

There do not exist in America, in the same degree, those circumstances of a dense and degraded population which occasion, in the old nations of Europe, such an infinite difference of knowledge and ignorance, of wealth the most exuberant and indigence the most horrible.\* No man in America need be poor if he has an axe and arms to use it. The wilderness is to him the same retreat which the world afforded to our first parents. His family, if he has one, is wealth ; if he is unencumbered with wife or children, he is the more easily provided for. An immense proportion of the population of the United States consists of agriculturists, who live upon their own property, which is generally of moderate extent, and cultivate it by their own labour. Such a situation is peculiarly favourable to republican habits. The man who feels himself really independent,—and so must every American who can use a hoe or an axe,—will please himself with the mere exertion of his free will, and form a strong contrast to the hallooing, bawling, blustering rabble of a city, where a dram of liquor, or the money to buy a meal, is sure to purchase the acclamation

wretched condition of the times, and such the violence and outrage to which men were exposed in those barbarous ages, that this latter class made a formal surrender of this independent property, and became slaves, that they might enjoy the protection of the lords. The first dawn of liberty arose from the fact that many of the slave peasants were enabled, by their economy and wise savings, to purchase their liberty. As their property procured them liberty, liberty made them profitable labourers to their former masters, whose revenues were thereby so much augmented, and the value of their lands so much increased, and so many saw the advantages accruing to themselves from the liberty of their slaves, that innumerable serfs were every where enfranchised. It is related by Robertson, that in the progress of time and of public improvement, charters of manumission were granted. These concessions were—first, that the right of sale of the person should be relinquished ; second, power was given to convey property by will or deed ; third, the taxes and services, which before were at the will of the lord, were now rendered certain and fixed ; fourth, marriage was allowed without the lord's permission. Little do we think of the condition of our English ancestors, when we look back to the period long after the discovery of this continent, and find Queen Elizabeth, in 1574, granting manumissions to certain slaves of her own. The labouring people were governed and legislated for more like animals than human beings ; what they should eat, what they should wear, and what they should earn, being prescribed by law. Even the dress of merchants and artificers, who were inferior to the lords and landholders, was provided for by law."—*Sedgwick*.

\* As you walk along our streams you may hear the merry notes of the bell mingling with the sounds of our water-falls, calling not the lazy, lounging monastic, to yawn over his matins ; but the vigorous and active mechanic to the conduct of the spindle and loom.

of thousands, whose situation in the scale of society is too low to permit their thinking of their political right as a thing more valuable than to be bartered against the degree of advantage they may procure, or of license which they may exercise, by placing it at the disposal of one candidate or another.\*

\* *Extracts from the Prospectus of the Emporium, a periodical work edited by Judge Cooper, of Pennsylvania, now President of Columbia College, in South Carolina.*

“Our agriculturists want a home market. Manufactures would supply it. Agriculture, at a great distance from seaports, languishes for want of this. Great Britain exhibits an instance of unexampled power and wealth by means of an agriculture greatly dependent on a system of manufactures—and her agriculture, thus situated, is the best in the world, though still capable of great improvement.

“We are too much dependent upon Great Britain for articles that habit has converted into necessaries. A state of war demands privations that a large portion of our citizens reluctantly submit to. Home manufactures would greatly lessen the evil.

“By means of debts incurred for foreign manufactures, we are almost again become colonists—we are too much under the influence, indirectly, of British merchants and British agents. We are not an independent people. Manufactures among us would tend to correct this, and give a stronger tone of nationality at home. I greatly value the intercourse with that country of pre-eminent knowledge and energy; but our dependence upon it is often so great, as to be oppressive to ourselves.

“The state of agriculture would improve with the improvement of manufactures, by means of the general spirit of energy and exertion, which now exists in so high a degree as in a manufacturing country; and by the general improvement of machinery, and the demand for raw materials.

“The home trade, consisting in the exchange of agricultural surpluses for articles of manufacture, produced in our own country, will, for a long time to come, furnish the safest and the least dangerous, the least expensive and the least immoral—the most productive and the most patriotic employment of surplus capital, however raised and accumulated. The safest, because it requires no navies exclusively for its protection; the least dangerous, because it furnishes no excitement for the prevailing madness of commercial wars; the least expensive, for the same reason that it is the safest and the least dangerous; the least immoral, because it furnishes no temptation to the breach or evasion of the laws; to the multiplication of oaths and perjuries; and to the consequent prostration of all religious feeling, and all social duty; the most productive, because the capital admits of quicker return; because the whole of the capital is permanently invested and employed at home; because it contributes, directly, immediately, and wholly, to the internal wealth and resources of the nation; because the credits given are more easily watched and more effectually protected by our own laws, well known, easily resorted to, and speedily executed, than if exposed in distant and in foreign countries, controlled by foreign laws, and foreign customs, and at the mercy of foreign agents; the most patriotic,

The most noticeable peculiarity in Rhode Island scenery, is the great number of cotton and woollen factories which are seen peeping from every valley where water power can be employed. Villages have grown up in this way in regions the most sterile and uninviting, and a large population are there fed, where without wealth, which they may almost be said to create, fewer families could subsist than the number of thriving and flourishing villages which now meet the eye on every side. "What the moral influence upon society will be, to have such masses of population collected together, without schools and without churches to counteract the tendency to corruption which all promiscuous assemblages of population have, it cannot be difficult to anticipate." Such were the reflections of the "National Ægis," in 1825. But we are happy to say that, in 1835, the grounds of those fears and apprehensions are removed; schools and churches have been introduced, and are producing the most happy effects. For, to promote the best good of our fellow men, we must aim, not only to make them industrious and wise in their occupations, but upright in their conduct and virtuous in their lives. Let the arts of life be carried to the greatest possible perfection; multiply the means of wealth ever so much—still, unless men are moral, virtuous and good, these improvements are lost, and worse than lost upon them. You may make every farm in our country a garden,

because it binds the persons employed in it, by all the ties of habit and of interest, to their own country; while foreign trade tends to demoralise the affections of those whose property is dispersed in foreign countries, whose interests are connected with foreign interests, whose capital is but partially invested at the place of their domicile, and who can remove with comparative facility from one country to another. The wise man observed of old, that, 'where the treasure is, there will the heart be also.' And time has not detracted from the truth of the remark.

"We have a decided superiority in the raw materials of cotton, hemp, and flax; in our alkalies for glass-works; in the hides and the tanning materials of the leather manufactory; and we can easily procure that advantage, so far at least, as our own consumption requires it, in the woollen manufactory. Other branches might be enumerated wherein our advantages of internal resource are undeniable; but I cannot see why we should neglect or despise these. Nothing but a stimulus is wanted to induce and enable us to make a proper use of our domestic riches. But men of skill and men of capital fear to begin; lest on the return of peace they should be exposed, in the weakness and infancy of their undertaking, to contend with the overwhelming capital and skill of the European powers, particularly of Great Britain.

"THOMAS COOPER.

"*Carlisle, Feb. 1813.*"

and the country around a paradise ; yet if good institutions are trampled in the dust ; if vice and moral corruption pollute and curse the soil ; it is not a paradise ; it is not an Eden ; it is a *hell*.\*

The advancement of this country, in manufacturing industry, is perhaps unexampled in history. In the year 1805, the total consumption of cotton, by the manufactories of the United States, was a little more than 1000 bales. Now, Rhode Island uses 30,000. In 1805, our woollen factories could not furnish the army with 6000 blankets. During the last war, capital was taken from commerce and invested in manufactures. This was the first impulse. In 1816, a report made to Congress showed that forty millions of dollars capital were invested in cotton manufactures, and *twelve millions* in woollen. In that year we manufactured 90,000 bales of cotton. In 1816, it was estimated that the whole amount of goods manufactured in the United States, was equal to fifty or sixty millions of dollars. It is now believed that we manufacture, of all kinds, to the amount of two hundred and fifty millions in a year, about twenty-five millions of which are exported, and the rest consumed in the country. The internal or domestic trade of every country is, perhaps, more permanent and useful than the foreign. It is not subject to the fluctuations of the commercial world, which frequently break out and spread desolation around.

The Missouri Advocate states, that copper is found from

\* There are two sorts of labour, working for profit and working for nothing. Persons who have nothing to do, generally have hard work to live. A late distinguished senator said in the parliament of England, "man is born to *labour*, as the sparks fly upwards." This observation is founded on a thorough knowledge of the destiny from which none can escape. The idle are always unhappy, nor can mental vigour be preserved without bodily exercise. Neither he who has attained to inordinate wealth, nor he who has reached the greatest heights of human intellect, is exempt from the decree, that every man must "work for his living." If the "gentleman" does not work to maintain his family, he must to maintain his life ; hence, he walks, rides, hunts, shoots, and travels, and occupies his limbs as well as his mind ; hence noblemen amuse themselves at the turning-lathe, and the workman's bench, or become their own coachmen. Hence kings sometimes play at being workmen, or, what is worse, at the game of war. Without exercise, the body becomes enfeebled, and the mind loses its tension. Corporeal inactivity cannot be persisted in, even with the aid of medicine, without symptoms of an asthenic state. From this deliquium the patient must be relieved in spite of his perverseness, or he becomes a maniac or a corpse. Partial remedies render him "a nervous man ;" his only effectual relief is bodily exercise.

Ouisconsin and the falls of St. Anthony, to the shores of Lake Superior, in such abundance and purity, that the Indians make hatchets and ornaments of it; and that it is easily worked, into any form, without any other instrument than the hammer. The whole region of the upper Mississippi is mineral, abounding in lead and copper. The lead mines are in the hands of the United States, but the copper, in 1826, was retained by the Indians.

Mr. Shirreff, an English farmer, who visited this country with a view to decide upon allowing a younger brother to emigrate hither, thus speaks of Lowell:—

“The females engaged in manufacturing, amount to nearly 5000; and as we arrived at Lowell on the afternoon of Saturday, we had an opportunity of seeing those connected with some of the largest cotton factories, retiring from labour. All were clean, neat, and fashionably attired, with reticules hanging on their arms, and calashes on their heads. They commonly walked arm in arm, without levity. Their general appearance and deportment was such, that few British gentlemen, in the middle ranks of life, need have been ashamed of leading any of them to a tea party. Next day, being Sunday, we saw the young females belonging to the factories going to church, in their best attire, when the favourable impressions of the preceding evening were not effaced. They lodge, generally, in boarding houses, and earn 8s. 6d. sterling, per week, independent of board; sewing girls earn about 4s. 6d. The recent introduction of large manufacturing establishments, this population, and ample reward of labour, account for the apparent comfort and propriety of the Lowell young women. The situation of the manufacturing class in Britain is very different; nurtured amidst poverty and vice, they toil in crowded and unwholesome factories from infancy, often disregarded by parents and employers, and attaining maturity ruined in constitution, and with few of the sympathies of humanity.

“This village may be taken as an instance of the great strides by which the United States are advancing to greatness, and the immeasurable water power nature has lavished upon them. The canal supplies more water than the present machinery requires; and after inspecting the surplus in the canal and rivers, I am of opinion there is water enough to propel nearly one hundred times the machinery at present employed, and which might employ a population of above one hundred thousand more. Britain is said to owe much of her greatness to the supply of coal, with which she has been blessed; but however extensive and available it may be, the water power of the United States will excel it in cheapness

and magnitude. The price of labour is, and will likely continue, much cheaper in Britain than in the United States, which seems the only circumstance that can ultimately give a superiority to the former.\*

*Depression of Manufactures in 1815.*—Antecedent to the period of the restrictive system, the great mass of manufactures consumed in the United States, was derived from great Britain. During that period, and the consequent war, foreign goods were attainable only in insufficient quantities, and at high prices. The inconvenience of depending on a foreign supply, being severely felt, led to the investment of much unemployed capital in manufacturing establishments. The facility with which water power, sufficient for these purposes, was attainable in various sections of the country, strongly invited to this object. During the war this capital was very productive; but at its close, the British manufacturers, having large quantities of goods on hand, adapted and originally destined for the American market, poured them into this country, to an amount far beyond the wants of the people, or their ability to pay, with a double view of vending their goods, and ruining the rival establishments of the United States. Many of these goods, after being warehoused a considerable time, were sold at auction at less than first cost, and often at little more than to pay the freight and duties. Improvident people, allured by the apparent cheapness of goods, were induced to make unnecessary purchases. The goods destined to the American auctions were

\* The attempt to introduce females into other employments, and especially into the printing office, is very properly reprobated; and the following note from the manuscript of an operative, is very expressive of a just indignation against it:—

“To woman belongs the service of the domestic temple; there she is nature’s priestess,—to minister in peace, far from the turmoil and pollution of busy life,—offering up the incense of pure affection, on the altar of innocence. Wo unto him, or to them, who would degrade the shrine, or stain its hallowed censer with ‘strange fire.’ Much of her bland power to bind up the wounded spirit, proceeds from her happy ignorance of the vicissitudes of public life, to which the tougher sex is doomed, and, while shielded from the bitter truth, she hopes the best, and her sanguine faith is often contagious. It is certainly a most curious trait of civilisation that drives woman from the ease and independence which the most enlightened policy of all former ages awarded her. Those who are really anxious for the welfare of females, let their exertions be directed towards procuring for their natural providers and protectors a sufficiently *just* amount of wages as shall serve to retain, in comfort, the sister, and wife, and daughter of the workingman, in her proper sphere.”—*Remarks on an attempt to introduce females into printing offices.*

handsomely finished, but of the cheapest materials and texture. The operation had, in a great degree, its designed effect; most of the considerable manufacturing establishments were obliged to stop, and many of the proprietors failed. This state of things commenced in 1815; its effects were more severely felt in the two succeeding years, and continued until congress, by a judicious arrangement of the tariff, in some measure relieved the manufacturing interest; and the people, learning wisdom by experience, relieved their circumstances, by substituting a prudent use of domestic articles, for an extravagant consumption of foreign.—*Perkins's Historical Sketches.*

The history of Fall River, a place which is becoming of so much importance in the manufacturing world, cannot but be acceptable. Situated on a rather abrupt elevation of land rising from the northeast side of Mount Hope bay, distant about eighteen miles from Newport, and nine from Bristol, R. I., stands the beautiful and flourishing village of Fall River, so called from the river, which, taking its rise about four miles east, runs through the place, and after many a fantastic turn, is hurried to the bay over beds of rocks, where, before the scene was changed by the hand of cultivation and improvement, it formed several beautiful cascades, and had a fine and imposing effect. The village is now only picturesque from the variety of delightful landscape by which it is surrounded; the back ground presenting a variety in rural scenery—where neat farms and fertile fields show themselves here and there between hill and dale, and rock and wood. The soil, though for the most part fertile, is in some places exceedingly rocky, and often in the midst of such places some little verdant spot shows itself to much advantage.

But Fall River is chiefly inviting as a place of residence, from the salubrity of the air, and the vicinity of Mount Hope bay, which spreads before it like a mirror, and extends easterly until it meets the waters of Taunton river, forming on each side numerous little creeks and coves, which add to the charms of the landscape materially; while on the southwest it takes a bold sweep, and passing round through Howland's ferry, where it is compressed through the narrow channel of a drawbridge, having the island of Rhode Island on one hand and the town of Tiverton on the other, again expands and flows on to meet the ocean. Howland's ferry is not visible from the village of Fall River, though it is from the bay, when at the distance of three or four miles. Vessels do sometimes pass and repass through the drawbridge at Howland's ferry to and from Fall River and Taunton; but the

most usual way of access to the former is through Bristol ferry, two miles south of Bristol port. It requires no great effort of imagination to go back a few years, and imagine the Indian with his light canoe sailing about in these waters, or dodging about among the rocks and trees.

The neighbourhood of Fall River has been the scene of frequent skirmishes among the Picknets, the tribe of King Philip, and the Pequods and Narragansetts. Uncas, too, with the last of the Mohicans, and the best, has set his princely foot upon its strand. Fall River, which in 1812 contained less than one hundred inhabitants, owes its growth and importance principally, indeed almost wholly, to its manufacturing establishments; which, though not splendid in appearance, are very numerous, and employ several thousand persons, collected from different parts of the country, as well as many foreigners; the immense fall of water here being now nearly covered by establishments of various kinds. There are more than forty thousand spindles in operation, and it is only twenty-one years since the erection of the first cotton manufactory. Previous to this the land in this vicinity belonged principally to the families of Borden, Bowen, and Durfee; three families from whom the principal part of the stationary inhabitants sprung. The land now divided among the different manufacturing establishments, is principally held in shares, that is, in the neighbourhood of the establishments. So flourishing has business been there, that there is scarce a mechanic, trader, or even labourer, who has been there for any length of time, who has not acquired an estate of his own. In 1812, the first cotton manufactory was erected by a company incorporated by the name of the Fall River Company. In the same year, another company was incorporated called the Troy Manufacturing Company, and another factory built. There were, in 1833, thirteen manufactories, viz. two cotton manufactories of the Troy Company; Pocasset, one woollen, do.; New Pocasset, Massasoit, Olney's mill, Calico Works, Fall River Company's mills, three in number; Annawan iron works and nail manufactory. The calico works alone, which cover a large area of ground, employ nearly three hundred hands; its state of improvement is not exceeded by any establishment of the kind in the country. There are besides a number of machine shops, &c., which, stuck about on the jutting rocks, many of them in the very bed of the stream, have a most singular appearance. The fall originally was through a deep black gulf, with high rocky sides. Across this gulf most of the manufactories are built. There is an appearance of active industry and a spirit of enter-



prise, as well as of cheerfulness and contentment, that at once strikes a stranger. It is evident, too, from the number of houses of worship, schools, &c., that the moral and religious education of the rising generation is not neglected. There are eight houses of worship, and a number of free-schools here, towards which the inhabitants themselves voluntarily contribute twenty-five hundred dollars per annum. The number of inhabitants in 1833, exceeded five thousand. It is to be supposed, that among the heterogeneous materials which form the community in this place, there is a great variety of character, as well as of creeds; occasionally some differences of opinion as well as clashing of interests; yet for the most part crime has been unknown there. It has often been the boast among the inhabitants that, living as they do, on the borders of two states, (part, and by far the greater part, is in Troy, Mass., the other in Tiverton, R. I.) the laws of either were seldom called to punish any thing except venial transgressions.

Fall River, too, can boast of its prowess in battle, of its revolutionary characters, in "the times that tried men's souls." For although their humble attempts to resist invasion have not yet found a place on the pages of history, yet certain it is, the tide of war has once rolled its threatening waves as far up as to reach the shores of Mount Hope bay. The character for bravery, generosity, and independence of mind, manifested at that period, seems to have become a part of their inheritance. Among all the changes which the increase of population causes, the primitive virtues of simplicity and hospitality are still eminently conspicuous. Whoever goes to reside there seems to adopt readily the manners of the inhabitants. Even the labouring part of the community in the manufactories, at well as in other departments, are positively distinguished by a degree of refinement and courtesy of manners, which serve to leave the most favourable impressions in relation to manufacturing villages. I shall always recollect with pleasure one little incident in one of the weaving rooms of the manufactory, where the noise was very distracting, arising from a vast number of looms going at once. The machinery suddenly stopped, and a strain of music arose simultaneously from every part of the room, in such perfect concord that I at first thought it a chime of bells. My conductor smiled when I asked him if it was not, and pointed to the girls, who each kept their station until they had sung the tune through.

At the time Newport was in possession of the British, there was an attempt made to destroy their mills at this place, consisting of

saw mills, grist mills, and a fulling mill; which the bravery of the few inhabitants, men, women, and boys, prevented.

The growth of Fall River, from the period of the revolution to the year 1812, must have been very slow; and ever since that time, until 1822: when there was but four stores in the place, of any description, and not exceeding four hundred inhabitants. The third manufactory was erected in 1821, and two more the ensuing year. In 1833, a large and elegant one was built. There is now one hundred shops and stores of various descriptions; but, excepting two or three on the Tiverton side of the village, scarcely any where spirituous liquors are retailed, and not a single distillery in the place. The roads north and south of the village lead through a delightful country. The view of the island of Rhode Island on the south one is beautiful,—while that leading to Taunton is scarcely less picturesque. On this road lies the little village of Assonet, where there is considerable commerce carried on. It is a singular sight to see vessels coming up to the very doors of the cottages, sheltered and shut in by the little woody point that encloses the tiny harbour,—and music to hear the voices and loud laughter of numerous little urchins, who are frequently seen playing on the hull of some old vessel on the grassy strand. These fairy landscapes on the one hand, are strangely contrasted by the wildness and sterility of that on the east, which resembles a newly settled country. The land lying between Fall River and New Bedford, a distance of sixteen miles, is a perfect desert; being only diversified by bogs, rocky pastures, and forests of scrub oak and wild poplar.—*History of Fall River.*

The annexed report to the “Society for Establishing Useful Manufactures in New Jersey,” shows the progress and extension of the cotton business in Paterson, from 1791 to 1827:—

“Your records show, that soon after the American revolution, when the United States had just established that form of national government which provides for commerce and its protection; when agriculture, the primary interest and pursuit, began to extend and flourish, and it was foreseen would become redundant and out of proportion to all other branches of industry, a number of men whose patriotism had been long conspicuous in public affairs, conceived that the prosperity and happiness of their country would be essentially promoted by the introduction of those manufactures known to be sources of benefit in Europe. It seemed to them *then*, as the later history of our country has proved, that it would be more for the common good, that the useful arts should share in the growing physical and financial ability of

the people, and the expense to convert the raw materials, abundantly produced among us, might as well be saved to the industry of our country. It appears, in the preamble of the charter they were presented with by the legislature of New Jersey, that a contribution of capital was made for this object, to the amount of more than two hundred thousand dollars. The great falls of the Passaic were ascertained to have an elevation, above tide, of 104 feet, and were calculated to be capable, by their elevation and the volume of water, of driving two hundred and forty-seven under-shot water wheels; and at Little Falls, four miles higher up, thirty-six feet fall was deemed capable of driving seventy-eight water wheels; that this river was navigable for thirty miles above the falls, with boats drawing five feet, to Chatham, and beyond, with a few locks, fifty miles. Becoming, from various sources of intelligence, thus satisfied of the superiority of this situation, the associated contributors of capital bought the right of the falls, the title to which was originally derived from the state itself, and were granted their charter, under the name and style of 'The Society for the Establishment of Useful Manufactures,' 22d November, 1791, vesting them with power over, and possession of, the waters of the Passaic.

"In consequence of the general war in Europe, the neutral commerce of the United States was soon found to be exceedingly advantageous; and it is well known that, for ten or twelve years succeeding the year 1791, it attracted most of the active capital of our country into its operations, and had so much effect upon our agriculture as to raise the price of provisions.

"By this accidental state of things, the society was retarded, but its purpose was not defeated, nor scarcely suspended. It was well known that the time could not be remote when every interest would seek its proper level,—a reflux of capital be expected to our shores, and the original occasion for such an example as the society proposed to itself to be, would recur with tenfold reason—the accumulated wealth of our country act and display itself, not only in great establishments of manufactories, but in opening the mines and the avenues of internal commerce and profit. The society, soon after the purchase of the Passaic, and the grant of its charter, proceeded to establish the first cotton factory and printing house: this was attended with loss. The society invited and encouraged skill, by leasing privileges, and aiding manufacturers with capital. This system was well calculated to draw numbers to share in the use of this great water power. Experienced mill owners have been induced hither, bringing wealth even from

England. Numerous artisans have sought and found employment coming from abroad, and from the adjoining states. The wages of the supernumerary hands of the surrounding counties, together with the sale of their surplus provisions, have enriched Bergen, Essex, and Morris.

“ In July 1827, there were in Paterson, New Jersey, 6,236 inhabitants, 1,046 heads of families, 7 houses of public worship, 17 schools, a philosophical society,—(it is evident that these establishments do collect around them, in due proportion, every art and profession);—15 cotton factories, in which 24,000 spindles operate; 2 factories of canvass, 1,644 spindles, employing 1,453 persons, whose wages are \$224,123 a year; extensive machine shops, and iron works, flax, 620,000 lbs. annually, 6000 bales of cotton, 1,630,000 lbs. cotton yarn spun annually, 430,000 lbs. of linen yarn, cotton and linen duck made, annually, 630,000 yards, cotton cloth, 3,354,500 yards, yarn exported, 796,000 yards, and new factories then building.

“ This is but the beginning of what Paterson must be, if not disturbed in its well planned career of usefulness.

“ Perhaps the time has nearly arrived, contemplated by the legislature, when it may be expedient and necessary to organise the corporate government as provided for by the act. For in every populous place, where a great amount of property is concentrated in business, a preventive police, a united local magistracy, a prompt administration of justice, the preservation of health, by the cleanliness of markets and streets, and the establishment of a hospital, where the accidentally injured may have the best medical aid and care, and the sick be better taken care of than in the midst of a busy multitude,—the preservation of morals, too, by affording an opportunity to every one to save, and not expend their earnings, beyond the sum necessary to subsistence, laying up the surplus in a savings bank, at interest, open to receive and secure any sum, however small, placed to the owner's credit, as often as it should be brought; thus accumulating a sum competent to an establishment in business, or in a home, and thus avoiding temptations to dissipation and extravagance, were among the objects of the legislature.

“ The advantages of doing business in a well regulated town, are considerations which interest all, and promote harmony, order, union, and good will; and all know that, *thus*, accessions of numbers will lead to the increased value of property. Foreigners are enabled to hold real estate in Paterson.”

The improvement of roads and canals leading towards Massa-

chusetts, Connecticut, and Rhode Island, from the surrounding districts of greater extent and production, are manifestly of the utmost importance, as they facilitate and cheapen the introduction of raw materials, grain, and other productions of the soil of less populous or more fertile districts.' This was a subject of great interest with Mr. Slater, who was a principal agent in promoting the famous road from Pawtucket to Providence, also what is called the Gore turnpike, to Webster, and the Worcester and Norwich turnpike. He was always in favour of the project of the Worcester and Norwich railroad, now so happily commenced, which will pass through Webster.

Indeed Mr. Slater is said to have owned forty thousand dollars, in turnpike road stock, little of which was available ; but he considered the importance of good roads as a necessary appendage to the manufacturing interest. When he commenced business, Rhode Island and Massachusetts were very defective in roads and canals.\*

\* The momentous fact is satisfactorily established, that the American manufacturers' demand has greatly surpassed, in 1812, all the abilities of the planters, farmers, land-holders, and miners, to supply those five descriptions of raw materials. It is certain, that neither in commerce, nor in navigation, nor in the fisheries, nor even in agriculture itself, do we find a truth so vast and stupendous, as that which is exhibited to our eyes in the case of labour-saving machinery. Taking the advantage, in favour of the cotton carding and spinning, at the ascertained rate of two hundred to one above manual labour, we are astonished to find that the industry of four millions of persons, operating with water and steam machinery, would be able to execute as much work as eight hundred millions of persons could perform in the old mode of manual industry. We do not expect to accomplish miracles, nor to engross manufactures. But the United States of America, sincerely regarding and thoroughly respecting the rights and interests of the rest of mankind, are able and authorised to participate with all the sister nations of the world, in this wonderful object of human industry, to which they have actually contributed so many valuable inventions.

Of all the discoveries and inventions yet accomplished, the machinery which saves labour, incidental to manufactures in the greatest degree, is that of Whitney, for ginning cotton wool.

The richest object of commercial enterprise, (continues Tench Coxe) for the merchants of the United States is the trade of those countries which do not manufacture. Of this, the trade of our American brethren, from Texas and Mexico to the Straits of Magellan, is a very interesting instance. We can import their raw materials and export our manufactures to an immense amount, with substantial benefit. Their rich products will not often be received in the ports of Europe in our vessels foreign to them. Their copper, crude sugar, peculiar cotton and woods, their various dyeing materials, drugs and medicines, their wool, hides, and tallow, and their gold and

The following is a specimen of Mr. Slater's business letters, they are full of information and close calculations ; in short, his opinion did much to regulate rules of interest, commissions, &c., with the agents of manufactured articles.

*Messrs. —, —, & Co.*

Gentlemen,—Your letter under date of 7th ult. by way of Oxford, is at hand, covering your last quarter's sales, discounts, commissions, and a check on New York for \$1500, which is at your credit. I was much mortified to see your account come on in the old style, notwithstanding so much has been said at times on the subject. You have charged bad debts back, but no deductions for commissions and interest thereon. As respects these bad debts, and others previous, the law is considered very plain on that point, unless proper diligence is exercised when the debt is due, the commission merchant has no right to charge the debt back. However, this is a subject which the manufacturers are taking into serious consideration. You have also charged four per cent. on case and bale goods ; amount of which, in your last quarter's sales, \$5,268 75 difference between that and what others generally charge, and what I can have a single barrel of flour or a quintal of salt fish sold for, amounts to \$79 04. Then comes a more serious item, which is, no interest account. How shall we get along with for time past. Two individual houses, the year past, have credited me nearly \$1000 interest, whose balances at the end of the last year was only about fifty per cent. more than the balance from you. My sons, and I too, think it necessary to go fully into an interest account. Many of my good friends, who dispose of my goods, keep no interest account ; but when they send in their quarterly account of sales, they stipulate, when due, by average, which I consider is the best mode. I have to request of you to give me your mind on the foregoing subjects, as well as on what terms you will agree to receive and dispose of my goods in future. The cotton business is now in such a deplorable state, that no manufacturer can live, if he gives about seven per cent. in commission and interest. Respectfully your obedient servant,

SAMUEL SLATER.

Mr. Slater's second marriage,\* was with the widow of Robert Parkinson, who had entrusted his affairs with Mr. S. and who had

silver, will be exchanged for cabinet wares, plate and jewelry, pottery, iron manufactures, mill-work, cooper's utensils, machinery, types, gunpowder, arms, ships, and other vessels, boats, &c. As our manufactures progress, the trade with that new and interesting country, and with St. Domingo, and all the countries similarly circumstanced, cannot fail to increase.

\* This is to certify whom it may concern, that on Friday, the 21st day of November, Anno Domini 1817, Samuel Slater and Esther Parkinson were lawfully joined in holy matrimony, and pronounced man and wife together, according to the rites of the protestant episcopal church, as witness my hand,

JOSEPH PILMORE,

*Rector of St. Paul's Church in Philadelphia.*

been an acquaintance many years in the Slater family. In this way Mrs. Parkinson had known the former wife of Mr. Slater, and had very much esteemed her as a friend. Mr. Slater's letter on that occasion, a copy of which was found among his papers, is written with so much propriety, that there can be no objection to its publication.

*Mrs. Robert Parkinson, widow, Philadelphia.*

NORTH PROVIDENCE, R. I. Sep. 23d, 1817.

Dear madam,—As the wise disposer of all events has seen fit in his wisdom to place you and me in a single state—notwithstanding, I presume none of his decrees have gone forth which compels either of us to remain in a state of widowhood. Therefore, under these and other circumstances, I now take the liberty to address you on a momentous subject. I have been inclined for some time past to change my situation in life, and have at times named you to my brother and sister for a partner, who have invariably recommended you as suitable, and have fully acquiesced with my ideas on the subject. Now if you are under no obligation to any one, and on weighing the subject fully, you should think that you can spend the remainder of your days with me, I hope you will not feel reluctant, in writing me soon to that effect. You need not be abashed, in any degree, to express your mind on this business, for I trust years have taught me to receive your reply favourably, if my understanding has not. I have six sons to comfort you with the oldest is about fifteen years, he has been at Oxford about a year, (not Oxford in Great Britain), the youngest is in his sixth year, I believe they are all compos mentis, and they are as active as any six boys, although they are mine. Cousin Mary is now down from Ludlow on a visit; she has a noble corpulent son about six months old. I should have divulged my intentions to you months past had not my brother given me to understand that he expected you daily on this way on a visit. Probably you may consider me rather blunt in this business, hope you will attribute that to the country that gave me birth. I consider myself a plain candid Englishman, and hope and trust, you will be candid enough to write me a short answer, at least, whether it be in the affirmative or negative; and should it be in the negative, I stand ready and willing to render you all the advice and assistance in my power relative to settling your worldly matters.

With due respect, as a friend and countryman, I am, dear madam, your well wisher,

SAMUEL SLATER.

N.B.—Hope you are a freemason as respects keeping secrets.

The death of Mr. Slater's eldest son,\* at a time when he became useful in his business and a pleasing companion to his

\* The following register from the town clerk, will show the number and ages of Mr. Slater's children:—

Samuel Slater and Hannah Wilkinson, married Oct. 2d, A. D. 1791.

