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PROVIDENCE JOURNAL.

SATURDAY MORNING, FEB. 26, 1870.

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

FIRST ARTICLE.

Samuel Slater and the Early History of the Cotton Manufacture in Rhode Island. Notice of Slatersville and Forestdale.

In entering upon a survey of the industry of Rhode Island, attention is first naturally and properly directed toward its most important element—the manufacture of cotton; and a just appreciation of its importance, history and extent, mingled with and worthily upholding a just and manly State pride, leads to a brief sketch of the founder, in this country, of that vast interest which today employs so much capital, requires and is carried on by such clear intelligence, such unwearied industry, and gives employment to so large a portion of our own population, and stimulates the advancement of agriculture both here and in the West. To Samuel Slater belongs the honor of having introduced into this country, the manufacture, which, in its far extending influence, is greatly the most valuable in the land, and which affects in one way or another every inhabitant of the country. After food, clothing is the first necessity of life; and of all the materials provided by nature, cotton is the most extensively used, the world over. Samuel Slater witnessed the first crude experiments which were made in the endeavor to spin cotton by machinery. His name is associated, and honorably associated with those of Strutt and Arkwright. From the earliest ages cotton cloth has been manufactured in the East, where the plant is indigenous, but the yarn was, and is, spun upon the distaff, and the loom employed is simply a few sticks or reeds which the weaver carries in his hands, and puts up in the shade of a tree, or at the side of his cottage, and moves from place to place, as fancy dictates or the heat compels. An overspreading branch, to which to fasten his balances, a hole in the ground to hold his legs and the lower part of the "geer," and his well trained muscles, supply the Indian with "privilege" and "power." With this rude material, the East Indian has for centuries produced fabrics, some of them so fine as to be properly designated in the poetical language of the Orient, "webs of woven wind," of such exquisite texture as scarcely to be discerned under a heavy dew. But what the manufacture was thousands of years ago, that it is to-day. When the inhabitants of the British Isles were clothed in skins, ere Cæsar had carried civilization and the sword thither, the Indian artisan produced a fabric which is yet equally a beauty and a wonder. But what he did then he does now, and nothing more. This superior product was the result of generations of training culminating with a few individuals in extraordinary skill. The great bulk of the cloth was of such quality as could easily be made by a great majority of the inhabitants, and such as the every-day wants of the population demanded. In the East there have been no improvements, no inventions, no building up of towns and opening up of new lands; the warp is still stretched on the ground, and the operative is still half naked and wholly ignorant. The introduction of machinery into India has not proved successful. It has brought not profit to the English, and subjugated the laborer to slavery.

In the year 1769, Richard Arkwright (afterwards Sir Richard) obtained his patent for spinning with rollers, and associated with him in business a Mr. Need, and Mr. Strutt, the latter a man of great mechanical knowledge and the largest business capacity. This firm erected the same year a mill in Nottingham, worked by horse power, which was superseded in 1771, by one built in Cromford, to which motion was given by water. In 1783, Samuel Slater entered the establishment of Strutt and Arkwright, and continued in their service for some eight years, having in the meantime not only become perfectly familiar with the whole routine of the business, but entirely capable, as it afterwards appeared, of constructing from memory the machinery requisite to spin the yarn. On the 15th day of September, 1789, Mr. Slater sailed from London for New York, where, after a passage of sixty-six days, he arrived, and whence he departed January, 1790, for Providence. On the 18th day of the same month, Moses Brown carried him to Pawtucket; and on the 20th day of December next following, he started three cards, drawing and roving, and seventy-two spindles, which were worked by an old fulling mill water wheel in a clothiers building, in which the business of Almy, Brown & Slater was continued for about twenty months, at the expiration of which time they had several thousand pounds of yarn on hand, notwithstanding every exertion was used to weave and sell it.

It is almost impossible to conceive the difficulties which surrounded and impeded the success of Slater. He was a stranger in a strange land, there was no person who had ever worked upon such machinery as he proposed to construct; there were no machine shops; few skilled workmen either in wood or iron, and no facilities for him in the accomplishment of his designs; he had not even the roughest sketch of his machines; he had only a tenacious memory, a thorough knowledge of what was wanted, and an indomitable will. Fortunately he found at once in Oziel Wilkinson, one, who like himself possessed a keen mind and a mechanical genius. They together made, or superintended the making, of the necessary tools to be used, and amid all the discouragements, and they were neither few nor small, which Mr. Slater encountered, he ever found in Mr. Wilkinson a friend and an adviser. Up to this time, no carding or spinning machinery had been successfully operated, and none at all by water. Tristam Burges in Congress, paid this eloquent tribute to these men, to whom Rhode Island owes so much: "A circumstance worthy the attention of the whole nation, and worthy, also, of a fair page in her history, is the art and mystery of making cloth with machinery moved by water power. This was introduced into Rhode Island, and commenced in Pawtucket, four miles from Providence, about the same time that the American system was established, by the import law of July 4th, 1789. Samuel Slater, an English mechanic of the first order of mental ability, brought this invention to Pawtucket. He could not bring out from England, models, draughts or specifications, the whole art was treasured in his own mind; that alone, which could not be rummaged and pillaged by any custom house regulation. He, on his arrival, addressed himself to Oziel Wilkinson & Sons. They were blacksmiths, whose hands were as skillful as their minds were intelligent and persevering. I have often thought Divine Providence directed Slater, and brought him to lay his projects before the Wilkinsons; because He had not fitted any other men in this country, with minds and abilities, either to see, and at once comprehend the immense benefit of it; or to understand and perform, what must be understood and performed, to bring this scheme into full and perfect operation." In a word, when Samuel Slater arrived in this country, all the machinery in use for the manufacture of cotton yarn for warps, was so imperfect as to preclude success, and there was a desire to import yarn from India; the American people being wholly indebted to, and dependent upon Great Britain for cotton goods. "If," then, as Mr. Burges well and truly said, "manufacturing establishments are a benefit and a blessing to the Union, the name of Slater must ever be held in grateful remembrance by the American people."

And here we must be permitted to interrupt our narrative by the relation of an anecdote which as completely discloses the character of Samuel Slater as it indubitably proves him to have been a man of the highest moral tone. After his frames were ready for operation, he prepared the cotton and started his cards; the cotton rolled on the top cards, instead of passing through the small cylinder. This was a great perplexity to him, and he was for several days in great agitation. Mrs. Oziel Wilkinson, in whose house he boarded, perceiving his distress, said to him: "Art thou sick, Samuel?" To which he replied by explaining the obstacle he had met, and saying; "If I am frustrated in my carding machine, they will think me an impostor." It was not of his fame, but of his honor, he was thinking.

It is perhaps as well to observe just here that up to the year 1817 the operations of manufactories in this country were confined to spinning yarn only, which was put out in webs and wove by hand-loom weavers. Mules for spinning filling had not then been introduced. The cotton used to be put out to poor families in the country, and whipped on cards, stretched on a small frame about three feet square, and the motes and specks were picked out by hand, at four to six cents per pound, as it might be for cleanness. From 1791 to 1805 all, or nearly all, the cotton factories erected in this country were built under the direction of men who had acquired their knowledge of the necessary machinery while in Mr. Slater's employ. In 1799 Mr. Slater entered into company with Oziel Wilkinson, Timothy Greene and William Wilkinson, the two latter, as well as himself, having married daughters of Oziel Wilkinson. They built the second mill on the east side of the Pawtucket river, the firm being Samuel Slater and Company, Mr. Slater holding one half of the stock. To Mr. Slater is due the credit of having introduced into this country, the Sabbath School. This institution, now as universal as our population, he initiated among his laborers as one of the disciplinary means of rearing intelligent and honest operatives. The year 1829 was a disastrous one to the manufacturers of Rhode Island. Mr. Slater felt but withstood the shock. His own business was perfectly within control. It had always been managed with great prudence, and his estate was, for those days, a very large one. Owing to endorsements he had made for friends, and which he had to meet, he suffered a temporary embarrassment, but paid his own paper and his endorsements, and retained a property gained by honest industry and careful attention, and which was thereafter largely increased. Mr. Slater died at Webster, Massachusetts, April 20th, 1835, aged 67.

It will be seen at once that the success of Samuel Slater was the result of a profound knowledge of his business; an unalterable determination; constant labor; and the most scrupulous integrity. From the commencement of his career to its close, his whole course was distinguished by diligence, sagacity and uprightness. His letters to his business correspondents display shrewdness, breadth of view and a straight forward manliness; those to his children, a very affectionate though not particularly demonstrative disposition. Fortunate in his early opportunities, they were yet such as would neither have been appreciated nor improved by one less observing, less faithful or less persevering. Respected in life, his character loses nothing, to say the least, in comparison with the more modern ideas of the market place and the counting room. In a word; in his exactness of purpose; his thoroughness in oversight; his unwearied exertion, and his perfect and unswerving regard for the fulfilment of every obligation he assumed, he may well be cited as a man whose example it would be both safe and honorable to follow. Those who attain any excellence, said Dr. Johnson, uttering a truth founded upon the experience of mankind, commonly spend life in one common pursuit; for excellence is not often gained upon easier terms. He who spent a life in the pursuit of excellence, in that which of itself was most excellent, and spent it honestly and honorably, may well, by his influence, say:

"Let none presume
To wear an undeserved dignity.
O, that estates, degrees, and offices,
Were not derived corruptly! and that clear honor
Were purchased by the merit of the wearer!
How many then should cover, that stand bare!
How many be commanded, that command!
How much low peasantry would then be gleaned
From the true seed of honor! and how much honor
Pick'd from the chaff and ruin of the times,
To be new varnish'd!"

Slatersville.

This village, owned by John and William Slater, and situated in the northwestern part of Smithfield, four miles from Woonsocket, on the Branch river, is one of the most picturesque villages in the State. The mills are situated in a natural amphitheatre, with the river on one side, and some acres of meadow on the other. On a plateau is the village, consisting of well built houses, many of them large and elegant. All are well kept, and an air of neatness pervades the whole place. In the centre of the village is a common well planted with trees, and fronting it the church, (the gift of John Slater, Esq., deceased), a commodious and well proportioned building. On the brow of the hill overlooking the mills and village is the beautiful residence of Wm. S. Slater, surrounded by ample grounds laid out and planted with trees in excellent taste. The fall of water is 37 feet; 1,407,414 pounds of cotton are manufactured annually, by means of 26,824 spindles and 605 looms. The amount of nominal horse-power is 460; 600 tons of coal are consumed yearly; six hundred hands are employed and the annual product is 5,799,541 yards of sheeting, shirting, flannel and print goods. The population of Slatersville is 1,200. The freight to and from the mills is 2,400 tons per year. The value of the yearly product is $600,000. Of the operatives in the mills, 200 are males and 300 females; while 100 others are employed on the farm and elsewhere; and 45 children under sixteen years of age are employed in the mills according to the terms and limits of the statute in such cases made and provided.

The First National Bank of Smithfield, is located here, with a capital of one hundred thousand dollars, Wm. S. Slater, President. A new three-story brick and stone building has recently been erected, in which is a large hall intended to hold the village library, consisting of one thousand volumes, and for a reading room. No liquor is sold in this village; and the average attendance of the Sabbath School is 165. Very evidently the spirit which Samuel and John Slater in 1806, impressed upon the place, still pervades it; the mills are solidly built; the tenement houses are spacious and allowed sufficient grounds; everything is quiet and orderly, and gives assurance of being well guided. The Messrs. Slater have long had in contemplation the construction of a reservoir, which would greatly add to their water-power, and some day the project will doubtless be consummated. In the meantime this village appears to combine as many advantages, and be subject to as few drawbacks as is possible for an exclusively manufacturing community. To the superintendent, Mr. Bowen, is due much, for the good order, the moral tone and general quietude which marks the village. Clearly there is much to be said in favor of independent and absolute ownership of a manufacturing district. There is something doubtless to be said on the other side, but of that, so far, we have no practical knowledge, and have received no teaching from observation.

Forestdale.

This village is situated on the same stream as, and half a mile below, Slatersville. For many years Mansfield & Lamb have carried on here the business of scythe making. In 1860 they erected a large and substantial stone mill, which is operated by the Forestdale Manufacturing Company, who own the machinery. The fall of water here is 14 feet; horse-power of water, 250; steam, 80. 150 tons of iron ore are annually used; 3 tons of steel, and 100 grindstones, are employed in the scythe works, which turn out per year 8,000 dozens of scythes.

The Forestdale Company use annually 1,400 bales of cotton; run 1,500 spindles and 300 looms, and employ 250 hands: males, 100; females, 150. About 35 children under sixteen years of age are employed in the mill. The value of waste made is $15,000. And the annual product is 2,000,000 yards of fine sheeting for bleaching, valued (at average prices for cotton for current year) at $300,000. The freighting of the Company amounts to 3,000 tons. The tenement houses are uniformly built, two stories high, calculated for four families, and are more than comfortable. It is a rule of the place that the children are to be kept at school, and the owners, and Mr. Holt, the Superintendent of the mill, are gentlemen who take an interest in the peaceableness and welfare of the community. Even smoking is not allowed in their store. Of course there is no show for rum. *Ex pede, Herculem.*

LECTURE.—A lecture will be delivered in the Cathedral, on High street, Sunday next, for the benefit of the Sisters of Mercy of St. Xavier's Academy, by Rev. Lawrence Walsh, of Collinsville, Ct. The subject of the lecture will be "Religious Orders." The object is a worthy one, and we hope the Cathedral will be filled on the occasion.

PROVIDENCE JOURNAL.

THURSDAY MORNING, MARCH 3 1870.

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

SECOND ARTICLE.

Woonsocket.

The ample water power at this place, with the falls, which in their natural state were exceedingly beautiful, at a very early day directed attention to what was, in other respects, anything but an inviting locality for a village. In 1695, John Arnold settled near this place, and in 1730 conveyed to his sons John and Joseph, by the first deed now to be found on record in relation to this territory, the land now occupied by the village of Woonsocket. John very soon erected a grist mill, which supplied the wants of the inhabitants in that behalf, for a considerable circuit of country. This and a saw mill were the only mills in operation until about the year 1816. In 1814, however, James Arnold commenced a small cotton mill for the manufacture of yarn. In 1825 a permanent stone bridge was constructed over that branch of the river next to the Globe side, by Dexter Ballou and Joseph Wilkinson; the middle arch, also of stone, was erected in 1833, by Aaron Rathbun; and the one on the Cumberland side, likewise of stone, was erected in 1843, by Eugene Martin. The old (upper) dam, has been replaced by one built of hewn stone, taken from one of the locks of the Blackstone canal; and when the river is unusually high the rush of waters over the rocks and through these three arches, is truly sublime. Within the precincts of the village, there is also the Bernon dam, a fine wooden structure, and the Hamlet dam. In order to a better understanding of what we shall have to say respecting Woonsocket, it may be well to state that Woonsocket village, when spoken of generally, is understood to include also the villages of Bernon and Globe, which are, and until the rising of the present General Assembly, probably will be, in the town of Smithfield. In 1867, the new *Town* of Woonsocket was set off from Cumberland, and includes Jenksville, with which, in fact, it is almost joined by the rapidly increasing population in that direction. If the proposed annexation of the Smithfield territory takes place, Hamlet village will also be included in the town of Woonsocket.

This question of annexation has caused no little excitement, and sundry citizens of Smithfield, before the Legislative Committee, opposed it upon the very natural and sentimental ground, that having lived all their days in the good old town of Smithfield, they wished to die in it. To which the friends of annexation replied, that they thought legislation should be directed rather to make a place desirable to live in, than to die in; and, (very impertinently,) that so far as these gentlemen were individually concerned, they might have "been buried" a quarter of a century ago, without any detriment to the progress of the world.

In 1846, that very industrious antiquarian, Mr. S. C. Newman, whom some of our readers may recollect in connection with the Blackstone monument which was not built, made an enumeration of the inhabitants and a compilation of the business of Woonsocket, which, as a starting point for our own investigations, and as affording a suggestive comparison between the village of that day and this, we quote briefly. The population, including Hamlet and Jenksville, was 4,856. The number of spindles—cotton, 55,780; looms 1,323. Woolen spindles, 2,280; looms 61. The Woonsocket *Patriot* published an edition of 1,000 to 1,200 copies. Its present circulation is 7,000 copies. There was at that time one Institution for Savings—(Woonsocket) limited to $100,000—with a deposit of $27,000. This institution is now authorized to receive deposits to the amount of $2,500,000, and has on deposit $2,000,000.

There are now four Institutions for Savings. The six National Banks had on deposit, as per their last Quarterly Returns—

Woonsocket National Bank		$102,113 55	
First do	do	37,745 31	
Citizens do	do	38,484 52	
National Union do	do	11,371 72	
Producers National do	do	35,179 03	
National Globe do	do	18,097 27	
			$243,101 40
Woonsocket Inst. for Savings		$2,013,449 13	
Citizens Savings Bank		250,000 00	
Peoples do	do	200,000 00	
Producers do	do	60,000 00	
			$2,603,449 13
A sum total of *deposits* of			$2,846,550 52

In 1847, the Providence and Worcester Railroad was opened for traffic, and has, since that time, by the increased facilities it has afforded, very much aided in the rapid advancement of this place. Among those whose sagacity and enterprise were enlisted in this undertaking, we shall not be deemed invidious if we name as worthy of especial mention, the venerable Harvey Chace, of Valley Falls, who still in a ripe old age, "frosty, but kindly," holds a place in the direction of the road; and whose judgment is as sound, and whose service is as valuable as that of any one among the men who have brought this road to, and still maintain it in, a condition not surpassed by that of any in the country. It was owing mainly, if not wholly to the foresight of Mr. Chace, that instead of following the line of the old Canal, and so avoiding wholly the important villages of Pawtucket, Central Falls and Valley Falls, it was run through them, not only to their great benefit, but to the very large advantage of the road, as will be seen when we state that in 1847, the only public conveyance between Valley Falls and Providence was a stage which came down from Worcester one day, and returned from Providence the next; and that now some fifty trains a day pass between Valley Falls and Providence, of course accomodating Central Falls and Pawtucket. In the year 1849, the business on this road between Providence and Woonsocket, was:

Passengers	68,216	Income	$26,441 80
Tons of Freight	14,410	do	18,707 60
			$45,149 40

In 1869:

Passengers	173,510	Income	$65,804 40
Tons of Freight	47,315	do	67,686 26
			$133,490 66

The late Dexter Ballou was one of the first of the permanently successful men, who engaged in manufacturing in Woonsocket. His brother, George C. Ballou, is the oldest manufacturer now living here. He commenced manufacturing cotton warps at Waterford, and removed to this place in 1830, employing some 8 or 10 hands. Besides his interest in the Clinton mill, he owns the Globe mills, on the Smithfield side of the river, and a large mill on the Woonsocket side. The fall is 18½ feet; number of horse power—water, 100; steam, 150; No. of hands 180; looms, 212; spindles, 10,000; annual consumption of cotton, 470,000; yards of cloth manufactured, 2,250,000; tons of coal used, 125; pounds of starch, 15,000; gallons oil, 1,200. The goods made are fine sheetings and shirtings for bleaching. Mr. Ballou also owns and runs a steam saw mill, 4 stories high, in which is also machinery for planing, morticing and sash making, operated by a steam engine of 40 horse power. He has also laid the foundation of a new cotton mill, to be 70x234 feet, with an ell 50x147 feet. Mr. Ballou has passed the allotted span of life, but is still as actively engaged in business as ever, although he devotes most of his time, especially in summer, to his farming operations. With all his wealth, Mr. Ballou is as industrious, prudent and unostentatious as in his earlier days, and the merchants of Providence will recognize his as one of the "gilt-edged" names,—the gilding being solid all the way through. Not given to pretence of any sort, he aids regularly in the maintenance of such churches as may require assistance from outside of their own body; and although possessing no political tastes or aspirations, he has represented the town of Smithfield, in the Senate of Rhode Island.

The American Worsted Company, George C Ballou, President, Reuben G. Randall, Treasurer, and P. H. Brown, Sup't. and Agent, commenced the manufacture of Coat Bindings, and Alpacca and Mohair Braids, in 1868. They now occupy a new and most excellently built stone mill, 40x100 feet, five stories high, with an ell 40x40, three stories high, owned by George C. Ballou. The mill is operated by a very compact and beautiful engine made by Brown, of Fitchburg, Massachusetts, of 100 horse power. They employ 60 hands and run 500 braiding machines; consume annually, 160,000 lbs. of fine wool; and use 500 tons of coal. The production is 90,000 yards of of braid per day. The Company will largely increase their machinery this spring, and will also erect a dye house.

The Woonsocket Rubber Company, Lyman A. Cook, President, Joseph Banigan, agent, and John F. Holt, Superintendent, commenced operations in 1865; employ 200 hands; consume 900 lbs. of rubber per day; use 925 tons of coal annually, and operate their works by means of an engine of 125 horse power. Their goods are boots, shoes, piano covers, wringing machine rolls, and all kinds of mould work. Caoutchouc, Gum Elastic or India Rubber, is an article *sui generis* The best is obtained from Peru, and Central America. It is the inspissated juice of a great variety of tropical trees, and is procured by piercing the tree, or by making a series of incisions around the trunk and main branches, whence the juice exudes abundantly as a creamy fluid which generally becomes firmer and darker by exposure to the air. The extreme elasticity of this substance, and its imperviousness to air and water, are qualities popularly known. These and others almost as valuable, have led to its manufacture to an extent very remarkable, when we consider that the first impression which the present generation had of it, was that of a coarse article so little valuable that the first shoes made of it were so heavy as to be actually cumbrous. Now that it is worth at least a dollar a pound in its crude state, we have learned to economize it. The caoutchouc of commerce, instead of coming to us as it did thirty years ago in fancy shapes, is found in large pieces of an irregular though roundish shape and loses by purification for use, about 15 per cent. of its weight. It is first washed, or rather soaked in hot water, passed through immense iron rollers, by which it is rendered thin and broken, and then dried in a room of the temperature of 120 degrees. Thence it is passed through a series of heavy rollers, and with it is incorporated such materials as that the future processes render it substantially a mineral, rather than a vegetable material. Exceeding heat, and intense pressure, after its due preparation, suffice to render it suitable for many purposes, for which in its natural state it would not be at all adapted. Mr. Lyman A. Cook is the present Senator from Woonsocket.

In 1837, Stephen N. Mason commenced on the "island" between Woonsocket and Bernon, the manufacture of soap. At that time there was no manufacture of the kind in the State, north of Providence. The villagers and farmers threw away their ashes, save those used for making soft soap for home consumption. Mr. Mason began by paying 12½ cents per bushel for ashes, and now pays 22 cents, and sells his leached ashes for 15 cents per bushel. At first his leached ashes were a drug; but Mr. Mason purchased some land in the vicinity, the soil of which was very light, and the application to this of his ashes, soon made such an improvement of it that that excellent farmer, the late George Andrews, of Smithfield, and others, took note of it. Mr. Andrews used for years to buy large quantities of these ashes, and since his example, they have always found a ready market, many deeming them even more valuable for the soil than the dry ashes.

When Mr. Mason commenced business here, the woolen manufacturers were accustomed to use a great amount of castile soap, and the then best American soap, Colgate's, of New York, for fulling purposes. Of course the large sums paid for this article were sent away from home. Mr. Mason made a soap, for this use, which, upon trial by Edward Harris, was found to be superior to any before used; Welcome Farnum, after a thorough experiment with it, sold a large quantity of castile soap he had on hand, and commenced the use of Mason's soap. From that day to this, the manufacturers of New England have, as a rule, used in their works no other; and it is sent south and west. The amount of money thus saved, and brought into Rhode Island in the thirty-three years since that especial manufacture was introduced, is worthy of recognition in estimating the value of our industry. Mr. Mason employs 8 hands; an engine of 25 horse power; uses 130 tons of coal annually, and makes 2,000,000 pounds of soap per annum. Mr. Mason was Senator from Smithfield, in the State Senate, in the year 1863.

The mill of Hon. Daniel B. Pond is operated by a horse power of—water 35—steam 40; fall of water 8 feet, being one-sixteenth of the Blackstone river. Number of hands, 110; spindles, 3,000; looms, 20; annual consumption of cotton, 168,000 pounds for the manufacture of warps. Woolen machinery, 1 set cards; 10 broad looms. Coal used, 400 tons; starch, 6,000 pounds. Product in addition to cotton warps, 60,000 yards per year of repellants. Mr. Pond was elected as Senator from Woonsocket at the spring election of 1869, and resigned prior to the present session of the General Assembly. He was also Representative for the political year 1868-9.

Two Hours in a Woolen Mill.

The Lippitt Woolen Company's mill, which went into operation in 1865, was intended to be, and is, a model mill. In it, from the first step in the manufacture, to the last, there is no step backward; no loss of time, space or labor. The wool is taken into the upper story, from whence, as it is wanted, it is carried by the attraction of gravitation, to the room below; a boy easily managing the descent. In this room it is sorted, the qualities numbered and placed in bins, and as called for dumped through a scuttle to a lower room where it is scoured, carried to another room where it is dried by means of cold air, and on the same floor, dyed in such colors as may be required. Being now ready for carding, it is raised to the upper, or fifth story, to be stored. This room is protected from fire by a series of pipes pierced with small holes, so that water can be thrown by the steam pump over the whole room simultaneously. Between this and the carding room there is an iron door, and another with three thicknesses of tin; the latter shutting of itself upon the passage of a person through it. The precautions against fire are ample and ingenious throughout. From the store room, on the same floor, the wool is taken to the carding room; a boy tends three cards, and weighs a given quantity of wool and places it within a given space on the rollers which feed the cards. From the carding room the wool is thrown down a scuttle to the room below, where the different numbers are placed in spaces set apart for each. As needed the wool is thrown through an aperture in the wall into a room the floor of which is covered with zinc. Here four quarts of olive oil are added to each hundred pounds of wool, and it is passed through a machine which incorporates the oil perfectly with the wool. Thence it is passed back through the partition into bins numbered in accordance with the cards on the same floor. By these it is made into roving,—a large roll of loosely connected wool, each card turning out one roll. Forty-eight of these rolls are then spun into one, and forty-eight of these again spun into a single thread, the object of this multiplied spinning, being to obtain an even thread. But this thread is still far from being ready for the loom; it is, in fact, an untwisted length of wool; but passing down to the room below, it is by the ordinary jack frame, and self-operating mules, spun into a thread of such fineness as the fabric to be made requires. Thence down another story, into the weaving rooms, and here, confessing our utter inability to tell how, we only aim to say what was done. There was a man in the midst of spools filled with woolen and silk thread. Near him, and as it seemed, somehow under his control was a seething, sputtering, hot tank, called a dresser, through which the threads were passed, and in which they received some sort of preparation, called sizing, which rendered them more amenable to the tension of the loom. Next these (warp) threads were placed through innumerable wires, and counted into reeds, and so were ready for the looms. But these looms; with their spools of different colored yarn bobbing up and down with the utmost apparent promiscuousness, with their chains; their irregular motion; their utter incomprehensibility to the common and unmechanical mind, who shall attempt to describe their mystery? Suffice it to say that the result is cloth of every variety of pattern, of every shade of color, and of a quality which we shall allow those qualified to speak their assent, below to indicate.

From the loom, the cloth is placed in the fulling machines. Thence it is taken to the scouring machines, and washed by means of hot water and large rollers, then dried by means of hot air; then it is pressed, shaved, inspected, and packed for market. In the New York *Economist*, of February 26th, we find the following statement of the sort of goods this mill makes:

The Lippitt Woolen Co., through Messrs. Denny, Poor & Co., as is usual, show an array of choice styles of their popular makes, and as being worthy of special criticism, their Double and Twist 6-4 coatings first claim our attention. These goods show a very superior workmanship in their general appearance, and particularly so as regards the finish, which is of the highest order, while the varied combinations that are presented make them one of the most attractive lines made in the country. Being represented in four qualities, the two finer grades are unsurpassed, as in evenness and fineness of spinning, they stand unequalled as a line, while in some of the colors the high colored silk thrown in imparts a glow of life which is seldom, if ever, seen in this class of goods of any fabric. Many of the styles are really beautiful in the arrangement of the colors, and the number of houses in which they are displayed is ample attestation of their worth.

The Superintendent is Mr. Albert J. Elwell; horse-power,—water 150; steam 125; fall 15 feet; hands employed, 300; sets of cards, 18; No. of pounds of wool used yearly, 550,000; No. of tons of coal, 900; No. of yards of cloth manufactured, 400,000.

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Manuf+Farmers Journal 3-7-1870

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THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

THIRD ARTICLE.

"Prætorian here, Prætorian there, I mind the bigging o't," as Edie Ochiltree said to the Antiquary. Our friend E. M. S. gives us early and courteous caution to be careful, by rapping our knuckles, for saying—following Smith Wilkinson, who was son of Oziel, and brother-in-law of Samuel Slater—that "the operations of manufactories in this country up to 1817 were confined to spinning yarn only." We were speaking especially of the cotton manufacture, and were not at all oblivious of the Beverly experiment. Will E. M. S. give his authority for saying that "weaving was done in this establishment," as we understand weaving to be done, when we speak of its accomplishment in a factory; i. e., by power? In the autumn of 1814, a power loom was put into operation at Waltham, Massachusetts; and about the same time Gilmour landed in Boston, from England, with patterns of the power loom and dresser; but, says the author of the "Memoir of Samuel Slater, and History of Manufactures," "previous to 1815 the whole weaving was done by hand-looms." Speaking broadly, the statement of Smith Wilkinson was correct, and the exception, and so far as we have any proof, the only exception, was in the case of the Waltham mill; speaking of course, as before, of cotton manufacture. As to the interesting investigation and discussion relating to the origin of the Sabbath School in this country, we can only say that the Memoir of Slater, from which we quoted, was written by a Connecticut clergyman, who might, nevertheless, have been mistaken. When E. M. S. and F. D. have settled the issue between them, we shall be glad to have for ourself, especially, the benefit of their erudition. In the meantime, trusting that they, or "any other man," who finds or imagines he finds, a mistake in our historical citations, or as to any matter of fact, will oblige us by a reminder thereof, and noting that in our last article, in speaking of the market whence Caoutchouc is principally obtained, we wrote Para, not Peru, we pass on to

The Social Manufacturing Company.

This establishment was commenced in 1810, by a company consisting of Joseph Arnold, Ariel Ballou, father of Dr. Ariel Ballou of Woonsocket, Abner Ballou, Nathan Ballou, Job Jenckes, Luke Jenckes, and Oliver Leland. The capital was sixteen thousand dollars. It afterwards was purchased by the late Dexter Ballou, who also owned the "Stone Mill," so called, in the village. Hosea Ballou, a brother, also manufactured cotton here for some time, and his skill in doing so is traditionally commemorated by the relation of a compliment paid him by Crawford Allen, who was quite able to appreciate the situation, and entirely willing and able to express his view of it in very vigorous language. From the experiment of 1810, this concern has grown until it is, for size, efficiency and economy, a model mill. The Company now owning it were incorporated a few years since, with the following officers:

President—Oren A. Ballou.
Treasurer—Henry Lippitt.
Superintendent—Charles Nourse.

The power used is, water 200 horse power, steam 500. The fall is 20 feet; number of hands employed, 500; number of looms, 800; spindles, 43,000; 1,700,000 pounds of cotton are consumed annually; 2,500 tons of coal; 40,000 pounds of starch; 3,200 gallons of oil, and 7,000,000 yards of fine sheetings, shirtings and sllesias for bleaching, are manufactured per year. In this mill is to be found, of course, the latest improvements in machinery, and is so constructed and arranged as to save as much as possible manual labor. To one acquainted only with old-fashioned picker and picker room, it is a treat indeed, to see the cleanly and pleasant room in which that work is done by means of the English machine in operation at the Social. There are, too, in this mill, two of the "slashers," so called, which take the place of the old-fashioned dressers. Theset wo have displaced eleven dressers, requiring 13 men, and need only two men each to operate them. But this is far from being the only or greatest advantage of these machines. Under the old style of dressing, the dresser-room was always an apartment by itself, in which the temperature ranged from 90° to 110° Fahrenheit. Now, other operations can be carried on in the same room, and the heat is only that which is comfortable and desirable. Besides, it is a matter of experience, that men working in the hot atmosphere of the dressing-room, became exhausted, craved stimulants, and were in larger proportion than other operatives given to the use of intoxicating liquors. There can be no doubt that there is a good deal of "moral suasion" in a machine which renders work almost a pleasure, and which requires only gentle exercise instead of the most debilitating labor.

The engines which supplement the water-power, are admirable ones and admirably kept. Everywhere there is proof of order and habitual neatness. One of the overseer's rooms struck us particularly; it had on the floor a pretty-figured oil cloth; a thrifty plant was in the window, and a bouquet of flowers on the handsome chestnut desk. The "boarding house" is an institution peculiar to the "Social," so far as we are aware, in this vicinity. It is conducted by Mrs. Pond, who has now some hundred boarders. The company employ her, and furnish everything. None but their employes are taken, and the women, at any rate, are boarded very considerably less than they could obtain the same accommodation for elsewhere. The building is a very fine one, three stories high, with a Mansard roof. As you enter, on one side is a comfortable common sitting-room for the men, and another for the women; the washing arrangements are ample, and sufficiently luxurious, if marble is a luxury, in these days for anybody save newspaper men. There is also a small reception-room for the use of those who may have callers, and in it is a cabinet organ and some very fine engravings; fine, more particularly, as displaying in their selection a refined and elevated tone. In a well-appointed room, nicely carpeted, and with a very fine book-case, is the library of some three hundred well-selected books, which are at the service of the boarders every Saturday from 6 to 7 o'clock p. m., and for every dollar contributed by the boarders, the company give a dollar for the purchase of new books. Besides the bath connected with the sick-room, there are others open to all.

The company have erected twelve very handsome brick cottages, each accommodating two families, for their superintendents. Other tenements of brick and wood, are supplied in full measure.

The Groton Manufacturing Company

have two mills here, superintended by P. J. Congdon. These mills, though small in comparison with that we have just described, are remarkable for neatness. Within a few years, Mr. Congdon has entirely renovated one of them, and it would be difficult to find rooms more perfectly kept, or a more thorough economy in labor. With an improved wheel, and new and improved machinery, Mr. Congdon has doubled his machinery, and increased his speed with the same amount of water. There is also a "slasher" in this mill, and in the same room, and, with perfect comfort, several women are employed.

The fall is 14.5 feet; 165 hands are employed; 202 looms are run; the number of spindles is 11,824; number of pounds of cotton manufactured annually, 520,000; 2,163,000 yards of cloth are made; 150 tons of coal consumed; 11,700 pounds of starch used, and 614 galons of oil. The goods made are fine sheetings.

The Bailey Washing and Wringing Machine Company

is in the occupation of the large establishment formerly known as the Metcalf Machine Shop. Mr. Selden A. Bailey is the originator of the rubber rolls which form the most conspicuous part of a machine which is fast finding its way into every part of the country. In 1855, Mr. Bailey, in conjunction with John Allendar, constructed the first wringer. The first patent was obtained in 1859. Both Bailey and Allendar secured patents the same year, but Mr. Allendar made no machines for sale. Mr. Bailey made, the first year, twelve machines, eleven of which he sold. In 1860, he invented the oscillating board, by means of which the water from the clothes is turned into a tub on either side. This simple invention secured to Bailey's machine the control of the market, inasmuch, as trifling as it seemed, it made all the difference between an inconvenient and a convenient household article. In 1859 and 1860, one thousand machines were sold, and since that time hundreds of patents have been taken out for wringers. In 1860, one hundred machines were made in Worcester; in 1862, Mr. Bailey commenced building machines in North Wrentham, Mass., where he lost everything but his patents. In 1864, at the request of Simeon S. Cook, he came to Woonsocket, and after some negotiation the business was entered into here. In that year, 2,000 machines were made; last year, 50,000 were made. In 1863, Mr. Bailey bought all Allendar's patents, and is in a fair way to derive a fair remuneration for his ingenuity, energy and industry. Infringers, who have been numerous, are pretty well disposed of, and success with so necessary a machine seems inevitable. The company run an engine of 75-horse power; employ 75 hands; by improvements in machinery and skill are enabled to do with 60 hands the work which at first required 90. One hundred and twenty-five tons of coal are consumed per year; 500,000 feet of lumber, and $75,000 worth of rubber.

F+MJ 3-10-1870

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

FOURTH ARTICLE.

The Woonsocket Company,

Owning four fine mills, and originally what is now the village of Bernon, much of which it still retains, occupies a large and valuable privilege, and has done much for that village. In 1831, the late Samuel Greene, came from Pawtucket to this place, and up to within a few months of his decease had charge of the Company's establishment. He was born in 1791, and his mother was daughter of Oriel Wilkinson. He possessed a decided taste for mechanics, and perhaps was more scientifically informed in the science of hydraulics than any of our manufacturers. When Gilmour first came to Rhode Island for the purpose of constructing the power loom, Mr. Greene made his acquaintance, and obtained from him much valuable information. In 1820, he with others formed a company under the name of the "Pawtucket Worsted Company," for the manufacture of vesting. To the late Hon. N. R. Knight, when he was chosen Senator of the United States from this State, the Company presented a vest of their own manufacture, which he wore to Washington, and which attained considerable attention there as being the first specimen of worsted goods manufactured in the United States. He was one of the original members of the Rhode Island Society for the Promotion of Domestic Industry, and also very active in promoting the establishment of the "MANUFACTURERS AND FARMERS JOURNAL."

He represented his native town in the General Assembly from 1816 to 1821 inclusive, and was throughout his whole life exceedingly interested in public affairs. He had a very great care for the orderly management of the village of Bernon, and in the deeds of that company to purchasers of lots, there has been and still is invariably inserted a clause that no spirituous liquors shall be sold on the premises. To the Episcopal Church, of which he was a communicant, he was very much attached, and in him it always found a discreet counsellor and a liberal friend. St. James' Church in Bernon has always been most fortunate in its clerical incumbents, and to Mr. Greene's advice, and the company's aid, it has been indebted for a good deal of that stability and constantly increasing numbers and influence which have marked it. The grounds which adjoin the mills are beautifully kept, and are one of the pleasantest features of our somewhat crowded and bustling town. The Woonsocket Company employ in these mills 250 hands, run 288 looms and 13,000 spindles.

It ought not to be omitted that to Mr. Crawford Allen, St. James' Church is indebted for a very commodious chapel.

The Woonsocket Iron Foundry,

S. S. Cook, agent, having purchased, now occupy the large building formerly owned by Willis & Lyman A. Cook, including that portion thereof which has heretofore been occupied as a cotton mill. This Company instead of pursuing the general business carried on here, have made arrangements to manufacture exclusively "Paul's New Improved Self-Acting Woolen Mules," of which they say, that as compared with jacks the advantage of this mule is such that in the saving of labor, the superiority of the yarn, the increase of production and the saving of waste, it will repay its cost in two years. There are two of these mules in operation in the Lippitt Mill, and one in one of Mr. Harris's mills. The Company show their faith in the value of their machine by discarding all other business and confining themselves to this single manufacture, as well they may if it deserves the encomiums they pass upon it. If it shall prove to be what they expect, very evidently no woolen mill can afford to be without it. And further it should be considered that every such enterprise, involving a large outlay, and much time to render it successful, is, if it prove as this promises to be, well-founded, a most gratifying and profitable addition to the businesss of the community in which it is carried on.

Messrs. J. P. & J. G. Ray

Occupy and own the old "Lyman Mill," so-called, and the "Bartlett Mill." The first cotton mill erected in Woonsocket is part and parcel of the "Lyman Mill." Gen. L. C. Tourtellot is Superintendent. The fall of water is 17 feet; one hundred horse power; 135 hands are employed; 115 looms run, and 5,800 spindles; 565,000 lbs. of cotton are consumed annually and 30 tons of coal used, and 2,000 lbs of starch. 600,000 yds. of light sheetings are made per annum, 60,000 lbs. of carpet warp and twine, and a large quantity of seamless grain bags.

Edward Harris,

Whose name as a manufacturer of fine and fancy cassimeres is so well and favorably known throughout the country, and who for so many years stood at the head of that manufacture, commenced business in Woonsocket in 1831, with a capital of 3,500 dollars, and in a mill with one set of woolen machinery. The first years of his business were not profitable, and he came very near abandoning it. Afterwards, however, profits were made, and for a long series of years his production constantly improved in quantity and quality until in many seasons the name of "Harris" was a fair profit over and above that to which the quality of his goods entitled him. That is to say, the uniformity and well known character of his cassimeres gave them a ready market at a renumerating rate, when other manufacturers less known, although producing goods of equal quality, found few or no sales, except at a much less price. He now owns one cotton mill and three woolen mills, and owns the large brick mill at the "New Privilege," occupied by Taft, Weeden & Co., of which we shall speak hereafter. The old, or No. 1, mill is still occupied, but the business is substantially done in No. 2, built in 1836, of stone, and which is five stories high; No. 3 mill, erected in 1844, five stories high and constructed of brick, and No. 4, a stone mill, six stories in height.

The fall of water is 15 feet; the horse power of the cotton mill, 100; steam, 40; hands in the cotton mill, 75; looms, 152; spindles, 7,000. The power of the woolen mills is—water, 350; steam, 100; hands employed therein, 475; and 21 broad and 82 narrow looms are run, with 25 sets of machinery; 850,000 lbs. of wool are manufactured per year; 1,500 tons of coal and 1,200 gallons of oil, and 500,000 yards of cloth manufactured. Joseph E. Cole is Agent, and Benjamin Bentley, Superintendent.

For the growth of Woonsocket, no one man has done so much as Mr. Harris. Early foreseeing the day when land in its vicinity would be very valuable, he purchased largely, and not only has he sold freely to such as desired to erect substantial homes, but he has himself built up a village at the "New Privilege" which, originally considered to be out of town, is now a very desirable part of it. In the exercise of a wise judgement, Mr. Harris has laid out a large number of streets, which for width and regularity contrast most favorably with the older portion of the village. And he has had the combined sagacity and liberality to secure by donation of land, the location of the High School building upon the territory which he has laid out, and, to a great extent disposed of. At the time, or immediately after company "K," of the First Rhode Island Regiment, left Woonsocket, in April, 1861, Mr. Harris placed in the hands of Captain Simpson one hundred dollars to be used as occasion might require for the comfort of the men of the Company. But that which ought to redound the most to the honor of Mr. Harris, is his munificient gift to the town of Woonsocket, and the immediate vicinity, of the large and elegant building erected by him on Main street, in 1856, and which is now valued at from seventy to seventy-five thousand dollars, for the purposes of a free library, and the supplementary gift of a most excellent library, costing twenty-five hundred dollars, which was selected by Professor Jewett, of Boston, and said by him to have been the best—in view of the number of volumes—which he ever organized. The library room has been very tastefully fitted up, and the building is one which would reflect honor upon Westminster street. Whatever Mr. Harris may be entitled to in the way of respect as a manufacturer or business man, on the facade of this noble block should be carved his name, and the words: "*Si monumentum quæris—circumspice.*"

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

FIFTH ARTICLE. 3-12-70

Mr. Nathaniel Elliott,

Who was burned out on the 1st of June last, has reconstructed his works on a larger and more perfect scale. Having been for some years engaged extensively in the lumber business, he some time since commenced as builder, and the increase of his operations has necessitated the use of varied and ingenious machinery. His building is of brick, 140x50, with additions 42x44, 30x70 and and 22x80 feet respectively; all of brick, the main part two stories in height, with roofs and doors of iron. A Woodruff & Beach engine, of 175 horse power, drives the saw mill, and supplies power for the sawing and planing. The engine room is tastefully painted, done on rainy days, Mr. Elliott says, by his own hands. It is so well kept that it is certain that the engineer does not sleep on his post. Adjoining the boiler room is a tower with iron doors, into which all the sawdust is carried by an elevator for the use of the furnace. When the latter with its appurtenances is fully completed, the sawdust from the entire establishment will be brought, some of it over two hundred feet, by it, without handling, into the tower. The saw mill now requires more than one man to remove the dust it makes. The rapidity with which the planing machine planes the sides and edges of a board, tongueing and grooving it at the same time, is something wonderful to one acquainted only with the old method of hand planing. There is also a machine which planes the four sides of a heavy beam, seventy feet long, easily and quickly. In the smaller machine, the knives make four thousand revolutions per minutes. The plain sawing is done with astonishing celerity. One machine has a saw for splitting; a slight movement displaces this and substitutes one for cutting off; it saws straight; it bevels and mitres with a mere turn of the hand. It looks, when in operation, as though it would do the work of a score of men. Another takes a strip of board and in an instant returns it a blind slat ready for use. Another receives a square stick and delivers it a round one. All kinds of circular and oblong work are performed with a quickness which is absolutely surprising. It is easy now to see how Mr. Elliott can do so much work in the way of building in so short a space of time. His energy in replacing his burnt machinery, and the capacity of his present establishment, give evidence that however rapidly Woonsocket may grow—and it is to be at an accelerated speed—we have at home resources quite sufficient for all our needs. Mr. Elliott can build houses as well, as handsomely and as cheaply as any one, as is proven by the numerous edifices he has constructed, and is now putting up. His perseverance and his integrity are equally creditable to him and advantageous to the community.

The horse-power of his engine is 125; he employs 100 hands; and uses and sells annually 6,000 tons of coals.

Mr. E. Hubbard,

who was also burnt out in the fire of June last, has recommenced his business as builder and contractor. His steam power is 30; hands employed, 60; tons of coal used, 50. Mr. Hubbard's establishment is of a similar character to that of Mr. Elliott, with the difference of less machinery and more hands employed relatively in work done by hand.

Mr. Hubbard, following his convictions of duty, entered the volunteer service during the war, and, as Captain, faithfully discharged his obligations to his country. In that service, as in his business relations, he proved himself wholly trustworthy, eminently capable and deserving of the confidence of all. In his loss by fire, he met with the hearty condolence of the entire community, and his renewed efforts have been rewarded by a larger patronage. In reckoning up the productive value of any given population, such a man is to be set down at a high figure. This sort of men it is, who give life, and thrift and power to a community. It is a varied industry which best promotes the growth of a place; and it is a sagacious and honest labor which accumulates and renders useful, capital.

Harris's New Mill

is occupied by Taft, Weeden and Company. It is one of the most substantial and well arranged mills in the country. It was built under the eye of Mr. Harris himself, and was intended to be, as it certainly is, a model establishment. It is situated on Mill River, a small stream which empties into the Blackstone below the Woonsocket privileges, after having been used by the Social Company. It is the largest breast wheel in the United States, being twenty-eight feet in breadth and forty feet in diameter. This wheel was built by Welcome Mowry, Esq., of Smithfield, and it runs as smoothly and noiselessly as though it were a pet toy of some enthusiastic inventor. So substantially is it put in that it causes in the floor near it only the slightest perceptible tremor. Slow, steady, sure and irresistible it moves, like fate, straight on to its appointed work. The building is, on the north front, 225 feet in length; on the western front, 279, and 61 feet wide. The dye house, which is a part of the building, is 101 feet in length and 40 feet wide. The engine building, also a part of the main one, is 101 feet long and 41 feet wide. The picker house is 93x50 feet. Detached, but near, is the storehouse, 83x50, two stories high; and the office, 83x50, also two stories in height. The lower story of the mill is constructed of dressed granite in immense blocks. Tens of thousands of dollars were expended in preparing the foundation, and nothing that forethought could suggest or money could procure, was omitted in making it firm and durable. It would sustain one of the monuments of Egypt, and does support a much more useful structure. The other stories are built of brick, with the same purpose of making it in all respects complete in its adaptedness to the purpose for which it was intended. The main building is five stories high, the others, two stories, and it has a large tower, in which is placed a fine clock. The bell is one of the best in the place. The two steam fire-pumps are very powerful ones, and can be put in operation without stopping the mill, or any of the machinery. It is quite capable, if it were necessary, of sending three streams of water into the heart of the village. It has thrown a stream over the Social mill, nearly a half a mile distant. It will force three streams over the mill in one minute and a half. This mill was erected in 1863, and is provided with nine fire escapes, the platforms at each story, including two windows. The fall is 40 feet; water-power, 250; steam, 300; hands employed, 450; looms run, 84 broad and 16 narrow; the mill operating 25 sets of machinery; 1,000 tons of coal are used per annum, and 1,200 gallons oil. The consumption of wool is 1,000,000 pounds per year, and 625,000 yards of fancy cassimeres are manufactured. Mr. Newell A. Boutell is agent.

Messrs. Taft, Weeden and Company, also run a large mill at Olneyville.

Hamlet.

This is one of the finest villages on the Blackstone river. Situated half a mile below Woonsocket, the mill occupies a level space on the branch of the stream; the land stretching southwardly in a fine meadow; rising to the west into a hill on which some of the finest building lots in the vicinity are to be found; and on the north ascending gently and forming a plateau where ere long will be erected pleasant residences, inasmuch as the situation, overlooking Woonsocket and commanding wide views, is admirably adapted for homes retired yet easily accessible, and within a few minutes walk of the centre of business.

The first proprietors who engaged in manufacturing here, were Edward Carrington and Stephen H. Smith.

Edward Carrington was born in New Haven, in the State of Connecticut, November 2d, 1775, and became a resident of Providence at the age of 18. He was at first in the employ of Samuel Butler, Seth Wheaton and Richard Jackson. He at once won his way to the confidence of his employers, and before he attained his majority, he commenced those mercantile adventures, which, although not uniformly successful, resulted in his embarking for India in 1802, whence he returned in 1811 to Providence, with a fortune equal to his highest expectations. In 1815 he again embarked in commerce, and be-

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came one of the best known, most accomplished and extensive merchants in the country at that time. At the time of his death he was a member of the General Assembly of the State, and appropriate resolutions were passed on the first day of the January session, A. D. 1844. In private life his peculiar character was best exemplified. His charity was almost unbounded, and his social nature was large and free. As a public man, he was honest and honorable, unqualifiedly and confessedly. Gen. Carrington died in Providence, December 24th, 1843.

Stephen H. Smith was a scion of good old Rhode Island stock. His grandmother on his father's side was the grand daughter of John Smith, distinguished in the early records as John Smith, miller, one of the five who crossed the Seekonk river with Roger Williams, at his first landing in Providence. His father was a son of Anne, the second wife of Gov. Stephen Hopkins, she being at the time of her intermarriage with Gov. Hopkins, the widow of Benjamin Smith. He received in Providence a good English education and acquired a love of letters, and improved a naturally fine taste to a degree which influenced his whole after life. When the project of a canal from Providence to Worcester culminated in the grant of charters from the States of Massachusetts and Rhode Island, Mr. Smith was appointed on the part of Rhode Island one of the Commissioners to locate the route and superintend its construction.

In 1830, the land about the Hamlet was covered with a dense growth of wood; there was no road leading from Woonsocket to it; the forest was untouched even up to where the Bernon Church now stands. The mill originally contained only 7,000 spindles, and of course the the grounds had to be cleared and the houses for the operatives built. The mill was erected by Spencer Mowry, Esq., who had been employed on the canal in the construction of locks, and on every lock from Manville to Worcester. There were no ten hour laws in those days, and Mr. Mowry and the men he employed were accustomed to work in the summer season sixteen hours a day. The best carpenters were paid $20 per month and boarded, and they did each as much work as three men would perform now per day, and their work was well done. Mr. Smith here displayed that taste and exemplified that love for the beautiful which always distinguished him. He had built two blocks of cottages, divided into twelve tenements each. In front of each tenement was a flower garden, and in the rear of each a vegetable garden. The wood-houses were uniform, and set on a line in rear of the buildings. Other smaller buildings were erected on a line with the blocks, forming a straight and broad avenue. Trees were planted, and the whole presented, as now, a quiet and picturesque appearance. The Superintendent's house stands, as originally, at some considerable distance, on a gentle eminence overlooking the mill and village, and in front of it, but some hundreds of yards, a clump of trees was planted, which separated the house from the street. Mr. Smith was accustomed to bring shrubs and flowering plants from his place in Smithfield, now belonging to the estate of the late Gen. George L. Barnes, and encouraged a love of floriculture in his tenants. Many a farmer's house between Providence and Worcester, was enlivened by his genial society, and in many he created a fondness for flowers and a love of books before unknown. He was exceedingly liberal, and made great efforts to induce the fathers to give their children a good education. In more than one instance parents were, at his suggestion, brought to send their daughters to a distance for the benefit of better schools than Smithfield at that time afforded. A lady, his contemporary, was used to say that, in his feelings Mr. Smith never grew old. He was always pleased with, and very gladly received in the society of the gentler sex. A perfect gentleman, he possessed a culture which rendered him both an interesting and instructive visitor. Probably no man in the State, in his day, had a keener love for or more thorough knowledge of pomological and floral matters than Mr. Smith. He had for those times a very excellent garden, great variety of pears and other fruits, and his place was one of the best laid out and kept in this part of the State. His theoretical knowledge was carried into practical use, and his orchards abounded with the choicest fruits, and his gardens were brilliant with the rarest and most beautiful flowers. In the language of the late Judge Staples, "The whole establishment bore plenary proof that the man of taste and science directed its management." In the room in which we write is a box containing a pretty nu-

and put up with that neatness which characterized him, which thirty years since he presented to a trio of young ladies of one family, to stimulate in them an appreciation and love of the study of nature. The very last days of his life were employed in revising for publication a report made by him in 1851 on the subject of butter making. He died in May, 1858.

After some years Mr. Smith withdrew his interest in the Hamlet estate, and it was owned by Mr. Edward Carrington, Jr., and George S. Wardwell. The latter gentleman will be recollected by many of our readers as one of those persons actively engaged in all projects for the advancement of the community. He was very prominent in originating and organizing the first public library in Woonsocket, and through his instrumentality Mr. Carrington gave one thousand dollars towards it, and it received the name of the "Carrington Library." It has since been merged in the present public library, which is augmented by the liberal donation of Mr. Harris, and now bears his name.

The Hamlet is now owned and operated by Isaac M. Bull, Esq., who has greatly enlarged the mill, and filled it with new and improved machinery. It is now a fine stone building with a handsome tower. The main part is 212 feet long, by 40 feet in width, with an addition 50x40 feet, and the foundation is laid for another addition of the same size. It is in every respect a well appointed mill, and is making a very fine class of goods for bleaching. The Superintendent is Mr. John M. Bennett. The willower or picker, is a very excellent machine, capable of preparing for the lapper 7,000 pounds of cotton per day. The three Turbine wheels and their arrangement, are most admirable, and the solidity with which they are put in, and the conveniences for their repair in case of accident or obstruction, are evidences of mechanical skill and care. The rooms are well kept, and the upper ones, some of them especially high and pleasant. We remarked here, as in the Social and Groton mills, the healthy, cheerful and active appearance of the female operatives. The provisions and precautions against fire in this mill are ample. There is a tank in the tower; pipes for the injection of steam from the boilers, and two force pumps capable of throwing heavy streams of water into any room in the building; say 1,300 gallons each per minute. To the elevator, which is worked by power, we noticed an attachment which we had not remarked, although it may be on those in other establishments. It is a contrivance by means of which, if the sustaining rope is broken, the elevator is at once arrested in its descent and any accident prevented.

The fall is 9.5 feet; power, water, 325; hands employed, 200; looms, 300; spindles, 15,500; number of pounds of cotton consumed annually, 676,000; number of yards of cloth manufactured, 2,700,000; tons of coal used, 300; pounds of starch, 16,000; gallons of oil, 1,000; fine sheetings are made. The "slasher" is to be introduced, and then this will be one of those model villages which give the most attractive character to manufacturing enterprise.

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

SIXTH ARTICLE.

3-17-70

The Clinton Mill,

In Woonsocket, was commenced in 1830, by Edward Carrington. The foundations were laid for a building 100 feet in length, and 50 feet in width, five stories high, and the first goods were finished in 1833. Soon after, John H. Clarke became interested with Mr. Carrington in this mill, and in 1835 bought out Mr. Carrington, and operated it on his own account until April 1, 1845.

John H. Clarke was born in Elizabethtown, New Jersey, on the 1st day of April, A. D. 1789. His father, Dr. John Clarke, was descended from the Rhode Island family of that name, one of whom had migrated to New Jersey. About 1777, Dr. Clarke, then a young physician, accompanied Dr. John Barnett, an eminent physician of that day, to Rhode Island. Dr. Barnett had been selected to superintend the establishment of a pest-house or small-pox hospital for Providence. Dr. Clarke was left in charge of the hospital, which was located in a building given for that purpose by Commodore Hopkins, on his estate in North Providence. Dr. Clarke married Amey, one of the daughters of Commodore Hopkins, and after residing some years at Providence, returned to Elizabethtown. After the death of his father, John H. Clarke, at the age of five years, returned to Rhode Island with his mother, where he lived with his grandfather, Commodore Hopkins, until the marriage of his mother with Judge Dorrance.

Mr. Clarke received his early education in Providence, and at Schenectady, New York, where he resided in the family of Dr. Maxcy, who married a daughter of Commodore Hopkins, and who was then president of the college at that place. He entered Brown University, where he graduated in the class of 1809. He studied law with the Hon. Tristam Burges, and was admitted to the Bar here. He was chosen Clerk of the Supreme Court in 18—. Mr. Clarke married Elizabeth, daughter of Colonel Ephraim Bowen, well remembered by our old citizens as the last survivor of the party which, in 1772, destroyed the British war-schooner Gaspee in Narragansett Bay.

Mr. Clarke early left the legal profession, and for some years carried on the distillery at the Pavilion estate, South Providence, then in Cranston. He afterwards entered into the business of manufacturing cotton cloth, as agent of the Steam Mill in Providence, then belonging to Benjamin and Charles Dyer, at that time leading merchants and manufacturers. He soon after purchased the estate at Arnold's Bridge, in Warwick, now known as Pontiac, which he conducted until he sold it to its present proprietors, Messrs. B. B. and R. Knight. When he purchased Arnold's Bridge property, there was a small factory there, and probably a grist mill. He erected a stone mill and built up the bleachery establishment. The estate has been greatly enlarged and improved by the present occupants. He built, in company with Gen. Carrington, whose neice, Miss Susan C. Miles, he had married for his second wife, the Clinton Mill, Woonsocket. Gen. Carrington conveyed his interest to Mr. Clarke, who run it for several years.

Mr. Clarke became early interested in Rhode Island politics; was a member of the General Assembly under the old charter, and during the interesting discussions upon the "right of petition," by John Whipple, James F. Smmons, and other notabilities of that day, and in the stirring times of 1842. He was elected to the United States Senate in 1845, and served for the term ending in 1852. He was subsequently elected to the R. I. Senate from Warwick, and as a member of the House of Representatives for Providence. When Mr. James M. Bull purchased the Hamlet estate, Mr. Clarke took charge of it and superintended its complete renovation, since which time he has not been engaged in active business, but still remains in green old age, enjoying in a high degree the respect and esteem of all who knew him.

On the 1st of April, 1845, Messrs. J. and P. Rhodes, of Providence, George C. Ballou, of Smithfield, and Oren A. Ballou, of (now Woonsocket,) purchased this mill, and run it, as then arranged, containing 6,500 spindles and 150 looms, until 1849, in which year there were added to the main building 148 feet in length of the same width as the original building, and a picker room 84x37. At this time the mill was supplied with new machinery, spinning, cards, drawing frames, and the English fly frames, with about 128 additional looms, making 12,000 spindles and 254 looms. In 1854, Oren A. Ballou sold his interest in the mill, (he wishing to concentrate his capital at the Social mill, which was then in process of erection,) and Peleg W. Lippitt, who had been manager of the mill since 1845, purchased a part of his interest, after which further additions were made to the machinery, until it now contains 16,000 spindles and 336 looms, a part of which are now being replaced by new ones, having been run, some of them, since the mill started in 1833.

There are two breast wheels built by Ulysses Mowry, of Smithfield, who, like his brother Welcome, who built the wheel at the Harris "New Privilege," is a most admirable mechanic. There is also an iron De Joinville wheel, used in high water and during very low water.

There is also used, as occasion may require, a Corliss steam engine, of 125 horse power. The mill is heated by steam, and for this purpose, and the use of the engine about 250 tons of coal are used annually. About 1,500 bales of cotton are required per year, and the product is 2,500,000 yards per annum of fine sheetings and shirtings for bleaching. The improvements outside of the mill have kept pace with those on the inside. In 1855 several dwelling houses were removed from one side of the street to the other, and a large and very handsome yard enclosed in front of the mill, which has been planted with fruit and forest trees, and ornamental shrubs. The land on the opposite side of the street has been graded, and a heavy stone wall some 400 feet in length and 10 feet high renders available a number of fine house lots to be occupied hereafter. The street in front of the mill has been graded, set with curb stones, and planted with shade trees. Peleg W. Lippitt resigned his situation at the mill on the first day of January, 1869, having had charge of it for twenty-four years. Edwin R. Thomas, who has been connected with the mill since 1854, is now the Superintendent. The fall is 14½ feet; hands employed 200.

The Clinton Mill, for a long time previous to the late war, had in the market an enviable reputation for the quality of its goods. All through that war it maintained, notwithstanding the scarcity and high price of cotton, the same quality of product. The result was that shirtmakers and those who desired an uniform class of cloth were always anxious to obtain its production. This has been a very successful mill. Mr. Lippitt was one of the shrewdest and most attentive of managers, and Mr. Thomas holds up the reputation of the goods. Among the many mills in Woonsocket, the Clinton has always stood deservedly high for its appearance, its management, the equitableness of dealing with help, and the standard and reliable quality of its manufacture. No names in the history of Rhode Island industry will go down to posterity with higher honor for business integrity than those connected with this establishment. Carrington, Clarke, the Messrs. Rhodes, Ballou and Lippitt are among those to whom the State owes a debt of gratitude for their energy, perseverance and old-fashioned honesty.

The Woonsocket Serge and Lasting Company

Occupy room in, and use power from the Tape Company's establishment. They employ 16 hands, and run eight looms in the manufacture of shoe lasting and serge, a manufacture carried on in this country, only here and in Lowell. The goods are of a quality to compete in the market with the English fabric, which is imported to a very large amount. There would seem to be no reason why this experiment in a new branch of industry should not prove entirely successful, inasmuch as these goods of the same number as the English, equal the foreign in solidity, and surpass them in style of finish. This Company contemplate enlarging their business, and the Lowell of Rhode Island promises to keep pace with other manufacturing communities, not only in the old and beaten paths, but in new enterprises. The gentle-

men interested are men of capital and of activity; anxious not more to acquire wealth for themselves than to advance the growth of the town.

Paul P. Smith, is Treasurer, and Henry J. Sweney Superintendent and Agent.

Joseph Moore

Is carrying on the manufacture of tape in the basement of the "Lyman Mill." He produces from three to four thousand dollars worth per year.

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To the Editor of the Journal:

SIR—As you express, in your third article on "the manufacturing and mechanical industry of Rhode Island," a desire to be corrected in the event of any errors in dates or facts, I wish to point out one or two inaccuracies in that article, which are of importance only as your series of articles shall be consolidated into a connected history of the manufactures of this State.

In your notice of the "Bailey Washing and Wringing Machine Company," you state that "Mr. Bailey is the originator of the rubber rolls which form the most conspicuous part of a wringer." In this you are misinformed, and your statement does injustice to the real inventor, whose petition is now before Congress asking a further extension of the patent granted him in 1848 for rubber rollers for wringers. Should it become generally known at Washington that Mr. Bailey was the inventor of what Mr. Young has always claimed, it might damage the prospects of the extension.

Again you say: "In 1855 Mr. Bailey, in conjunction with John Allender, constructed the *first wringer*."

This cannot be so, as the fact above referred to would indicate. Besides this, wringing machines with rollers have been known and patented in this country since 1821, if not earlier. From 1850 to 1857 the English patent office issued numerous patents for elastic rollers for washing and wringing machines. Testimony adduced in various suits brought by the Bailey company against some of the infringers, not yet "disposed of," fixes the date of Mr. Allender's first rubber roll wringer in 1857. Mr. Bailey does not appear until 1859. His "oscillating board" is not used in one out of every hundred machines made and sold in this country.

Yours, &c.,

March 10, 1870. UPSON DOWNS.

In answer to the foregoing communication, we have simply to say that in our investigations respecting the industry of the State we seek only for facts. As our correspondent intimates that certain statements by us made are to be determined by the courts, we leave them as we find them, assuring all parties concerned that these columns are not devoted to the disclosure, manipulation, or ignoring of matters *pendente lite*. We are a plain "folk," and when we find ourself confronted by the gentlemen of the long robe, we shall incontinently crave the benefit of the clergy, and retreat into the sanctuary of uncontroverted truth, with a "by your leave," Upson Downs.

PROVIDENCE JOURNAL.

THURSDAY MORNING, MARCH 24, 1870.

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

SEVENTH ARTICLE.

Jenckesville.

Jenckesville, in the town of Woonsocket, is owned by Oscar J. Rathbun, and the mills run by him. The father of Mr. Rathbun, Aaron Rathbun, was one of the solid men of Woonsocket in its earlier days. His brick block was for a long time one of the most considerable buildings on Main street. He was one of the Directors of the Providence and Worcester Railroad, and a sagacious and substantial business man. Prudent, honest and retiring, he enjoyed the confidence and the respect of all. Jenckesville is at present a little isolated from the village of Woonsocket. With the fall of water (50 feet) it possesses, the high grounds around it, the splendid views it affords, and its natural facilities for building, it is destined at no distant date, probably, to be occupied by residences of the better sort. Strangers who merely see Main street in Woonsocket, with its trench and its noise of clattering machinery, have very little idea of the place as it is, and as it will be when taste and means combine to utilize the territory which hitherto has been neglected. On Globe side, on Bernon hill, and on the grounds of Mr. Bull, of the Hamlet, are situations equal in every respect to those which are to be found anywhere. Good air and water, fine views, proximity to business, almost hourly trains to Providence, and frequent ones to Boston, are among the inducements to capital and to the lover of quietude within reach of all the comforts and luxuries of life, to settle in Woonsocket. And the rapid growth of the town in the last decade is an assurance of a still greater prosperity in the future.

The fall of water at Jenckesville is 50 feet; power, 110; hands employed, 50; number of looms, 80; spindles, 7,000; pounds of cotton used annually, 325,000; tons of coal, 300; pounds of starch, 7,000; yards of cloth made per year, 1,250,000; being sheetings, shirtings and drillings.

Waterford.

Evans & Seagrave, and Earl P. Mason, operate one of the woolen mills at Waterford, formerly owned by Welcome Farnum. The fall of water is 10 feet, horse-power—steam, 160; water, 300; hands employed, 4,00; looms, 58 broad, 52 narrow; sets of machinery, 24; pounds of wool used annually, 1,000,000; tons of coal 1,000; gallons of oil, 1,000; the product is 700,000 yards of fancy cassimeres.

F. M. Ballou

also runs one of the Waterford mills, with 10 feet fall; 100 horse-power, water; 160 hands; 50 narrow looms; 10 sets of machinery. using 385,000 pounds of wool; 400 tons of coal; 480 gallons of oil; and producing 300,000 yards of fancy cassimeres.

Charles B. Aldrich

carries on at Waterford, in Smithfield, the business of contractor and builder, and coal and lumber merchant. He uses steam power, 40; employs 50 hands, and owns the old Bartlett place, so called, in Smithfield, whence come every year some of the finest specimens of corn, potatoes and other vegetables, which are presented to the inspection of those who visit our annual agricultural exhibition.

The Woonsocket Gas Company

consume 2,300 tons of coal, and make 11,131,000 feet of gas.

The Minor Industries

of Woonsocket employ some additional steam power, and about 150 hands.

There are some facts which stand out in bold relief, in comparing the Woonsocket of to-day with the Woonsocket of 1860. It has got beyond the "dead-point." There is no longer any question whether or no it is to be a large place of varied industry, with the self-sustaining power, and the usual advantages, social, educational and esthetic, of a compact and intelligent community. It is no longer dependent upon one or two branches of manufacture. Neither can it be controlled by any one man. If it is in a transition state, the transition is from apathy to activity,—from rural ideas to an appreciation of the duties and privileges of a consolidated community. Fifteen years ago, it was said that the water power was used up, but mills have, since that time, been constantly built, enlarged and made more productive. There are about twenty steam engines in operation in the village, and the machinery is almost universally of the latest and best descriptions. The operatives in the mills, as a rule, present as healthy and cheerful a presence as any class of persons leading a sedentary life. The shortening of the hours of labor has been to the worker in the mills, a greater boon than to the mechanic where employment is in the open air. And the improvements in ventilation, in the neatness of the mills, and accompanying education in habits of personal cleanliness, and the greater opportunities for respectable recreation and the improvement of the mind, have told upon the operatives in a most beneficial manner.

Pawtucket.

In order to prevent confusion in the minds of those who are not familiar with the locality, it is proper to say, that this name was originally applied to the immediate vicinity of the falls in the Blackstone river; Pawtucket, in the language of the aborigines, signifying, according to *tradition*, falls of water. And on both sides of the river grew up the village; that portion on the east side being in the town of Rehoboth, Massachusetts, and that on the west side in Rhode Island. Rehoboth was subsequently divided into three townships, of which one was named Pawtucket. So that there was the town of Pawtucket in Massachusetts, and the village of Pawtucket lying on both sides of the river. In 1862 by an exchange of territory between Massachusetts and Rhode Island, the town of Pawtucket was transferred to Rhode Island, so that we have now the town of Pawtucket, and the village of Pawtucket situated in the towns of North Providence and Pawtucket. It is of the village we shall speak. It may be well to note, also, that the Blackstone river, which rises in Massachusetts, is called the Pawtucket river below the Pawtucket falls. According to tradition, as early as 1655 Joseph Jenks, a native of England, and a manufacturer of iron, came into this vicinity. In 1671 he purchased of Abel Potter, of Moshanticut, sixty acres of land, lying near Pawtucket falls. At this time, and for more than a century afterwards, this region of country, on the Rhode Island side of the river, was part and parcel of the town of Providence. This Joseph Jenks was Assistant or Lieutenant Governor of the Colony, and his son Joseph was Governor of Rhode Island from 1727 to 1732. At that day, however, it was deemed "highly necessary" that the Governor should reside at Newport, and an appropriation was consequently made, of one hundred pounds, to defray the expenses of the removal of the Governor from the then wilds of Pawtucket, to the more populous and more promising town of Newport. In 1765 the town of North Providence was set off from Providence and incorporated as a town. Its population was, in the aggregate, 830 souls. In 1865 the population was 14,553.

Joseph Jenks was engaged, as we have said, in the manufacture of iron. As early as 1676, the first forge built by him, was burned by the Indians during King Philip's war. The lower dam was constructed in, or before the year 1718, across the river, taking the place of one previously erected, which extended about three-quarters of the way across from the Rhode Island; and a separate one on the Massachusetts side of the river. About the year 1714, "Sergeant's Trench" was dug for the passage of fish up and down the river. In those days shad found their way up the Blackstone as far as Woonsocket Falls, and as the dam at Pawtucket hindered this immigration of this delicious fish, and "Sergeant's Trench" failed of its destined purpose to furnish free ingress and egress therefor, the General Assembly, in 1761, authorized a lottery to raise fifteen hundred pounds, old tenor, for the purpose of making a passage around Pawtucket Falls, "so that fish of almost every kind, who choose fresh water at certain seasons of the year, may pass with ease." Twelve years later the General Assembly passed an act making it lawful for any one to break down or blow up the rocks at Pawtucket Falls, to "let fish pass up," and "the said river was declared "a public river." Fortunately for Pawtucket it was then too poor or too moral to engage in the lottery business, or the rocks were too many and too hard. Alewives were shut out from Woonsocket, but iron and cotton, and a manifold industry centred at Pawtucket.

In those times the son followed the business or profession of the father, and as Joseph Jenks came to Pawtucket for the sake of its water power, and the benefit of the timber wherewith to make charcoal for his forge, and made his iron as his father had before him, so his descendants followed in his footsteps, and at an early day Pawtucket was famous for its iron manufacture, being in that respect in advance of Providence. Muskets were manufactured here as early as 1775, by Stephen Jenks, and here were made anchors for Providence vessels, in 1784 or '5, by Oziel Wilkinson, who had previously, at his blacksmith shop in Cumberland, made the first cut nails ever manufactured from cold iron. His five sons were also all blacksmiths, and from the fertile brains of David proceeded the invention of the slide lathe, to-day—as he truly said of it—more valuable in the machine shop, than all other tools combined, for finishing brass and iron work. Up to 1846 all that he had received from his invention, which he had patented, was ten dollars. In 1848, Congress granted Mr. Wilkinson a gratuity of ten thousand dollars, "as a remuneration to him for the benefits accruing to the public service, from the use of the principle of the gauge and sliding lathe, of which he was the inventor." He was an early, true and valuable friend of and co-worker with Samuel Slater. He gave the lot on which the Catholic Church now stands, and although himself a decided Episcopalian, he did not limit his bounty, in the days of his prosperity, to any sect or denomination.

For many years Pawtucket supplied Nantucket and New Bedford with the heavy presses used in pressing out the whale and sperm oil, then an article of every day household use. Here in 1794 was cost the iron for the draw of the bridge at Cambridge, Massachusetts, and here cannon of excellent quality were cast. We have already given some account of the introduction of cotton spinning at Pawtucket, by Samuel Slater, and some idea of the novelty if not of the risk of that undertaking, at that day, may be formed from the fact that when 500 pounds of yarn had accumulated, Moses Brown wrote to Mr. Slater—"Thee must shut down thy gates, or thee will spin up all my farms into cotton yarn." The entire number of operatives included nine children from seven to twelve years of age, tending two spinning frames, one of 24 spindles, the other of 48; 72 spindles, all told, eight spindles to an operator. To-day one man tends, in the cotton mill, 1,408 spindles!

The machinery by which the first yarn was produced by water power, was set up in a small shop, but the fact that it could be manufactured to the requisite extent was made patent. The experiment had succeeded, and in 1793 a mill was erected. During the same year a slitting mill was built by Oziel Wilkinson, and a flouring mill by Thomas Arnold, the first built in the State. In a letter written by Moses Brown, in 1791, he says: "The manufacture of iron into blistered steel, equal in quality to English, has been begun within about a year in North Providence, and is carried on by Oziel Wilkinson." At this time Wilkinson also manufactured pig and bar iron, nail rods, rolled hoops and plates, spades, shovels, rails and anchors. In 1794, Daniel Wilkinson and Elijah Ormsbee built a steamboat, Wilkinson making the engine, in which they made a trip from Winsor's Cove, about three and a half miles from Providence, to the latter place. "After the frolic was over," wrote Mr. Wilkinson, more than half a century afterwards, "being short of funds, we hauled up the boat and gave it over." This, it will be remembered, was some twenty years before Fulton navigated the Hudson with his steamboat. And in this connection it may not be amiss to revert to the narrative of Mr. Wilkinson in respect to this unprosecuted experiment. While building his engine, a young man called, says he, "to see me, and wished to see the boat, and remained a day or two examining all the works. He told me his name was Daniel French, from Connecticut. About the year 1840, I was on the railroad from Utica to Albany, with an aged gentleman in the cars, and the subject of steam power came up, when I informed him of my early acquaintance with steam power, &c. He said more credit, he thought, had been given to Fulton than he deserved; that Col. John Stevens was more deserving than Fulton. I told him I never thought Fulton an inventor, but simply a busy collector of other people's inventions. To which he replied, 'I always said so, and he never would have succeeded had it not

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been for Daniel French.' What do you mean by Daniel French, asked I. 'Why a Yankee,' said he, 'that Fulton kept locked up for six months making drafts for him.'"

In 1799 the second cotton mill was commenced. It was built by Oziel Wilkinson and his three sons-in-law, Samuel Slater, Timothy Greene, and William Wilkinson, and was situated on the Massachusetts side of the river. About this time there resided in Pawtucket an ingenious clockmaker by the name of J. Field. He commenced the casting of brass in the anchor shop of Mr. Oziel Wilkinson. Between the years 1794 and 1805, George Robinson built here seventeen vessels of from 80 to 280 tons burden. He employed from ten to twenty ship carpenters. In the meantime Thomas Arnold had been concerned in building seven or eight vessels. Other parties were also employed in this business, and all of them had the iron-work done in the shop of the Wilkinsons, and obtained their anchors from the various anchor shops here. About the year 1810, Oziel Wilkinson and his son Abraham, who were both active politicians, and, it may well be supposed, influential personages in the town, were estimating the expenses for the ensuing year, in order to have arrangements perfected for the annual town meeting. As they figured up the items on the counter of their store with a piece of chalk, the aggregate amounted to the sum of some eight hundred dollars. As the footing was announced, Oziel energetically exclaimed to his son, "It will not answer, Abraham; we must cut some of these expenses down. 'The town of North Providence will not stand such a tax as that." The assessed tax of the town in 1869, was over $100,000.

We have heretofore said that about the year 1814 weaving by power looms was commenced here. In 1816 the Gilmour loom was introduced into the Lyman mill on the Woonasquatucket river, but failed to work until David Wilkinson discovered and removed the difficulties in the way of its operation. Nor has this place been less distinguished for inventive genius than for its early attention to manufactures. In the excellent address, delivered by the Rev. Massena Goodrich, at the Centennial Celebration, in 1865, we find the following enumeration of inventions by citizens of North Providence. In 1822, Mr. Asa Arnold invented the differential speeder. In 1823, Pitcher and Gale invented a geared cone speeder. In 1838, Mr. James S. Brown invented a machine for boring passage for rover and speeder plyers. In 1852, Mr. Brown took out a patent for turning irregular forms, and in 1857, one for improvement in speeder. In 1863, he obtained a patent for grinding files, and another for improvement in furnace for hardening files. Other patents we shall doubtless find as we enter in detail upon the survey of the industry of a place which has contributed so largely through its enterprising and skillful men, to the advancement of the manufactures of our State and the country.

The terrible pecuniary blow which shocked Rhode Island in 1829, and prostrated so many manufacturers, which sent Daniel Wilkinson out of the State to earn a livelihood, and which for a time seemed to have carried desolation into all ranks of business, affected Pawtucket most seriously; the business men of Providence thought it would not recover from it in twenty years, and perhaps it did not, but with its advantages, and the example it had had in the energy and forecast of Slater and the Wilkinsons, it was not in the nature of things that it should remain permanently in a depressed and stagnant condition. The water power can never be taken away; the position it occupies, at the head of tide water navigation; the railroads connecting it with the cities of Providence, Boston and Worcester, and the country north; the easy access for business purposes, and to send freight to New York; its healthiness; the excellence of its water, and the now varied industry which is carried on in it, all point to a sure, a rapid and a large increase in its prosperity. With this preliminary sketch, which might easily havebeen greatly extended, we enter upon a more familiar acquaintance with our thrifty neighbors.

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

EIGHTH ARTICLE.

Calico Printing. 3-28-70

The cotton manufacturers of this country never felt assured of the permanent value of their business, until the printing of cotton cloth became a success. Just as Moses Brown became anxious, when his firm had five hundred pounds of yarn on hand, so those who had completed their experiments with the power loom, and ascertained its efficiency, were fearful that there would be no sufficient demand for the amount of product they easily saw within their reach. All these forebodings were, however, dissipated when it was certain that the cloth would be needed for the every day dresses of the majority of the females in a new and constantly growing country. And if they did not early take into consideration the possibility of our production, after the new era of demand, so they hardly thought of the exportation to foreign countries, which, in regard to many of our fabrics, has guaranteed, and it is to be hoped, will in the future ensure, profitable employment for all our machinery.

One of the sweetest, as it is the cheapest of pleasures, is that of contemplating harmonious and agreeable colors. It is the light and shade of the landscape, which, quite as much as the configuration of the land, and the architectural ornamentation, which may adorn and diversify it, give it beauty and attractiveness. It is the cloud tinged by the rising or setting sun, which in its gorgeous tints, and in consequence of them, commands our admiration; the foliage of the forest and the variegated hues of the flowers rival in their fascination the graceful boughs of the one and the delicate structure of the other. Very naturally, in all ages of the world, the attempt has been made to imitate nature, and affix in indestructible colors, her every varying and fugitive beauties upon the material used in ordinary dress and upon occasions of rare state and ceremony. The ancient Britons painted their bodies with woad, it is supposed for the same reason that the Indian now paints his face, to render himself more terrible to his enemies in battle; but the old savage who roamed, half naked, the fens of England, was very particular as to the style of his tattooing; and long before he had any other habitation than the canes of the earth, or the shelter of a few branches of trees accidentally blown down and piled together, he had learned the rudiments of the art of dyeing. Indeed, the amount and fineness of the figures were the "standard of the man," inasmuch as only inferior persons were without any. And as the coloring was pricked in, a Cimbrian chief underwent almost as much agony to gratify his pride, as does the modern belle who attempts to dance in high heeled shoes and tightened corset.

Sacred history declares the fact that at a very early period the art of dyeing was well understood. Joseph had a coat of many colors; and when the Israelites were commanded to make curtains for the tabernacle, they were ordered to make them of fine twined linen, blue, and purple, and scarlet, and they were to be looped together with gold taches, so that "cunning work" of the curtains, the colors of imperial purple, and the royal blue and dazzling scarlet, corresponded with and equaled in magnificence the rings of gold. And the daughters of kings, being virgins, were appareled with garments of divers colors, as a mark of distinction. Dr. Roberts states, that in India it is now customary to invest a favorite or beautiful child with a coat of many colors, consisting principally of crimson, purple and other colors, which are often tastefully sewed together. He adds: "A child being clothed in a garment of many colors, it is believed that neither tongue nor evil spirit will injure him, because the attention is taken from the beauty of the person to that of the garment." Tyre appears to have been the only city of antiquity which made dyeing its chief occupation, and the staple of its commerce. There is little doubt that purple, the sacred symbol of royal and sacerdotal dignity, was a color discovered in that city; and that it contributed in no small degree to its opulence and grandeur. Among the heathen this color was considered peculiarly appropriate to the service of the gods; and Homer intimates that it was only worn by princes, and that limitation of its use was common with the nations.

There were various shades of purple, of greater or less estimation. The most esteemed Tyrian purple was, probably, of the color of coagulated blood. The dye was obtained from several varieties of shell-fish, comprehended under two species —one (Buccinum) found in cliffs, and the other (Purpura or Relajia) which was the proper purple fish taken at sea.

Ovid, in his description of the contest in weaving between Minerva and Arachne, dwells not only on the beauty of the figures which the rivals wove, but also mentions the delicacy of shading by which the various colors were made to harmonize together:

Then both their mantles button'd to the breast,
Their skillful fingers ply with willing haste,
And work with pleasure, while they cheer the eye
With glowing Purple of the Tyrian dye;
Or justly intermixing shades with light,
Their colorings insensibly unite
As when a shower, transpierced with sunny rays
Its mighty arch along the heaven displays.

Homer sings the purple vest of Telemachus and the golden shuttle of Calypso. The Chinese practiced block printing before any species of printing was known in Europe. Calico-printing does not appear to have been practiced in Europe until the close of the seventeenth century. According to the Encyclopeda Britannica, "it is not more than a century and a half since calico-printing was transferred from India to Europe, and little more than a century since it became common in Great Britain. The nations with whom it has made the greatest progress, are Switzerland, France, some parts of Germany and Great Britian." To which it may now be justly added, that the United States is now producing calicoes and muslins of a quality calculated to supersede in a great degree all but the very finest English and French goods.

The exact time of the introduction of this industry into our country we have not been able to ascertain. There were experiments going on simultaneously in different parts of the country, and in 1794 the first calico printing in Providence was commenced by Messrs. Schaub, Tissot and Dubosque, in a chocolate mill on the present site of the Franklin Foundry. Mr. Dubosque, who had been attached to the French navy and married in Rhode Island, had learned the art in early life as it was practiced in Alsace in France. The cloth printed was imported from Calcutta. The printing was done with wooden blocks, and the calendering by friction on a hard substance with flint stone, metal rollers being then unknown. A calendering machine was introduced in 1790, and about the same time Herman Vandusen commenced calico printing in the same manner at East Greenwich, cutting his own blocks; but the business in Providence was the first of any extent in the State. Three years after, calico printing was also carried on in Providence by Peter Schaub and Robert Newell.

The first lot of cotton goods printed in the United States by engraved rollers and machinery driven by water power reached Philadelphia, October 6th, 1810, from the Bleach and Print Works of Thorp, Siddall & Co., about six miles from Philadelphia. The cylinder machine was brought from England. One man and two boys were able to print ten thousand yards of cloth, or fifty thousand children's handkerchiefs, in one day. The first cotton mill at Lowell commenced the manufacture of calicoes in the year 1822, and about the same year, Messrs. David H. Mason, and Mathew W. Baldwin, manufacturers of improved bookbinder's tools, in Philadelphia, commenced the first engraving of cylinders for calico printing, in the United States. The establishment of print works on a large scale, at Taunton and Fall River and Lowell, Mass., Dover, N. H., at Baltimore, Columbiaville, N. Y., and elsewhere within a few years, gave them a prosperous business, in which their numerous improvements enabled them to compete successfully with foreign artists. The invention and manufacture of tools and machinery adapted to their use, some of which were pateated this year, led to the construction of calico printing machines, drying and calendering machines for cotton, silk or paper, drop and seal presses, and engraver's machines. In the year 1823, the rapidly increasing cultivation and consequent low prices of cotton, the success of the Waltham establishment, then the pride of America in cotton manufacture, and the more recent success at Lowell, led to the contemplation of calico printing on a large scale, at several places.

American calicoes or chintzes, of seven or eight colors, fast and brilliant as any imported, accompanied by specimens of jaconet muslin, suitable for gentlemen's neck cloths, spun and woven on the Brandywine, were sent early in this year to the editor of the *Register* at Baltimore. The printed cottons being made of American cotton, were better than English prints of a similar kind, which were usually made of the inferior Bengal or Surat cotton. They could be sold for twenty-five cents a yard. About forty thousand dollars were said to be invested in their manufacture. The Warren factory, at Baltimore, was making large preparations to manufacture calicoes, and finished its first bale in July, 1824. Print works were erecting at Taunton and Lowell, Massachusetts, at Dover, New Hampshire, and were in operation on a smaller scale at Philadelphia. The New Jersey Bleaching, Printing and Dyeing Company, at Belleville, nine miles from New York, was incorporated in December, 1824, with a capital of $150,000, and erected one of the largest and most complete manufacturing establishments then in the United States. The printed calicoes ranked with those of the Taunton and Chelmsford factories. The Merrimack Manufacturing Company was at this time making about twenty-five hundred yards of printed calicoes daily. In 1826, calico printing was carried on at Pawtucket, and sixty thousand yards per week were printed in New England.

The Hudson Calico Print Works, at Columbiaville or Stockport, five miles above Hudson City, N. Y., were established this year on a small scale by Joseph and Benjamin Marshall. In 1836 this establishment employed 250 hands and printed on an average eighteen thousand yards daily. In 1829 the use of Turkey red in calico printing, which had long given the French an advantage over English and American prints, was successfully introduced by the manufacturers of Lowell. The quantity of calicoes printed in the United States during the year ending April 1st, 1836, was one hundred and twenty millions of yards.

There is evidently a serious error in the item of "value of product" in the census of 1860, as regards calico printing in this State. The State census of 1865 gives as the value of the product of six establishments in the State the sum of $23,551,216. We are now prepared to look at the process in detail of calico printing.

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

NINTH ARTICLE. 4-4-70

The Dunnell Print Works.

The Print Works of the Dunnell Manufacturing Company are situated about a mile and a half from the bridge, in Pawtucket, in a beautiful valley, and wear anything but the appearance of a manufacturing establishment of such large proportions. Not that the buildings are few or small, but the absence of the usual noise and confusion of a factory village is a feature as marked as it is pleasant. Perhaps the illusion was heightened in our case, by the fact that we approached the works through the grounds of Mr. Dunnell, Senior; their extent and beauty attracting the attention and gratifying the taste, even when beheld on a raw March day. Once fairly on the premises, we perceive that there is ample room and verge enough for a business amounting to millions annually. In a long building, which we enter first, we find workmen employed in preparing the copper rollers for the pattern to be etched upon them. These rollers are about a yard in length, some of them longer; say five inches in diameter, and one and a half inches in thickness. For etching, they are covered with a light coating of varnish; they are then placed in a machine, under a series of diamond pointed pins. In front sits a girl, who traces on a prepared plate of lead, a pattern magnified, say nine times larger than that to be etched on the roller. The diamond points are moved on the copper roller, in correspondence with the movements of the engraver on the traced plate, directed by the operator, and scrape off the varnish, wherever they touch. The roller is then immersed in diluted acid, in order that the pattern may be etched, or eaten into the roller; the varnish remaining wherever the diamond has not touched, protecting the other portion of the roller. When this varnish is removed, the roller is ready for use.

There is another process by which the copper roller is prepared for printing. A small steel roller, about an inch in diameter, has the pattern cut upon it, so that it stands out in relief, like the face of type. This pattern is transferred, by pressure to another steel roller, properly softened, and which, after being re-hardened is made to impress the pattern upon the copper roller. Of these copper rollers there are required to be kept on hand for the use of these works some fifty thousand dollars worth. We are now ready to witness the operation of printing. The cloth is sewed together by machines, in lengths of miles. It is then trimmed by a machine which takes from one side of it, all the irregularities or foreign substances; it is then passed over red hot plates of copper, to singe it. It is then washed and bleached. It will be understoed, that these processes are conducted by means of machinery and steam. From the washing and bleaching room, the cloth is carried a long distance into a drying room where it passes over and between immense rollers heated by steam. It is then ready to be printed. In the dyeing room we find heavy machines, which in no way give evidence by their appearance or by their surroundings of their capacity to create the delicate and airy figures which we find afterwards upon the cloth which has passed through them. They are large, far from attractive *per se*, and the numerous utensils filled with various colored pigments, remind one rather of a painter's shop, than of flowing muslin, or fanciful figures.

The copper rollers which we have described, are placed in the machines; under them is a trough containing the appropriate color, so placed that the roller is immersed about one half its diameter; as it revolves, on one side of it, a thin steel plate scrapes the coloring matter off, leaving of course the etched, or depressed figure, covered with the color. Under this roller, and pressed heavily upon it by a large iron cylinder, the cloth passes, and is printed. It then passes into the drying-room which has a temperature as hot as good people are likely to be called upon to endure. As we are not writing a scientific treatise, we have not taken especial pains to introduce in its precise order, and in detail the item of mordants, which, however, are of the utmost importance in the matter of calico printing. Did each drug impart its own color to cloth, and did there exist a sufficient variety of these drugs for the various shades of colors, dyeing would be a very simple art, as it would only be necessary to dissolve the dye-stuff and impregnate the goods. But so far from this being the case, if we except indigo, there is scarcely a dye-stuff that imparts its own color to goods; indeed, the most part of the dye-drugs used have so weak an affinity for cotton goods especially, that they impart no color sufficiently permanent to deserve the name of a dye. These circumstances render dyeing sufficiently intricate, and make it more dependent upon science; in fact, it is only by the nicest arrangement of a few chemical laws, that the dyer is enabled to turn to advantage the various coloring substances of which he is in possession. When the dyer finds that there is no affinity between the goods and any coloring substance which he desires to employ, he endeavors to find a third ingredient, which has a mutual attraction for the cloth and the coloring matter, so that by combining this substance with the cloth, and then passing the cloth through the dyeing solution, the coloring matter combines with the substance which is upon the goods, and constitutes a dye. This third substance is termed a mordant, from the French *mordre*, which signifies to bite, from an idea which the old dyers had that these substances bit or opened a passage into the fibres of the cloth giving access to the color. This theory has given place to a more scientific one, although the term is continued in use. After the cloth is printed, it is starched and calendered. It is then cut into pieces of the proper length, folded in yard folds by a machine, examined piece by piece, and if found perfect, pressed and is ready for the market.

It only remains to say that the goods printed at this establishment comprise the common calicoes and muslins of a fine texture, on which are printed patterns of various styles and of the most elegant designs, and that each class of goods is of a quality equal to that of any foreign make; indeed, a chastened taste finds here everything, that, in its most exigent mood it need desire. This establishment employs an engine of 150 horse power, 300 hands, uses 6,000 tons of coal, and produces $2,500,000 worth of goods annually, including the value of the cloth.

Edmunds & Brother

manufacture spectacles, and are the only manufacturers of that article in the State. They commenced the business here about a year and a half ago, employ 8 hands, use water power, 2, and produce yearly $4,500 worth of goods.

Payne & Taylor

are manufacturers of Sailors Hair Cloth Paddings and Ladies Hair Cloth Shirtings. They employ 20 hands, run 50 looms, run by water power, 50; their pay-roll is $6,000 per annum; value of production, $52,000 yearly, and their product, 105,000 yards of goods. Among the many curious machines one sees in visiting our different manufactories, none is more interesting than the hair cloth loom. A bundle of horse-hair is placed at one side of the loom, and from it a single hair is plucked by delicate fingers. If however, they fail to secure a hair, the attempt is repeated once and again without any movement of the harnesses. Nor do they move until one is taken up. The shuttle is long and seizes the hair taken up by the fingers, leaving it in its proper place. The whole machine is a wonderful triumph of mechanical skill.

Randall, Skinner & Company

manufacture a Patent Low-Pressure Steam Heating Apparatus, Iron Fence, Boiler Pumps, and Steam and Gas Fittings. They have been in business one year, employ 5 hands, use 3 horse power, water, and manufacture $25,000 worth of their various products. Their Heating Apparatus is Gold's patent, and is in operation in different parts of the State.

Wm. M. Haskell & Company,

make bolts, nuts, washers, screws, and other articles of a like character. They have a fine establishment, use a steam engine of 25 horse power, employ 50 hands, pay for wages yearly, $26,400; and their production amounts to $67,000 annually.

James S. Brown,

manufacturer of cotton and woolen machinery, and malleable iron castings, of Parr, Curtis & Madely's self-acting mules, and the patent Ameri-can speeder, owns and occupies a large and substantial establishment built of brick, four hundred feet long, three stories in height for one hundred feet, and two stories for the remaining portion. There is also connected with this two buildings, each 40x80, and a pattern house of the same size two stories high. The engine used is of 56 horse power, and the amount of coal consumed yearly, 450 tons.

George H. Fuller

manufactures jewelers' findings; employs 30 hands; uses 5 horse water power, and produces a large variety of articles. Pay roll, $600; value of annual sales, $14,000.

The Pawtucket Tack Company

make tacks and nails; employs 9 hands; water power, 5 horse; a capital of $10,000; and the annual production is $12,000.

William Jeffers,

who has a well established reputation throughout the country for the manufacture of steam fire engines, was the first builder of these, as well as of hand engines, in Pawtucket, or in this State. His machines are well known in most of the large cities of the Union, and are a most valuable improvement upon the old hand fire engines. Commencing the manufacture in 1849, he has built in all 192 machines. In 1862, he built the first steam fire engine constructed in this State, and has since that time built forty, of an average value of four thousand dollars each. He uses water-power, 5; employs 25 hands, and is constantly receiving orders from abroad for his engines.

One or two facts are already apparent, which we mention here, in order that they may not be overlooked. It is evident that the industry of Pawtucket is greatly diversified; that there are a good many small establishments; comparatively few corporations; and that the water power of the Blackstone river is not nearly so well and thoroughly utilized as at Woonsocket.

Note: In our last we said that there was an error in the United States census of 1860, as regards the "value of the product" of calico-printing in this State. Further examination shows, that the United States census included only the value of the printing, whereas the State census of 1865, gave the value of the product, including the cloth. It is patent that according to the latter mode of tabulation, credit is given for the cloth, both to the manufacturer thereof, and to the calico printer. Unless, therefore, the basis of calculation is distinctly asserted and kept in mind, considerable error would ensue.

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

8

TENTH ARTICLE.

4-16-70

Lonsdale.

This place, owned by the Lonsdale Company, situated seven miles from Providence, was commenced as a manufacturing village, in 1829, and the first mill was started in 1832; the second mill in the same year, and the third in 1833. The bleaching department was put in operation in 1844. The present Superintendent, George Kilburn, Esq., came to Lonsdale in 1847, and has from that time had charge, as he now does, of the old village, while Edward Kilburn, Esq., has the immediate superintendence of the No. 4, or new mill, and the Ashton mill. The number of spindles at Lonsdale, and the old Sinking Fund, or Ashton mill, in 1847, was 23,000; now 112,000. As the business has increased, the village has grown up, and is to-day one of the pleasant places in the State. No liquor is openly sold, and the general tone of public sentiment on all questions involving the welfare of the community, is high.

The bleaching is an extensive department of the operations at Lonsdale. It is under the charge of Mr. Peter Byrne, to whom we are indebted for a very pleasant and instructive hour. There are bleached here the goods made at these mills, at Ashton, at Blackstone, at Hope and other factories. About fifty miles, or 90,000 yards of cloth per day, are put in process of bleaching, and it takes a week to complete the work. Twenty-five miles of cloth, in the gray, or as it comes from the loom, are sewed together and carried to the wash room; they are allowed to drain one day, when they are boiled in lime water; then treated to an acid solution, dried and mangled. This mangle is a machine worthy of a moment's attention. It is respectable for its cost as well as for its peculiarities. It cost some six thousand dollars. One of its rollers is made of corn husk; one of flax, and one of bronze. The advance made in machinery within twenty years is as apparent here as in other departments of manufacturing. Where sixty men were then required, only thirteen are needed now.

There is, also, a calendering machine which exhibits great ingenuity in its construction. One roller is made of paper, pressed into form by a force of a thousand tons. Between this and an iron roller, the goods to be calendered are passed, but within the same space of time in which the iron roller moves twelve inches, the paper roller moves twenty-four, sliding over the former, somewhat as the sad iron does over the cloth when ironing is done by hand. The pressure upon these rolls necessarily causes a great deal of friction, and it has been a cause of considerable trouble in consequence of the heating of the bearings. Mr. George Kilburn has placed a wheel above these bearings so as to transfer to it the friction so far as to relieve to a great extent the difficulty heretofore experienced.

These three mills contain 860 looms; 41,000 spindles; and the fall of water is 22 feet. The horse power is,—water 550; engine in bleaching, 180; engine supplementary to water power, in summer, 250. Three thousand tons of coal are consumed at the bleachery; 2,000 at mills, 1,000 at the gas works. The number of hands employed, is 850, and 3,200 bales of cotton, averaging 475 lbs. to the bale are used each year. The product is 5½ millions of yards of fine sheetings, shirtings, muslins and silesias. From six to twelve different styles of goods are here manufactured. The girls in the finishing room earn from seven to twelve dollars per week.

The population of Lonsdale, (old village,) is about sixteen hundred, and the company has erected a two-story brick school house 50x70, the rent of which it gives to the district. There are the three departments of Primary, Intermediate and Grammar, and the schools are well attended, and well taught. The teacher is paid $1,700 per year, with some perquisites, which round out the salary so as to make it a very handsome one. The average attendance is 200 scholars. This school house was built prior to 1861, and cost from $7,000 to $8,000. The Episcopal church is a very commodious edifice, seating 550. The salary paid the clergman is $1,800, toward which the Company contributes liberally. The average attendance of the Sabbath school, of which George E. Kent is Superintendent, is 300. Of these, many come from the new village and the surrounding population. There is also a Baptist church, which sustains a Sunday school of its own.

The Company are completing a new brick building, four stories high, 62x111, which will prove both ornamental and useful to the village. In the ower story is a large room intended for the use of the Band, the Engine Company and the military organization. On the second story, first from the street, is a fine room to be occupied as a library and reading room, two stores, and offices. The upper stories are devoted to a Hall, which for proportion and finish will vie with any to be found in the State, the needs of the vicinage considered. It occupies, with its ante-rooms and a fine vestibule, the entire area of the building, and is twenty-six feet in height. A gallery runs around three sides; a stage, with complete gas

fixtures occupies one end; and it is to be lighted by two burners with 120 jets in all. It will be well ventilated, and the ceiling handsomely tinted. For the size of the place, it is an uncommonly fine hall. Very clearly, this building was not erected with any idea that it would prove directly a profitable pecuniary investment. And as evidently, if the library and other rooms shall be properly managed, it will add very materially to the pleasure, the culture and the advantage of the citizens of Lonsdale. These two villages—only a short half mile apart, are now, what the Scotch term a house devoted to one family,—self-contained. They have within themselves every facility for literary and religious improvement. With all the advantages of the country, there are all, except some of the very highest, of those to be found in the city. Quiet, orderly and well managed, with excellent schools, and a sober population, such a manufacturing village presents a most favorable picture of Rhode Island industry directed by abundant capital, and encouraged in, and stimulated to rational recreation and moral habits. The dwelling houses are provided with pure water, and are not crowded as to room. There can be no doubt that the right and purpose of strict supervision over the whole place is beneficial to all concerned.

The New Mill, (No. 4.)

On the Cumberland side of the river is a fine brick structure 212x70 feet, with sundry additions which increase materially its capacity; four stories high, and admirably appointed in every respect. It was commenced in July, 1860, and covered in before winter. The machinery is of the best kind, and the system of operation seems to be perfect. The water through the turbine wheels usually supplies sufficient motive power, although an engine is always ready to supplement its action. The picking room has English machines to perform their work, which permits a cleanliness and a comfort unknown in that department in the olden time. The two main belts are two and a half feet in width, and cost each a thousand dollars. In every room there is that evidence of order and neatness which one is led to expect from the excellence of the building, and the fine arrangement of the grounds. The machines are dusted, the floors swept and washed often and regularly, and the opeartives have a healthy and pleasant appearance. There is none of the dirty, greasy smell and general discomfort which we have too often been accustomed to in former days. Mr. Kilburn, with a geniality and clearness which could not be excelled, explains, so that even one wholly unacquainted with machinery and manufacturing, in any practical sense, could understand, the meaning and manner of the operation of the various machines. From the opening of the cotton bale, to the perfect cloth, one could follow the different processes in an intelligent way. And this, simple as the reader may deem it, we deem no slight acquisition in the way of useful information. The why and the wherefore are understood better than ever before, as we more fully appreciate the difficulties in the way of making the finer qualities of goods, and the uninterrmitting care and varied knowledge of men and things he must possess, who is successful in this branch of industry. During the war, in consequence of the high price of cotton and the inability always to secure enough of the necessary grades, in special cases, great attention was paid to the improvement of machinery, and to all the processes of working the material, and the result has been a very great advance in the art, so that more has been gained, probably, in perfecting machinery and skill in manipulation within the last eight years, than was gained in the twenty-five preceding years. The idea which lies at the bottom of cotton manufacture, is to get out of the raw material as much of the foreign matter, and wear out the fibre as little as possible. It is possible to work the cotton until its natural strength is very much impaired. Just how much to do, and just where to stop, is the test of a good manufacturer. This will be readily understood, if we enquire into the nature of the article we are speaking of.

The fibres of cotton are extremely fine, delicate and flexible. When examined by the microscope, they are found to be somewhat flat, and two-edged or triangular. Their direction is not straight, but contorted, so that the locks can be extended or drawn out without doing violence to the fibres. These threads are finely toothed, which explains the cause of their adhering together. But if we consider the fineness of a flock of cotton, and the softness it discloses in the hands and to the touch, it will be very evident these teeth, which give its adhesiveness, will not bear an unlimited amount of tension. Every operation, up to the completion of the thread, tends to wear the fibre smoother and smoother. This tendency is checked the moment that the twisting process commences. There is, besides, the important matter of securing an even thread. If a single roll from the card were spun by itself to the requisite fineness, it is easy to see that, in the nature of things it would be of unequal thickness and strength. That is to say, there would be places where a quantity of the fibre would give a uniform texture, and places where the line would present a diameter unequal in short distances. In order to prevent this, the rolls are doubled and redoubled, so that these unequal diameters shall be equalized. The oftener the threads are doubled, the less is the ratio of imperfection.

To secure as far as may be, the establishment against fire, there is a tank in the tower, holding seven thousand gallons of water, and pipes in every room, with hose attached; in addition to which, pails ever filled, hang plentifully in every story. There is, of course, the force pump, and also a fire hand engine, with sufficient hose, for the protection of the village. There is also a set of bath rooms, and the time table is so arranged that each operative has his, or her opportunity once a week to indulge in that necessity and luxury. To supply tenements for their operatives, the company has built a village of comfortable brick houses, into each of which pure spring water is introduced, and they are all ventilated with especial care, a feature in construction which is not always found in more pretentious residences. The population is about 800. The fall of water is 15 feet. Horse power—water, 650; steam, 250; number of looms, 600; spindles, 32,000; hands employed, 425.

This mill stands at the westerly side of, and immediately at the foot of what was known as "Study Hill," the favorite resort of William Blackstone. The Providence and Worcester railway, which passes close to the westerly side of the mill, cut through the centre of this hill. Originally, it rose in a handsome cone-like form, some fifty feet above the surrounding land and sloped about seventy feet to the river on the west. It was covered with a beautiful grove, and from it a most delightful prospect of the river, winding to the southwest, was, and still is to be had. The grave of Blackstone, marked by two calcareous stones, of irregular roundish form, is to be seen in the meadow, a few rods from the Lonsdale station, and just east of the remaining portion of the hill. Blackstone was the earliest settler of Boston, having resided there four or five years previous to the arrival of Winthrop. He afterwards came to what is now the town of Cumberland, and located near Study Hill. Having escaped from what he considered the tyranny of the Lord Bishops in England, he could as little brook the tyranny of the Lord brethren at the Bay. At the first General Court, composed of all the freemen of the Colony of Massachussetts, held in the autumn of 1630, Blackstone applied for the freedom of the Company, and was admitted at the General Court held in May, 1631. In 1634, or thereabouts, he became the first permanent white settler in Rhode Island, and planted the first orchard therein. Roger Williams crossed the Pawtucket river, and was one of the six original settlers of Providence, in 1636, Some of the first trees planted by Blackstone, (originally spelt Blaxton,) were living, and two of them bore apples as late as 1830, being nearly two hundred years old. He died May 26th, 1675, having resided, probably, more than fifty years in New England.

The Ashton Mill,

Also owned by the Lonsdale Company, is situated midway between Lonsdale and Albion, and is, with the fine brick village built in conjunction with it, located on the Cumberland side of the Blackstone river. It is built of brick, the main building being 348x90, four stones high; with an addition for an engine room and other purposes 107x68, also of brick, and two stories in height.

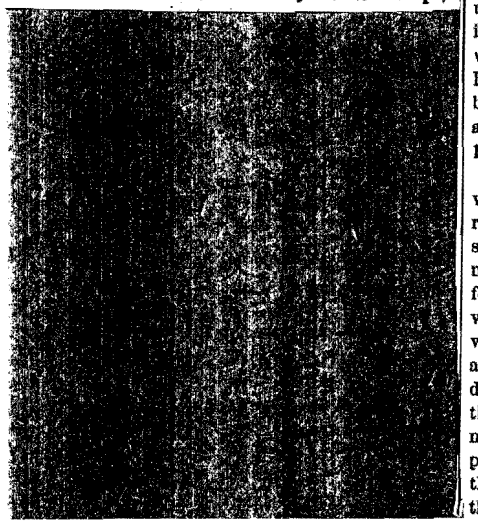
The building for the stowage of cotton, is a very handsome brick building with a Mansard roof, and is fire proof. The counting room is a specimen of unsurpassed convenience and neatness. The engine room and engine are unequalled for their beauty and the superior cleanliness which prevails. The engine is beautifully painted with the arms of the State, and the national eagle, and the brass oil cans and apputenances shine as did of yore the brass andirons of the parlor when the elligible daughter of the household, for matrimonial honors, expected a favored suitor. The picker room has in it a machine which sends all the dust into a tower capped with cut granite, and the comfort and health of the operatives in this room are as well secured as in those portions of the mill which used to be so much more desirable. The rooms in this mill are fourteen feet high, with the exception of the upper story, which is sixteen, and all are well lighted with very large windows. In the main tower is a tank holding 10,000 gallons of water, and the precautions against fire are complete. The operatives as they enter the mill, find a withdrawing room, in which they leave their outside clothing, and the indication which this affords of the order of the establishment, is verified in every room and department in it.

There is, perhaps, no one item in our modern manufacturing, which shows more clearly and astonishingly the enormous advantage, in point of product, of machinery over manual labor, than the spinning. In this mill, one man tends 1,408 spindles. Eighty years ago, the prudent and industrious housewife was as proud of an extra hank of yarn per day, as is the modern belle of the latest style of sailor jacket, or the largest chignon. The spinning wheel sang merrily in every farmer's house, and the inmates little dreamed of the day when a mill like this should spin 60,000 miles of yarn per day, of which it would require 30 miles in length to weigh one pound. No traveller on the Providence and Worcester Railroad, fails to admire the fine proportions, and the solidity of this mill; nor the taste displayed in the ornamentation of the grounds. The grass is equal to any in the best kept lawn, and the trees which have been planted have been so selected and arranged as not to impede the light for the mill, while they give it a cheerful and attractive appearance. The Company have erected and given to the Episcopal Church, a fine edifice, and have, also, built a chapel for the Sunday school and lectures. The number of looms, is, 700; of spindles, 38,400; of hands employed, 450; horse power—water 400; steam 300. Fall 9½ feet. 1,200 tons of coal are used, and the product is 5,000,000 yards of cambric, muslin, and rolled jaconets. The entire establishment was built after plans by, and under the immediate supervision of, Edward Kilburn, Esq., who now superintends it.

With the improvements in machinery, there is, of course, a less number of operatives required to do the same amount of work, but while inspecting this mill, with its airy rooms of an agreeable temperature; its clean floors; its machinery as delicate and as neat as that of a sewing machine, we could not avoid the reflection that many a girl who is toiling in the city for a mere pittance, and still more, many a vain and idle girl who is tasking her father's purse for needless finery, and fretting herself because she has nothing to do, and "nothing to wear," might find it equally beneficial to her health, her spirits and her purse, to make one in the spinning or weaving room of some such mill. When girls can, within the present factory hours and in so easy and healthful labor, earn from eight to twelve dollars per week, they ought neither to be a burden to others, nor spend their time in the frivolities of a semi-fashionable, and wholly foolish and miserable idleness.

The boarding house is a fine brick structure, intended to accommodate fifty boarders. It is plainly and neatly finished, thoroughly ventilated, and made entirely comfortable. Everything about and around it wore an air of pleasantness, the effect of which was enhanced by the rehearsal by a band of Sunday School scholars, of their songs for the Sunday. The chapel, which was erected at the expense of the Company, is a very pretty and tasteful Gothic edifice, 34x64, finished in good style; carpeted and curtained; and lighted by a large number of fine gas-lights. The window in the chancel is a more than ordinarily good specimen of painted glass. An organ of sufficient power and good tone was presented by one of the members of the Company, as was a silver Communion service, by another. There are very few communities, anywhere, furnished with a so comparatively commodious, admirably appointed, and every way creditable church building.

There is, of course, in this village, and in the mill establishment, a congruity, a completeness and a finish, resulting from its having been built from the beginning according to a well arranged and deliberate plan, which is not to be found in the older villages, where the mills have been built, added to and improved by degrees. No finer mill is to be found either in this, or any other country, and no one working here need deprive him or herself of the means of mental improvement, or the consolations of religion. If other manufacturers shall not follow the example of liberal expenditure, here set, it cannot be otherwise than that the influence will be felt in the improved opportunities of the operatives, and the better morality and higher taste which shall pervade the factories of our State.



THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

ELEVENTH ARTICLE.

Manville.

This pleasant village is situated four miles south of Woonsocket, on the Blackstone river, and the Manville Company own, but do not occupy, the entire volume of the water. A history of this place will show very intelligibly the history of manufacturing operations in this State, after the smaller streams were left for larger privileges, and even before the latter had become generally profitable. In 1740, the land on which the village is now built, on both sides of the river, was owned by David Wilkinson, who, in that year deeded it to Samuel Wilkinson, who, in 1747, redeeded it to David. In 1759, David Wilkinson deeded it to Benjamin Wing, of Dartmouth, Massachusetts. Wing conveyed it to Abner Bartlett in 1802, in which deed the premises is for the first time referred to as a "water privilege," and mention is made of the bridge, by the name of the "Unity Bridge." In 1803, Bartlett sold to Luke Jillson, who conveyed it in 1805, to Samuel Hill, Jr., of Smithfield, and William Aldrich, of Cumberland. Samuel Hill, Jr., was known afterwards as Judge Hill. Hill and Aldrich deeded in 1811, to Thomas Man, Stephen Clark, George Hill, David Hill, Jesse Brown, George Aldrich, Otis Capron, David Wilkinson, Alpheus Ammidon, Stephen Whipple and Asa Bartlett, reserving an interest to themselves, and the grantees were styled the "Unity Manufacturing Company." Three years thereafter, in 1814, Aaron Man, father of Samuel F. Man, purchased the interest of Alpheus Ammidon, and allusion is made in the conveyance to the Unity Cotton factory, a grist mill, saw mill, and fulling mill. In 1821, the Unity Manufacturing Company sold to William Jenkins and Samuel F. Man, all their interest in the estate. In 1831, Jenkins and Man conveyed one-fourth part of the estate to Arlon Man, brother of Samuel F., the estate having been considerably enlarged by purchases of adjoining land, since the original purchase from Wilkinson. September 28, 1854, the heirs of Samuel F. Man, and William and Anna Jenkins, conveyed the mill estate and lands, to the Valley Falls Company. In 1863, the Valley Falls Company deeded to the Manville Company, then composed of Tully D. Bowen, Henry Lippitt, William H. Reynolds, Charles H. Merriman, Samuel Chace and Harvey Chace, and the name of the concern was changed to "Manville Company."

The proprietorship has changed somewhat since this purchase, but the name is unaltered. Tully D. Bowen has deceased, and others have sold out, but the great bulk of the interest remains in the same names as in 1863.

The Manville Co. was incorporated May, 1863. The stockholders now are, estate T. D. Bowen, John A. Taft, Anthony & Hall, H. B. Bowen, Harvey Chace and sons, R. Handy; Harvey Chace, President; John A. Taft, Treasurer and Agent.

At an early day, a furnace was erected here, the iron ore of Cumberland, which is now shipped to Pennsylvania, having a recognized value with such men as the Wilkinsons and those connected in business with them. Here was cast hollow ware of the various kinds needed in domestic service. The saw mill, fulling and grist mills stood where the brick mill now stands. There is a tradition that one of the kettles from the furnace being left out in the rain was filled with water which froze solid, and that Israel Wilkinson after the next day's sun had melted the ice sufficiently to allow it to be turned out, worked off the upper surface spherically so as to form an ice globe. This, by fixing an iron hoop around its centre so as to control it, he made into an ice sun glass and concentrating the rays of the sun through it into a focus, melted some iron wire. Israel and David Wilkinson were relatives of Oziel Wilkinson, of Pawtucket, and in a very considerable degree partook of his love for, and skill in, mechanical pursuits. The late Joseph Wilkinson, of Smithfield, was a cousin of the David Wilkinson, of Pawtucket, who invented the slide lathe. Joseph Wilkinson was a man of quick intellect and sound judgment. He would never engage in any manufacturing business, saying that where a difference of a quarter of a cent a yard in cloth would make or ruin a man, his capital should not be risked. He created the Hamlet meadows out of the original swamp, and arid sand. He also directed the reclamation of the land, afterwards the Manville meadows, and which Samuel F. Man, in his day, took a great deal of pride in keeping up to the extreme point of fertility, which could only be done by careful irrigation.

The "Mott Dam," now a thing of the past, it having been flowed out by and for the benefit of the Manville Company, was the subject of an eleven years law suit between Joseph Wilkinson, and Jenkins and Man. It was situated about one mile below the Hamlet village, and was nearly five feet high. John Whipple, and Richard W. Greene were of counsel in the case, Whipple being for the complainant, Wilkinson, who owned the adjoining land, and Greene for Jenkins and Man. Afterwards Thomas A. Jenckes came into the case with Judge Greene, and after the usual fortunes of a case, where both parties were pertinacious and all the counsel able, with judgment for the plaintiff in the Common Pleas, a reversal by the Supreme Court, a new trial and much expense and trouble, the case was finally settled by junior counsel on both sides, one at least of them never having been forgiven by his client for doing him that good service. Samuel F. Man died in 1847, Joseph Wilkinson in 1851; they were neighbors for years, and although opposing litigants, were quite capable each of appreciating the abilities of the other. The Blackstone flows without a ripple over "Mott Dam," and the intellectual vigor and varied information of Samuel F. Man, and the keen perceptions and cool understanding of Joseph Wilkinson, are only occasionally brought to mind in that locality where once they swayed an influence respected and acknowledged.

Thomas Mann was one of the first settlers of Smithfield, was Judge of the Court of Common Pleas, under the old system, and Town Clerk of the town of Smithfield, for many years. He was first chosen clerk in June, 1817. He was succeeded in June, 1840, by the late Gen. George L. Barnes. Stafford Mann, son of the Judge, was Town Clerk from 1850 to 1855, and was then succeeded by the present Clerk, Samuel Clark.

Stephen Clark, father of Samuel, and son of Samuel, occupied, as did his father, the estate now owned and occupied by the present Town Clerk of Smithfield. The great-grand-father of the present owner of this fine estate, was concerned in Shay's rebellion, and the grand-father, as a boy, came first to Glocester, and afterwards to Smithfield, where he was President of the Town Council in 1798. Stephen Clark was a member of the General Assembly in 1839, and a prominent man in his town.

George and Daniel Hill were land owners near Manville, and Jesse Brown, a proprietor in Cumberland. David Wilkinson owned a farm about a mile from Manville, and was one of the "solid men" of the town. The enterprise evidently did not meet the anticipations of the projectors, although the losses, if any, were not such as to embarrass men of their means.

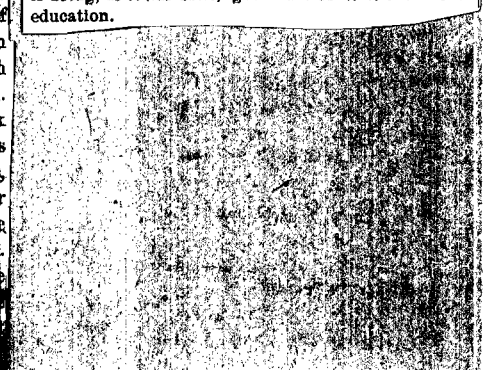
The first mill was built at Manville, in 1812, It is four stories in height, counting the attic, 100x32, shingled on the sides, and is being renewed and promises to last for years to come. The present mill was built in 1826, of brick, and was originally 139x42, five stories high. In 1859, thirty-two feet were added to its length, and in 1862, 45 feet more, making it now 216x42, with an ell, added in 1859, 80x44. At the same time turbine wheels were put in, so that there are now six stories filled with machinery. The entire machinery has been changed since 1847, and under the superintendence of Mr. Russell Handy, who has been, with a short intermission, thirty years about the mill. Everything presents a neat and improving aspect. By purchases of real estate, and improved machinery, with other outlays, the value of the Manville property has been doubled since 1866. The new dam, built year before last, is one of the best, if not the very finest on the river. It is constructed of large hewn granite; is 246 feet long; 13 feet in width at the botton, 8 feet on top, with cap; 18 feet in height on the average, and rests upon solid rock its entire length. In some places it is 24 feet in height, and composed of stones 10 to 14 feet in length, and 2 feet square. It was commenced August 15th, 1868, and finished in three months and one day. It cost, say $32,000. The foundation for a new mill, 250.x76, with an ell 76x36, is finished. It is of the most solid description. It is built of hewn granite, the stones being from 6 to 8 feet in length and 18 inch face by 12 inches in depth. It cost some $62,000. The work recently done on the trenches, bulkheads, &c., has cost $20,000 more. The fall of water is 19 feet, and the volume sufficient to drive both mills, or rather the three mills, as the old wooden structure before mentioned is to have new machinery. Three hundred hands are now employed, and the horse power, 250. The entire power is 900. The looms in use, 348; spindles, 20,000; and about four hundred tons of coal are used to heat the

spindles are to be placed in the present and old wooden mills. The mill to be erected on the new foundation is calculated for 45,000 spindles. The goods made here now are fine lawns for printing, these having taken the place of fine shirtings, which were equal in quality to the goods of the New York Mills. A thousand acres of land give the Manville Company "ample room and verge enough" for agricultural pursuits; and they have on their premises some of the finest building sites in the State. The village, which lies on the Smithfield side of the river, is well built on wide streets, shaded with beautiful maple and elm trees. It is perfectly kept and evinces the results of careful oversight. The Company is fitting up a large two-story store, and making preparations for slaughtering cattle, so as to provide plentifully and cheaply for the wants of their operatives.

For the purposes of a school house and a large hall, there is a fine two-story building, and we have rarely seen better furnished rooms than the primary and intermediate school rooms present. Leading up to this building and the church which stands beside it is a wide and pleasant avenue having noble trees on either side. Episcopal services are conducted in the church regularly, and the edifice, which will seat three hundred persons, has been cushioned, carpeted and handsomely painted by the Company. There is a good organ, and the "dim religious light" which streams in at the windows is in perfect keeping with the atmosphere of the village. Nowhere is to be found a more quiet and thoroughly orderly community. The late Samuel F. Man was a strict disciplinarian, and he laid out Manville regularly, and maintained in it, during his life, a sober and industrious population. The present proprietors act upon the assumption that wealth has its duties, as well as its power and privileges, and they are not only improving the looks and capacity of their establishment, but they have regard to the welfare of their operatives. No liquor is sold in the village, and persons employed must conform to the proprieties and outward moralities of life. Mr. Handy and the Treasurer, John A. Taft, Esq., make it evident by every word and act, that they feel the responsibility which, whether acknowledged or not, presses upon all who have the direction of large numbers of individuals.

The population of Manville is about 1,000; there are 100 scholars in the Sabbath school; and the district school is well attended. As a proof of the advance made in the character of their manufactures, it suffices to state, that in 1866 the numbers of the yarn spun were from 30 to 35, while now they are from 65 to 80. This place was for many years the residence of Hon. Bradbury C. Hill, late Senator from Smithfield in the General Assembly, and here he laid the foundation of his fortune, working sixteen hours a day, honest labor. When that question, which caused so wide a difference of opinion, and in many cases worked so great an alienation of feeling between the Law and Order men,—whether Dorr should or should not be liberated—came to agitate the State, Mr. Man and Mr. Hill were found on opposite sides. Mr. Man went with Charles Jackson, for liberation; Mr. Hill could see neither its necessity nor justice. He had sympathized with the spirit and been electrified and strengthened by the eloquence of "Old Narragansett," and he could not change his convictions so readily as some other men, equally able and equally honest. He had been in the Legislature, and had received a renomination, but Samuel F. Man, in whose employ he then was, and for many years had been, told him squarely that he should be defeated, notwithstanding his nomination, unless he would pledge himself to vote for liberation; this he would not do, and he was defeated. Without acceding to the judgment of Mr. Hill, it is, at this day, at least, refreshing to recall the political firmness of one, who, even at the loss of office, carried out his own views of individual duty.

NOTE:—In our article upon Lonsdale, we sinned a sin of omission, in not stating more definitely that the higher grade of school in that village is a "High School." We intended to do full justice to an institution creditable to the village and town, but permitted ourself to err in the use of terms. It is proper to say that the Lonsdale High School ranks high; has fitted, and well fitted many students for college, and is doing, as it has done, good service in the cause of education.



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THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

TWELFTH ARTICLE.

Pawtucket.

In returning to the varied industry of this most enterprising village, we find in the establishment of the Cole Brothers, manufacturers of steam fire engines, a study worthy of more than a momentary attention. In the early annals of every town we find that the first provision against fire, is an ordinance requiring the citizen to keep and maintain in order one or more fire buckets. These now obsolete articles, made of substantial leather, may yet be seen occasionally, and powerless as they would be in our day, they doubtless did good service in their own. From these, the advance to the hand engine, which required to be filled by buckets, was something considerable; and the addition of the suction hose was a great stride in efficiency. The hand engine then became a powerful instrument, and in their best days the fire companies of Providence were composed of the most public spirited, generous, substantial and energetic men of the town. In the days when "No. 3" began to get a little old fashioned; when "No. 6," Hydraulions "No. 1" and "No. 2" were waging an amicable rivalry, the rolls of the department were answered by as true voices as ever responded to the call of duty in any emergency in life. When Alexander F. Adie was Captain o "Hydraulion No. 1," and Aldrich was Chief o the Fire Department, it was the best blood of the city that "run with the machine."

Other reasons than the introduction of steam fire engines have conduced to the organization o a paid fire department. The city in its natural development into a large town had outgrown the earlier system, and the machines which required only a few men to work them, and these with some mechanical knowledge, completed by their eviction of the hand engine, the inevitable revolution. The engines of the Cole Brothers have now been fully tried at home, and in the various parts of our own country. They have stood the severest practical trial to which they could be exposed, competition with the engines of Jeffers. Beginning business in 1866, the Cole Brothers have built 21 engines at a cost of $3,800 to $4,000 for single engines, and of about $4,500 for double engines. These machines are found in Central Falls, Pawtucket, Providence, Warren, Bristol and south and west; and they are now at work upon as many orders as they have the room and men to employ. They also manufacture a steam stationary engine of great power, one of which has been purchased by the Rubber Company of Woonsocket. This firm received at the Fair of the American Institute, held in New York in 1869, the First Medal and a Diploma for one of their machines. The Coles have also made improvements for which they have received patents, and which they claim as being very valuable additions to the steam fire engines built before their inventions. Without professing to go behind, or to add to the certificate of value which a patent *prima facie* is, we state simply the claim of these inventors in regard to their engines. "One of the most objectionable features of all steam fire engines, hitherto, has been their failure to draught water from deep wells, and also failures on short draughts, occasioned by small sticks or sediment getting under the valves, thus rendering the engines useless. These objections we have entirely overcome." The patent piston rod avoids sticking on the centres, and cramping of the sliding box. The improvements in the boiler enables the use of all sorts of water without foaming. They use a twenty horse power steam engine, and employ thirty hands. Annual sales $80,000.

It is the belief of some based upon the experience of the Patent Office; of others upon philosophical principles; and of others upon the conviction of a direct and minute Divine oversight, that every want of man will find its supply, not only in the world of matter, but of adaptation of new forms of old principles, so that the progress of the world shall be certain and rapid. As gas has, after oil, superseded the candle; as the spinning jenny and the power loom have taken the place of the distaff, and the hand loom; so, it is argued, will a way be found to pick cotton by machinery, and to do anything and everything which increasing population, luxury or the demands of foreign markets may require. And these philosophers have reason for their confidence. From the "Shoo fly potatoe cutter," to the hair cloth loom, there is a device for saving labor and expense in every department of business. And yet manual labor is scarcer and better paid than ever before. With the introduction of the sewing machine, the amount of work expended upon dresses has increased, so that, wonderful as was the invention of Howe, it can by no means outstrip the genius for frills, and furbelows and all the unnameable, but costly flounces and "things" which adhere to, if they do not adorn, the modern dress. And with all the improvements in the machinery for manufacturing cotton goods, operatives never had until within a few years, such clean, well lighted and ventilated rooms, such light work, such steady pay and such high wages as they now have, in addition to which, with the improvement in the character of the mills, there has been quite as marked advancement in the opportunities for mental and moral growth. There is a good deal of the very best sort of preaching in a nice machine, placed in a tidy room.

Z. P. and J. S. White

are manufacturers of all kinds of machinery castings, steam and water pipe and kindred articles. Zebulon White, the father of the members of the present firm, commenced business here in 1847, and his sons have continued and enlarged the works. The also manufacture Wood's patent hangers for shafting. They use steam power, six horse; employ fifteen hands; and their annual sales are $40,000.

D. D. Sweet & Company,

Manufacturers of Sash, Blinds, and Doors, sales rooms 87 and 89 Canal street, Providence, have a large and well arranged establishment. Here we see again the great dependence upon machinery, and the immense variety of work it performs. The building occupied by this firm is 40x180, 2 stories in height, with an ell 30x60 also 2 stories high. A lumber room 25x90, heated to a high temperature by exhaust steam, gives the drying facilities so much needed in preparing lumber for fine work, and some of that we see in the form of black walnut and birds-eye maple doors, in which these beautiful woods are left in their original state, in so far as they are not of course painted. Nothing can be handsomer than this maple for inside finishing, and we were not surprised to learn that doors made from it are worth from forty to fifty dollars each. But with all the machinery in use here, it is found that certain kinds of cheap work can be more profitably purchased than made, the price paid formaking being less than the cost of transportation of the rough material and the expense of manufacture here. The finer qualities of work are, by means of machinery and skilled manual labor, turned out in such quantity, and of that high grade demanded by a rapidly increasing community, and a constantly spreading architectural taste. The power used by this concern is a steam engine—50 horse-power; they employ 50 men, and are the only firm in Pawtucket engaged in this branch of business. Their monthly pay roll is $2,400, and their annual sales $37,000, not including their retail sales.

S. S. Humes & Co.,

manufacturers of trunks, boxes, mouldings and brackets, employ 50 hands; their pay roll is $2,400 per month; and their annual sales $46,000. They are also extensively engaged as builders and contractors, and their business as such is not included in the statement of their yearly product above given.

Rhode Island Stove Works,

manufacturers of cook stoves, air tight castings, sinks, hollow ware, &c., &c. This establishment, formerly known as the Pawtucket Furnace Company, was established prior to 1853, was incorporated under its present name in 1869, uses 12 horse power—steam; employs 40 hands, pays wages monthly, $2,500; and makes sales yearly to the amount of $80,000.

S. T. Hornby and Brothers,

manufacturers of lounges and mattresses—hands employed 12; monthly pay roll $250; yearly sales $30,000.

L. Upham & Company,

manufacturers of wood machinery. Hands employed 15; monthly pay roll $600.

Greene Brothers,

manufacturers of welting cord and skein thread. Hands employed 6; monthly pay roll $150; amount of annual sales $12,000.

PROVIDENCE JOURNA

MONDAY MORNING, MAY 9, 1870

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

THIRTEENTH ARTICLE.

Fales, Jenks & Sons.

The history of this house is equally interesting and instructive. It discloses the peculiar energy, skill and success of the New England artisan. It proves the value of continuing in one family given occupation, and it is an example of well rewarded industry which should animate every apprentice with a desire first to learn well his trade, and then to become his own proprietor and employer. If, in the changes which time produces in every community, it has come to be the fact with us that a larger capital is necessary now than in former times to enter successfully into any business, it is still true that the skilled, industrious and sober mechanic is able to obtain higher wages than ever before, and to secure an interest in large establishments proportioned to his value in carrying them on. The man who can superintend a large cotton or woolen manufactory or machine shop, is sure of a good salary if he wishes to avoid the risks of trade, or a fair share of the profits which capital enables him to make. Next to the farmer who owns his land, and knows how to till it, he is the most independent man in the land, as he surely is one of the most useful. In the "old and effete" monarchies of Europe, the sagacious and successful manufacturer is crowned with political and social honors; but in our fiercely democratic and republican country we have not yet arrived at this stage of civilization, and congratulate ourselves upon our extraordinary display of common sense and self-respect in worshipping hereditary or shoddy born wealth, and making legislators of half-educated and wholly unpractical men,—men who neither know what the interest of the people is, nor could draft a law if they understood what were its design.

We are not arguing in favor of sending every mechanist to the legislature, but we are in favor of giving credit to any and every man, who in his own walk in life has shown the ability and perseverance requisite to success in it. And, again, this need not necessarily be a pecuniary success. The inventor of the slide lathe for metal did not die rich, but he gave his entire manhood to useful labor, and bequeathed to his country a labor-saving machine, which has been worth to it millions of dollars. In that aristocracy of intellect, which, aside from all moral considerations, is eternally one Americans can consistently acknowledge, the men who by their ingenuity render life less burdensome, and its comforts greater and cheaper, should have high place and generous recognition.

Forty years ago, (1830) David G. Fales and Alvin Jenks formed a copartnership for the manufacture of cotton machinery, and commenced business at Central Falls, in a hired shop. Their first piece of work in the way of building, was a spooler made for a firm in Richmond, Virginia. This machine was sold for $60. For two years they confined their operations to the manufacture of cotton-spinning and thread-making machinery. In 1833, they purchased the right to manufacture in Rhode Island, Hubbard's patent Rotary Pump, which for a long time continued to be a principal article of their manufacture. It is now a very inconsiderable item in their business. Twenty years ago it was considered the best house pump in use, and was as we know from practical experience an excellent article. In connection with it we first heard of this firm and the fact that it was made by them was thought guaranty enough of its worth and thoroughness of make. Improvements have been made by this firm upon these pumps, and as a stationary force pump for fire purposes, they rank as high as any.

The first Ring Spinning Frames were made by Fales & Jenks in 1845; the first Ring Twisters, being among the first of these machines built in this country, for thread, worsted, woolen and silk, were made by them in 1846, for Benjamin Green. Several years since, Fales, Jenks & Sons, made for and sent to J. & P. Coates, the celebrated manufacturers of "Coates'" sewing thread, at Paisley, Scotland, some Twisters, Dressers and Winders. These machines were so superior to those heretofore in use by the Messrs. Coates that they were made the models of new machines for their and other establishments. The canny Scotchmen know a good thing when they see it, and although Sidney Smith declared (as untruly as slanderously,) that they could not comprehend a joke, no [illegible] them of not understanding a plain business line which promised to put money in their purse. Pawtucket to Paisley, greeting!

In 1854 Alvin F. Jenks and John R. Fales, sons of the original partners, were taken into the business, and the firm-name of Fales, Jenks & Sons adopted. In 1856 Mr. Alvin Jenks died, and another of his sons, Stephen A. Jenks, was admitted to the partnership, which is now composed of Alvin F. Jenks, John R. Fales and Stephen A. Jenks. They now manufacture, in addition to cotton and woolen machinery, shafting, hangers, rotary force pumps, plunge pumps, safety-valves, and other articles, besides doing foundry work to order.

Previous to 1860 they had procured most of their castings at other establishments, but in 1859-60 they built a furnace at Central Falls, and in 1861 built a large lot of milling machines, used in the manufacture of guns and sewing-machines. In 1862-3 they added to their buildings in Central Falls a brick shop, three stories in height, 300x63, with an ell, 73x60, which they afterwards sold to the American Linen Company. In 1866, after vainly attempting to procure in the immediate vicinity of their old works, at what they deemed a fair price, land for another and larger establishment, the company purchased fifty-six acres of land adjoining, now flanked by the village of Pawtucket. Their buildings are located within less than half a mile of the bridge, (the centre of the village,) and within one-fourth of a mile of the stations of the Boston and Providence, and Providence and Worcester railroads, and yet when they made this purchase for twenty thousand dollars, very many very sensible men thought they were going out of town, and too far; from the village for success. The fact is that their new works are nearer the stations than were their old ones at Central Falls. People forgot to reflect that the "Horse Burying Ground" need not retain forever either its name or its ruggedness of aspect.

This plat of land is now laid out into streets this firm has erected thirteen houses two stories in height, intended each for two families, and five four-family houses, each two stories high, for their workmen. Their lots, 50x100, sell for $600 to $800 each. Ten acres of the original purchase have been sold to the Conant Thread Co., and instead of being out of, this establishment is exactly in the way of every business facility.

When this land was first taken in hand by Fales, Jenks & Sons, it was as picturesque a bit of landscape as its name indicated. The soil was a light sand; its surface was uneven and covered with stunted pines, and even its immediate proximity to Pawtucket had given it no marketable value. It was held by persons who had neither the necessity nor the inclination to sell, and the prospect was that it would remain for years equally unattractive and unproductive. The go-aheadativeness of this firm has made it in less than four years a pleasant and industrious neighborhood, at once valuable to them and a benefit to the village.

The main shop is 450x63 feet, two stories high, except for one hundred feet on the south end, which is three stories in height. There is a pattern building, built of brick and fire-proof, three stories high, 80x40 feet; a furnace 160x60 feet, with an ell 60x50; a blacksmith shop 60x80; a lumber house 40x80; one with the necessary accessories. [illegible] is one of the very best in the country, high, (two stories), light and admirably ordered. A small brick building is already put up for a brass foundry. The engine is supplied with water by a pond of about one acre in extent fed by springs; this has been excavated to the depth of from five to fifteen feet, and stocked with fish. It is oval in form, is being handsomely walled up around the margin, and will, when its banks are sown in grass, and trees planted around it, as is intended, prove a pretty adornment of as very practical, and usually not ornamental concern. The furnace is capable of melting from five to seven tons per day of pig iron. The power used is a Corliss engine of 80 horse power, and 150 hands are employed. 500 tons of coal are used annually. When business is brisk, 300 hands are employed, and the annual sales amount to $320,000. It is simple justice to say that this is one of the largest and best arranged establishments of its class in the country.

We beg to tender our thanks to Edward A. Browne, Esqr., for the courtesy shown and information afforded us.

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

FOURTEENTH ARTICLE.

5-21-70

PAWTUCKET.

The Dexters.

Two years before Samuel Slater arrived in Rhode Island; at the time when the Wilkinsons had just commenced their operations in this village; when the present size and appearance of the place was as far from the conception of the then inhabitants as the modern ideas of life and maxims of business morality would have been repugnant and odious; at a time when honest labor was the rule and not the exception for those who were able to live without work; and within a few years of the close of the Revolutionary War, in 1788, to wit, was born N. G. B. Dexter, who presented in all his life an example of an honest, industrious, persevering and notably trustworthy merchant. The Dexters go back to the days of Roger Williams. Gregory Dexter, the ancestor of the families of that name, was an associate of Williams's, and died pastor of the First Baptist Church in Providence. He was printer as well as preacher, and performed the very first printing that was done in Boston. Mr. Dexter was in the employ of Samuel Slater for a season, and it may well be that he then and there imbibed that thorough idea of faithfulness in all relations which he carried with him, and exemplified during his long and honorable career.

Mr. Dexter married in 1808, Amey Jenks, daughter of Jerahmeel Jenks. Mrs. Dexter was a decendant of Joseph Jenks, the founder of Pawtucket. In 1858 the golden wedding of this couple was celebrated, and there were present the Rev. David Benedict and his wife, he being the clergyman who married them, and Major Josiah Jones, of Providence, and his wife, Major Jones having been at the time of the marriage of Capt. Dexter one of publishers of the *Providence Phenix*, and the person who set up with his own hands the marriage notice. Both clergyman and printer celebrated their golden wedding, the same year.

Capt. Dexter, was just, punctilious and scrupulously honest, never reduced by any consideration into lowering for a moment the quality of his goods, or his standard of trade ethics. Commencing business in a very small way in 1820, by buying cotton yarn and putting it up in five pound bundles for sale, Mr. Dexter was overtaken by that financial hurricane which in 1829 swamped the Wilkinsons and so many others, and put back the advance of Pawtucket for twenty years. In the disasters of 1837, he again had to succumb to the storm, and failed. But beginning again, he paid his creditors in full with interest, so that no man could say, at last, that he had an unsatisfied claim against him for the smallest amount. In other words he believed that a just debt never outlawed, and that an honest man would pay it as soon as he could—and he acted upon this conviction.

From the purchase of yarn, in 1830, Mr. Dexter commenced the manufacture of thread, and afterwards of the knitting cotton, for which the house is now famous throughout the country.

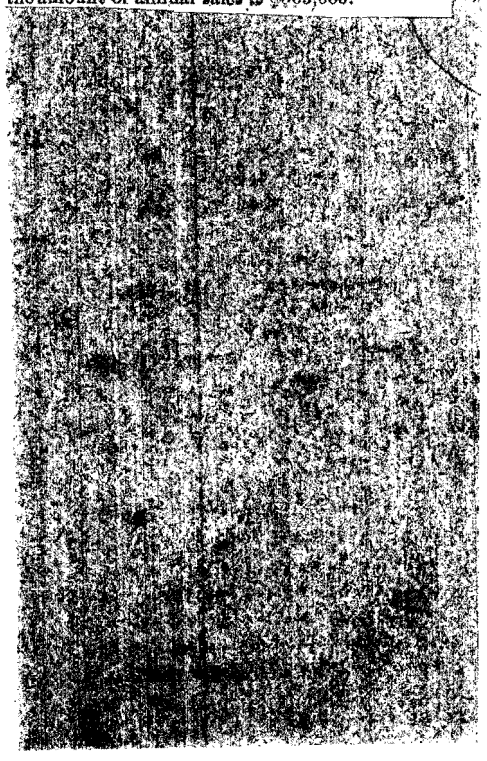
In the year 1831, Mr. Dexter took into co-partnership his son Jerahmeel J., and continued the business until 1837, when he took it into his own hands again. In 1855, Mr Dexter sold his entire interest to his sons Simon W. and Daniel S, remaining, however, with them and actively engaged in and about the business until his death in 1866.

The manufacture is of knitting, darning and tidy cotton, and is sent to every part of the United States and Canada. In 1855 the product was from 500 to 1,000 lbs. per week. It is now often 25,000 lbs per. week, and orders are received for sixty to seventy thousand pounds of yarn, each.

The first real estate purchased by Mr. Dexter for manufacturing purposes, was in 1851, when he bought that conspicious and valuable central estate at the corner of Main and Pleasant streets. This is apparently the most desirable location for business purposes in Pawtucket. The building was erected in 1822, by Samuel Slater, Major Ebenezer Tyler and David Wilkinson, and was called the Union Block. It cost, without the lot, $22,500, and is one of the best buildings for strength and thoroughness of construction in the State. Mr. Dexter was at that time clerk for Mr. Slater, and paid the bills. It is 40x80, built of brick, and five stories high, with a basement which gives six stories for actual occupation. This firm also own a mill on the east side of the river, five stories in height, 62x90, built of stone and wood, capable of running 12,000 spindles. At Valley Falls they have another mill, brick, four stories high, 30x60. The founder of the business began his manufacturing with two rooms and 400 spindles, with picker, carder, speeder and spinning frame in one room. For thirty years Mr. Rawson of Cumberland has made yarn for this concern; a proof that there is some stability and fair dealing yet in the land.

Originally the yarn was put up in skeins, but of late a demand has grown up for it in balls. This necessitated the invention and manufacture of a machine expressly for this purpose. But an examination of the balls of yarn of the Dexters and of other manufacturers discloses a wide difference in their uniformity and compactness of structure. Inasmuch as all use the same machine, we were at a loss to account for this, until informed that the Messrs. Dexter have added an invention of their own, which secures an exactness and finish which the original machine failed to furnish. It is one of those little things which marks the line of demarcation between fair and first-rate. But while the neat and attractive ball, all ready for use, is designed for the American woman's purchase, the yarn in skeins, which is sold at retail about eight cents on the pound cheaper, is bought by the Germans of the west. And herein is displayed a trait of character which in a nation makes a mighty margin of profit for the more prudent class. The American woman does not think twice, nor at all, about eight cents in the pound, two cents on a ball of yarn, which pleases the eye and is convenient for use. But the German frau, accustomed to a minute economy, bethinks her that the children who can do little else, can at least wind yarn, and so that entire population, which is large in the west, buy only the cheaper form. This item of itself would be of no great consequence; but it is only a part of a general education and universal habit. The German and French woman is economical. She makes a dinner out of what our Yankee wives, if they knew anything at all about it, would consider a very inadequate provision, and she makes a tasty and appropriate dress of the cheapest material, leaving expensive stuffs and ill-assorted colors to the Yankee girl whose father has money, but whose father's daughter has neither taste, self-reliance, knowledge of harmony in dress nor any sense of what is due to her own station in life, and what is absurd in view of it.

The number of hands employed by the Messrs. Dexter is 250; the power is, at corner of Main and Pleasant streets, 90, steam; on the east side of the bridge, 100, water; at Valley Falls, 110, steam. The counting room, winding and packing rooms are in a large building on Pleasant street, two stories high about 40x100. On the first of January last, the firm had on hand between $150,000 and $175,000 worth of yarns, and now it is with difficulty that they can fill their orders promptly. In the days of Capt. Dexter, a New York merchant sent him a hundred dollar bill, saying that he had enquiries for his yarn, and desired him to select and send him the value of the remittance. The annual purchases of that customer now amount to one hundred thousand dollars. The consumption of cotton is 200 bales per month, and it is a simple fact in the statistics of trade, that in their own line, the Dexter Brothers stand at the head of the business in this country. They keep up the old established quality of their goods, and every buyer knows that he gets what, and just as much as he bargains for. The monthly pay roll of this concern is $6,500; and the amount of annual sales is $305,000.



MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

FIFTEENTH ARTICLE.

Albion. 5-30-70

Samuel Clarke, who died in the year 1817, owned the Albion privilege, together with a large tract of land on the Smithfield side of the Blackstone river; and this property descended by will to his two sons, Samuel and Mowry Clarke. Samuel sold his interest in the same very soon to Mowry, who in 1822 deeded it to Samuel Hill, Jr., of Smithfield, and Abraham Wilkinson, of North Providence, who were the first to improve the water power, they having purchased land on the Cumberland side of the river, of Jotham Carpenter. (For several years the place was called Monticello.) In 1822, Hill and Wilkinson having no more than commenced operations by building a dam, Wilkinson sold to Hill his interest in the fifty-three acres of land then comprising the estate, and the water power bounding on the Pawtucket river, for the consideration of fifteen hundred dollars. March 22d, 1822, Samuel Hill sold to Joseph Harris, Preserved Arnold, Daniel G. Harris and William Harris, Abraham and Isaac Wilkinson, nine undivided tenth parts of this estate. In March. 1823, Mr. Hill sold to the last named parties his remaining tenth part, leaving the entire fee in them. This company erected in 1823 the old stone mill, about 50x100, four stories high, which is still in operation, and which contained 108 looms. In 1830, the interest of Abraham and Isaac Wilkinson and Samuel B. Harris, who had in the meantime become part owner, was sold at Sheriff's sale by Mark Aldrich, Deputy Sheriff, at the suit of the Lime Rock Bank, George Wilkinson, son of Abraham, being the purchaser, the privilege at this time being known as Albion. George Wilkinson in 1833, the Harrises and Preserved Arnold having disposed theretofore of their interest, for the sum of ninety thousand dollars, sold to Horace Waldo, Francis Waldo and George Trott, Jr., of the city of New York, two undivided thirds of the Albion estate. The Waldos and Trott sold in 1834, to William and Christopher Rhodes, Orray Taft, Thomas Truesdell and Robert Rhodes, who owned the entire estate, the title to which we have traced in a general and not detailed way.

Afterwards Orray Taft sold his interest to William A. Howard, of Providence, and Thomas Truesdell his, to Robert Rhodes. In the year 1864, William A. Howard deeded his interest to Harvey and Samuel B. Chace. During the few years previous to 1854, Gen. Libbeus Tourtellot, now of Woonsocket, was superintendent, and made very material improvements in the place, adding not only to the value but to the beauty of the village.

In 1854, Harvey and Samuel B. Chace purchased three-eighths of this estate, and in the year 1856, the Albion Company was incorporated by act of the General Assembly. Afterwards, Robert Rhodes disposed of his interest to H. and S. B. Chace, and Samuel B. Chace of his to Harvey Chace, who transferred to the Albion Company, which then first organized under the charter.

In 1832, a wooden mill was erected near where the station of the Providence and Worcester railroad now stands, 35x60, which was burned in 1836. Another wooden mill had also been built in 1830, by George Wilkinson, called the Green mill, about 40x120, which has recently been dismantled. As before stated, the original stone mill is still in operation, and on the north is now joined by a new picker and carding room, built of brick, two stories high, one hundred feet in length, while on the south is the new mill, built of brick, 120x52, with the foundations laid, and wheel in for an additional hundred feet. This new mill is six stories in height, most thoroughly constructed, and has a large and commodious tower, which will be in the centre of the building when completed as planned. The entire mill will be, in round numbers, four hundred feet in length when finished. There is also a cloth room and office, constructed of brick, two stories high, 40x60; a blacksmith and machine shop two stories in height, brick, and in the upper story of which weaving is performed; a saw mill 80x25; a two story stone store-house; and one half of the green mill, 55x40, to be used as a store-house, the other half having been transformed into an imposing tenement house. A new modern dam was erected in 1854.

As is the case with many, if not most of our manufacturing villages, Albion presents to the traveller by rail, its least attractive aspect. Indeed the village is hardly to be seen from the cars. In reality the eighty tenements are mostly situated on a high bluff overlooking the river, and are very pleasantly and even picturesquely placed. Nor is this all. Standing on the platform in front of the station, and looking north, there is as pretty a landscape as is to be found on the river. At the right, looking across the dam, is a bit of scenery which is unique and perfect. The river is placid; the water splashes over the dam with a joyous beauty; the rugged rocks rise rough and abruptly on the thither shore; the graceful birches are reflected in the water below, and the light and cheerful green of the springing foliage contrasts charmingly with the dark gray of the granite; while taking in a wider sweep, the river winds gracefully between the hills on either side, which by their curvature seem to mingle not far off in one mass of bright and living verdure. In the early spring-time, and when the autumn rains begin, Muzzy brook, which once turned the wheel of Oziel Wilkinson's forge, leaps in a succession of cascades from the meadow above to the river below; and, like one of Ruggles's gems, is, in its own way, wholly unapproachable. It is infinitely more lovely than the celebrated falls of Inversnaid, on Loch Lomond, about which so many pretty and poetical things have been said and sung.

It will be noticed by what has already been said, and what is yet to be related, that in the hands of Messrs. Harvey and Samuel B. Chace, a great impetus has been given to the improvement of Albion. And it would be doing injustice to the topic should we omit a slight sketch of the life of Mr. Harvey Chace, who has been so conspicuously interested in our manufacturing industry during a long and most active life. In 1806, at the age of eight years, Mr. Chace entered the mill in Swanzey, Massachusetts, operated by a firm of which his father was one of the partners, and which run some 400 spindles. At this tender age he attended school during the day, and worked in the mill during one half of the night. The Rhode Island proprietors of this mill, were James Maxwell, Charles Wheaton, James Driscoll and Nathan M. Wheaton, and there were others living in Massachusetts,—a pretty large proprietorship for what would now be considered a very small mill. Here he remained until 1812, when, at the age of fifteen, he was deputed to superintend the organizing and starting of a cotton mill in Burrillville. This was a mill of a few hundred spindles, owned by Job Chace, Miller Chace, James Inman and Lewis Thompson of Rhode Island, and others of Massachusetts. Having performed this duty satisfactorily, he returned to Swanzey and remained till 1813. Forty-nine years afterwards he visited the mill in Burrillville—the Tenhill, and found it still in operation although changed to the manufacture of woolen goods. In 1813, with his father he removed to Fall River, and went into the employ of the Globe Manufacturing Company at Tiverton, R. I., in a small factory of a few hundred spindles, built by the late Joseph Durfee and others in 1810, and which was afterwards sold to the American Print Works. Durfee and his associates failed, and Mr. Chace remained in the employ of the new company which purchased the mill. Mr. Durfee was an enthusiastic manufacturer, and was accustomed to declare that one throstle frame was worth more than any farm in Tiverton. Hezekiah Anthony, of Providence, was clerk of the Swanzey Company of 1806.

From Tiverton, Mr. Chace went to the Troy mill in Fall River, the first cotton factory erected there, and remained until 1843. There were twenty-six original subscribers to the stock of this concern, which was divided into one hundred shares, and owned, forty-five per cent. by residents of Rhode Island, and fifty-five per cent. in Massachusetts. The Rhode Island proprietors were Amey Borden, Tiverton; Clark Chace, Portsmouth; James Maxwell, Warren; James Driscoll, Warren; Jonathan Bowler, Newport; N. M. Wheaton, Warren. The whole number were accustomed to attend the company meetings, and sometimes brought with them a part of their families. From this has grown the immense manufacturing business which now gives life and wealth to Fall River. In this year he removed to Valley Falls, his father having purchased in 1839, three-fourths of the privilege at that place, and of which he and Samuel B. Chace had taken a lease in 1840, which lease was continued until 1860. In 1852, the father, Samuel Chace, deceased, and the three brothers, Harvey, Samuel B. and Oliver Chace, formed the Valley Falls Company. This company purchased Manville in 1854, Harvey and Samuel B. having in 1852 purchased of Henry Marchant his one-fourth part of the Valley Falls privilege, and having also bought the Albion.

Notwithstanding the fact that Mr Chace has ever been most industrious in pursuing his business, he has never been indifferent to the promotion of public enterprises. In 1835, when the late Andrew Robeson, M. H. Ruggles and others were petitioners before the General Assembly of Rhode Island for an act to incorporate a company to build a railroad from Providence to Fall River, he aided in surveying the route, and was zealous in advancing the project. The late Joseph H. Tillinghast, then a member of the Assembly and an able and representative man, carried the insertion of a clause in the charter providing that the company should pay to the State a bonus of $30,000 for their corporate privileges. It is perhaps unnecessary to state that the charter was not accepted. The promoters of the scheme were in advance of the knowledge and sentiment of the "assembled wisdom."

From the year 1831, Mr. Chace had recognized the value and necessity of a railroad through the valley of the Blackstone, and when the first movement was made in 1843, for the accomplishment of that end. he took part in it with his accustomed energy. At the first informal meeting held in Providence, without public notice, and at which scarcely more than a dozen men were present, he advocated immediate action to such purpose that he and Joseph Carpenter were appointed a committee to raise the sum of two thousand dollars for the preliminary expenses. This amount was secured, and, as we all have good reason to know, the road was built. When the question of location came up, the capitalists interested, and the engineer were strongly in favor of a route which would leave on one side, and out of the beneficial influence of the road, the villages of Pawtucket, Central Falls and Valley Falls, and, strange to say, the citizens of Pawtucket were universally apathetic upon the subject, or opposed to having the road located through their village. The route by the old canal was the cheaper route, if only the cost of construction was considered, but the traffic of these places, which so many thought of no consequence, Mr. Chace foresaw to be an important element in the success of the undertaking. How well he calculated is seen in the fact that now there are some twenty passenger trains a day each way between Valley Falls and Providence, stopping at Central Falls and Pawtucket, and that about two hundred and fifty mechanics leave Pawtucket daily during the summer, by this road, for their work in Providence, and three-fourths of that number leave Providence in the morning for their work along the line in the villages, returning in the evening. This of course does not include that very considerable number of persons doing business in town, and living in these villages, who are enabled to do so only in consequence of the facilities this road affords. Mr. Chace was chosen one of the Directors of the road upon the organization of the Company, and still remains in the board, and one of finest locomotives has been named "Harvey Chace," as recognition of his untiring perseverance and sound judgment as a Director.

In 1856, the Manville Company, and the Albion Company gave the land, and built a road between Manville and Albion, along the river side. In 1868, as a continuation thereof, Messrs. Harvey and Samuel B. Chace constructed a bridge across the Blackstone at Albion, and a road of a mile in length to the Cumberland Hill road, to Providence. The entire length of the road is some three miles, which together with the bridge cost, aside from the land, not less than ten thousand dollars, and which the towns of Smithfield and Cumberland accepted as a public highway, paying in all to the builders, three thousand dollars. In 1837, Mr. Chace was connected with a manufacturing company, doing business at Grafton, Mass., which failed. He together with his brother, Samuel B., assumed the business and liabilities of the concern, and paid the debts in full.

And now at the age of seventy-three years, Mr. Chace is one of our most sagacious and enterprising citizens, attending daily to his various duties with all the punctuality and clearness of mind which have ever characterized him. It is a remark made by those who are connected with him in different boards of direction that he never misses a meeting, and is never behind time; and the same testimony is borne by the Society of Friends in regard to their meetings. Of him it may emphatically be said, that his word is as good as his bond. There are certain principles which have guided Mr. Chace throughout his long and successful life. Temperance, industry, an implicit and abiding faith in the right, and the belief that it is every man's duty to aid in human progress and the development of the resources of the country, have been his animating and sustaining conviction and practice. Intelligent, cheerful and social few, men are more capable of interesting and instructing those whom they meet in daily life. Hopeful, yet neglecting no proper precaution; exact in business, yet not living for this world alone, Mr. Chace is one whose life and example the young may well emulate, and all pay the tribute of a well deserved respect.

The fall of water at Albion, is fourteen feet the power in use,—water—three hundred and eighty horse power; the power available is something like eight hundred horse power. There are four hundred looms, and from 18 to 20,000 spindles in operation, there being power provided for twenty-five thousand spindles. Two hundred and eighty-five hands are employed; four hundred tons of coal used per annum; and four million yards of print cloths produced annually.

David Alexander is the efficient Superintendent of this concern.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

12

SIXTEENTH ARTICLE.

6-1-70

One of the prominent interests of the village of Pawtucket, is that of the manufacture of leather belting and factory leather, (so-called,) consisting of lace and picker. These articles were first produced by the Hon. Lewis Fairbrother, who engaged in the business in 1834, continuing in same until 1865, when he withdrew from its prosecution; his son, H. L. Fairbrother, becoming his successor.

Commencing with the same limited capital of most of the manufacturers in Pawtucket, forty years ago, with a building thirty feet by fifteen feet, Mr. Fairbrother, by personal attention and energy, perfected this branch of trade, and thus made leather a staple product of the place. His sales for the first year amounted to only $8,000, but steadily and rapidly increased annually, until his retirement. Other parties in Pawtucket, most, if not all of whom secured their knowledge of the trade in his establishment, are now engaged in it; in fact, the small tannery previously mentioned proved the nucleus of the leather interest of to-day, so far as Pawtucket is concerned. In the early days of manufacturing, all cotton spinners and weavers made, are of picker leather upon their looms, but improvements superseded its use. As that demand ceased, another sprung up of far greater magnitude, it being discovered that no leather was so well adapted for moccasins for the lumbermen in the forests of the east and the west as this.

There are probably 25,000 sides tanned in the town, annually, for this purpose.

The original style of white lace leather, which was in vogue in 1834, has given way, in a great measure, within the last four years, to lace leather manufactured under different patents, the reason being that atmospheric influence was found capable of destroying the strength of the salt and alum tanned, or white leather. Practical experimentalists have proved that strength can be secured by other processes, which have been universally adopted. We would say here that all lace leather is made from hides cured and baled in Calcutta, and taken from the small native cows of the East Indies; and all moccasin, or picker from the hides of our domestic cattle.

In 1845, Mr. Fairbrother associated the manufacturing of leather belting with his previous product. This leather article is now the prominent feature in the trade. At that time he was obliged to purchase his leather for belting at any and all the markets of the country.

Mr. Fairbrother represented the town of North Providence, in the Legislature in 1855 and 1856, and the following year as Senator, and for the year 1864.

Upon the succession of his son, Mr. Henry L. Fairbrother, to the the business, with increasing demand for belting, and the unsatisfactory qualities of leather on sale in the leather marts, it became evident that it would be practicable to tan such hides as weree specially adapted to that article. Large and repeated additions were made to their works, and the result has been, that they secured what they sought.

They are now taking in monthly from the leading butchers in the State 1,500 hides, the most of them being devoted to belting; those too light going to other tanners for upper leathers, &c.

Their works are now being run to their full capacity, besides being obliged to tan portions of their stock in Massachusetts and New Hampshire.

Their goods are sent to every State in the Union, with occasional shipments to Cuban and South American ports.

Large outlays for the successful production of their different styles of goods have been made, until they may safely be said to have a model tannery.

J. O. Starkweather & Co.

This firm manufactures broadcloths of a very fine quality in blue, black and brown colors, of course the finest quality of wool only is used, it being mainly obtained from Pennsylvania, although some of it is imported. The process of coloring with indigo, for a blue, is a very delicate one, requiring great skill and care in the manipulator. As a foundation, and to ensure the necessary fermentation, about six hundred pounds of woad is placed in the vat. This woad is imported from England and is the same article which the belles of Britain used in the ante-Cæsarean days to dye their bodies, and which the sterner sex used for the same purpose, the one for the beauty of the color, and the other in order to appear more terrible in battle. When the indigo is put in and the proper temperutare attained and kept up, fermentation commences, and the indigo is dissolved. On the surface of the vat is seen the different shades of blue, that coppery color which is noticed on breaking a lump of indigo, and the shading of one color into another affords a varied and beautiful appearance. The cloth is woven 88 inches in width, and is shrunk by various processes to 54 inches, and in the meantime is reduced in length one-third.

The time required to manufacture and finish a piece of broadcloth is much longer than that necessary to prepare for market a piece of cassimere, and the specimens we saw gave full evidence that they had not been hurried in their manufacture. This is, we believe, the only manufactory of broadcloth in this State, and the product is of a grade comparing favorably with the well-known and highly esteemed fabric of the Slaters at Webster, Mass. The number of hands employed is forty-six; and the works are run by water, forty horse power being used. The spinning and weaving are done in a stone building originally built for a cotton factory, in 1810, by Oziel Wilkinson. The production is about one hundred and seventy-five yards per day, and the value of the annual sales about $140,000. No finer quality of cloth need be desired by even the most luxurious and fastidious, and celebrated as Pawtucket is for the variety and excellence of her manufactures, we doubt if many of the citizens of Rhode Island were aware that in that place was produced a broadcloth which the manufacturer need not blush to put by the side of the German or French goods.

The Slater Cotton Company,

of Pawtucket, was incorporated in 1869, and commenced operations immediately, Scott W. Mowry, Esq., being agent, and Mr. S. N. Lougee, Superintendent. This is a very fine establishment. The main building is 307x50, three stories, built of brick, as indeed are all the buildings, with an ell of irregular shape, ninety feet in length, with three stories in occupation; another ell 50x50, two in stories height, is used for engine and picker room, and one 62x36, fire proof, is the boiler house; yet another building 110x86 at the widest part, two stories high, is used for storing coal and cotton waste, and for a blacksmith shop. In the second story and attic is machinery. The office is 30x30, two stories in height. There are two brick towers 22½x22½, severally 86 and 60 feet high, in which are wardrobes for the operatives.

The woodwork of the mill is admirably grained in imitation of chestnut; the rooms are fourteen feet in height, well lighted, and capable of almost perfect ventilation. Every part of the machinery, and the conveniences for health and cleanliness correspond with the character of the building, and the precautions against fire are ample, of the best kind.

The weaving room is 304x50, with no belt save one, above the looms. The gas-lights are standard ones, and taken altogether this is one of the finest rooms we have seen. Of course, the Slasher is in operation here, and is, as at other mills, a success.

The mules were built by James Brown; spinning machinery by Fales and Jenks; the cards and looms by Paul Whitin and Sons, and the speeders by Thomas J. Hill. The engine is one of Corliss's. The establishment occupies four sides of an irregular quadrangle, and in the centre is laid out a fine grass plat with concrete walks. In and near the engine room, were pots of pansies, roses, lilacs and blooming plants, evidencing the taste of the person who moves the machine which moves the mill.

This concern employs 275 hands; use 250 horse power—steam; burn 1,300 tons of coal annually; run 313 looms and 20,000 spindles. It is making fine lawns of a variety of styles, and the product is from 40,000 to 45,000 yards per week.

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

MTFJ

SEVENTEENTH ARTICLE.

6-6-70

D. Goff & Son,

of Pawtucket, are manufacturers of worsted braids, and commenced business in 1861. The senior partner is Darius Goff, who is also concerned in, and senior partner of the Union Wadding Co., and also engaged in other branches of business in Providence. The Messrs. Goff occupy a stone mill six stories in height, 66x40, owned by Darius Goff. Although they manufacture worsted yarns, alpacca braid is their specialty. This business like every other new enterprise has had its seasons of trial and experiment. There was much to be learned, and many difficulties to overcome. That the Messrs. Goff have well overcome the inevitable preliminary failures is evident from the fact that they are now enabled to sell their goods as fast as manufactured, without the intervention of agents or commission houses. They sell their goods "cash 30 days" delivered in Pawtucket. And their sales for the month of April last, amounted to twenty thousand dollars.

The machinery used in the manufacture of worsted braid, is almost entirely of English make, and some of it of a very interesting character. Of course the foundation of the article is the wool, and upon a proper selection of this, depends in a very great degree the quality of the goods. If the staple is not long and bright, no after manipulation will produce the highest quality of braid. The Messrs. Goff pay especial attention to the acquisition of the best raw material. After the wool is washed and prepared for use, it is placed in the "Preparer," a machine which simply draws it into laps; whence it goes to the "Comber," which takes out all the short wool. This machine takes the place of the hand comber, whose average day's work was eight pounds. It performs its office in a most thorough manner, combing 400 pounds per day, or as much as fifty men would do. This combed wool, which is almost as fine and glossy as silk, is then spun very much in the same way as cotton, and placed in the braiding machine, which is a curiosity in mechanics. The braid is then colored and prepared for market. The coloring is done in Pawtucket, is of every shade required by the varying demands of fashion, and of superior quality.

Mr. Darling has laid the foundation for a mill, in continuation of the present one, to be 150x50. The fall is 15 feet, the horse power 100; 80 hands are employed, and the business is steadily increasing. Beginning with a moderate amount of machinery, the Messrs. Goff have added to their establishment as their trade has extended. They found or made an opening for a new manufacture; they have pursued it with care, energy and economy; they have built up their business, and as they produce an article always wanted, and in large quantities, there is no reason to doubt the permanency of their operations. But here as everywhere in manufacturing, in ordinary times, success is only attained by skill, prudence and perseverance. In times of peace there is no royal road to wealth.

Squire Z. Phinney,

commenced in 1856, the manufacture of cigars, with the not extravagant capital of five dollars. In those days there was no license requisite to enable one to carry on his business, and revenue stamps were as yet uninvented as a plague to dealers, and a profit to Uncle Sam. Mr. Phinney could therefore purchase his little stock of tobacco, made it into cigars himself, and sold them whenever and wherever he could without paying tribute to Cæsar. By making a good article he secured customers, and by keeping up the quality of his cigars to the original standard, he retained them. This is a process which, continued, is sure in the long run to secure a good business, especially if the article made is a luxury, many people having money to spend for champagne and cigars, who find it difficult to find much to fool away upon beef and shoes.

Mr. Phinney now employs ten hands, and makes about half a million of cigars annually. These he disposes of mostly in New England, where his brands are favorably known, and have an established reputation. As we have never seen Mr. Phinney, we are not able to give his theory of the prophylactic virtues of tobacco, and as we have not smoked his cigars we do not know whether they would verify our doctrine upon that point. But as a friend of ours is a customer, to say that whatever ought to be done, somebody ought to try and do, so we say that whatever is to be made, should be made of the best.

The Blackstone Knitting Mills.

Goodman & Company manufacture woolen scarfs, shawls, cardigan jackets, ladies' vests, childrens' sacks, fine arabs and numerous other articles of every-day and fashionable wear.

From the mitten which protects the hands of the laborer to the breakfast shawl and bedouin of the lady whose only care is to appear beautiful and be gracious, this concern shows specimens of useful and ornamental manufacture. Some of the goods were fully equal to the imported article, and the taste displayed in the colors and making up, could not be surpassed. So far as intrinsic value and perfection of style are concerned, Pawtucket might well furnish to all America this kind of goods.

This establishment uses annually one hundred thousand pounds of woolen yarn, which it spins on its own premises. It employs 150 hands uses 40 horse power of water power, with a fall of six feet, and manufactures a variety of articles which have heretofore been made by hand or imported. It is obvious that if the necessary woolen wear of our citizens which has heretofore been made by hand, can be produced by machinery, it will be a gain, in the reduced price, to a very numerous class; and if the articles of luxury which we have been accustomed to purchase abroad, can be made at home, we shall save so much of money to the country.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

EIGHTEENTH ARTICLE.

Valley Falls. 6-8-70

In April, of the year 1812, Joseph Jenks, of Smithfield, for the sum of $2,500, sold to Abraham, Isaac and David Wilkinson, sixteen acres of land, including the water privilege at Valley Falls, and gave a right of way through his land to Central Falls. In November of the same year, David Wilkinson sold his interest to Abraham and Isaac. The latter constructed the turnpike from Pawtucket to Lonsdale, at the old oak which stands in the centre of the road leading west to the village of Lonsdale. Isaac Wilkinson was an excellent mechanic, and at the age of seventeen had charge of the Cupola, now Franklin Foundry, in Providence. During the war of 1812, he cast cannon sixty days in succession, two heats per day. Abraham and Isaac Wilkinson built, about the year 1820, a stone mill, which has recently been demolished. In 1830, Henry Marchant purchased one-fourth part of the privilege. William Harris owned 1-12, and Crawford Allen the remainder. William Harris built, about 1820, a mill which was burned in 1830. In 1833, Crawford Allen erected the stone mill on the Cumberland side of the river. This mill, as originally built, was 44x112, and four stories in height. To it was added by the Valley Falls Company, in 1868, an addition, of brick, two stories, 40x90; one, also of brick, 40x90, three stories, and a picker house, of stone, two stories, 54x40.

On the Smithfield side a wooden mill, 125x44, four stories, was erected in 1844, and a brick mill, four stories, 156x44, in 1849. These mills are now run by turbine wheels, four doing the work of eleven breast wheels. The first self-acting mules, operated on the Blackstone river, were started at Valley Falls. When the Messrs. Chace applied to Brown & Pitcher, Pawtucket, to build them, Mr. Pitcher refused to have anything to do about it; afterwards Mr. James Brown built them. In 1868, this privilege became the property of Samuel B. Chace, and thereafter of the Valley Falls Company, of which Mr. Chace is the principal member. Since that year, improvements have been made on a large scale about the mills, and to a considerable extent in the village, mainly owned by the Company, and containing population of something like two thousand inhabitants. In the year 1852-3, the Messrs. Chace constructed a stone dam of the most substantial kind; although not so high as that at Manville, it is one of the finest and perhaps the handsomest dam on the river, it being built upon a curve, of hewn stone, with abutments which are remarkable for their solidity.

Broad street is a quiet, pleasant street, upon which are numerous charming residences with ample grounds, fine trees and shubbery, and an air of neatness, and elegance which speaks well for their owners. That of Mr. Samuel B. Chace is the largest and most modern, and is surrounded by flower gardens and all the insignia of refined taste. On the opposite side of the street is a vacant lot laid down in a beautiful lawn, giving what so many seem indifferent to, but which is so important, an attractive prospect from the front windows of the dwelling. Other places are rich in grass and trees and ample space and that air of retirement, which is so grateful to the busy or the cultivated man.

By the construction of the Blackstone canal, which went into operation in 1828, the power of the Blackstone river was greatly increased, and it soon became evident to some of the far-sighted manufacturers that in order to render that stream more efficient in summer, when the water is low, a system of reservoirs was absolutely essential, inasmuch as the machinery it would move during a larger portion of the year was much greater than could be employed in the dry season. Mr. Harvey Chace had been active as early as 1825 in increasing the water power at Fall River, by raising the ponds which supplied the mills there, some two feet for a length of nine miles, at an expense of $30,000, the proprietors there agreeing to be assessed proportionately for the expense. Paul Whitin & Sons were the first of the manufacturers on the Blackstone to appreciate the advantages which Mr. Chace well knew would accrue from the construction of reservoirs, and in or about the year 1850, the mill owners, or a part of them, on the Blackstone were induced to agree to pay $8,000 toward one, which the Whitins built at a cost of $25,000. About the year 1866, the Holden reservoir was constructed on Tatnich brook, a tributary of the Blackstone, the Whitins guaranteeing the sum of $4,000, and Mr. Chace assuming to raise an equal amount from the mill-owners below Blackstone, and the proprietors on the tributary contributing a like sum. Toward this enterprise the proprietors in Pawtucket and Central Falls aided by their subscriptions. A reservoir has also been built at Pascoag at an expense of some $15,000. Mr. Chace having spent much time and labor in securing this desirable result, and it is an easily demonstrated fact that more might yet be profitably done in this direction than has been already accomplished.

Those who recollect the discussions which preceded the construction of the Providence and Worcester railroad, will remember that it was objected to the project, that the water power at Woonsocket was then already used up. Such men as Paul Whitin and Harvey and Samuel B. Chace, were better informed, isshown by the immense increase of the number of spindles since 1847; and although the water power is in many instances supplemented by steam, the reservoir system, properly carried out, would add even to the present power almost immeasurably; and in the opinion of Messrs. Chace, who are certainly most competent judges, the Blackstone and its tributaries offer an unsurpassed field for this species of improvement. In accordance with the idea that the whole power of the Blackstone had been exhausted in 1847, at Woonsocket, it was argued that that place had attained its growth, and that as it had theretofore done its business without a railroad, it would not pay to construct one. The same thing was said about Fall River; that it was thought by many that it could never attain a population exceeding ten thousand inhabitants. Of the growth of Woonsocket since that time in consequence of the construction of the railroad the entering upon new branches of industry; the building of the reservoirs and the use of steam we have ample evidence, but the figures in relation to Fall River are so appropriate and encouraging to those who believe in the future growth of our manufactures and population, that we give them as exact proof of what inevitably follows a judicious and thorough utilization of undeveloped resources. There being no reason why what has been done there should not be done in kind, if not in degree, the entire length of the Blackstone river. The population, voters and valuation of property in Fall River in and since 1810, has been as follows:

	Population.	Polls.	Valuation.
1810	1,296	242	$150,045 50
1820	1,594	350	200,323 30
1830	4,057	956	932,060 50
1840	6,734	1,600	2,989,474 00
1850	11,524	2,753	7 423,050 00
1860	14,026	3,283	11,522,650 00
1865	17,515	4,461	12.134,090 00
1869	25,099	6,247	21,398,525 00

Now, the power of and on the Blackstone has been doubled since 1827, and is susceptible of being made much greater than it now is in the lowest stages of the waters. To that end it is only necessary to adopt every obvious and equally profitable means. To utilize in fact the resources which are now wasted. The villages are already in being, and the required outlay would give largely increased value to the present investments.

Mr. Samuel B. Chace, has devoted his life to the business of manufacturing, and to his mechanical skill and sound, sturdy common sense and clear judgment is due much of that success which has been attained by himself and his brother Harvey. For some time he has been in ill health, and the care of the large business at Valley Falls has devolved upon his sons, A. B. Chace, late Professor of chemistry in Brown of University, who is Treasurer of the Company, and E. G. Chace, who is agent. Mr. George Smith, who has been in these mills for thirty years, in the efficient Superintendent.

The fall is, on the Cumberland side of the river, eleven feet seven inches, and on the Smithfield side, 14 feet, the gain on the Smithfield side being made by the increased length in the trench. The horse power—water—is 400. 350 hands are employed; 750 looms run; and 35,000 spindles.

Valley Falls is surpassed by no village in the State in its efforts in behalf of temperance. Not only are there frequent lectures upon the subject but the influence of the Company and its managers is persistently exercised in favor of sobriety. For many years no place has been let by the Messrs. Chace, as none is now, for the sale of intoxicating liquors, nor is any such sale permitted on any premises owned by the Company.

PROVIDENCE JOURNAL.

MONDAY MORNING, JUNE 13, 1870.

THE MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

NINETEENTH ARTICLE.

MTFJ 6-13-1870

The "Union Wadding Company," of Pawtucket, are manufacturers of white and colored waddings of all styles, and of machinery waste. The members of this firm are Darius Goff, of Pawtucket, J. D. Cranston and Stephen Brownell, of Providence, and H. U. Stearns, of Pawtucket. Mr. Goff first started the manufacture of wadding in Rehoboth, Massachusetts, in a small way, by hand manufacture, in 1838. In 1844 he built a good-sized mill for the purpose of making wadding by machinery, and during the first year of its operation was burned out without insurance. In 1847 he built the original mill on the site now occupied by the present company. About the year 1852 it was burned with only $5,000 insurance. It was immediately rebuilt, and with many and very important additions, is now occupied by the present company. Under the hand-sizing system a man could size 200 yards per day; now this establishment turns out 6,000 lbs. per day. The building erected in 1852 was 220 feet long, one hundred feet being two stories in height, and the remainder one story, the whole being forty feet in width, with a small picker and boiler house. The main building is at present 332x40 feet, three stories in occupation; the engine house is 55x44; picker house, 34x74; store-house No. 1, 30x50, 3 stories; store-house No. 2, 30x75, 2 stories; store-house No. 3, 40x72, 3 stories; two other buildings, lately erected, fronting on Pine street, each of similar dimensions as the last named building.

Although the manufacture of wadding is the principal portion of the business of this concern, in which it stands at the head in this country, yet its product of machinery waste for cleansing steam engines and machinery is of no small consideration, it making some three tons per day. Prior to the war clean cop waste for wiping purposes sold for seven cents per pound, but as the price of cotton advanced it went up to forty-five cents. Not only did the price advance, but it was found impractible to supply the demand from the sources theretofore depended upon. In consequence, new material was sought for, and a variety of new machinery invented to prepare it so as to meet the requirements of amount and cheapness. Among other means used to accomplish this result, the Company established a bleachery at Bellefont, on the Pawtuxet river, in 1862, exclusively for washing and bleaching waste for their establishment, with a capacity of about 6,000 lbs. per day. Some idea of the extent of their operations may be gained from the fact that they bring to and carry away from their works in Pawtucket daily about ten tons of material and manufactured articles. For their fine white wadding the cleanest and whitest cotton is purchased, and a more beautiful article is not to be found in the market.

Most of the machinery used here, being different from that required at other establishments, is manufactured on the premises in ample machine shops, of wood and iron. In the latter we saw thousands of steel teeth, which, after proper manipulation, are made a component part of machines of great power which straighten out the tangled threads of mill waste as easily as a lady smooths her own or her purchased tresses. The motive power is an engine of 100 horse-power, and a like additional amount of steam is required for drying purposes. The coloring room is an extensive one, in which from 4,000 to 5,000 pounds of cotton are colored per day. In addition to a large cistern, there is an Artesian well which affords the clearest and purest water. The

carding room for colored cotton is 40x170 feet, and that for carding white cotton is filled with the finest machinery, and the material is almost as light and glossy as silken floss. Indeed we think few persons have any idea that wadding, in its best estate, is an article of such intrinsic fineness and delicacy.

In the course of their experiments for the purpose of utilizing waste which had not been deemed of sufficient value to be saved, a great deal of money has been expended by this company, and Mr. Stearns, who is Superintendent of the works, has devoted much time and ability in order to render valuable that which in former years has been literally and totally a waste. Without going into detail, it is sufficient to say, in order to show how well the company have prosecuted their purpose, that even the oil, which heretofore has been laboriously washed out only to be thrown away, is now extracted and sold for lubricating purposes. Nothing but skill and perseverance could ever have made out of the unpromising material which is the constituent of machinery waste, so useful and widely used an article, with a residuum of equally valuable and as universally used material for engineers' use. For sundry of the machines and processes the company have received patents, but some of the labor saving machines are unpatented; among others a machine which, in this business, is to the old mode of operation, what the "slasher" is to the old-fashioned dressing-room. Mr. Stearns is conversant with, and experienced in the manufactures he superintends. The consequence is, that with ample capital at command, this concern is enabled to use material which in other hands would be comparatively worthless; and by so much as it renders such material serviceable in the business of the country does it add to the wealth of the nation.

The employes of this company number about eighty and are paid weekly, aggregating about $750 per week.

The value of manufactured goods turned out is about half a million dollars annually.

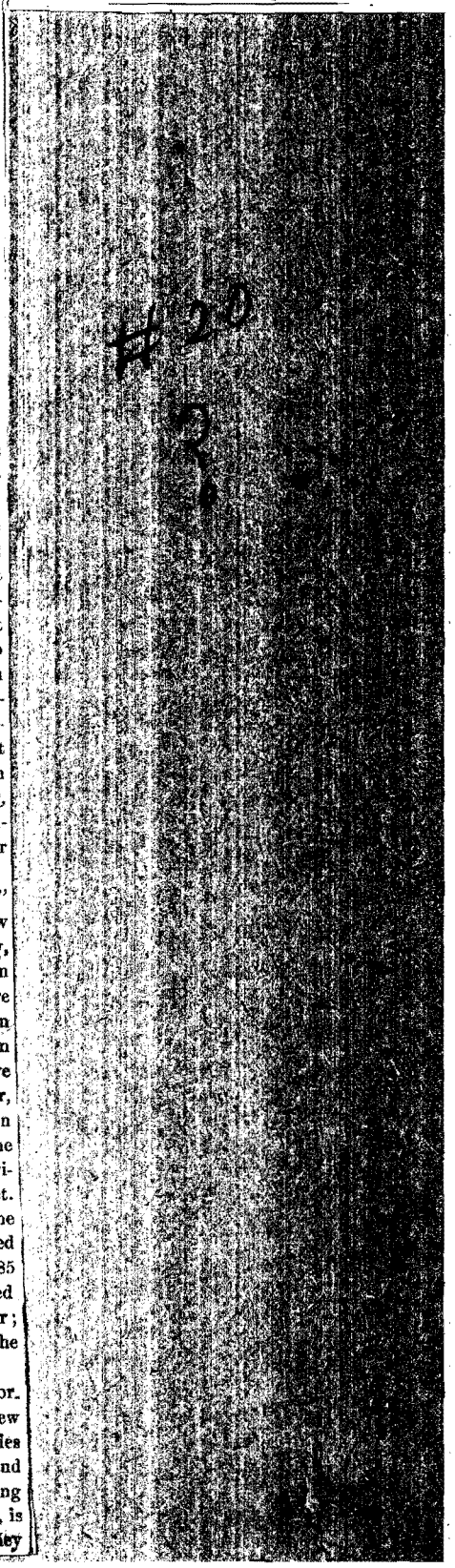
The Bridge Mill Manufacturing Co., of Pawtucket, occupy one of the most ancient manufacturing sites in the village. Situated immediately on the river, on what was the Massachusetts side, and in close proximity to the new bridge, the present edifice covers the site of an old building erected in the last century, used as an oil mill, and grist mill, and machine shop. The present structure is known as "the Old Yellow Mill," although it is so well preserved as to compare favorably in appearance with many more modern edifices. In 1821, the building then standing was enlarged, by Joseph Underwood, and first used as a cotton mill, in which were manufactured sheetings and shirtings. It was enlarged in 1825, and the making of bed-ticking entered into by the Pawtucket Bed-Tick Manufacturing Co. Samuel Pitcher purchased it in 1835, and Thayer & Pitcher commenced making sheetings and shirtings in 1836, with new machinery. In 1854 it passed into the hands of Cornelius Barrows, who continued to make cotton goods until 1865, when the estate was purchased by the present Company, Amos N. Beckwith and Frank H. Richmond, of Providence. They make at present 7t8 muslins. The mill is 80x36, seven stories, built of wood. The fall is 15 feet; power, 60 horse; there are run 112 looms, 5,000 spindles, and 23,000 yards of cloth are made per month.

The "Pawtucket Manufacturing Company" occupy what is popularly known as the "New Mill," which was erected in 1843 by the Company, and the owners of the privilege, heirs of Pardon and William Jenks. The original partners were Alanson Thayer, James C. Starkweather, John R. Burrows, and Henry Jerauld, all of whom have deceased save Mr. Jerauld. There have been added to the Company, Benjamin L. Pitcher, Ellis B. Pitcher, Cornelius Barrows, and John M. Thurber—all of whom are now dead. The present owners are Charles F. Sampson, of Providence, and A. R. Mathewson, of Pawtucket. The product of this mill is print cloths. The building is 43x70, with an ell 18x43, constructed of wood, and seven stories high. There are 185 looms, 7,200 spindles; 125 hands are employed and the fall is 14 feet, giving 112 horse power; 150 tons of coal are used annually, and the monthly production is 34,000 yards.

The "Hope Thread Company" was incorporated in 1869, it having done business for a few years previously in Massachusetts. It occupies portions of several buildings, in Pawtucket and Central Falls, making spool thread and knitting cottons. Their power—water—in Pawtucket, is 40 horse; in Central Falls—steam—20. They employ 80 hands, and manufacture 40,000 dozens of thread, and 5,000 pounds knitting cotton per month. The capital stock is $100,000, and the value of the annual product $200,000. George S. Curtis, of Boston, is President, and John F. Adams, of Pawtucket, Treasurer. The business, even in these dull years, has proved a success.

R. B. Gage & Co., manufacturers of cotton yarn, erected in 1868, in an exceedingly pleasant location, in the northerly part of the village, on the easterly or Massachusetts side of the river, a very fine steam yarn mill. The building is of brick, 136x50, four stories, with an ell 40x50, used as an engine and boiler house. The power is 80 horse, as used, although the engine is capable of doing twice the present amount of work. The land cost, two years since, $10,000, and is worth double that sum to-day. The establishment cost $120,000, and is filled with the newest and best machinery, manufactured in this country, it being from the works of James S. Brown, Thomas J. Hill, Fales and Jencks, and the Whitins; 30 hands are employed, and yarn is spun from No. 6 to 100.

Mr. Gage has been in the business for thirty years, and built this mill according to his own ideas of what a good working mill should be; and it is well and substantially constructed in every respect. The rafters are of southern pine, fastened with wrought iron bands; the jet is of iron, as are the window caps, and throughout there is evidence that, as it was built by day's works, so it was superintended by one who understood the value of using the best material, and having it put together in the most solid way. The views from the upper stories are, on every side, extensive and charming. We have seen few better appointed or more substantial mills. Order and neatness prevail through every room.



TWENTY-FIRST ARTICLE.

7-11-1870 Pawtucket. M+FJ

Among those who, for a quarter of a century, have devoted themselves to a legitimate and important business, and thus aided materially in the growth of Pawtucket, James Davis stands as a peer of the most industrious, honest and successful. He commenced business the first day of January, 1847, with no capital save a knowledge of his business, and the credit, which in those days was equivalent to a cash capital, of being an honest and hard-working man. At that time there was here but one small leather establishment, carried on by Mr. Lewis Fairbrother, who did a business amounting to thirty or forty thousand dollars per annum. Mr. Davis commenced with the manufacture of picker and lace leather, under the old system of performing every portion of the work by hand. At the end of two years he found it necessary to enlarge his establishment, and purchased the estate he had theretofore held by lease. The estate he bought had upon it a building 30x60 feet, two and a half stories high, used as a tenement house. This was arranged so as to meet the requirements of his business; eight new vats were sunk, making in all eighteen, and some fifteen hands were employed. In 1852 it became necessary to make further enlargements to provide for the extension of his trade, which had increased so that the yearly sales amounted to thirty thousand sides of leather. With the growing demand for his production, he deemed it important to make every improvement which should add to the facility of manufacture and diminish cost. For this purpose he introduced steam power into his works, being the first to make use of it in this branch of business in Rhode Island. His first experiment was with two thirty-inch boilers, and an engine of twelve horse power. In connection with this advance, Mr. Davis invented and applied machinery to be worked by power, for some of which he has received patents, and some of which is unpatented, but all still in use, and found to be of great value. In the same year Mr. Davis commenced a new branch of the leather manufacture, he having already the largest establishment in the country of this kind. The new product was belting for machinery, and steam power was used for stitching the leather, for the first time. Steam was also introduced profitably into the drying room.

The business continued to increase, and the necessary enlargements to meet it to be made, until, in 1854, he erected a four-story building, 30x160 feet, with an ell 50x64 feet, and sunk nine vats, and employing 30 men. In 1863 Mr. Davis invented a new process for tanning belt leather, which proved to make a far superior article to that before made. In consequence a great demand arose for his manufacture, and again he found himself straightened for room. Pursuing his established policy of increasing his production just in proportion to the wants of the trade, and having a reputation in the market, well and permanent because never trifled with, he now doubled the capacity of his establishment, so that at present his works form a hollow square: the buildings being four stories in height; 30 x 191 feet; 30 x 108; 80 x 140; 44 x 140; 30 x 90; with two and a half acres of flooring. He uses four 30 inch 24 feet boilers, a superior 30 horse power steam engine, using 175 tons of coal yearly, and employs fifty men.

In these works are now tanned yearly, 16,000 heavy ox hides for belt leather; 4,000 for picker leather, and 10,000 foreign, (mostly East Indian,) hides. Mr. Davis is also largely engaged in the manufacture of leather hose, and in this branch of industry stands, if not without a rival, certainly without a superior. Mr. Davis has always, and still continues to supervise in person his business. That he is a practical man, perfectly understanding every part of his trade, is evidenced by the fact that beginning with nothing but his hands and knowledge of his business, he has built up so large an establishment with profit to himself, and with the result of a production always in demand, and holding a high rank in the estimation of buyers. No small proportion of his success is due to the enlightened forecast which saw a coming demand, and that mechanical skill which enabled him to invent machinery adapted to a more speedy and cheaper manufacture. And this ingenuity has not benefitted him alone; other establishments have been furnished with his improvements. He constructed the first power hide mills, which are now used by the other tanning establishments in Pawtucket.

A walk through the different rooms of Mr. Davis's works suffices to show how he has kept pace with the introduction of machinery in other branches of manufacture, and that he understands his own in every particular. In the preparation of hides, the labor of a man and horse used to turn out from 25 to 100 hides; now, 200 are manipulated in half a day by machinery. Again, as many hides are now scoured in fifteen minutes as two men used to scour in a day. And so on in every department.

After the cotton business, the leather manufacture is the largest in Pawtucket. The cotton mills are returning to the use of belts instead of gears for machinery, and the consequence is that this part of the trade is of great importance.

Although Mr. Davis has attended strictly to his business, and has not been, in the ordinary acceptation of the term, a politician, yet he was elected a member of the House of Representatives of Rhode Island, in the years 1863, 1866 and 1867. His yearly sales now amount to $300,000, more or less, and he pays the same strict attention to the quality of his goods as when he was making his way to a trade. If he takes a just pride in the quantity of goods he turns out, he is still more regardful of their quality.

M+FJ 7-26-1870

MANUFACTURING AND MECHANCIAL INDUSTRY OF RHODE ISLAND.

TWENTY-SECOND ARTICLE.

Warren.

Unlike its northern sisters, Warren did not grow up as a manufacturing town; a small seaport, the importance of its original business having declined, it presents the appearance of a finished town, the quietness of which has been broken within a score or so of years by the loom and the spindle, and yet not to such an extent as to vary to the mere casual observer the general air of repose, not to say lassitude, which distinguishes it from such villages as Pawtucket and Woonsocket. And yet such branches of manufactures as have been introduced here have thriven, as we shall see, abundantly, and are prosecuted with a skill which places them on an equal footing with more ambitious and older concerns.

The Warren Manufacturing Company was organized in 1847, by gentlemen, mostly of the village, who sought in connection with others who had been engaged in commerce, to find employment for their capital, and in some measure resuscitate the business which had fallen away from the place. The original corporators were N. M. Wheaton, John O. Waterman, Lewis Hoar, Hail Collins, James Coffin, John R. Wheaton, Joel Abbott, William S. Wheaton, Charles Wheaton, Samuel Wheaton, George T. Gardiner, Luther Cole & Co., Thomas G. Turner, Alfred Bosworth, Otis Bullock, Stephen Martin, Samuel W. Remington, Suchet Mauran, Samuel A. Driscol, George Wheaton, Jabez Brown, Nathanie Drown, Paschal Allen, Daniel R. Wheaton Dwight T. Hammond, David Phinney and Gardner Willard. The shares were $1,000 each, and about eighty-five thousand dollars were paid in. John O. Waterman was chosen Treasurer, John R. Wheaton, Hail Collins, George Wheaton, Suchet Mauran and James Coffin, the Board of Directors, and William T. Wheaton, Clerk. The amount expended in building and for machinery was $107,000.

In 1860 a new mill was erected. The first mill, built of brick, was 220x50 feet, with five stories in occupation by machinery, and contained twelve thousand spindles. In 1860, the capital stock was increased to $300,000, and the new mill, also of brick, was constructed, 72x175, with an ell 45x65 feet, running 20,000 spindles. The original mill is operated by an engine of 200 horse power, and the new mill by one of 250 horse power.

The entire outlay of the Company has been about $500,000, it now owning considerable land, eighty tenements, nearly nine hundred feet on the river with two wharfs, and a fine boarding house 40x70 feet, three stories high, with a French roof. These mills have made since they were started, fine and heavy sheetings, and rolled jaconet cloths. The quality of goods was kept up during the war, and the improvements have been made from the profits of the capital invested.

Here was an experiment in a new enterprise, the success of which was *a priori* based upon the securing of skillful and honest management. Few if any of the men who put their money into this concern knew anything about cotton manufactures. Mr. John O. Waterman was the man who did know practically what to do and how to do it. He came of good stock. His father, John Waterman, and John P. Franklin, built the Merino Mill, so-called, on the Woonasquatucket river, about 1810. Mr. Waterman, senior, afterwards went to New Orleans to purchase cotton for the Blackstone Company, and in 1817 hired the Union mill in Olneyville, run it three or four years, and at the expiration of his lease went to Blackstone, as the agent of the Blackstone Company. In 1830 he built the first steam mill in Olneyville in company with Thomas M. Burgess, formerly Mayor of Providence.

Mr. John O. Waterman went from the Merino mill in 1830, to Olneyville; in 1836 a second mill was built, and in 1847 Mr. Waterman went to Warren, and superintended the erection and starting of the first mill built there, and still remains as Treasurer and manager.

The superintendent of these mills, Mr. Stephen Clark, has had a large experience, and is a thorough and successful manufacturer. Born in Smithfield, brother of the efficient Town Clerk of that large and prosperous town, Mr. Clark, at Manville, Albion, Ashton, and Woonsocket, has as superintendent and proprietor [illegible] manufacturers.

January 1st, 1867, he took charge of these mills, and has, amid all the fluctuations of business, kept the reputation of the goods at its highest standard, and increased the production. The number of hands employed is about five hundred, and this is not only the largest establishment in Warren, but the success which has attended it has stimulated other enterprises which aid in giving life and animation to the place. Here capital and skill have joined hands to mutual advantage, and to the benefit of the community. It needed a little pluck at first, and intelligent industry afterwards; both were furnished, and the result is profit to the owners, and growth to Warren.

The Inman Manufacturing Company was incorporated May, 1867. Its members are Henry A. Monroe, J. B. Mathewson, A. C. Mathewson, John S. Fenner, Allen C. Mathewson, Milton S. Morse and D. C. Wood. John S. Fenner is Treasurer; Joseph McCarthy, Secretary, and W. B. White, Superintendent. The manufacture is braids, boot and shoe lacings and lamp wicks. Capital $100,000. The buildings form a quadrangle and are of the following dimensions: No. 1, 100x30 feet, 2 stories; No. 2, 70x28 feet, 2 stories; No. 3, 151x25 feet, 2 stories; store house and shed; 50 horse power engine. 700 braiders are run, and 175,000 lbs yarn used per year. The product is 500,000 gross shoe lacings, 75,000 gross wicks. Thirty thousand lbs of brass are used in tipping the lacings, and eighty hands are employed. Many of the braiders used are the invention of members of the concern, and are made on the premises.

Here we found a relic of the "American System" in its earlier days; the girls and women employed are Americans living in their own families, and wives and daughters of owners of the soil. They were a bright, pleasant and capable set of women, doing light agreeable work and earning remunerative wages. Respecting themselves, they received the respect of all who came in contact with them. In this establishment the hours of labor are only ten, and the manufacture a healthy one. The Superintendent, Mr. White, evidently carries out in his dealing with his help the maxim placed in a conspicuous place—"Do unto others as you would have others do unto you," and we have not seen a better ordered establishment. In 1869 this establishment received from the Massachusetts Charitable Mechanics Association, a silver medal, for its Braiders.

The Cutler Manufacturing Company was incorporated in 1869, and George Hail is President and C. R. Cutler, Treasurer. This company makes Yarns, Cops, Warps, Twines, &c., &c.

Messrs. Hail and Cutler commenced this business in 1860, and erected a wooden mill 100x40 feet, two stories in height, the machinery being operated by an engine of 40 horse power, and employing 40 hands. In 1868 a new brick mill was erected 120x64 feet, with an ell 40x40, and a boiler house 40x50. The mill being four stories in height, this mill is furnished with an engine of 150 horse power, and requires 150 hands. The number of spindles in the new mill is 10,000. The amount of cotton worked in both mills is 810,000 lbs., per year 1,200; tons of coal are used, and the company owns three acres of land and nine tenement houses.

MANUFACTURING AND MECHANCIAL INDUSTRY OF RHODE ISLAND. 15

TWENTY-THIRD ARTICLE.

Bristol. 8-1-70

The National Rubber Company of this place has organized, and has in almost complete operation the largest establishment of this kind in the United States. It was incorporated, and some fine buildings erected in 1864. The manufacture of goods was commenced in September, 1865. The original corporators were A. O. Bourn, of Providence, H. G. Norton, of New York, A. C. Eddy, of Providence, Alfred Garfield, of Providence, Richard Levich, of Philadelphia, and A. H. Bart, of Cincinnati. The capital stock was $300,000, which, at the last January session of the General Assembly, was permissively increased to $500,000. William W. Brown and Edwin M. Chaffee, of Providence, and Tappan Wentworth, of Lowell, Mass., has become corporators, and H. G. Norton has retired. The Company is organized as follows: Col. Wm. W. Brown, President; A. O. Bourne, Treasurer and Manager; Edwin M. Chaffee, Secretary; Isaac F. Williams, Superintendent. The first purpose of the Company was to confine its operations to the manufactue of clothing, all kinds of druggists' articles, steam packing, belting and hose. We shall see eventually how greatly it has enlarged the scope of its business. The first purchase of land, was of ten acres, it being the last lot left intact under the original allotment by the proprietors, who, after the incorporation of the town in 1680, presented to every actual settler, who would bind himself to put up a two-story house, and finish off two rooms, ten acres of land. The lot purchased by the Company lies within five minutes walk of the railroad station, and had descended from the original grantee of proprietors without deed to within a very recent period. It cost the Company the very modest sum of three thousand dollars, or thereabouts.

The buildings, as they will appear when the improvements now making are completed, will be a very great ornament to the town. They are constructed of stone and brick, mostly of split stone, and present not only a very substantial, but an attractive appearance. The front on Wood street shows a length of 158 feet, two stories high, in the centre of which is a fine archway leading into the premises. The stories are each 14 feet in the clear, and a fine cupola gives an admirable finish to a very striking structure. Running parallel with the street, and joining the building aforesaid, is a new one-story building 152 feet in length and 40 feet in width, built of stone, with walls about 20 feet in height, and to be one story. The stone walls are 22 inches in thickness, and the brick 16. Iron doors are everywhere, where doors are needed, as a security against fire. The original buildings were, in the aggregate, 1,020x 40 feet. The aggregate of the new buildings is 1,660x40 feet, making a total of 2,680x40.

In 1867 the manufacture of boots and shoes was commenced, and the price list enumerates nearly two hundred different articles now made in this establishment. To carry on the business there are on the premises three steam engines of some seven hundred horse power in all, and from 750 to 800 hands will be employed this fall. The fire which occurred in January last, and which caused a loss of some $300,000, has led not only to the erection of new buildings, but to a better arrangement for the speed of business, and to the introduction of new guarantees against destruction by fire. And in this latter respect it would seem that everything had been done which sagacity and a generous outlay of money combined could effect. Three Fales & Jenks's steam rotary engines, hydrants at almost every corner of a building, hose in the different rooms, with pressure, so that in an instant four streams can be forced into each room, and generally a profuse precaution which we have nowhere else seen equaled. To supply the works with water there is a well 24 feet in diameter and 19 feet in depth, which, besides supplying the boilers, (twenty in number,) furnishes 150 gallons of water per minute. The value of the yearly product is about $1,700,000, which may be increased some twenty per cent by the additional facilities now nearly completed. In and about the buildings, there are three thousand feet of track, on which is conveyed material from one part of the establishment to the other, saving a great deal of time in the matter of handling goods in the various processes of manufacture. A glance at the names of the different articles here made, would astonish the unsophisticated. Hardly anything is beyond the reach of the artist in

caoutchouc, but we were surprised, and, if we must tell the whole truth, grieved to see among other specimens of manufacturing skill, an assortment of "baptismal pants." We once saw a good woman possessing great zeal, but a weak physical frame, who had been baptised in the dead of winter, through the ice, and who always maintained that no true Baptist ever took cold on such occasions. Either, then, the clergy must have deteriorated in manly vigor, or the faith of the convert is stronger than that of the ministers. That earnest woman would never have enjoyed the preaching of a brother who went into the water with India rubber breeches on. It was bad enough, we thought, when our friends began to warm their water, but to insist upon the necessity of immersion for the neophyte, and shrink from wetting one's own feet—well, we shall have to speak to brother Fulton about it. The amount of chemical skill required in order to prepare rubber goods so as to withstand the extremes of temperature, and maintain an uniform pliability, is not slight. The articles used in the process of vulcanizing the rubber must be properly proportioned, and then a heat applied of 270 degrees. And of heat, there is dry heat by furnace, by steam, and wet heat by steam under high pressure.

The rooms of this establishment are all high—from twenty to twenty-three feet—most of them well lighted and admirably ventilated. One is calculated for 66 men, who will finish, each, a case of a dozen pairs of boots per day. Another, the shoe room, is 180x60 feet, 23 feet high, with fifty windows of a large size, and exceedingly pleasant and airy. In this 5,000 pairs of shoes per day will be finished. Some of the machines are extremely massive, and of perfect workmanship, costing some thousand dollars each; and others, invented and patented by the Superintendent, do a peculiar class of work in a way which cannot be otherwise accomplished. The engine room is a large and most tastefully fitted up apartment, being ceiled on all sides with black walnut, chestnut and hard pine. The amount of rubber on hand is usually about one hundred thousand pounds.

About one-half of the operatives are girls and women, and their average earnings are $10 per week; they obtain board at from $3 50 to $4 per week, and are employed eight months in the year, their vacation coming in the summer, when, with fashionable people and over-worked clergymen, they take their yearly recreation. There are, however, some 150 of the number who work the year round, and one girl has, for the last three years, averaged $16 per week, and instances have occurred where they have received $100 a month. These, of course, were the most skillful and industrious, but the fact proves that in Bristol, woman's sphere is not a contracted one, nor her rights by any means unappreciated or unprofitably exercised. We have heard and read a goodly number of speeches in favor of granting privileges to the sex; but we have never seen any more convincing argument in behalf of woman's ability than was presented in the appearance of the women in this concern, and the statement of their balance on the credit side of the ledger.

Of course no establishment of this magnitude is successfully carried on without constant supervision by one thoroughly acquainted with all its details. Superintendent Williams has learned his business in the old-fashioned way, by practically laboring in every department. He plans the buildings; directs every part of the manufacture; and knows at once if anything goes wrong. In a word, is master of the situation. Although he has been a resident of Bristol only since this business was started here, he has won the confidence and esteem of the community, and is respected as a man of thorough business capacity and integrity. No slight executive ability is required to conduct profitably so extensive a concern, and the regard in which Mr. Williams is held by the citizens at large, is shown in the fact that at the last spring election he was chosen as Senator from Bristol in the General Assembly. This ancient town may well pride itself upon the building up in it of an industry so large, and requiring such a number of people to carry it on, and the capitalists who have here spent their money, and the man who makes that capital redound to the growth of the place, are to be deemed worthy and praiseworthy citizens.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

TWENTY-FOURTH ARTICLE.

M+F J **Bristol.** 8-25-1870

The visitor to this ancient town finds in its general aspect no indications of a manufacturing village. The streets are broad and silent; great elms on either side, with a spreading magnificence which denotes age, lusty though it be, shade the sidewalks which resound to no hurried feet, and invite to a repose which the hum of business rarely breaks; the atmosphere of the place lulls to quietude, and the intensest Yankee finds his nerves relaxing, and his mind yielding to the dreamy idleness of a spot where no hurry is ever known; where trade is a matter rather of theory than active pursuit; where the residences are charming; where one who has performed his "mission" in this world might await with a calmness to which everything would minister, the summons to that last sleep, which would prove in this region so slight a change from the waking life.

The sugar refinery, which at one time must have been a source of a great activity; is now deserted and silent. The wharf at which the splendid "Bristol" and "Providence" were accustomed to lie, making each evening lively and bustling, is as devoid of animation as Fisk's breast is of modesty.

Rural, charming town; given a competency, a few friends and a self-contained spirit, and no place could be more winning or satisfactory. We should like to pass the Fourth of July in Bristol. There may be a drum in the place; if there ever was, it is there now; but we should not have the slightest fear that it would arouse one from slumber in the early morning, and as for the horror and noise of explosive fire-crackers, we should as soon anticipate being disturbed by an earthquake, or a great tidal wave in Mount Hope Bay. And yet Bristol has just purchased a new steam fire engine, and has, so far as we know, the only rock crushing machine, for road making, in the State. A portion of a street, which had been reconstructed with the stone prepared by this machine, was equal to anything we have seen in the way of road, and bore the test of a winter's travel, we were told, admirably. It would be well if some other places would take a hint from this action of Bristol, and learn how much more profitable as well as pleasant good highways are than poor ones. This crusher is stationed a little way out of town; whether on account of contiguity to the "raw material," or because the noise thereof would disconcert the native Bristolian, we were not informed.

Our readers do not need to be told that Bristol was formerly a place of considerable commercial consequence. Commodious and stately houses, surrounded by fine grounds, and bearing every evidence of a refined taste, date back to the time when the trade between Bristol and the West Indies was important and remunerative. When it became evident that this business had permanently declined, a few men undertook to do what the commercial men of the north part of the State were doing; transfer their activity to, and employ their capital in manufacturing. The Bristol Steam Mill Company was the first of the manufacturing enterprises of Bristol. Jacob Babbitt was President, Jacob Babbitt, Jr., Treasurer, and Moses B. Wood, Superintendent. A mill was erected of stone which was burned, about 1840, and rebuilt in the year. Afterwards Byron Diman was elected President of the company, and Martin Bennet, Treasurer. In the great financial crash of 1857 owing, to heavy failures in New York, this Company was obliged to suspend. The mill was purchased, after a few years, by Charles Anthony and Tully D. Bowen, Massadore T. Bennett being agent, as he still is. The concern was sold afterwards to George M. Richmond, of Providence, and is now owned by the Richmond Manufacturing Company, an incorporated company. The number of spindles in this mill is 9,200; number of looms, 200; operatives, 175; it is operated by an engine of 100 horse power, and makes a thousand pieces of print cloth per week.

Babbitt and Wood projected the Pokanoket mill; Jacob Babbitt, President, John Norris, Treasurer of the company, and Mr. Babbitt continued to occupy the position of President until his decease. This mill having been partially burned down, and idle for a number of years, was purchased by his son Major Babbitt, and rebuilt. He sold it to William H. Reynolds, and it is now the property of the Reynolds Manufacturing Company, incorporated in 1864—W. H. Reynolds, President; Jeffray Hazard, Treasurer; Benjamin Boss, Superintendent. The main building is of stone, 5 stories high, 152x45 feet; wing 50x36 feet; engine and boiler house 60x50 feet. The company own four houses on Thames street; one on Constitution street, and three others, being two to four family tenement houses; five stores on Long Wharf, of two stories each, built of brick. The mill contains 10,750 spindles; 237 looms, and employs 200 hands. The engine is of 120 horse power, and the product 2,000,000 yards sheetings per annum.

The manufacturing enterprise of Bristol was initiated by Jacob Babbitt, who was born in Taunton, Mass., October 22d, 1769. His father's name was Ebenezer, and the family name appears early in the record of the town, and of the Plymouth Colony. He was married September 22, 1789, to Bathsheba Stoddard, daughter of Miles Stoddard, and came to Bristol in the year 1792. He seldom left the town from that time till the day of his death, nearly sixty years. He worked at first at his trade, that of a silver-smith, and repairer of watches. In this business he laid the foundation of his fortune by the manufacture of silver buckles, and gold beads, then very fashionable. When he came to Bristol,—said the *Bristol Gazette* at the time of his death,—he came without property or education or friends to assist him, relying solely upon the labor of his hands for the acquisition of any capital upon which he could engage in business, and by uniform habits of industry and economy, with strict integrity, and the exercise of sound judgment, he was generally successful in his undertakings, and notwithstanding many and severe losses, acquired and transmitted to his descendants a large fortune.

Mr. Babbitt, soon after he had established himself in Bristol, engaged in the Cuban trade, and when the war of 1812 had been opened, he continued to carry on the trade in spite of embargo and blockade. At that time he was assisted in his business by his son-in-law, Benjamin Bosworth. Their vessels sailed during the war, under the flag of Denmark, and often when disguised as dilapidated coasters, brought heavy and valuable cargoes into the port of Bristol. He was closely connected with the banks of Bristol, being from the start associated with the Commercial Bank, and for a long time President of it. It was truly said at the time of his decease, that, "Bristol is as much indebted to him as to any one individual for whatever of prosperity it enjoys." Neither of the cotton mills would have been established without the assistance derived from him. He died March 8, 1850, aged 80 years, 4 months and 14 days.

M+F J 9-12-1870

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

TWENTY-SEVENTH ARTICLE.

Central Falls.

C. C. Holland, manufacturer of cotton yarns and threads, commenced business here in conjunction with A. A. Stafford, in 1867, and afterwards purchased the interest of his partner. He occupies the Andrew Jenks mill, so-called, which is built of stone, is 40x90 feet; 3 stories in height, and uses 30 horse power of water, taken from the Blackstone river. The mill contains 2,500 spindles; employs 22 hands, and consumes 2,500 pounds of cotton per week. The annual value of product is $52,000, which is sold to weavers of small wares, such as suspenders, hoop skirt braids, and a great variety of goods. Much of it is sent to Philadelphia, and in that and other cities the German population make a great number of articles on hand looms.

Mr. Holland is his own superintendent and business manager, and is thoroughly conversant with the manufactures, having been in the employ of Greene & Daniels some twelve years, and Superintendent of the Stafford thread mills for four years. If the present tendency of manufacturing is, as it undoubtedly is, to large concerns, yet an establishment like this, managed by one who understands its every detail, and is economical, active and industrious, has advantages which are not to be slighted. Even in the present depressed state of trade, Mr. Holland finds a ready demand for his product, and his mill is in full operation.

Thurber, