quantity and value; the returns being made, mostly, in connection with the hemp crop. To a great extent its cultivation is confined to the Western States, where scarcely any portion of the plant is deemed of use, except the seed for exportation. According to the Patent Office Report, 100,000 bushels of flax-seed were raised in a single county in Ohio, last season, which produced to the growers the sum of $65,000; but nine-tenths of the fibrous substance were thrown away as worthless, which, had it been saved and properly prepared, would have commanded in the city of New York a further sum of $150,000. In 1849, it is affirmed that in the State of New York not less than 46,000 acres of land were sown in flax; but what proportion, if any, of its fibre was preserved is unknown. Other instances, illustrating the vast product of seed, and the great waste of fibre, in our country, might be adduced; but the foregoing facts are sufficient to indicate the importance of investigating and improving our agricultural resources, and of promoting the development of those which may be made available in the advancement of our national interests. The fact that flax can be raised in every climate, and in almost every quality of soil adapted to the growth of the ordinary grains, renders the subject of its culture a question of momentous concern to the world at large, but especially so to every country or state which has no exclusive agricultural staple of its own.

"The adaptation of every section of the United States, north as well as south and west, to the successful prosecution of the business of raising flax, will not be doubted. Not so with cotton; and if, as is asserted, the former may be as easily, expeditiously, and economically converted into the form of cloth as the latter, it is palpable that in those portions of the Union where cotton cannot grow a very deep interest must be felt in the culture of its anticipated substitute.

"The first attempts to prepare flax so as to resemble

cotton in appearance and texture were made in Sweden upwards of one hundred years ago. We find, in the Swedish Transactions for the year 1747, a description of the method and agencies employed for the purpose. Boiling small quantities of the plant in a mixture of sea-water, ashes, and lime; subsequent rinsing in sea-water; rubbing with the hands; repeated washing with soap; exposure to be bleached; additional washing; alternate beating and rinsing; then drying, working, carding, and pressing, — constitute the tedious process there described. It is true, the results of these protracted and laborious operations were similar to those produced by the experiments of our own day: but they were the fruits of chemical and mechanical influences combined, requiring the aid of a prodigious amount of manual toil; while the modern improvement is effected almost exclusively by chemical means.

"The new process by which "flax-cotton," as it is called, can be prepared for the manufacturer, is thus described by the inventor, Chevalier Claussen: —

"'The principle of the invention by which flax is adapted for spinning upon cotton, wool, and silk, independent of flax machinery, consists in destroying the cylindrical or tubular character of the fibre, by means of carbonic or other gas, — the action of which splits the tubes into a number of ribbon-like filaments, solid in character and of a gravity less than cotton, the upper and under surfaces of which are segments of circles, and the sides of which are ragged and serrated. In order to explain the nature of the process by which this change is effected, it is necessary first to explain the structure of the flax-plant. The stem of the plant consists of three parts: the shove or wood; the pure fibre; and the gum resin, or glutinous matter which causes the fibres to adhere together. In the preparation of the plant for any purpose of fine manufacture, it is necessary first to separate from the pure fibre both the woody part and the glutinous substance. The former of these may be removed by mechanical means, previously referred to, almost as simple as those employed in the threshing of wheat. In order, however, to remove

the glutinous substance from the fibre, recourse must be had either to the fermentation produced in the steeping process, or to some other chemical agent. The present system of steeping in water, whether cold or hot, is, however, ineffectual for the complete removal of the glutinous substance adhering to the fibres, a large percentage of which is insoluble in water. The first process, therefore, which it is necessary to adopt in the preparation of flax-cotton, is to obtain a perfect and complete disintegration of the fibres from each other, by the entire removal of the substance which binds them together.

" 'This is effected by boiling the flax for about three hours, either in the state in which it comes from the field, or in a partially cleaned condition, in water containing about one-half per cent of common soda. After undergoing this process, the flax is placed in water slightly acidulated with sulphuric acid; the proportions of acid used being 1 to 500 of water. Any objections urged against the employment of such substances, even in the small proportions above stated, are at once met by the fact, that the soda present in the straw, after the first process, neutralizes the whole of the acid, aud forms a neutral salt, known as sulphate of soda. This process, producing, as it does, a complete separation of the integral fibres from each other, is equally adapted for the preparation of long fibre for the linen, or of short fibre for the other branches of textile manufacture. When required to be prepared for linen, all that is necessary after the above process is to dry and scutch it in the ordinary modes.'

" Should flax supersede cotton, there must inevitably ensue a vast revolution in our relations with Great Britain; and a great change, also, in the relative interests of the northern and southern States of our own country. A glance at the annually increasing value of our cotton crops, from the date of the first exports to England to the time when New England has begun to divide the market, and to share largely in the consumption of the material, may foreshow the immense reflux in the tide of trade which

this expected innovation must produce. But, as the universal law of mutation is written on every national as well as social and domestic interest, the results of such changes should not be dreaded.

"Time and nature are constantly exerting their recuperative energies. Nations have risen and flourished, with prospects of perpetual duration, quite as well founded as those which we indulge at this moment in regard to the permanency of our own political organization; yet history, at this day, only tells us that they once existed, and that others have sprung up in their stead. Trade, and every species of human intercourse, continually undergo fluctuations; but the principle of regulation is ever at hand, to equalize and harmonize the various conflicting interests which might otherwise destroy each other. We are too often deceived into a belief that our individual or national prosperity is so unchangeably established, that there remains to us no further duty than to live on in the enjoyment of present possessions. But civilized life produces daily new wants, to meet which new means of gratification must be as often devised: for the sources of support, both for nations and families, as well as the character of all the wishes and demands of mankind, whether in power or in poverty, differ essentially in the present age from those of the last; and are perpetually varying and multiplying — perhaps reforming and refining — from century to century, as our race presses onward in the 'march of improvement.'

"From the foregoing facts and considerations, it will be admitted that the culture of flax in the United States fully deserves that share of public attention which the subject is daily exciting; for it must eventually become a highly important item of our agricultural resources. That the plant can be raised abundantly in every State of the Union, under proper tillage, without exhausting the soil, cannot be doubted; and, from recent developments, it is but reasonable to conclude, that, to a considerable extent, this material may soon be adopted as a practicable substitute

for cotton, in the manufacture of the same class of fabrics as are now produced from the latter substance.

"I have the honor to be, gentlemen,

"Your obedient servant, &c."

The experiments of Chevalier Claussen both in Europe and this country having failed of producing a practical result, the attention of many others was directed to the subject, among whom was Colonel Jonathan Knowles, who obtained a patent for his theory; and a company was formed in New York for making flax-cotton, which failed before accomplishing the desired object.* The following is a copy of Mr. Knowles's Patent Specification: —

Be it known, That I, Jonathan Knowles, of Trenton, in the County of Mercer, and State of New Jersey, have invented a new and improved process of preparing flax, hemp, and other similar vegetable fibres, for manufacturing into yarn, cloth, &c., of which the following is a clear and exact description: —

"I take rotted or unrotted flax, cut into the desired length of staple, and boil it in a weak solution of soda, or other alkali, until the shives will readily separate from the fibre by rubbing; I then treat it with chloride of lime, and chloride of soda, or any other preparation of chloride which is its equivalent for this purpose, and with borax, common salt, saltpetre, Glauber salts, Epsom salts, sal ammoniac, alum, sulphates of zinc or copper, carbonate of ammonia, or any other salt the equivalent of these, for the purpose. The effect of thus treating these fibres is simultaneously to bleach and subdivide each of them into numerous fine filaments, which are deprived of the hardness and rigidity peculiar to flax and that class of fibres, and converted into a state very closely resembling cotton. I am aware that Claussen has prepared flax for spinning, &c., by first steeping or boiling it in a solution of caustic alkali; second,

* Mr. Knowles's Patent.

steeping it in a very dilute acid, or exposing it to the fumes of sulphur, to neutralize the alkali; third, washing it thoroughly in water, to divest it of acid; fourth, steeping it in a solution of hydrochloride of lime or other bleaching salt; fifth, steeping it in a strong solution of some salt whose acid will combine with the lime or other base of the bleaching salt, while the base of the salt in solutions combines with the chlorine liberated from its former base to form a new bleaching salt; sixth, steeping it in a bath of carbonate of soda, or the equivalent thereof; seventh, steeping it in a dilute acid to decompose the carbonate, and thus develop carbonic acid within the fibres, to split, sunder, separate, or resolve them into their elementary filaments; and, eighth, it is then well washed in water, to free it from the chemicals, and then dried.

"These operations have not been entirely successful, as the fibre prepared by them is deficient in strength when it possesses the requisite softness and fineness; while by my process the fibre is left with unimpaired strength, and the same is reduced into a fine soft, downy state resembling fine cotton, suitable for carding, spinning, and weaving on such machinery as is now employed for performing these operations on cotton and wool.

"To apply my process, I take any quantity of flax, rotted or unrotted, dressed or undressed, and cut into the required length. I then boil it in an alkaline solution for from three to six hours, until the shives and fibres will readily separate, and afterwards wash it in water, and put it into a suitable vat, tub, or vessel; and, for every hundred pounds of the fibre, I pour into the vessel a quantity of clear liquor, sufficient to cover it, composed of water in which ten pounds of chloride of lime has been stirred. The fibre must be agitated and worked about in the liquor, so as to become thoroughly saturated as rapidly as possible, which will usually occupy from eight to ten minutes; after which, one pound of borax, dissolved in water, must be poured into the tub, and agitated so as to mix it thoroughly with the fibre. As soon as the original fibres appear to be completely separated into the elementary filaments, which will be from

two to ten minutes, according to circumstances (the exact time can only be determined by actual inspection), they must be at once removed from the tub, the liquor pressed out of them, and then they must be washed in pure water to separate thoroughly all adhering chemicals; after which they must be dried, when they will be ready to be submitted to the action of the picker, cards, or other suitable machinery, to render the mass flocculent, and to separate shives and other foreign matter, in the same manner that cotton is prepared for spinning, &c. I have tried the various salts above mentioned, but borax makes a better product than any of the others. Yet I have obtained very good results by using the others; and all appear to act in the same manner upon the fibre, the difference being only in degree. I have not discovered the rationale of the salts or of the chlorine upon the fibre, and therefore am unable to give any explanation on that point; but the result, of which there can be no doubt or uncertainty, shows unmistakably an improvement upon the process heretofore tried for cottonizing flax and other similar fibres. I have above described the fibre to be steeped in the chlorine solution before adding that of the salt, because I find the operation to be more rapidly performed this way than when the order of mixture is reversed; yet the result appears to be the same, otherwise than in the consumption of time, whichever solution be used first. I have also mixed the saline, or splitting, and chlorine, or bleaching, solutions together in the vat, before immersing the fibre; and the result produced in this way is as good, but the process is accompanied by an increased disengagement of offensive gas, which is objectionable. I have also prepared several successive lots of fibre in the same liquor, and found the process as perfect in its results in the last as the first, but taking a little longer time for its performance.

"I have mentioned one pound of borax and ten pounds of chloride of lime as the proper quantities of these chemicals, for the treatment of one hundred pounds of flax. I may also add that I have found a saturated solution of common salt, one and a half pounds of Glauber salts and

of saltpetre, two pounds of Epsom salts, about two pounds of sulphate of zinc, one pound of chloride of soda; and these quantities to a pound of sal ammoniac to be the proper relative quantities of these several substances to produce the corresponding effect of one of borax: but the quantity of every alkali used will vary according to variations in its own quality and that of the flax or other fibre being operated on. But these things must, from their nature, be left to the judgment of the operator.

"I have found, that, by heating or boiling the fibre in any of the foregoing solutions, a much better effect is produced than when the solutions are used cold. The process is also hastened by heating; and I find that the agitation produced by admitting steam for heating into the bottom of the vessel is beneficial. I am aware that Claussen has proposed to use in his process several of the salts I have mentioned; but I make no claim to the use of any substance in any process such as he describes, nor in any other in which the bleaching and splitting of the fibres are effected separately.

"What I claim as my invention, and desire to secure Letters Patent for, is the method herein described of preparing vegetable fibre for picking, carding, spinning, and manufacturing into fabrics by such machinery as is usually employed for performing the corresponding operations on ordinary cotton and wool, by first steeping or boiling it in a solution of alkali; second, washing it with water; third, steeping it in a solution of chlorine bleaching compound mixed with a solution of splitting salts, to bleach and split it simultaneously; and, lastly, washing it with water, and then drying it, — as herein set forth: whereby the reduction of the fibre to its elementary filaments is expedited, and the expense thereof lessened by dispensing with much of the tedious manipulations and treatment heretofore practised, while at the same time the quality of the product is improved."

In testimony whereof, I have hereunto subscribed my name,

J. Knowles.

The great value to manufacturers of the introduction of any new fibre that would serve as a substitute in any measure for cotton or wool, together with the conviction that such a fibre could be produced from long stapled filaments, led the author, in 1854, to commence experiments on flax for that purpose.

These experiments were persevered in, with a view of establishing factories for its manufacture on the Hydraulic Canal, at Niagara Falls. In the spring of 1857, a bale of linten, made from flax, was sent from Niagara Falls to East Greenwich, R. I., for further experiments, which were conducted at the bleachery of Mr. George W. Brown, with success. A very good article of fibrilia was there made, which was successfully used with cotton and wool in their respective branches of manufacture.

Subsequently, the machinery was set up at Watertown, Mass.; and an article was turned out, which was mixed with cotton and wool in the production of satinets, jeans, stockings, and fine specimens of cloth, which was used for calico-printing. The experiments have been perfectly satisfactory; and machinery is now in process of construction for mills in New England and the West, by Messrs. A. Sisson & Co., of Coventry, R. I. Mr. Stephen Randall, of Centerville, R. I., and Messrs. Sam'l Nicholson and Alfred B. Hall, had charge of the machinery at Watertown, and the former is the author of some valuable improvements in machinery for the manufacture of flax-cotton. He has been an advocate of and believer in the project of making a practical substitute for cotton for many years, and has given considerable time and attention to the subject.

MANUFACTURE OF LINEN FABRICS.

The tedious process of manufacturing flax in long line, as practised by the ancients, and which, in a somewhat modified form, is now continued by the nations of Europe, has necessarily precluded its general use by the people on account of its high cost. It has ever been estimated as among the choicest productions of any country which has given it general use; and its character and value has been tenaciously maintained amidst the conflicting innovations of all other fibres. The manufacturers and operatives both of France and England, as well as the governments they sustained, were exceedingly jealous of its being superseded by any other fibre; and on many occasions, both by physical force and legal enactment, showed their determination, at all hazards, to maintain its supremacy in the composition of textile fabrics. At the present time linen constitutes a staple manufacture in almost all European countries; but more especially in France, England, Scotland, Ireland, Germany, Russia, Switzerland, Austria, and Flanders. In Great Britain, it has been prosecuted for a very long period; but, until of late years, its progress has been inconsiderable, compared, at least, with that made in other branches of manufacture. The reasons for this were partly the want of improved machinery with which to manufacture the same to advantage; the absurd restrictions that were for a lengthened period laid on the importation of foreign flax and hemp; and partly to the rapid growth of the cotton manufacture. "It is only within the present century that machinery has been used in the production of linen cloth; the first mills for the spinning of flax, according to Brande,

having been constructed at Darlington about sixty years ago. In England, according to the same author, the principal seat is Leeds and its immediate vicinity; and, in Lancashire, Dorset, Durham, and Salop; in Scotland, Dundee, which indeed may be regarded as the chief seat of the British manufacture; and, in Ireland, the province of Ulster. The entire value of the linen manufacture of Great Britain and Ireland, ten years ago, was estimated at eight million pounds sterling, and the total number of persons employed in it about one hundred and eighty-five thousand."

Before the employment of machinery and water-power for the manufacture of linen, and while the process was carried on by hand, the character of the operatives was very low and degraded. Hardly a sufficient sum could be earned from day to day, in the spinning and weaving of the fibre, to support life; and this deprivation of the ordinary comforts of a simple existence tended to contract and sensualize the mind, already very low. Spinners and weavers were in the habit of combining together to suppress any new attempts at mechanical progress by brute force; and, as early as sixteen hundred and eighty, the silk and woollen weavers mobbed the India House, in revenge for importations of chintzes from Malabar. Following this, by incessant clamors and intimidations, they induced the government to exclude altogether the beautiful robes of Calicut from the British market. Ure says: "The sapient legislators of that day, intimidated, as would appear, by the East London mobs, enacted in 1720 an absurd sumptuary law, prohibiting the wearing of all printed calicoes whatsoever, either of foreign or domestic origin. This disgraceful enactment, worthy of the meridian of Cairo or Algiers, proved not only a deathblow to rising industry in this ingenious

department of the arts, but prevented the British ladies from attiring themselves in the becoming drapery of Hindostan." After an oppressive operation of ten years, this act was repealed by a partially enlightened set of senators, who were then pleased to permit what they called British calicoes, if made of linen warp, with merely weft of the *hated* cotton, to be printed and worn upon paying a duty of no less than sixpence the square yard. In this menace to the government, the real character and moral condition of the operatives was manifest; and it was not until 1774, a time so memorable in the history of American colonial oppression, that this clause for the protection of linen warp in calicoes was repealed, and the pugnacious spirit of the operatives cooled down. Such were the movings of the popular mind when England was emerging from the trammels of despotism, broken by the great revolution of 1688, but which, for a hundred years thereafter, held her in a state of siege.

Her favorite historian would soothe the inquisitive spirit of the present day with the assumption that the consummation of this revolution was perfected in the seventeenth century, and that subsequent generations witnessed no resistence to the established government, and that the means of effecting every improvement which the people require may be found within the constitution itself.

This might be so, if her last revolution had been one of a purely political character, as assumed; but there being a deeper principle still, which underlaid the strata of government, and which sought to control it, — namely, that of a provisional subsistence for the suffering masses, — it ran down nearly to the nineteenth century, with little diminution. The real struggle throughout the United Kingdom

during the eighteenth century was one between the people and the aristocracy for means of support. The Colonies had scarcely supported the expenses of that navigation from the mother country which sustained them; other countries were diverting the profits of their commerce; voyages of discovery to new worlds of fortune had lost their attractive power; the East India Company was looked upon with great jealousy; and a life at home was the most popular theme of conversation in the hut of the peasant, the room of the hand-weaver, or the mechanic, toiling at his bench in the metropolis.

The water-power of the country being deficient; the coal mines undeveloped, from the inability to drain them, as subsequently accomplished by the perfection of the steam engine; the vast source of wealth in her iron mines laying comparatively dormant, — the spirit subsequently engendered in the British heart, by the constant labor in their development, seemed only aroused to its proper point in the accomplishment of these great objects. The manufacture of fibrous substances, particularly the native staples of flax and wool, received an impulse under the general progress, which never was lost in the introduction of cotton. The invention of Paul in 1750, followed by Hargrave's jenny in 1767, and the immediate improvement by Arkwright in the spinning frame; by Cartwright's loom; and then by Watt's improvement in steam engines, — caused fibrous manufactures to receive an impetus, which, carried down with increased velocity to the present day, has changed the character of the operative masses of the whole of Great Britain.

France, by her statesmen, reluctantly yielded to the popular mind in establishing restrictions against the manu-

facture of cotton, and in favor of a protection of flax, but removed them sooner than did England, even against the most formal protests of the manufacturing interests of that country.

When the project of permitting the free manufacture and sale of printed cottons was brought up, it received the sternest opposition that could be presented to the government from every town possessed of a chamber of commerce. Deputies were chosen to present these protests; and they did it under much irritation, and with a spirit of menace, which, a few years later, by its impetuosity and desperation, plunged France into that whirl of resistless anarchy, which, for the time being, uprooted the very forms of society and government, and established the French Revolution, in all its terrors. The deputies from Rouen declared to the government, "that the intended measure would throw its inhabitants into despair, and make a desert of the surrounding country." Those from Lyons, "that the news had spread terror through all its workshops." Tours "foresaw a commotion likely to convulse the body of the state." Amiens said "that the new law would be the grave of the manufacturing industry of France." And Paris declared "that her merchants came forward to bathe the throne with their tears upon that inauspicious occasion." The government persisted in carrying its principles into effect; and the results were favorable to the prosperity of the nation. That enlightened policy, magnified by the experience of more than half a century, through the sagacious and pungent penetration of one of the most progressive monarchs of the age, has lately established a more extended system of free trade in France, which, no doubt, will produce a commensurate benefit in coming time.

Soon the advantage of the established system became apparent; and the government in turn, through its inspector general of manufactures, felicitated the jealous but mistaken chambers of commerce on the unmistakable evidences of pecuniary gain.

He said: "Will any of you *now* deny that the fabrication of Printed Cottons has occasioned a vast extension of the industry of France, by giving profitable employment to a great many hands in spinning, weaving, bleaching, and printing the colors? Look only at the dyeing department, and say whether it has not done more good to France, in a few years, than many of your other manufactures have in a century."

One of the prominent sources of jealousy in the introduction of cotton was, that it was not a *French* production, while flax was a *native* product; and it was urged upon the government that much loss would accrue to the country from the exportation of so large an amount of specie as would be necessary to meet the annual growing demand of a foreign product, likely to become of such magnitude as would *cotton*, when once successfully introduced.

The force of this argument was entitled to respect in the simple estimation of restrictive national prosperity, as it is a well-settled point in political economy, that home production of the raw material, when coupled with exportation of the manufactured product, increases the permanent prosperity of any state or kingdom in a high ratio. The Emperor Napoleon I. felt the importance of this principle in his domestic economy, and sought, by every means possible, to carry it out in his governmental policy, and early turned his attention to the cultivation and manufacture of flax within his empire, with a view of establishing

and maintaining its supremacy over cotton; and one of the liberal bids made for a successful artistic accomplishment was for the cottonizing of flax, so that it could be spun in short fibrils upon the new machinery then successfully adapted for cotton. The accomplishment of this object seems not to have been obtained in his illustrious day and generation, but was left to a new nation just then emerging from the clouds of republican gloom in another hemisphere, to develop for the use of mankind, at a time when seemingly no other substance could be found to supply the pressing demand. Russia and Austria, as well as nearly all Europe, partook, in some measure, of the jealousies of France and England in bringing forward cotton, in competition with flax; but very little opposition, however, was met with, compared to that of the two countries mentioned, principally for the reason of the incomparable amounts put in use for their manufactures. And, of late years, the great demand for fibres for manufacture, beyond the possible supply of cotton, has excited an increased interest on the subject of the growth of flax and hemp, and all like substances from which it might be possible to create a substitute for cotton.

Italy has ever given much attention to the manufacture of flax, and some of the finest fabrics have been made within her shops. Probably no country in Europe would have derived greater advantage from its protection and use than she, had not the political distractions of this unhappy land kept the energies of her people trammelled.

The present destinies of that country, under the benign influence and protection of a liberal and enlightened monarch, seem to be progressive; and the American heart will rejoice in the union of Italy under one national banner.

HISTORY OF THE MANUFACTURE OF FLAX IN AMERICA.

The history of flax is coincident with the progress of the civilized world. From the earliest records of antiquity we learn that its fibre was used for fabrics, and the seed for the value of its oil for mechanical and medicinal purposes. The early Egyptians used its fabrics as vestments in which to wrap their mummies, and early made fine linen a valuable article of their commerce; and biblical history speaks of it in many places as an article well known and used. From Egypt a knowledge of the culture and manufacture of flax is supposed to have been carried to Greece and Rome; and the Romans in turn carried it to Britain, from whence in time it spread through western Europe, and America.

Flax was one of the first cultivated products of New England, after the arrival of the Pilgrims at Plymouth.

The necessities for clothing, which were almost wholly supplied from native flax and wool, led the first settlers to cultivate the plant with much care and success.

The process, however, both of raising and manufacturing the fibre, was the same as used by the ancients; and, in those early days of the colony, the supply was governed by the wants of each individual family, who, as a general thing, raised and manufactured what they needed within the limits of their own farms and cottages.

Settlements were early made at Dover, and at Exeter, New Hampshire, and Haverhill on the banks of the Merrimac, the inhabitants of which paid great attention to the cultivation of flax. From these frontier towns in New Hampshire, settlements ran back into the interior; and the

character and progress of these were about the same. One continued struggle with adversity and suffering marked their course.

The character of the pioneers was as diversified in talent and cultivation as were the causes which sent them there, and the difficulties which they had to encounter.

One nucleus would combine one religious class and creed, while its neighbor would form a different.

Quakerism and Episcopalianism would be the antagonistic principle in one place, while Puritanism and political domination would produce the same effect in another. At the head waters of the Saco, deeply imbedded in the recess of fifty mountain peaks, might be found a follower of Cromwell, who had buried himself among the Indians, to escape the vigilance of the pursuing tenacity of Charles II., and from whose influence would spring a settlement afterwards important in the history of the country. Another distinctive element might be found on the banks of the Merrimac, not at all connected with local, religious, or political dissension, but which would show the strange exceptions from a total exemption from Indian atrocities, and by a most progressive advancement in religious teachings, agricultural development, and mechanical progress.

The arrival of the Scotch-Irish in 1718, from Londonderry, in Ireland, formed a new era in the history of New Hampshire. They introduced the hand-cards, the foot-wheel, and the loom, and were first to cultivate the potato; and also laid the foundation for an extensive cultivation of flax, and the manufacture of linen. They were a very peculiar people; and the result of a diffusion of their blood and principles among the citizens of New England has been most fortunate in the history of their offspring. Most

of the heads of families were in the prime of life. Adventurous, persevering, and robust, they feared neither savage nor beast. The experience they had had at home had fitted them in a wonderful manner for the toils and persecutions they would be subject to in the new land of their adoption. As they were Irish, and Presbyterians, a broad predjudice arose against them from the enlightened congregations of Boston and Worcester, where they first tarried; and they were obliged to flee from those places, and seek refuge in less populous ones. Sixteen of these families attempted a settlement on Casco Bay; but, finding no tract of land which was satisfactory, they returned to Boston, and directed their course westward, up the Merrimac River, to the spot where Haverhill now stands. From this place, hearing of a fine tract of land, about fifteen miles distant, which was called Nutfield, they solicited a grant of the same from Massachusetts. The settlement was commenced on the eleventh of April, 1719; and an address was made by their pastor, the Rev. Mr. McGregor, who took his position under a large oak, on the east side of Benson Pond. The settlements were made promiscuously through various parts of the town, with but little regularity; giving crooked roads and ways, which the expenditure of considerable sums of money has not entirely remedied up to the present day. It is a singular fact, that, though their sufferings from religious persecutions, war, and famine, were so great in the Londonderry of the old world, the experience of the new was directly the reverse. Their religious persecutions seemed to cease from their removal to Nutfield; while *this* town seemed singularly exempt from Indian depredations. The cause for this exception in Indian hostility might be accounted for from the fact that

they had obtained an acknowledged Indian title to their township; although it has been attributed to an influence exerted by their pastor, the Rev. Mr. McGregor, over the Marquis de Vandreuil, the French Governor of Canada, who had been a classmate with him at college, and who was supposed to have controlled the Indians. It was soon ascertained that the settlement was beyond the jurisdiction of Massachusetts; and therefore an act of incorporation was asked and obtained from the General Court of New Hampshire, then sitting at Portsmouth, at the mouth of Piscataqua River. Many interesting histories have been written concerning the settlers of Londonderry, among which there is a sketch of their character and experience, by Parton, in the "Life of Horace Greely." He says, —

"About the year 1612, when James I. was king, there was a rebellion of the Catholics, in the north of Ireland. Upon its suppression, Ulster, embracing the six northern counties, and containing half a million acres of land, fell to the king, by the attainder of the rebels. Under royal encouragement and furtherance, a company was formed in London, for the purpose of planting colonies in that fertile province, which lay waste from the ravages of the recent war.

"The land was divided into shares, the largest of which did not exceed two thousand acres. Colonists were invited over from England and Scotland.

"The natives were expelled from their fastnesses in the hills, and forced to settle upon the plains.

"Some efforts, it appears, were made to teach them arts and agriculture. Robbery and assassination were punished. And thus, by the infusion of new blood, and the partial improvement of the ancient race, Ulster, which had been the most savage and turbulent of the Irish provinces, became, and remains to this day, the best cultivated, the richest, and the most civilized.

"One of the six counties was Londonderry, the capital of which, called by the same name, had been sacked and razed during the rebellion. The city was now rebuilt by a company of adventurers from London; and the county was settled by a colony from Argyleshire, in Scotland, who were thenceforth called Scotch-Irish.

"Of what stuff the Scotch colonists were made, their after history amply and gloriously shows. The colony took root and flourished in Londonderry. In 1689, the year of the immortal siege, the city was an important fortified town of twenty-seven thousand inhabitants; and the county was proportionately populous and productive. William of Orange had reached the British throne. James the Second, returning from France, had landed in Ireland, and was making effort to recover his lost inheritance. The Irish Catholics were still loyal to him, and hastened to rally round his banner. But Ulster was Protestant and Presbyterian: the city of Londonderry was Ulster's stronghold, and it was the chief impediment in the way of James's proposed descent upon Scotland.

"With what resolution and daring the people of Londonderry, during the ever-memorable siege of that city, fought and endured for Protestantism and freedom, the world well knows. For seven months they held out against a besieging army, so numerous that its slain numbered nine thousand. The besieged lost three thousand men. To such extremities were they reduced, that, among the market quotations of the times, we find items like these: A quarter of a dog, five shillings and sixpence; a dog's head, two-and-sixpence; horse-flesh, one-and-sixpence per pound; horse-blood, one shilling per quart; a cat, four-and-sixpence; a rat, one shilling; a mouse, sixpence. When all the food that remained in the city was nine half-starved horses, and a pint of meal per man, the people were still resolute. At the very last extremity, they were relieved by a provision fleet; and the army of James retired in despair. On the settlement of the kingdom, under William and Mary, the Presbyterians of Londonderry did not find themselves in the enjoyment of the freedom to

which they conceived themselves entitled. They were dissenters from the established church.

"Their pastors were not recognized by the law as clergymen, nor their places of worship as churches.

"Tithes were exacted for the support of the Episcopal clergy. They were not proprietors of the soil, but held their lands as tenants of the ground. They were hated alike and equally by the Irish Catholics and the English Episcopalians. When therefore, in 1617, a son of one of the leading clergymen returned from New England with glowing accounts of that 'plantation,' a *furore* of emigration arose in the town and county of Londonderry; and portions of four Presbyterian congregations, with their four pastors, united in a scheme for a simultaneous removal across the seas.

"One of the clergymen was first dispatched to Boston to make needful inquiries and arrangements. He was the bearer of an address to His Excellency the Right Honorable Colonel Samuel Smith, 'Governor of New England,' which assures his excellency of 'our sincere and hearty inclination to transport ourselves to that very excellent and renowned plantation, upon our obtaining from his excellency suitable encouragement.' To this address, the original of which still exists, two hundred and seven names were appended, and all but seven in the handwriting of the individuals signing, — a fact which proves the superiority of the emigrants to the majority of their countrymen, both in position and intelligence. One of the subscribers was a baronet, nine were clergymen, and three others were graduates of the University of Edinburgh.

"On the fourth of August, 1718, the advance party of Scotch-Irish emigrants arrived in five ships at Boston. They selected for their permanent abode a tract twelve miles square, called Nutfield, which now embraces the townships of Londonderry, Derry, and Windham, in Rockingham County, New Hampshire.

"The land was a free gift from the king, in consideration of the services rendered his throne by the people of Londonderry in the defence of their city.

"To each settler was assigned a farm of one hundred and twenty acres, a house-lot, and an out-lot of sixty acres. The lands of the men who had personally served during the siege were exempted from taxation, and were known down to the period of the revolution as the 'exempt farms.' The settlement of Londonderry attracted new emigrants, and it soon became one of the most prosperous and famous in the colony.

"It was there that linen, as a matter of commerce, was first made in New England.

"The English colonists at that day appear to have been unacquainted with the culture of the potato; and the familiar story of the Andover farmer, who mistook the balls which grew on the potato-vine for the genuine fruit of the plant, is mentioned by a highly respectable historian of New Hampshire as a 'well-authenticated fact.'

"These Scotch-Irish of Londonderry were a very peculiar people. They were Scotch-Irish in character and in name, — of Irish vivacity, generosity, and daring; Scotch in frugality, industry, and resolution; a race in whose composition nature seems for once to have kindly blended the qualities that render men interesting with those that render them prosperous. Their habits and their minds were simple. They lived for many years after the settlement began to thrive upon the fish which they caught at the falls of Amoskeag; upon game; and upon such products of the soil as beans, potatoes, samp, and barley. It is only since the year 1800 that tea and coffee, those ridiculous and effeminate drinks, came to any thing like general use among them.

"It was not until some time after the revolution that a chaise was seen in Londonderry; and even then it excited great wonder, and was deemed an unjustifiable extravagance. Shoes, we are told, were little worn in the summer, except on Sundays and holidays; and then they were *carried in the hand to within a short distance of the church, where they were put on.*

"There was little buying and selling among them, but much borrowing and lending.

"'If a neighbor killed a calf,' says one writer, 'no part of it was sold, but it was distributed among relatives and friends; the poor widow always having a piece; and the minister, if he did not get the shoulder, got a portion as good.' The women were robust; worked on the farms in the busy seasons, reaping, mowing, and even ploughing on occasion; and the hum of the spinning-wheel was heard in every house. An athletic, active, indomitable, prolific, long-lived race. For a couple to have a dozen children, and for all the twelve to reach maturity, to marry, to have large families, and die at a good old age, seems to have been no uncommon case among the original Londonderrians.

"This people were among the first to resist British oppression, and catch the spirit of the revolution; and there were but few tories among them. They contributed largely, both in money for expenses, and soldiers for the army; the town giving a bounty of thirty pounds for every man who enlisted for three years. Stark, the hero of Bennington, was one of them.

"With regard to the linen manufacture, it may be mentioned, as a proof of the thrift and skill of the Scotch-Irish settlers, that, as early as the year 1748, the linens of Londerry had so high a reputation in the colonies, that it was found necessary to take measures to prevent the linens made in other towns from being fraudulently sold for those of Londonderry manufacture. A town meeting was held in that year for the purpose of appointing 'fit and proper persons to survey and inspect linens and hollands made in the town for sale, so that the credit of our manufactory be kept up, and the purchaser of our linens may not be imposed upon with foreign and outlandish linens, in the name of ours.'

"Inspectors and sealers were accordingly appointed to examine and stamp all 'the hollands made and to be made in our town, whether brown, white, speckled, or checked, that are to be exposed for sale;' for which service they were empowered to demand from the owner of said linen 'sixpence, old tenor, for each piece.' And all this occurred within thirty years from the erection of the first log hut in

the township of Londonderry. However, the people had brought their spinning and weaving implements with them from Ireland, and their industry was not once interrupted by an attack of Indians."

The improvements in the cultivation and manufacture of flax, which the Scotch-Irish brought to Londonderry, were soon adopted by many other settlers in New England. In Connecticut and Rhode Island, as well as in Massachusetts and Maine, much attention was given to its culture. Many families made it their principal product, although the seed was not at that time so valuable as now. In 1725, the valley of the Saco was surveyed, and attempts were made to remove the Indians from the territory, without success; and many battles were fought, in which great losses were sustained on both sides. On the 16th of April of that year, Capt. Lovewell fought his renowned battle at Fryeburg with the Pequawket Indians. But it was not until 1762 that the town became settled. Conway, the adjoining town, was settled in 1764; and Albany, formerly Burton, in 1766, although tradition fixes the date of the settlement of the latter town at a much earlier period. These three towns were extensively cultivated for flax by settlers from the banks of the Merrimac, who had carried on the manufacture of flax for many years before their removal.

Hundreds of persons, if their history were known, would reveal to the world full accounts of a long and detailed experience, for many years, throughout New England, in the culture and manufacture of flax; and through the whole of these experiences but little variation would occur in the management and result, one of which will be sufficient for an example.

In 1770, there lived on the banks of the Merrimac a young farmer, by the name of Jeremiah Gilman, a descendant of those of that name who were among the first settlers of Exeter. He was largely engaged in the manufacture of flax by hand-power, which, even at that period, was only used in New England. Tradition says that the success of this farmer over his immediate neighbors, in the flax business, was in consequence of the experience and labors of a manumitted slave in his employ, who was celebrated for working flax. When the old negro was on his death-bed, and the family stood around him, he desired that he might be buried in the family burying-knoll, and that an epitaph of his own composing should be inscribed on his gravestone. His request was complied with, and the following lines were inscribed: —

Here lies a poor old negro slave,
Dead and silent in his grave.
His skin was black as any wax,
And a master old hand to get out flax.

In 1775, Colonel Gilman, with many of his neighbors, joined the defenders of American liberty. He was one of the first at Bunker Hill, and served as colonel of one of the New Hampshire regiments, in the war which followed that eventful day.

In 1780, he left the army for a season to attend to his private affairs, which were suffering for the want of some guiding hand; and the continental money, with which he was paid off, was of very little service in rescuing his property from that ruin in which long neglect and want of money had plunged it.

When peace was established, and the American heart

become more buoyant in the hope of brighter days, he became inspired with the thought of bettering his condition, by selling out his remaining property and emigrating West, where he could secure a larger tract of land, upon which to settle his large family of twelve children, some of whom had already arrived at an age to commence life on their own account. His eldest son started on a tour of observation West and South ; another East ; and the old gentleman himself went up to the head waters of the Merrimac, and crossed over, between the mountains, to those which formed the Saco. He was much interested in the interval lands on the banks of the streams forming the Saco, and subsequently, with three brothers, settled in that vicinity. He returned home from this trip, where he was joined by his second son, who had prospected in Maine without sufficient inducements arising to locate there ; and after waiting two years for the return of his eldest son, who had gone South, and not having heard from him since he left, arrangements were made for commencing the settlement among the mountains of New Hampshire.

A large tract of land was purchased in the township of Burton, now Albany, near Mt. Chocorua ; and he commenced a settlement there, while his brothers chose a location further north, on Bear-Camp River, in the township of Tamworth.

This territory was sixty miles from Concord, and fifty from Dover, through almost a dense wilderness ; and the first settlers endured hardships of no common order. They often had to go thirty or forty miles to procure corn and grain, which they brought on their backs, or on hand-sleds, from Gilmantown and Canterbury. The settlements on the Bear-Camp were begun by Richard Jackman, Jonathan Choate, David Philbric, and William Eastman ; and who

were soon followed by the families of Nickerson, Mason, and Bryant; the Gilmans; and by Laban Allen, from Bridgewater, Massachusetts. All these families went more or less into the manufacture of flax, but none so extensively as Colonel Gilman, who, in connection with a grist-mill, which he had built, arranged to spin flax by machinery and water-power, the first which is supposed to have been erected in America. (See frontispiece.)

Colonel Gilman removed the elder portion of his family to the settlement during the second year, but did not give up the homestead entirely until the expiration of five years. Forests were cut down and burned, and flax was grown upon lands now as dense with woody growth as was the primitive wilderness; and, at the present day, the orchard trees may be found densely mixed with the maple, the birch, and the pine.

The house in which he lived still stands, and is inhabited; but the old mill has long since fallen to decay, although the line of the canal, taken around the side of the mountain and the mill-pond, walled in between three knolls, is still visible. Many years had passed after the family had thus settled in the mountain glen, when the elder son, unannounced and unknown, returned to his father's house. He had traversed the West and South, and had escaped untold dangers and perils. He went on foot through North and South Carolina and Georgia, and took up a residence in the latter State, but was finally driven away by the Indians, with the loss of the product of his labor; and nearly lost his life in the last single encounter with some thirty Indians, who followed him several days. Whatever the effect of his explorations might have been, if his family had not already settled at Burton, they were

not likely to produce any change then in the mind of the old gentleman; and the young man quietly settled down with the rest of the family upon the farm. He had seen the growth of cotton and tobacco, and introduced the latter in the settlement, which was annually raised for many years thereafter. He worked upon flax, and introduced the mixture of the cotton and flax threads in cloth, which formed a popular branch of their domestic product; and from that period the united efforts of the family were joined with others in the neighborhood to make the most of this article as a means of income.

There were no roads for carriages through the woods in those days, and transportation was upon horseback, in which exercise the daughters of Colonel Gilman were well experienced. They carried the cloth thus made to market upon pillions; and it was not an uncommon thing to see eight or ten equestrians, daughters of the settlers, start off to Dover, Portsmouth, Portland, Boston, and sometimes Springfield, as occasion required, with the product of their own hands, to be sold for money, or exchanged for family necessaries, and cotton, with which to carry on their business at home.

Bears and wolves were very plenty in the neighborhood; and it was not an uncommon thing for the settlers to encounter these animals in an unsought combat. Sometimes they would follow persons on horseback; and at one time the youngest daughter of Colonel Gilman, who had been berrying some six miles up the mountain glen, was followed by a catamount several miles, she yielding the merits of the chase to the instincts of the noble horse she rode, which carried her safe over rocks and fallen trees, — outdistancing the pursuer, and arriving at home soon

after dark. It was customary for the girls of the settlement to pull the flax, while the boys attended to the rotting, breaking, and swingling the same, when it was taken into the house in hanks, and was combed, spun, colored, and woven for checked goods, mixed with cotton; and, when used for plain linen, bleaching was subsituted for coloring. There was a cloth made from tow, which was used for the coarser articles for family wear, both for male and female apparel; another comprehended all kinds of mixed and checked goods; while still another, from the fine flax, was wrought into the various grades of linen then in demand.

The working of flax in this settlement was carried on with nearly as much order and precision as that of the present day in manufactories; and children were then taught the true value of labor. The history of a day in Colonel Gilman's family would be very nearly that which would be given as the experience of many others in the neighborhood. In winter, the hour of rising was generally at three-and-a-half o'clock; the boys making the fire, foddering the cattle, and then taking up some necessary employment or study, and carrying it on till daylight, when they commenced out-door work. Sometimes the morning employment would be shelling corn, or winnowing wheat or other grain, in the barn, by the light of the lantern; and sometimes down cellar, assorting and cutting vegetables. At another time, a systematic course of lumbering would be carried on near the house, in an outbuilding, by splitting and shaving shingles or clapboards. At another time, the morning hours would be spent in a course of studies, mostly in reading, spelling, and mathematics. After breakfast, the teams were got out, and the work of the day commenced in lumbering, wood-cutting, or teaming, as the case

might be. At noon, an hour was given to man and beast, for dinner, and then they labored till dark, when the teams were put up, the chores were done, and the evenings were open to collective or individual amusement, according to the taste of the beneficiaries, until nine o'clock, when all were expected to retire. In summer, the hour of rising was four o'clock, when the outdoor labors were immediately commenced, and carried on till six o'clock, when there was an interval for breakfast, after which their teams were taken out, and worked, with the exception of intermission for dinner, until dark, when all were ready to partake of supper, and soon retire for the night.

The dairy work was divided between the males and females. The latter were expected to rise at four o'clock in winter, and attend to household affairs till after breakfast, — when they commenced carding, spinning, or weaving, the invariable rule for the commencement of which was as soon as it was light enough to see the threads in the reed of the loom. Where a family was large, one of the girls was sometimes employed in reading to the rest; and in that manner, together with their own casual opportunities for self-improvement, they acquired the most of what education they enjoyed. The work at the loom and spinning-wheel terminated at dark; and, after a few domestic duties, the females were through their labor for the day. In the summer they rose at five o'clock; and their first labor was milking the cows, which were then driven to pasture. The milk was then strained and set for cream, after which the butter was churned, — which, in Colonel Gilman's family, was done by water-power. The cheese department was left either to the mother or one of the eldest daughters. Both of these processes were

completed, so far as possible, before breakfast, after which the work of spinning and weaving was commenced. During the spring the younger females were expected to assist in planting, by dropping corn, beans, and other seeds, if required; and in haying-time, in emergencies, the whole female household, in raking hay, before a shower.

In the autumn, and sometimes in the early summer, they attended a district school, generally kept in the neighborhood, by one of Colonel Gilman's daughters, who taught all of the simple English branches, except grammar, which in those days was taught by itinerant teachers, making that an especial study. On Sunday morning the whole family went to church, — the women on horseback, and the men on foot. The mother and six daughters, each with a horse, saddle, and bridle, might thus be seen passing along the pathway through the woods, — six miles to the adjoining town, — to church; the father and sons following after on foot, except at such times as pillions were used, and the women were mounted upon the horse behind the men. At such times, it was common for the men to take some weapon of defence along with them; for it was not an uncommon thing for their path to be disputed by bears, which often sat up straight on their haunches before the horse, directly in the path, and would not easily be persuaded to move out of the way. This was particularly the case where the dam had cubs; and many most desperate encounters were had with these animals.

One of the settlers, returning from a neighboring lake with a string of fish, was attacked by a bear so fiercely, that he had to give up half his burden to escape the importunity of Bruin, who soon devoured the fish, and pursued and overtook the fisherman, and seized the balance;

leaving him to return to his hungry children fishless, besides having received a deep scratch across his back, from the claws of the bear, on his first attack. Once, a boy of about ten years of age, who went to turn a horse into the pasture, was attacked, killed, and nearly devoured by a bear.

In the midst of winter, a traveller went up the glen on horseback, and was attacked by wolves. He abandoned the horse to their fury, who soon killed him; while the traveller sped for his life, through the snow, on foot.

He was overtaken near a log hut, which had been vacated by its pioneer tenant, and hardly was able to crawl up the ladder to the chamber, under the roof, when nine of them, fierce and hungry, had taken possession of the room below. He drew the ladder up after him, and was able to keep them at bay, from their inability to jump or climb to the upper floor. Here *he* sat, and below *they* sat, acting as sentinels upon each other for some hours, they having the choice of retreat, and he of endurance; but soon the power of intellect rose superior to instinct, and he turned the tables upon them by a stratagem, which reversed the order of their programme. With the end of his ladder he made a sudden motion against the door, and shut it, enclosing them in the room below; while he knocked a board off the roof, and escaped, leaving them, as he used to say, safely in pound. The next morning, with some of the settlers, they proceeded to the cabin, and found the wolves still safely enclosed, where they were soon dispatched by bullets from their guns. On proceeding to the spot where the horse was left, scarcely a remnant was found: even the saddle and bridle were nearly consumed.

In the manufacture of flax, the old process of dew-

rotting was abandoned through an accidental discovery of an improved plan. A bundle of flax had accidentally fallen into the stream, where it laid some time, and was taken out in a supposed worthless condition. The youngest daughter of Colonel Gilman used it for experimenting, when it was found that the fibre was not injured, but was whiter and stronger than that from dew-rotted straw. This led to further experiments in that direction, and resulted in the adoption of the stream-rotting process for ever after. The water from this mountain stream was subsequently found to contain peculiar chemical qualities, which acted readily upon the glumien in the flax, as a solvent. For many years the hay cut in this valley was poisonous to cattle, if fed exclusively upon the same; and the superstitious attributed it to Chocorua's curse, — an Indian chief, who had been shot on the top of the mountain peak bearing his name, for the supposed murder of the family of one of Cromwell's adherents, Cornelius Campbell, who was obliged to flee his native land on the accession of Charles II.

The pretence for this murder on the part of the Indian chief was the accidental poisoning and death of his son by drinking poison placed in a vessel to destroy vermin.

Chocorua, standing upon the cliff in the early morning (as shown by one of Cole's landscape pictures), heard the voice of his enemy from below, commanding him to throw himself into the abyss. With Indian calmness, he replied, "The Great Spirit gave life to Chocorua, and Chocorua will not throw it away at the command of the white man." "Then hear the Great Spirit speak in the white man's thunder!" exclaimed Campbell. He fired, and the ball pierced the heart of Chocorua, who, before expiring, is said

to have raised himself on his hand, and in a loud voice, that grew more terrific as its huskiness increased, to have uttered the following malediction: "A curse upon ye, white men! May the Great Spirit curse ye when he speaks in the clouds, and his words are fire! Chocorua had a son, and ye killed him while the sun looked bright. Lightning blast your crops! Winds and fire destroy your dwellings! The Evil Spirit breathe death upon your cattle! Your grave lie in the war-path of the Indian! Panthers howl and wolves fatten over your bones! Chocorua goes to the Great Spirit, — his curse stays with the white man!"

An antidote was afterwards found for this poison to cattle in the substance of meadow muck mixed with a weak solution of alkali; and the town is at the present time considered one of the best in that region for raising neat stock.

Such were some of the experiences of New England life in the growth and manufacture of flax, and such the character which battled with the adversities of a pioneer settlement in the production of the physical and mental blessings which have been bequeathed to us at the present day. Some of the early settlers of this region still live, whose youthful memories are brought forward to interest the inquirer into the history of pioneer life. A year since, the author met an old lady of that region, daughter of the before-named Laban Allen, who is now in her ninety-second year, who remembered her early experiences in this wild region with as much vividness as when they were enacted in her childhood.

CULTIVATION OF FLAX FOR MAKING FIBRILIA.

(PRINCIPALLY SUGGESTED BY ENGLISH AUTHORS.)

The flax plant may be grown in almost any climate or soil on the face of the globe; although the constituent elements of the fibre, or woody stalk, will be somewhat different, on account of changes in either soil or climate. The atmosphere furnishes nearly all the elementary principles of which the fibre consists; therefore, if the woody part of the stalk, and the oil-cake from the seed, shall be retained for consumption on the farm, the product will not impoverish the soil more than any other crop.

MOST FAVORABLE CLIMATE.

The districts where the temperature is the most equable will be the most suitable for the growth of flax, — where neither severe drought nor excessive moisture prevails. In the event of a long continuance of drought with a hot sun, when the plant has gained a height of but three or four inches, the leaves are unable to protect the soil from the sun; and the roots, having penetrated but slightly, are unable to get sufficient moisture: the plant is in great danger of destruction. In such a case it should be watered, if possible. Flax will bear a good deal of moisture, and thrive best in moist climates.

SOIL.

The best soil for flax is a sound, dry, deep loam, with a clay subsoil. The land should be properly drained; for, when it is saturated with either underground or surface

water, good flax cannot thrive. Yet the soil ought to be able to retain a moderate moisture. Light clays and alluvial soils will also do well under proper management; but light sandy or gravelly soil, and very strong undrained clay, should be avoided. Flax should not follow crops where much manuring has been done, as it produces many weeds, and the flax fibre grows thin and poor upon the stalk. New grounds produce a strong crop of flax.

PREPARATION OF GROUND.

The land should be well drained; the weeds carefully taken from it, and the soil left in a fine, deep, clean state. Then the roots can penetrate into the ground; and they will oftentimes, to an extent equal to half the length of the stem above ground. Plough in the autumn, immediately after harvest, across the ridges; leave the land in this state till early spring; then plough again; then give it a thorough harrowing, leaving it in a fine pulverized state, taking care to remove stones and sods. Rolling is then advisable. The surface should be left as smooth as possible, as the crop will then grow more evenly. If the soil is very stiff, one more ploughing than above-named may be resorted to.

SEED AND SOWING.

Sow seed that is plump, shining, and heavy, and of the best brands. Sift it clear of seeds of weeds; for by doing this a great amount of labor in after-weeding will be avoided. About two bushels of seed is a fair average to sow per acre. It is better to sow too thick than too thin. The ground being well prepared, sow the seed, giving the ground as *equable a supply as possible.* After sowing, cover it with a seed-harrow, going twice over it, — once

up and down, and once crosswise; this spreads it more equally, and avoids the small drills made by the teeth of the harrow. Finish with the roller, which covers the seed about an inch; thus giving it a proper depth, and insuring an even germination. Sow nothing with the flax.

The earlier the seed is sown, the more slow and steady the growth, which is desirable, as the fibre is in consequence finer. Later in the season, vegetation is more rapid: the fibre grows quicker, and has not time to become fine and mellow.

CARE WHILE GROWING.

Weeds must be carefully pulled when the plant is about three inches high. If there is an appearance of a settled drought, the weeding should be deferred till a later day, as by weeding then the tender roots of the plant would be exposed. To get good seed for future sowing, allow some to fully ripen for the purpose.

MATURITY OF STALK.

The fibre is in the best state before the seed is quite ripe. If it remains longer uncut, the fibre is coarser. The best time for cutting is as the seeds begin to change their color from a green to a pale brown color, and the stalk becomes yellow for nearly or quite two-thirds of its height from the ground, and to lose its leaves. If the fibre is cut too early, it is flimsy; if too late, coarse. So long as the seed is in the husk it continues to ripen. Cutting should only be done in dry weather.

MANNER OF GATHERING.

When properly ripened in the field, the flax may be cut with the ordinary scythe or mowing-machine; and should

in all respects be cured the same as hay. It should be placed in the barn, or in stacks in the field, as soon as dry enough after cutting; and should not be exposed to constant dews or rain. It may be threshed by an ordinary threshing-machine, as the tangling of the straw is no injury to the fibre for making fibrilia. And, when the seed is thus removed, it may be broken on the farm by the brake, needing less power than a threshing-machine, or it may be hauled like hay to designated depots in the neighborhood, where a brake may be permanently worked; and the tow, thus cleaned and scutched, may be sent to market, to be cottonized at the factories where used.

GENERAL OBSERVATIONS.

By the foregoing method, the roots of the flax are left in the ground, and act as a fertilizer. The shoves or woody portion of the stalk, after breaking, if used unrotted, and before the albuminous properties are suffered to ferment, make the best of feed for stock on the farm; and this, in unrotted straw forming three-quarters of the whole weight of the original straw, is an important item for the consideration of the farmer in estimating the value of his crop. The rotting process heretofore practised by farmers, which has always been so tedious a part in the culture of flax, is sought to be avoided. In fact, the only value that there can be in rotted above unrotted straw, to the purchasers for the manufacture of fibrilia, is in the great difference in weight, which is about one-half. One ton of unrotted straw, when fully rotted, will only weigh about ten or twelve hundred pounds; the fibre being about the same. It will be seen then that the farmer can afford his unrotted straw for one-half the price of rotted, besides saving all the

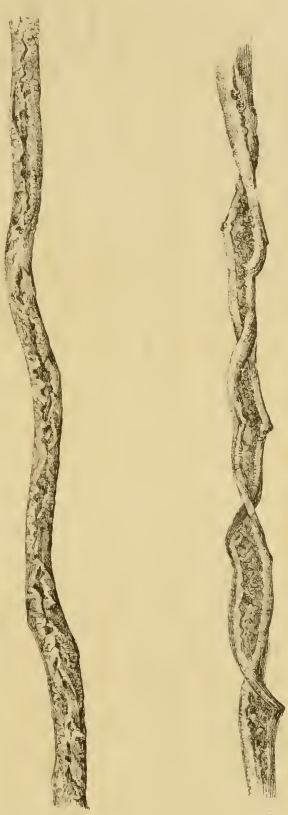
trouble and expense of rotting; therefore, with this allowance, it is better for both the farmer and the manufacturer that the straw should not be rotted. One ton of unrotted straw will produce about four hundred pounds of pure fibrilia, and will leave about twelve hundred pounds of valuable food for stock.

HISTORY OF COTTON.

"Cotton is a vegetable down, — the produce of a plant growing in warm climates, and indigenous in India and America. The name of the genus is Gossypium, and there are many varieties. The cotton is contained in the seed-vessels, and adheres closely to the seeds of the plant."

There are three great distinctions: 1st, herbaceous cotton; 2d, shrub cotton; 3d, the tree cotton, — each of which has several varieties. The most useful is the herbaceous, which is cultivated in the United States, India, China, and many other countries. The shrub cotton grows in almost every country where the annual herbaceous cotton is found. The tree-cotton grows in India, China, Egypt, the interior and western coast of Africa, and in some parts of America. The cotton-plant, in all its varieties, requires a dry and sandy soil. It will grow on rocky hills where the soil is too poor for any other valuable crop. A marshy soil is wholly unfit for the plant; and a wet season is destructive to the crop. The most fatal disease to which it is subject is the blight, produced by wetting at the roots. The plant flourishes the most, and produces cotton of the best quality, on the sea-coast, with few exceptions. The skill and energy applied to the cultivation of cotton, in the United States, has enabled this country to distance all others in providing

Plate 7.



FIBRES OF NATURAL COTTON.

Diameter magnified 500.

J.H.Bufford's Lith. 313 Washington St. Boston.

a supply for England and other European countries. Most of the Southern States raise cotton as their principal crop; and since the invention of the cotton-gin, by Eli Whitney,* have increased and multiplied its growth, till, by its importance, it has become one of the most valuable crops of the Southern States.

The fibril itself, when ready for use, is but a bleached skeleton of what it was in the time of its growth. When the juices were moving, it was a cylindrical tube through which the fluids and gases passed, by attraction and hydraulic pressure. When the fluids begin to dry up, the fibril begins to bleach, and the tube collapses and twists, coiling a great number of times in the space of an inch, which gives it a very uneven, serrated edge, and makes it rough to the touch and more difficult to spin. It is also very porous through the diameter of what was the tube; and is open, like a piece of lace, to the microscopical eye. The tube itself no longer exists; in fact, so perfect is the collapse, that, by the more recent and finest microscopes, no division of the segments is found. The fluids which pervaded the cotton fibril, in its growth, were lighter than those in flax; and, in their evaporation, left less of insoluble or coloring matter on the tube. They also were greater non-conductors of both electricity and caloric than the fibrils of flax. The gauze-like character of the fibril is the reason of its not being so strong, or not taking and holding so good a color as the fibrils of flax or hemp, which are tubular.

The known history of cotton is more recent than flax, wool, or silk; and fabrics made from this fibre are of later

* Eli Whitney was born at Westborough, Mass., Dec. 8, 1765, and died Jan. 3, 1825, aged 59.

date than either of the others. India claims to be the birth-place of cotton, although it is hard to fix this fact to a certainty, as it is known to have existed in America from the earliest history or knowledge of fibrous manufactures, of which we have any trace, on this continent.

The Mexicans had neither wool, hemp, nor silk; and though they possessed flax they did not make it into cloth. Cotton cloths formed their principal article of clothing. The only exceptions for making cloth was from feathers, and the wool of rabbits and hares, and a fibrous plant called "maguei."

It is to be supposed, then, that they adopted cotton, for their gowns, at a very early period; and, until the researches of geological or other investigations shall tell us to a certainty whether India or America is the oldest in the history of vegetable productions, we cannot tell to which the honor is due of producing the first cotton-plant. In India the manufacture of cotton, no doubt, flourished before the date of authentic history. The physical organization of the people was well adapted to spinning and weaving, with the rude implements they possessed; and modern improvements in machinery have been unable to exceed, in fineness, the threads manufactured by this people.

The progress of the development of the cotton manufacture, and its introduction into the western states of Europe, was very peculiar. Few articles of commerce ever became subject to such restrictions and drawbacks as this fibre, which, though raised and manufactured in the East quite early, was only introduced into Europe at a comparative late period, after existing thirteen hundred years on the south shores of the Mediterranean. In fact, cotton was hardly introduced into England before the important improve-

ments in spinning and weaving, by machinery, brought it forth to the world, like magic, to supersede other fibres then used, and to create, in the history of manufactures, one of the most important commercial interests that the world has ever known. The reason of this drawback to the introduction of cotton into Europe, Mr. Baine attributes to its interior growth and manufacture for so long a time, almost exclusively, in those populous regions lying beyond the Indus, which were an unknown world to the nations bordering on the Mediterranean.

At the advent of the Christian Era, cotton was known and manufactured in Upper Egypt, and also in the island of Tylos, in the Persian Gulf; and garments were made from it for the Egyptian priesthood. The Italians and Spaniards first received cotton from the Arabs; and the first mention of goods from this fibre, as an article of commerce, is in the "Circumnavigation of the Erythrœan Sea, by Arrian, an Egyptian Greek, who lived in the first or second century of the Christian Era."

"Arab traders first brought Indian cottons to a port in the Red Sea, establishing a trade in calicoes, muslins, and other cottons, which extended to Europe, and continued till the full introduction of the goods through the middle ages, and down to the establishment of the East-India Company." "In Arabia, and the neighboring countries," according to Baine, "cottons and muslins came gradually into use, and the manufacture was spread by the commercial activity and enterprise of the early followers of Mahomet throughout the extended territories subdued by their arms." Omar, one of the immediate successors of Mahomet, and the same who was connected with the building of the Suez Canal, between the Mediterranean and Red Seas, wore

cotton garments, for it was said of him, that "he preached in a tattered cotton gown, torn in twelve places." In China, cotton was manufactured at a very early day, and their system of weaving colored threads was among the first processes of that kind of which we have any record. Nankeens have ever been an article of exportation by the Chinese, and the cotton from which they are made is said to be of the color of the cloth, as exported. The Tartars, after their conquest of China, cultivated the fibre quite extensively, and brought it into common use. The artisans in China, like those of England and France, who were engaged in the manufacture of woollens and silks, resisted the introduction and manufacture of cotton, until the product was proved too valuable to be set aside, on account of the cheapness of the raw material, and the value of the fabrics made. "In the empire of Japan, in Java, Borneo, and the numberless islands of the Indian and Chinese Archipelagos, cotton is the ordinary apparel of the natives." "In the year 1590," says McPherson, "cotton cloth, of native manufacture, was brought to London, from Benin, on the coast of Guinea." The use of cotton has always been claimed as best suited to the torrid zone, as it is a greater non-conducter of either heat or electricity than flax or wool; thus checking the heat from perspiration, and holding it from passing through the fibres of the cloth faster than the fluid itself is absorbed by capillary attraction, leaving less condensation on the skin, and holding the heat in the same, until both elements pass off together. As early as the tenth century, the cotton plant was introduced into Spain, by the Mahometans, and was cultivated for manufactures; the followers of the Prophet having the honor of establishing the manufacture of cotton at Seville, Grenada, and

Cordova, as well as in their eastern cities of Bagdad and Damascus. Neither Italy nor Greece manufactured cotton till a much later period, although they were the general nurseries for European advancement. Though silk, wool, and linen were extensively manufactured in these states as early as the tenth century, cotton was not found there for four hundred years after. "The Moors, who were mingled with the Arabs, or who came to settle in Spain after the conquest," were the most expert and ingenious in the manufacture of cotton, and linen, hemp, and silk stuffs. The Arabs devoted themselves more particularly to the manufacture of woollen cloth, and that of arms. These artisans prepared and spun the cotton for weaving the different kinds of fabrics in use, particularly of sail cloth, which was in great demand at Barcelona, which was the station of the Spanish Armadas. All kinds of goods were thus manufactured, and were made extensive articles of commerce, before the same manufactures were introduced in other parts of Europe. The Italians had but little intercourse with the Mahometan invaders of Spain, with whom they had been in contention for eight centuries, and claim to have drawn their knowledge of manufactures, as well as their supplies of the raw material of cotton, from Syria and Asia Minor. But it is doubtful whether cotton was ever manufactured in Italy, to any great extent; and the transmission of the art to the French and English was probably through some other source. The Flemings may have received their knowledge of the cotton manufacture from Syria, during the crusades. Their talent in manufacturing woollens has always been appreciated. Except when the cotton manufacture was borne onward by the impetuous tide of Mahometan conquest and colonization, its progress

was ever slow, until the improvements in cotton machinery in England brought it out in full force. From 1760 to 1800, the advance in Britain was unparalleled; and it was from the improvements thus made that the United States received her first impetus in cotton manufactures. At the present time, the cotton machinery of the United States is unrivalled for perfection of manufacture in the whole world. Up to 1738, no material improvements had been made in cotton spinning from the Indian method of spinning and weaving; and the wool-cards then in use were adopted for the use of cotton. A change in some respects had been made in the spinning-wheel and loom, corresponding in some measure to the difference in climate and physical character of the people; yet but little advancement was made in the process generally. Each family in the country districts had a wheel for spinning cotton, and the hours not appropriated to other occupations were devoted to this labor; and the yarn was sent to the weaver, in another district. Men, women, and children were thus occupied to the number of over two hundred thousand, when Paul's spinning-frame changed the course of hand spinning to machine spinning, when one man could do the work of one hundred. Machine-spinning in England was early carried to great perfection; and the fineness of the thread equalled the hand-spinning of India, of which such almost fabulous accounts are given. Cotton yarn has been spun in England, according to Baine, of three hundred and fifty hanks to the lb., each hank measuring eight hundred and forty yards, and the whole forming a thread of one hundred and sixty-seven miles in length. "A specimen of yarn from India, spun by hand in 1786, and sent to England by the East India Company,

weighed $34\frac{3}{10}$ grains, was five yards and seven inches long, and consisted of one hundred and ninety-six threads, consequently its whole length was one thousand and eighteen yards and seven inches. This, with a small allowance for fractions, gives twenty-nine yards to a grain, two hundred and three thousand to a pound averdupoise of seven thousand grains; that is, one hundred and fifteen miles, two furlongs, and sixty yards." "The print-cottons of India are said to come from the neighborhood of Dacca, extending along the banks of the Mequa, and about three miles inland." As a general thing, however, American cotton is far superior to any raised in India. England has outstripped every competitor in the manufacture of cotton, though much later in the race than Spain, Italy, the Low Countries, Bavaria, Saxony, Prussia, and Turkey. She owes much of her success, however, as does American manufactures, to the cotton-gin, which reduced the price of the raw material, and increased its culture. Water-power in England is so scarce that she could never have arrived at her present position in cotton manufactures from that motor. Steam has filled the cavity; and from her coal mines, which yield one hundred million dollars per year, she supplies her motive-power, and at the same time feeds her operatives. Her iron mines bring in about the same amount per annum, which helps her very much in supporting that existence which would be sadly short in native product. With all this estimated wealth in coal, she has less than the State of Pennsylvania, which exceeds in amount that of England, Wales, France, Spain, Portugal, and the Netherlands. The honor of the inventions in cotton machinery, like all other "honors," has been closely contested in England. Wyatt accused Paul of stealing

his invention of a spinning frame; and Paul, in turn, complained of Arkwright and Hargraves in the same way. Probably, as in other inventions, all made new discoveries or valuable improvements.

In a work entitled, "Men Who Have Risen," Hargraves is said to have nearly lost himself in ecstacies when he first conceived the idea of the "Spinning Jenny." Suddenly he (James Hargraves) dropped upon his knees, and rolled on the stone floor at full length. He lay with his face towards the floor, and made lines and circles with the end of a burnt stick. He rose, and went to the fire to burn his stick. He took hold of his bristly hair with one hand, and rubbed his forehead and nose with the other and the blackened stick. Then he sat upon a chair, and placed his head between his hands, his elbows on his knees, and gazed intently on the floor. Then he sprang to his feet, and replied to some feeble questions of his wife (who had not risen since the day she gave birth to a little stranger), by a loud assurance that he had it; and, taking her in his sturdy arms, in the blankets, the baby in her arms, he lifted her out, and held her over the black drawings on the floor. These he explained; and she joined a small, hopeful, happy laugh with his high-toned assurance that she should never again toil at the spinning-wheel; that he would never again "play," and have his loom standing for want of weft. She asked some questions, which he answered, after seating her in the arm-chair, by laying her spinning-wheel on its back, the horizontal spindle standing vertically; while he made the wheel revolve, and drew a roving of cotton from the spindle into an attenuated thread. "Our fortune is made when that is made," he said, speaking of his drawings on the floor. "What will you call it?"

asked his wife. "Call it? What an' we call it after thysen, Jenny? They called thee 'Spinning Jenny' afore I had thee, because thou beat every lass in Stanehill Moor at the wheel. What if we call it 'Spinning Jenny'?" It is of but little consequence who has the honor of an invention, provided it answers the great purposes of civilization, — feeds the hungry, clothes the naked, and elevates the mind of man. If more time was spent by inventors in perfecting their machines and discoveries, and less in striving to build up immortal honors, the latter would be a more sure result of the former. The manufactures of England have increased since 1641, when linen-warped cottons were made at Manchester to the amount of fifty million miles of yarn per day, which would reach two thousand times round the globe; and a web of cotton cloth per diem, which would reach from Liverpool to New York.

The export of British cotton goods (undoubtedly with linen warp) in 1697 was £5,915. It increased in fifty-four years to 1751 to £45,986; and during the following twelve years it increased to £200,354. It has been estimated that the whole value of cotton goods manufactured in Manchester, Bolton, and other places in England, at that time, amounted to £600,000. In 1833, the cotton goods exported amounted to £18,486,400, while the whole manufacturers' product was £34,000,000. The amount of raw material imported the same year, from various countries, according to McCulloch, of which the United States was the principal, was 286,292,955 lbs. In 1750 the home consumption of cotton was only about 1,400,000 lbs.; and it increased in one hundred years to 1850, to an importation principally manufactured in the

United Kingdom, to 612,235,100 lbs., while the increase in exportation of manufactured goods has been in nearly the same proportion. England is wholly dependent upon importations for her supply of cotton, a small proportion of which comes from her colonies. She is now making every effort to increase the supply from her Indian territories. Her flax crop, both in the British Isles and India, is more valuable than the cotton; and her full supply of flax and hemp for cottonizing, under the new process, may easily be had from her own colonial soils.

Flax and wool, and what little of cotton that was manufactured in this country before the revolution, was done mostly by hand-labor and machinery.

In 1790, the first cotton-mill erected in the United States was at Pawtucket, R. I., by Samuel Slater, since which time the advancement of the business has been almost unparalleled. Popular cities, towns, and villages, have sprung up, under the influences of the cotton manufactures, by the hundred. In 1807, the Globe Mills in Philadelphia were erected. "Up to 1812," says Mr. Baird, "there were thirty-three cotton factories in Rhode Island, containing 30,663 spindles. In Massachusetts, there were twenty mills, with 17,371 spindles."

"The capital invested in manufacturing establishments, in 1815, amounted to about $60,000,000." In 1819, Mr. Kirk Boot, and other gentlemen from Boston, purchased the present site of Lowell, — then a barren district, containing but a few houses and inhabitants, who derived their principal support from fishing in the Concord and Merrimac rivers. The first company was organized in 1822, and was styled the "Merrimac Manufacturing Company," for the manufacture of prints and sheetings, and employed about two thousand hands.

"Now, the Lowell manufactures represent about a mile of mills, filled with machinery, extending in a continuous line from Pawtucket Falls to the Merrimac River."

Other companies were organized in rapid succession. The Hamilton, in 1825; Appleton and Lowell, in 1828; Middlesex, Suffolk, Tremont, and Lawrence, 1830; Boot, 1835; Massachusetts, 1839.

These companies, together with the bleachery and machine-shop connected therewith, had a capital of $11,110,000; employ 12,320 hands, run 301,393 spindles, 9,313 looms; producing 1,952,791 yards of cloth per week, including print-goods, sheetings, shirtings, flannels, drillings, and about twenty-two thousand yards of broadcloth per week. The bleachers bleach 4,000,000 pounds, and dye 2,000,000 yards annually. "For the year ending Nov. 10, 1860, the Merrimac Manufacturing Company, Lowell, made 22,036,646 yards of cloth, and during the past year printed 21,292,903 yards. The kind of cloths manufactured are of the finest quality, from Nos. 25 to 40, and consequently do not amount to as much as the coarse fabrics, made in some other corporations. And the Massachusetts Cotton Mills, Lowell, have manufactured 30,265,284 yards of cotton cloth, or a web 17,190 miles in length, — more than two-thirds long enough to reach around the globe." "The population of Lowell was, in 1820, two hundred; it is now swelled to 35,000 inhabitants." Other towns have sprung up, in the United States, almost as suddenly as Lowell. Waltham, Patterson, Ware, Fall River, Taunton, Pawtucket, Lawrence, Adams, New Market, Mattewan, Norristown, Pa., and Gloston, N. J., are mentioned by Mr. Baird as instances of rapid growth and wealth under the influence of successful manufacturing establishments.

He also says, that, in 1840, there were in the United States about 1025 cotton mills, containing about 2,112,000 spindles, — of which there were, in the State of Massachusetts, about 310 cotton mills; New Hampshire, 70; Vermont, 30; Rhode Island, 130; Connecticut, 120; New York, 120; Pennsylvania, 80; New Jersey, 55; Delaware, 17; Maryland, 30; Ohio, 10; Virginia, 10; Kentucky, 10.

"Several of these were small establishments, with not more than 1000 spindles; there were also numerous small factories in the Western and Southern States, which are not included in the above statements."

The number of spindles in operation, in 1850, had increased twenty per cent in the previous decade.

Factory Valuation of Massachusetts, 1860. — "The Valuation Committee," says the 'Transcript,' "make the aggregate valuation of the factory property of Massachusetts to be 298 cotton mills, estimated to be worth $20,964,486; and 177 woollen factories, valued at $7,363,350. The increase in the spindles in the cotton-mills, since 1850, is 474,197. The last official returns of the product of these mills we have were made in 1855, — which year the value of the cotton goods produced was estimated to be $36,464,738, and the woollen goods were valued at $15,-124,233. The cotton used cost $10,585,174; the number of operatives employed was 36,588, of which 23,000 were females.

"In addition to these are the linen factories, the establishments for printing silks and calicoes, the bleacheries, the paper-mills, card, boot and shoe, India rubber, and glass factories, — which, in the aggregate, make a vast sum invested in the industrial pursuits of our population.

"In Essex County, there are 16 cotton mills, which are

appraised at $4,743,778; and 28 woollen mills, appraised at $2,781,500. Middlesex County has 53 cotton mills, appraised at $6,233,223; and 21 woollen mills, appraised $1,787,300. Worcester County has 80 cotton mills, appraised at $2,792,763; and 62 woollen mills, appraised at $1,569,000. Hampshire County has 11 cotton mills, appraised at $749,312; and 12 woollen mills, appraised at $179,200. Hampden County has 26 cotton mills, appraised at $2,295,632; and 16 woollen mills, appraised at $134,100. Berkshire County has 21 cotton mills, appraised at $361,756; and 26 woollen mills, estimated at $535,050. Norfolk County has 28 cotton mills, appraised at $284,862; and 10 woollen mills, appraised at $351,700. Bristol County has 56 cotton mills, appraised at $3,254,940; and 2 woollen factories, appraised at $25,500. Plymouth County has 7 cotton mills, appraised at $248,220. The other counties have no factories of cotton or wool."

England, and other portions of Europe, have advanced rapidly in manufactures during the last twenty-five years; and yet, with all the combined efforts of Europe, Asia, Africa, and America, for the production of cheap fabrics for ordinary wear, the supply is not one-half that the real necessities of mankind demand. Estimating the annual crop of cotton, throughout the world, at six million bales, and dividing the product among the naked and half-clad citizens, it will be easy to see that not half of them would then be properly clothed, and that twenty-five million bales, instead of six millions, would be nearer to a fair estimate of the annual demand.

"The number of spindles employed in the manufacture of cotton," says Baird, "in various parts of the world, are 28,985,000." These are distributed as follows: Great

Britain, 17,500,000; France, 4,300,000; United States, 2,500,000; Germany, 815,000; Russia, 700,000; Switzerland, 650,000; Belgium, 420,000; Spain, 300,000; Italy, 300,000. Of the 2,500,000 in the United States, 150,000 are in the Southern States, and 100,000 spindles in the Western States."

The general magnitude of the cotton trade may be estimated from the following data: The importation of raw cotton into England, in the year 1845, was 721,979,953 lbs., of which 626,650,412 lbs. were from the United States; 42,916,332 lbs. of this was exported to other European states.

In 1846, the value of cotton-goods manufactured in England, exclusive of home consumption, was £25,599,826, — £1,016,146 of which was in small wares, £7,882,048 in twist and yarn, and £16,701,632 in other descriptions of goods.

The magnitude of a protective tariff must, in the present condition of things, to a great extent, control the profits on an extended manufacturing system in the United States. In the early history of manufactures, the changes of the tariff affected the prosperity of the business very much.

Under this state of things, manufactures languished; and, until the adoption of Mr. Baldwin's tariff, in 1824, ruin stared the manufacturers in the face. British goods still glutted the market; but the American manufactures improved, and even increased. The changes in the tariff since then have caused similar fluctuations; but the real progress is in the ascendant for manufactures, and it is not likely that they will ever again fall back to some of their past points of depression. Permanent and profitable mills

are now fast filling up the western valleys, and cotton is already shipped from the South to Massachusetts, by way of western lakes and canals; and, in a few years more, the waters of the Niagara and the upper Mississippi will be turning spindles and looms for the manufacture of fabrics for the home consumption of the great West.

Cotton can now be delivered at any of the ports on Lake Erie much cheaper than in New England; while the saving in re-transportation of manufactured goods, and the means of living for operatives, will insure a large per cent in favor of the West, as the great coming manufacturing district of the United States.

In the advent of new materials for the manufacture of textile fabrics, the whole country will feel a lively interest. The South, as well as the North, will be benefitted by such changes as may come. There are in the South many natural weeds which will make fibrilia; and, during the past season, there was grown within the corporation limits of New Orleans many thousand tons of a weed which makes as fine a fibre as flax, and which may be cultivated, or gathered in its wild state, for the manufacturer, at a large profit, and from which millions of people now suffering may be clothed. The whole West, as well as the immense plains which slope from the Rocky Mountains, are prolific in natural plants which are suitable for manufacture into the finest calico, and which have only to be gathered and manufactured to meet the wants and pecuniary aspirations of the agriculturalist.

The following table, taken from the "Scientific American," shows the progress of the cotton manufacture in this country: —

Years.	Male operatives employed.	Female operatives employed.	Wages of Females.	Wages of Males.	Aggregate Wages.
1838	14,000	47,000	$9,287,200	$4.368,000	$13,655,200
1839	15,000	50,000	9,880,000	4,680,000	14,560,000
1840	15,500	52,000	10,275.200	4,836,000	15 111,200
1841	13.800	46,000	9,089,600	4.305,000	13,395,200
1842	16,500	55,000	10,868,000	5,148,000	16,016,000
1843	17,000	69,000	11,658,400	4,304,000	16,962,400
1844	20,000	66,000	13,041,600	6,240,000	19,281,600
1845	22,000	72,000	11,227,200	6,864,000	21,091.200
1846	23,000	75,000	14,820,000	7,176 000	21 996,000
1847	25.000	85,000	16,796,000	7,800,000	24,596,000
1848	27,000	95,000	18,772,000	8,424,000	27,196,000

The manufacturers of England are beginning to be anxious about the permanency of a supply of cotton, so important to the subsistence of their middling classes, and at the present time are exerting themselves to increase the growth of cotton in their colonies.

"*The Cotton Supply of England: its Importance to Society at Large.* — Upwards of 500,000 workers are now employed in our cotton factories; and it has been estimated that at least 4,000,000 persons in this country are dependent upon the cotton trade for subsistence. A century ago, Lancashire contained a population of only 300,000 persons; it now numbers 2,300,000. In the same period of time, this enormous increase exceeds that on any other equal surface of the globe, and is entirely owing to the development of the cotton trade. In 1856, there were in the United Kingdom 2,210 factories, running 28,000,000 spindles and 299,000 looms, by 97,000 horse power. Since that period, a considerable number of new mills have been erected, and extensive additions have been made to the spinning and weaving machinery of those previously in existence.

"*The amount of actual capital invested in the cotton trade of this kingdom is estimated to be between* £60,000,000 *and* £70,000,000 *sterling.*

"The quantity of cotton imported into this country, in 1859, was 1,181¾ million pounds weight; the value of which, at 6d. per lb., is equal to £30,000,000 sterling. Out of 2,829,110 bales of cotton imported into Great Britain, America has supplied us with 2,086,341; that is, 5-7ths of the whole. In other words, out of every 7 lb. imported from all countries into Great Britain, America has supplied 5 lb.

India has sent us about 500,000 bales; Egypt, about 100 000; South America, 124,000; and other countries, between 8,000 and 9,000 bales. In 1859, the total value of the exports from Great Britain amounted to £130,513,185, of which £47,020,920 consisted of cotton goods and yarns. Thus more than one-third, or £1 out of every £3, of our entire exports consists of cotton. Add to this the proportion of cotton which forms part of £12,000,000 more exported in the shape of mixed woollens, haberdashery, millinery, silks, apparel, and slops. Great Britain alone consumes annually £24,000,000 worth of cotton goods. Two conclusions, therefore, may safely be drawn from the facts and figures now cited: First, that the interests of every cotton worker are bound up with a gigantic trade, which keeps in motion an enormous mass of capital; and this capital, machinery, and labor *depends for five-sevenths of its employment upon the Slave States of America for prosperity and continuance; secondly, that, if a war should at any time break out between England and America, a general insurrection take place among the slaves, disease sweep off those slaves by death,* or the cotton crop fall short in quantity, whether from severe frosts, disease of the plant, or other possible causes, *our mills would be stopped for want of cotton, employers would be ruined, and famine would stalk abroad among the hundreds and thousands of work-people* who are at present fortunately well employed.

"Calculate the consequences for yourself. Imagine a dearth of cotton, and you may picture the horrors of such a calamity from the scenes you may possibly have witnessed when the mills have only run on 'short time.' Count up all the trades that are kept going out of the wages of the working classes, independent of builders, mechanics, engineers, colliers, &c., employed by the mill owners. Railways would cease to pay, and our ships would lie rotting in their ports, should a scarcity of the raw material for manufacture overtake us."— *From the London Cotton Supply Reporter, of February* 3, 1860.

France feels the need of cotton-growing lands very keenly; and, if her colonial possessions were adapted to the growth of that fibre, she would be willing as a nation to contribute largely to the culture of so valuable a product for her manufactures.

The Cotton Trade of France: its Commencement and Progress.— The Paris "Siècle," of the 26th of January, contains an article giving a historical sketch of the cotton trade in France, from its importation

by the brothers Bowers, of Ghent, in 1800. At present cotton-spinning extends over the departments of the Ain, the Aisne, Allier, Ariege, Aube, Aveyron, Basses Alpes, Bouches du Rhone, Calvados, Correze, Côté d'Or, Doubs, Drome, Eure, Gironde, Haute Saone, Haute Viene, Isêre, Loire, Loire Inferieure, Loiret, Loire et Cher, Lozère, Manche, Maine et Loire, Marne, Mayenne, Meurthe, Meuse, Nord, Oise, Orne, Pas de Calais, Puy de Dome, Basses Pyrénées, Pyrénées Orientales, Rhone, Bas Rhin, Haut Rhin, Haute Saone, Sarthe, Saone et Loire, Seine, Seine et Oise, Seine Inférieure, Somme, Tarn, Tarn et Garonne, Var, Vaucluse, Vosges, Vendée. Cotton cloths are manufactured in the same departments; and, in small quantities, in the departments of the Gers, Lot et Garonne, Indre et Loire, Morbihan, and Cher. There were 2,606 cotton manufactories at work in France in the year 1850. The spinning-mills employed 63,064 workmen; the cotton-cloth manufactories, 188,567; and the manufactories of inferior articles, 23 299. The spinning-mills contained 16,301 frames, and the manufactories 113.378. The production of these establishments amounted in value to only 334,000,000f., which would give only 10f. worth to each inhabitant, or scarcely four shirts, or six pairs of stockings, or one sheet, — which is too little for a civilized country, particularly when we consider that a large quantity of the cotton manufactured in France is exported. The cotton imported annually into France from America, Asia, and second-hand from England, is estimated at 72,000,000 kilogrammes, value about 108,000,000f. This sum is increased by the import duty, which, in 1851, amounted to 12,320,000f., or about an eighth of its real value.

With such fiscal regulations it was impossible for French manufacturers to compete with English. Cotton-wool, prepared for spinning, coming direct from French colonies, enters free of duty. Turkish cotton, imported in French vessels, pays 15f. the 100 kilogrammes, and in foreign vessels 25f. Indian cotton is taxed 5f., or 25f., as the case may be; that of other countries beyond Europe, 20f. and 25f. When cotton is at all worked, it is subject to an enormous duty. Thus, cotton carded and gummed in sheets pays a duty of 100f. and 107f. the 100 kilogrammes, according as the ships by which it is imported are French or foreign. Raw cotton, in thread of No. 143, pays 7f. and 7f. 50c. the kilogramme; cotton-twist, 8f. and 8f. 80c. All others, without distinction of quality or number, are prohibited. The cotton-thread prohibited is all that is comprised between Nos. 10 and 143, — that is, all that is manufactured in France. The consequence of the withdrawal of prohibition will be, that thread used in the manufacture of coarse

middling cloths, that is, those most used by the mass of the population, will be admitted. Cotton-lace is prohibited in France, except that manufactured by hand, which pays five per cent on the value. At present France does not export one-third of the quantity of cotton-lace exported by England. When the duty is taken off the raw material, and reasonable duties are imposed on cotton-thread, it is expected that France, after a certain time, will be able to compete with her rival. All nations, except the English, are inferior to the French in this branch of manufacture, in which the talent of her weavers, dyers, and printers would perhaps have secured her the first place, if she could have procured the primary matter at a lower price. She must likewise reduce the price of transport, revise the port dues and the various restrictions on her maritime commerce. She must likewise prepare dockyards on her Atlantic ports, to receive cotton. The cultivation of cotton in Algeria will likewise produce an excellent effect. *It will enable France, before many years, to dispense with the slave grown cotton of America; and, in case of a maritime war, she need not fear any difficulty in bringing cotton into France.*

The English are making strong efforts to increase their supply of cotton; and, no doubt, they will eagerly press the further cultivation of flax and hemp for fibrilia within the United Kingdom, as well as their vast colonies in India. A London correspondent of the "New York World," of June 9, 1860, says: —

The Movement for New Supply of Cotton. — I gave you some account of the proceedings of the "Cotton Supply Association" in Manchester, the object of which is to stimulate the production of cotton in other portions of the world, that they may not here be so dependent on the *United States* for their supply. The *real* design is undoubtedly two-fold: *First*, to guard against the disasters to their manufacturing districts, should hostilities ever occur between the two countries, so as to cut off the supply of cotton from our country. But the second and *real* reason undoubtedly is to contribute toward the abolition of slavery in America, by lessening the demand for cotton from us, and so making slave labor unprofitable. This may be a very *benevolent* enterprise; but its practical results will no more meet the expectations of the men who are engaged in it, than did the results of emancipation in the West Indies, in regard to sugar, meet the expectations of the

benevolent men who were instrumental in accomplishing that great result.

Official returns just published here by the government give some interesting facts on the subject of cotton. These returns show that the *imports* of cotton into the United Kingdom, in 1859, attained a total much in excess of the imports of any former year. *Seventeen years ago*, or in 1843, the receipts here were 573,193,116 lbs.; in 1859, they were 1,225,989,072 lbs.! showing an increase, in seventeen years, of 552,785,956 lbs., or about 82 per cent.

Of the supply, the United States contributed, in 1843, 85 per cent of the receipts; and, in 1859, 78 per cent. It thus appears, that, notwithstanding the enormous increase in the consumption of the raw material, Lancashire is now less dependent upon the United States, by 7 per cent, than she was seventeen years since. In 1843, the total importation from all other parts of the world, except the United States, was 98,454,594 lbs.; in 1859, it was 264,281,208.

In regard to cotton manufactures in the United Kingdom, the total value of cotton manufactures of all kinds, including cotton, twist, and yarn, was, in 1843, £23,447,971. In 1859, it reached the enormous sum of £48,202,225, or over $231,000,000; the increase in the value of manufactured goods, in seventeen years, being 106 per cent. Thus the recent opening of China and Japan, and of India, consequent upon the recent great changes in the government, and the policy to be pursued toward that country, will greatly increase the demand for manufactured cotton goods, no one can doubt; *and it is my deliberate belief, that, if the product of the raw article in America should increase a hundred-fold, England would consume it all. I trust its production will, indeed, be vastly increased;* but that our manufactures will so increase that we shall consume more than the increase in our own country, and thus compete with England in the vast markets of the East.

British Exchange of Cotton Goods for Cotton. — An English journal gives the following statement of the exchanges of cotton goods by England in 1859 for raw cotton, with its two great sources of cotton supply, India and the United States: —

Exchange with India in 1859:

Export of cotton goods to India, ...	193,603,270 lbs.
Import of raw cotton from India, ...	192 330,880 "
Excess of exports, ...	1,272,390 "

Exchange with the United States in 1859:	
Export of cotton goods, 1859,	45,029,411 lbs.
Import of raw cotton, 1859,	961,707,264 "
Excess of imports,	916,677,853 "

The journal from which this statement is taken thinks that it is better for England to cultivate the Asiatic market for its cotton goods, instead of the American; in which opinion we heartily concur. It appears that India and China together took last year over two-fifths (approaching one-half) of all the British exports of cotton manufactures. The statements are thus given, —

British exports of cotton goods in 1859:	
To India,	968,016,350 yds.
To China, &c.,	194,335,633 "
Total to India and China,	1,162,351,983 "
To all the rest of the world,	1,401,093,410 "

The press of the United States have of late been prolific in data on the subject of the growth and manufacture of cotton. The "New York Times" has published some valuable articles on that subject, and the two following are from that sheet: —

England Looking for a Supply without Dependence upon the United States.—As the Cotton States are placing great dependence upon England as their future customer for their "great staple," it may be well for them to read the third annual report of the "British Cotton-Supply Association," from which some extraordinary facts may be learned, showing the great energy and research of that Association, acting under the determination to obtain a full supply of cotton in the future, without dependence upon the product of slave labor.

Those who believe that England has been unsuccessful in her efforts to obtain cotton from other places will be somewhat surprised at the following facts. The sources of her supply, at different periods, have been as follows: —

		1850.	1857.
United States,	lbs.	493,153,112	654,758,048
Brazil,	"	30,299,932	29,910,832
Egyptian,	"	18,931,414	24,842,144
West Indies,	"	228,913	1,443,568
East Indies,	"	118,872,742	250,338,144
All other places,	"	2,090,698	7,986.160
Total,	"	669,576,861	969,318,896

Thus showing, though her increased consumption is very large, yet she has obtained nearly one-third of the whole amount consumed from other places than the United States.

The prospect, however, of her future supply is the more surprising, as the report of the Association illustrates. They state that there is not an inhabited cotton country in the world to which their attention has not been directed.

Through the influence of the British Consuls, the cultivation of cotton in Turkey has been commenced under great promise. The Home Minister in Greece has introduced it into many departments; *and in the Island of Cyprus an estate of eighty thousand acres has been devoted to it. Cotton seed has been distributed among the farmers of the fertile valley in the Meander, in Asia Minor*, with full instructions for planting and gathering the crop. Of Egypt, the Committee report "that they expect to increase the growth from one hundred thousand bales *to the large figure of one million.* In Tunis, the Bey is using great exertions with his subjects to cultivate the 'Great Staple.'" In Western Africa, at Sierra Leone and Sherbro, cotton-gins have been introduced, and a profitable trade in the native cotton commenced. In Liberia, and along the gold coast, every exertion is being made with every prospect of success. At Accra and Cape Coast Castle are Agricultural Societies which make cotton culture their specialty. A great quantity of cotton is raised in the adjacent countries. *The Accra Agricultural Society have engaged with a Lincolnshire firm to purchase this cotton, which they buy in the seed at less than a cent a pound. This cotton, cleaned, is worth in Liverpool fourteen cents a pound.*

From the interior an agent of the Association reports that a large export trade will soon be realized, and that he found seventy thousand people busy in its growing, spinning, and weaving. The prospect is, that, in the numerous towns which stud the coasts, cotton marts will soon be established, and furnish a large quantity.

At Elmina, Benin, Old Calabar, and the Cameroone, a good begin-

ning has been made by distribution of seed and cotton-gins. At Lagos, a hopeful trade has been opened. Along the line of the River Niger, it is proposed to establish trading stations. It is reported that immense quantities, which can be bought for six cents clean on the Niger, are worth sixteen cents in Liverpool.

In South Africa, the government of Natal is stimulating the cotton culture. Numerous farmers there are planting it; and, as an illustration of their success, one of them reports that he has on hand one hundred thousand pounds.

In Eastern Africa, in the rich valley of the Shire, a European colony is being established for raising cotton.

From the Feejee Islands the Committee have received the most wonderful specimens of cotton growing *wild* there, and *reproducing* for from ten to *fifteen years! The samples are so valuable as to range from thirteen to twenty-four cents per pound:* they say "that from no other part of the world has such a collection of graduated qualities been received." *It is calculated that from half the area of these islands might be raised four millions bales per annum.*

Australia has entered into the cultivation, and will soon export freely. Samples of the best quality have been received. But the Committee say from "wondrous India" are they receiving the most flattering reports; *and this year it is estimated that her exports will reach a million bales.* In British Guiana the cultivation has also been undertaken, with the most encouraging prospects.

In Jamaica, the "British Cotton Company" report flattering progress. So much for England.

In Havana, Cuba, great efforts are being made; and a new company has been established, called the "*Anglo-Spanish Cotton Company,*" *with a capital of* $1,000,000, for raising cotton.

It is evident from these facts, to the intelligent mind, that "King Cotton" does not sit so firmly on that *throne*, before which so many bow and worship, as many may imagine or desire. And it is certain that the day is not distant when the manufacturers of Europe will draw their largest supply of cotton from the sources named; and that the American manufacturer will also be impressed with the belief (so soon as his sympathies for the interests of the Cotton States shall be *refused* and *severed*), as are the European manufacturers, that cheap labor should produce cheap cotton, and that in no other parts of the world can labor be found upon the right soil and in the right climate, to compete with Africa and the East Indies, where more than 300,000,000 are waiting employment. To those parts of the world will

the Northern States soon be led to look, by the energies and example of England, to supply their wants of cotton; and asked to join with the other "civilized powers" of the earth, in the protection and employment of free labor, and the suppression of those *institutions* antagonistic to the same.

Cotton and the Cotton Trade. — The "North American Review" for the current quarter begins with an article (written by a gentleman of Boston) headed as above. The history and statistics of this important staple are given in a brief but clear account, derived mainly from "Ellison's Handbook," the latest authority on the subject. It is, indeed, a wonderful history. No other product of human labor, no other element in the commerce of the world, has played so momentous a part. In less than a half century, the manufacture of cotton has quadrupled the wealth and power of Great Britain. In the same short period, its culture in the United States has changed the current of events, and controlled our national politics. Among the causes which have conspired to bring our country to its present critical condition, cotton stands pre-eminent. The change which has taken place in southern opinion and feeling as to the nature and tendencies of slavery, and the entirely altered tone of southern language on that theme, began with the rising prospects of cotton, and have kept pace with the progress of that great staple. Such a change very naturally awakened the jealousy, and called forth the remonstrances, of the North. The purposely irritating assaults of the abolitionists, and even the milder comments of those who could not but condemn the institution, while they deprecated all interference with it, reacted on the southern mind, and, by a process perfectly natural, drove it still further in the wrong direction.

When our constitution was adopted, cotton, as an article of field culture and of trade, was unknown to the country. What if the products and exports of the Slave States had continued the same as they were in 1787? Suppose their principal contributions to general commerce were still, as at that time, tobacco, rice, indigo, and wax. Who imagines that under such conditions the South would ever have stood where she now stands? Who doubts that long before this the whole northern tier of her States would have been far on the road to general emancipation and universal freedom? or that even the States which lie nearest the tropic would by this time have been looking earnestly and hopefully forward to the day when they, too, should enjoy a like blessed deliverance? Most assuredly, the formidable attitude of the

question which now confronts us is due mainly to cotton. Other causes have had their share, and may have seemed more efficient. Motives of humanity, religious scruples, jealous feeling, personal and partisan ambition, sectional prejudice and sectional injustice, real or supposed, all these have mingled with more or less of influence in the process, and have contributed to the combined result, — and yet, as efficient causes, have all been interior and subordinate to cotton, the *primum mobile* of the entire system.

Very probably the people of the Southern States have been quite unconscious of the gradual change which this great cotton interest has been effecting in their opinions and feelings in regard to the whole subject of slavery. Yet none the less demonstrable, as we apprehend the matter, are the change and its cause. The vast importance attached by the cotton-raisers to their great staple has, for years, been a matter of common remark. In their view, it has seemed to surpass and overshadow any other interest, and all other interests, of the country. And, at this moment, is it not evident that all their fine air-castles of future sovereignty, trade, wealth, and alliances, are built on imaginary cotton bales? Would they venture, or threaten to venture, on an enterprise so perilous, did they not hope and expect that somehow their cotton is to carry them through it? The southern cotton crops have become, they tell us, so essential to the world, that, rather than forego the use, slavery-hating England herself will eagerly join hands with the great slave-trading confederacy.

Should the menaces which now load every breeze from the sunny South prove more than empty threats, the cotton question will soon become the great question of the day. Our as yet confident belief is, that the dreadful issues of rebellion and revolution, of devastation and carnage, will be averted. As coming events shall cast their frightful shadow before, let us hope that the conservatism of the South will rise in its might, and that thousands of deluded secessionists will pause, and draw back from the abyss towards which they are now rushing. Heaven in mercy grant it! But suppose it is to be otherwise, — suppose disruption to ensue, with or without war, — is cotton still to rule? That a state of war, so long as it should last, would be all but fatal to the cotton-planters, is very certain. But suppose, — impossible though it be, — suppose secession peaceably effected, is the monarch's throne perfectly secure?

We have lately had occasion to demonstrate the utter powerlessness of King Cotton in an hour of trial like the present, and the essential weakness of every community, which, like the South, cultivates but

one thing, and that a *raw* material, which they cannot convert into useful forms. If they would become truly prosperous and *independent*, our southern brethren must diversify their agriculture, and raise something to *eat* as well as something to wear. But there are other aspects of this great cotton question, destined soon to arrest universal attention, and which must deeply interest both the cotton-growers of the South and the cotton-traders of the North.

How earnestly England has endeavored to free herself from dependence on our cotton planters is well known. Wherever in Asia or in Africa cotton is raised or can be raised, she has lent her aid to increase and improve its culture. True, she has met with many difficulties. The costly experiments made in India, with imported seed, and under the supervision of experienced planters obtained from our Southern States, though not wholly unsuccessful, fell a good way short of their expected results. Both in quantity and quality, American cotton had an advantage, which it seemed likely to keep. This partial failure of British experimentation has contributed largely to the overweening confidence of southern planters in the cotton power.

But the English people are not easily diverted from any purpose which they have deliberately formed. If we are to have a Southern Confederacy, based on the cotton-trade, it may be well for its members to know, definitely, what are the *prospects* as well as purposes of their greatest customer in reference to this very important article. As to her purpose, there can be little doubt. If her hate of slavery makes her even now reluctant to buy of us, would she be less reluctant to purchase of a nation wholly given over to an institution which she abhors? Nay, it is certain, if any thing in the future is certain, that she would redouble her efforts to emancipate herself from all dependence on the southern cotton-fields.

To what extent she has the prospect of such emancipation may be learned, in part, from the following facts. Apart from America, it is evident that India must be her main dependence for those supplies of the raw material which have become absolutely necessary to feed her thirty millions of spindles. In this vast outlying province of the British Empire, cotton has always been raised in very great quantities. It may surprise some to be told that its present annual produce exceeds four millions of bales. As the average Indian bale is about fifty pounds less than the American, so much allowance must be made, when comparing the crop of India with our own. In respect of quality, the difference is still greater. The Indian cotton is short in the staple, and is apt to be in bad condition when it reaches the mar-

ket. To a certain extent, this inferiority may be ascribed to peculiarities of the soil and climate. Irrigation and manuring will do much to improve the quality, as well as to increase the product. Col. Grant states, as the result of his own experience and observation: —

"Nothing appears more susceptible of improvement from culture and a regular supply of water than cotton. In fact, the cotton of the common field and that of the irrigated bed cannot be recognized as the same plant. Not only do the shrubs attain to an increased size, and bear more numerous pods, but each pod is much larger, and contains a much greater quantity of fibre."

Old works for irrigation have recently been repaired, and new canals for the same object have been made, producing a wonderful change and rich returns.

"In 1857 a joint-stock company was formed in London to construct a canal for navigation and irrigation through Madras, Berar, and Mysore, and another from the Malabar to the Coromandel coast, which will open four hundred thousand square miles of cotton-growing land, — a much larger area than is now devoted to cotton in the United States."

Hitherto, difficulty of transportation has seemed to be an insuperable obstacle to the increase and improvement of the East Indian cotton trade. Over many hundreds of miles inland, it is conveyed some eight or ten miles a day, on the backs of bullocks, to the nearest water, and thence by boats to the place of shipment. Imperfectly cleaned at first, saturated with water on the way, torn and stained, often with sand or stones inserted to conceal waste or depredation, the bales reach the end of their long, slow journey. To meet these evils, as well as to add security to those remote possessions, a system of railways, more than two thousand miles in extent, is now in rapid progress.

Another obstacle to the raising of cotton in India, and probably the greatest of all, has resulted from the tenure of the soil, and an iniquitous system under which half or two-thirds of the crop go for rent and taxes. Since the country passed to the Crown, surveys have been ordered, with the design of bringing the land of India under a system of rent which shall be just and fair. When this is accomplished, it will increase immensely the resources and wealth of that populous country. Let it be remembered, now, that the steady energy and boundless wealth of the United Kingdom are pledged to the prosecution of these great improvements; that she is carrying them on at an expenditure of twenty-five millions of dollars a year; that she has a hundred and

sixty millions of subjects to do her work ; and that she is resolved, if the thing be possible, to raise her own cotton, — and we may see some reason to question the long-continued supremacy of our great southern king.

Twelve years ago, Europe received annually, from the East Indies, less than two hundred thousand bales of cotton. In 1857, the supply from that source had reached nearly seven hundred thousand bales. This large ratio of increase will, undoubtedly, be vastly augmented under the stimulus and the facilities soon to be furnished. In the words of the reviewer, —

"It is safe to predict that in five years more the produce shipped from India will surprise the world. Were the export of cotton from the United States to be arrested for two years, by a revolution or by adverse seasons, there is reason to believe that India *might be made to yield, from her vast resources, nearly two millions of bales per annum to England.*"

But it is not to Hindostan alone that England looks for those supplies of cotton which are to make her independent of the American planter. Cotton of superior quality is raised on the banks of the Nile. In 1855, Egypt contributed 251,000 bales to the European market; and this amount may be a good deal increased when the immense dams now in progress, under scientific engineers, shall add fifteen feet in height to the annual inundation. In 1857, a company called the "Cotton Supply Association" was formed in England ; and funds were raised to carry out its objects. In less than a year this society had sent nearly 6,000 bushels of superior cotton-seed to the coasts of Asia and Africa, and to the shores of the Levant. Many hundreds of cotton-gins have been sent from England to the western coast of Africa, whence they find their way into the cotton-raising countries of the interior. In the Yarriba country, which lies between the Niger and the Atlantic, large quantities of cotton are raised for the market; and a superior article is sold for three to four cents per pound, with a handsome profit to the planter. Over the whole of the fertile and well-watered region of Sousan, stretching from the sources of the Niger to those of the Nile, with the Great Desert on the north and the Mountains of the Moon below, cotton is known to grow spontaneously, and is formed into cloth by the negro women. And England, we are told, "is using every effort to divert the chiefs of this region from the slave-trade to the culture of cotton. With the one hand she invites them to produce and sell the raw material, and with the other to receive the fabrics of her varied manufacture."

FIBRES OF NATURAL WOOL

Diameter magnified 300.

J.H.Bufford's Lith

Nor is this all. Every scientific, every missionary explorer who leaves England to penetrate the African interior must go, like Ceres, with his pockets full of seed. Livingston, in his steam-launch, pushing up the Zambezi; Burton and Speke in the heart of Ethiopia; and Barkie on the Niger, — take with them the cotton-gin and cotton-seed. But enough for the present. We have pointed out a few of the omens which should comfort those who fear that some convulsion at the South is about to stop all the looms and spindles. How those omens should be regarded by southern augers is for them to determine.

WOOL.

Wool is defined by Professor Owen to be "a peculiar modification of hair, characterized by fine transverse or oblique lines, from two to four thousand in the extent of an inch, — indicative of a minutely imbricated scaly surface, when viewed under the microscope; on which, and on its curved or twisted form, depends its remarkable felting property, and its consequent value in manufactures."

Wool is not peculiar to the sheep, but forms a sort of under-coat, beneath the long hair, in the goat and many other animals. The Argali, or wild sheep of Siberia and Kamtschatka, has a summer coat of hair, sleek as that of the deer; but in winter a woolly variety of hair is developed in excess, and the under-coat is also of a fine, woolly down. In the domestic sheep, the fleece has been greatly improved and modified by circumstances of climate, pasture, shelter, and judicious crossing of breeds, by which many varieties of wool have been grown, chiefly divisible into the two great classes of *carding* and *combing wool.* The occurrence of hair in the fleece of the domestic sheep is now rare, and is considered as indicative of bad management; but, if sheep are left to themselves on downs and

moors, there is a tendency to the formation of hair among the wool. Change of pasture has a marked influence on the quality of the wool: if sheep that have been fed on chalk downs be removed to richer pastures, only a month before shearing, a remarkable improvement will take place in the fleece. So, also, sheep that occupy lands within a few miles of the sea will produce a longer and more pliant wool than that of sheep from more inland districts. Wool varies in quality in the same flock at different times. When the sheep is in good condition, the fibre is brilliant; but in badly fed or diseased sheep the wool is dull and dingy, and when cut from the dead animal it is harsh and weak, and takes the dye badly.

In commerce, wools are distinguished as *fleece* wools and *dead* wools, — the first being obtained from the annual shearings; the second, from the dead animal.

The fibre of wool has been made into cloth from the earliest ages, and its value has been superior to any other from which clothing has been made. Through the earliest histories, both sacred and profane, it is mentioned as an important and indispensable article of domestic economy. It is probable that the first use that was made of wool for clothing was by felting it into a kind of cloth for that purpose. Spinning and weaving must have been brought out at a subsequent day.

It has been supposed, by able writers, that the sheep was not native with Europe, but with Central Asia, from which the whole race of domesticated sheep has sprung. The ancients were addicted to pastoral life; and history has brought down to us, in stories of romantic beauty, the experiences of the shepherd, and the many blessings this simple life bequeathed to posterity. Many of the inhabit-

ants of Tartary, Persia, Mesopotamia, Syria, Palestine, and the north of Arabia, were occupied by pastoral life; and wandering shepherds, for thousands of years, maintained a distinct character in those countries. The plains of Mesopotamia were rich in pastorage; and the book of Genesis gives us an interesting account of Jacob's experience in raising flocks and herds. From Ezekiel we learn that Damascus supplied the Tyrians with wool. The Moabites made sheep-breeding "a *royal occupation*." The Arabs, from the earliest time up to the present day, have bestowed no less attention upon sheep than upon horses. Isaiah, recording the excellence of the sheep of Arabia, in the language of the address of the Almighty to his people, says, "All the flocks of Kedar shall be gathered together unto thee, the rams of Nebaioth shall minister unto thee; they shall come up with acceptance on mine altar, and I will glorify the house of my glory."

The Hebrews were altogether an agricultural and pastoral people. Abraham, Isaac, and Jacob present beautiful images of the kind of life which still continues with little variation among the Bedouins or wandering nomads of Arabia.

The pastoral life of the Sicilians was marked by peculiar characters, as well as that of the Arcadians. The Belgians first introduced sheep into England; and the Saxons advanced the breed still further. Spain, of all European countries, has paid the most attention to the breed of sheep; and the Spaniards introduced different races and breeds of sheep from all other countries accessible to them, and where their stock could be benefitted. The most valuable breed, and the most widely diffused of all the fine-wool breeds of sheep in Europe, is the merino. America has

obtained her stock from nearly every country in Europe; and at present she possesses nearly every variety. Her wool crop is quite insufficient for her wants; and a larger interest, under any circumstance, should be taken in wool-growing by the farmers of the whole country. There are thirty millions of sheep in the United States, where there should be one hundred millions; and these yield but a small cut of wool, usually averaging but two or three pounds per head. The increase of sheep is cut down quite too much, by slaughter, for the market. It would be more profitable, in a long run, to pay more attention to raising sheep for the fleece, and less for the butcher. The product of wool in 1840 was 35,802,114 lbs.; in 1850, 52,789,174 lbs.: making an increase of 16,987,060 lbs., — 47¼ per cent.

The first sheep of New England were brought chiefly from England by the early settlers, and were the foundation of the stock bred here for two hundred years; though it was collaterally intermixed to such an extent that at the present time it compares in character to no particular breed in Europe.

The importation of the Spanish Merino, and other fine-wool sheep from Europe, caused the reduction of the old English stock; and it is now difficult to find the pure breed of any class of foreign sheep in the country. Sheep are pastured in the United States under greater restrictions than in Europe. In Spain, the migratory flocks, it is said, number ten million, which twice a year are led a journey of four hundred miles; passing the summer in the mountains of the north, and winter on the plains of the South.

The great demand for wool, in Europe as well as the United States, beyond any adequate means of supply, for the past few years, has led to all manner of experiments

to meet the growing wants of mankind. Most of the means used for this purpose have been in the wrong direction. The efforts have turned in the line of inferior counterfeits, as a mixture of wool, instead of a valuable auxiliary to the wool-fibre. Coarse wool has been imported, unworthy of the name, and scarcely finer than goat's hair; and the same has been mixed with other fibrous substances, like damaged cotton, and has been manufactured and thrown upon the market as pure woollen goods. The colors would change rapidly, and the fibres would separate, proving a worthless imposition upon the public. This system has even been carried on with a mixture of fine wool and cotton; and the people have been defrauded under the supposition that they were buying pure woollen goods. The farmers in many of the Western States have discovered this fraud in imported goods, and have arranged with small woollen mills, near at hand, to manufacture their cloths to order; preferring to wear fabrics that will bear out the character that pure wool would give, even though not quite so smoothly dressed, than buy an article better looking which will soon drop to pieces in wear. A great many of the woollen factories in the West have cut off their intercourse with commission merchants in the East; choosing rather to depend upon the farming population in their vicinity for support, than manufacture for the general trade, paying large commissions for sales of a pure article reduced to the common standard of mixed goods in one common market.

The West is beginning to feel "that goods can be produced cheaper by giving employment to the hands on the spot, and a home market to materials." That this is especially true with regard to a second-hand intercourse

with Europe, a late Western correspondent of a Boston paper, on this subject, remarks, —

That the West can convert her own wool into cloth, employ her otherwise unemployed labor in doing it, and pay that labor in her own corn, wheat, and bacon; that it is cheaper to do this than to send her wool to England, to be there made into cloth and brought back for use, and to send her corn after it to pay for the making, — she paying all expenses both ways, and taking such price for her corn as the English laborer chooses to pay, while her own people are seeking for profitable employment in vain. The consumers of the West may have also found out that their home-made cloth is cheaper, for the reason that it will wear twice as long a time as the foreign, it being made wholly of wool, unmixed with "shoddy;" and, although the price may seem dear at the time of purchase, it will prove otherwise in the end. Why, then, should the West continue to export her wool and corn, and import "shoddy" cloth, at an immense loss to herself, because importers will sell their cheap stuff on credit? Better far to supply her own wants from her own means, and keep out of debt. And this, we apprehend, she will do to some extent, whatever temptations may be offered in the shape of cheap foreign fabrics, sold on long credit.

We have alluded to "shoddy." Perhaps all our readers do not know what it is, nor what they put upon their backs when they buy English cloth. A writer in the "U. S. Economist" says, —

"To supply the demand for shoddy, the whole world is searched for rags. The gutters of filthy cities; hospitals of every class and every clime; poor-houses; and in fact every place where filth, poverty, and wretchedness exist, — contribute largely to this supply."

This being the material from which it is made, no wonder, therefore, that, —

"Although the shoddy trade has added largely to the wealth of those concerned in it, yet it has its necessary evils. There is a sickness known in Dewsbury as the 'rag fever,' that afflicts those who are directly connected with the sorting and grinding of woollen rags. They are easily known by their pale and sickly looks, aside from the disagreeable smell that is always with them; and, were it not for the very stringent sanitary regulations that are enforced in England, the manufacture of shoddy would breed a plague. It requires but a little stretch of the imagination to picture to ourselves the amount of filth, and the seeds of disease, that must accumulate where shoddy is largely manufactured."

He says of the cloth made from this material, in whole or in part, —

"It is an error, however, to suppose that the consumption of shoddy fabrics in England have increased in the same ratio that they have been produced in that country. By far the largest portion of the cheap low woollens, made in England, are exported; and *the United States takes more of them than any other country.* It would be about as difficult to induce a man in the shoddy country to wear the article he manufactures, as it would be to compel an apothecary to swallow his own decoctions, — they know too much about it."

And this is the cloth with which our manufacturers have to compete; and so hardly are they pressed with it, that it is said they will have to resort to the use of "shoddy" in self-defence. We hope not. American cloths, both of cotton and wool, command a large preference now, from their superior strength and durability. Let them lose this reputation, and the competition will be at an end, because we cannot compete with England in "shoddy;" and we shall lose, in the attempt, all we have gained by making sound, honest fabrics.

Such is the description of goods imported; and the manufacturers of New England know it well, and have to bear up under its depressing influence. Their own goods bear no comparison with English manufactures, at least so far as the debasing influence of the use of "shoddy" is concerned.

The great difficulties in the way of the manufacturer of woollens have been for the want of a partial substitute for wool, by the mixture of some substance which should not detract from its strength, value, and beauty, and which would cost less than wool. Many fibres would do this to advantage, with a moderate per cent of mixture, was it not for the difficulty, and in fact impossibility, of spinning a long-line and short fibre together. The fibre of flax or hemp, to the amount of twenty-five per cent, could be mixed with wool to an advantage, in every respect, for the manufacture of broadcloth, was it not for the difficulty before named in spinning. This difficulty has been overcome in the

manufacture of fibrilia; and it is a relief to the manufacturer to be able to state to his customers frankly, that fibrilia is mixed with the wool in his cloths, and that the goods are absolutely more valuable, and will hold the colors better, than though they were pure wool. The length of the staple of the mixture of fibrilia can be governed entirely by the length of the fibres of the wool; and that is what has been so much needed heretofore. In the manufacture of hosiery, this mixture is of great value, as the greater amount of stockings worn in this country have a large combination of cotton with the wool. Any individual judgment, familiar with flax, will decide in favor of fibrilia against cotton, for such a purpose, in view of obtaining strength, softness, and beauty.

Hosiery thus mixed will produce an entire new influence in the conducting properties of the fibre in the stocking, — an item of no little importance to health and comfort. Many people are affected differently through perspiration of the feet; and fibrilia, being a better conductor of heat and electricity than either wool or cotton, will in the mixture produce an effect by such means which must prove beneficial to all. The following lines by Dyer will thus, in some measure, be contradicted: —

> "Still shall o'er all prevail the shepherd's stores,
> For numerous uses known; none yield such warmth,
> Such beauteous hues receive, so long endure;
> So pliant to the loom, so various, none."

The one hundred and seventy-seven woollen mills in Massachusetts, producing from fifteen to twenty millions of dollars worth of goods per annum, would save two millions of dollars annually by the use of a proper amount of

Plate 9

FIBRES OF NATURAL HEMP

Diameter magnified

J. H. Bufford's Lith. 313 Washington St. Boston.

fibrilia of their own manufacture, and produce more valuable goods than now.

The drawing of the wool fibres, as shown in plate 8, is most perfect; and the engraving is skilfully done. It is believed to be one of the most perfect microscopical expressions of that fibre which has ever been published.

The number of sheep existing in the United States in 1850 was 21,723,220; and it is quite unfortunate that the amount is not three times as many. The number of pounds of wool raised in the United States the same year, according to the census, was 52,516,959 pounds.

HEMP.

"Hemp is a valuable plant (the *Cannabis Sativa* of Linnæus), supposed to be a native of India, but long since naturalized and extensively cultivated in Italy, and many countries of Europe, particularly Russia and Poland, where it forms an article of primary commercial importance. It is also cultivated in different parts of America, though not in such quantities as to supersede its importation. It is stronger and coarser in the fibre than flax; but its uses, culture, and management are pretty much the same. When grown for seed it is a very exhausting crop; but when pulled green it is considered as a cleaner of the ground. In this country its cultivation is not deemed profitable; so that, notwithstanding the encouragement it has received from government, and the excellent quality of English hemp, it is but little grown, except in some few districts of Suffolk and Lincolnshire. The quantity raised in Ireland is also inconsiderable." — *Loudon's Encyclopedia of Agriculture.*

With proper preparation, English hemp is preferable to any other for strength, and makes excellent clothing for common wear. The coarser sort is made into cordage; the better kind into linen, which is valued for its warmth. The colors of the cloth made from hemp remain unimpaired by wear; and the cloth itself can be bleached both in the old and new way.

Vast quantities of hemp are annually exported into England from Russia, and other countries where the growth is plenty. Petersburgh furnishes a large supply.

An immense amount is consumed in the manufacture of sails and cordage. An invaluable property which the plant possesses is that of driving away the insects which feed upon vegetables; and a mode of protecting gardens and other places from their assaults is by sowing a belt of hemp around them. The ancients are said to have had very little knowledge of the uses of hemp, in respect to the thread which it affords. Among the Greeks and Romans, however, it was used for ropes and nets, but not for clothing.

It is probable, from microscopical examination of the linen from the Egyptian mummies, that their flax resembled our hemp more than our flax, in the form of its fibrils.

"Hemp has been cultivated in Bengal from remotest antiquity; but not, as in Europe, for the purpose of being manufactured into cloth and cordage. In the Hindoo economy it serves as a substitute for malt; a favorite intoxicating liquor called *banga* being produced from it. This, also, is the use to which it is applied in Egypt." — *Milburn's Oriental Commerce, &c.*

Hemp is imported into the United States chiefly from Russia; the annual value, on an average, of the three

years ending September 30, 1838, imported from that country, being $450,000, while the whole importation of it amounted to $609,334.

"The annual value of all articles manufactured from hemp, sail-duck being the principle of these imported during the same period, amounted to $681,117, of which $549,967 were from Russia. An average quantity of these articles, to the value of about $100,000, was re-exported, — for the most part to Cuba and the other West India Islands, and to South America." — *Mc Culloch's Commercial Dictionary.*

Kentucky produces the largest portion of the hemp crop of the United States. In 1850, it was five-eighths of the whole hemp crop of the Union. Missouri, Indiana, and Ohio are increasing their culture of hemp, though more attention is paid to flax than formerly, which, in some States, has taken from the hemp crop.

Hemp can be grown for fibrous manufacture in every State in the Union at a profit, although a limestone soil is the best for its cultivation.

The crop of hemp and flax in Kentucky would make three hundred thousand bales of fibrilia. The seed of flax may make that plant preferred by the farmers of the West, as it pays for the expense of the whole crop, leaving the fibre as profit. Either of these fibres can be cultivated at much more profit for fibrilia than for any other purpose; and, when machinery is introduced for breaking the stalks on the farm, much labor will be saved over the present mode of treatment of the fibre. Hemp bleaches under the new process without difficulty, and will hold colors better than most any other fibre, if colored under pressure by the new process.

The fibrils of hemp, when separated from the filaments and fibres, vary but little from those of flax, with the exception that they appear more jointed. The juices, in flowing up and through the tubes, rest stationary for certain periods at certain points, and thus leave marks or circles on the inner side of the tube, which appear like joints in a rod of cane. The size of the ultimate fibril does not differ much from flax, and its length and fineness will vary according to the age at which the stalk is gathered. All fibrils, when used for textile fabrics, are better when cut before the stalk is fully ripe; and this mode of gathering has been adopted with hemp, as the seed is not of itself so valuable as that of flax. In the new process for making fibrilia, however, the difference is not so great as in the old method for the manufacture of linen; as all the glumien of the fibre, in either flax or hemp, is under the more immediate control of the manufacturer. As a rule, the solving properties of the fibre of any plant may be estimated by the character of the oil of its seed. The oil from hemp-seed is more soluble, in other words, it is easier to dilute, than that from flax; and, to a certain extent, the glumien of the fibre is easier to extract. It is quite probable that the character of both hemp and flax, in all their relations, as raised in America, is quite different from the ancient plants, and to a certain extent from those now raised in Europe. Climate and soil will affect each in a few years, and produce a different article from the original from which they sprung.

Hemp is most valuable in the production of fibrilia; and the present crop of the United States, if cottonized, would be much more valuable than for its present uses. The Kentucky hemp is capable of making a superior article of

fibrilia, and therefore should not be used for cordage and other coarse purposes, when there are many kinds of hemp that will not cottonize, which are nearly as valuable for rope. The breaking of hemp for fibrilia may be done with machinery, like flax, and thus reduce the cost of raising very much. A negro is now stinted at one hundred pounds per day, in breaking hemp by hand; while one of the fibrilia brakes, moved by two horses, will turn out one thousand pounds on the plantation. The process of cottonizing hemp is so nearly like that of flax, that a separate description is deemed quite unnecessary: the principal difference would be in simple changes of the solvents, which a little experience will teach any manufacturer. A volume might be written on the growth and manufacture of hemp alone, but it is not requisite to the present purpose of this work. A microscopical drawing of the fibre of hemp may be seen in Plate 9.

JUTE, OR JEWS' MALLOW.

Jute has but recently become an article of commerce to this country; and, at the present time, by far the largest amount of importation is in bagging cloths, principally used for baling cotton in the South. Within a few years this trade has arisen between India and other countries, among which is the United States; and the fibre itself has been imported and used to some extent, mixed with other fibres, for certain kinds of manufacture. There are two kinds of jute under the same name, both of which are common in the East. The stems yield fibre, and the leaves are used as pot-herbs by the natives of India, Egypt, Arabia, and

Palestine. In dry soil, it grows small and herbaceous; in a medium soil, some four or five feet high; while, in a hot, moist climate, it attains a height of from ten to fifteen feet.

Some attempts were made to introduce the culture of jute into England, but as yet not with general success, — probably for the want of proper care and attention to the requirements of the plant in acclimating it, which may be done there, as well as in the United States, when skilful attention shall be given to that object in following out the natural laws which govern the changes in transplanting seed into a new soil and climate.

Doctor Roxburgh describes the plant thus, —

"*Corchorus Olitorius*, 'Pot-Herb,' or 'Jews' Mallow,' as seen in the Mediterranean region, is an herbaceous annual plant, only a foot or two, but in India of several feet, in height, and erect in habit.

"The stem is smooth, cylindrical, and more or less branched. The leaves are of a lively green color, and smooth, alternate, on foot-stalks, oval or ovo-lanceolate in shape, with the margin dentate, and with the two lower dentitures terminated by a slender filament. The stipules are simple, awl-shaped, and reddish colored at their base. The peduncles or flower-stalks are one to two flowered. The flowers are small; having the calyx consisting of five pieces or sepals, and the corolla of five yellow petals. Stamens numerous. Torus, or nectary, cup-shaped, with glands at the base of the petals. Ovary solitary; ripening into a long, nearly cylindrical capsule, ten ribbed, six to eight times longer than it is broad, five celled, and formed of five valves, with five terminal points. Seeds numerous, with nearly perfect transverse partitions between them. Flowers in the rainy season, and fructifies in October and

November. The fibre is long, soft, and silky, and well fitted for many of the purposes to which flax is applied, as it is divisible into very fine fibrils, which are easily spun. Jute is not easily bleached under the old methods of treatment, but is easily controlled under the new, which has a tendency to strengthen rather than weaken the fibre. The glumien is harder to dissolve than hemp, and the fibre requires different solvents from that fibre. The circumference of the stalk is about one inch."

Dr. Buchanan describes the "pot" or "jute" as spun by two kinds of spindles, the Takur and Dhara. "A bunch of the raw material is hung up in every farmer's house, or to the protruding stick of a thatched roof; and every one who has leisure forms, with one or other of these spindles, some coarse pack-thread (sutoli), of which ropes are twisted for the use of the farm.

"The Dhara is a reel, on which a thread, when sufficiently twisted, is wound up. The Takur is a kind of spindle which is turned upon the thigh, or sole of the foot. Ghurghurea is a third kind of spinning-machine. It is only the lower Hindoo castes, called 'Rajbongsi,' 'Konget,' and 'Polya,' that form this pack-thread, for being woven into sackcloth; and spin a finer thread, from which the cloth called 'Megili,' or 'Megila,' is woven. By far the greater part of the cloth that is used dyed receives the color in the state of thread. The coarse cloth, called 'Megili,' is woven by the women of the lower class of people. Most families have a loom; and the people, especially the women, in the afternoons, work a little occasionally, and this serves to clothe the family.

"The pieces consist of three or four narrow cloths sewed together, some four or five cubits long, and from two to

three cubits wide, and are worth from two to eight *annas* each. Some have red and black borders. It is said to be more durable than cloth made of cotton."

From a great number of specimens of jute examined by the author, he is convinced that the fibre, as imported into this country, has been injured and weakened. It is quite probable that the manner of rotting or curing, as practised by the natives of India, hurts the strength of the fibre; and it is to be hoped that so valuable a substance may yet be preserved in all its native strength and beauty for the hungry market.

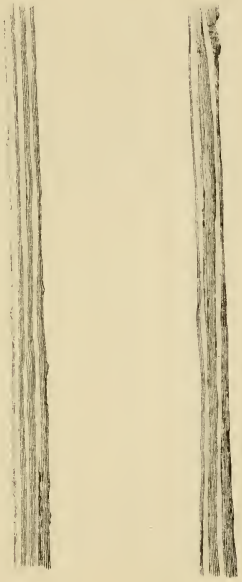
SILK.

Silk is one of the oldest fibres known in ancient history. In China, the tradition of the silk culture is carried back into the mythological periods of agriculture.

The silk-worm is undoubtedly a native of China; and the rearing of it, and the manufacture of silk in ancient times, seems to have been entirely confined to the Celestial Empire. The highest ladies of rank engaged in this occupation, whose example was soon followed by persons of all ranks; and garments made from silk came into ordinary use.

It eventually became known in Rome; and an article of such beauty had only to be introduced into that city of gay and luxurious habits, to become much sought after by ladies of rank and opulence, to whom the use was almost exclusively confined, from its scarcity, caused by the high price and difficulty of importation. None of the ancients seemed to know the nature of silk, or how it was produced. Some thought it a species of wool or cotton; others, a down on the leaves of trees or flowers.

Plate IV



FIBRES OF NATURAL SILK

Diameter magnified 500.

J.H.Buffords Lith.

At one time, the wearing of silk by men was prohibited by law: but a Roman emperor, disregarding this law, clothed himself in a garment made entirely of silk, and after this the wealthy citizens made general use of it; and the price declined as efforts were made to import larger quantities.

Greece, Sicily, and Italy each in turn took up the breeding of the silk-worm; and, in all these countries, extensive manufactures were established, and sustained by native production.

The silk manufacture was introduced into France in 1480, under the superintendence of Louis XI. It was not prosperous; but in 1521 a new importation of workmen from Milan was procured, and established at Lyons, under the protection of Francis I. The manufactures flourished, and not only supplied the demand of France, but furnished an abundance for foreign markets.

The manufacture of silk appears to have been introduced into England in the 15th century, although silk had been in use two centuries earlier, being imported from France. Though the manufacture met with many drawbacks, from prohibitions and restrictions, and a lack of suitable machinery, these difficulties were finally overcome; and, in 1842, *British silken goods were exported into France, amounting to* 181,924 *pounds.*

The United States presents facilities for the production of silk, but it has not yet been successfully accomplished.

The matter has been brought before the public, and inducements offered by government and by private individuals for the rearing of silk-worms. The production of silk was, in the early days of our country, particularly recommended to the northern colonies as the means of exchange to England for such goods as were wanted.

Silk has been counterfeited more than most any other fibre; and the mixture has been as a general thing very bad, from the fact that the fibre had to be spun on long stapled machinery. A perfect mixture, and an economical method of manufacturing silk with other fibres, can *only* be done when machinery shall be so arranged as to spin the same in *short staple*, — the same as fibrilia is done.

Georgia seems to have been most fortunate in manufacturing silk; and the raw silk exported to London sold at a higher price than that from any other part of the world. It was said to be more profitable than other kinds of ordinary business.

In 1760, the culture of silk was introduced into Mansfield, Connecticut. It was pursued to a small extent in other places in New England, but Mansfield retained the pre-eminence.

In 1826, Congress encouraged the culture of silk by a variety of means. The increasing use of this article, and the immense sums sent abroad for its purchase, aroused the attention of the people. The mulberry plant was introduced; and, from its productiveness of foliage, great hopes were entertained that the silk-worms could be successfully reared, and the culture of silk prosper; but the almost total destruction of the trees by frost caused the public to despond, and the impulse again relaxed. In 1838, a speculation was entered into by some unprincipled individuals to force the sale of the mulberry, which proved so detrimental to the already flagging interest of the people, that the scale of progress was turned downward from that time.

The fibre of silk is very smooth, and is represented in Plate No. 10.

CHINA GRASS.

"China Grass," "Rheea," or "Ramee" fibre has been known in the English market but a few years. It is of the nettle species, and grows in the East Indies. Some dwarf plants of a similar kind grow in Europe and America. It is not impossible but China Grass may yet be cultivated with success in America. The fibre is very strong and silky; and, properly prepared, it resembles silk in appearance more than any other fibre of vegetable growth. Royle says "the plant is cultivated with considerable care; that it may be obtained from seeds, but more quickly by parting the roots, as it throws up numerous shoots; that these may be cut down, and that fresh ones will spring up, so that three several crops may be obtained in the season. Great care is also taken in the scraping, peeling, steeping, and bleaching the fibre." The first crop yields strong and coarse fibres; the second and third crops, delicate fibres for the finer fabrics.

The new process of making fibrilia is well adapted to China Grass, and will make it a more valuable fibre than though prepared by the old process.

BLEACHING AND COLORING.

The old processes of bleaching and coloring have been fully described in the books, though the causes *why* the changes are produced in the appearance of the fabrics when acted upon have not been explained. The practical solution of this problem has been attempted for ages, by

experimenters and writers; and yet, at the present day, thousands of the most scientific and deeply read examiners of the subject seem as much in doubt, at least so far as their published theories represent their knowledge, as were the philosophers of past centuries. Perhaps there is no subject so important, connected with the production of textile fabrics, as that of coloring. It produces all the varieties which go to make up and support the principles of trade and fashion which govern textile fabrics, and from the earliest ages has been a subject of the most intense interest to humanity. Princes, potentates, and powers, in all their variety of influence, have been wedded to the mystic charms of color, and in many cases have sought to monopolize its use. At times it has been restricted by legal enactments, and has always been a most abject slave to fashion. The *royal purple* has had greater power within its influence than gold, and it intrinsic value, as a matter of commerce, has been much more.

Whenever we seek from learned authors the causes which create and fix color, the whole volume of nature is opened to us as a reference in which to find the proper solution. We are cited to light, and then to heat, and then to electricity and magnetism; and after a patient study of all these, if we follow the old texts, we return as ignorant as before to the first subject, which, like a new finger-board, points to other paths of investigation. Where there is so much doubt thrown on the subject by renowned authors, it is but reasonable that all deep investigators should have, as by necessity they must possess, some theories of their own differing from others, which may be given to the world to general advantage for comparison.

The author has been many years engaged, theoretically and practically, in investigating this subject, in connection with his experiments on fibres for making fibrilia; and, as the practical part of them has resulted in a great improvement for the use of fibres for that article, the theories beyond may be of some service to others in perusing the subject for other purposes.

The ideas of the author, in some respects, may seem strange, and his theories may be doubted. They may not even be original: but he has the satisfaction of knowing that a part of them, at least, have become very valuable, practically; and that their value has been discovered through the dawn of those theories not yet carried out or proven beyond his own experiments, but which were necessary to harmonize that part of his theory which has been substantiated. They have been worked out, point by point, like the words in a puzzle, till so much has been shown of the whole, that he is pretty well satisfied of the general results; and he unhesitatingly gives them to the world.

First, as to the process of bleaching and coloring, and the mechanical method of doing it; second, the barriers in the way which are to be removed; and, third, as to the theories in its support, which go beyond and affect other laws and organizations of matter, but a knowledge of which is necessary to account for color, its causes and effects.

BLEACHING.

The object of bleaching is to purify and whiten fibrous substances. The old methods are so fully described in books, that it may be simply necessary to say, that, by soak-

ing, boiling in water and alkalies, washing, subjecting the fibre or cloth to acids, and chloride of lime, air, light, heat, and cold, the result is produced. One method now used for bleaching linen in Europe will answer as an example: —

Process for Bleaching Linen.

1. Steeping 12 hours in cold water.
2. The whole is then boiled.
3. Washed in pure water.
4. Boiled 12 hours in carbonate soda, caustic lye, gumfustic or resinous soap.
5. Exposed on grass from 4 to 8 days.
6. Boiled as before.
7. Washed.
8. Exposed on grass.
9. Boiled.
10. Washed.
11. Exposed on grass.
12. Steeped in vitriol, sp. gr. 1.02.
13. Washed.
14. Boiled.
15. Exposed on grass.
16. Scalded.
17. Soaped and rubbed.
18. Washed.
19. Exposed on grass from 2 to 4 days.
20. Scalded with soap.
21. Washed.
22. Rubbed.
23. Washed.
24. Exposed on grass.
25. Steeped in sulphuric acid.
26. Washed.
27. Bleaching liquor.
28. Washed.
29. Scalded.
30. Washed.
31. Exposed on grass.
32. Steeped in sulphuric acid.
33. Washed.
34. Bleaching liquor.
35. Washed.
36. Dried.

Although the before-named plan for bleaching linen, which occupies some six weeks, has been somewhat improved of late, and the process for cotton goods, both in this country and Europe, is not so tedious, and can be carried through in a few days, yet it is much more troublesome and expensive than the new method used by the author, which may be thus described, —

In bleaching, the object to be attained is: first, the solu-

tion and removal of all gummy or oily substances that naturally adhere to the fibre; and, second, the production of such a change in the organic matter of the fibre as will reflect white when exposed to the atmosphere and rays of light. Is white, then, a color? The author thinks it is, just as much as blue or black, although produced by entirely different causes. White is produced in fibres by an organic change of their substance, brought about by external influences so applied that they change the *form of crystallization in the particles* of matter composing the fibrous material acted upon, so that the particles or crystals are of different shape from what they were before, and therefore reflect the rays of light differently, viz., so as to appear perfectly white to the eye.

COLORING.

In coloring, the object first to be attained is the same as in bleaching, viz.: a removal of all foreign matters from the fibres and fibrils which would prevent the free circulation and penetration of the coloring fluids; and, second, such application of coloring fluids as shall cause them to adhere firmly to the fibre both within and without the fibrous tubes, so that, when removed from the solution, and washed and dried, and exposed to the air and light, the crystallized particles thus adhering shall reflect light so as to give the desired colors. And that, unlike *white*, which is produced by the change of the form of the crystals in the fibre itself, color is produced by the addition of the coloring matter to the fibre, which coloring matter, by the peculiar forms of its own crystallized particles combined, in the aggregate, reflects the rays of light so as to produce the

desired visible result. Color, then, is caused by a mere form of crystallization reflecting light according to the shape and combinations of these crystals adhering to matter, or floating in water or other fluids. For instance, a combined aggregate of crystals of an octagon shape would reflect one color, while a hectagon would yield another; and so on to the end of the ability of our vision to detect differences in the innumerable angles of matter and the rays of light acting upon them. The author has no doubt of the existence of many more forms of color than have yet been recognized, simply because we have been looking in the wrong direction for a solution of what color really is. If this be so, we may expect such changes, by the discovery of new material for coloring, which, when combined with those now existing, will change the whole present established character of colors. The influences which produce white will probably be found to be very different from those bringing out any other color; and, so far as the author has examined, will prove very simple and organic, verging nearer to the first principle than any others. Other colors seem to be combined under more gaseous forms, like that of the ordinary atmosphere under its various changes, which will produce every variety of influence. In vegetable life, a plant springing from the ground, and being suffered to grow in the dark, will be nearly white; while, being opened to the influences of light and air, will soon assume an entirely different shade of color. In light there must be a form of chemical action or combustion which does not exist in the dark, which will affect color, changing it from hour to hour and day to day, through all the stages with which we are familiar from the use of colored clothing. It follows then, that, in order to under-

stand the principles which combine color, and the changes of the same under the influences of light, heat, and the ordinary atmosphere, we must study these principles. Time may solve the problem; but at present we can only glance at the subject with a timid mind of uncertainty, which future light and strength will dispel.

The best means of bleaching and coloring which the author has found may be thus explained, —

A revolving boiler, capable of sustaining a pressure of from two to six atmospheres, is provided, hung upon pivots at the ends, in which a proper man-hole is opened for the admission of fibres, yarns, or cloths. When the man-hole is closed, and it is properly secured air-tight, it is made to revolve horizontally; and a shaft runs through the centre of the same, to which arms are attached, revolving in a different direction from the boiler, which carry the fibrous substances round with them, plunging the same alternately under and above the fluids, which may be let into the boiler. The fluids may be admitted through pipes connecting with the boiler in such quantities as are desired to effect the object, but not so as to fill the boiler more than half-full of liquid; and a column of steam or compressed air may be let in, in sufficient quantity to create a pressure of from thirty to ninety pounds per square inch in the boiler; and the boiler is then made to revolve, passing the fibres above and beneath the liquid, and subject to the pressure. The effect of this will be to dissolve all foreign matter, and remove it from the fibre, so that it can be drawn off. The colors are then let into the boiler, and are treated the same way, under pressure, till the fibre is freely saturated; after which it can be taken out, washed, and dried, and is fit for use. The pressure will cause the

crystals in the color to adhere with great tenacity to the outer surface of the fibre, as well as to penetrate all the tubes in such fibrils as have them. In coloring wool, flax, hemp, China grass, and other like substances which are tubular, but little difficulty exists in fixing the colors: but in cotton, which has lost its tubular shape, it is much harder, as only an external surface is presented to hold the color, which is not only affected more easily by the wear of the outer surface, from its special nature, but from the influences of light and air immediately in contact with the color; while, in tubular fibrils, a protection is provided by the walls of the tube itself, which keep out both air and direct light. The tube being transparent, the crystals reflect a different color from within, than what would show from the external surface alone coming in direct contact with light and air.

That the currents of light, heat, magnetism, and electricity through the air, earth, or water around us, are constantly at the work of consolidation, and that the same parent principle which has created and now holds the sphere of worlds in her hand with such harmony and beauty, is the same which governs the growth and perfection of the flax-stalk in all its perfection, whether looking at its anatomical form, the color of its flowers, or the infinitesimal principles of organic life which exists in one simple grain of the glumien which cements its fibres together. The influences of color come very near our highest organs of sensation, and spread through all the ramifications of our existence. Our affections, our enthusiasm, and our noblest principles are brought out and find expression under the influences of these changes in our vision. The fields of beauty are full at every turn;

and they open to our inspiration new lines of enjoyment at every step, under the attractions in nature and art which light and shade present. Is it remarkable that we should want to know what color is, or desire any new powers of investigation that would develop a better knowledge of its principles?

The cause of this crystallization, whether in the atmosphere, vapor, or solid substances, and which results in that state or condition of matter which reflects color, the author thinks is the active interposition of an element not generally known or recognized in the scientific world; viz., a primary element or fluid emanating from the sun, which the author, for convenience' sake, calls "actien," or *the first principle.*

That this fluid, or with us original principle, flows from the sun, either in all directions through the solar system, or in concentrated rays exclusively upon the planets of its creation in straight lines, carrying neither light nor heat as it travels through space, these elements being only generated within the circle of the atmosphere surrounding the planet when the fluid pervades the same; the contact instantly causing a combustion, producing the changes which we enjoy in their various phases, together with electricity and magnetism in the forms of which we know their use and power, with a thousand other conditions existing in the chemical and geological combinations which surround us on every hand, many forms of which are beyond our present comprehension. That this fluid comprehends the origin of the whole planetary system, beginning from a vaporous or analogous condition similar to what is now supposed to form a cometary system, and following it up by condensation and consolidation until all the forms

of matter are created of which we have any knowledge, and graduating their orbit according to the density of these planets for the time being; the eccentricity of the orbit diminishing as the density of the planet increases.

That the electric and magnetic fluids, which seem to be most subtile of all acknowledged agents at the present time, are not in reality primary elements as they exist, but rather that they are creations from a first power more subtile than they, which is of itself the primary in the creation of our globe, and from which both electricity and magnetism are created through contact with the earth and its atmospheric surroundings.

That from this fluid or primary element proceeds all the physical consequences connected with the origin, subsequent changes, or present condition of an earth and its atmosphere, which would be observed in its annual passage around the sun, or its diurnal revolutions on its own axis.

That the result of the motion of this fluid toward and its precipitation upon the planet, is to propel it in its orbit around the sun, as well as to create a diurnal motion on its own axis, at right angles with the line of the current; keeping always the same point of polarity toward the sun, thereby causing a constant magnetic current in the same direction through the earth, and proving, that, if that current should be introduced at the opposite pole, the motion of the earth upon its own axis would be immediately reversed.

That the form of magnetic attraction which really comprehends the law of attraction and gravitation is established, and for the time being is maintained, by the peculiar forms and results of the working of all the variations and subdivisions of these laws, as they are partially shown to us

through all the ramifications or changes in our system. That the form of combination of this fluid with other substances is instantly checked, and the elements lay in a semi-dormant state, when any physical obstacle of greater density than the atmosphere shall interpose to break its current directly toward any part of the surface of the earth on which we may stand. Thus, when the sun shall have sunk beneath the western horizon, the line of the same interposes an obstacle in the way of a free traverse of the fluid towards a more eastern point of the earth's surface, and darkness in its various forms intervenes.

The density and power of this fluid is measured upon the objects of its concentrated force, in different degrees, according to their distance from the sun; all conforming to the acknowledged laws of attraction and gravitation, so far as the planetary system is concerned, but entirely contradicting the theory of the density of the sun itself, which must be many times greater than the present theoretic estimate.

That the established theory of a uniform measure of attraction of gravitation between the equator and the poles cannot be correct; and that the discrepancy must be supplied by a form of magnetic attraction not yet acknowledged, but must be brought in to meet the demands of centrifugal and centripetal forces existing on the line of the equator.

That the magnetic pole, varying in position from the geographical pole, where it should naturally exist, is caused by the difference in density between a solid and a fluid or open pole, carrying the magnetic pole where it is now really found, near the edge of the great solid pole.

The acknowledgment of these laws would account for the difference in temperature of the atmosphere between

the poles and the equator, and the tropical and polaric influences of each as now understood.

It would also account for the aurora borealis, the rainbow, the refraction of light, the reflection of heat, and the automatic formation of color.

What are light, heat, and cold? Who has not asked questions like this a thousand times, with no satisfactory answer from the books? We know that heat produces an opposite feeling to cold on our senses, and from that may judge that the two elements are constantly at war with each other; that in summer heat, and in winter cold, prevails in a majority; and a great part of the effort of life is to create an equilibrium by artificial means. We suppose these changes in the temperature and seasons are produced by the different positions of parts of the earth to the sun in certain conditions of its orbit. But would these conditions of heat and cold exist if we were really supplied by heat in its present form, — by currents of caloric from the sun itself, — which must, in that case, come in such volumes as to wholly envelop us at all times, and flow with great velocity to every part of the earth, equalizing the temperature as it goes? And would not the diameter of the earth, even, prove but a small impediment in the way of the universal current or its course, when compared in size with the distance from the cause or fountain of that heat? Would not that heat be spent in going through space, so that, on its arrival at the earth, its force would be less than on its start or midway from the sun? If so, how can we account for the fact, that, the farther we ascend from the surface of the earth, the colder we find it? Is it not more probable that the fluid coming from the sun is neither luminous nor hot,

and that these conditions are mere results of the combination of that fluid with other elements which surround the globe at a short distance from its surface? If this theory is correct, the volume of heat surrounding the earth must be much less than though it came in such quantities from the sun; and that would account for the great changes of the seasons, which could only be so great from a much more diminished supply of caloric than must exist around us if the volume comes in the shape we sense it directly from the sun? May we not reasonably suppose that the changes of heat and cold around us are produced by a diminished combustion of the first principle in winter, and an enlarged one in summer, from the fact that the rays of actien from the sun in summer are less interrupted, and flow in greater volumes to our position of the earth, than in winter, from the fact that the sun runs lower towards the horizon in winter, and will not admit so large a volume of that principle flowing *in straight lines upon us?* and that, when we feel cooler, it is because there is too little of combustion, and the fluid comes to us in a more raw state, and, when we feel too warm, it is because the combustion is too great, and flows too fast, — one principle constantly absorbing or changing the other?

Philosophers have told us, in the present as well as past ages, that light and heat come from the sun, which is a luminous body, and that both travel certain distances in a given time; that it would take a certain number of thousand tons of coal, burned upon each square yard of the sun's surface, per hour, for all time, to give us the amount of heat which we require and get daily; that the heat at the nearest point of approach of one of the comets was equal to six times that of molten iron; and yet that the

density of the sun is much less than that of the earth! By this theory, does not the density of the sun have to be re-estimated every time a new comet or planet is discovered, in order to make the law perfect, as the burden of its attractive properties must of course be increased? Such thoughts and questions have arisen in the author's mind, as probably in thousands of others; and the before-expressed theory is his answer so far as it goes. If he is wrong, he will be most happy to learn from those who have gone farther in their investigations, and can give more consistent reasons for the cause of light, heat, or color. Until then, he will be content to think that the air we breathe, the life-sustaining power which flows from shrub to shrub and flower to flower to-day, combine the same electric chain which to-morrow climbs the mountain-glen, and there, 'neath the moon's pale light, congeals the crystal quartz.

RESOURCES OF THE UNITED STATES FOR FIBROUS MATERIAL.

The versatility of the soil and climate in the United States is peculiarly adapted to raising flax and similar fibres in large quantities; and probably within the present century she will produce an amount of fibre, as compared to which the present product of the whole world will seem but small.

These peculiarities do not apply to the exclusive growth of fibrous substances, but to most all others now known as articles of commerce, whether needed either for food or manufactures. Many productions of tropical growth have

already been successfully introduced; and it is to be hoped that many others will gradually be acclimated, until our country may become, as it ought, the "garden of the world."

Certain it is that its peculiarities will tell in some measure upon productions yet to be brought out, in new chemical combinations in accordance with that mysterious law which has proved its soil and climate quite different from that in any other part of the world in the same latitude, and under the same apparent physical influences. Both heat and cold, as well as the humidity of the atmosphere, seem governed by local, electrical, or magnetic influences. The grains are more abundant and diversified than in any other part of the world. Barley will grow from Lapland to the equator. Rye will thrive almost as far north as barley. Oats, as far as 55° north. Wheat, 50° north. Indian corn, 47° north to Rio de la Plata in South America. Rice is confined to the Southern States. Orange, lemon, citron, and pomegranate on the eastern continent, 20° 50′ north; and nearly as far north on the western continent. Sugar, cotton, tobacco, and indigo, between 30° south and 44° north. Apples, pears, and plums, on the eastern continent, between 6° and 40° north; on the western continent, they extend still farther each way. Flax and hemp flourish best between 30° and 65° north.

The tea-plant has already been introduced successfully from China; and hence it may be inferred that spices, cinnamon, pepper, cloves, and nutmeg, ginger, &c., now found for the most part on the islands south of Hindostan, China, and Japan, may yet be acclimated. Fibrous plants for manufactures are very abundant all over the United States;

but few of them comparatively have yet been developed. But it is easy to prove that many fibres now suffered to go to waste in various parts of the country can be readily cultivated to a profit. Many of them will make good paper, which are not of sufficient length for spinning. A perfect diffusion of water in any country and climate like ours will prove its great fertilizer; and in that respect our own land is peculiarly blessed. There is no lack of this element in any part of the country, to supply the absorption of the soil, or the evaporation that shall rise and diffuse itself through the thirsty air to be absorbed by vegetation.

The immense table lands and terraces, beginning near the ocean's level and terminating in the Rocky Mountains, afford steps pointing to every part of the country, down which the melting ice and snow travel from the great reservoir of congelation at the top, to the lowlands at their intersection with the ocean at every point both north and south, east and west.

These channels will never close within the possible anticipations of our race. Terraces thus formed are interesting to contemplate in their magnitude and interest. They are only touched by the footsteps of time. The most important of them is cut by the Niagara and St. Lawrence rivers. From a point near the mouth of the Saguenay, at its intersection with the St. Lawrence, there was once a great natural barrier extending north and south to intervening high lands, which held in one great basin the waters of the upper St. Lawrence and Lake Ontario, some three hundred and fifty feet higher than their present elevation. Another basin of the same kind stretched across the foot of Lake Erie by what is now called the Lewiston Ridge, extending north to about forty degrees of latitude,

and south till it intersected Chataque Ridge, which elevated the waters of Lake Erie, Huron, St. Clair, and Michigan nearly to the present level of Lake Superior, which is some twenty-two feet higher than they now are. When these mighty barriers were cut by the Niagara and St. Lawrence, many hundred thousand square miles of water disappeared, and fertile fields for future agriculture took their place. Western New York, northern Ohio, Michigan, Wisconsin, and parts of northern Indiana and Illinois were drained; leaving some of the best lands in the West now open for cultivation. Many parts of the prairie lands of the West still lie but about from seven to ten feet above the level of Lake Michigan. The same changes, in a more limited sense, extended to other parts of the country, as now shown by the beds of the Chesapeake, Potomac, Delaware, Susquehanna; and of greater magnitude in the course of the Missouri and Mississippi. Farther west, towards the Rocky Mountains, there is a great table land or water shed, which is the source of the Mississippi which opens to the south; also, the Red River of the north, which travels towards the North Pole till it falls into Hudson's Bay; and a smaller called the St. Louis River, which empties into Lake Superior. These three rivers take their rise near each other within the present geographical boundaries of Minnesota; at times the Mississippi and the Red River of the north almost interlock with each near their sources; and the same thing occurs as between the Wisconsin River which connects with the Mississippi and the western lakes. On the northern shore of Lake Superior, an immense bog exists, which is of such a sponge-like consistency that it is said to rise and fall with the level of the lake, and to hold a vast amount of water not estimated in

the waters of Lake Superior. Even if these lakes were drained, a very uneven surface of land would be revealed, perhaps partaking somewhat of the shape of those already above the surface. Lake Superior is 968 feet in its mean depth, or 348 feet below the level of the ocean. Lake Michigan is 869 feet deep, or 279 feet below the level of the ocean. Lake Huron is 811 feet deep, or 241 feet below the level of the ocean. While Lake Erie has only a mean depth of 81 feet, and would thus be about 475 feet above the level of the ocean. It would take a cut through the bottom of Lake Erie of 489 feet in depth to reduce Lake Huron down to the level of the ocean. A more astonishing rise in the bed of the lakes than these exist between Lake Erie and Chataque Lake, which is only 12 miles distant from Lake Erie, and which is some 800 feet higher. The present cutting of the gorge at Niagara, if carried to Lake Erie, would fall some 250 feet below the bed of Lake Erie. Some of the smaller rivers of the South, like the Alabama, Tennessee, Red, Colorado, and Rio Grande, cut through a system of terraces, the same as those described nearer the mountains, but as a general thing through an entire different character of soil, the same being much more alluvial, and but little above the level of the ocean. On the west of the Rocky Mountains, the sources of the Columbia, Frazer, Rio Colorado, and other important rivers, present nearly the same cutting by time's resistless chisel, opening not only a soil of the first class for cultivation, but untold wealth in mineral productions, yielding to the same law of denudation. These channels have and will water the North American continent with a sufficiency for all purposes of agriculture and manufactures to the end of time, and with a product equivalent

to the support of two thousand million inhabitants. Within this vast area there are mountains which cleave the very heavens, and pierce the gathering clouds, which precipitate their misty burdens on their sides, opening countless avenues to the larger gathering streams below, supplying the great arterial pulsation as perfectly as through the human frame. In winter these mountains catch the first congealed snows which fall, and open them again in distillation, earlier in the spring than they melt below.

The distribution of these streams of water through every part of the country, and in the western part of the same, with immense waterfalls, together with the wide diffusion of inexhaustible beds of coal, will furnish any conceivable amount of motive power that future ages can demand. And the broad acres of fertile lands, under the variations of climate within the territory of the United States, when properly tilled, will furnish all materials for manufactures of which the human mind can conceive the use. A reasonable proportion of these will ever be used for the production of fibres; and, in addition to flax and hemp, which have been enumerated among the present available products for making fibrilia, many others, and perhaps hundreds, will yet be added.

The Northern and North-Western States can raise flax or hemp, and other fibres for making fibrilia, in large quantities, without interfering with any staple crop at present raised. If we should take from the tillable lands of each state one quarter, and devote it to the cultivation of flax, and estimate the product as one bale of fabrilia, of 500 lbs to the acre, which would be a small estimate, the aggregate would be 16,003,809 bales, and would be apportioned nearly as follows, —

Maine,	509,899	Maryland,	699,476
New Hampshire,	562,872	Ohio,	2,462,873
Vermont,	650,352	Michigan,	482,277
Massachusetts,	533,359	Indiana,	1,261,635
Rhode Island,	89,121	Illinois,	1,259,886
Connecticut,	442,044	Missouri,	734,606
New York,	3,102,241	Iowa,	206,170
New Jersey,	441,997	Wisconsin,	261,374
Pennsylvania,	2,157,154	Minnesota,	1,258
Delaware,	145,215		

Total number of Bales, of 500 lbs. each, ... 16,003,809

The value of this, cottonized at the mill, would be 10 cents per lb., or $50 per bale, making	$800,190,450
The seed from the crop, at market, would be at $1 per bushel, ...	240,057,135
	$1,040,247,585

Many of the States may find it convenient to change the *pro rata* of their product above or below the apportionment; but the estimate will give a good idea of what may be done if necessary, by way of fibrous productions, in the North.

An able article in the "North American Review," of the current quarter, before alluded to in the quotation from the "New York Times," was written by Hon. E. H. Derby, of Boston, and treats very fully of cotton, its growth and manufacture. Mr. Derby, in his article, has given a table showing the average weight of bales of cotton in all countries where it is produced.

Bales of the United States, ...	443 lbs.
" " East Indies, ...	387 "
" Egypt, ...	313 "
" Brazil, ...	181 "
" West Indies, ...	175 "

The cotton crop of the South, now about four and one-half million bales, may be much increased by going over a larger area; but little improvement will be made in increasing the amount per acre, if we judge from past experience. The average amount of fibrilia per acre will be somewhat more than cotton, and will cost less. The specific gravity of flax being greater than cotton, the same number of pounds of cotton would make the greater number of yards of cloth, were it not for the greater waste in cotton, which gives fibrilia the advantage in that respect. The cotton-plant needs much more care than flax in raising, and during its growth requires the repeated use of the plough and hoe; while flax needs but little attention after it is once sown. The labor of picking the seed-cotton per acre is more than all the labor on flax till it is broken, and the linten is ready for market.

One hand and two horses can gin one thousand pounds of cotton per day; and the modern flax-machine can break about two tons of flax per day, with four horses and two men. The adaptation of machinery for enlarging the cultivation of cotton is rather problematical, and will not materially enlarge the crop on the same amount of land.

From the above it will be seen that the means of supply for fibrous material is adequate to any demand, for the present century at least; and the outlay for this purpose will be quite small for machinery for its use. One of the great objects of producing fibrilia in its present shape is to enable the manufacturer to spin it on cotton and woollen machinery.

The cost of a brake and a scutcher for farm use will be not far from $500; and one set of such machinery will answer for a large neighborhood.

The seed from flax will pay all expenses of cultivation, and yield a small profit beside, to be added to the value of the fibre, and feed from the straw, — which in the aggregate will render it a profitable crop to the farmer.

Well-cultivated lands will yield two tons of straw per acre, and twenty-five bushels of seed.

The seed in New England is worth $1.50 per bushel, or . .	$37.50
The straw in New England is worth, unrotted, $10 per ton, .	20.00
	$57.50
If the unrotted straw is broken on the farm, two tons will yield 1000 lbs. of linten, worth in New England, . . .	$40.00
And 2500 lbs. of unrotted shives, which make the best of food for cattle, worth, ...	20.00
Seed from two tons of straw, twenty-five bushels, ...	37.50
	$97.50

One ton of good flax straw will make 400 lbs. of pure fibrilia.

THE WORKING MEN AND WOMEN OF THE NORTH.

The distinctions in society between the institutions of the North and the South, as well as the domestic and social conditions of the people in all parts of the country, have been often commented upon by the press, and discussed in private circles, but have left one portion of the people much in the shade, and but little understood by those engaged in other spheres of action. It is often said that the southern planter looks upon the free white tiller of his own so an inferior being, and so the female of the South the matron who attends daily to her own domestic

If this is so, it is not for the want of the power of appreciation, or lack of sympathy, on the part of the southern gentleman and lady, but simply from the fact that they are not acquainted with those of the North, and their real condition, and motives of labor. They neither understand their principles, talents, or the measure of their intelligence, education, or moral principle.

To a great extent, the people of the North misunderstand the people of the South in the same way; and, by these two errors in social and political life, the people of different sections of the Union are constantly in conflict with each other. A more grievous error even than this wrong is chargeable directly to the people of the North, in not sympathising with or understanding and appreciating the true condition of each other. The working men or women of the North are nowhere less understood than by their own people, and this as to their consequence, principles, talents, or education.

Begining upon the pinnacle of that fictitious and fashionable life which pervades and controls large cities, and running back through every grade of life and labor which belongs to ordinary existence, there is *first* a want of knowledge, and *second* a want of appreciation and sympathy with and for the masses, behind or below the required castes and conditions of society, which disgraces the heart and intelligence of those who are able and do pass life in luxurious dissipation.

Great injustice is often done to the masses under this evil, and most unwarrantable oppressions follow as a consequence. The farmer and mechanic are looked upon by many with a spirit of indifference or contempt which is intolerable. The factory operative, whether male or

female, is classed under the same head, although possessing moral worth, talent, intelligence, and intrinsic merit, equal to any class for sustaining the national power and profit. The commercial, financial, scientific, and literary support of all large cities in the Northern States comes from this very class; and experience has proved, that, but for the constant recuperation from this portion of the population of the country, the cities would fall to decay. A majority of the distinguished of all classes, — the statesman, the professional man, and the merchant, — have all come from the country, and have graduated from the farm and the workshop; and yet these great reservoirs of physical, mental, and moral leaven are neither understood nor appreciated. The farmer who, by his own hand, gets his living from the soil, sends his children to school, and teaches them to labor, and to learn practically the great natural lessons of life, becomes then the primary support of the nation, — its intelligence and its glory. The mechanic who toils at the forge or the bench for his daily bread, and rears children at his side that are familiar early with the use of tools, and the toils of manual labor, with perhaps but three months' schooling per year, often does more for his country and society than the wealth of the millionaire. The girl or boy thus brought up, familiar with nature and all her stern realities, and who subsequently may become an operative in a factory or workshop, is as likely, and more, to become the parent of children that shall be a blessing to humanity, as those who from childhood have been raised in luxury This class, too, have been, and still are, the pillars of human progress. They furnish the strong physical constitutions that replenish the nation's decay. They furnish the bone and sinew that bring

forth the fruits of the land upon which we exist, — the mechanical skill for the production of the necessaries and luxuries of life, and the consequent moral and physical strength which recuperates society, and cements it together. In addition to this, they possess all the real capital which upholds the present financial system. Each one of these, by their labors, support many others engaged in mere artificial and metaphysical life, who have become so far deluded by the customs of business, society, and the influences of the almighty dollar, that they do not even know the power that built them up, or comprehend the reasons for the sudden overthrow sure to follow an artificial and fictitious state of things in the financial world. If the money belonging to the working classes of New England was drawn from the Savings Bank, and converted into specie, the amount in all the banks would not pay fifty cents on the dollar, and they would be left bankrupt in twenty-four hours. And still the artificial world lives on the paper currency, created by this very specie, owned by the hard workers, whom, in return, they would crush down to the smallest pittance for their daily labor. New England, in this, is greatly at fault; and the day of retribution is at hand. "The laborer is worthy of his hire," and coming time will show that the real standard has been too long kept out of sight. More of the sons of New England must go to the farm and the workshop, and less to the professional and non-producing avocations of life; thus regaining the glorious influence which she has had in past days, when it was her pride to dignify labor and eschew fanaticism. The middling-interest man is becoming more familiar with his own measure and value, and Nature for him is asserting his rights, in creating that equilibrium

which restores each to their proper place in the affairs of life. The present fictitious state of business cannot much longer exist, and things must come down where they belong. Honest labor must have its reward, and monopolies must sink. The mechanical interests of the country will be simplified, and the producer and consumer will come nearer together.

A class in the community, floating between actual labor and a settled means of support, are at times made to suffer by neglect and want more than those who absolutely live "by the hand to the plough." Among this class there is the greatest misery existing. They need the care and sympathy of all classes combined, and should be provided for by contributions from all.

Leaders in the "Boston Herald" and "Commercial Bulletin," of recent date, are worthy of attention, and read as follows, viz.: —

The Claims of the Masses. — We have been so long in the habit of considering ourselves as the most favored community on the face of the earth, that we are too apt to forget that even in our own land, and at the very threshold of our doors, there is much misery and want that could and ought to be relieved. To say nothing of the selfish and vindictive passions which are systematically cultivated by a large portion of our community, until they destroy every vestige of manliness in the character, there are multitudes all around us, who are constantly suffering privations, which a little effort on the part of their more favored brethren would easily remove. The tendency of the present times is to concentrate capital in the hands of the wealthy, and to make the condition of the poor man more wretched with each revolving day. The vast improvements in machinery which are so rapidly displacing manual labor would, within the next half century, enable the mass of the community to subsist with but a very few hours labor per day; but, unfortunately, the politics and economical laws of the present day crowd the laboring classes to the lowest stipend on which they can possibly exist. Should this policy continue, the prospect

ahead is not very favorable for the laboring classes. So long as it is believed that nothing but the almighty dollar deserves the attention of human beings, so long will capital trample down labor, and defeat the wise ends under which Providence is guiding our people in their scientific attainments. This paramount importance which all of us assign to wealth is the cause of the difficulties which the poorer classes are obliged to contend with. While on the one hand it stimulates industry and enterprise, on the other it loses sight of the fact that relaxation is as necessary to the system as work. We have, to be sure, benevolent societies and philanthropic individuals who are ever ready to relieve those great evils which stare us in the face; but poverty, sickness, and other suffering, which is unobtrusive, and therefore more deserving of relief, we pass by, and too generally allow ourselves to remain ignorant of its existence. We boast of our institutions for the relief of the insane and sick, and this is well; but do we take the pains to find out who would be the most benefited by these institutions? We congratulate ourselves upon our free schools; but the hundreds of boys and girls who for want of proper clothing cannot attend school furnish but a poor commentary upon our self gratulation. We talk of our industry and enterprise, and profess to furnish employment, at remunerating prices, to those who are destitute of work; but these professions lose their force when we reflect that multitudes of of seamstresses and laborers toil from week to week, for a series of years, without being able to procure a decent subsistence. All these things are wrong. The poor need the personal, kind attention of their more fortunate brethren; and, were these so disposed, their condition would be very materially improved at little or no expense. If the truly benevolent, those who neither ask nor expect any reward for their efforts, would interest themselves personally to relieve the wants of the poor and the oppressed, much of the poverty and more of the crime that exists among us would quickly disappear. It needs but right hearts, directed by sound heads. The subjects for this benevolence are all around us, and the lover of his kind can find them in every street. Who does not know some one or more, who, by misdirected powers, has been a sufferer for years? Let such take their neighbor by the hand, and by wise and kind counsel induce him to improve his condition. Such an effort, in the proper spirit, cannot be unsuccessful; and the benefactor will find that his reward will more than equal that of his beneficiary. We would not make this the motive for the effort; but the law of nature will make the reward certain, and the more so the less the benefactor expects it.

Laboring Classes of New England. — Without speaking disparagingly of any other country, or making an invidious distinction between this and any other section of our own country, we propose to consider the present condition of the laboring classes of New England, and the relation which they bear to the social, industrial, commercial, and intellectual well being of the whole country. We take New England, not because all the merit in this direction belongs to her (though to the Pilgrims belong the credit of first giving reality to the dignity of labor), but because the facts and statistics necessary to our argument are more full and reliable than either in the Middle or Western States,

At a time when similar troubles were brooding, from similar causes. Mr. Webster, in the United States Senate, said : —

"Why, who are the laboring people of the North? They are the whole North. They are the people who till their own farms with their own hands ; freeholders, educated men, independent men." . . .

"Five-sixths of the whole property of the North is in the hands of the laborers of the North: they cultivate their farms, they educate their children, they provide the means of independence. If they are not freeholders, they earn wages: these wages accumulate, are turned into capital, into new freeholds; and small capitalists are created. Such is the case and such the course of things among the industrious and frugal."

Such was the indignant response of the great statesman to an insidious comparison between the laboring classes of the North, and those who are recognized as the laboring classes elsewhere.

It was one of his majestic outbursts, intended to cover the whole ground, and to annihilate at once his opponents' assumption, while it forbade all attempt to cross question upon details. We believe, however, these details would be interesting, — are especially interesting at this time, when mistaken notions with regard to the resources of the laboring classes at the North may be productive of great evil, and while a correct estimate might be equally productive of great good.

The term "laboring classes," however, as Mr. Webster uses the term, is too comprehensive for our present purposes. We shall therefore confine ourselves to that class which comes within the exact definition, — as those who let themselves on hire, — as we presume it is this class who beset the imagination of our friends at the South when they say the laboring classes are raising the cry of "bread or blood!"

What is the present condition of this class and what are their immediate resources?

We see by the recent report made to this State that there are —— saving banks, and the aggregate deposits in these are over thirty-nine millions of dollars, — a sum that, if equally divided, would give over thirty-three dollars to every man, woman, and child in the State; and yet this sum, great as it is, does not represent all the available resources of this class in our community. In nearly every town in the State, the journeyman mechanic, the day laborer, the factory operative, and the servant-girl, has money lent out on interest which escapes the eye of the assessor, the aggregate of which cannot be estimated; and from these resources they seldom draw to meet temporary wants. In the upheaving of things in 1857 and 1858, the fact was brought to light that a very considerable portion of the stock in our large manufactories was owned in single shares by the operatives employed to work in them.

In the early history of our railroad enterprise, when investments in this direction were looked upon as the safest, the farmer's son worked over time till he got a hundred dollars, and bought a share of railroad stock; the young girl who braided straw and knit socks in winter, and taught school in summer, did the same; and so on through the whole list. And, through all the financial revulsions and stock depreciations, a very large proportion of these have never changed hands.

So too, in the towns on either Cape, the laboring classes are individual ship-owners: every dollar is saved up till a hundred is accumulated, and then a company is formed, often of sixty-four, who build or purchase a vessel. Their individuality is lost sight of to the world; it is merged in those who hold the nominal control, — who represent them as the president and directors represent individual interests in our banks, factories, and railroad. These are the representatives of the laboring classes of the New England States, and these are their resources.

It is idle to talk about the extremity of the laboring classes at the North; that extremity can never happen except in universal ruin. If such extremity as is talked of could possibly occur anywhere here, it would be in our large cities, where the foreign population represents the majority of the laboring classes; but even here, if the deposits in our savings institutions are correct indices, it will be seen they are amply provided against such a contingency.

Whatever may be the condition of the Irishman at home, when he gets here his avarice is sharpened by opportunities to earn money, and he lays it up. The sober, industrious Irishman in Boston becomes

a man of wealth: he has his rent-roll, he builds houses and owns ships, — and yet passes for a day-laborer, and is a day-laborer. The position is not looked upon as degrading; he is not pointed out with that mean distinction which separates him socially from wealth and influence acquired otherwise. He exercises all the functions of a citizen, and his ambition springs from this. He knows that caste is not recognized here to that degree which is able to shut him out from the highest distinctions, so be it that he is willing to work for them. He is eligible to a seat in the councils of the nation, the state, and the town; and there he is found to-day, exercising his influence, and proving the wide-spread blessings which arise from an equal division of property brought about by the proper appreciation of labor. When the laboring classes at the North, especially in New England, and more particularly in Massachusetts, raise the cry of "bread or blood," and attack the distinctive rich classes; when they threaten destruction to our factories; when they seize upon our banking-houses, and break open the vaults, for whatever reason, — they will simply destroy property which their own industry has accumulated, and nearly seven-eighths of which is actually owned by them.

When we speak of the recuperative energies of Massachusetts, of New England, of the North, we mean the energies of the laboring classes, — the fishermen, the farmers, the mechanics, the operatives in our factories, and the day-laborers; the very classes represented by that class to whom Burke referred when he told the British Ministry, "Such thrift can take care of itself; it needs no protection, it is dependent upon no circumstances, it contains within itself the germ of success, it spreads and does not contract, and is not to be conquered by human power."

Contrast the condition of the laboring classes in England and on the continent, and everywhere where the dignity of labor is not recognized, with the laboring classes here, and see what the general measure of intelligence is in the former, as compared with the latter.

Wealth can never accumulate to the prejudice of the masses where labor rises to the dignity of a calling. Such is eminently the position of things among the masses here in New England. Those institutions which are the peculiar boast of New England have sprung from, and are maintained by, the laboring classes. Where is there such a system of free schools as that of Massachusetts? Look, too, at the eleemosynary institutions and corporations scattered all through the state. Contemplate for a moment the great sums collected in our churches for the spread of the gospel, not only in our land but through

the world. These are not controlled by government, nor fixed by law; nor are we indebted for them to any privileged class, but they come as the free gift of the laboring masses, who regard them as means of mutual good and mutual improvement. The very genius of republican institutions had its origin in this peculiar condition of New England society. While in Europe property has for centuries been continually centralizing, it has been a marked feature in New England that it has been constantly tending to distribution. Mr. Everett, in a speech delivered many years since, stated that in no instance had property descended directly to the third generation. To borrow a very graphic illustration, the pot here boils up and boils over, while in the old world it is continually boiling in.

This plan of general distribution, this principle of equalizing property, has made the laboring classes of New England what they are to-day, — independent sovereigns. It is this independence of condition that has given to them independence of thought and action.

It is the boast of New England that her laboring classes have been the nurseries of her great men. They have furnished by far the greater proportion of our statesmen, jurists, legislators, public officers, merchants, and inventors. The remotest portions of this confederacy to-day are reaping the advantages of the wisdom and councils of such men. Our commerce, which extends to every nook and corner of the globe, is the result of that vigor and enterprise which could have originated only in that state of society which recognizes the equality of labor.

When, therefore, we talk about the laboring classes at the North as being fruitful in resources, when we talk abont the recuperative energies of the North, we mean something. When we say there is hardly a contingency possible that can bring ruin upon our commerce, our manufactures, and our general industry, we abide by it, and are willing to offer as a pledge of the truth of it the proof we have given.

The laboring classes are not supported; in other words, they *give an impetus* to our industry, our agriculture, and our commerce. The *wealth* of New England, for the time being, represents the *accumulations of the laboring classes.* The first class in the gradation of wealth is only what imperious necessity has forced out from those who were the laboring classes a few removes back. At the first blush, it would seem a bold assertion to say that the initiative to all our wealth had a common origin in the laboring classes; but a careful examination and research will, we think, bear out the assertion to its fullest extent.

The wealth of our foreign commerce has arisen from energy and enterprise, — unlike that of any other great commercial nation, which history shows us grew out of conquest, or was planted and sustained under the overshadowing power of governments. This energy and enterprise, though it is constantly in a common proprietorship, owes its very first movement to the diligence, industry, perseverance, and that love of adventure and inquisitiveness (which naturally follows) of the laboring classes.

The fishermen of Cape Cod had hardly made their calling a distinctive feature of colonial industry before they expanded it into the whaling business; and the still more hardy adventurers of the whaling fleets, discovering the rich resources of the islands of the Pacific, first gave birth to the great commerce we now have in that direction. A simple mechanic going out from New England to work on wages for a foreign potentate, has so made use of his faculties (faculties engendered by his independent position at home) in discovering advantages for trade and commerce, that he has laid the foundation for a commerce with his native country which is yearly increasing in magnitude. The future commerce of New England with Egypt, which now promises to be large, will date its first impulse to the skilful work of the mechanics at Springfield. The Yankee machinist, who went to Cuba to set boilers and erect engines on the plantations, carried with him that same independence which permitted him at home to shake hands with the president, and argue with the magnates of the land; and this enabled him to open up certain plans for the economy of labor, which resulted in making a market for millions of the product of New England industry. An unfortunate mechanic, in doing a piece of work for his master, accidentally split a piece of iron; and, while pondering upon the best plan to mend it (the first idea that presents itself to a genuine Yankee), made a discovery which has resulted in building a hundred factories, with millions of capital, and added another to the industrial projects of New England. A poor laboring man, in one of our large cities, who used to stand in water up to his knees rolling logs, conceived the idea of opening up a new branch of trade, which he carried to a successful issue, the results of which are seen in our deeply loaded vessels going to every quarter of the globe. He died, and left a large fortune, which is now spreading itself in every direction to double and swell the aggregate of our wealth. One of the richest merchants in this city walked from his native town to Boston, and earned his first money by going to a neighboring beach, digging a hand-cart full of clams, and dragging them more than twelve

miles for sale: his name is associated with some of the most liberal, charitable bequests, and his wealth is visible in some of the noblest warehouses in the city. The head of one of the largest ship-owning firms came from Cape Cod, worked as day-laborer on the wharf, became master of a small vessel, and then a merchant. Twenty-two of the presidents of the Boston banks have come up directly from the laboring classes; and, if we were to specify them, their financial management would show the value of their self-education. The men who have given the most vitality to our railroad interests, and who stand in the front rank of their managers, were farmers' sons. And so on through the interminable list.

We have cited these to show the irrepressible activity of the laboring classes, the power they wield in moving the great interests of society; and to show the exhaustless supply from which the trade and industry and commerce of New England can draw. The laboring classes are individually connected with all that is valuable in a community of free people or free institutions like New England; more than this, they are its root and its support.

There can be no permanent embargo placed upon a commerce having such a source, and fed by such streams. Destroy to-day all the existing markets for the consumption of New England industry, and in a year other markets would be found. Her industrial population would pour out from her hill-sides and valleys, and go forth to discover new lands, people them, and thus create markets, as they have gone forth in times past: they would invest Mexico, as they have California; and they would raise corn and wheat and cultivate farms along the rich valleys of South America, as they have all through the West.

The different classes of laborers in the United States, and the contest between capital and labor, together with the political influences of slave-labor upon the masses, as well as the true condition of the working-man, and his means of support, both in the United States and Europe, form subjects of public and private discussion at the present time, the substance of which occupies much of the public press. A correspondent of the "Boston Post," writing on this subject, says, —

It may be objected, that a very large amount of the poverty and the suffering, and crime growing out of it, is not attributable at all to

any real or supposed conflict between capital and labor, but to physical and mental derangement of body and mind, inherited from parents who had "eaten sour grapes;" *or brought on by personal imprudences, by too studious and sedentary habits, by indulgence in an excessive use of nervous and arterial stimulants or the indulgence of inordinate passions, by unavoidable epidemics, and by accidents.*

This is indeed true to some extent. There are diseases and accidents that the irrepressible conflict between capital and labor has nothing to do with; but these diseases and accidents are comparatively few, and their prolonged effects trifling. A good and wise man prayed God to give him *neither poverty nor riches.* Great wealth often tends to dangerous indulgences of the animal passions, to be followed by crime, disease, and premature death; and to the transmission of physical and mental disease to the third and fourth generation. Probably most, if not all, the disease and crime, which is now hereditary, was superinduced by the irregularities of extreme poverty and wealth, originating in the conflicts between capital and labor, and ending in debauching both the blood and the consciences of generations to come. *But, be these suppositions as they may, the most of the present moral and physical evils that afflict the nations may be traced directly to the love and power of money in its conflicts with labor, and its triumphs over it, whether slave labor or free.*

The conclusion is, that, while free labor confers peculiar benefit upon the slave, the slaveowner, having his money invested in labor, and owning it in the services of his negro, his interest and the interest of the free man, who owns his own labor, are identified. The slave has no value, except in the sweat of his brow. *There is really no commercial value in the man of mere muscle, black or white, but in his labor. Hence, as a slave grows old, his value rapidly decreases.* In an ox, besides his labor, there is value in his beef, tallow, and hide. In a horse there is small value left in his hide after he is past labor. Hence, while an old horse is worth little, an old ox, if well fattened, is worth as much as the young, or nearly as much; but an old slave is worth nothing, and less than nothing.

When a good slave is worth $500, a free laborer can get fifty cents per day; when the slave is worth $1,000, free labor is worth seventy-five cents per day; and, when a good slave is worth $1,500 or $2,000, a good free laborer is worth one dollar per day, — the value of free and slave labor always corresponding. The slaveholder, therefore, must always be in favor of laws to protect labor and products of labor from the encroachments of the moneyed power. In fact, the free man own-

ing his own services, and the slaveowner owning the services of another man, must, from the very nature of things, be allies, and work and vote together for the enactment of laws to protect labor against the power of money contested by the lust of avarice.

We often hear the opinions of Jefferson, and other great statesmen of history, garbled and quoted to sustain the dogma of the "irrepressible conflict." Were Jefferson, Madison, and Hamilton now living, and in full possession of their intellectual faculties, no men's opinions would be entitled to more respect. But they prove nothing of the power of steamboats and railroads, spinning-jennies and power-looms, telegraph and cotton gins, in giving value to the cotton plant, and consequently slave labor, as now seen in the agricultural and commercial relations to all the industrial pursuits of civilization.

Less than a half million of savages imported into North America, under the control of the North men, have increased to near five millions, of which four millions are held under service. Thousands of those are civilized, and all are semi-civilized. All schemes of emancipating the slaves are Utopian. No practicable plan has been devised, or can be, to emancipate and colonize them. It is impossible for the two races to live together on terms of political or social equality.

Doubling the population every twenty-five years, would give in one hundred years more than four hundred millions of white men and sixty millions of black men in the present boundaries of the United States; and the child is born who will live to see this amazing result. What, then, will be the condition of the races, and what relation they will hold towards each other, is known only to Him of infinite wisdom. Nor need we trouble ourselves about it. "Sufficient for the day is the evil thereof;" and to God and posterity we may well leave the future of this and every other vexed and kindred question.

The merits and demerits of the question of slavery, as it *now* exists, *is not to be divided by the abstract opinions of Abraham, Moses, Socrates, Washington, or Jefferson; but by the ruling minds of the ruling race, now in possession of the Government of the United States.* They must settle and will settle this question, *for the time being;* and settle it too with reference to the well-being — the highest good of both master and slave — of both slave and free labor, and of the civilized world. *And the generations to come, from generation to generation, must settle it for themselves, as our fathers did for themselves, and as we will for ourselves.*

Who can tell how old Time will set the men on the chess-board one hundred years hence? Not knowing how they will be placed,

what passing human vision can say how they ought to be, much less how they will be, played, by the living human wisdom of the then passing generation? *And if we cannot tell what future living generations should do, and will do, shall we permit the dust of by-gone ages to be thrown into our eyes, and blind and mislead our reason? Our fathers ignored precedents.* Shall we be governed by them, and allow them to legislate for us? God and common sense, humanity and reason, and progress and civilization, forbid!

The condition of the laborer in America in many respects is as bad as that of Great Britain; and the following from "Punch" is illustrative of the *real condition* of the peasant there, as well as *some* of the laboring classes here, as compared with the interest felt in the brute creation:—

THE PEASANT'S PETITION.

The Petition of the British Peasant to the British Landlord, humbly complaining, showeth unto your Honor:—

That your Petitioner, having ventured upon the liberty (for which he hopes to be pardoned) of having peeped into the stables of your Honor (but he solemnly declares, with no evil intentions, and he would not take an oat without leave), has perceived that if thought, sense, and kindness were ever manifested towards animals, it is in your Honor's stables aforesaid.

That the residence in which your Honor humanely places your horses is well built, water-tight, and well ventilated, is excellently floored, and has an excellent supply of water; that its drainage is perfect, and its light cheerful; and that the creature that cannot live contendedly therein must be a beast.

That the arrangements for the health and comfort of your Honor's horses seem to your Petitioner perfect, and designed to make the animals happy when at home, and fit when they come out to perform any amount of work which your Honor may call on them to do.

That (contrary to the arrangements in your Petitioner's dwelling, begging pardon for mentioning such a place) separate places are provided for your Honor's horses, so that they sleep apart, and are in no way detrimental to one another.

That your Petitioner, knowing the kindness of your Honor's nature,

as shown by this provision, and by hundreds of other acts of your Honor's, not to speak of your Honor's lady, and the young ladies (all of whom he humbly wishes a happy new year, if he may be so bold), *takes the liberty to believe that your Honor cannot know that your Petitioner's cottage, on your Honor's estate, is badly built, is not drained, has no ventilation, has a rotten floor, and is so cold that in the winter the only way your Petitioner and his family can keep bodies and souls together is by huddling together, adults, children, grown-up lads, and girls, all together in one wretched bedroom, out of which they come half poisoned by the foul air, not to offend your Honor's delicacy by saying any thing more than that they are good for far less work than could otherwise be got out of them.*

Your Petitioner therefore, for himself, his wife, four grown-up children, and five little ones,

Humbly prayeth unto your Honor,

THAT YOU WILL BE GRACIOUSLY PLEASED TO TREAT HIM LIKE A HORSE.

And your Petitioner will ever pray and work, &c.

COMMISSION MERCHANTS AND JOBBERS.

The manufacturer of textile fabrics in New England, as a general thing, is controlled by the vacillations in the progress or thrift of the commission merchant and jobber. They furnish the raw material, and takē the goods manufactured for sale. Great competion has arisen during the last twenty-five years between persons in different parts of the country, who are engaged in this business; and the manufacturer has been almost entirely dependent upon them for support. They controlled the markets, both for buying and selling; and their great numbers consumed a large portion of all the real profits made on the goods, besides keeping a constant fluctuation in prices by their over-strained efforts to maintain their position. If one-half of that class would enter manufacturing directly, the

balance would be able to afford a better living to the manufacturing operatives of New England; while the trade would become more healthy and natural. The following, from the "Atlantic Monthly," for January, 1861, published by Messrs. Ticknor & Fields (which is doing so much for the progress of humanity), used by permission, will give a better idea of the jobber of dry-goods than the author in his own language would be able to do. The difference in education and labor between the clerk in the store and the apprentice in the shop, will be readily conceived; and the results upon the world will be as striking as their different experiences. The enormous expenses incurred by the jobber, in selling goods under a system which has prevailed for the last fifteen years, renders it necessary that he should cut down the operative, who makes the fabric, to the smallest possible means of existence in his vocation; thus swallowing up more of the profits in this high-wrought and overstrained system of drumming and cramming customers (who, if let alone, would always buy all that they could afford to pay for) than the producers get from the raising of the fibre, or manufacturing the same into goods ready for sale. The farmer and manufacturer, then, have to support by their own labor a class more numerous, or at least who spend more money, than themselves. This fact is now well known, and of itself would overturn the present manufacturing system of New England in ten years, if other causes now inevitably pressing did not intervene.

A Dry-Goods Jobber in 1861.

What is a dry-goods jobber? No wonder you ask. You have been hunting, perhaps, for our peripatetic post-office, and have stumbled

upon Milk Street and Devonshire Street and Franklin Street. You are almost ready to believe in the lamp of Aladdin, that could build palaces in a night. Looking up to the stately and costly structures which have usurped the place of once familiar dwellings, and learning that they are, for the most part, tenanted by dry-goods jobbers, you feel that for such huge results there must needs be an adequate cause; and so you ask, What is a dry-goods jobber? . . . .

A dry-goods jobber is a wholesale buyer and seller, for cash or for approved credit, of all manner of goods, wares, and materials, large and small, coarse and fine, foreign and domestic, which pertain to the clothing, convenience, and garnishing, by night and by day, of men, women, and children: from a button to a blanket; from a calico to a carpet; from stockings to a head-dress; from an inside handkerchief to a waterproof; from a piece of tape to a thousand bales of shirtings; not forgetting linen, silk, or woollen fabrics, for drapery or upholstery, for bed or table, including hundreds of items which time would fail me to recite. All these the dry-goods jobber provides for his customer, the retailer, who in his turn will dispense them to the consumer.

A really competent and successful dry-goods jobber, in the year of grace one thousand eight hundred and sixty-one, is a new creation. He is begotten of the times. Of him, as truly as of the poet, and with yet more emphasis, it must be said, He is born, not made. He is a poet, a philosopher, an artist, an engineer, a military commander, an advocate, an attorney, a financier, a steam-engine, a telegraph-operator, a servant-of-all-work, a Job, a Hercules, and a Bonaparte, rolled into one.

"Exaggeration!" do you say? Not at all. You asked for information? You shall have it to your heart's content.

To a youth, for a time interrupted in his preparation for college, I said, —

"Never mind; this falls in exactly with my well-considered plan. You shall go into a dry-goods store till your eyes recover strength; it will be the best year's schooling of your life."

"How so?" was the dubious answer; "what can I learn there?"

"Learn? Every thing, — common sense included, which is generally excluded from the university curriculum: for example, time, place, quantity, and the worth of each. You shall learn length, breadth and thickness; hard and soft; pieces and yards; dozens and the fractions thereof; order and confusion, cleanliness and dirt, — to love the one and hate the other; materials, colors, and shades of color; patience, manners, decency in general; system and method, and the

relation these sustain to independence; in short, that there is a vast deal more out of books than in books; and, finally, that the man who knows only what is in books is generally a lump of conceit, and of about as much weight in the scales of actual life as the ashes of the Alexandrian library, or the worms in any parchments that may have survived that conflagration."

"Whew!" was his ejaculation; "I didn't know there was so much."

"I dare say not. Most of your limited days have passed under the training of men who are in the like predicament, — whose notion of the chief end of man is to convert lively boys into thick dictionaries, and who honestly believe that the chief want of the age is your walking dictionary. Any other type of humanity, they tell us, 'won't pay.' Much they know of what will and what won't pay! This comes of partial education, — of one-sided, of warped and biased education. It puts one out of patience, — this arrogance of the University, this presuming upon the ignorance of the million, this assertion of an indispensable necessity to make the boy of the nineteenth century a mere expert in some subdivision of one of the sciences. The obstinacy of a hereditary absolutism, which the world has outgrown, still lingers in our schools of learning. Let us admit the divine right of Science, admit the fitness of a limited number of our youth to become high-priests in her temple; but no divine right of fossil interpreters of Science to compel the entire generation to disembowel their sons, and make of these living temples mere receptacles of Roman, Grecian, or Egyptian relics. We don't believe that 'mummy is medicinal,' the Arabian doctor Haly to the contrary notwithstanding. If it ever was, its day has gone by. Therefore let all sensible people pray for a Cromwell, — not to pull down University Science, but to set up the Commonwealth of Common Sense, to subordinate the former to the latter, and to proclaim an education for our own age and for its exigencies. Your dry-goods jobber stands in violent contrast to your university man in the matter of practical adaptation. His knowledge is no affair of dried specimens, but every particle of it a living knowledge, ready, at a moment's warning, for all or any of the demands of life."

You are perhaps thinking, — "Yes, that is supposable, because the lessons learned by the jobber are limited to the common affairs of daily life, are not prospective; because, belonging only to the passing day, they are easily surveyed on all sides, and their full use realized at once; in short a mere matter of buying and selling goods, — a very

inferior thing as compared with the dignified and scholarly labors of the student."

How mistaken this estimate is will appear, as we advance to something like a comprehensive survey of the dry-goods jobber's sphere.

First, then, he is a buyer of all manner of goods, wares, and materials proper to his department in commerce. . . . His forecast is taxed to the utmost, as to what may be the condition of his own market, six, twelve, or eighteen months from the time of ordering goods, both as to the quantity which may be in market, and as to the fashion, which is always changing, — and also as to the condition of his customers to pay for goods, which will often depend upon the fertility of the season. As respects home-purchases, he is compelled to learn, or to suffer for the want of knowing, that the difference between being a skilful, pleasant buyer and the opposite, is a profit or loss of from five to seven and a half or ten per cent, — or, in other words, the difference oftentimes between success and ruin, between comfort and discomfort, between being a welcome and a hated visitor. . .

Is your curiosity piqued to know wherein buyers thus contrasted may differ? They differ endlessly, like the faces you meet on the street. Thus, one man is born to an open, frank, friendly, and courteous manner; another is cold, reserved, and suspicious. One is prompt, hilarious, and provocative of every good feeling, whenever you chance to meet; the other is slow, morose, and fit to waken every dormant antipathy in your soul. An able buyer is, or becomes, observing to the last degree. He knows the slightest differences in quality and in style, and possesses an almost unerring taste, — knows the condition of the markets, — knows every holder of the article he wants, and the lowest price of each. . . . He knows the estimate put upon his own note by that seller. He knows what his note will sell for in the street. He knows to a feather's weight the influence of each of these items upon the mind of the seller of whom he wishes to make a purchase. . . . He can unravel any combination, penetrate any disguise, surmount any obstacle. Beyond all other men, he knows when to talk, and when to refrain from talking; how to throw the burden of negotiation on the seller; how to get the goods he wants at his own price, — not at *his* asking, but on *the suggestion of the seller*. . . . . .

The incompetent man, on the other hand, is presuming, exacting, and unfeeling. He not only desires, but asserts the desire in the very teeth of the seller, to have something which that seller has predetermined that he shall not have. He fights a losing game from the start.

He will probably begin by depreciating the goods which he knows, or should know, that the seller has reason to hold in high esteem. He will be likely enough to compare them to some other goods which he knows to be inferior. . . . . .

"But," you are asking, "do only those succeed who are born to these extraordinary endowments? And those who do succeed, are they, in fact, each and all of them, such wonderfully capable men as you have described?"

If by success you mean mere money-making, it is not to be denied that some men do hat by an instinct, little, if at all, superior to that of the dog who smells out a bone. . . . It must be owned that a portion of the successful ones are *lucky*, — that a portion of them use the blunt weapon of an indomitable will, as an efficient substitute for the finer edge of that nice tact and good manners which they lack. . . . . .

But there are other things to be said of buying. The dry-goods jobber frequents the auction-room. If you have never seen a large sale of dry-goods at auction, you have missed one of the remarkable incidents of our day. You are not yet aware of how much an auctioneer and two or three hundred jobbers can do and endure in the short space of three hours. . . . If you would see the evidence of comprehensive and minute knowledge, of good taste, quick wit, sound judgment, and electrical decision, attend an auction-sale in New York some morning. There will be no lack of fun to season the solemnity of business, nor of the mixture of courtesy and selfishness usual in every gathering, whether for philanthropic, scientific, or commercial purposes. Many dry-goods jobbers will attend the sale with no intention of buying, but simply to note the prices obtained; and, having traced the goods to their owners, to get the same in better order and on better terms; the commission paid to the auctioneer being divided, or wholly conceded by the seller to the buyer, according to his estimate of the note.

A dry goods buyer will sometimes spend a month in New York, the first third or half of which he will devote to ascertaining what goods are in the market, and what are to arrive; also to learning the mood of the English, French, and Germans who hold the largest stocks. Sometimes these gentlemen will make an early trial of their goods at auction. Unsatisfactory results will rouse their phlegm or fire; and they declare they will not send another piece of goods to auction, come what may. For local or temporary reasons, buyers sometimes persist in holding back till the season is so far advanced that the for-

eign gentlemen become alarmed. Their credits in London, Paris, and Amsterdam are running out, — they are anxious to make remittances; and then ensues one of those dry-goods panics so characteristic of New York and its mixed multitude. An avalanche of goods descends upon the auction-rooms, and prices drop ten, twenty, forty per cent it may be; and the unlucky or short-sighted men who made early purchases are in desperate haste to run off their stocks before the market is irreparably broken down. Whether, therefore, to buy early or late, in large or in small quantities, at home or abroad, — are questions beset with difficulty. He who imports largely may land his goods in a bare market and reap a golden harvest, or in a market, so glutted with goods that the large sums he counts out to pay the duties may be but a fraction of the loss he knows to be inevitable.

. . . And when you remember that the purchases of dry-goods must be made in very large quantities, from a month to six or even twelve months before the buyer can sell them, and that his sales are many times larger than his capital, and most of them on long credit, you have before you a combination of exigencies hardly to be paralleled elsewhere.

The crisis of 1857 brought a general collapse. Scores and scores of jobbers failed; very few dared to buy goods. Mills were compelled to run on short time, or to cease altogether. The country became bare of the common necessaries of life. . . . .

When a financial crisis overtakes the community, we hear much and sharp censure of all *speculation*. Speculators, one and all, are forthwith consigned to an abyss of obloquy. The virtuous public outside of trade washes its hands of all participation in the iniquity. This same virtuous public knows very little of what it is talking about. What is speculation? Shall we say, in brief and in general, that it consists in running risks, in taking extra-hazardous risks, on the chance of making unusually large profits? Is it that men have abandoned the careful ways of the fathers, and do not confine themselves to small stores, small stocks, and cash transactions? . . . .

. . . They do not consider, that, an immense amount of goods being of compulsion sold without profit, a yet other huge amount must be so sold as to compensate for this. Nor do they consider that the possibility of doing this is often contingent upon the buyer's carefully calculated probability of a rise in the article he is purchasing. Many a time is the jobber enabled and inclined to purchase largely only by the assurance that from the time of his purchase the price will be advanced.

The *selling* of dry-goods is another department in high art about which the ignorance of outsiders is ineffable. I was once asked, in the way of courtesy and good neighborhood, to call on a clergyman in our vicinity, — which I did. Desirous of doing his part in the matter of good fellowship and smooth conversation, he began thus, —

"Well now, Mr. Smith, you know all about business: I suppose, if I were to go into a store to buy goods, nineteen men out of twenty would cheat me if they could; wouldn't they?"

"No, sir!" I answered, with a swelling of indignation at the injustice, a mingling of pity for the ignorance, and a foreboding of small benefit from the preaching, of a minister of the gospel who knew so little of the world he lived in. "No, sir; nineteen men in twenty would not cheat you if they could; for the best of all reasons, — it would be dead against their own interest."

Not a day passes but the question is asked by our youths who are being initiated in the routine of selling goods, — "Is this honest? Is that honest? Is it honest to mark your goods as costing more than they do cost? Is it honest to ask one man more than you ask another? Ought not the same price to be named to every buyer? Isn't it cheating to get twenty-five per cent profit? Can a man sell goods without lying? Are men compelled to lie and cheat a little in order to earn an honest living?"

What is the reason that these questions will keep coming up, — that they can no more be laid than Banquo's ghost? Here are some of the reasons. First and foremost, multitudes of young men, whose parents followed the plough, the loom, or the anvil, have taken it into their heads that they will neither dig, hammer, nor ply the shuttle. To soil their hands with manual labor they cannot abide. The sphere of commerce looks to their longing eyes a better thing than lying down in green pastures, or than a peaceful life beside still waters, procured by laborious farming, or by any mechanical pursuit. Clean linen and stylish apparel are inseparably associated in their minds with an easy and elegant life; and so they pour into our cities, and the ranks of the merchants are filled, and over filled many times. Once, the merchant had only to procure an inviting stock, and his goods sold themselves. He did not go after customers, — they came to him; and it was a matter of favor to them to supply their wants. Now, all that is changed. There are many more merchants than are needed; buyers are in request; and buyers whose credit is the best, to a very great extent, dictate the prices at which they will buy. The question is now no longer, How large a profit can I get? but, How small a pro-

fit shall I accept? The competition for customers is so fierce that the seller hardly dares ask any profit, for fear his more anxious neighbor will undersell him. In order to attract customers, one thing after another has been made "a leading article," a bait to be offered at cost or even less than cost, — that being oftentimes the condition on which alone the purchaser will make a beginning of buying.

"Jenkins," cried an anxious seller, "you don't buy any thing of me, and I can sell you as cheap as any. Here's a bale of sheetings now, at eight cents, will do you good."

"How many have you got?"

"Oh! plenty."

"Well, how many?"

"Fifteen bales."

"Well, I'll take them."

"Come in, and buy something more."

"No, nothing more to-day."

There was a loss of seventy-five dollars, and he did not dare buy more.

It will be obvious that the selling a part of one's goods at less than cost enhances the necessity of getting a profit on the rest. But how to do this, under the sharp scrutiny of a buyer who knows that his own success, not to say his very existence, depends upon his paying no profit possible to be avoided, — no profit, at all events, not certainly paid by some sharp neighbor who is competing with him for the same trade?

"But is there any thing in all this," you are asking, "to preclude the jobber's telling the truth?" . . . .

I answer: In order to get his share of the best custom in his line, the dry-goods jobber has taken a store in the best position in town, at a rent of from three to fifty thousand dollars a year; has hired men and boys at all prices, from fifty dollars to five thousand, — and enough of these to result in an aggregate of from five to fifty thousand dollars a year for help, without which his business cannot be done. Add to this the usual average for store-expenses of every name, and for the family-expenses of two, five, or seven partners; and you find a dry-goods firm under the necessity of getting out of their year's sales somewhere from fifteen to a hundred and fifty thousand dollars profit. . . . .

Now, though there is nothing even in all these urgencies to justify a single lie or fraud, there is much to sharpen a man's wits to secure the sale of his goods. . . . Every dry-goods jobber knows that his

customer's foolish hope and expectation often demand three absurdities of him: first, the assurance that he has the advantage over all other jobbers in a better stock of goods, better bought; secondly, that he has a peculiar friendship for himself; and thirdly, that, though of other men he must needs get a profit, in his special instance he shall ask little or none; and that, such is his regard for him, it is a matter of no moment whether he live in Lowell or Louisiana, in New Bedford or Nebraska, — or whether he pay New England bank notes within thirty days, or wild-cat money and wild lands, which may be converted into cash, with more or less expense and loss, somewhere between nine months and nine-and-twenty years.

And yet the uninitiated "can't understand how an honest merchant can have two prices for the same goods." An honest man has but one price for the same goods, and that is the cash price. All outside of that is barter, — goods for notes. His first inquiry is, What is the market-value of the note offered? True, he knows that many of the notes he takes cannot be sold at all; but he also knows that the notes he is willing to take will in the aggregate be guarantied by a reservation of one, two, or three per cent, and that the note of the particular applicant for credit will tend to swell or to diminish the rate; and he cannot afford to exchange his goods for any note, except at a profit which will guarantee its payment when due, — which, in other words, will make the note equal in value to cash.

. . . Among merchants it is matter of common notoriety that the prompt and exact adherence to orders insisted on by merchants, and prompt advice of receipt of business and of progress, cannot be expected from our worthy brethren at the bar. (The few honorable exceptions are respectfully informed that they are not referred to.) We do not expect them to weigh or measure the needless annoyance to which they often subject us, because they have never been, like ourselves, trained to the use of weights and measures; and therefore we are not willing to stigmatize them as dishonest, though they do, in fact, often steal our time and strength and patience by withholding an answer to a business letter.

None but those who are in the business know the assiduous attention with which the dry-goods jobber follows up his customers. None but they know the urgent necessity of doing this. The jobber may have travelled a thousand miles to make his customer's acquaintance, and to prevail upon him to come to Boston to make his purchases; and some neighbor, who boards at the hotel he happens to make his resting-place, lights upon him, shows him attention, tempts him with

bargains not to be refused, prevails upon him to make the bulk of his purchases of him, before his first acquaintance even hears of his arrival. To guard against disappointments such as this, the jobber sends his salesmen to live at hotels, haunts the hotels himself, studies the hotel-register far more assiduously than he can study his own comfort, or the comfort of his wife and children. Of one such jobber it was said facetiously, — "He goes the round of all the hotels every morning with a lantern, to wake up his customers." I had an errand one day at noon to such a devotee. Inquiring for him in the counting-room, I was told by his bookkeeper to follow the stairs to the top of the store, and I should find him. I mounted flight after flight to the attic, and there I found, not only the man, but also one or two of his customers, surrounding a huge packing-case, upon which they had extemporized a dinner, — cold turkey and tongue, and other edibles, — taken standing, with plenty of fun for a dessert. The next time we happened to meet, I said, "So you take not only time, but also customers, by the forelock!"

"Yes, to be sure;" was his answer; "let 'em go to their hotel to dinner in the middle of a bill, and somebody lights upon 'em, and carries 'em off to buy elsewhere; or they begin to remember that it is a long way home, feel homesick, slip off to New York, as being so far on the way, and that's the last you see of 'em. No, we're bound to see 'em through, and no let-up till they've bought all they got on their memorandum."

We have not yet touched the question of credit. To whom shall the jobber sell his goods? It is the question of questions. Many a man who has bought well, who in other respects has sold well, who possessed all the characteristics which recommend a man to the confidence and to the good-will of his fellows, has made shipwreck of his fortunes because of his inability to meet this question. He sold his goods to men who never paid him. To say that in this the most successful jobbers are governed by an instinct, by an intuitive conviction which is superior to all rules of judgment, would be to allege what it would be difficult to prove. It would be less difficult to maintain that every competent merchant, however unconscious of the fact, has a standard of judgment by which he tries each applicant for credit There are characteristics of men who can safely be credited, entirely familiar to his thoughts. He looks upon the man, and instantly feels that he is or is not the man for him. He thinks his decision an instinct, or an intuition, because, through much practice, these mental operations have become so rapid as to defy analysis. Not being in-

fallible, he sometimes mistakes; and, when he so mistakes, he will be sure to say, "I made that loss because I relied too much upon this characteristic, or because I did not allow its proper weight to the absence of some other, — because I thought his shrewdness or his honesty, his enterprise or his economy, would save him:" implying that he had observed such non-conformity to his standard, but had relied upon some excellency in excess to make up for it.

What are the perplexities which beset the question, To whom shall the jobber sell his goods? They are manifold; and some of them are peculiar to our country. Our territory is very extensive; our population very heterogeneous; the economy and close calculation which recommend a man in Massachusetts may discredit him in Louisiana. The very countenance is often a sure indication of character and of capacity, when it is one of a class and a region whose peculiarities we thoroughly understand; but, coming to us from other classes and regions, we are often at fault, — more especially in these latter days, when all strongmindedness is presumed to be foreshadowed in a stiff beard. Time was when something could be inferred from a lip, a mouth, a chin, — when character could be found in the contour and color of a cheek; but that time has passed. The time was, when, among a homogeneous people, a few time-honored characteristics were both relied on and insisted on: for example, good parentage, good moral character, a thorough training, and superior capacity, joined to industry, economy, sound judgment, and good manners. But Young America has learned to make light of some of these, and to dispense altogether with others of them.

Once, the buyer was required to prove himself an honest, worthy, and capable man. If he wanted credit he must humbly sue for it, and prove himself deserving of it; and no man thought of applying for it who was not prepared to furnish irrefragable evidence. Once, a reference to some respectable acquaintance would serve the purpose; and neighbors held themselves bound to tell all they knew. The increase of merchants, and fierce competition for customers, have changed this. Men now regard their knowledge of other men as a part of their capital or stock in trade. . . . Alas, it cannot be denied that even dry-goods jobbers, with all their extraordinary endowments, are not quite perfect! for some of them will "state the thing that is not," and others "convey" their neighbor's property into their own coffers, — men who prefer gain to godliness, and mistake much money for respectability.

There are very few men, in certain sections of the country, who

will absolutely refuse to give a letter of introduction to a neighbor on the simple ground of ill-desert. Men dread the ill-will of their neighbor, and particularly the ill-will of an unscrupulous neighbor; so, when such a neighbor asks a letter, they give it. I remember such a one bringing a dozen or more letters, some of which contained the highest commendation. The writer of one of these letters sent a private note, through the mail, warning one of the persons addressed against the bearer of his own commendatory letter. . . . One of the greatest rogues that ever came to Boston brought letters from two of the foremost houses in New York to two firms second to none in Boston. . . . .

. . . Never, perhaps, was it so true as now, that "the seller has need of a hundred eyes." The competent jobber uses his eyes first of all upon the person of the man who desires to buy of him. He questions him about himself with such directness or indirectness as intinct and experience dictate. He learns to discriminate between the sensitiveness of the high-toned honest man and the sensitiveness of the rogue. Many men of each class are inclined to resent and resist the catechism. Strange as it may seem, the very men who would inexorably refuse a credit to those who should decline to answer their inquiries are the men most inclined to resent any inquiry about themselves. While they demand the fullest and most particular information from their customers, they wonder that others will not take them on their own estimate of themselves.

The jobber next directs his attention to the buyer's knowledge of goods, — of their quality, their style, their worth in market, and their fitness for his own market, — all of which will come to light, as he offers to his notice the various articles he has for sale. He will improve the opportunity to draw him out in general conversation; so guiding it as to touch many points of importance, and yet not so as to betray a want of confidence. He sounds him as to his knowledge of other merchants at home and in the city; takes the names of his references, — of several, if he can get them; puts himself in communication with men who know him, both at his home and in the city. If he can harmonize the information derived from all these sources into a consistent and satisfactory whole, he will then do his utmost to secure his customer, both by selling him his goods at a profit so small that he need have little fear of any neighbor's underselling him, and also by granting every possible accommodation as to the time and manner of payment.

A moderately thoughtful man will by this time begin to think the

elements of toil and of perplexity already suggested sufficient for the time and strength of any man, and more than he would wish to undertake. But experience alone could teach him in how many ways indulged customers can and do manage to make the profit they pay so small, and the toil and vexation they occasion so great, that the jobber is often put upon weighing the question, Should I not be richer without them? Thus, for example, some of them will affect to doubt that the jobber wishes to sell to them, and propose, as a test, that he shall let them have some choice article at the cost, or at less than the cost, now on one pretext, and now on another; intimating an indisposition to buy, if they cannot be indulged in that one thing. If they carry their point, that exceptional price is thenceforth claimed as the rule. Another day the concession will be asked on something else; and by extending this game, so as to include a number of jobbers, these shrewd buyers will manage to lay in an assorted stock, on which there will have been little or no profit to the sellers. To cap the climax of vexation, these persons will very probably come in, after not many days, and propose to cash their notes at double interest off. Only an official of the inquisition could turn the thumb-screw so many times, and so remorselessly.

But we have yet to consider the collection of debts. The jobber who has not capital so ample as to buy only for cash is expected invariably to settle his purchases by giving his note, payable at bank on a fixed day. He pays it when due, or fails. Not so with his customers: multitudes of them shrink from giving a note payable at bank, and some altogether refuse to do so. They wish to buy on open account; or to give a note to be paid at maturity, if convenient, — otherwise not. The number of really prompt and punctual men, as compared with those who are otherwise, is very small. The number of those who never fail is smaller still. The collection laws are completely alike, probably, in no two States. Some of them appear to have been constructed for the accommodation, not of honest creditors, but of dishonest debtors. In others, they are such as to put each jobber in fear of every other, — a first attachment taking all the property, if the debt be large enough, leaving little or nothing, usually, for those who have been willing to give the debtor such indulgence as might enable him to pay in full, were it granted by all his creditors.

No jobber can open his letters in the morning in the certainty of finding no tidings of a failure. No jobber, leaving his breakfast-table, can assure his wife and children, sick or well, that he will dine or sup with them. Any one of a dozen railroad-trains may, for aught he

knows, be sweeping him away to some remote point, to battle with the mischances of trade, the misfortunes of honest men, or the knavery of rogues and the meshes of the law. Once in the cars, he casts his eye around in uneasy expectation of finding some one or more of his neighbors bound on the same errand. While yet peering over the seats in front of him, he is unpleasantly startled by a slap on the shoulder, and, "Ah, John! bound east? What's in the wind? Any ducks in these days?" "Why, — yes, — no, — that is, I'm going down along; little uncertain how far; depends on circumstances." "So, so: I see. Mum's the word." Well, neither is quite ready to trust the other, neither quite ready to know the worst. So long as a blow is suspended, it may not fall; and so, with desperate exertions, they change the subject, converse on things indifferent, or subside into more or less moody meditations upon their respective chances and prospects.

Any jobber who has seen service will tell you stories without number of these vexatious experiences, sometimes dashed with the comical in no common measure. He will tell you of how they arrived at the last town on the railroad, — some six or seven of them; of how not a word had been lisped of their destination; of the stampede from the railroad-station to the tavern; of the spirited bids for horses and wagons; of the chop-fallen disappointment of the man for whom no vehicle remained; of his steeple-chase a-bareback; and of their various successes, with writs and officers, in their rush for the store of the delinquent debtor. Of three such Jehus the story goes, that, two of them having bought the monopoly of the inside of the only vehicle, and in so doing, as they thought, having utterly precluded any chance for the third, their dauntless competitor instantly mounted with the driver, commenced negotiations for the horse, which speedily resulted in a purchase; and thereupon detached the horse from the vehicle, drove on, and effected a first attachment, which secured his debt.

The occurrence of "a bad year" compels many a jobber to abandon his store and home for one, two, or three months together, and visit his customers scattered all over the land, to make collections. Then it is that the power of persuasion, if possessed, is brought into efficient use; discrimination, too, is demanded, — good judgment, and power of combination. For a debt that cannot be paid in money may possibly be paid partly in money, or in merchandise of some sort, and in part secured; and, among the securities offered, to choose those which will involve the least delay is generally no easy matter.

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Success in the jobbing business makes such demand on talent and capacity as outsiders seldom dream of. Half-a-dozen Secretaries of State, with a Governor and a President thrown in, would not suffice to constitute a first-class jobbing firm. The general or special incompetency of these distinguished functionaries in their several spheres may probably be covered by the capacity of their subordinates. The President of these United States, of late years, at all events, is not supposed to be in a position to know whether the will is or is not "a self determining power." But no jobbing firm can thus cloak its deficiencies, or shirk its responsibilities. Goods must be bought and sold and paid for; and a master-spirit in each department, capable of penetrating to every particular, and of controlling every subordinate, cannot be dispensed with. He must know that every man to whom he delegates any portion of his work is competent and trustworthy. He must be able to feel that the thing which he deputes to each will be as surely and as faithfully done as though done by his own hand. No criticism is more common or more depreciatory than that "such a one will not succeed, because he has surrounded himself with incompetent men."

It is much to be regretted that it cannot be said, that no man can succeed in the jobbing business who is not a model of courtesy. Unhappily, our community has not reached that elevation. But this may with truth be affirmed, — that many a man fails for the want of courtesy, and for the want of that good-will to his fellows from which all real courtesy springs. There is small chance for any man to succeed who does not command his own spirit. There is no chance whatever for an indolent man; and, in the long run, little or no chance for the dishonest man. The same must be said for the timid and for the rash man. Nor can we offer any encouragement to the intermittent man. From year's end to year's end, the dry-goods jobber finds himself necessitated to be studying his stock and his ledger. He knows, that, while men sleep, the enemy will be sowing tares. In his case, the flying moments are the enemy, and bad stock and bad debts are the tares. To weed out each of these is his unceasing care. And, as both the one and the other are for ever choking the streams of income which should supply the means of paying his own notes, his no less constant care is to provide such other conduits as shall insure him always a full basin at the bank. Nobody but a jobber can know the vexation of a jobber who cannot find money to cash his notes when they are beginning to be thrown into the market at a price a shade lower than his neighbor's notes are sold at.

In conclusion, a few material facts should be stated.

As a general proposition, it is not to be denied, that those who are in haste to get rich will find in the dry goods jobbing business many temptations and snares into which one may easily fall. A young man who is not fortified by a faithful home-training, and by sound religious principle, will be likely enough to degenerate into a heartless money-maker.

While the young man who has been well trained at home, who appreciates good manners, good morals, and good books, will derive immense advantage in acquiring that quick discernment, that intuitive apprehension of the rights and of the pleasure of others, and that nice tact which characterize the highest style of merchants, — he who has not been thus prepared will be more than likely to mistake *brusquerie* for manliness, and brutality for the sublime of independence. As, in a great house, there are vessels unto honor and also unto dishonor, so in the purlieus of the dry-goods trade there are gentlemen who would honor and adorn any society, and also men whose manners would shame Hottentots, whose language, innocent of all preference for Worcester or Webster, — a terror to all decent ideas, like scarecrows in corn-fields, — is dressed in the cast-off garments of the refuse of all classes.

Success in retailing does not necessarily qualify a man to succeed in the dry-goods jobbing business. The game is played on a much larger scale. It includes other chances, and demands other qualifications, natural and acquired. Instances are not wanting of men who, in the smaller towns, had made to themselves a name, and acquired an honorable independence, sinking both capital and courage in their endeavors to manage the business of a city jobber.

It should be well remembered, that, while it is not indispensable to success in the jobbing business that each partner should be an expert in every department of the business, — in buying, selling, collecting, paying, and book-keeping, — it is absolutely necessary that each should be such in his own department, and that the firm, as a unit, should include a completely competent man for each and every one of these departments. The lack of the qualities which are indispensable to any one of these may, and probably will, prove an abyss deep enough to ingulf the largest commercial ship afloat.

Finally, to avoid disappointment, the man who would embark in the dry-goods trade should make up his mind to meet every variety of experience known to mortals, and to be daunted by nothing. He will assuredly find fair winds and head winds, clear skies and cloudy skies,

head seas and cross seas, as well as stern seas. A wind that justifies studding-sails may change, without premonition, to a gale that will make ribbons of top-sails and storm-sails. The best crew afloat cannot preclude all casualties, or exclude sleepless nights and cold sweats now and then; but a quick eye, a cool head, a prompt hand, and indomitable perseverance will overcome almost all things.

Such is the character, qualifications, experience, and necessities of that class of merchants who stand between the producer and consumer, and who swallow up so large a portion of the profits of the work of their hands. It purports to be written by an experienced adept in the art of traffic, and no doubt is correct. What chance have the simple farmer and mechanic, who turn their whole energies to natural production and construction, in the hands of such men as those described, unless they are honest guardians of their trust? Most certainly the operative is entirely at the mercy of such as control him in this great web or labyrinth of metaphysical interchange between the producer and consumer. The causes of this evil are plainly laid down. Too many fly from the farm and the workshop to the counting-house and salesroom for employment who are dazzled with the glittering appearances of this class, and are charmed with the hope of living without manual labor. The remedy is simple. The dignity of labor will support itself; and the evil before described will disappear when the young men of the country remain at their mills in the rural districts, and *sell*, as well as *manufacture*, their goods. A sale will surely come to their very doors when this system is carried out; and greater profits will follow.

FIBROUS MANUFACTURES.

Fibrous manufactures are confined to two general principles; viz., the long and the short stapled modes of spinning. Each process is entirely different in its character. The short stapled process is confined to cotton and wool. The long staples are flax, hemp, silk, jute, and like fibres, the filaments of which are naturally long. The new production of fibrilia is intended for the short stapled machinery now in use for the manufacture of cotton and wool; and therefore every factory for the old processes is available for the new. This will save many millions of dollars to the country over and above a process requiring new machinery. The differences in manufacture, and the discoveries made in bringing out the new article, in part may be summed up in the following order: First, the flax-straw is mown and threshed by machinery, instead of being pulled and rippled by hand. Second, the rotting process, if used at all, is modified by a filtering system, which dissolves the glumien, instead of a fermenting process, which *sets* the azotized matter holding the fibres together. Third, the fact has been established, that the ultimate fibrils of flax are short, and overlap each other in their position upon the original stalk; are tubular, or cylindrical; and are capable of being separated naturally, at their points of cohesion, under the solving and mechanical processes combined, — instead of being a long line, as defined by old examiners of the fibre, who describe the fibril in its minute form as being the segment of a circle or tube which has been split asunder. Fourth, the glumien in flax and other fibres is solved by natural and

easy processes, using solvents natural to the juices of the plant under pressure, and with *warm* fluids in the first processes, instead of *boiling* the fibres first in alkalies, which have a tendency to *set* the glumien instead of *dissolving* it. Fifth, the fibres are bleached and colored in a much simpler, quicker, and more economical manner, than by the old methods, and with no injury to the material. Sixth, the fibres are separated and shortened by machinery, with drawing rollers, graduated so as to give any length fibril required by a tensile strain, which strands the fibres, leaving the ends separated or split, so as to easily unite in spinning, instead of cutting the fibre as heretofore attempted, which leaves blunt ends not readily uniting in spinning. Seventh, by the combined process, the fibrils are smoothed by dissolving the glumien adhering to them in the old process; rendering the cloth made from fibrilia smoother than linen, and changing the whole character of the same as a conducter of either electricity or heat, thereby rendering the same more comfortable in wear. Eighth, an article is produced which spins like cotton or wool, and makes a better cloth than cotton, at a less price, and for about one-half the cost of the old process of making linen. These advantages will commend themselves to the reflective world, who no doubt will improve them, — in which labor we wish them good speed. The subject of fibrous manufactures is broad, and there is no fear of its being overdone for generations yet to come. Thirty million bales of an equivalent to cotton will be none too much to supply the present demands of the world. The humanitarian principle of the age demands enlargement through this mode of aiding the development of the moral and physical being of mankind.

New England was the pioneer in the manufacturing, as well as the common-school system; and she has much to remember with pride as well as gratitude. Her record is deeply engraved in the history of the republic, and in its influence upon the world. Her sires were the first to plant the seeds of liberty; and they nourished them with their blood as well as tears. The growth has been strong, and the yield much; but the fruit is not yet ripe, and the whole world is now looking for the final result of one of the greatest political experiments ever yet tried. Foreign governments are wondering whether the weeds in this vast field — now, alas! too plainly visible — will be suffered to grow up, and choke the ripening fruit, and destroy its perpetuity; or whether coming time shall witness the destruction, and the grain, "fully ripe," be gathered to the garner, and the picture and the lesson be finished. What becomes the duty of the northern man in this state of national conflict and confusion? The answer should be plain to every heart: Do right, and be fearless as to the result. What shall New England do? Look first to herself. Do justice to her whole people where she has neglected them, and make amends. If she has suffered one class, either through her civil or social laws, to oppress another, she should remedy the evil, and look with charity and sympathy upon those whose simple and unobtrusive, though laborious, life has been her support in times past, and to whom only can she look in seasons of coming peril. Let her protect the laborer, the mechanic, and the farmer in their own proper calling, and guard their rights with a jealous care, that their earnings shall not be consumed by multiplicities in traffic by the non-producing part of her

community, some of whom set themselves up as their masters; and who, if suffered to go on, would so counterfeit New England products and New England hearts, that they would soon be unknown in comparison with the past. She should consolidate her whole people by the indissoluble bonds of affection and justice. Then all her elements of industry will become active, her people happy, and her institutions respected by the whole Union and the world. Thrice happy will she then be, and thrice useful in the cause of humanity! Her benevolence, now so large, will be practical, and will be the more valuable from the judgment and discretion brought to bear in its use.