William Slater, son of Samuel Slater and Hannah his wife, born August 31st, A. D. 1796.

father, was a severe trial; I find the following letter written to him during his sickness:—

*Samuel Slater, Jr.*

NORTH PROVIDENCE, Nov, 18th, 1820.

Dear Son,—Herewith you will receive, per John Sims, your shirts, stockings, &c., which I thought you would be in want of, before I should probably again be at Oxford, therefore I send the bearer up on purpose with them, and in order to ascertain the state of your health; which you will get Mr. Tyson to inform me of. Probably it will be some weeks before we again have sleighing, therefore, if you should wish to return home before we have sleighing again, I will have the carriage sent up any hour you may see fit to say. Now, as your life and health depend entirely on your strict attention to every thing appertaining thereto, do let me entreat you to be very particular in all your food, &c., and see that you keep yourself free from the inclemency of the weather, and above all things, keep your feet warm and dry. I had a letter from John this week; he says if that vessel which was coming to Providence after nails, &c., does not come, he will send your trunk by mail. He sent your grammar by Captain Cooke, whom A. and B. and I sent to Cheshire to look at Mr. Granger's farm. I saw Mr. Johnson of Providence respecting soldering those dye tubs; who says, the upright parts cannot be soldered without being turned partly down, observing that there was no way to keep the solder in its place, after melting it with the soldering iron, until it became cold. Shall write Mr. Tyson on the subject. I have been in Providence this afternoon to attend the funeral of Mr. Wheelock's little daughter, Eliza Slater Wheelock; from all accounts she was almost a perfect being; the heavy loss is almost insurmountable to her parents. My dear son, do let me entreat you to be very careful of your health, and spare

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Elizabeth Slater, daughter of Samuel Slater and Hannah, born November 15th, A. D. 1798.

Mary Slater, daughter of Samuel and Hannah, born Sept. 28th, A. D. 1801.

Samuel Slater, son of Samuel and Hannah, born Sept. 28th, A. D. 1802.

George Basset Slater, son of Samuel and Hannah, born February 12th, A. D. 1804.

John Slater, son of Samuel and Hannah, born May 23d, A. D. 1805.

Horatio Nelson Slater, son of Samuel and Hannah, born March 5th, A. D. 1808.

William Slater, son of Samuel and Hannah, born October the 15th, A. D. 1809.

A true extract, as appears of record, &c.

*Witness,* H. ANGELL, T. Clerk.

*November 5th, A. D. 1814.*

Thomas Graham Slater, son of Samuel and Hannah Slater, was born Sept. 19th, 1812.

Mrs. Slater died a short time after her last child, and left her husband, overwhelmed in business which was daily increasing, with a family of small children. Perhaps a mother's loss was never more severely felt.



no pains to get restored to your former health, and believe me your affectionate father,  
SAMUEL SLATER.

N.B. I forgot the title of the book which you requested me to get when last at Oxford. Do send me word per J. Sims what it is, and I will get it without delay and forward it.

*George Benson Strutt, Esq.*

NORTH PROVIDENCE, June 4th, 1821.

Dear Sir,—At the special request of G. Sullivan Esq. counsellor, and many of my friends in this section of the country, I now take the liberty to address you principally in their behalf. The object is merely this: A certain cotton manufacturing company in this country, who have been in the cotton business a few years only, still, they have pretended to be the inventors of almost every thing, and have taken out patents accordingly; but as it is so well known, that, before they commenced business, one of their brightest partners was in England, for some time, (cloaked as a merchant,) obtaining information and workmen, which induces the public here to believe, that they claim that which belongs to the public, &c. The greatest question is concerning the double speeder, now much used in this country, which is said to be on a much improved plan to any thing in Great Britain. Mr. Sullivan will forward this letter to one of his friends in England, who will wait on you in order to ask you some questions, but not with a view of obtaining any information, as respects any new improvements with you. If the questions asked appear pertinent you will have the goodness to answer them accordingly. We have a very recent new plan of machinery, just set in operation, only yet nicknamed the treble speeder, for roving and winding, which, from all appearance, far exceeds the double speeder; as it will not cost more than one third per spindle, will be abundantly more durable, and perform double the work. The front roller must make at least 400 revolutions per minute, or the machine will not perform the work to best advantage. I contemplate having some of the kind in operation shortly, and should the plan far exceed the double speeder, on a full experiment, I will send you a draught of it with pleasure. I am told the inventor, a country boy about twenty years of age, is now spinning on the same principle, as fine as one hundred skeins to the pound, and running the front roller about as fast as for roving.

I am, dear sir, your most obedient servant,

SAMUEL SLATER.

WEBSTER, Jan. 31, 1835.

Most honoured friend, Moses Brown—Your esteemed favour under date of the 26th ult., was duly received, which I should have answered without delay, had not I been deprived of holding my pen, owing to a lame hand and wrist. However, I immediately sent word to my son John, instructing him to see you on the subject of your letter, and to render every assistance in my behalf. It is very unpleasant to me that the lodge and chapter should attempt to violate their sacred contract, made with the owners of Union Block. I was not over friendly to putting on the additional story, but my

two partners (who were both masons) stated the masons would take a lease of it for forty or fifty years, and pledge thirty shares which they owned in the Manufacturer's bank as security for payment of the rent, but some years after, I learned the shares had not been pledged, for some reason or other. Some of the candid masons have frequently observed to me, that it was the intent and meaning to pledge that stock, and although it had not been done, still it ought to be. I have no surplus cash to spend in the law, but still I, for one, consider a part of my duty to my fellow beings to aid and assist in trying to make people to be honest and upright in all their contracts. Hoping the many years which have passed over your honourable head, still permit you to enjoy your usual state of health and activity, I remain with every respect, your obedient servant,

SAMUEL SLATER.

Mr. Slater's business, up to the year 1829, had progressed, and was established on a permanent basis. And such was the snug and punctual manner in which he managed his concerns, that he did not owe, in all his purchases and debts, one thousand dollars; while he had fifty thousand dollars in mortgages on real estate. No one could justly accuse him of want of prudence and foresight in his loans or responsibilities. It, however, appeared, when the village of Pawtucket was shaken to its foundation, that Mr. Slater's endorsements were very heavy and extensive; and during the panic which followed, he was unable to take up all his endorsed paper, without great sacrifice, yet he knew that, with some accommodation, and with perfect safety, he could meet all demands and save much property from destruction. It was with these views that he applied to William Almy, one of his first partners in his business, and who was then a partner in Pawtucket and in Smithfield, but his application did not receive that prompt and cheerful attention which Mr. Slater had reason to expect; but was considered as a refusal.

This circumstance increased the alarm and shook credit, in Rhode Island, to its centre. All confidence was lost, when Mr. Slater said that, without some accommodation, to gain time, to meet his endorsed paper, he should stop his mills, till he could turn himself round. There was something strange, passing strange, that William Almy should not have fully entered into Mr. Slater's views; having known his circumstances, and being convinced, as he must have been, of his immense property. A meeting of wealthy men was held in Providence, at which meeting Mr. Slater gave a schedule of his property, when Cyrus Butler, Brown & Ives, Moses Brown, and others, expressed a wish for an arrangement, that Mr. Slater should go on with his business. He finally sold out his third in the "Old Mill" in Pawtucket, and his fourth

of the Smithfield property ; and Wm. Almy became the purchaser of those places.

Mr. Slater was concerned in the new steam mill, in Providence, and it was found necessary to take the whole of that into his hands ; so that he weathered the storm and settled his affairs in a much shorter time than was expected. Not without a considerable loss of property, and what was of more consequence, a loss of confidence in men of business in general. It was very evident that his mind and feelings were very essentially affected, and, with his poor state of health, he never fully recovered his tone of assurance.

Some of his letters, about this time, discover a sensibility that was never observable before ; for he was remarkably free of all remarks on those with whom he was connected in business. This was, however, a rebuff that he little expected, and a kind of trial that he was unaccustomed to ; he never before knew what it was to be unable to meet every demand, and could generally anticipate such calls. He said to me : "I felt the more, because I had never been used to it." He felt his dignity, as a business man, hurt, when his proposition did not meet with prompt and cheerful attention and acquiescence.

About this time I find, on some of his papers, the following passages copied. "As the partridge sitteth on eggs, and hatches them not, so he that getteth riches, and not by right, shall leave them in the midst of his days, and at his end shall be a fool."—Jer. xvii. 11.

"Bread of deceit is sweet to a man, but afterward his mouth shall be filled with gravel."

Messrs. ———

NORTH PROVIDENCE, Feb. 3, 1829.

Gentlemen,—S. Slater & Sons have come to a determination to place that *ignoble* establishment in Dudley, called Slater & Howard's woollen factory, in a state of respectability. Whether or not it was got up in iniquity I cannot say ; but I fear some things, during the life of it, are mysterious. It is the united wish of S. Slater & Sons to sink into oblivion the past inroads that have been made, one way or another, on that establishment. They are very anxious to place the business, in future, on a fair mutual ground, so as to pay about six thousand dollars a year for extra *stock*, raising the wind, bad debts, and too liberal commissions. Perhaps you may think that I am rather severe in my remarks ; but I think I can say, as the Earl of Essex said, when Queen Elizabeth boxed his ears. A noble lord told him to submit. His reply was : You are only a looker on, *but I feel it*. However, waiving the allegory, I would just observe to you that, in the course of this month, I contemplate remitting to you from twelve to sixteen thousand dollars, in

bills on the south, and bank bills on Slater & Sons' account, providing the negotiations can be made on 'as favourable terms in your city (where neither Jew nor Quaker has an abiding place,) as can be done elsewhere. I should like your reply on the subject, both as it respects bills of exchange, and Providence and current bank bills. Yours, &c.

SAMUEL SLATER.

*Messrs.* ———

N. PROVIDENCE, Jan. 7th, 1829.

Gentlemen,—In my last, under date of the 31st ult., I wrote you that I had drawn on you, for ten thousand dollars, on four months, in favour of the Steam Cotton Manufacturing Company, in order to meet a demand nearly due in Philadelphia, since which, have altered a five thousand draft into three, two of \$1500 each, and one of \$2000, all payable at the same time.

It is rather a pinching time here for money; though many of the money borrowers say times are becoming more easy. Since the failure of Mr. Hurd, money-jobbers and anti-tariff folks have propounded almost every one, who has seen, or at least touched of late a cotton or woollen factory, that he must go down stream, and amongst them, some whose chins are barely above water, are (friendly) afraid that I have a very heavy load on my back, &c. It is true, I am on two neighbours' paper, but am partially secure, and hope in a day or two, to be fully secured against an eventual loss, providing Mount Etna should not extend its lava much beyond the usual limits. Last week, my sons George, John, and Nelson, bought out my old friend Edward Howard, in the woollen business, which relieves my mind considerably. The business in future will be transacted by myself and sons; and as it respects the Amoskeage and Steam Cotton Manufacturing Company, including the woollen factory and all my private concerns, (which I consider very trivial,) I think I can boldly say, after the whole company debts are paid, (all of which I have to meet,) there will be left from 800,000 to 1,000,000 of dollars to all concerned. I barely mention these circumstances to in some measure rebut any flying reports that may reach your city, and of course will not retard your acceptance of my paper so long as you have my funds in your hands to make you perfectly secure: I shall probably spend (at least) several weeks here, therefore, if you have not already forwarded your last quarter's sale and account current to Oxford, you will send it to Pawtucket. In great haste, your obedient servant,

SAMUEL SLATER.

N.B. It is a general time of health in my family. Hope you and all connections are well. S. S.

*To the same.*

NORTH PROVIDENCE, June 15th, 1829.

Gentlemen,—Since I wrote you under date of the 12th inst., there has been a dreadful storm in and about Pawtucket. I believe on Friday last, Samuel B. Harris made an assignment of his property without even consulting his endorsers, A. I. & W. On Saturday A. & I. W. made an assignment of their property, and as a great amount of paper was lying over, both of their own, and that which they had endorsed for W. Harris & S. B. Harris,

as soon as the alarm was given in Providence, the Providence people, with their lawyers and sheriffs, were busy enough here until midnight on Saturday night, but the conjecture is, they were too late. It will not be necessary for you to make known the name of your informant of the above. Yours, &c.  
S. SLATER.

*To the same.*

July 29th, 1829.

Gentlemen,—On the 22d inst., I drew on you in favour of B. & C. Dyer & Co. at four months, for \$1000 to take up my son Nelson's draft on A. & I. Wilkinson, which was by them dishonoured. Nelson received the draft in part payment of his legacy. Since I wrote you last, D. W. has gone down the falls. His failure is a serious one, and it affects my mind and body seriously, and purse too for the present, but hope eventually to meet with but little loss.\*

Nelson started the Kennedy factory on my account last Monday, I hope shortly to have some goods for you. To-day Jonathan Congdon & Sons, Charles Hadwin, and others, made assignments; so we slide along. I should write you oftener would my health and spirits permit. Yours, &c.

SAMUEL SLATER.

N.B. Kennedy's debts amount to \$115,000, which greatly surprised me and every other person it is about double what I expected.

I exposed myself very much and got cold in my left arm, so that, now, I may almost say, that I am armless. As soon as the humble-bee makes his appearance, I hope my infirmities will leave me.

I hope the great scarcity of money at this time, 1829, will have some effect on those dealers in negroes, who are so opposed to the woollen and other bills before congress.

As the great-gun of the brokers has made an assignment, and failed, it creates a fear in me that they are not so safe to place funds with as many of the state banks. Notwithstanding I own forty shares in the United States Bank, Slater, Wardwell & Co, who have made use of my name as a stockholder, have in no one solitary instance been able to get one cent of the best paper discounted at that bank. I wish the mother bank would take a peep into the business.

1829.—You may rely on one thing, that, if you do, or are obliged to sell cotton goods much lower, you will bankrupt a number of poor cotton spinners. I am not very partial to this mode of drawing, but money is extremely scarce in Providence and its vicinity, that if people do not resort to some stratagem or other, (who can,) nothing but a general bankruptcy would ensue. I have the unpleasant news to give you, that J. Green & Son and John Gardner made an assignment last night, (June 18th 1829,) and their mills are motionless to-day.

\* This was the most trying time in Mr. Slater's life, he was unable to sustain those who relied on him for assistance any longer; he found himself responsible for \$300,000, when the pressure of money was so great as to shake the confidence of the capitalists of New England, and the community in general.

June 11th, 1829.—My health has been at a very low ebb, I have suffered almost every thing from a violent distress at my stomach, which produced indigestion, and nearly a total loss of appetite; and in addition to other afflictions, about three weeks past, I was violently attacked in my old emaciated knee, with the rheumatism, to that degree, which deprived me of motion. I am now rather creeping up hill, and make out with the assistance of my crutches to hobble about my room two or three times a day.

Connoisseurs say, that the steam factory is now making the best goods in the country.

*To the same.*

N. PROVIDENCE, August 3, 1829.

Gentlemen,—Your two letters under dates of the 27th and 28th ult. are at hand. In regard to my endorsements for D. Wilkinson, they are heavy without doubt, but I am secured for the whole eventually. The steam mill is in debt to a large amount, but as \$70,000 have been paid in, and as the whole establishment is holden for her debts, I conceive, taking all things into view, that the depreciation will not exceed the amount paid in. As I have to look up entire new friends to aid me in my unexpected liabilities, makes my task more arduous.

There is coming due at different periods, at the Merchant's bank, Providence, on D. W. and J. K.'s account, about \$62,000, which some of the directors say I can have my own time to pay. Brown & Ives and C. Butler sent me out word, that they wished to have an interview with me; they say I must be carried through, and I doubt not they will do it,

My brother is down here, and he and Mr. Sayles made out a sketch of my real and personal property, valued in their judgment, at what they consider it worth now, at \$690,000, leaving out the Dudley woollen establishment. As respects your observations relative to your fears not being unreasonable, I make every allowance, after taking into view your informant, whom I for years have thought was a *near-ox*, but now I have reason to believe the *off-side* is more congenial to his feelings. It is contemplated to make some arrangements to-morrow, so as to put my affairs in a proper train. When I see any of you face to face, I will give you a history of *human* or *inhuman* generosity. Two of my consignees have already offered to loan me \$10,000 each, over and above the amount of invoices, whom I have not been acquainted with forty years. The failures round here are pretty frequent, the names, no doubt, you have already heard. I shall endeavour to advise you frequently of what is going on here. Respectfully your obedient servant,  
SAMUEL SLATER.

*Samuel Slater, Esq. Oxford, Massachusetts.*

NEW YORK, 10th mo. 21, 1821.

We take the liberty of writing to thee on a subject which has been discussed by our mutual friend John B. Toulmin and ourselves. In the course of every year we receive a great many letters of recommendation with emigrants from Europe, who come out here to seek employment, as labourers, manufacturers, servants, &c. and we are frequently at a loss to procure situations for them. This city is such a general resort for emigrants, there

are always more applicants than places to fill, and consequently much misery is endured by those who are without employment, many of whom return to their native country in despair. J. B. Toulmin has told us of thy kindness in assisting poor people to find employment, and he recommended us to address thee on the subject. We shall feel much obliged to thee if thou wilt permit us occasionally to recommend poor emigrants to thy notice, and also if thou wilt let us know whenever thou or any of thy friends are in want of men, women or children, who have testimonials with them. In this way we may both be the means of serving our country people who cross the Atlantic to obtain a livelihood.

We remain respectfully thy assured friends, A. BELL & Co.

*Samuel Slater, Esq.*

NEW YORK, 21st Oct. 1831.

Dear sir,—I was at Providence a few weeks ago, and much regretted to hear of the sickness of your son, H. Nelson, and of your own indisposition. I had not time to visit you at Oxford, but it will afford me much satisfaction to attend to your orders at Mobile, to which place I return on the 1st November, per ship "Splendid." The crop of cotton, state of Alabama, is represented to be much better this year than last, and prices will probably open at six to eight and a half cents. Such cottons as will spin No. 16 and 18, I think will be bought at seven and a half to eight cents, perhaps lower. Freights are also likely to be lower this year than last. I now beg to call your particular attention to the annexed letter from my most respectable friends, A. Bell & Co. I think aid may be rendered to respectable emigrants, that may be useful to manufacturers in want of hands, as well as to them. I am fully aware of your disposition to be useful, and feel assured you will excuse the liberty now taken.

I am, sir, very truly, your obedient servant, J. B. TOULMIN.

The above letters afford me an opportunity of introducing the usefulness and benevolence of Mr. Slater, in a point of view in which his character has not been duly appreciated.

From the first establishment of the old mill in Pawtucket, it was the resort of every English mechanic who reached our shores; whether by the way of Nova Scotia or New York, you would meet them steering for Rhode Island, with enquiries for Slater's Mills. It is easy to conceive that this continual drain on his attention not only taxed his purse but his patience. But in Samuel Slater they always found a friend who would find them immediate employment if possible, or direction to the most probable places, where they would fulfil their wishes. He knew well how to advise, they looked up to him as a father, and had undoubted confidence in his directions. Many thousands applied to him in this way; he sent none empty away, and it is not easy to conceive of the amount of money which he presented, as well as the amount of joy afforded, to strangers. This was his fort of charity, it was

thrown in his way, and he exercised his benevolence for upwards of forty years in a retired unostentatious manner. He treated none with contempt or reproach, but assured them all that with sobriety and industry they would be able to live in plenty and peace. He warned the idle and intemperate of their danger, reminding such that no country could sustain vice from misery. This was the sphere of Mr. Slater's charities, in which situation few were ever situated to do so much good, and few would have availed themselves of the opportunity to the extent that he did.

*Messrs. George B. & John Slater.*

NORTH PROVIDENCE, Feb. 8th, 1832.

Dear sons,—I wrote John on the 28th ult. that I thought it would be advisable for one of you to come down and see your sick brother, hoping it might in some degree revive his drooping spirits, since which time have not decidedly heard from either of you, only circuitously, that you were in Boston. I hope your brother Nelson is rather more comfortable. He is placed in a disagreeable situation, his nurse is sick, and his uncle has a large family, which must very much interfere with their comfort, &c. He has pretty much made up his mind to move out here in the course of a few days, providing it can be done without endangering his existence. Probably the presence of one of you might make his journey out here rather more agreeable. As the Rev. J. Fletcher once wrote to his friend who had omitted writing for some time, he asks, "Are you alive, paralytic, gouty, slothful, or too busy to write a line to your friend?" Your affectionate father,

SAMUEL SLATER.

*Mrs. Esther Slater, Pawtucket, R. I.*

WILKINSONVILLE, April 9th, 1832.

Dear wife,—I arrived at Webster the day I left Pawtucket, at about five o'clock, pretty comfortable, though somewhat fatigued. I found all my sons and grandsons in good health. Yesterday, son John, wife and son, and I, too, left Webster for this place, where part of us tended church fore and after noon, although very cold. They have not completed repairing the breach in the flume but expect to go to work in two or three days. When I arrived at Webster, daughter Sarah having no help but Harriet, she sent for Fanny, who came over that night. I had a little conversation with her on the subject of going to Pawtucket. She said she would not live with Miss R.; otherwise should be glad to live with us at Pawtucket. Do write me how Nelson gets along, as well as the other invalids. I do not expect to return any earlier, at least, than the last of this week. In haste, yours, &c.

SAMUEL SLATER.

N.B.—Send me all the news you can.

*Mrs. Samuel Slater, Pawtucket, R. I.*

WEBSTER, February 25th, 1833.

Dear wife,—I left Wilkinsonville the same day which you left there sick. Son Nelson informed me that your health was measureably restored. In-



deed I was, in some degree, satisfied that the salubrious air of Pawtucket would soon reanimate you. I have been tolerably well since I arrived here, until a few days past. On Thursday last I traveled round on foot to view some house lots, in the snow broth, and got my feet at least a little damp, if not perfectly wet. The night following was very cold and froze very hard. The next morning after *breakfast*, not in the afternoon, I recommenced my pursuits, and as I was so much older and more clumsy than I thought I really was, that while I was going up a steep frozen hill, and being not sure-footed, I happened, accidentally, to fall prostrate on the ice, to the annoyance of my hip and shoulder. I am now some better, but am severely afflicted with a cold, probably partly from sleeping alone. Last Wednesday morning, about 5 o'clock, a little grand-daughter came to town: she and her mother (as the old woman's sayings are,) *are as well as can be expected*. Son John arrived here last Saturday night, and, no doubt, before this time, has kissed the baby, &c. &c.

I shall endeavour to leave here as soon as the sleighing will permit, so as to get clear of the old maids (both white and black,) who are daily soliciting me for a chance to go to Pawtucket; also a black, or coloured, man wants to live with us. This looks a little like what I have often told you, that there are people to be got for money.

A certain hook which has been baited with shiners, for some time past, will not induce a certain mackerel to bite, or at least swallow the bait. Further particulars when I see you. Respectfully yours, &c.

SAMUEL SLATER.

N. B. How does your old maid do? If Wm. Bliss should want a few dollars, towards cutting wood, you will let him have some.

*Mrs. Esther Slater, Pawtucket, R. I. Favoured by Miss M. Turner.*

WEBSTER, September 28th, 1833.

Dear wife,—The bearer, Miss Mary Turner, would have gone down to Pawtucket, some days past, had I not deferred it on account of seeing my son Thomas, who promised, on Tuesday last, since which time I have not seen and scarcely heard from him, excepting by way of a teamster or tin pedlar, verbally. Mrs. Turner expects to recruit you up in the course of a week or ten days, and then bring you up into the county of Worcester, where you can see, among other curiosities, a noble stone dam, built after the architectural skill of Sir C. Wren. It is a very heavy job, and you may rely on it, I pay good attention to it. I generally eat my breakfast in season, so that I get over there by sunrise, and remain, either sitting or standing on rocks or stones, until sunset; and then during the night I sleep from two to six hours. I enjoy tolerable good health, and my limbs are daily gaining their wonted activity, &c. You will endeavour to find some employment for my new driver, Silvester Davy, during his stay at Pawtucket. If you should come up shortly, I wish you to send up a little good West India, which I want for a *medicine*. I should like to hear how you and all your invalids get along. I would say many things, but having about forty *eye servants* under pay, on out door jobs, all whom I find it necessary to watch as close as a cat does a mouse, therefore I must close.

With due respect, yours, &c. &c. SAMUEL SLATER.

N. B. It is a general time of health here.

*To the Assessors of the Town of Sutton, Mass.*

WEBSTER, August 23d, 1834.

Gentlemen,—Ever since I have owned the estate at Wilkinsonville I have felt injured at the high tax that has been assessed on that property. I have understood that after scaling down the real value, from one quarter to one third, you have then estimated the property at fifty-six thousand dollars, until last year, when you reduced the tax some. Now, in order to give you some light respecting the actual value of it, I will take forty-seven thousand dollars for all the real estate and machinery I own in the town of Sutton; and if you require it, I stand ready to make oath of it. If any one of you will find a purchaser at the above price, I will cheerfully make him a present of fifty dollars. Yours, &c.

SAMUEL SLATER.

Mathew Carey, Esq., of Philadelphia, in 1827 visited the village of Lowell, and desirous of laying before the public a correct statement of its progress and present condition, proposed a number of queries to Mr. Boott, from whom he received the following answer, and communicated it to the public through the medium of the United States Gazette.

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LOWELL, October 25, 1827.

Dear sir,—I believe the following brief statement embraces all the objects specified in your letter of the 22d. If, however, I have, in my haste, omitted any thing, I will cheerfully supply it. With regard to Mr. Hurd's works, I am very imperfectly informed, and should prefer you to draw your information from some other source.

There are now in full operation, at Lowell,\* six cotton mills, four stories

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\* "About fifteen years ago the now territory of Lowell, being about four square miles, and bearing upon it fifteen thousand inhabitants, was owned by a few honest farmers, who obtained subsistence for themselves and families by the cultivation of this comparatively barren spot, and the fish they caught in the Merrimac and Concord rivers. It comprised the northeasterly part of Chelmsford, and bounded easterly by the Concord river, which separated it from Tewksbury, and northerly by the Merrimac that divided it from Dracut; and from the fact of its situation at the confluence of these rivers, was called Chelmsford Neck, and originally by the Indians, *Wamaset*.

"Thus for centuries it lay with the vast resources, which we now see developed, slumbering in its bosom, unsuspected and unknown. But the spirit of enterprise and improvement came, and its touch, like that of the magic wand, has turned this seeming wilderness, not simply into a fruitful field, but into a busy, enterprising, and prosperous city.

"In 1819, Kirk Boott, Esq. a wealthy merchant of Boston, in the habit of a hunter, explored this place. He discovered its resources, and immediately, in company with several other rich merchants of that city, purchased the land and water privileges. They were incorporated by the name of the

high, 155 feet by 44, containing 25,000 spindles, and about 150 looms; in which were made, the last year, 5,042,408 yards of cloth, weighing 1,045,386 pounds, from 1,176,082 pounds of raw cotton. The numbers of yarn, 22, 26, 30, and 40. Two mills for twilled and four for plain goods. Three other mills are covered in; the first will be started in January, and the other two in July and January following. There are now employed 1200 persons in

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'Proprietors of the Locks and Canals on Merrimac river,' and commenced operations by digging a canal from the Pawtucket Falls, easterly, one mile and a half, where it emptied into the Concord river. This canal is sixty feet wide, and carries in depth eight feet of water. This is their grand canal; lateral branches are cut, which carry the water to the several manufacturing mills, and then discharge into the Merrimac or Concord rivers. They then erected a large brick machine shop, and commenced building machinery. This company sell out the privileges to manufacturing companies, dig the canal, erect the mills and build the machinery, and put the whole into operation;—they do it cheaper than any body else would do it; and these are the only terms on which they will sell the privileges. The company has a capital of \$600,000, and employs, constantly, about 200 workmen in their machine shop. A part of their lands they have sold out to individuals at an enormous advance on the original price. Land for which they paid \$20 or \$30 per acre, they have sold for one dollar per square foot. They have still a considerable portion of it on hand and unsold. Kirk Boott, Esq. is their agent.

"Lowell contains, as we have before remarked, about 15,000 inhabitants, and was incorporated in 1824 into a town distinct from Chelmsford, and received its name from Francis C. Lowell, Esq. who early introduced manufactures into this country. There are now about twenty-five factories in operation, and there yet remain unoccupied privileges for nearly as many more. When these shall be taken up, as they, in all probability, will, they will probably afford means of subsistence to another 15,000 inhabitants, making in the whole 30,000.

"A new canal is now being dug, which will furnish sites for about a dozen mills, of the size already built. A company has recently been incorporated by the name of 'Boott Cotton Mills,' which have purchased four of these sites, and upon them are immediately to erect four large brick mills. The railroad from this place to Boston is now complete. It will be, we apprehend, of mutual advantage to both places, and especially to Lowell. It is said to be more permanently built than any other in the country. There are to be two tracks. It will greatly facilitate the immense transportation between these places. A steamboat, owned by Messrs. Bradley & Simpson, has commenced running, between Lowell and Nashua, a distance of fourteen miles. It is to co-operate with the railroad. A spacious market house, 166 feet long, is to be built this season,—\$40,000 have been appropriated for the purpose. Our town is deficient in public buildings. A town house, school houses, and poor house, are all, we believe. Our streets are not paved, but will be ere long. And on the whole, notwithstanding its present imperfections and deficiencies, which time, we trust, will remedy, it yet presents, as we believe, much to interest the curious traveller."—*Lowell Journal*.

the mills; nine tenths of whom are females, 20 of whom are from 12 to 14 years of age. Adjoining the mills of the Merrimack Manufacturing Company, are their bleach and print shops, covering more ground, but equal in capacity to two mills; something over a hundred are here employed, about one fifth females, and one fifth boys. None are taken under 12. Apprentices are taken at 14 to 16, until 21; receiving for the first year, including board, \$125, and \$25 in addition, each succeeding year. Except in the print works, there are no foreigners, and there exceed not one quarter part. Daily wages would perhaps average 50 cents, the minimum being 37½, and the maximum \$2 00. At present about 2,500,000 yards are printed, the residue are sold bleached. The average value of the prints is about 18 cents, of the bleached goods 12 to 13 cents. The foundation of the first mill was laid in 1822, and the first return of cloth, November 1823. Belonging to the mills and print works, and in their immediate vicinity, are 130 tenements, about 24 by 36 feet, which rent from \$60 to \$100 per annum.

The machine shop is of the same dimensions as the mills, and gives employment to about 1,800 machinists; average wages about ninety cents: but as a large portion of the work is by contract, and done by the apprentices, many of them earn from four to six dollars per day. There are 20 tenements attached to the shops; the rent of each of which is about \$90 per annum. The cast iron is furnished from Gen. Heach's furnace, about four miles above: consumption averages a ton daily.

The company to whom the machine shop belongs, have a large tract of land and an immense water power, and are prepared to furnish machinery of all descriptions at short notice, and erect the necessary buildings. They have lately contracted to erect two mills, 155 by 44, near the same, and furnish the machinery capable of making 3,000,000 of yards of cloth, yard wide, of No. 14 yarn, per annum,—to build thirty three-story brick tenements, agent's house, and out buildings,—to furnish eight acres of land, and ample water power, and to put the same in operation for about \$300,000.

Besides those steadily employed in the mills, about 150 mechanics, such as masons, carpenters, &c., find constant work. The amount of capital actually invested is \$2,400,000, viz:

Merrimack Manufacturing Company, - - -	\$ 1,200,000
Proprietors of Land and Canals, - - -	600,000
Hamilton Manufacturing Company, - - -	600,000

With respect to the appropriation of land, I will mention a fact. I purchased, in 1822, nine tenths, undivided, of a farm of 110 acres, for \$1,800. The owner of the other one tenth had agreed to convey it for \$200, but dying, suddenly, insolvent, it was sold by order of the court, and I gave, for seven and a half tenths of his one tenth, upwards of \$3,000. All his debts being satisfied the remainder was sold, a year afterwards, for the benefit of minor children, for nearly \$5,000.

Land favourably situated is worth fifteen cents a foot, and there are a few spots that would command fifty. In 1822, the whole population of that part of Chelmsford which now constitutes Lowell, did not, exclusive of Mr. Hurd's mill, exceed 100; it is now probably 5,000.

The solitary storekeeper of 1822, is now surrounded by numerous rivals; and there are few luxuries, and no necessaries, that sharp competition among

the dealers does not enable the consumer to purchase as cheap in Lowell as in Boston.

Lowell is situated 25 miles northwest of Boston, on the Merrimack river, and is divided from Tewksbury by the Concord, which here falls into the Merrimack. Middlesex canal empties into the Merrimack, a mile above Lowell, and furnishes a cheap conveyance for heavy articles. At present no manufactured goods are conveyed by this channel to Boston, there being no suitable boats. And indeed, if there were, unless the tolls were considerably lower, there would be little saving. Teaming is done low, and the goods carried to any point. The canal terminating in Charles's River, trucking would be necessary, and the expense would thus very nearly equal teaming.

The consumption of foreign articles, in Lowell, such as madder, sumac, indigo, &c., gives employment to far more tons of shipping than would be required to bring the manufactured goods from abroad; and at the same time furnishes to our own coasters an immense increase of freight, by its steady demand for the products of the other states of the Union, such as quercitron bark, flour, starch, copperas, lime, &c. Were this subject actually examined it would be found to exceed the belief of even those most favourable to the American system.

There is a branch of manufactures rapidly increasing, (and in which there is still great room for improvement,) that owes much of its progress to the establishment of print works. I allude to chemical works; many articles are imported from abroad that can be made full as well at home, and which I have no doubt soon will be. Trusting that the present duties will not be abated for some years, we shall go on building two mills a year; and while we hope to reap a reasonable return, I am sure we are benefiting our country, in at least an equal degree. Yours, truly,

KIRK BOOTT.

*Extract of a letter, dated Lowell, April 20, 1835.*

Gentlemen:—As you have considered the brief sketch which I gave of the business of Fall River, worthy of a place in your columns, the annexed account of Lowell, Mass., which has been obtained at some pains and expense, I think cannot be less so.

The total amount of capital employed in the incorporated companies of this place is \$6,650,000. They are at present *nine* in number. The first is the

Locks and Canals Co.—Capital \$600,000, for supplying water power to the various manufacturing establishments. The company have an extensive machine shop, for the manufacture of cotton and woollen machinery, railroad cars, engines, &c. They employ 200 men, at good wages.

The Merrimack Co.—Capital \$1,500,000,—have an extensive print works, and five cotton mills. They run 34,432 spindles, 1,253 looms, give employment to 1321 females, and 437 males, and make 172,000 yards per week.

The Hamilton Co.—Capital \$900,000, have a large printing establishment and three cotton mills. They run about 19,000 spindles, 600 looms—employ about 800 females and 200 males; and make 78,000 yards of prints and drillings per week.

The Appleton Co.—Capital \$500,000, run two mills, between 10 and 11,000 spindles, 350 looms—employ 475 females, 70 males, and make 80,000 yards of No. 14 sheetings and shirtings per week.

The Lowell Co.—Capital \$500,000, manufacture cotton, carpets, rugs, negro cloths, &c., of a very superior quality. They run 4,500 or 5,000 spindles in their cotton mills—140 cotton and 68 carpet looms—employ 330 females, 150 males, and manufacture in the aggregate about 43,000 yards per week.

The Suffolk Co.—Capital \$450,000—run two mills in the manufacture of No. 14 drillings, with 10,240 spindles, 350 looms, give employment to 460 females, 70 males, and makes 90,000 yards per week.

The Tremont Co.—Capital \$500,000,—run two mills, 11,000 spindles, 400 looms, employs 450 females and 80 males, and makes 120,000 yards of No. 14 sheetings and shirtings per week.

The Lawrence Co.—Capital \$1,200,000, went into operation since either of the above. They run at present four cotton mills, for the manufacture of sheetings and shirtings, No. 14 to 30, 37 to 41 inch wide; another large mill and a bleaching establishment is soon to be in operation.

The Middlesex Co.—Capital \$500,000, is a very fine establishment; the superior character of their goods is too well established to require notice here. They manufacture broadcloths and cassimeres, in which they consume 470,000 lbs. of wool and 1,500,000 teasels annually. They run two mills, 3120 spindles, 98 looms—give employment to 240 females, and 145 males—making about 6000 yards of cloth per week. In a few weeks this company will manufacture 500 yards of satinets per day, in addition to their present business.—They will then work up 2000 lbs. of wool per day!

The above establishments consume yearly 11,239 tons anthracite coal; 4750 cords of wood, and 50,549 gallons of oil. The total amount of cloth made is 39,170,000 yards per annum, which requires in the manufacture about 12,256,400 pounds of cotton. In the bleacheries &c. they use 310,000 lbs. of starch, 380 barrels of flour, and 500,000 bushels of coal per annum.

The average sum of money paid to the persons in these establishments, is \$89,000 per month.

Besides the above, there are in this place, a flannel factory; the extensive powder mills belonging to O. M. Whipple, card and whip factory, glass works, furnace, &c. employing from 300 to 400 hands.

I believe it is decided on to commence shortly the erection of *four* new mills (*not thirteen*, as has been published) on a canal now cutting for the purpose. There will still be room and water in the place for *five* more, but I have not learned that it will be likely to be occupied soon. *Belvidere* is now a part of Lowell, by an act of the legislature: taken together, they present the most thriving and business-like appearance; and will rank in population with Newark, in New Jersey, or indeed, with any inland town in the United States.

North Providence was incorporated 1767. It is now distinguished for its manufactures, particularly those of cotton, which form an important interest. There are ten cotton mills, one of which is the first that was built in America, and in Paw-

tucket, S. Slater erected the first water-frame spinning machinery. The extent of this business having concentrated a large capital, and an immense aggregate of industry, has, within the last thirty years, given rise to a large and flourishing village. The village of Pawtucket is situated in the north-east section of the town, four miles north-east of Providence, on the border of the Seekonk river; its site being principally the declivity of a hill, and it is highly romantic and picturesque. The river here affords numerous natural sites for manufacturing establishments, mills and hydraulic works of almost every description; which are occupied to a great extent. The rapid march of manufacturing and mechanical industry, which the short annals of this place disclose, has few examples in our country, and has produced one of the most considerable and flourishing manufacturing places in the United States, and the village is built upon both sides of it, being partly in Rhode Island and partly in Massachusetts. That part of the village which is in Rhode Island, is principally built on four streets; and comprises eighty-three dwelling-houses, and twelve mercantile stores. There are six shops engaged in the manufacturing of machinery, having the advantage of water-power; and various other mechanical establishments, affording extensive employment and supporting a dense population. Upon the Massachusetts side of the river, there is a village of nearly equal size and consequence, for its manufacturing and other interests. Besides the cotton business, there are in the town two furnaces for casting, one slitting mill, two anchor shops, two screw manufactories, three grain mills, one clothier's works, &c. fourteen stores, three places of worship, two academies, and eight schools.

Here the first Sunday-school was taught in New England.

Pawtucket had advanced with uninterrupted prosperity; in consequence of the superior road to Providence, it was viewed as a suburb of the city, and the intercourse was a continual stream of carriages, and conveyances of cotton, returning with cloth and other manufactured goods.

Iron works, machinery, nail manufactory, flour mills, as well as the cotton manufacture, were carried on in the first style; till such a demand for houses, tenements, &c. obliged the inhabitants to build in a rapid manner, so that its appearance as a place of business surpassed any other of its size and dimensions; all its water was fully occupied. This was the cradle of the cotton business, and the consequence of Slater's spinning frame.

Previous to 1829, Pawtucket presented a village of steady and increasing prosperity; every man, woman, and child, found full

employment, at the highest rate of wages. Those who knew the place in 1790,\* were astonished at the rapidity with which buildings of every description arose. And though in the vicinity of Providence, every article of commerce was kept for sale in elegant shops and stores. The cotton mills never ceased to operate their thousands of spindles which had been erected, and produced a quantity of cloth almost incredible to those unacquainted with the power and speed of the water frame and power loom, of the latest improvement. Here, machinery was manufactured for other parts

\* In Benedict's history, 1813, is the following notice :—" The manufacturing of cotton on Arkwright's plan was begun in Pawtucket, in 1790, by Samuel Slater, Esq. from England. There are now in this village, and near, almost 7000 spindles in operation, and within a mile and a quarter of it, including both sides of the river, are buildings erected, capable of containing about 12,000 more. In 1810, according to an account taken by John K. Pitman of Providence, in the state of Rhode Island, only, were thirty-nine factories, in which over 30,000 spindles were running, and the same factories were capable of containing about as many more. The number of spindles in this state only is, in 1813, probably not far from 50,000. In 1810, the gentleman above mentioned ascertained, that within thirty miles of Providence, which includes a considerable territory in Massachusetts, and a small portion of Connecticut, there were seventy-six factories, capable of containing 111,000 spindles. The number of spindles now in actual operation within this circumference are said to be 120,000. The amount of yarn spun each week is not far from 110,000 pounds, or 5,500,000 a year. This side of the river Delaware, the number of cotton factories of different dimensions, built and building, are estimated at five hundred. We may add to the account of places of worship in Rhode Island, that there are many new commodious school houses, in the neighbourhood of the factories, built by their owners on purpose for public worship, as well as schools.

"In 1809, seventeen cotton mills were in operation within the town of Providence and its vicinity, working 14,296 spindles, and using 640,000 pounds of cotton, which yielded 510,000 pounds of yarn. About 1000 looms were employed in weaving. At that time seven additional mills were erecting in the vicinity of the town. One was in operation in East Greenwich with five hundred spindles. The cloths manufactured were bed-ticking, stripes and checks, gingham, shirting, and counterpanes. They are superior to imported goods of the same kind. There was then a woollen manufactory in Warwick and another at Portsmouth. About 50,000 hats were then made annually, worth \$5 each, exclusive of felt hats. A number of paper mills are established. Linen and tow cloth are made extensively, as well as rum, cards, chocolate, and the coarser manufactures of iron. At North Providence, in 1795, there were erected on the Pawtucket, three anchor forges, one slitting mill, two machines for cutting nails, one tanning mill, one oil mill, three snuff mills, one grist mill, one cotton manufactory, one clothier's works, and three fulling mills; they all go by water. Their number in 1812 was much increased."



of the country, and the very best mechanics from Europe found ready employment. There was a time when wheat was brought from the west to the flour mills. These, together with nail factories and other iron works, caused Pawtucket to be a place of business. The road from Pawtucket to Providence was equal to any in the world, and was the admiration of travellers; it connected North Providence with the city, and the intercourse was incessant. Churches and schools were created in sufficient numbers to educate the youth, and accommodate the whole of the inhabitants in their different modes of worship.

The cotton manufactories of Smithfield, R. I. (1819) are important and extensive. There are nine factories, all of which contain more than 11,000 spindles. About one half of these belong to one establishment, owned by Almy, Brown and Slaters. This mill is situated upon the aforesaid branch of the Pawtucket river, about one mile and a half from its junction, being an excellent site for hydraulic works. At this place, there is a large and flourishing village called Slatersville, comprising from six to eight hundred inhabitants. This village is of recent date, having grown up with the manufacturing business, which may be considered as the parent of it. It is impossible to contemplate such a village as this, without the most pleasing sensations and reflections. What a seat of wealth, a focus of activity, and a nursery of industry! What a display of mechanical ingenuity, and what a development of the importance and influence of the useful arts! What a combination and variety of operations, what diversity of employment, and what a number of distinct and curious processes are comprised in the manufacture of those fabrics requisite to supply the wants which the refinements of society occasion! Who can look upon such manufacturing villages as this, without regarding them as the germs of the future Manchesters of America? In addition to the cotton factories which have been noticed, there is another establishment, containing 8000 spindles, which is supposed to be within the bounds of this town, owned by Butler, Wheaton, & Co. of Providence.

Smithfield is well supplied with schools, there being twenty regular ones, which are provided with suitable houses, and are maintained through the year, and several private schools; three incorporated academies; four social libraries; and four places of worship. There is a remarkable fall of water upon the Pawtucket river, called Woonsocket Falls, which is a curiosity. The fall is about twenty feet; it is not perpendicular, but over a precipice of rocks for some distance. The fall of the water upon these rocks,

through a succession of ages, has occasioned numerous excavations, all of which are smooth and circular, and some of them very large, being sufficient to contain several hogsheads.

CHEPACHET, (Gloucester, R. I.) Nov. 1831.

Dear sir,—This village is sixteen miles north west of Providence, and contains about six hundred inhabitants, a church, a school house, and a fire engine; it is on a branch of the Blackstone. Here are three cotton factories, two of them belong to H. B. Lymon & Co., who run 1452 spindles, 41 looms, employ 60 hands, consume 125 bales of New Orleans cotton of 400 pounds each, or 50,000 lbs. a year, and make 270,000 yards of No. 30 printing goods; the other one belongs to Arnold & Wood, who run 1000 spindles, 23 looms, employ about 20 hands, and work up 800lbs. a week, or 40,000lbs. a year—they make 3000 yards a week, or 150,000 yards a year, of shirting.

About eight miles from this settlement, I struck upon a small stream, called the Woonsocket. There is no stream that I have yet seen, for its size, that sustains so many manufacturing establishments as this little river does. There are on its banks twenty-five mills of various kinds, giving support and employment to about thirteen hundred persons. On this stream the first power looms in Rhode Island were put into operation. It is indeed a little river, but it is more valuable to the country from the efficient industry that it sustains, than if its waters flowed over a bed of auriferous lands.

On this stream there are, also, two reservoirs, belonging to the several mill proprietors, who are united into a company for the purpose, under an act of incorporation—the first ever constructed under the authority of this state for use of mills. The reservoirs contain 200 acres, with an average depth of eight feet, and to be drawn off in seasons of drought. My leisure did not admit of my visiting the mills on this stream: I therefore commenced at the Georgia Manufacturing Mills. Their main building is of stone, four stories high, and 180 feet long; they run 3700 spindles, 104 looms, employ 150 hands, and work up 3000lbs. of cotton a week, or 156,000lbs. a year. They manufacture printing goods, and turn out 13,500 yards a week, or 675,000 in a year. Samuel Nightingale, Esq., is the agent at Providence, and Israel Saunders at the factories.

Half a mile below, is another large establishment, belonging to Philip Allen, Esq. There is a stone building 125 feet long, with several ramifications of brick and wood, all painted white, which gives it an aspect of neatness and beauty: 4300 spindles and 100 looms are run, giving employment to 130 operatives. Here are made only fine goods, from No. 45 to 50. H. Holden, agent.

Another half a mile below this, Richard Anthony & Son have a cotton mill of 768 spindles, 22 looms, giving employment to 30 hands; they work up 80 bales of cotton, and make 2200 yards of sheetings a week, or 111,000 in a year. A short distance from here, the Centre Manufacturing Company have a stone mill of 2475 spindles, 60 looms, and employ 75 hands. They make sheetings. They use 2500lbs. of cotton a week, or 125,000lbs. in a year, and turn out 7500 yards a week, or 375,000 a year. James Anthony is the agent of both these establishments.

Something short of a mile from the last mill, you come to Zachariah Allen, Esq.'s woollen manufactory. It is of stone, 60 feet by 40, four stories high, with out buildings for dyeing, &c. There are 600 spindles, 21 broadcloth looms, which give employment to 60 hands. He works up 50,000lbs. of wool, and makes 65 yards a day, or 22,500 yards a year, of broadcloth, valued at from three to four dollars a yard. John Wait, agent.

Mr. Allen's mill is about four miles from Providence. As you proceed down the stream you come to the Lyman Manufacturing Company's establishment. They have two mills, and run 2200 spindles, 60 looms, and employ 75 hands. They make 11,000 yards a week, or 550,000 yards a year of printing goods. Three quarters of a mile below, Manton & Kelley run 800 spindles, 26 looms—employ about 30 hands, and make 5,500 yards a week of printing goods, equal to 275,000 yards in a year. The Marino mills are three miles from Providence, and belong to Franklin & Waterman. They run 1656 spindles, 78 looms, and employ 80 hands: they make 7000 yards a week, or 350,000 a year. Two miles from Providence, in the village of Johnston, Ephraim Talbot and others, have 1500 spindles, 40 looms, and employ 65 hands. They make 5,500 yards a week of seven-eighth sheetings, which is equal to 275,000 yards in a year. Half a mile below, R. Waterman has two mills—one for the making of oil, the other for brown paper. The last establishment on the Woonsocket, and to me the most interesting, is Salmon Townsend & Co.'s manufactory of hat bodies. Mr. Joseph Grant is the company and the inventor of machinery. He is a native of Rhode Island, and has been possessed of his patent for ten years. They work up 200lbs. of wool a day, and make in the same time 1000 hat bodies, or 300,000 in a year. I should like to give you a description of the machinery, but it requires more technicalities than I am possessed of to do it justice—beside, although simple in itself, it should be seen in operation to form a just estimate of the genius that invented it, and of the great value it is to the country.

#### WOONSOCKET FALLS.

The following article is from the pen of a correspondent of the New York Transcript, under date, "Smithfield, R. I., April 12." The writer ought to have said Woonsocket Falls may be denominated the "capital of Smithfield and Cumberland." The Blackstone river is the dividing line between the towns, at this place, and the principal part of the village lies in Cumberland. The writer says—

This is a delightful town. It is the "bordershire" of the state, and joins the county of Worcester, one of the richest, most healthful, and enterprising sections of country to be found on the face of the globe.—The town of Smithfield, for many years had devoted itself exclusively to agricultural pursuits, but of late has become the very focus of "American industry." The Blackstone river and canal runs through it, and the almost endless variety of scenery with which it abounds, gives it many advantages over the ordinary inland towns of New England. It largely participates in the in-

dustry of the day, and probably operates a greater number of spindles than any town or village this side of the Potomac.

The village of Woonsocket, which may be denominated the "capital of Smithfield," is at the fall of the Blackstone river, and drives a very heavy as well as a profitable business. I am informed that upwards of fifty thousand spindles are operated at this place, to say nothing of an immense quantity of other machinery. The village partakes of all the variety of pastoral beauty, and its cliffs and waterfalls, and bubbling rivulets, are pre-eminently calculated to give inspiration to the poet.

The mill sites at Woonsocket are very valuable; it is said they could not be purchased for half a million of dollars, and yet the whole village was sold twenty years ago for twenty thousand dollars. The price given for it at that time was considered exorbitant; and its former proprietor, James Arnold, Esq., has, I believe, made some legal attempts to get the estates back again. In all this he has been unsuccessful; and the consequence has been, tedious and vexatious litigation, without the attainment of a single object.

The village and most of its "dependencies" belong to capitalists of Providence, and in their operations they give employment to some hundreds if not thousands. Although I am not an advocate of the "factory system," and know that it is full of abuses, I must confess that the appearance of the operatives of Woonsocket goes in no small degree to repel and repudiate the objections that have been so often and forcibly urged against manufacturing establishments. The whole body of spinners have the appearance of comfort and domestic happiness, and if they do not enjoy these rich and desirable blessings, I am deceived in my calculations.

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SOUTH OXFORD, Slaterville, Nov. 1831.

Dear sir,—The town of Douglas is about an equal distance from Uxbridge and this place, being about six miles from each. The source of the Mumford river, which I have heretofore named to you, is within four miles of Douglas, and is from Manchoug, Wallace, and Badluck Ponds. On this stream and in the east part of the town, the Douglas Manufacturing Company have two mills—one of stone, and both five stories high. They have 4,000 spindles, 119 looms, and employ 200 hands. They work up 275,000lbs. of cotton into 1,000,000 of yards of printing goods. They have, also, a small woollen concern for making *bockings*; but it is to be relinquished, as it does not answer their expectations—Samuel Lovett, agent. Douglas contains 2,000 inhabitants, and three places of public worship.

Slaterville embraces a part of Dudley, as well as of this town, and an effort is to be made, I understand, to have it set off as a separate and independent town. Here resides Samuel Slater, Esq. the patriarch of manufactures in this country. It is only known to a few that the world is indebted to this gentleman for the discovery of cotton thread. In 1794, while spinning a quantity of Sea Island cotton, the evenness and beauty of the yarn attracted the attention of Mrs. Slater. The question arose, if this is doubled and twisted, why will it not make good sewing thread? The experiment was made, and in order to be fully satisfied of the result, a sheet was made with one half of linen thread and the other half with the cotton. It was

immediately put into use, and the first thread that gave way was the linen! From this period, he commenced the manufacture of thread, and it soon spread into England, France, and other European countries, where it is generally supposed to be of English origin.

Mr. Slater is also the author of Sunday schools in this country, the good effects of which will be more durable than monuments of marble. He is now in his 64th year. His benevolence and philanthropy have been co-extensive with his means; and few have done more to bring young and enterprising men into business than Samuel Slater. He has, probably, now a larger amount employed in manufactures than any single individual in the United States. The firm here is Samuel Slater & Sons.

They have seven mills—two of stone, three of brick, and two of wood. Five of these derive their power from French river; the other two are in the centre of the village, and obtain their power from Slater's lake; the Indian of which is *Chorgoggaggoggmanchogga*. It is a large pond more than four miles long, and is a never failing source of supply. They use 6,000 spindles, and 90 looms, employ 180 hands, and work up 1,000 bales of cotton, which produces 15,000 yards a week, beside large quantities of satinets warps, and sewing thread. They manufacture, also, broad cloths, cassimeres, and satinets. In this branch of their business, they use 600lbs. of wool a day, or 180,000lbs. a year.

#### GENERAL JACKSON'S VISIT TO PAWTUCKET.

The present chief magistrate of the Union, in company with the vice president, waited on Mr. Slater, at his house, to thank him, and congratulate him, as the representative of this great republic, as a friend and benefactor of the country, by introducing among them valuable machinery, before unknown, which has changed the whole policy of the nation. In particular, it has promoted the growth of cotton at the south, and changed the whole face of New England, and thereby made the solitary places literally glad. It has raised amidst rocks and barren land the most beautiful villages, teeming with joy and gladness. Forming a numerous population, not ignorant and vicious, not ragged and oppressed, but paid, fed, and dressed, with the best the country affords; not sunken in profligacy and dissipation, but raised in intelligence, and morals, as well as religious feeling, beyond the other parts of the States. When the president witnessed these scenes of honest industry, of happiness and plenty, of order and decorum, examples of sobriety and morals—he expressed the highest satisfaction. When he was told, that the man who introduced the foundation of this prosperity resided in the village, but was confined to his house by a rheumatic disorder, the consequence of his early exposure in operating his first machinery, President Jackson, with his suite, repaired to the house to pay his respects to the man who had thus benefited our

common country. With the affability and complaisance so peculiar to General Jackson, he addressed Mr. Slater as the father of the American manufactures, as the man who had erected the first valuable machinery, and who had spun yarn to make the first *cotton-cloth* in America; and who had, by his superintendence and direction, as well as by intense personal labour, erected the first *cotton-mill* in Rhode Island; which was first in the land of the pilgrims. General Jackson, who had been informed of these particulars, entered into familiar conversation on the subject. "I understand," said the president, "you taught us how to spin, so as to rival Great Britain in her manufactures; you set all these thousands of spindles at work, which I have been delighted in viewing, and which have made so many happy, by a lucrative employment." "Yes, sir," said Slater, "I suppose that I gave out the psalm, and they have been singing to the tune ever since." "We are glad to hear also, that you have realised something for yourself and family," said the vice president. "Yes, sir, I have obtained a competency." "We are all glad to hear that." "So am I glad to know it," said Slater; "for I should not like to be a pauper, in this country, where they are put up at auction to the lowest bidder."

After this social talk with the president and his suite, General Jackson observed in parting—"It must give you great pleasure to see health and prosperity spread all around you, and to see the progress which has been made, since you first came amongst us; the change is very great, I am told that cotton cloth is lower than was ever known before. I trust you will persevere and go on to perfection." "Cotton cloth is rather too low for profit, but I suppose it is as good as raising corn for fifty cents per bushel, so that we must not complain."

I visited the present Mrs. Slater, at her house in Pawtucket, R. I. for the purpose of conversing with her on the last sickness of her deceased husband; and nothing could exceed the reverence and affection with which she spoke of him; his firmness and forbearance in conducting his business; his abilities to regulate his numerous concerns; how he always relied on his own resources; his deep sense of gratitude for the care and goodness of a benignant Providence over him, from his youth up; when, left in early life without a father's watchful eye to guide him, he bound himself to Mr. Strutt; when he left his native land, and visited a land of strangers, without introduction or a single acquaintance, in raising him up friends, especially a father in Oziel Wilkinson, and beloved companion; and in affording him opportunities to prosecute his enterprise; for these mercies, and others innumerable, I

have great cause for gratitude. He bore his various pains and sicknesses with great patience, though he disliked that any one should have the particular care of him but Mrs. Slater, who was constantly at his call, and watching over his wishes, to alleviate his complaints, and afford him all that a tender and affectionate female can afford her best friend in distress. These consolations he had to the last ; she watched over his dying moments, and his dying breathings, and heard the last word he uttered, "*Farewell.*"\* That final word closed all his communications with man on earth ; whereby he bade adieu to his wife and children and to all his concerns. Mrs. Slater has endeared herself to his children, for her constant and unwearied care to them when young, and to those of them who died after her marriage to Mr. Slater.

The writer of this memoir can give testimony with what fidelity and judgment she took the charge of Mr. Slater's domestic concerns—the whole care of his family ; which she conducted in a style becoming their situation ; and though the last seventeen years were in a great measure years of sorrow and affliction, yet his situation was greatly alleviated by a faithful friend and a partner of his griefs. Our deceased friend was sensible of her value to him ; he arranged her property, and adjusted his will in all respects satisfactorily and agreeable to the wishes of his widow, according to their mutual agreements. Mrs. Slater knew him and lived with him when his mental powers were fully developed ; he had improved himself by much reading of the best authors in the English language. His perceptions were quick and his observations of mankind very extensive and penetrating. He knew the depth of every person he conversed with ; his particular dislike was to *falsehood, deception, and dishonesty* ; other faults he appeared readily to forgive, these he never passed over without severe censure. It was no wonder that so indefatigable a man as he was himself, should dislike listlessness and idleness ; he used to say, "I will help those who will try to help themselves ; but

\* Found in Mr. Slater's bible, written on a small piece of paper, a short time before his death ; his mind had been depressed by some afflictive circumstances which weighed on him. Also the passage in Judges, chap. X. 15th verse, was marked by a leaf being turned down.

Psalms, chap. XLII. 11th verse,—“Why art thou cast down, O my soul, and why art thou disquieted within me? Hope thou in God, for I shall yet praise him who is the health of my countenance and my God.”

Prov. chap. XVII. 28th verse,—“Even a fool when he holdeth his peace is counted wise, and he that shutteth his lips is esteemed.”

those who will not, I do not see it my duty ; such ought to suffer the consequences of their indolence ;” this was a fixed principle with him. His tenderness to animals, and every thing under his care, whether cat or dog, horse or cow, sheep or oxen, showed that he was of a merciful disposition. He was not cruel and morose, though he was frequently silent and reserved, especially to persons with whom he was not intimate. It took some time for him to unbend and become easy and talkative ; but when he did, his conversation was worth hearing ; and his sons hung on his lips, and all his people treasured up his sayings and observations as so many oracles of wisdom.

With Obadiah Brown (his partner, mentioned in the note below) \* he formed a close and sincere friendship, and always spoke of his loss with sincere regret. In the year 1829, he observed to me, “ I should not have been so tried, if Obadiah Brown had been living.” This affection was reciprocal ; for there was no one in whom the son of Moses Brown placed more confidence, than in Samuel Slater, whom he named as his executor in his will ; and showed, to his last moments, how highly he esteemed his valuable partner at the “ Old Mill.”

\* Whereas there are acts unsettled between William Almy and Obadiah Brown, under the firm of Almy & Brown, and Samuel Slater, commencing from the year one thousand eight hundred and three, and continuing to the present time, and whereas they being desirous to bring them to a close, have in order thereto mutually and hereby fully agree that the following terms shall be the final close thereof up to the first day in the present year, viz. that Almy & Brown pay to Samuel Slater the sum of five thousand dollars, and that the stock in the mill, and in the hands of Almy & Brown, and Samuel Slater, or in the hands of their agents, as well as all debts due to them as owners of the cotton mill at Pawtucket, shall continue and belong to them in the several proportions which they hold in the said mill, say one third to each person ; and that all their acts with each other of every name be considered as settled up to the said first day of the present year ; and that the said acts, whether in the mill books, or in the books of either Almy & Brown, or Samuel Slater, be entered balanced up to the first day of the said present year, excepting so far as relates to the balances of stock and outstanding debts, which at that time was in the hands of the said Almy & Brown, and the said Samuel Slater or their agents, which stock and debts belonged to them as owners of the said cotton mill at Pawtucket, shall, as before said, continue to belong to them as heretofore. It is also understood that all the notes and mortgages which they hold together as owners of the cotton mill aforesaid, shall be considered as belonging to them the same as the balances of stock and outstanding debts of any other description. It is also agreed that all notes which they have of each other, that is to say against each other, shall be given up as included in this settlement ; and that this agreement and conclusion shall be binding upon them, the said



## CABOTSVILLE.

This pleasant village is growing up with astonishing rapidity, and bids fair to become, at no very distant day, a second Lowell. A few weeks produce changes here that almost destroy the identity of the place, and give to the visiter new objects of admiration on every repetition of his visit. Streets are cut in every direction, and dwellings and shops going up as if by some magic influence ; yet, notwithstanding the changes that are wrought from week to week by the spirited enterprise of its citizens, the influx of population and the increase of business ; its growth seems to be that of health, and warranted by its extremely favourable location and business facilities. The water power at this place is immense ; and as yet, scarcely begun to be occupied. There is a neatness, too, and good taste in the location of the streets and the arrangement of buildings, which is not common in manufacturing villages, and which reflects great credit upon those who have superintended the arrangement. The cotton factories are extensive, and in appearance resembling those at Lowell. We were politely conducted through the different establishments at this place a few days since, by a friend connected with one of them, and were highly pleased with the perfect good order which prevailed in every department—every one apparently understanding and discharging his duties with a promptness and ease which showed familiarity with the occupation. From the cotton factories and machine shops we proceeded to the sword establishment of N. P. Ames. This is well worth a visit from every one who has a taste for finished cutlery. Mr. Ames is a contractor under government for the manufacturing of swords for the officers of the army and navy of the United States.

The flourishing village of Willimantic is situated in Windham county, Connecticut, on the Willimantic river, near its confluence with another small river called the Natchaug. It extends about a mile along the former stream. Twelve years ago, there were less than a dozen houses, and those very indifferent ones, on the site

Almy & Brown, and the said Samuel Slater, their heirs, executors, and administrators. Agreed to and signed, this nineteenth day of second month, called February, in the year of our Lord one thousand eight hundred and nineteen.

ALMY & BROWN.

SAMUEL SLATER.

Witnesses, *Samuel Slater, Jun., John Slater.*

Obadiah Brown, named in this agreement, took the place of Smith Brown, and continued in the business till his death.

of the present village.\* Now there are four manufacturing establishments here, (running twelve thousand eight hundred spindles, and making annually two millions nine hundred and fifteen thousand yards of cotton cloth,) besides a very superior paper mill lately erected, where printing paper of the best quality is made in great quantities, and there is also a small sattinet manufactory. There are three houses for public worship in the village,—two free and three private schools, a public library, six stores where goods are retailed, and one hundred dwelling houses, containing, many of them, from two to four families each. I have resided three years in Willimantic, and have no hesitation in asserting, from personal experience and observation, that the schools are as well attended here, the scholars, generally, as forward in their education, and the inhabitants as moral in their conversation and conduct, as the people of the neighbouring towns where the *manufacturing system* has not yet been introduced.

A great proportion of the inhabitants of this place, before they came here, were possessed of little or no property. Many of them were in a state of abject poverty. Not owning land for cultivation, and having been educated to no trade, they had no regular employment for themselves or for their families, nor means of supporting them. To them the manufacturing system has indeed proved a blessing. It has furnished them and their children with steady employment, enabled them to clothe their families and obtain for them a regular and comfortable subsistence, and to give their children a decent education.

The *system*, therefore, as it respects the classes above mentioned, (and they constitute three fourths of the population of all the manufacturing villages,) works well; and no objections can be offered against it which cannot, in my opinion, be readily and satisfactorily answered.

#### GREENEVILLE.

This beautiful village, situated on the west bank of Shetucket river, a little below its junction with the Quinebaug, and five

\* No chapter in the history of national manners would illustrate so well the progress of social life, as that dedicated to domestic architecture. The fashions of dress and of amusement are generally capricious and irreducible to rule, but every change in the dwellings of mankind, from the log house to the stately mansion, has been dictated by some principle of convenience, neatness, comfort or magnificence.

hundred rods above steam and packet navigation, has had almost as rapid a growth as the villages of the west. In the year 1828, the general assembly of Connecticut granted a charter to a company of individuals under the name of the "Norwich Water Power Company," the object of which was the construction of works to bring into use the immense water power then wholly unoccupied at this place. The capital of the company was \$40,000; and having purchased a large tract of land lying on both sides of the river, they proceeded to erect a dam and dig a canal, through which the water of the river, necessary for manufacturing purposes, might flow.

These works required much skill and labour. The river at this place is much larger than any other in this section of the country across which a dam had ever been erected for manufacturing purposes, and there are perhaps few if any larger in the United States. It was doubted by many whether a dam could be made to stand permanently against so powerful a stream, and one subject also to great annual freshets. It was built of stone, in length 280 feet, and of a character so solid and substantial, as when finished there seemed little reason to apprehend that it would be carried away. Experience thus far has strengthened this opinion. The abutments of this dam are certainly very handsome and durable specimens of stone masonry. The canal is about one mile (4620 feet) in length, 46 in width at the surface, and 10 feet deep. These works were completed in 1830.

It will be recollected that the manufacturing business was in a state of great depression about this period of time; so great indeed that many persons entertained the belief that it would never revive again in New England. The prospect was gloomy indeed, but the work had been commenced and was vigorously prosecuted. The growth of the village, as has been remarked, has been most rapid. It already contains about sixty dwelling houses, one church, two stores, one tavern, three firms of carpenters engaged in building, one firm of masons, one shoemaker's establishment, one tailor's, two milliner's, and one blacksmith's, (besides a blacksmithery establishment connected with each manufactory). Population about 850.

Of the manufacturing establishments, it may be proper to speak more in detail.

The largest is that of the Thames Company, for the manufacture of cotton cloth. It is one of the finest edifices of the kind in New England, being built of brick, five stories high, 138 in length by 44 in width. There are employed in it about 180 persons of

different ages and sexes; about 42,000 lbs. of cotton are worked up in it per month, and about 132,000 yards of cloth manufactured in the same space of time.

The mill of Messrs. Kennedy & Tillinghast, the Shetucket Tick Factory, for the manufacture of bed ticking, contains 1650 spindles, and employs about 70 persons. About 14,000lbs. of cotton are worked, and 28,000 yards of cloth manufactured each month.

The Greeneville Manufacturing Co. employs about 50 persons, and turns out about 12,000 yards of flannel per month, using for that purpose about 4800lbs. of wool.

The Chelsea Manufacturing Company employs about 20 persons in the manufacture of paper. About 2800lbs. of rags are worked up each day. Some idea of the amount of business done by this company may be inferred from the fact, that the paper sold to a single newspaper establishment in the city of New York, amounts to about \$20,000 per annum.

In addition to these establishments there are two manufactories of carpets, one of which is just getting into operation, and which together employ about 30 persons; a machine shop which employs about 20 men; a manufactory of wood-screws which employs a similar number; a window sash and blind manufactory which employs about a dozen; and a manufactory of mould buttons which employs about 20 persons. The place is still increasing, numerous dwelling houses and stores now being in progress. A number of very eligible sites for manufacturing establishments of any description are yet unoccupied, and there is a large amount of water power unemployed. No ardent spirits are sold at any place within the limits originally purchased by the Water Power Company, and in all deeds or grants of land made by them, is a clause requiring the observance of that regulation, the penalty for the violation of which, if persisted in, after thirty days' notice in writing given to discontinue the same, is a forfeiture of the building where the offence shall have been committed, with the land annexed to the same, to the granters, their successors and assigns.

The village is situated in a delightful tract of country, and is very neat and attractive in its appearance. The dwellings, though not large, contain generally from two to four families, most of which take boarders. Being all painted white, they have a uniform and handsome appearance, and seem to be the abode of industry and contentment. The place derives its name from William P. Greene, Esq. formerly of Boston, now of this city, to

whose capital and public spirit, not merely this village, but this town and vicinity are very largely indebted for their prosperity.

The theme we have selected would seem to afford little room for the exercise of the fancy or the imagination. Still, the scene where our article is laid, is by no means barren of poetical associations. The brave and warlike Miantonimo, the sachem of the Narragansets, lies buried on the estate of the Water Power Company, all unconscious of the buzzing wheels and whirring spindles which are revolving so rapidly around his last resting place. We may as well add that the grave of Uncas, the sachem of the Mohicans, is also in the vicinity, near the residence of the Hon. Calvin Goddard. Miantonimo, it will be remembered, was defeated and taken prisoner by Uncas, and subsequently put to death. Life's fitful fever being over, the victorious and the vanquished, the captive and the conqueror, sleep quietly and peacefully together.

There are a number of cotton and woollen factories established in the towns along the Ohio. Cincinnati is a rival of Pittsburg, in manufactures of iron, &c. There are a number of furnaces for smelting iron ore, in the counties along the Ohio, particularly in the region of Hocking River. Glass is manufactured in several towns in the same part of the state. Iron is also made in some of the counties bordering on Lake Erie. On the Muskingum, below Zanesville, salt is manufactured at various places, for about thirty miles,—260,000 bushels are made annually. Considerable quantities are also made on Yellow Creek, about fourteen or fifteen miles above Steubenville. In 1830, there were, in this state, \$334,672 invested in the manufacture of salt, and 446,350 bushels were made. In every town and village in the state, all the ordinary manufactures, such as hats, cabinet ware, &c., are made to an extent proportioned to the demand. And almost every farmer is the manufacturer of a large part of the articles of wearing apparel, &c. which his family need. It is impossible to make any estimate of these things; if it could be done, it would exhibit a very great amount of manufactures of this sort, and of immense value.

Cincinnati is the great commercial emporium of Ohio,—and, next to New Orleans, the largest city in the valley of the Mississippi. It was founded in 1789. There have been built, at this city, no less than *one hundred and fifty steamboats!* The value of the manufactures of this city is very great; exceeding \$2,500,000 annually! Vast quantities of cabinet work, hats, &c., are here made for exportation.

1. There are ten foundries, including a brass and bell foundry,

and one for casting type. 2. There are three or four cotton factories, and fifteen rolling mills, and steam engine factories and shops. 3. There are five breweries. 4. There is a button factory, and a steam coopering establishment, where several thousand barrels are made, annually, by machinery, propelled by steam. 5. Two steam flour mills, and five or six steam saw mills. 6. There is one chemical laboratory. There are not less than forty different manufacturing establishments driven by steam power.

“We had the pleasure,” says a traveller, “a few days since, of visiting the works of this company, situated on the north bank of the Appomattox, about four miles from Petersburg, and were no less gratified by the beauty and substantial appearance of the buildings than surprised at the expedition with which they have been erected. They consist of two cotton mills, three stories high, a machine shop and sizing house, built of granite of a superior quality, obtained from a quarry on the company’s land. The principal mill is 118 feet long by 44 feet wide ; the other 90 feet long by 40 feet wide. They will contain about 4,000 spindles and 170 looms ; a large portion of which have been set up and ready for use. In addition to these buildings, the company have erected a granite house for a store, and fifteen or twenty frame tenements, as residences for the workmen, each to contain two families ; and preparations have been made to erect as many more as the establishment may require. When the whole shall be completed, and the mills in full operation, it is estimated that Matoaca will contain between four and five hundred inhabitants. It had already assumed the appearance of a village, and will, in a short time, vie with any manufacturing establishment in the country, for beauty of situation, the substantial construction of its buildings, and the care and attention bestowed on the comfortable accommodation of the workmen.

“It is expected to put the works in operation early in the next month, and we understand that it is the intention of the company to manufacture all the cotton spun in their mills, into cloth. Matoaca furnishes another gratifying evidence of the enterprise of our fellow citizens, and of the increasing prosperity of Petersburg. We have now, in addition to the several well known flour mills, five cotton, and two cotton seed oil mills ; and there remains a large unemployed water power on the Appomattox.”

“It gives me great pleasure,” says Webster, “on occasion of so large an assembly of the city of Buffalo, to express my thanks for the kindness and hospitality with which I have been received in this

young, but growing and interesting town. The launching of another vessel on these inland seas, is but a fresh occasion of gratulation on the rapid growth, the great active prosperity, and the exciting future prospects of this town. Eight years ago, fellow citizens, I enjoyed the pleasure of a short visit to this place: there was then but one steamboat on Lake Erie; it made its passage once in ten or fifteen days only; and I remember that persons in my own vicinity, intending to travel to the far west, by that conveyance, wrote to friends to learn the day of the commencement of the contemplated voyage. I understand that there are now eighteen steamboats plying on the lake, all finding full employment; and that a boat leaves Buffalo, thrice every day, for Detroit and the ports in Ohio. The population of Buffalo, now four times as large as it was then, has kept pace with the augmentation of its commercial business. This rapid progress is a sample, but certainly is not to be regarded as the measure, of the future advancement of the city. It will probably not be long before the products of the fisheries of the east, the importations of the Atlantic frontier, the productions, mineral and vegetable, of all the northwestern states, and the sugars of Louisiana, will find their way hither by inland water communication. Much of this, indeed, has already taken place, and is of daily occurrence. Many who remember the competition between Buffalo and Black Rock, for the site of the city, will doubtless live to see the city spread over both.

“Desiring always to avoid extremes, and to observe a prudent moderation in regard to the protective system, I yet hold steadiness and perseverance, in maintaining what has been established, to be essential to the public prosperity. Nothing can be worse than that which concerns the daily labour and the daily bread of whole classes of people should be subject to frequent and violent changes. It were far better not to move at all, than to move forward and then fall back again. A just and leading object in the whole tariff system, is the encouragement and protection of American manual labour. I confess, that every day's experience convinces me more and more of the high propriety of regarding this object. Our government is made for all, not for a few. Its object is to promote the greatest good of the whole; and this ought to be kept constantly in view in its administration. The far greater number of those who maintain the government belong to what may be called the industrious or productive classes of the community. With us labour is not depressed, ignorant and unintelligent. On the contrary, it is active, spirited, enterprising; seeking its own rewards,

and laying up for its own competence and its own support. The motive to labour is the great stimulus to our whole society ; and no system is wise or just which does not afford this stimulus, as far as it may. The protection of American labour, against the injurious competition of foreign labour, so far, at least, as respects general handicraft productions, is known, historically, to have been one end designed to be obtained by establishing the constitution ; and this object, and the constitutional power to accomplish it, ought never to be surrendered or compromised in any degree. The interest of labour has an importance in our system, beyond what belongs to it as a mere question of political economy. It is connected with our forms of government, and our whole social system. The activity and prosperity which at present prevail among us, as every one must notice, are produced by the excitement of compensating prices of labour ; and it is fervently to be hoped that no unpropitious circumstances, and no unwise policy, may counteract this efficient cause of general competency and public happiness." Again, when at

*Pittsburg, July 5th, 1833.* "The chief magistrate of Pittsburg has been kind enough to express sentiments favourable to myself, as a friend to domestic industry. Domestic industry ! How much of national power and opulence, how much of individual comfort and respectability, that phrase implies ! And with what force does it strike us, as we are here, at the confluence of the two rivers whose united currents constitute the Ohio, and in the midst of one of the most flourishing and distinguished manufacturing cities in the Union ! Many thousand miles of inland navigation, running through a new and rapidly improving country, stretch away below. Internal communications, completed or in progress, connect the city with the Atlantic and the lakes. A hundred steam-engines are in daily operation, and nature has supplied the fuel which feeds their incessant flames, on the spot itself, in exhaustless abundance. Standing here, in the midst of such a population, and with such a scene around us, how great is the import of these words, 'domestic industry !' Next to the preservation of the government itself, there can hardly be a more vital question, to such a community as this, than that which regards their own employments, and the preservation of that policy which the government has adopted and cherished, for the encouragement and protection of those employments. This is not, in a society like this, a matter which affects the interest of a particular class, but one which affects the interest of all classes. It runs through the whole chain of human occupation and employ-



ment, and touches the means of living and the comfort of all. New England has conformed herself to the settled policy of the country, and has given to her capital and her labour a corresponding direction. She has now become vitally interested in the preservation of the system. Her prosperity is identified, not perhaps with any particular degree of protection, but with the preservation of the principle ; and she is not likely to consent to yield the principle, under any circumstance whatever. And who would dare to yield it ? Who, standing here, and looking round on this community and its interests, would be bold enough to touch the spring, which moves so much industry, and produces so much happiness ? Who would shut up the mouths of these vast coal pits ? Who stay the cargoes of manufactured goods, now floating down a river, one of the noblest in the world, and stretching through territories almost boundless in extent, and unequalled in fertility ? Who would quench the fires of so many steam engines, or stay the operations of so much well employed labour ? I cannot conceive how any subversion of that policy, which has hitherto been pursued, can take place, without great public embarrassment, and great private distress. I have said, that I am in favour of protecting American manual labour ; and, after the best reflection I can give the subject, and from the lights which I can derive from the experience of ourselves and others, I have come to the conclusion that such protection is just and proper ; and that to leave American labour to sustain a competition with that of the over-peopled countries of Europe, would lead to a state of things to which the people could never submit. This is the great reason why I am for maintaining what has been established. I see at home, I see here, I see wherever I go, that the stimulus, which has excited the existing activity, and is producing the existing prosperity of the country, is nothing else than the stimulus held out to labour by compensating prices. I think this effect is visible every where, from Penobscot to New Orleans, and manifest in the condition and circumstances of the great body of the people : for nine tenths of the whole people belong to the laborious, industrious, and productive classes ; and on these classes the stimulus acts. We perceive that the price of labour is high, and we know that the means of living are low ; and these two truths speak volumes in favour of the general prosperity of the country. Is it not true, that sobriety, and industry, and good character, can do more for a man here than in any other part of the world ? And is not this truth, which is so obvious that none can deny it, founded in this plain reason, that labour, in this country, earns a better reward

than any where else, and so gives more comfort, more individual independence, and more elevation of character."

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MASSILLON, Ohio, 1835.

"Neither the limits of my time or paper would allow me, in my last, to say one word in relation to the beautiful and hospitable village in which it is my happiness at present to sojourn. Six years ago the place where it stands contained only such houses as were occupied by the tillers of the soil. Within that time a place of extensive business has grown up, as by the stroke of a magician's wand. I do not mean, however, to be understood that Massillon has yet attained the dimensions of a very considerable town. It is, on the contrary, not more than one quarter as large as most towns in the country which have not a greater amount of trade. But so far as it has been built, the buildings give the strongest evidence of its prosperity, and foretell the rapid growth which it will experience for many years. Its stores, warehouses, and dwellings, are large and neatly built, and almost uniformly of brick. There is not a single ordinary building in the place, except two or three that stood here before the village was laid out. The streets are arranged in the most convenient order, and the grounds laid out with an uncommon degree of taste.—Nature seems to have indulged her fancy in preparing for the approach of art, and art has by no means rendered to nature an ungrateful return. All things considered, I think it is one of the most pleasant villages I have ever seen, and, located as it is, in the midst of numerous water-mill sites, beds of coal, limestone, and iron ore, all on the very banks of the Ohio and Erie canal, and all, too, near at hand and in possession of its enterprising citizens; situated in the centre of one of the largest and most fertile districts of Ohio, a district inhabited by a very numerous and industrious population, it cannot fail of becoming, in a few years, one of the most important places of the great west. In addition to its communication by water with New York, New Orleans, and Philadelphia, a rail road, of which Massillon will constitute the western terminus, will doubtless be constructed in the course of two or three years, to connect with the Pennsylvania rail road, which is to be extended to Pittsburg. The necessary charter has already been obtained from the legislature of this state, and persons ready to build the road are only waiting for a similar act from the next session of the legislature of Pennsylvania.

"Before the construction of the Ohio and Erie canal the vast resources of this country were comparatively little known, and were of little value. By means of that great work the value of wheat, the staple commodity of the country, has appreciated from twelve and a half to eighty seven and a half cents per bushel, and the cost of supplies from the cities has been diminished in an equal ratio. Of course the inducements for the farmer to grow crops to any greater extent than was necessary for his own consumption was very slight. Some idea of the change which has supervened since the completion of the canal may be gathered from the fact, that this day, while the harvest is yet unfinished, there have been purchased, at the warehouses in this village, upwards of *fifteen hundred* bushels of wheat. And I am assured by one of the most respectable dealers here, that, during the business

season, from three to four hundred bushels in a day is not an unusual quantity to be received at the warehouses and mills.

“With this trade, then, very rapidly increasing, you will not doubt that, when all other resources are brought into action, Massillon will become an important town.

“The crops of all descriptions, throughout this whole country, are this year unusually abundant, but as they flow into granaries entirely empty, present prices are likely to be maintained. The farmers upon this exuberant soil are all growing rich, and the industry of every man reaps a liberal reward.”

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“I wonder not,” says an English writer, “that the first settlers in Virginia, with the bold Captain Smith of chivalrous memory at their head, should have fought so stoutly to dispossess the valiant father of Pocahontas of his fair domain, for I certainly never saw a more tempting territory. Stonington is about two miles from the most romantic point of the Potomac river, and Virginia spreads her wild, but beautiful and most fertile paradise on the opposite shore. The Maryland side partakes of the same character, and perfectly astonished us by the profusion of her wild fruits and flowers. We had not been long within reach of the great falls of the Potomac, before a party was made for us to visit them; the walk from Stonington to these falls, is through scenery that can hardly be called forest, park or garden; but which partakes of all three. A little English girl accompanied us, who had but lately left her home, ‘Oh how many English ladies would glory in such a garden as this!’ and in truth they might; cedars, tulip-trees, sumacs, junipers, and oaks of various kinds, most of them new to us, shaded our path. Wild vines with their rich expansive leaves, and their sweet blossom, rivaling the mignonette in fragrance, clustered round their branches, strawberries in full bloom, violets, anemones, heart’s-ease, and wild pinks, with many other and still lovelier flowers, literally covered the ground. The arbor judeæ, the dog-wood, in its fullest glory of star-like flowers, azalias, and wild roses, dazzled our eyes whichever way we turned them. It was the most flowery two miles I ever walked. The sound of the falls is heard at Stonington, and the gradual increase of this sound is one of the agreeable features of this delicious walk; I know not why the rush of water is so delightful to the ear; all other monotonous sounds are wearying, and harass the spirits, but I never met any one who did not love to listen to a waterfall.”

“The manufactures of Virginia, like her coal mines, are but just beginning to rise into importance. But recently the attention of her citizens has been directed to the subject, and few out of the state are aware how far she

has already advanced, and how rapidly she continues to advance in this branch of industry. I make no reference to the manufacture of tobacco, for in this she has long been engaged, with celebrity and success. I would observe, however, while mentioning it, that this branch has increased immensely within a few years, and now gives employment, in Richmond and Petersburg alone, to not less than 1,500 persons. This business is also extensively carried on in Lynchburg. But the manufactories to which I particularly allude, are such as are carried on elsewhere, in manufacturing the raw materials common to the United States, and in which the question of competition may be considered as involved.

“In Richmond, and Manchester, on the south bank of the river, during the last year, a large cotton manufactory, a large paper mill, and an extensive iron foundry, all went into operation. They are all owned by chartered companies, have adequate capitals, and the buildings are of the most substantial kind, and in the finest order. There are now in full operation here, two cotton manufactories, three iron foundries, to one of which a steam engine manufactory is attached, one cotton seed oil mill, one paper mill, one screw manufactory, two cut nail works, and an extensive puddling furnace and iron making and manufacturing establishment is nearly completed. A number of other companies have been chartered by the legislature, for the purpose of carrying on various other branches of manufacturing, all of which will, no doubt, soon be in operation. Besides the manufactories above mentioned in the vicinity of Richmond, few places can boast of so large or superior flour mills. The Galego mill, which is perhaps the largest in the world, alone runs 22 pair of stones, and makes five hundred barrels of flour daily. Haxal’s mill is but little inferior to this, and Rutherford’s and Clark’s, though less than the others, are considerable mills. The Richmond city mills’ flour is the finest bread flour in the United States, and commands in the foreign markets the highest prices. There are also in this vicinity at least six corn mills.

“The water power at and near Richmond is immense, and easily available; it is the entire James River, which is nearly half a mile wide, and falls more than a hundred feet in a few miles. The advantages of its position for manufacturing purposes, are many and great. Situated at the head of good navigation,—open nearly all the year,—adjacent to a rich coal field,—connected with the interior, as it soon will be, by a canal leading through a fine iron district,—with a healthy and pleasant climate, surrounded by a good soil, nothing can prevent its becoming one of the greatest manufacturing cities in the Union.

“Next to Richmond in importance, and in some respects in advance of it, is Petersburg, at the head of the tide water of the Appomattox. Here cotton manufactories grow up and flourish, as if by magic. They have five or six here now, all of them extensive establishments, and some of them with numerous out buildings. One of them, a short distance from Petersburg, called by an Indian name that I have forgotten, is an establishment inferior to few, if any, in the northern states, and with its houses built for the workmen, forms quite a village. All these manufactories employ white labourers. The experiment, however, of negro or slave labour, has been made in one of the manufactories at Richmond, and has proved fully successful. Other manufactories are about to be erected near Petersburg, in some of which it

is expected that negro labour will be introduced generally, if not exclusively. Indeed, there is every reason to believe that it is better adapted to the manufactory than to the field, and that the negro character is susceptible of a high degree of manufacturing cultivation. Should this kind of labour be found to succeed, of which I think, from some years' acquaintance with it, there can be no doubt,—it will give a decided advantage to the southern over the northern or European manufacturer. This kind of labour will be much cheaper, and far more certain and controllable. He will have nothing to do with 'strikes' or other interruptions, that frequently produce serious delay and loss to the employer. Before the present year the average expense for a good negro man per year, might be estimated at one hundred dollars, for field labour. Some superior hands, well acquainted with tobacco manufacturing, or good mechanics, would perhaps go to one hundred and fifty dollars. These prices include hire, food, clothing, &c. This year, in consequence of the great demand for labourers on the railroads, they are at least twenty dollars higher.

"The water power of Petersburg, though inferior in magnitude to that of Richmond, is yet very considerable. It is also without the advantages of an immediate connexion with the coal and iron regions; nor has it so good a navigation as the latter, as vessels only of six feet draught of water can come to it, while those drawing eleven may go to Richmond; yet is Petersburg as well, if not better, situated for the cotton manufacturing than Richmond. A railroad of sixty miles in length connects it with the Roanoke, and brings to it daily large quantities of cotton, from which it can have the first and best selection. This, together with the cheapness of water power, building materials, and all the articles that enter into the consumption of those who labour, give to it great advantages. Besides its cotton manufactories, it has a cotton seed oil mill, and several flour mills.

"Besides these two prominent places, many others may be found in Eastern Virginia, but little less favourably situated for manufactories. At Fredericksburg, on the Rappahannock, is a considerable water power, and on nearly all the rivers that empty into the Chesapeake, there are more or less sites. On the James River, between Richmond and the mountains, they are almost innumerable, and when the state improvements will have been completed, they will all be in good location. Manufacturing is carried on at Wheeling, on the Ohio, but Western Virginia is identified with the great valley of the Mississippi, the future greatness or prosperity of which no imagination can reach,—it is a world in itself, and the world beyond it cannot change its destinies.

"Heretofore the cheapness and superior productiveness of land in the new states, has operated to retard the prosperity of Eastern Virginia; and those causes, to which has recently been added the high price of cotton, are now seriously checking her advancement, by withdrawing much of her money capital, and many of her citizens and labourers to those states, attracted by the prospects there offered, in the cultivation of the soil, a pursuit more congenial to the habits and feelings of Virginians than commercial or manufacturing enterprises. If Virginians had remained on her own soil, and retained, for her own use, the labourers she has grown, and the capital they have earned, instead of building up other states, she would be a giant in these days. It may be better, however, for her sons, herself, and the Union,

that she has peopled Kentucky, Tennessee, Mississippi, and Alabama, than that she should be the first state of the Union, or that the banks of her rivers should be covered with towns and manufactories.

“A new day is dawning in this part of the Old Dominion. She has found that boasting of her past greatness and glory will add nothing to her present prosperity. The active and regenerating spirit of the west has infused new life into her veins, and that same spirit makes her less metaphysical and more rational. The spirit of improvement is abroad, and within a year or two has worked wonders. Every where, railroads, canals, mines, and manufactories, are the subjects of discussion and action. Enterprising citizens of other states and countries are directing their attention to the many inducements she offers for the profitable employment of their skill, their labour, or their capital. Her own enterprising citizens have asked for and will doubtless obtain additional capital by the establishment of new banks. Old habits and feelings may, for a while, check her onward progress, by denying to her the facilities necessary to the full development of her vast resources ; yet must the genius of the age triumph ; and when the old lion fairly shakes the dew from his mane, and the cobwebs are cleared from her halls of legislation, the manufacturers of the northern states and of the old world will have to look well to their spinning jennies.”—*Pennsylvanian*.

“Wisdom and knowledge, as well as virtue, diffused generally among the body of the people, being necessary for the preservation of their rights and liberties ; and as these depend on spreading the opportunities and advantages of education in the various parts of the country, and among the different orders of the people, it shall be the duty of legislatures and magistrates, in all future periods of this commonwealth (Massachusetts), to cherish the interest of literature and the sciences, and all seminaries of them ; public schools, and grammar schools in the towns ; to encourage private societies, and public institutions, rewards and immunities, for the promotion of agriculture, arts, sciences, commerce, trades, manufactures, and a natural history of the country, to countenance and inculcate the principles of humanity and general benevolence, public and private charity, industry and frugality, honesty and punctuality in their dealings ; sincerity, good humour, and all social affections, and generous sentiments among the people.” It is not saying too much, when we assert that Slater’s opinions and conduct coincided with the above sentiments : and that we have reason to be thankful that his footsteps were directed to America ; that it was put into his heart to visit these shores, for the purpose of introducing the cotton spinning into the United States ; without which we never could have maintained our independence, but should have relied on foreign supplies. Its establishment is therefore one of the greatest events that has yet taken place in the whole world, and

will in the end be the means of revolutionising the whole inhabitable globe.

Though I was the personal friend of Mr. Slater, and had a better opportunity, than any other individual, of knowing his opinions and views on all subjects connected with business, politics, and religion; yet it is not my intention to press any of his peculiarities, nor did I design to become his eulogist. It was my duty to record the fair fame that had gathered round his successful life. In consequence of his being the introducer of the carding, drawing, roving, and spinning by water, in the improved state as used by Mr. Strutt at Belper, both for stocking yarn and twist; it was not thought improper to connect his memoir with an Essay on Manufactures; so that this circumstance may be noted by future historians of the cotton business in the United States. In this account it was important that a correct statement should be preserved, which would have been difficult to obtain, if the present opportunity had been lost. I am only anxious for the authenticity of my statements, for which I feel myself responsible, and liable to correction. My own views of the character of Samuel Slater are expressed in two words—*the Arkwright of America*.

Mr. Slater no sooner found that his business collected children and young people, who were destitute of the means of instruction, and knowing the plan of his old master, Strutt, at Belper, in establishing a Sunday school, than he followed his example, and opened a school in his own house, sometimes teaching the scholars himself, but generally hired a person to perform that duty. One young man from Providence college was deterred by his father, who was a minister of the standing order in Connecticut, who considered it a profanation of the Sabbath. But Mr. Slater persevered, and he was assisted by his father-in-law Oziel Wilkinson, and Obadiah Brown—and I am acquainted with persons who are indebted to that institution for all the early instruction they ever received. There are several living who attended this school at Pawtucket. Mr. Slater told me, that he claimed to have commenced the first Sunday school in New England, and I promised him that it should not be forgotten.

These schools have followed almost every manufacturing establishment that I am acquainted with; and there are no places where they are of so much importance. I observe in the History of Derbyshire, England, that the school which Mr. Strutt established in 1782 is still in existence at Belper, and endowed so that four hundred children are taught, in the common rudiments of English instruction. This gave rise to Sunday schools in Britain, and the

same cause led to their establishment in New England. There may be different opinions respecting what kind of education shall be afforded at Sunday schools, but there can be but one opinion upon their general utility, more especially in manufacturing towns and villages. They have had a very happy effect in the state of Rhode Island, and they have led to the formation of other schools in different parts where instruction had been much neglected.

I conversed with the Rev. Wm. Collier, now engaged in the City Mission in Boston. He stated to me at his house, corner of Chambers and Green street, that he remembers perfectly well in the spring of 1796 that, while at Providence college, President Maxcy informed him that he had received an application from Mr. Slater of Pawtucket, to send him one of the students to instruct a Sunday school, and that he would compensate them for their services. The reason of the president's giving Mr. Collier the first offer was, that he was not able to pay his college expenses. Mr. Collier said, that the compensation would have been a great benefit to him, but he doubted the propriety of teaching a school on Sunday, as he was religiously disposed, and was associated with those who had received their early impressions from the preaching and writings of Mr. Whitfield, and the idea struck him as a profanation of the Sabbath. The president reasoned with him on the opportunity he would have to do good in Pawtucket; stating that there had never been a school of any description there, and no place of worship, and probably no religious or moral instruction, certainly not of a public nature. There was no restriction as to the course of instruction, and he could conduct it, so as to be most useful to the children. These considerations caused him to accept the offer, and he began his labours in the Sunday school on the following Sabbath. He does not recollect that there was any particular form of religious instruction introduced by him, but has no doubt that he did so in a conversational manner with the young people, as he was at that time very religious and disposed to converse with people on the subject.

Mr. Allen succeeded him in teaching the school.

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At a fine water privilege in Athens, Georgia, there was established a cotton mill with machinery from England, by Dearing & Co.; it is still in operation, and one also in Columbus. Mills are erecting in Tennessee on a small scale; and in Kentucky they are anxious to obtain persons who understand the business. The time is approaching when there will be factories at the south and far-west: New England must send out her sons to superintend their operations.



## CHAPTER VII.

## MISCELLANEOUS DOCUMENTS.

“ Seal up the mouth of outrage for a while,  
Till we can clear these ambiguities  
And know their spring, their head, their true descent.”

This chapter is designed to preserve important information which came too late to be arranged in the first part of the work, to which it more properly belongs. The pieces by Tench Coxe are those referred to by Fisher Ames, and which were published under his patronage. They are characteristic of the writer, who was constantly adapting the energies of the people to the natural resources of their country, congenial with their habits, their soil, and their climate.

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“ *A Plan for encouraging Agriculture, and increasing the value of Farms in the Midland and more Western counties of Pennsylvania, by means of Manufactures applicable to several other parts of that State, and to many parts of the United States.\**”

“ In a country, the people, the soil and the climate of which are well suited to agriculture, and which has immense natural treasures in the bowels and on the surface of the earth, *the creation of a ready, near, and stable market for its spontaneous and agricultural productions, by the introduction and increase of internal trade and manufactures, is the most effectual method to promote husbandry, and to advance the interests of the proprietors and cultivators of the earth.* This position has been assumed by one and maintained and relied upon afterwards by others of the most informed and sound minds in Great Britain, in relation to the internal trade, manufactures, and landed interests of that kingdom, although it is an island, possessing uncommon advantages in its artificial roads, canals, rivers, and bays, which, altogether, afford the inhabitants a *peculiar* facility in transporting their surplus produce, with very little expense, to foreign markets.

“ To a nation inhabiting a great continent, not yet traversed by artificial roads and canals, the rivers of which, above their natural navigation, have been hitherto very little improved, many of

\* See Fisher Ames's Letters, pp. 51, 52.

whose people are at this moment closely settled upon lands which actually sink from one fifth to one half the value of their crops, in the mere charges of transporting them to the seaport towns, and others of whose inhabitants cannot at present send their produce to a seaport for its *whole* value, a thorough sense of the truth of the position is a matter of unequaled magnitude and importance.

“The state of things in most of the counties of Pennsylvania which are contiguous to or in the vicinity of the river Susquehannah, and its extensive branches, is considered to be really and precisely that which has been described; and the object of this paper is, to suggest hints for a plan of relief from the great expense and inconvenience they at present sustain, by creating a market town for their produce, on the main body of that river, at some proper place between the confluence of its eastern and western branches, and the lower end of its present navigation.

“It is proposed that the sum of five hundred thousand dollars, to be applied as hereinafter mentioned, be raised in either of the three following methods—that is to say, either by five thousand subscriptions of one hundred dollars each, to the capital stock of a company, to be temporarily associated for that purpose, without any exclusive privileges. Or, by the sale of one hundred thousand lottery tickets at five dollars each, or fifty thousand tickets at ten dollars each; the whole enhanced amount of which is to be redrawn in prizes, agreeably to a scheme which will be hereinafter exhibited. Or, by the application of five hundred thousand dollars of the moneys in the treasury (or otherwise in the command) of the state of Pennsylvania. The inducements to the operation, either to the states, to the adventurers in the lottery, or to the subscribers of the stock of the associated company, will appear in the sequel to be an augmentation of about one hundred per cent. in the value of the property to be embraced; that is, in a profit of about one hundred per cent. on the moneys to be raised or advanced for the purchase of the lands, and the erection of the buildings.

“The application of the above sum of five hundred thousand dollars, might be as follows:—

“1st. In the purchase of land on the western bank of Susquehannah, as a town seat, to be regularly laid off in a town or city for inland trade and manufactures, with streets sixty feet wide, in oblongs of five hundred feet, fronting the southwestern or prevalent summer winds, by two hundred and twenty feet; each oblong to be intersected by a twenty foot alley, running lengthwise, or from the northwest to southeast, so as to give all the lots south-

west front exposures, or southwest exposures and outlets in the rear."

Here follows a detail of particulars which are too local and unimportant to be followed minutely. The above sum is therein appropriated to the purchases of land, the erection of houses, mills, rope-walks, tan-yards, bake-houses, steel-furnaces, soap-boilers, tallow-chandlers, blacksmiths, coopers, wheelwrights, coppersmiths, brass-founders, turners, skin-dressers, gunsmiths, and plumbers' shops; malt houses, breweries, distilleries, printing office, bleach-yards, fulling-mills, potteries, water forges, tobacco and snuff manufactories, lumber yards, boat-builders' yards, school houses, churches, taverns, sail-cloth manufactory, brick-kilns, twine and cord factories, starch works, and dwelling houses, public library, parchment and glue manufactories, pump maker's shed and yard, &c.

"The buildings above mentioned will form a town of one thousand houses, useful work shops and factories by water, fire, or hand, all of stone or brick, which is larger by near one half than the borough of Lancaster. Being on the river Susquehannah, a very great and extensive natural canal, which, with its branches, flows through a country of fifteen millions of acres, and will be connected with the lakes, the position for a town must be considered as warranting a presumption that the lots would be more valuable. In order to extend this advantage, the buildings should be erected on every second or perhaps every third lot, whereby a number of interval lots would be left, which would be nearly of the same value. A further advantage would result from such a disposition of the houses, as the vacant lots could be usefully applied to garden purposes until they should be built upon. As the proposed houses and workshops would be of stone and brick, the possibility of the progress of fire would be less, if the owners of the interval lots should build wooden houses hereafter, than if they were to erect such houses in a compact separate quarter.

"The lots, without the scene which should be first built on, would cost, after throwing out the streets and alleys, about five dollars, and might be moderately estimated, were such a town erected, at the medium value of ten dollars.

"This town being contemplated as such an auxiliary to Philadelphia, as Manchester, Leeds, Birmingham, and Sheffield, &c. are to the seaports of Great Britain, it would be necessary to connect it with the city immediately and effectually by opening a good road to the Lancaster turnpike, by whatever might be necessary to give it the benefit of the communication with Philadelphia

through the Swatara and Tulpohocken canal, through the Brandywine canal, and through the Newport and Wilmington roads, and by all other means which can be devised. It would also be proper to connect it with the borough of Reading, Lancaster, York, Carlisle, &c., and with the western and north-western, northern, and other great roads. Thus circumstanced, with the supplies of wood fuel, coal, bark, iron, grain, cotton, hemp, flax, wool, timber, stone, lime, forage, &c., which those roads and the Susquehannah and its branches, would certainly and permanently afford, this plan could not fail to become of very great profit to the subscribers or prize-holders, or the state, and to the landed interest, both tenants and owners. The expense of transportation from the nearest navigable part of the Susquehannah by way of Newport, is nine dollars per ton; from Middletown it is twelve dollars per ton to sixteen dollars per ton; and as four-fifths of the state are on or westward of that river, the immense saving that would be made by a great and stable market like that contemplated, is equally manifest and desirable. It may be asked, whether the owners of the houses, shops, and works, would receive application from tenants? The answer is, that they would themselves be induced to occupy some of them, that the boroughs in the vicinity have been greatly extended by the settlement of tradesmen, manufacturers and others, who depend upon them and upon the farmer; and that unless their inhabitants open canals to the Susquehannah, or discover coal in their vicinity, those boroughs which are not on that river cannot grow much larger, though the demand for manufactures is steadily increasing with our population. It is regretted that the latter increase of Lancaster has been inconsiderable. But the water works, and the works by fire, which are proposed to be erected, will attract and support tradesmen and the workmen requisite to proceed with the goods they have now begun; as is constantly the case in Europe.

“It may be safely affirmed, that no part of the United States at present half as fully populated as the five counties on the Susquehannah, offers so encouraging or so certain a prospect for an inland town. It is as it were the bottom of a great bag or sack, into the upper parts of which natural and agricultural produce are poured from the northeast, from the north, and from the west.

“It will be observed, that many water works, and objects requiring the moving power of water, are particularised in the plan. For which reason, and in order to procure all the public and private advantages which are attainable, it is proposed to take some position where the river can be so drawn out of its natural bed,

as to create those mills seats and falls. It is confidently affirmed, and is not at all doubted, that there are not wanting places of that great and valuable natural capacity.

“Doubts may arise about the expediency of erecting some of the works. It is therefore observed, that those which are mentioned are merely offered for consideration. None of them are intended to be urged : but it is believed that most of them would prove, on examination, eligible.

“The greater part of the private emolument would be realised, it is supposed, by the erection of nine hundred dwelling houses of various sizes (in any of which various kinds of manufactories could be pursued,) and one hundred shops for such branches as, by reason of their producing loud noises, or unpleasant smells, or of their requiring greater room, could not be carried on among women and children, infirm, aged, or sick persons, or within the compass of an apartment in a common dwelling-house. In that case, however, it would be manifestly prudent to bring the unimproved mill seats into view, that they might be in the way of early use and improvement.

“The reasons of extending a view to the immediate erection of those water mills and other works, is, that by their very great consumption of the raw materials and produce which may be drawn by purchase from the farmers, they will as early and materially increase the benefits of the proposed town to the landholder and cultivator, without taking any hands from agriculture, or preventing any from going to it.

“It will be proper to ascertain, with precision and certainty, what would be a reasonable value of two thousand acres of land, thus purchased, and thus built upon, that the inducements to the operation may be duly exhibited.

“The borough of Lancaster will appear to afford a means of comparison not too favourable, when it is remembered, that a position on the west side of the Susquehannah would give the proposed town a most extensive and fertile back country for its supplies by land, free from the expense and risk of any ferry ; and that it would acquire building materials, provisions, raw materials, and the infinitely important article, pit coal, the very important articles timber and bark, in the greatest abundance, and on the cheapest terms, by means of the navigable waters of the Susquehannah ; and that its traders and artisans could transport produce and manufactures to and receive supplies from Philadelphia, through the canal of Swatara, without any the least expense of carting.

“ An estimate of a town, consisting of the lands and number of buildings particularised above, may be reasonably made as follows :

“ The actual first cost of all the various buildings above mentioned, is stated to be	\$500,000
“ From these deduct the value of the four schools and the church, seven thousand two hundred dollars, which would be public, and would be of no value to the owners of the town, as such, but as they might reflect value upon the houses, manufactories, and lots. Also deduct the sum of five thousand dollars, allowed for the charges of superintendence.	12,200
“ Remains as the actual cost and real value of all the private buildings.	487,800
“ The value of one hundred lots to be given for twenty churches, and thirty-two for the market, court house, and jail; nothing, but as they reflect value on the other property in the town.	000,000
“ The value of one thousand and ninety nine lots, of the size of twenty by one hundred feet, on which the above private buildings and works are to be erected when they shall be completed, at one hundred dollars each on a medium.	109,9000
“ The value of two thousand one hundred and ninety eight interval lots, (lying between and among the private and public buildings, and exclusively of those without that part of the town plot proposed to be built upon, with the fund of five hundred thousand dollars,) at eighty dollars each on an average.	175,480
“ The value of one hundred and twenty feet lots, making twenty large lots equal to one hundred feet square, suitable for erecting twenty other mills, with the requisite share of water right, at five hundred dollars for each mill seat.	10,000
“ N.B. These will make with the improved mill seats about forty, and will not require the height of water, or command of a fall to be kept for more than a quarter of a mile.	
“ It is believed much more might be placed against this item.	
“ The value of the exclusive privilege of keeping ferries, arising out of the ownership of the grounds, to constitute prizes.	5,000
“ The value of twenty two thousand lots, accommodated with streets and alleys, not within the part built upon as above, with the wood on them, and on the streets and alleys, for fuel and timber, the stone, lime, clay, &c. for building, at ten dollars per lot, to constitute prizes.	220,000
	\$1,008,540

“ The several objects in the foregoing estimate of one million eight thousand five hundred and forty dollars, to constitute prizes to be drawn by the purchasers of five hundred thousand dollars worth of tickets : a scheme of a lottery more profitable than most which have been exhibited, and which will moreover yield

great advantages to every proprietor and tenant of lands within the sphere of trade belonging to the town.

“ Although such calculations and estimates as these ought always to be received with the utmost caution, and to be examined with strictness, yet there are circumstances, which, it is conceived, insure success to a well devised and well executed plan in the scene already mentioned.

“ A very great and increasing supply of all those things which can create, maintain, and extend a town ; which can attract, cheaply support, and certainly and thoroughly employ, an industrious community, forced by the nature of the river and country into this singular scene—justify an affirmation that no such spot for a town of inland trade and manufactures of native productions exists in the populated parts of the United States. To estimate the value of the river, and the water works, and their permanent influence upon the prosperity and growth of such a town, let us for a moment suppose, that twenty similar mills, twenty unimproved mill seats, and a copious canal leading to the Susquehanna, were superadded to the present advantages of the borough of Lancaster.

“ It cannot but be perceived, that most of the American inland towns have been commenced without due attention to the powers of water, the advantages of interior navigation, and a copious and certain supply of other fuel, when wood shall become scarce and dear. The whole number of the houses in the towns of some of the states is very inconsiderable, which is principally owing to their produce having passed on, without any natural stoppage or heavy expense of transportation, from their farms to their export market ; or to a scarcity of fuel, which has been created, and will be increased by their growth.

“ There will be a peculiar certainty and stability in the value of property, in such a place as that contemplated, because its trade and manufactures, depending on our own laws, and upon our productions, will not be subjected to the injuries and vicissitudes which often arise from foreign restrictions and prohibitions, and from the defalcations of the imports of foreign, precarious and tropical productions. On the other hand, every new discovery of a mineral or fossil, every addition to the articles of cultivation in the great landed scene, on which it will depend, whether for food or manufactures, will yield fresh nourishment and employment to its inhabitants.

“ In addition to the reasons already suggested for placing the town upon the western side of the Susquehanna, it ought to be

added, with a view to the present and all other plans of establishing towns, in this climate, that the eastern and northern sides of all waters in the United States (the elevation, dryness of the soil, and other things being equal) are less healthy than the southern and western sides. As it further regards that great concern, the health and comfort of the citizens, it also merits repetition, that by the plan proposed, no inadvertent or uninformed man will be able to build his house or place of business in such a manner as to deprive himself of the blessing of the summer winds.

“Although great stress has been laid upon a particular scene in the course of this paper, from a thorough conviction of its fitness and value, it is manifest, that many of the ideas will apply to such of the existing towns in the state of Pennsylvania and elsewhere, as have a capacity to command, by due exertion, and at a moderate expense, water falls, coal or inland navigation. A diligent examination of their respective capacities, in those particulars, ought, upon the general principles suggested, to be made.\* It is also clear, that a very large part of those advantages may be gained at Harrisburg, Middletown, the falls of the Delaware, at the lower end of the Schuylkill canal, and most of the other canals in the United States, by such a power of water as has been mentioned above. In the states of Vermont and Kentucky, in the western parts of Pennsylvania and New York, in the northwestern and southern governments, and in general, at those places on the easternmost, or nearest parts of all the western waters, and the southern, or nearest parts of all the northern waters, where the internal navigation terminates, the whole of the above plan, in a maturer state of their population, will apply, with the most solid and extensive benefits, to the cultivators and proprietors of the soil.”†

\* *T. Coxe, Esq.*

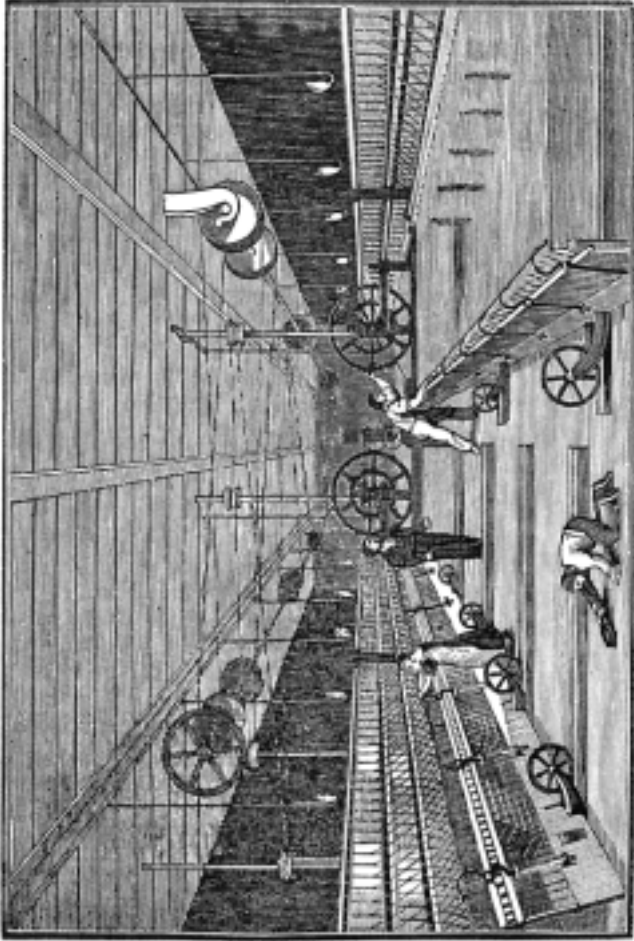
SATURDAY.

Dear sir,—I mentioned one or two things yesterday, which were urgent. One was the papers for the enquiry. You will see by the enclosed, that they are to go to the house of representatives. Will you be so good as to have a letter prepared this morning. I stay at home to-day, to look over petitions. Let the warrants, &c., be sent me. Yours, affectionately.

A. HAMILTON.

† The grounds around the lower falls of many of the rivers emptying into the Atlantic Ocean, are also very suitable for such a plan, because provisions, wood, coal, and raw materials may be transported to them coastwise and from foreign countries.





----- **MULE SPINNING** -----

*Reflections on the affairs of the United States, occasioned by the present war in Europe. (Recommended to the particular attention of the Owners of Coal and Water falls in the Western country.)\**

“It is highly prudent in every nation, seriously to consider the effects which great events in other countries may have produced on their affairs, and to anticipate, in time, the consequences in regard to their interests, to which such events may possibly give

\* *Tench Coxe, Esq.*

NEW YORK, January 7, 1792.

Dear sir,—I lately received, and read with pleasure and profit, the enlarged copy of the examination of Lord Sheffield’s publications: and yesterday I was favoured with your letter, enclosing Secretary Hamilton’s interesting and able report on the subject of manufactures, for both of which accept my thanks.

No better way can, in my opinion, be devised, for negotiating treaties of commerce, than that of augmenting the national respectability, and exhibiting successive and unequivocal proofs of the resources and union of the states, and of the stability and wisdom and energy of the national government.

With sentiments of esteem and regard, I have the honour to be, dear sir, your most obedient humble servant,

JOHN JAY.

*Tench Coxe, Esq., Philadelphia.*

LONDON, December 18, 1794.

Dear sir,—Accept my thanks for your obliging letter of the 8th of last month, and for the book which accompanied it. As yet, I have not had time and leisure to give it that regular and attentive perusal which it appears to merit. It certainly contains much useful information; and from your accuracy, I presume that the facts and statements in it are correct. It will naturally lead both our own people and foreigners to form a favourable and just estimate of the United States, and show, in a strong light, the policy of maintaining that respect for our government and laws, without which, our local and other advantages can neither be enjoyed nor improved.

The manner in which the insurrection has been dissipated, gives me pleasure; and there is reason to hope, that the arts and counsels which produced it, will not be able to operate such another. Our affairs, relative to this country, have a promising aspect: the best disposition towards us prevails here, and indications and proofs of it daily increase. I do really believe that this government mean to give conciliatory measures with the United States a full and fair trial. It never can be wise to cast ourselves into the arms and influence of any nation; but certainly it is wise and proper to cherish the good will of those who wish to be on terms of friendship and cordiality with us. It may seem strange, and yet I am convinced that, next to the king, our president is more popular, in this country, than any man in it.

With the best wishes, and with sentiments of esteem and regard, I am dear sir, your most obedient servant,

JOHN JAY.

rise. The enhancement of the cost of our manufactured supplies, by the demand for the immense armaments, by land and sea, now making in Europe, and the impediments to the cheap transportation of our produce by the recent deduction of a large proportion of the vessels which lately carried them at peace freights, with the impossibility of building, in time, a sufficient number of ships to perform the service, and to supply the purchases, by foreign nations, render it a matter of most comfortable reflection that we have made such frequent and full examinations of our capacities in the business of manufactures, and that we have made so great progress in the establishment of many of the most useful and necessary branches. There seems nothing to warrant a belief, that we shall cease to pursue our course in peace. But it is manifest that, even in that desirable situation, the inducements to pursue manufactures are not a little increased by the advanced cost of our supplies, and the diminution of our carriers at peace freights, already mentioned. It will be wise, then, to devise more methods of increasing our manufactures, in order to cheapen and multiply supplies, and to extend the home market for our agricultural productions. It is, moreover, well worthy of remark, that in consequence of the war in Europe, many articles of great importance, in the building of houses, improving new plantations, and supplying the settled country, and the industrious poor, are said to be prohibited to be exported from Great Britain, because they can be applied to military purposes, or may be wanted for themselves. However reasonable or customary, in similar circumstances, this may be, our citizens must actually be subjected thereby to great additional expense, and the charges of improving and cultivating real estates of every description, must be considerably increased. Manufacturers of these prohibited kinds of goods, are therefore rendered indispensable, by the situation of that country which is the principal foreign source of our supplies.

“However improbable or impossible war may appear, in the judgment of many, or most of us, it can do no injury to remark, that the cost of our supplies would be so excessively increased, by that worst of all possible events, and the vessels to carry our produce at peace freights, would be so extremely diminished, if our own should be involved, that nothing but such great and vigorous efforts as that suggested for consideration, could save our cultivators from a very inconvenient expense, in procuring supplies, and the most distressing reduction of the market prices of many articles of their produce.

“It will be perceived that the plan is laid upon a scale which

is not likely, at this time, to be carried into execution in any one place. It is necessary, therefore, to remark, that it is not intended in any view, but to exemplify what might be done with a given capital. The owners, however, of certain great water situations might, safely and advantageously, lay out their circumjacent grounds in a town plot, with such views, and they might sell or let, on ground rents, such ordinary building lots, or such situations for water works, as purchasers or tenants might apply for, leaving the plan to mature by time and the natural attractions and advantages of the several scenes ; or improvements might be commenced upon a scale of 5,000, 10,000, 15,000, or 20,000 dollars, as capital might be obtainable, and prudence might appear to justify. In all events, it is conceived, that a profitable attention to our situation may be promoted, and possibly some reflections, favourable to the United States, and to the proprietors of particular estates, and many vicinities, may be suggested, by the publication of the plan at the present very interesting crisis.\*—*Federal Gazette*.

\* *Tench Coxe, Esq., Lancaster.*

WASHINGTON, February 11, 1801.

Dear sir,—Your favour, of January 25th, came to hand some days ago, and yesterday a gentleman put into my hand, at the door of the senate chamber, the volume of the American Museum for 1798. As no letter accompanied it, I took it for granted it was to bring under my eye some of its contents.

I have gone over it with satisfaction. This is the morning of the election by the house of representatives. For some time past, a single individual had declared he would, by his vote, make up the ninth state. On Saturday last he changed, and it stands at present, eight one way, six the other, and two divided. Which of the two will be elected, and whether either, I deem perfectly problematical : and my mind has long been equally made up for either of the three events. If I can find out the person who brought me the volume from you, I shall return it by him, because I presume it makes one of a set. If not by him, I will find some other person who may carry it to Philadelphia if not to Lancaster. Very possibly it may go by a different conveyance from this letter. Very probably you will learn, before the receipt of either, the result, or the progress at least, of the election. We see already, at the threshold, that if it falls on me, I shall be embarrassed, by finding the offices vacant, which cannot be even temporarily filled, but with the advice of the senate ; and that body is called on the 4th of March, when it is impossible for the new members of Kentucky, Georgia, and South Carolina, to receive notice in time to be here.

The summons for Kentucky, dated, as all were, January 31st, could not go hence till the 5th, and that for Georgia did not go till the 6th. If the difficulties of the election are got over, there are more and more behind. Until new elections shall have regenerated the constituted authorities, the defects of our constitution, under circumstances like the present, appear very great. Accept assurances of the esteem and respect, dear sir, of your most obedient servant,

TH: JEFFERSON.

COMMONWEALTH OF MASSACHUSETTS.—*In the House of Representatives.*  
Oct. 25, 1786.

*Ordered*, that Mr. Clarke and Mr. Bowdoin with such as the honourable senate may join, be a committee to view any new invented machines that are making within this commonwealth for the purpose of manufacturing sheep's and cotton wool, and report what measures are proper for the legislature to take to encourage the same.

Sent up for concurrence,  
ARTEMAS WARD, *Speaker*.

*In Senate*, Oct. 25, 1786.—Read and concurred, and Richard Cranch, Esq. is joined.

SAMUEL PHILLIPS, JUN. *President*.

COMMONWEALTH OF MASSACHUSETTS, Nov. 1786.

The committee of both houses appointed to view any new invented machines that are making within this commonwealth for the purpose of manufacturing cotton and sheep's wool, have attended that service, and examined three very curious and useful machines, made by Robert and Alexander Barr, for the purpose of carding and spinning of cotton, and ask leave to report the following resolve, which is submitted.

RICHARD CRANCH, *per order*.

*Resolved*, that there be granted and paid out of the public treasury of this commonwealth, to the said Robert and Alexander Barr, the sum of two hundred pounds, to enable them to complete the said three machines and also a roping machine, and to construct such other machines (connected with those already exhibited) as are necessary for the purpose of carding, roping, and spinning of sheep's wool, as well as of cotton wool; they to be accountable for the expenditure of the same, and to lay their accounts of the whole expense of those several machines before the general court for allowance. And it is also

*Resolved*, that all those machines before-mentioned, when finished, shall be delivered by the said Robert and Alexander Barr to a committee of the general court to be hereafter appointed; to be disposed of as the legislature shall think meet, for the purpose of promoting, extending, and encouraging the manufacture of woollens and cottons within this commonwealth. And it is further

*Resolved*, that a gratuity, such as the general court may hereafter agree upon (when a full trial shall have been made of the utility and public advantage of those machines) shall be given to the said Robert and Alexander Barr, as a reward of their ingenuity, and as an inducement to other ingenious artists and manufacturers to bring their arts also into this commonwealth.

*In Senate*, Nov. 16, 1786.—Read and accepted. Sent down for concurrence.  
SAMUEL PHILLIPS, JUN. *President*.

*In the House of Representatives*, Nov. 16, 1787—Read and concurred.  
ARTEMAS WARD, *Speaker*.

Approved—JAMES BOWDOIN.

The committee of both houses appointed to examine the machines for carding, roping, and spinning cotton and sheep's wool, lately made at Bridgewater, under the patronage of the general court, by Robert and Alexander Barr, have attended that service, and on the most critical examination of those machines, your committee find them to be constructed on such true mechanical principles, and executed with such accuracy, as reflects honour on the genius and ability of those young artists; and that in the opinion of your committee they are well adapted to promote several very valuable branches of manufacture within this commonwealth, and therefore ask leave to report the following resolves, which are submitted.

RICHARD CRANCH, *per order*.

COMMONWEALTH OF MASSACHUSETTS.

Whereas by a resolve of the general court passed the 16th of November, 1786, the sum of two hundred pounds was directed to be paid out of the public treasury of this commonwealth to Robert and Alexander Barr, to enable them to complete certain machines for carding, roping, and spinning cotton and sheep's wool.

And whereas the said Robert and Alexander Barr have exhibited to this court an account of the expenditure of one hundred and eighty-nine pounds and twelve shillings of the sum aforesaid, which account appears to be just and reasonable. And whereas by the resolve of the general court passed the 16th of November aforesaid, it is further resolved, "That a gratuity, such as the general court may hereafter agree upon, (when a full trial shall have been made of the utility and public advantage of these machines) shall be given to the said Robert and Alexander Barr as a reward of their ingenuity, and as an inducement to other ingenious artists and manufacturers to bring their arts also into this commonwealth," therefore resolved that the said Robert and Alexander Barr be and they hereby are discharged from the whole of the said sum of two hundred pounds granted as aforesaid, and also that six tickets in the land lottery established by an act passed the 14th of November, A. D. 1786, be given by this commonwealth to the said Robert and Alexander Barr, "as a reward for their ingenuity in forming those machines, and for their public spirit in making them known to this commonwealth." And the managers of the said lottery are hereby directed to deliver to the said Robert and Alexander Barr six lottery tickets accordingly, taking duplicate receipts for the same, one of which to be lodged in the secretary's office. And it is further resolved, that the said machines be left under the care of the Hon. Hugh Orr, Esq. until the further order of the general court, and that public notice be given for three weeks successively in Adams and Nourse's newspaper, that the said machines may be seen and examined at the house of the Hon. Hugh Orr, Esq. in Bridgewater, and that the manner of working them will be there explained to those who may wish to be more particularly informed of their great use and advantage in carrying on the woollen and cotton manufactures. And the said Hon. Hugh Orr, Esq. is hereby requested to explain to such citizens as may apply for the same, the principles on which the said machines are constructed, and the advantages arising from their use, both by verbal explanations, and by letting them see the machines at work. And it is further resolved, that the said Hon. Hugh Orr, Esq. be, and he hereby is, permitted and allowed to make use of the

said machines during the whole time of his having the care of them, as aforesaid, as some recompense for his own time and trouble in showing them and explaining their use to the citizens of the commonwealth at large.

*In Senate, May 2d, 1787.*—Read and accepted. Sent down for concurrence.

SAMUEL PHILLIPS, JUN. *President.*

*In the House of Representatives, May 2d, 1787.*—Read and concurred.

ARTEMAS WARD, *Speaker.*

Approved—JAMES BOWDOIN.

COMMONWEALTH OF MASSACHUSETTS.—*In Senate, March 8, 1787.*

*Resolved* that Richard Cranch, Esq., with such as the honourable house shall join, be a committee to examine the machines now making at Bridgewater by Robert and Alexander Barr, under the patronage of the general court, for the purpose of carding and spinning cotton and sheep's wool, which machines are now nearly completed. And the said committee are hereby empowered and directed, as soon as may be, to examine the accounts of the said Robert and Alexander Barr, respecting the expense they have been at in making those machines, and to allow the same, or so much thereof as to them shall appear reasonable; and also to report to the next general court what gratuity, in their opinion, the said Robert and Alexander justly deserve, as a reward for their ingenuity in forming those machines, and as an encouragement for their public spirit in making them known to this commonwealth.

And the said committee are further directed to report their opinion, in what manner those machines may be disposed of, so as to make them most universally known, and generally useful to this commonwealth.

Sent down for concurrence,

SAMUEL PHILLIPS, JR.

*In the House of Representatives, March 8, 1787.*—Read and concurred, and Mr. Clarke and Mr. Howard are joined.

ARTEMAS WARD, *Speaker.*

Approved—JAMES BOWDOIN.

*Commonwealth of Massachusetts to Robert and Alexander Barr, Dr.*

To sundry materials, &c. for making and completing the several machines for the purpose of carding, roping, and spinning cotton and sheep's wool, viz:—

	£.	s.
To leather, . . . . .	2	00
To card teeth, . . . . .	3	19
To cash paid Ezekiel Reed, for altering his machine, and pricking the leaves, and setting the card teeth, . . . . .		9
To 36lb. of brass at 10d. per lb. . . . .	1	10
To card tacks, 4m. . . . .		5
To cash paid for files, crucibles, &c. . . . .		4
To 8 months labour of two men, each at £6 10 per mo. . . . .	104	
To 8 months board of do. at 9s. per week, . . . . .	28	16
To wood for fuel, . . . . .		14

*Carried forward,* £154 4

	£.	s.
<i>Brought forward,</i>	£154	4
To 261 different pieces of iron work . . . . .	36	12
To coals for melting brass, and timber for the machines,	1	
To expenses in transporting the machines to and from Boston. . . . .	1	4
	£187	
To cash paid for passages and expenses on the road to Bridgewater, omitted in the above account. . . . .	2	12
	£189 12	

ROBERT BARR.  
ALEXANDER BARR.

*To the Honourable Senate and House of Representatives of the commonwealth of Massachusetts, in general court assembled. The petition of Thomas Somers humbly sheweth,*

That in the fall of the year 1785, the tradesmen and manufacturers of Baltimore in Maryland, having formed themselves into an association, in order to apply to the legislature in behalf of American manufactures, being stimulated thereto by a circular letter received from a committee of the tradesmen and manufacturers of the town of Boston. Your petitioner then, residing in Baltimore, (having been formerly brought up to the cotton manufactory, and willing to contribute what lay in his power to introduce said manufacture in America,) did, at his own risk and expense, go to England, in order to prepare the machines for carding and spinning cotton. That after much difficulty, your petitioner found that he could only take descriptions and models of said engines; with which he returned to Baltimore last summer. Soon after his arrival he found that they were very dilatory about encouraging the matter, and with the advice of some friends he resolved to try what might be done in Boston. That on his way to Boston, the sloop was driven ashore by the late storms, on Cape Cod, by which misfortune your petitioner lost almost one half of the small property he had to subsist on until he could get into business. Your petitioner therefore humbly prays for such assistance to begin the manufactory as shall seem most agreeable to your honours, and as in duty bound shall ever pray, &c.

THOMAS SOMERS.

N.B. Your petitioner is perfect master of the weaving in the speediest manner, and of adapting to advantage the different kinds of yarn for marseilles quilting, dimity, muslins plain, striped or checked, calico, cotton and linen jeans, jeannettes, handkerchiefs, checks, drabs, and many other kinds in that line, and understands the management of cotton, and how the spinning should be performed.

T. S.

COMMONWEALTH OF MASSACHUSETTS.—*In the House of Representatives,*  
*March 2, 1787.*

On the petition of Thomas Somers, setting forth his being possessed of certain descriptions and models of machines, for the facilitating labour in the carding, roping, and spinning of cotton wool; and also, his knowledge of adapting the thread for, and of weaving dimities, plain, striped and



checked muslins, calicoes, jeans, jeannettes, and other cotton manufactures ; and praying that he may receive some encouragement for the establishing the cotton manufacture within this commonwealth :

With a view to encourage the aforesaid manufacture, and to give the said Somers an opportunity to give specimens of his abilities to perfect the manufactures set forth in his said petition, *Resolved*, That there be paid out of the public treasury, by warrant from the governor and council, twenty pounds lawful money to be applied to the purposes aforesaid, which sum shall be deposited in the hands of Hugh Orr, Esq. of Bridgewater, who shall be a committee to superintend the application of the same.

Sent up for concurrence,

ARTEMAS WARD, Speaker.

*In Senate, March 8, 1787.*—Read and concurred,

SAMUEL PHILLIPS, JR. President.

Approved—JAMES BOWDOIN.

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It has been observed that Mr. Slater introduced stocking yarn and sewing thread. It is not easy to estimate the value of these articles to this country in 1790 ; the following remarks will show that these yarns required superior skill and experiment.

Stockings are made of only one thread, entwined so as to form a species of tissue, extremely elastic, and readily adapting itself to the part it is employed to cover. The tissue cannot be called cloth, for it has neither warp nor woof, but approaches it closely, and for the purposes to which it is applied, is much superior. It is well known that the ancient Romans had no particular covering for the legs ; but during the middle ages, hose or leggings made of cloth came into use ; and at a later period, the art of knitting stockings was invented. Very different accounts are given of the time and country of this important invention, some attributing it to the Scots, and others deriving it from Spain. Woven stockings are manufactured by the machine called *stocking-frame*, which is exceedingly ingenious, but too complex to be described without plates. It was invented by William Lee, of Nottinghamshire, England, in 1589. He met with little encouragement in his attempts to set up an establishment in England, but was invited into France by Henry IV. and received with great favour. Henry's assassination, soon after, interrupted his prospects, and he died in Paris in great poverty. A knowledge of his machine was carried back to England by some of his workmen, who established themselves in Nottinghamshire, which has since continued to be the principal seat of the manufacture. For near two hundred years, few improvements were made on Lee's invention, and two men were usually employed on one frame ; but it

has been much improved, and adapted also to the manufacture of *ribbed* stockings.

The yarn for the stocking-frame is required to be particularly smooth and equal, and it is therefore spun in a manner different from other yarn, two roves being united to form the thread; on this account it is called double-spun twist.

The making of sewing-thread, by firmly twisting together two three, or more threads of cotton yarn by machinery, is a considerable branch of business, carried on both at Manchester and in Scotland, and in which Mr. David Holt, of the former place, has made great improvements. The beauty of this article, and its remarkable utility and cheapness, are universally known, as it is used in every house, and in the making of almost every kind of clothing. Several shops in the principal streets of London sell this article only. It is also extensively exported; the quantity sent abroad in 1833, was 1,187,601lbs. Cotton hosiery is chiefly made throughout the counties of Nottingham and Derby, at Hinckley, and at Tewkesbury. The number of persons employed in the cotton branch of the hosiery trade, will probably amount to nearly 40,000, in Great Britain.

The following notices of Brindley and Crompton are too interesting to be omitted in this work.

James Brindley, a native of Tunsted, near Wormhill, Derbyshire, an eminent engineer and mechanic, was born in 1716. The poverty of his family prevented his receiving more than the rudiments of education, and at seventeen he became apprentice to a millwright. On the expiration of his indenture he commenced business as an engineer, and, in 1752, displayed great talent in contriving a water engine for draining a coal mine. A mill, which he constructed on a new plan, and other works of the same description, introduced him to the patronage of the Duke of Bridgewater, then occupied in planning a communication between his estate at Worsley and the towns of Manchester and Liverpool, by water. This immense work, the idea of which was ridiculed by most of the scientific men of the period as impracticable, Brindley undertook, and by means of an aqueduct over valleys, rivers, &c. completed so as to form a junction with the Mersey. This success caused him to be employed in 1766, to unite the Trent and Mersey, upon which he commenced the "grand trunk navigation canal," but dying before its completion, the work was finished in 1777 by his brother-in-law, Mr. Henshaw. From this main branch Brindley also cut another canal near Haywood in Staffordshire, uniting it with the Severn in the vicinity of Bewdley,

and finished it in 1772. From this period scarcely any work of the kind in the kingdom was entered upon without his superintendence or advice. Among other designs, he prepared one for draining the fens in Lincolnshire and the Isle of Ely, and another for clearing the Liverpool docks of mud, which was especially successful. The variety of his inventions, and the fertility of his resources, were only equaled by the simplicity of the means with which he carried his expedients into effect. He seldom used any model or drawing, but when any material difficulty intervened, generally retired to bed, and there meditated on the best mode of overcoming it. On such occasions, he has been known to seclude himself for days; and so partial was he to inland navigation, that he is said, to a question humorously put to him on his examination before the house of commons, "For what purpose did he consider rivers to have been created," at once to have replied, "Undoubtedly to feed navigable canals." The intensity of his application to business brought on a hectic fever of which he died in 1772.

CROMPTON.—The "short and simple annals" of the life of this worthy man,—so much resembling the history of many other sons of genius,—are thus recorded by Mr. Kennedy, in his "brief memoir":—

"About the year 1802, Mr. G. A. Lee and myself set on foot a subscription for Mr. Crompton, which amounted to about £500; and with this he was enabled to increase his little manufacturing establishment, in Bolton, namely, of spinning and weaving. He was prevailed upon also, to sit to a London artist, for his portrait, which is now in my possession. He was left a widower when his children were very young, and his only daughter kept his little cottage, in King street, Bolton, where he died, and where she lived in 1829. Being a weaver, he erected several looms for the fancy work of that town, in which he displayed great ingenuity. Though his means were but small, his economy in living made him always in easy circumstances. In 1812, he made a survey of all the cotton districts in England, Scotland, and Ireland, and obtained an estimate of the number of spindles then at work upon his principle, which amounted to between four and five millions; in 1829 about seven millions. On his return, he laid the result of his enquiries before Mr. Lee and myself, with a suggestion, that parliament might grant him something. With these data before him, Mr. Lee, who was a warm friend to genius of every kind, with his usual energy entered fully into his merits, and made an appointment with the late George Duckworth, Esq. of Manchester,

who also took a lively interest in the scheme, and gratuitously offered to draw up a memorial to parliament in behalf of Mr. Crompton. This was signed by most of the principal manufacturers in the kingdom who were acquainted with his merits. He went to London himself with the memorial, and obtained an interview with one of the members for the county of Lancaster. He remained there during the session, and was in the house on the evening that Mr. Perceval was shot, and witnessed the catastrophe. A short time before this disastrous occurrence, Mr. Perceval had given him a promise to interest himself in his behalf; and, in accordance with this assurance, had brought in a bill, which was passed, for a grant of £5000, in full, without fees or charges. Mr. Crompton was now anxious to place his sons in some business, and fixed upon that of bleaching: but the unfavourable state of the times, the inexperience and mismanagement of his sons, a bad situation, and a misunderstanding with his landlord, which occasioned a tedious law-suit, conspired in a very short time to put an end to this establishment. His sons then dispersed, and he and his daughter were reduced to poverty. Messrs. Hicks and Rothwell, of Bolton, myself and some others, in that neighbourhood and in Manchester, had, in 1824, recourse to a second subscription, to purchase a life annuity for him, which produced £63 per annum. The amount raised for this purpose was collected in small sums, from one to ten pounds; some of which were contributed by the Swiss and French spinners, who acknowledged his merits, and pitied his misfortunes. At the same time his portrait was engraved for his benefit, and a few impressions were disposed of: he enjoyed this small annuity only two years. He died January 26th, 1827, leaving his daughter, his affectionate housekeeper, in poverty."

*Mill Ponds and Reservoirs.*—A large mill pond is very advantageous on small rivers, the natural currents of which are not sufficiently abundant at all seasons to furnish the requisite supply of water. It serves as a reservoir, to collect and retain the water which flows into it during the night, for use the subsequent day; in effect, as before observed, doubling the power of the stream. Each acre of a mill pond, one foot in depth, contains 43,560 cubic feet of water, weighing  $62\frac{1}{2}$  lbs. to the foot = 2,722,500 lbs. of water; which, with a fall of ten feet, give available force equal to 567 horse power. If the water were all applied in the course of one minute to the water wheels, or  $567 \div 720$ , the number of minutes in a day of 12 hours, gives .787 or very nearly three fourths of a horse power for each acre of water one foot deep, used with a fall

of ten feet, for one day. With this fall, a mill pond containing 20 acres, and susceptible of retaining a quantity of water of the same extent, and one foot in depth, will give to the proprietor of the mill a command of a 15 horse power, for one day, independent of the ordinary supply of the stream. The depth of pond will not compensate for a deficiency in extent of surface; because, in proportion as the surface of the water subsides, or is drawn down, the height of the fall, and consequently the power, is diminished in an equal ratio. On this account reservoirs, constructed entirely above the level of the mill pond, are peculiarly serviceable; a small extent of ground, covered to a considerable depth with water, being thus rendered equal to a great extent of ground covered with a shallow sheet of water. Where large natural ponds or swamps can be converted into reservoirs, for retaining the flood waters of winter, for use during the droughts of summer, the water power of small streams may be surprisingly augmented. During nine or ten months of the year, inconsiderable brooks yield sufficient water for important hydraulic operations. If, then, by means of artificial reservoirs, the deficiency in the supply of water, during the two or three months of summer, can be obviated, and the winter torrents be made to swell the current of the summer brook, the stream at once becomes as important and effective as one much larger without these artificial resources. The expense of constructing a reservoir may be rendered comparatively light should all the proprietors of the mill seats benefited by it unite to defray them. Even the amount of the very costs of litigation in some cases, relating to water privileges, would be sufficient, if judiciously expended in this way, to place at the control of both parties a greater additional water power than that for which they may be contending.

In the town of Providence, which has been termed the Manchester of America, from having been the centre of the most extensive manufacturing operations, there was, in 1826, only one cotton mill of less than a thousand spindles, whilst several hundred thousand were in operation on the mill streams in the country adjacent. A cotton mill, intended for operating seven or eight thousand mule spindles, with the preparation and looms, was erected in 1827, as an experiment of the practicability of employing *steam power*. Anthracite coal, from the Schuylkill, is successfully used in the furnace of the steam engine of this cotton mill. Mr. Slater was concerned in the above experiment, and has owned the whole of it since 1829. At present, it produces yarn No. 80,

and the cloth is said to be the finest and best in the country. It has more than answered the expectations of the proprietor.

Zec. Allen says:—"By an experiment made with a large high pressure steam engine, in Rhode Island, it appeared that when the throttle valve was thrown open, and the machinery of the mill disconnected with the engine, it required 25 lbs. to the inch on the safety valve, to cause the steam engine to make its regular number of working strokes, and to maintain its proper speed. Without having its friction at all increased by being loaded, it thus required about 17 horse power, equal to one third of the whole estimated power of this engine, to move the beam, piston and fly wheel."

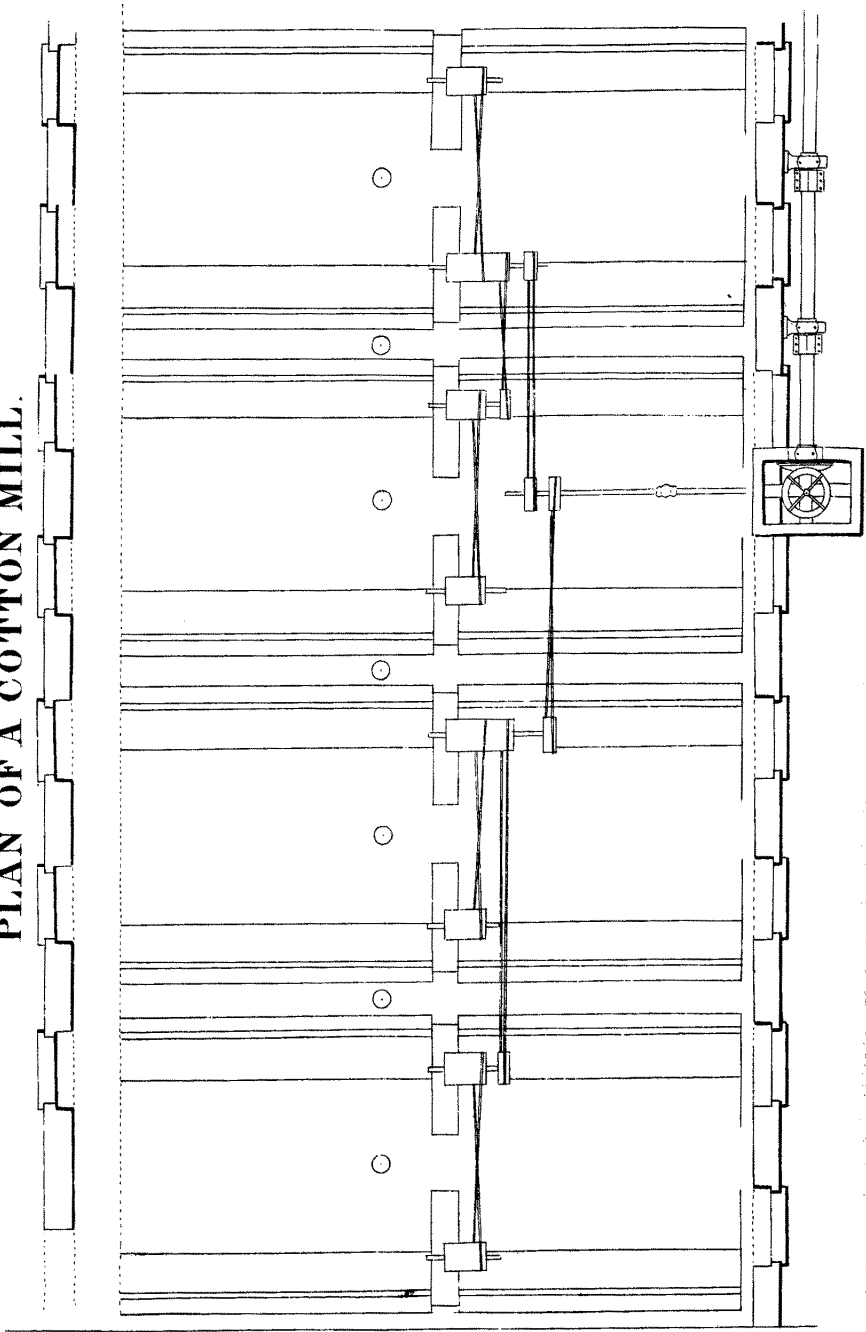
*Calculating Machine.*—Of all the machines which have been constructed in modern times, the calculating machine is doubtless the most extraordinary. Pieces of mechanism, for performing particular arithmetical operations, have been long ago constructed; but these bear no comparison, either in ingenuity or in magnitude, to the grand design conceived and executed by Mr. Babbage, for the British government.

Great as the power of mechanism is known to be, yet few will scarcely admit it to be possible, that astronomical and navigation tables can be accurately computed by machinery; that the machine can itself correct the errors which it may commit; and that the results of its calculations, when absolutely free from error, can be printed off without the aid of human hands, or the operation of human intelligence. All this, however, Mr. Babbage's machine can do. The calculating machine, constructed under the superintendence of the inventor, has been executed at the expense of the British government, and is, of course, their property. It consists, essentially, of two parts,—a calculating part and a printing part; both of which are necessary to the fulfilment of Mr. Babbage's views: for the whole advantage would be lost if the computations made by the machine were copied by human hands, and transferred to types by the common process. The calculating machinery exhibits workmanship of such extraordinary skill and beauty, that nothing approaching to it has been witnessed. In order to execute it, particularly those parts of the apparatus which are dissimilar to any used in ordinary mechanical constructions, tools and machinery of great expense and complexity have been invented and constructed; and, in many instances, contrivances of singular ingenuity have been resorted to, which cannot fail to prove extensively useful in various branches of the mechanical arts. The drawings of this machinery, which form a large part of the work, and on which all the contrivance has been bestowed, and all the

alterations made, cover upwards of 400 square feet of surface, and are executed with extraordinary care and precision. In so complex a piece of mechanism, in which interrupted motions are propagated, simultaneously, along a great variety of trains of mechanism, it might have been supposed that obstructions would arise, or even incompatibilities occur, from the impracticability of foreseeing all the possible combinations of the parts ; but this doubt has been entirely removed by the constant employment of a system of mechanical notation, invented by Mr. Babbage, which places distinctly in view, at every instant, the progress of motion through all the parts of this or any other machine ; and, by writing down in tables the times required for all the movements, this method renders it easy to avoid all risk of two opposite actions arriving at the same instant, at any part of the engine. In the printing part of the machine, less progress has been made in the actual execution, than in the calculating part. The cause of this is the greater difficulty of its contrivance, not for transferring the computations from the calculating part to the copper or other plate, destined to receive it, but for giving to the plate itself that number and variety of movements which the forms adopted in printed tables may call for in practice.

The practical object of the calculating engine is to compute and print a great variety and extent of astronomical and navigation tables, which could not be done without enormous intellectual and manual labour ; and which, even if executed by such labour, could not be calculated with the requisite accuracy. Mathematicians, astronomers, and navigators, do not require to be informed of the real value of such tables ; but it may be proper to state, for the information of others, that seventeen large folio volumes of logarithmic tables alone were calculated, at an enormous expense, by the French government, and that the British government regarded these tables to be of such national value, that they proposed to the French board of longitude to print an abridgment of them, at the joint expense of the two nations, and offered to advance £5000 for that purpose. Besides logarithmic tables, Mr. Babbage's machine will calculate tables of the powers and products of numbers, and all astronomical tables for determining the positions of the sun, moon, and planets ; and the same mechanical principles have enabled him to integrate innumerable equations of finite differences ; that is, when the equation of differences is given, he can, by setting an engine, produce, at the end of a given time, any distant term which may be required.

**PLAN OF A COTTON MILL.**





## CHAPTER VIII.

## EXTRACTS FROM THE SPINNING MASTER'S ASSISTANT.

"To complete the wonder, this manufacture is the creation of the genius of a few humble mechanics ; it has sprung up from insignificance to its present magnitude within little more than half a century ; and it is still advancing with a rapidity of increase that defies all calculation of what it shall be in future ages."—*Baines*.

Previous to the above work, published in Glasgow, 1832, nothing ever appeared in Europe on the art of cotton spinning, fitted to assist the master, manager, or artisan, in acquiring a correct and systematic knowledge of the *real* principles of the business. So that the manager of a cotton spinning factory could only acquire a proper knowledge of his business by long experience and application in the practical department of the manufacture, and it depended upon the situation in which he was placed, and the advantages he enjoyed, if he ever obtained that correct knowledge of all its details which is essentially necessary to render him fully qualified for managing a large establishment with satisfaction or profit to the proprietors.

It is only when *theory* and *practice* are combined, that efficiency can be attained in effecting improvements.

In all factories where there is a variety of machinery employed in the manufacturing of any particular kind of goods, it has always been found that the manner in which the machinery is placed, together with the arrangement of the different departments has a very prominent influence in either retarding or accelerating the progress of the work. But in no place is this influence more sensibly observed than in a cotton spinning factory. It is obvious, however, that the manner in which the machinery is placed, and the arrangement of all its different departments, will entirely depend upon the plan of the house, or the form in which it is built ; hence the propriety and advantage of having a mill built on such a plan, or form, as to admit of having all the machinery placed, and the various departments arranged, in the manner best adapted for facilitating the progress of the work as a whole.

The situation of the ground, or space upon which the mill is to be erected, must always be taken into consideration in laying

down the plan or fixing upon the particular form in which the house is to be built ; and in some cases this plan must just be made to suit the situation or place in which it must stand. But when the situation and extent of the premises are such as to afford ample scope for the proprietors to build their mill on any plan or form which they may think proper ; in these circumstances, the house may be built in a form that will admit of having the machinery and the various departments and offices of the establishment, arranged in such a manner as to afford the greatest facility for accelerating the progress of the work in all the different stages or departments. They ought to be so situated as to prevent all unnecessary going to and from any of the different departments of the work, by the workers employed about the establishment. All the different offices, such as ware-room, picking-room, mechanic's shop, &c. ought to be contained within the walls of the mill, if possible, because there is always a continued communication with these different offices.

A good ground plan of a *cotton-mill*, is 145 feet long, and 37 feet wide within the walls ; with a wing attached to one end, 64 feet by twenty. A house of these dimensions would cover a space of about 7461 square feet, besides the stair-case and water-closets. A house 37 feet wide affords ample space for machines of 300 spindles each. A wing attaches to the body of the building, the various departments of which should be occupied for all the different offices, or separate apartments necessarily required about a cotton spinning factory. The body of the mill is supposed to be 145 feet long and 37 feet wide within the walls ; and supposing it to be six stories high, a house of these dimensions would be capable of containing 23,000 spindles, with all the necessary preparation for average numbers. If steam was needed it would require an engine of between 40 and 50 horses' power to drive a mill of this extent. Every spinning factory ought to have a little more power than is merely necessary to drive it, because the weight of the machinery will often vary with the weather, the quality of the oil used, &c.; consequently, when there is barely a sufficiency of power, the engine will frequently be so overburthened, as to render it incapable of driving the machinery at a regular speed, thus requiring more trouble and expense for fuel, &c. This is worthy of attention where steam is used.

The breadth of the mill being 37 feet, affords ample room for arranging all the different machines in the carding department in the best order, both for promoting the progress of the work, and allowing the different workers that are employed in this depart-

ment to attend to their employments, without being in the least incommoded for want of sufficient room.

The length of the mill being 145 feet, would afford sufficient space for the spinning machines. Two upright shafts would be quite sufficient for driving all the machinery contained in a mill of this length. The cotton and waste cellars should be a detached building to lessen the risk. As the raw material is prepared in the carding room for all the spinning departments, the cards ought to be placed as near the centre of the mill as possible. A factory of the dimensions recommended above, six stories, would require two preparation rooms; these might be placed on the same floor with the picking-rooms. As there is always a constant communication between these two departments, if they are placed at a distance from each other, a great deal of time must unavoidably be lost in passing to and from the one to the other; but by this arrangement very little time will be lost; for the laps can be carried direct from the spreading machines to the back of the breaker cards, and the tops, strips, or other waste returned in the same way. An easy method for conveying the rove from the carding to the spinning room, should be adopted to save time and labour. The staircase ought always to be placed on the outside of the mill, and the outer door always kept shut during working hours. As it is obvious that the particular arrangement of the different departments, and the order in which the machinery is placed will always have a prominent influence upon the productive capabilities of large establishments, the advantage of having them arranged in the best manner which practical wisdom and experience can suggest, is so apparent as to require no force of language to prove it. And if such arrangements depend upon the particular form or plan upon which the factory is built, then the importance of having the different departments arranged in the most approved manner, is so obvious as to need no further comment.

*The Method of calculating the Speed of the different Shafts and Machines.*

In calculating the speed of the various shafts, the first thing to be done is to find the revolutions per minute of the first or main shaft; and when this is known, the principle upon which to proceed in tracing out the speed per minute of all the other shafts throughout the whole establishment, is both simple and easy to be understood.

Suppose the first moving power to be a water wheel; find how

many revolutions it makes per minute, then, how many teeth are in the spur or bevel wheel. Multiply this number by the revolutions of the wheel per minute, and divide the last product by the number of teeth in the pinion acting in the same, and the result will be the revolutions of the first shaft per minute.

But if the first moving power should be an engine, the first thing to be done is to find the number of strokes the engine makes per minute; and if the engine crank be attached to the wheel, then every double stroke of the engine will make one revolution of this wheel, and it will be the first driving wheel. Multiply the number of teeth which it contains by its revolutions per minute, and divide the product by the number of teeth in the pinion which is fixed on the end of the first shaft, and the result thus obtained will be the revolutions per minute of the shaft. And when the speed of the first shaft is thus found, the process of tracing out the speed of all the others, will be comparatively easy. Suppose an engine of 50 horses' power, and making 40 single strokes per minute, equal to 20 revolutions of the first shaft; therefore this shaft revolves 20 times per minute. Upon the end of the first shaft there is a large driving wheel, containing 96 teeth, driving the second shafts. Upon one end of the second shafts are two pinions containing 48 teeth each, driven by the large wheel. Upon the other end are two wheels, containing 56 teeth each, driving the upright shafts, upon the foot of which are the pinions, containing 32 teeth; upon the top of the upright shafts are the wheels, containing 54 teeth each; these wheels drive the cross shafts. The pinions upon the ends of the cross shafts (which receive the motion from the upright shafts) contain 42 teeth each. Required the revolutions per minute of each shaft.

**RULE.**—Multiply the speed per minute of the first shaft, by the number of teeth in the first driving wheel, and divide the product by the number of teeth in the pinion, which is fixed upon one end of the second shaft, and the result will be the speed per minute of the second shaft. In like manner, the speed of the upright shaft may be obtained by multiplying the speed per minute of the second shaft, by the teeth in the driving wheel, which is fixed upon the other end of the second shaft, and dividing the product by the number of teeth in the pinion which is on the foot of the upright shaft. And to find the speed of the cross shafts, multiply the speed per minute of the upright shaft by the teeth in the wheel on the top of the upright shaft, and divide the product by the teeth in the pinion on the cross shaft; and so by the same process, the speed of any shaft may be traced out, however remote, or at whatever distance it may be situated from the first moving power.

EXAMPLES.

Speed per minute of the first shaft, 20 revolutions.  
 Number of teeth on the first driving wheel, 96.  
 Number of teeth in the pinion 48)1920(40 speed per minute of  
   192           second shaft.  


---

 Speed of second shaft per minute, 40 revolutions.  
 Number of teeth in the wheel, 56  


---

 Number of teeth on the pinion 32)2240(70 speed of upright shaft.  


---

 Speed of upright shafts per minute, 70  
 Teeth in the wheel on the top of upright shaft, 54  


---

 42)3780(90 speed of cross  
   shaft.

*To find the speed per minute of any given shaft.*

RULE.—Begin at the first moving power, and trace out all the driving and all the driven wheels separately. Multiply all the driving wheels together, and their product by the speed per minute of the first shaft; then multiply all the driven wheels together, including the first driven wheel on the given shaft, (the speed of which we wish to ascertain;) divide the product of the drivers by the produce of the driven, and the result thus obtained will be the speed of the given shaft. Required the speed of cross shafts.

EXAMPLE.

<i>Driving wheels.</i>	96	<i>Driven wheels or pinions.</i>	
First wheel,	96	Second pinion,	48
Third wheel,	56	Fourth pinion,	32
Fifth wheel,	54	Sixth pinion,	42
	96		
	56		
	576		
	480		
	5376		
	54		
	21504		
	26880		
	290304		
Speed of shaft	20		
	64512)5806080(90 speed of the cross shafts.		
	580608		

The preceding examples sufficiently illustrate the process of tracing out the speed of all the different shafts; for by the same process we can trace the speed of any number of shafts throughout all their windings, even to the remotest department of any factory. The speed per minute of the cross shafts, which give motion to all the machinery in both the carding and spinning rooms, should always range from 88 to 90 revolutions. By the preceding examples the speed of the cross shafts will be found to be 90 revolutions per minute. When the speed of the cross shafts is known, the speed of all the different machines in either the carding or spinning departments, may be easily ascertained. Commence with the spinning department.

*To find the speed per minute of the fly on the jenny.*

**RULE.**—Begin first at the cross shaft, and trace out all the driving and driven pulleys and drums separately, from the large driving pulleys, on the cross shaft, to the fast and loose belt pulleys on the axle of the fly on the jenny. Multiply the diameters of all the driving pulleys and drums together, and their product by the speed of the cross shaft.\* Then multiply the diameters of all driven pulleys and drums together, and with their product divide the product of the drivers as found above; the result will be the revolutions of the fly per minute.

Say the large driving pulleys, upon the cross shaft, are 20 inches in diameter; likewise suppose that all the belt drums, and belt pulleys, are all the same diameter, viz. 18 inches. Required the revolutions of the fly or rim per minute.

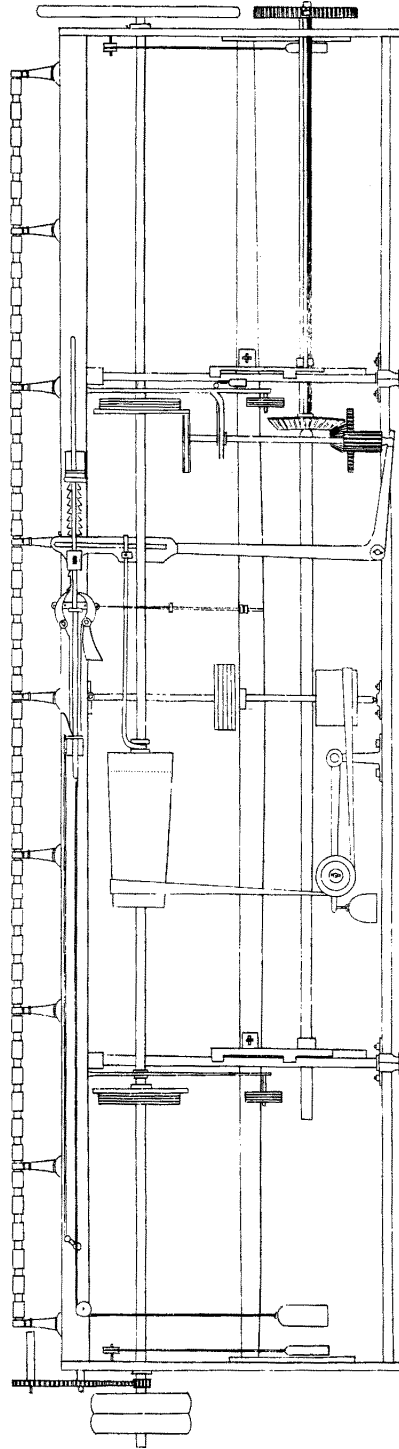
**EXAMPLE.**

<i>Driving drums and pulleys.</i>	<i>Driven drums and pulleys.</i>
Pulleys on cross shaft, 20 inches.	Top speed pulleys, 18 inches.
Belt drums, 18 do.	Belt pulleys, 18 do.
Speed of cross shaft per minute, 90	
Diameter of pulleys, 20	
<hr style="width: 50%; margin: 0 auto;"/>	
Diameter of top speed pulley 18	1800(100 revolutions per minute
	18 of the belt.

Say the wheel, on the same shaft with the pulleys, contains 74

\* In all calculations of this kind where the drivers and driven are separated and multiplied together with a view to ascertain their relative speed, should wheels, containing the same number of teeth or drums, or pulleys of the same diameter, occur on both sides, these may be omitted in the operation. In these examples such are therefore omitted in the operation.

**FLY FRAME.**



teeth, and working into the wheel, of 84 teeth, on the axle of the fly.

Speed per minute of belt pulleys, 100  
Teeth in the wheel, 74

84)7400(88.09 revolutions of the fly  
per minute on the first speed.

Say the wheel, on the same shaft with the pulleys, contains 84 teeth, and working into the wheel, of 74 teeth, on the axle of the fly.

Speed per minute of belt pulleys, 100  
Teeth in the wheel, 84

Teeth in the wheel, 74)8400(113.5 revolutions of the fly  
per minute on the second speed.

The revolutions of the fly being known—to find the revolutions of the front roller of the jenny per minute.

**RULE.**—Begin at the bevel wheel, on the axle of the fly, and trace out the driving and driven wheels from it to the wheel on the front roller. Multiply the number of teeth in the drivers together, and their product by the revolutions of the fly, and multiply the number of teeth in the driven together. Divide the product of the former by the product of the latter, and the result will be the revolutions of the front roller per minute.

EXAMPLE.

<i>Drivers.</i>	EXAMPLE.	<i>Driven.</i>
Wheel on axle of fly, 50		Wheel on top of bevel shaft, 50
Wheel on under end of bevel shaft, 34		Wheel on front roller, 50
Revolutions of the fly per minute, 88.09		88.09 or first speed.
Teeth in the wheel on under end of bevel shaft, 34		34
		35236
		26427

Wheel on top of bevel shaft, 50)2995.06(59.90 revolutions of the front roller per minute.

*To find the revolutions of the spindle for one of the fly, and of the spindle per minute.*

**RULE.**—When the wharves are one inch diameter, multiply the diameter of the fly by the diameter of the drum-band groove in the twist pulley, and divide by the diameter of the fly-band groove.



Suppose the diameter of the fly to be 40 inches, fly-band groove in twist pulley  $14\frac{1}{2}$ , and drum-band groove 16 inches. Required the revolutions of the spindle for one of the fly.

## EXAMPLE.

Diameter of fly,	40 inches.
Do. of drum-band groove,	16
	<hr style="width: 10%; margin: 0 auto;"/>
Do. of fly-band groove, 14.5	640.0
	580
	<hr style="width: 10%; margin: 0 auto;"/>
	600
	580
	<hr style="width: 10%; margin: 0 auto;"/>
	20

(44 revolutions of the spindle, for one of the fly.)

The revolutions of the spindle for one of the fly being 44, this multiplied by the revolutions of the fly per minute, gives the revolutions of the spindle per minute.

Revolutions of fly on the first speed,  $88.09 \times 44 = 3875.96$  revolutions of spindle per minute on first speed.

Revolutions of fly on the second speed,  $113.5 \times 44 = 4994$  revolutions of spindle per minute on second speed.

*Note.*—It is difficult to find any general rule by which the revolutions of the spindle for one of the fly or rim can be exactly ascertained by calculation, because these are often found to vary according to the thickness of the drum and fly-bands, the diameter of the wharves, &c. The older these bands are, they become smaller and sink deeper into the grooves; hence the variations of the spindle in proportion to the fly. The above rule, will be found to come as near the truth as any which has hitherto been suggested.

Say the cross shafts which give motion to the various machines in the carding and picking rooms, revolve 90 times per minute. Required the speed of the different machines in these departments.

*To find the speed of the cards per minute.*

**RULE.**—Begin at the cross shaft, and multiply its revolutions per minute, by the number of teeth in the wheel, and divide the product by the teeth in the pinion on the card-drum shaft; this will give the revolutions of the shaft per minute. Multiply this by the diameter of the card drums, and divide the product by the diameter of the belt pulleys, on the axle of the card cylinder; the

result thus obtained, will be the revolutions of the card cylinder per minute.

EXAMPLE.

Teeth in the wheel, 40	Teeth in the pinion, 36
Diameter of card drums in. 18	Diameter of belt pulleys, 16
Speed of cross shaft, 90	
Teeth in driving wheel on do. 40	

Teeth in driven pinion, 36)3600(100\*revolutions per minute of the card drum shaft.  
 36  
 Revolutions of shaft per minute, 100  
 Diameter of card drums, 18 inches  
 Diameter of belt pulleys on axle  
 of card, 16)1800(112.5+ revolutions of card cylinder per minute.

*To find the revolutions per minute of the delivering shaft in the card.*

**RULE.**—Begin at the pinion on the main axle of the card cylinder, and trace out the driving and driven wheels, or pinions separately, from it to the pinion on the end of the delivering shaft.\*

Multiply all the drivers together, and their product by the revolutions of the cylinder per minute; then multiply all the driven together, and with their product divide the product of the former.

EXAMPLE.

<i>Drivers.</i>						<i>Driven.</i>
Teeth in pinion on main axle, 20	48	Revolutions of cylinder per minute, 112.5	Teeth in pinion on main axle, 20	2250.0	48	Teeth in wheel, 144
						Teeth in pinion, 22
Teeth in pinion, 48						Teeth in wheel, 144
						Teeth in pinion, 22
						<hr style="width: 50%; margin: 0 auto;"/>
						288
						<hr style="width: 50%; margin: 0 auto;"/>
						288
						<hr style="width: 50%; margin: 0 auto;"/>
						3168
						<hr style="width: 50%; margin: 0 auto;"/>
						90000
						<hr style="width: 50%; margin: 0 auto;"/>
						3168

3168)108000.0(34.99+ revolutions of delivering shaft per minute.

\* The revolutions of the feeding roller is found by the same method as the delivering shaft.† Intermediate wheels or drums are never taken into the operation of calculating the speed or draught of any kind of machinery.

† The shafts in carding and picking rooms, revolving at the rate of 100 times per minute, the speed of all the different machines in these departments may be calculated from this.

The revolutions of the delivering shaft per minute being 34.09, multiplying it by the circumference of the delivering ball, gives the length produced per minute.

*To find the speed of the cylinder shaft in the drawing-frame.*

RULE.—Multiply the diameters of the drums together, and their product by the speed per minute of the shaft, and multiply the diameters of the driven pulleys together. Divide the product of the former by the product of the latter; the result is the speed per minute of the cylinder shaft.

EXAMPLE.		<i>Driving drums.</i>	<i>Driven pulleys.</i>
Speed of shaft,	100	18	Diameter of pulley, 16.75
Diameter of drum,		1800	Diameter of pulley, 16
		14400	10050
		1800	1675
		268.00	268.00

(120.89 + revolutions of cylinder shaft per minute.)

*To find the speed of the fly or tube frames per minute.*

RULE.—Multiply the diameters of the driving drums together, and their product by the speed of the shaft; and multiply the diameters of the speed pulley, and the belt pulley, on the end of the frame shaft, together. Divide the product of the former by the product of the latter, and the result is the speed per minute of the frame shaft.

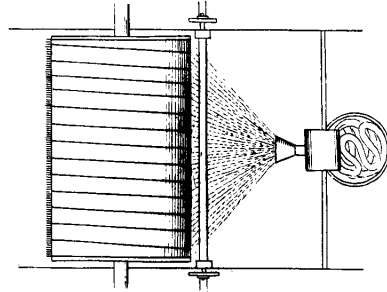
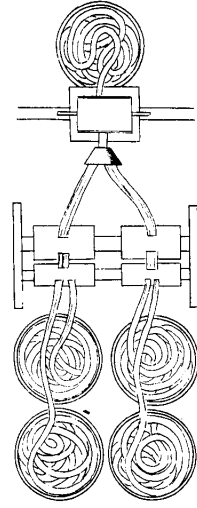
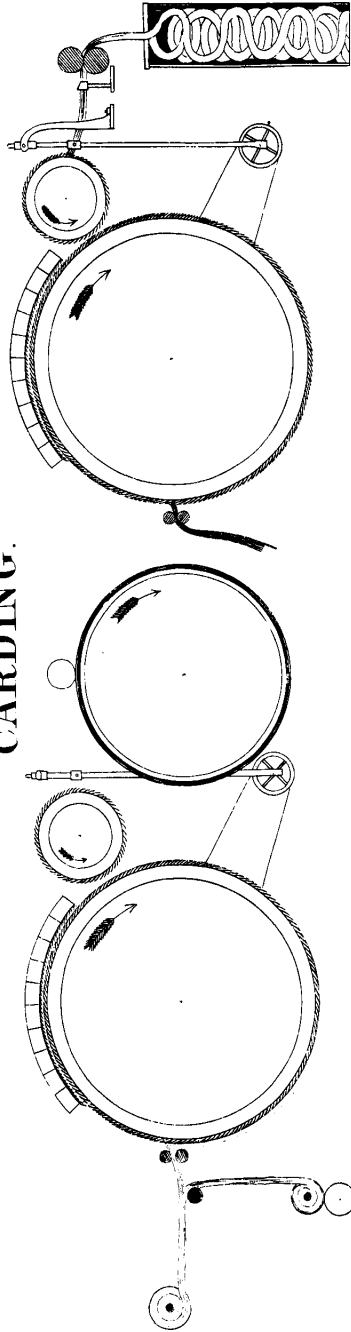
EXAMPLE.			
Speed per minute of shaft	100	18	Diameter of speed pulley, 13 $\frac{3}{4}$
Diameter of drum, inches,		18	Diameter of belt-pulley, 11 $\frac{1}{2}$
Diameter of drum, do.		18	
Speed of shaft,	100		Diameter of pulley, 13.75
Diameter of drum,	18		Diameter of pulley, 11.5
		1800	6875
Diameter of drum,	18		1375
		14400	1375
		1800	158.125
		158.125	158.125

(204.90 speed of fly or tube frame shaft per minute.)

*To find the speed per minute of the scutching machine.*

RULE.—Multiply the speed per minute of the shaft in the picking room, by the diameter of the main drum, and the product by

CARDING.



the diameter of the drum ; then multiply the diameter of the drum by the diameter of the belt pulleys, on the shaft, on the machine. Divide the product of the former by the product of the latter ; the result will be the speed per minute of the shaft.

## EXAMPLE.

Speed of shaft per minute,	100	Diameter of drum,	18
Diameter of drum,	24	Diameter of belt pulleys,	$10\frac{1}{2}$
Diameter of drum,	22		<hr style="width: 50px; margin: 0;"/>
			180
Speed of shaft,	100		9
Diameter of drum	24		<hr style="width: 50px; margin: 0;"/>
			189
	2400		
Diameter of drum	22		
	<hr style="width: 50px; margin: 0;"/>		
	4800		
	4800		
	<hr style="width: 50px; margin: 0;"/>		

189)52800(279.36+ revolutions per minute of  
shaft in scutching machine.

The preceding calculations are merely intended to exemplify the method of tracing out the motions of the various shafts and machines, from the power which gives the first motion, to the remotest movement in the whole establishment.

The plan of the shafts and other gearing, in some of the old establishments, will be found much more complicated ; yet still the principles upon which their various speeds are calculated are always the same ; and if once these are properly understood, the method of tracing out the speed of every shaft throughout the ramifications of even the most complicated establishments, will then be comparatively easy.

If there are different kinds of cotton used, it is important that they should be properly and regularly mixed together ; and unless this be particularly attended to, a regular and uniform quality of yarn cannot be produced.

The cotton is weighed previous to being put into the spreading machine, and when spread into a given length and thickness, is called a feed ; a number of these follow each other ; so that a continuous web of cotton passes through the machine, and is rolled on a wooden roller, until it be of sufficient size, when it is carried to the cards, in which state it is called a breaker lap.

If any machine, in the whole process of cotton spinning, be of more use and importance than another, it is the carding engine ;

nor can it be dispensed with, the process of cotton spinning, (properly speaking,) begins only at the carding; for all the previous departments of the process are merely preparatory to this, and consist chiefly in mixing, cleaning, and opening the cotton, so as that the cards may take the best effect upon it.

That much depends upon a proper system of doubling and drawing for making a superior quality of yarn, is generally admitted. And as I believe that it is owing to the particular management of this essential part of the process that enables one spinner to excel another in the quality of the yarns they produce, too much importance, therefore, cannot be attached to this subject. For whatever be the quality of the cotton that is used, or the yarn required, the whole doubling and drawing must be regulated accordingly. And unless the one be adjusted to suit the other, it is vain to expect a superior quality of yarn.

*To find the twists per inch on the yarn, suppose No. 36.*

**RULE.**—Multiply the revolutions of the front roller by its circumference, and divide the revolutions of the spindle per minute by the product.

**EXAMPLE.**

Revolutions per minute of the front roller,	58.72	
Circumference of do.	3 $\frac{1}{2}$ inches.	
	17616	
	734	
	183.50	4000.00(21.70+ twists per inch in the yarn.

Spinning masters who have occasion to be frequently changing the sizes of yarn, may sometimes be at a loss to know the precise quantity of twist that particular numbers will require, unless they have some rule to direct them how to find what twist will suit any given numbers of either weft or warps.

The following rules for finding this are considered to be the most correct. **RULE 1.** If for warp yarn, allow 25 twists to the inch, or 25 revolutions of the spindle for the inch of yarn of No. 50, and the same for No. 60 wefts. Taking the above for the data upon which to proceed. To find the twists per inch that any given size of yarn will require. **RULE 2.** If for warp yarn, as No. 50 is to the square of 25 so is the given size, to the square of the twists per inch which the given size requires.

EXAMPLE.

How many twists per inch will No. 64 warp yarn require?  
 As No. 50 :  $25 \times 25 = 625$  : : 64

$$\begin{array}{r} 64 \\ \hline 2500 \\ 3750 \\ \hline 50)40000 \end{array}$$

800(28 $\frac{1}{3}$  twist required for No. 64 warps.  
 4

$$\begin{array}{r} 48)400 \\ 384 \end{array}$$

$$\begin{array}{r} 16 \\ 16) \frac{16}{48} = \frac{1}{3} \end{array}$$

**RULE 3.**—If for weft yarn, as No. 60 is to the square of 25 so is the given size to the twists per inch, which the given size of yarn requires.

EXAMPLE.

How many twists per inch will No. 80 wefts require?  
 As No. 60 :  $25 \times 25 = 625$  : : 80

$$\begin{array}{r} 80 \\ \hline 60)50000 \end{array}$$

Find the square root of 823.33(28.69 twists per inch required for No. 80 wefts.  
 4

$$\begin{array}{r} 48)423 \\ 8\ 384 \end{array}$$

$$\begin{array}{r} 566)3933 \\ 6\ 3396 \end{array}$$

$$\begin{array}{r} 5729)53700 \\ 51561 \end{array}$$

2139

There is another short and simple rule, approved of by some managers, for finding the twists per inch, which any given size may require, which may be shortly stated without exemplifying it.

**RULE.**—Multiply the square root of the given size by 3 $\frac{1}{4}$  if for

warp yarn, and by  $3\frac{1}{4}$  if for wefts; the result of either will be the twists per inch which the given size of yarn requires.

Managers of spinning factories do not seem yet to be agreed upon what is the most proper dimensions of a mule jenny. Some contend, that mules containing from 264 to 280 spindles, are the most profitable, because they generally turn off a much greater quantity of yarn in proportion to their spindles, than those of a larger size; and, besides, they are easier to work or manage, and not so destructive to the drum and fly bands, having less weight to drive. Others, again, suppose, that as all mules, of whatever size, require the same gearing, as well as drums and belts, to move them, the larger the better: as a factory filled with mules of a large size will require less power to drive it, having less gearing, it will require fewer belts, &c. &c.

Young carding and spinning masters, who have newly entered into a charge in any of the departments, or for operatives and mechanics, who may be looking forward to such a situation, it is of the utmost importance that they exercise themselves in performing all kinds of calculations connected with the business, and thereby acquire expertness in performing them, when necessary, as it will be the means of saving much trouble and uncertainty afterwards.

*Velocity of Wheels.*—Wheels are for conveying motion to the different parts of a machine, at the same, or at greater or less velocity, as may be required. When two wheels are in motion their teeth act on one another alternately; and, consequently, if one of these wheels has 40 teeth, and the other 20 teeth, the one with 20 will turn twice upon its axis for one revolution of the wheel with 40 teeth. From this the rule is taken, which is:—As the velocity required is to the number of teeth in the driver, so is the velocity of the driver to the number of teeth in the driven.

*Note.* To find the proportion that the velocities of the wheels, in a train, should bear to one another, subtract the less velocity from the greater, and divide the remainder by the number of one less than the wheels in the train; the quotient will be the number rising in arithmetical progression, from the least to the greatest velocity of the train of wheels.

EXAMPLE.

What is the number of teeth in each of three wheels, to produce 17 revolutions per minute; the driver having 107 teeth, and making 3 revolutions per minute?

$17 - 3 = 14$   
 $3 - 1 = 2$  = 7, therefore 3, 10, 17, are the velocities of the three wheels.



By the rule,

$$10 : 107 :: 3 : 32 = \frac{107 \times 3}{10} = 32 \text{ teeth.}$$

$$17 : 32 :: 10 : 19 = \frac{32 \times 10}{17} = 19 \text{ teeth.}$$

THE COMMUNICATION OF POWER.

There are no prime movers of machinery from which power is taken in a greater variety of forms than the water-wheel, and among such a number there cannot fail to be many bad applications. Suffice it here to mention one of the worst, and most generally adopted. For driving a cotton mill, there is a water-wheel about twelve feet broad, and twenty feet diameter; there is a division in the middle of the buckets upon which the segments are bolted round the wheel, and the power is taken from the vertex: from this erroneous application, a great part of the power is lost; for the weight of water upon the wheel presses against the axle in proportion to the resistance it has to overcome, and if the axle was not a large mass of wood, with very strong iron journals, it could not stand the great strain which is upon it.

The most advantageous part of the wheel, from which the power can be taken, is that point in the circle of gyration horizontal to the centre of the axle; because, taking the power from this part, the whole weight of water in the buckets acts upon the teeth of the wheels; and the axle of the water wheel suffers no strain. The proper connection of machinery to water wheels is of the first importance, and mismanagement in this particular point is often the cause of the journals and axles giving way, besides a considerable loss of power. To find the radius of the circle of gyration in a water wheel is therefore of advantage to the saving of power, and the following example will show the rule by which it is found.

EXAMPLE.

Required the radius of the circle of gyration in a water-wheel, 30 feet diameter; the weight of the arms being 12 tons, shrouding 20 tons, and water 15 tons.

30 feet diameter, radius=15 feet.

S.	$20 \times 15^2 = 4500 \times 2 =$	9000	}	The opposite side of the water-wheel must be taken.
A.	$12 \times 15^2 = 900 \times 2 =$	1800		
W.	$15 \times 15^2 = 3375$	= 3375		
	$2 \times 20 + 12 = 64$			
	W.15	14175		

$$\frac{W.15}{79} \quad \frac{14175}{79} = 179 \text{ the square root of which is } 13\frac{4}{10} \text{ feet, the radius of the circle of gyration.}$$

The preceding examples sufficiently illustrate the process of tracing out the speed of all the different shafts: for by the same process we can trace the speed of any number of shafts throughout all their windings, even to the remotest department of any factory. The speed per minute of the cross shafts, which give motion to all the machinery in both the carding and spinning-rooms, should always range from 88 to 70 revolutions. By the preceding examples the speed of the cross shafts will be found to be 90 revolutions per minute. When the speed of the cross shafts is known, the speed of all the different machines in either the carding or spinning departments, may be easily ascertained.

On the opposite page will be found a table condensed from Newton's machinist's table, showing the proportional radii of wheels to their pitch.

*Extract from Baines's History of the Cotton Manufacture in England.*

	Prices of machinery in England, 1834.		Prices of machinery in the United States, 1834		Actual prices sold in U.S.
Card'g engines,	£30 to 40	\$144 to 192	£40 to 50	\$192.00 to 240	\$100 to 250
Throstles, per spindle,	8s. to 9s.	2.91 to 1.92	1.4. to 1.6	\$ 5.76 to 6.22	\$4.25 to 6
Mules per do.	4s.6 to 5s.	1.08 to 1.20	13s to 14s	\$ 3.12 to 3.36	\$2.12 to 2.25
Dressing Ma- chines,	£30 to 35	\$144 to 168	£80 to 90	\$ 384 to 432	\$400
Power Looms,	£7½ to 8½	36 to 40.80	£12 to 16	57.60 to 76.80	\$ 50 to 75

*Mr. White.*

I have obtained the actual sale prices of the above named machinery from one of the principal machine makers in this city, Mr. Stanford Newell, which I believe to be correct. Yours, very respectfully, Z. ALLEN.

The fact respecting the higher prices of American machinery, arises from their ornamental work, which the English think unnecessary; as they regard only the utility and durability of the machine. This circumstance may be worthy the attention of our machinists; whether it is best to expend so much for polishing the appearance of the works.

Table of the Proportional Radii of Wheels, from  $\frac{1}{4}$  to 3 Inches Pitch.

No. of Teeth.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	3
10	0.405	0.809	1.214	1.618	2.023	2.427	2.832	3.236	3.641	4.045	4.854
11	0.444	0.887	1.331	1.775	2.218	2.662	3.106	3.549	3.993	4.437	5.324
12	0.483	0.966	1.449	1.932	2.415	2.898	3.381	3.864	4.347	4.830	5.795
13	0.522	1.045	1.567	2.089	2.612	3.134	3.656	4.179	4.701	5.223	6.268
14	0.562	1.123	1.685	2.247	2.809	3.370	3.932	4.494	5.056	5.617	6.741
15	0.601	1.202	1.804	2.405	3.006	3.607	4.209	4.810	5.411	6.012	7.215
16	0.641	1.281	1.922	2.563	3.204	3.844	4.485	5.126	5.767	6.407	7.689
17	0.680	1.361	2.041	2.721	3.401	4.082	4.762	5.442	6.122	6.803	8.163
18	0.720	1.440	2.160	2.879	3.599	4.319	5.039	5.759	6.479	7.198	8.638
19	0.759	1.519	2.278	3.038	3.797	4.557	5.316	6.076	6.835	7.594	9.113
20	0.799	1.598	2.397	3.196	3.995	4.794	5.593	6.392	7.192	7.991	9.589
30	1.196	2.392	3.588	4.783	5.979	7.175	8.371	9.567	10.763	11.958	14.350
40	1.593	3.186	4.780	6.373	7.966	9.559	11.152	12.746	14.339	15.932	19.118
50	1.991	3.982	5.972	7.963	9.954	11.945	13.935	15.926	17.917	19.908	23.889
60	2.388	4.777	7.165	9.554	11.942	14.330	16.719	19.107	21.496	23.884	28.661
70	2.786	5.572	8.358	11.145	13.931	16.717	19.503	22.289	25.075	27.861	33.434
80	3.184	6.368	9.552	12.736	15.920	19.103	22.287	25.471	28.655	31.839	38.207
90	3.582	7.163	10.745	14.327	17.909	21.490	25.072	28.654	32.235	35.817	42.981
100	3.980	7.959	11.938	15.918	19.898	23.877	27.857	31.386	35.816	39.795	47.754
110	4.377	8.755	13.132	17.509	21.887	26.264	30.641	35.019	39.396	43.774	52.528
120	4.775	9.550	14.326	19.101	23.876	28.651	33.426	38.202	42.977	47.752	57.302
130	5.173	10.346	15.519	20.692	25.865	31.038	36.211	41.384	46.557	51.730	62.077
140	5.571	11.142	16.713	22.284	27.855	33.426	38.996	44.567	50.138	55.709	66.851
150	5.969	11.938	17.906	23.875	29.844	35.813	41.781	47.750	53.719	59.687	71.625
160	6.367	12.733	19.100	25.466	31.833	38.200	44.566	50.933	57.299	63.666	76.399
170	6.764	13.529	20.293	27.058	33.822	40.587	47.351	54.116	60.880	67.645	81.174
180	7.162	14.325	21.487	28.649	35.812	42.974	50.136	57.299	64.461	71.623	85.948
190	7.560	15.120	22.681	30.241	37.801	45.361	52.921	60.482	68.042	75.602	90.722
200	7.958	15.916	23.874	31.832	39.790	47.748	55.707	63.665	71.623	79.581	95.497
210	8.356	16.712	25.068	33.424	41.780	50.136	58.492	66.848	75.204	83.560	100.271
220	8.754	17.508	26.261	35.015	43.769	52.523	61.277	70.031	78.784	87.538	105.046
230	9.152	18.303	27.455	36.607	45.759	54.910	64.062	73.214	82.365	91.517	109.820
240	9.550	19.099	28.649	38.198	47.748	57.297	66.847	76.397	85.946	95.496	114.595
250	9.947	19.895	29.842	39.790	49.737	59.685	69.632	79.580	89.527	99.475	119.369
260	10.345	20.691	31.036	41.381	51.727	62.072	72.417	82.763	93.108	103.453	124.144
270	10.743	21.486	32.230	42.973	53.716	64.459	75.202	85.946	96.689	107.432	128.919
280	11.141	22.282	33.423	44.564	55.705	66.847	77.988	89.129	100.270	111.411	133.693
290	11.539	23.078	34.617	46.156	57.695	69.234	80.773	92.312	103.851	115.390	138.468
300	11.937	23.874	35.811	47.747	59.684	71.621	83.558	95.495	107.432	119.369	143.242
310	12.335	24.669	37.004	49.339	61.674	74.008	86.343	98.678	111.013	123.347	148.017
320	12.733	25.465	38.198	50.930	63.663	76.396	89.128	101.861	114.593	127.326	152.791
330	13.130	26.261	39.391	52.522	65.652	78.783	91.913	105.044	118.174	131.305	157.566
340	13.528	27.057	40.585	54.114	67.642	81.170	94.699	108.227	121.756	135.284	162.341
350	13.926	27.853	41.779	55.705	69.631	83.558	97.484	111.410	125.336	139.263	167.115
360	14.324	28.648	42.972	57.297	71.621	85.945	100.269	114.593	128.917	143.241	171.890
370	14.722	29.444	44.166	58.888	73.610	88.332	103.054	117.776	132.498	147.220	176.664
380	15.120	30.240	45.360	60.480	75.600	90.719	105.839	120.959	136.079	151.199	181.439
390	15.518	31.036	46.553	62.071	77.589	93.107	108.625	124.142	139.660	155.178	186.213
391	15.558	31.115	46.673	62.230	77.788	93.345	108.903	124.461	140.018	155.576	186.691
392	15.597	31.195	46.792	62.389	77.987	93.584	109.182	124.779	140.376	155.974	187.168
393	15.637	31.274	46.911	62.549	78.186	93.823	109.460	125.097	140.734	156.372	187.646
394	15.677	31.354	47.031	62.708	78.385	94.062	109.739	125.416	141.092	156.769	188.123
395	15.717	31.433	47.150	62.867	78.584	94.300	110.017	125.734	141.451	157.167	188.601
396	15.757	31.513	47.270	63.026	78.783	94.539	110.296	126.052	141.809	157.565	189.078
397	15.796	31.593	47.389	63.185	78.982	94.778	110.574	126.370	142.167	157.963	189.556
398	15.836	31.672	47.508	63.344	79.180	95.017	110.853	126.689	142.525	158.361	190.033
399	15.876	31.752	47.628	63.504	79.379	95.255	111.131	127.007	142.883	158.759	190.511
400	15.916	31.831	47.747	63.663	79.578	95.494	111.410	127.325	143.241	159.157	190.988

*Motion, Resistance, and Effect of Machines.*

Various as the modifications of machines are, and innumerable their different applications; still there are only three distinct objects to which their utility tends. The first is, in furnishing the means of giving to the moving force the most commodious direction; and, when it can be done, of causing its action to be applied immediately to the body to be moved. These can rarely be united, but the former can be accomplished in most cases. The second, in accommodating the velocity of the work to be performed, to the velocity with which alone a natural power can act. The third and most essential advantage of machines, is in augmenting, or rather in modifying, the energy of the moving power in such a manner, that it may produce effects of which it would have been otherwise incapable. For instance, a man might with exertion lift 400lbs.; but let him apply a lever, and he will lift many times that weight. The motions produced by machines are of three kinds, viz. accelerated, uniform, and alternate, *i. e.* accelerated and retarded. The first of these always takes place when the moving power is immediately applied; the second, after the machine has been in motion for a short time; the third, in intermitting machines, such as pendulum clocks, &c.; but though a seconds' pendulum is accelerated the first half second and retarded the next, still it produces a constant number of vibrations in a given time, and therefore may be considered as a machine of uniform motion. The grand object, in all practical cases, is to procure a uniform motion, because it produces the greatest. All irregularities of motion indicate that there is some point resisting the motion, and to overcome which a part of the propelling power is wasted, and the greatest varying velocity is only equal to that velocity by which the machine would move when its motion is uniform. If the machine moves with an accelerating velocity, it is certain that the power is greater than what balances the opposing resistance, and therefore cannot produce the greatest effect; because the whole resistance is not applied. In both these cases the machine has neither the power nor the effect which it would have if moving uniformly. When irregularity of motion takes place, particularly in a large heavy machine, it suffers a continual straining and jolting which must very soon destroy it. It is therefore of the greatest consequence, that, from all machines, every cause tending to produce irregularity of motion should be taken away.\*

\* Hydrodynamics, which signifies water and power or force, is that branch of natural philosophy which embraces the phenomena exhibited by water

*Management and government of Spinning Factories, &c.*

Cotton spinning factories, like all other establishments where a large capital is invested for the purpose of manufacturing any par-

and other fluids, whether they are at rest or in motion. It treats of the pressure, the equilibrium, the cohesion, the motion, and the resistance of fluids; and of the construction of the machines by which water is raised, and in which it is the first mover or the primary agent. This science is generally divided into *hydrostatics* and *hydraulics*, the former of which considers the pressure, equilibrium, and cohesion of fluids; and the latter, their motion, the resistance which they oppose to moving bodies, and the various machines in which they are the principal agent. Although hydrodynamics is but a modern science, and was studied by the ancients only in its most general principles, yet many of the leading doctrines and phenomena upon which it is founded are familiar to the rudest nations, and must have been well known in the very earliest ages of society. Even at the remote period when man first trusted himself to the waves, the pressure of fluids, and the phenomena of floating bodies, were undoubtedly known to him; and in the more advanced state of navigation, when the Phœnicians were able to colonise the most distant regions of the globe, the directing power of the helm, the force and management of the oars, the action of the wind upon the sail, and the resistance opposed to the motion of the vessel, were well known facts which implied practical acquaintance with some of the most important doctrines of hydrodynamics. Notwithstanding, the doctrine of fluids may still be considered as deriving its origin from the discoveries of Archimedes. The history of these discoveries has been rendered ridiculous by vulgar fables which have long been discredited; but it appears unquestionable, that they originated in the detection of a fraud committed by the jeweller of Hiero, King of Syracuse. Archimedes was applied to by the king to ascertain, without injuring the workmanship, whether or not a new crown, which had been made for him, consisted of pure gold. The method of solving the problem is said to have occurred to him when in the bath, and he applied it successfully in detecting the fraud. The hydrostatical doctrines to which Archimedes was thus conducted, were illustrated by him in two books. He maintained that every particle of a fluid mass in equilibrio is pressed equally in every direction. He examined the conditions in consequence of which a floating body assumes and preserves its position of equilibrium, and he applied to bodies that have a triangular, a conical, and a parabolic form. He showed that every body plunged in a fluid, loses as much of its own weight as the weight of the quantity of water which it displaces; and upon this beautiful principle is founded the process which he employed for ascertaining the impurity of Hiero's crown. No one could deny the result of this experiment. The screw of Archimedes, which is still used in modern times for raising water, is said to have been invented by him when in Egypt, for the purpose of enabling the inhabitants to free themselves of the stagnant water which was left in the low grounds after the inundations of the Nile; and Athenæus informs us, that navigators held the memory of Archimedes in the highest honour, for having furnished them with means of carrying off the water in the holds of their vessels.

ticular kind of goods upon an extensive scale, require to be very skilfully managed in order to make them profitable, either for producing a superior quality of yarn, or turning off a large quantity in proportion to the extent of the machinery. All the different departments may be arranged in the most judicious manner, and every machine made and adjusted on the most approved principles, and yet the establishment and the mode of government which generally prevails, may be greatly deficient in respect both to the quantity and quality of its produce.

Considering the amount of capital invested in these establishments, it might be expected that proprietors would be much more scrupulous, with respect to ability and merit, in the choice of those to whom they confide the charge of the different departments, than they frequently are; hence the reason why certain proprietors realise a high profit from their establishments, whilst others can scarcely secure the interest of the capital.

It is an erroneous opinion to suppose that any person, who may not have been early and long practised in the business, can, notwithstanding, acquire as much knowledge by their own experience in the course of a few months, as will qualify them for taking a full charge of a factory. It will be admitted, that those who have been brought up to the business, where they had many opportunities of seeing the methods of adapting the different machines to suit the various qualities of cotton, and sizes of yarn, and who know how to adjust machinery in the event of any little accidents or errors that frequently occur in practice, must possess a decided advantage over those who have not enjoyed so favourable opportunities. It would be advantageous for the agent or overseer of a cotton mill to have a thorough knowledge of the business *in all* its details, as without this he must sometimes leave much of the management of certain departments to others, and they, occupying only a subordinate station, are likely to feel a subordinate responsibility: hence may arise much mismanagement, attended with loss to the proprietors. The manager who knows his business, can both give directions to those that are under him, as well as discern whether they are qualified for the situations they occupy, and when they fail in their duty.

It is a most essential qualification on the part of the manager, that he be expert in performing *all kinds* of calculations connected with the business; in regulating the speed of the different machines; in adjusting the draughts of the various machines; and in making changes in the qualities of the cotton and sizes of the yarn. In regulating the speed of the various machines, parti-

cularly in the preparation department, it is important to have them, so that the one shall not be over driven, nor the other working at an under speed.

Let the carding engines be adjusted to such a speed as will suit the nature of the cotton and the quality of the yarn for which they are preparing it; the speed of the drawing frame should also be regulated to take up exactly what the cards bring forward, without any unnecessary loss of time on the part of either, and all the other machines should be regulated in the same manner. But it might be desirable to ascertain the most advantageous speed, at which the different machines should be driven for the various qualities of yarn. The number of carding engines that should be allowed to the drawing-frame is important; from No. 80, downwards, the carding engines may range from eight to ten.

The proper adjustment of the draughts on the different machines is also of equal importance to a proper arrangement of the speed. Excess of draught on any one machine, while there is less than necessary on another, should be uniformly avoided.

In working an inferior quality of cotton, there is always a less quantity of yarn produced in a given time, but a much greater quantity of waste; besides, the yarn being of an inferior quality, is likely to hurt the credit of the manufacturer; whereas a superior quality will always support his credit, command a fair price, and secure a sale, so that he will often have his money when others have their stock.

Another primary object in the management of a factory, that ought to be studied, is the avoiding all *unnecessary* expenses by alterations on the plan of the gearing, or arrangement of the machinery, especially such as might only be adapted to please the eye rather than improve the productive capabilities of the establishment. To have the large gearing all fitted up on the most approved plan, and the machinery arranged in the manner best calculated to facilitate the progress of the work, are doubtless objects of the greatest importance, but when once the establishment has been filled with machinery, and all its arrangements completed, it is better to let it remain as it is, than try to improve it; and indeed, to begin then to make alterations, would be highly objectionable, because the money expended on these alterations might far exceed all the advantages arising from the supposed improvements. To keep all the machinery in good repair, and in the best working order, cannot be too highly recommended; as without doing so, it is impossible to produce a regular and uniform good quality of yarn; and to keep machinery in good order, by

regular care and attention, is much easier than to repair it after it has been allowed to go out of repair from negligence and want of care.

MR. ORRELL'S MILL, NEAR STOCKPORT, ENGLAND.

1. Its two-fold heart, or twin steam engines, one of which makes its maximum effort, while the other makes its minimum, to secure perfect equability of impulsion through all the ramifications of its shafts, and to prevent arterial throbbing or tremor, formerly so common, and so injurious to the work of delicate machines.

2. The great bevel wheel gearing, which transmits the power of the engine in rectangular directions, either transversely or vertically, and with any modification of speed.

3. The horizontal and upright shafts, with their several pulleys.

4. The distribution of the straps, or belts, that convey the power from these revolving shafts and pulleys.

5. The respective positions of the various productive organs in their respective floors : such as the preparation machines, throstles, mules, power-looms, dressing machines, warping mills, &c. Dr. Ure has promised the whole anatomy of the mill in the above order.

The recent innovations in proportioning the sizes, regulating the connections, and adjusting the movements of the system of shaft gearing, form a fine feature in the philosophy of manufactures. Thus, not only an improvement has been made in the regularity of impulsion, but a considerable increase of power from the same prime mover has been obtained ; amounting, in some cases of old mills remounted by Messrs. Fairbairn and Lillie, to fully 20 per cent. The durability of shafts so exquisitely turned and polished, is another great advantage. The spinning factory of Messrs. Ashworth, at Egerton, which has been at work for several years, exhibits an elegant pattern of the engineering just described : for it has some subordinate shafts, hardly thicker than the human wrist, which convey the power of ten horses, and revolve with great speed, without the slightest noise or vibration. The prime mover of the whole is a gigantic water wheel, of sixty feet diameter, and one hundred horse power. I have frequently been at a loss, in walking through several of the millwright factories, to know whether the polished shafts that drive the automatic lathes and planing machines, were at rest or in motion, so truly and silently did they revolve.

The method of increased velocities in the driving arms or shafts



of factories is, undoubtedly, one of the most remarkable improvements in practical dynamics. It diminishes greatly the inertia of the mass to be moved, by giving to much lighter shafts and wheels the same momentum; and it permits the pulleys or drums, which immediately impel the machines by straps, to be reduced to a size much nearer to that of the steam pulleys, fixed on the main axis of these machines. About thirty years ago the velocities of the main shafts, proceeding from the moving power, whether of steam or water, amounted to no more than from thirty to forty revolutions per minute, and of the smaller and remoter shafts, to only forty or fifty. At the same period the drums were heavy tubs, and from thirty to upwards of sixty inches in diameter. This improved system is under deep obligations for its actual state of perfection to the above named engineers; though it had commenced, as we have stated, before their time.

In the mills mounted by these gentlemen, it is interesting to see slender shafts, like small sinewy arms, rapidly transmitting vast power through all the ramifications of a great factory.

A mill, propelled by a steam engine of fifty horse power, was formerly geared with shafts, having an average transverse section of thirty-six square inches, or varying in size from four to eight inches square. An engine of like power at the present day, will, in consequence of the increased velocities above described, work with cylindrical shafts not exceeding five and a half, and often only three inches in diameter; possessing, therefore, an average area of only fifteen square inches, instead of thirty-six. The horizontal shafts that run under the ceilings of the different working rooms are two inches, and seldom exceed two and a quarter in diameter. Hence, the mass of gearing has been reduced fully one half. But the shafts now make from one hundred and twenty to one hundred and fifty revolutions in a minute; and, occasionally, as where throstles are turned, so many as two hundred in the same time. Thus we see the requisite momentum is gained with a light shaft, while the friction is proportionally diminished, and the driving drum revolves with a velocity in accordance with the accelerated pace of the modern machines.

The philosophy of manufactures investigates the most economical and energetic modes of applying the motive force to the various working organs; the carding engings, the drawing heads, the roving frames, the throstles, the mules, the power looms, the dressing machines, &c.

The dressing machine does, at present, two hundred pieces of thirty yards each, in a week, equaling six thousand yards; and

costs in wages, to the dresser, fifty shillings. This branch of the trade having, in consequence of the high wages, been, like the mule spinning, continually disturbed by unions and strikes, has led to the invention of a self-acting machine, which will dress at least six thousand yards of warp in two days, under the superintendence of a labourer, at three shillings a day; that is at a cost, in wages, of six shillings. This mechanism is, at the same time, greatly simpler and cheaper than the former, and will soon come into general use for coarse calicoes.

Prodigious sums are wastefully expended every year, which would be saved by a more thorough acquaintance with true principles of science and art. Several individuals who have embarked vast fortunes in factories, are, to a very great extent, the victims at least, if not the dupes, of scheming managers, who are ever ready to display their perverse ingenuity, by the substitution of some intricate trap, for a simpler but less showy mechanism. There have been many cases where a complete system of good machines, capable of doing excellent work, has been capriciously turned out of a cotton factory, and replaced by another of greater expense, but of less productive powers, and less suited to the style of work than the old one, if skilfully managed. These substitutions are continual in many establishments. They interfere most essentially, and often unnecessarily, with the going of the mill, and are referable almost always to injudicious choice at first, and capricious alterations afterwards; circumstances over which the proprietor, from ignorance of the structure of a good machine, cannot always venture to exercise the proper control. There are, no doubt, many mill managers perfectly fitted, by judgment, knowledge, and integrity, to second the sound commercial views of the mill owner, and to advance the business with a profitable career. These practical men form the soul of the factory system. But with a wrong-headed, plausible manager, the proprietor is sure to be led such a mechanical dance as will bewilder him completely, unless he has acquired a clear insight into the *arcana* of the business, by deliberate study of the composition and performance of each machine in his factory. It may be supposed that this species of education can be most easily acquired in the midst of the machinery itself; but this is a mistake, which experience speedily proves.

The object of manufactures is to modify the productions of nature into articles of necessity, convenience, or luxury, by the most economical and unerring means. They have all three

principles of action, or three organic systems: the mechanical, the moral, and the commercial; which may not unaptly be compared to the muscular, the nervous, and the sanguiferous systems of an animal. They have also three interests to subserve,—that of the operative, the master, and the state; and must seek their perfection in the due development and administration of each. The mechanical being should always be subordinate to the moral constitution, and both should co-operate to the commercial efficiency. Three distinct powers concur to their vitality,—labour, science, capital; the first destined to move, the second to direct, and the third to sustain. When the whole are in harmony, they form a body qualified to discharge its manifold functions by an intrinsic, self-governing agency, like those of organic life.

The drawing-frame is a most essential constituent of the spinning system, executing a task much too delicate and irksome for handicraft labour, and therefore does the highest honour to its inventor, Sir Richard Arkwright. It equalises the riband delivered from the finishing card, and reduces it to one of smaller dimensions, called a sliver, which it effects by uniting many ribands into one, at the same time that it lays the fibres in parallel lines, and attenuates the whole by a regular process of extension. The twin-roller mechanism, which was perfected at least, if not invented, by Arkwright, derives its best illustration from the drawing frame. This talented individual saw so clearly the great part which this machine played, in cotton spinning, that when bad yarn made its appearance, in any one of his mills, he swore a loud oath, according to the vile fashion of the time, and ordered his people to look to their drawings, convinced that if *they* were right, every thing else would go well. It is only those who have deliberately studied the intricate train of operations in a spinning factory, who are qualified to appreciate the merit of so admirable a systematist as Arkwright; and they know the value of his drawing-frame far better than his invidious detractors.

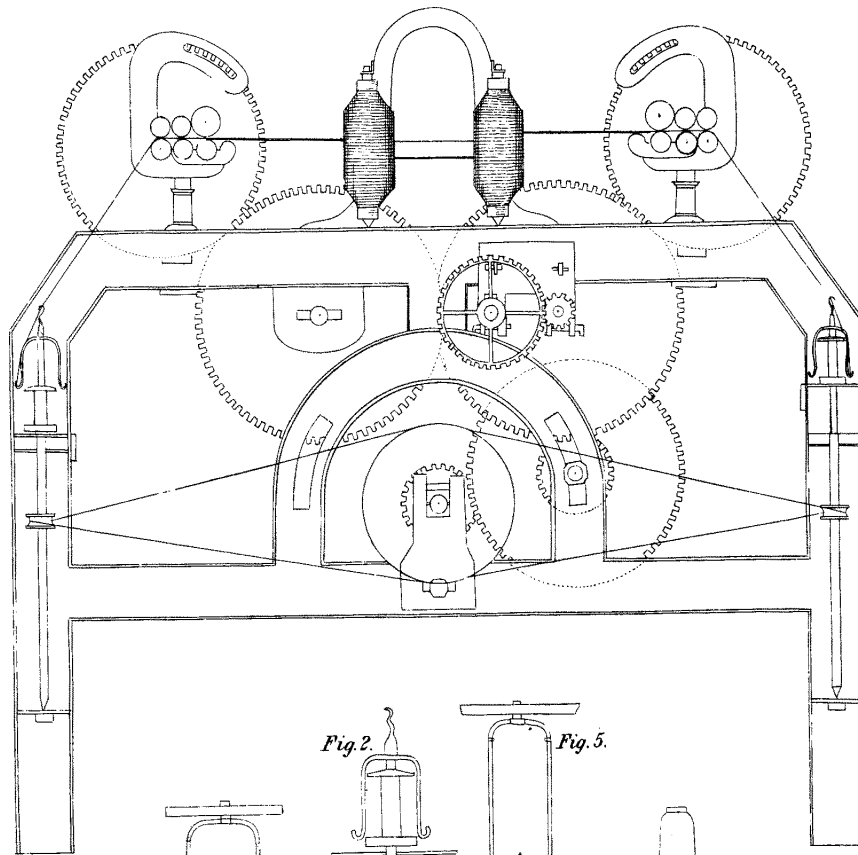
The drawing of the sliver into parallel lines of filaments is effected by the joint action of upper and under rollers; the former being smooth and covered with leather, the latter being fluted lengthwise. Of such twin-rollers, there are usually three in the same horizontal plane, of which the three under rollers are driven by wheel work, with either two or three successive velocities, and carry round their incumbent weighted rollers by the effect of friction.

In silk establishments the machinery can be, and is often, employed from three to six hours after the hands have left work, to

the advantage of the masters, (the number of hours depending on the quality and cost of the silk); therefore the imposing of a restriction on the moving power, in silk establishments, would have the effect of increasing the cost on the quantity of silk turned off. When water power is used, the portion of the silk machinery which contains the swifts, generally works all night without being tended.

It is in spinning the lower numbers, as forties, and in weaving, that the English manufacturers, some time ago, were most fearful of being hard pressed by foreign competition.\* Switzerland has,

\* The Danforth (or cap) Spinner was invented in 1828, by Charles Danforth, a native of Massachusetts, who had been employed for a number of years as an operator of cotton machinery. He, at the time, resided in Rockland county, New York. Having had experience on the common throstle as well as the Waltham dead spindle, he was aware that the two greatest difficulties in these modes of spinning were the flyer being out of balance, and the drag of the bobbin by the strength of the thread. He thought if any plan could be contrived to wind the yarn on the bobbin without the use of the flyer, it would enable him to run the bobbin very fast. After some reflection, it occurred to him, that a bobbin revolving on a fixed spindle, and circumscribed by a smooth, stationary, polished ring, suspended from, or fixed to, the top of the spindle, would produce the desired result. He accordingly proceeded to make the experiment. He, first, permanently secured a throstle spindle in the frame to prevent its turning; he then, after cutting the curls from the ends of the flyer, riveted to them a smooth ring, which passed round the bobbin; he then turned a groove, in the lower head of the bobbin, for the driving band to run in, and having put all together, he pieced up his thread and filled the bobbin without any difficulty. It was perceived, in this first attempt, that the tension on the yarn, while spinning, was very light, and consequently the yarn wound quite soft on the bobbin. It was, therefore, very naturally, thought the principle would be good for spinning weft. He, therefore, constructed his first model for weft; and, after making various experiments, fixed on the present mode of making and supporting the stationary ring, which is a cap with a polished steel ring on the bottom, having a conical socket in the top, made to fit a small cone on the top of the spindle. It was also found, that the wooden bobbin, running at the rate of 7000 turns per minute, on a fixed spindle, was apt to get dry, make a loud noise, and wear the bobbins. To obviate this difficulty, a waive was made, having a tube on the top of sufficient length to pass through the bobbin, on which the bobbin is placed, and revolves with it. This waive takes the friction all off the bobbin, and as it is made of metal, is durable, and runs without noise. Mr. Danforth has patented his invention in this country, and caused patents to be taken in England and different European states. This mode of spinning has now been thoroughly tested, and is found to be capable of producing full 40 per cent. more yarn, on counts from No. 14 to 50, than any other plan heretofore known. It is generally approved of by the spinners who have tried it, and has gone into use, both in this country and



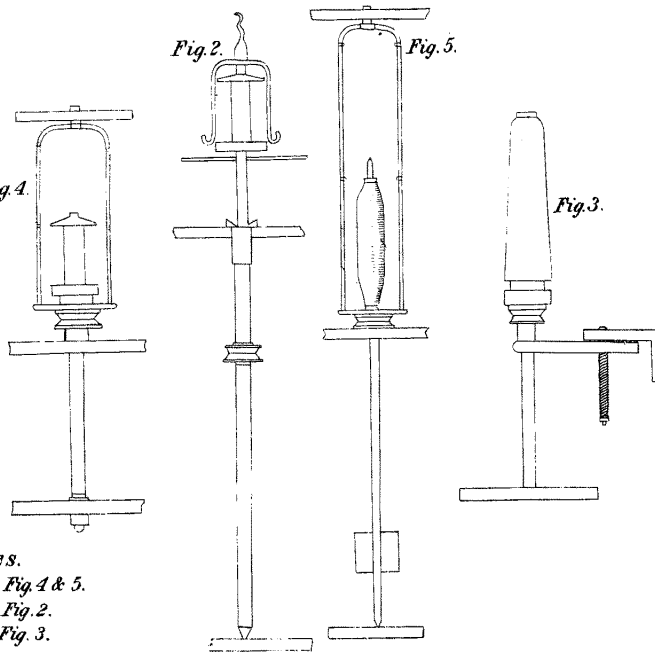
*Fig. 4.*

*Fig. 2.*

*Fig. 5.*

*Fig. 3.*

*SPLINDLES.*  
*New Throstle Fig. 4 & 5.*  
*Old Throstle Fig. 2.*  
*Danforth do. Fig. 3.*



for the last seven years, not only supplied herself, but her neighbours, to a considerable extent, with that mean quality which may be reckoned the staple of cotton yarns. It appears that the time of working cotton mills in Manchester is less, by about one hour daily, than that in any other part of the world, where the cotton manufacture is carried on to any extent.

It is my firm belief, that there is not a better or more certain mode of benefiting a country village than by establishing a cotton factory in it. The pure, unmixed effect of factory labour will be best and most easily found in the country,—where it affords regular employment, during a series of years, to the same families. The attendance at the Sunday schools, of such as are employed in factories, shows that that class of the operatives furnishes its full proportion of scholars.

Beset, as it now is, in the departments of cotton, wool, silk, linen, iron, and steel, by the industry of rival nations, it can maintain its place in the van of improvement only by the hearty co-operation among us, of heart and hand, of employer and employed. Once thrown out of the market, it would, ere long, be distanced in the race, by the more frugal and docile labour of the continent and United States.—*Ure.*

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WAGES.

It was at my urgent request, that the writer of the following remarks on *Wages*, supplied me with his views upon the subject. His situation has enabled him to take a practical survey, and though I am surprised to find his ideas accord so materially with my own conceptions, yet his essay ought to have, and doubtless will have, more weight in the community than any thing that I could have produced, more from observation and reflection, than from the best opportunity of knowing the practical operations between the employer and the employed. I was very desirous of obtaining these observations for the chapter on the value and uses

Europe, more rapidly than any other improvement in spinning has before been known to do. The principle is such, that instead of making the thread drag the bobbin, the bobbin is made to drag the thread; and the resistance of the atmosphere and the slight friction of the thread, on the lower edge of the ring, produces that retardation necessary for winding the yarn on the bobbin. In consequence of which, the tension on all the threads, are perfectly uniform, and at the same time delicate, giving a great uniformity and elasticity to the yarn. The machine also takes much less power than the common throstle. They are made and sold by Messrs. Godwin, Clarke & Co., at their shop, in Paterson, New Jersey, who are the proprietors of the patent, and manufacturers of all kinds of cotton and woollen machinery.

of property, where they seem properly to belong ; but the mere circumstance of the place they occupy, will not prevent a due consideration of the arguments. To the writer, I feel deeply indebted, for the pains he has taken to fulfil my request, as well as for other assistance I have received in the progress of my work.

It has been my desire to derive from the best sources, such valuable information, as shall be useful to the operatives of this country, on whose welfare and respectability so much depends ; whether America will be able to maintain the high ground of liberty and self-government which she has assumed, and on which position the civilised world is looking with fear and reverence.

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“ Man is born to [labour, says a certain author,] as the sparks fly upward.” We dispute not the authenticity of this text, no more than of the original. But why is he born to labour ? The simple reason is, that in the most spontaneous and fertile regions, the fruits of the earth drop not into his mouth. Were this the case, few would be found willing to give any extraordinary exertion to procure them in any other way : the necessity of exertion to procure, infers the right of possession and enjoyment when attained, and hence arises a notion of property, or right of using what has been obtained by the outlay of labour, and farther, what has luckily adverted to its possessor by discovery or chance. But in order to fully secure the possession of such acquirements, it is more than necessary that the use should be yielded to the reward of the exertion of achievement, it is requisite that full right should accrue to the individual to retain or dispose of such fruits of toil in any manner or direction that he may think proper, barring the direct injury or annoyance of his neighbour.

Hence the admitted right of bartering or devising it, either in his life time or at death, is essential to a perfect possession ; and we have no instances of a state of society in which one or both these rights were not believed inherent in individuals composing the community. Indeed the necessity of law or custom affording this guarantee, seems implied in the very nature of human association. Take away from man this motive to exertion, and you restrict his operations to the mere immediate exercise of those functions requisite to furnish the instant means of appeasing the stern demands of hunger and thirst. These satisfied for the moment, the uncertainty attending future possession would effectually preclude any desire to exercise the faculties that prompt to the accumulation of resources for consumption beyond the pressing necessities of the hour. It is the notion of a perfect property in whatever has accrued to him from the labour of his hands, that is the first inducement of man to any continued effort or exertion. For this he pursues the game on the hills, or casts his rude net into the waters ; he spreads his snares in patience for the fowls of the air, or toils in anxious expectation for the roots that nature has hidden in the earth ; or going one step further in the progress of civilisation and human improvement, he tames the more docile animals to domesticity, or returns to the earth a portion of the fruits wrested from its bosom, and awaits in full confidence the period of

fruition, when he shall reap the reward of his toil and providence. It is plain that without this guarantee of possession of the proceeds of his industry and care, the first step in the amelioration of his condition could never be accomplished by man.

We are told of a race of men who were found, by strangers visiting their wretched island, grubbing with their fingers in the earth for roots, and stripping the bark from rotten logs in search of the insects and reptiles that harboured within its recesses, wherewith to satisfy the cravings of unappeased hunger. In such a herd, (for it would be preposterous to term this a community,) the notions of property and separate possession must have been very limited indeed, extending at most to a claim for the exclusive possession of a decayed bough, and probably not farther than to the loathsome grub just seized and about to be devoured. Tacitus describes the Fenni as "a savage race living in squalid poverty and misery; with neither arms, nor horses, nor homes;" and indeed whenever we hear of a nation deeply immersed in barbarism, we usually find as a concomitant, an utter disregard of the rights of property; almost all the savage nations of the South seas are reported by the first explorers to have been given to pilfering; not so much from any vicious or injurious feeling towards those they robbed, as from an imperfect notion of the right given the proprietor by previous possession.

These people are constantly represented by voyagers as idle and thriftless in no ordinary degree: living on the spontaneous fruits of the earth, and taking little or no care to hoard or increase the stock for subsistence spread out by the hand of nature before them. They were likewise found extremely unsusceptible of improvement or amelioration, and most probably would never have attained any portion of either, had not some notions of property and separate possession been infused into them by accidental intercourse with strangers.

The idea of property, then, is the earliest germ of civilisation—the first step in the improvement of the physical, intellectual, and moral condition of mankind; and law and custom have found it necessary to recognise this idea, in every *really social* condition. In order that these ideas may be of any avail to the community, it is absolutely necessary that the guarantee should be of the most perfect and inviolable character. A restricted right or possession would be entirely nugatory. Being valueless to the individual, it could not result in any general benefit to the community, as all must hold under the same insecure tenure. The best laws have therefore secured possessions in the most limitless and unrestricted manner, only restraining the proprietor from such flagrant uses of them as would result in immediate injury to his fellows. Subject to this wholesome restraint, he is at liberty to use the fruits of his labour according to his own view of happiness to himself. He may barter one species of fruit for another, he may cast his surplus to the waves, or he may hoard it in granaries to meet his own future occasions, or to relieve the necessities of his brethren: but the same laws which accord these privileges to him for trifling emergencies afford the basis of more extended operations upon similar principles. If, having a tree, he may barter its fruits for the products of another's labour, there is no seeming reason why he may not reserve the fruits until he can purchase double the amount with the same quantity: if his own economy and foresight have secured him from the effects of a failure in the earth's product, is it con-



sistent with the rights of property, as necessarily laid down, that he should part with his hard-earned store without an equivalent; and he, having acknowledged right over his own property, has also the right of dictating the terms on which he will part with it: and here sprouts out the germ of evil in that which is productive of so much good.

If the provident man has secured by his own unassisted endeavours sufficient for the sustenance of two for any specified time, it becomes as easy, he may make it more so, for another to procure subsistence by giving him his exertions for any specific objects as to seek it from other sources. It is easy to perceive that the efforts of two, directed by the sagacity of one, will speedily enable the chief to add another labourer on the same terms as the first, from whom a further profit will be derived; and the number of those employed at length swells to an extent that precludes any other employment for the director, than that of planning and apportioning the tasks of others. Herein arises the evil from a very necessary admission. Preponderance is given to one, and comparative subjection imposed on others, by the steady operation of that law, without which civil society could not hold together for an hour. Overgrown capitals, vested in the hands of particular individuals or families, control in some measure the destinies of large portions of their fellows, and particular cases of oppression consequent upon their predominance, grow into such common practice as to call down just obloquy upon the whole mass of those on whom it has devolved to furnish employment to fellows of their race.

It is probable that, in a primitive condition, a man, compelled to seek in the forest or the flood for the means of relieving his physical wants, would not stop short on the possession of what was enough for one meal or two, or for the supply of a single day. He would prefer an extra hour of labour, at successful seasons, in order to indulge his love of ease for a longer term after his present exertion should have ceased: he would therefore return from his toil with a surplus that might be hoarded for the wants of the morrow, or be bartered to advantage with his neighbour for products of another sort. If he has stripped a tree of its chestnuts, he may dispose of all or a part for the returns of the labour of him who has gathered shell-fish from the waters. The rate at which this exchange is made will depend on several contingencies, but chiefly on the facility or difficulty of procuring the different commodities. If, for example, the labour requisite for the gathering 100 chestnuts be about the same as that of securing a dozen mussels, the likelihood is that one will be reckoned a fair equivalent for the other. But on the other hand, should one or the other article be difficult of attainment, the rates would speedily change, and the one would rise and the other fall proportionably to the operation of the above causes. If in consequence of the higher value of either commodity any one should devote himself, and others his hired labourers, to the task of securing large portions with a view to reaping the benefits of the labours of those engaged in obtaining the other commodity, he would be speedily met by two other elements that enter into the relative value of productions—the present demand existing for them, and the perishable or enduring nature of the article. In the first case, if he discovers that his exertions are bringing more to the mart than there are mouths to consume or other articles to pay for, he may slacken his exertions by parting with a portion of his labourers, or he may turn their

industry into a different channel. Should the nature of his products admit of their being preserved uninjured or with slight deterioration in value for some time, it may become a consideration with him whether to continue the production and hold back in the hope of a more advantageous disposal. If however, he decide on withdrawing some part of his labourers from the employment and dismiss them altogether, they, having probably consumed all their share of the gains from day to day, are compelled to resort to some other mode of industry or continue at their present toil on their own account. This they will be likely to do at a decrease of remuneration to themselves, and to the manifest disadvantage of all engaged in their particular occupation.

In proportion as the produce of their toil is perishable in its nature, will these, their difficulties, increase, and their wages fall; or, in other words, the amount of general commodities they can obtain for that produced by their particular occupation will decrease, until they will, by sheer necessity, be compelled to carry their toil into some other channel, or fail entirely in procuring subsistence.

Perhaps there is no other element, in the fixing of a standard of value, so prompt in its operation as the above, viz: the perishability of the article. The difference between the products of the mine and the garden are obvious at a glance. While all the metals, whether precious or base, maintain a steady determinate value, from year to year, and almost extending through centuries, the fruits of the surface of the earth, frequently many of those most necessary to man, vary in price from day to day, and even fluctuate in value in the same market-place within the hour. However inordinate and keen may be the demand, it cannot preserve the equality in the price of the most delicate and quickly injured fruits, or esculents, for a few hours together. The rapidity with which they waste enjoins a necessity for their speedy disposal; and in exact proportion to this, is their price fickle and transitory. As the prices of labour, or wages, must of necessity depend on the avails of that labour, at all events in the last resort, it is not at all to be wondered at,—indeed it would be marvellous were it otherwise,—that it should feel the influence of the same laws. Hence, as a general rule, there is no branch of human industry so poorly remunerated, or in which profits can be so little relied on, as agriculture; the very branch that devotes itself to the most urgent necessities of the race. As if those who produce the “fund, out of which the labourer is supported,”\* should draw less of it to their own behoof than any of the rest of their fellows.

That labour, the producing cause of all commodities, should follow the rule of the commodities themselves, is in strict accordance with general laws. That its price or wages should be regulated both by the demand and by the plentifulness of the commodity or fund wherewith it is to be paid, may be conceded to a limited extent. But there are some exceptions to the latter, which it may be necessary for the advocates of these (as exclusive) causes, to explain or account for. The miners in South America are the

\* See “An Essay on wages,” by H. C. Carey. Mr. C. has better conceived than explained his ideas. It were easy to show, were his book under review, that many or most of his views are fallacious. But we may safely trust him to the *Reviewers*. It seems, however, this notion belongs to Mr. Senior.

worst paid labourers in the universe, yet the fund from which they are sustained is in the utmost profusion around them. The labourers, in the new settlements of our own country, are better paid than any other at agricultural employments, and this in spite of an utter scarcity of the means of payment, and when the means of subsistence have to be brought, at great labour and expense, from a distance. In the first case, labour is carried to a very bad, and in the latter, to a very good market. Whatever may be the gross amount, even to profusion, of the fund from which labour is to be paid, the proportional quantity accorded to the labourer must ever be controlled by those who have the present possession or property of the means of payment: and to say that there is ample, nay, exuberant means of repaying the labour of the whole race, throughout the globe, and yet that there are numbers who cannot achieve a bare subsistence, by the utmost exertion, is but to describe the present, and almost every past, condition of humanity.

It would appear that those who have turned their attention to this somewhat obscure subject, have paid little attention to that depression in the price of wages which results from the ill choice or acceptance of the market, at the same time that they have overlooked, entirely, the material element that, more than all others, affects the produce of labour, in common with all other commodities, viz:—its extreme perishability.

When we consider that this quality or defect enters more largely into human labour than into any of its products,—that it is as evanescent as time itself,—and even perishes in the very operation of seeking a mart, we may cease to wonder at its being so severely subjected to the overbearing exactions of its employers. Capital may lie idle for a time,—the most that it can lose is the profit that might accrue from its active employment; or, should it be in the shape of articles liable to decay, from the necessary deterioration in quality that will result from their peculiar susceptibilities. But the time lost to the labourer is without compensation; the commodity is not lessening in value only, it is departing, departed, entirely from his grasp: and being that, on which alone he depends for existence, unless he is willing to perish himself, he must take the offers of the best bidder in the market. If, therefore, he shall have confined his acquirements, or capacity for employment, to any specific branch of industry, although by thus doing he may have increased the avails of his labour while his employment is marketable, he has yet thereby rendered himself more liable to a chance of failure at different seasons: yet it must be confessed, that the general rate of the highly skilled in one branch exceeds largely that of those who have no other capacities than those with which strong hands and willing hearts have invested them. The meanest handicraftsman, almost constantly, reaps more for his exertions than the strongest and most active day labourer.\*

On the other hand, the more general employment afforded to the great mass more perfectly secures them from total inaction. The union of the two requisites of skill in peculiar and adaptation to general operations seems to furnish the conditions that would entirely place the disposal of his labour

\* It must be confessed that, the terms we are compelled to use, very much tend to confuse our notions on subjects of this sort. The handicraft operative is equally a day labourer with him who understands no more than the wielding of a spade or a mattock: and as yet we have no terms whereby to distinguish, accurately, the two.

perfectly at the command of the labourer. If we add to this a proper restraint on the quantity brought into the market, and a careful economy in its expenditure, as well as in the use of its proceeds, we shall go far towards placing the amount of remuneration to the labourer within his own control.

But these objects are not to be effected by combinations to make specific rules for individuals or trades. All general unions of men to carry partial measures, must rebound with accumulated force against their operators. By the time that the Trades Union system shall have gone the round of the circle of the mechanic arts, its supporters will not be a little mortified to discover that they are precisely in the position whence they set out—viz: that the proceeds of their toil will not enable them to purchase one ounce more of meat, or one jot of additional gratification, beyond the prices already afforded them—while they will, in the mean time, have caused a great deal of individual misery and annoyance. The error lies in supposing that they may effect in mass what as individuals they are incompetent to perform. But the true statement would seem to be, that every community is strong in proportion to the strength of the individuals composing it. If their efforts were bent to the objects of making the individual labourer experter, wiser, more intelligent and economical than at present—could he depend more for his gratifications on sources within himself, and less on the trappings of the external world, if a proper self-denial could be imposed, and juster views cherished of the relations under which his Maker has permitted him to exist, the labouring man might speedily be placed in a condition to secure all the compensation that mere human toil is fairly entitled to.

These efforts must begin with the imposition of restraints on those appetites which exhaust his physical powers and drain his purse; which impose on him the maintenance of a family before he has secured even the certainty of constant provision for himself alone; and which, at the same time, tend directly to increase that stock of labour in the market which it is his manifest interest should be limited in supply. They must go farther than this: by making his source of enjoyment more intellectual, they must give the death blow to that infatuated affectation or vanity that impels the man of an income of one dollar to compete in external appearance with him of one hundred per day. A miserable vain glory, the offspring, but an illegitimate one, of our republican institutions; but fruit utterly unworthy the sons of those mothers who substituted the hedge-thorn for pins in the dark days of our struggle for freedom.

The first question for the day labourer to solve is:—On how much less than my earnings can I satisfy my natural and wholesome wants—preserve or renew my powers for future operations, and defend myself against the inclemency of the weather. When this is satisfactorily ascertained, he may enquire: Is it prudent, is it honourable, is it just, that with the means within my power, I should invite another to share the proceeds of my labour, with the probability, almost certainty, of introducing other helpless beings into the world to draw upon the scanty and hard-pressed pittance. Should he not pause upon this consideration, and weigh well the different position in which the lapse of a single year may place him? In one case hampered

\* I use the word in its vulgar acceptation. There are none in this country who do not labour.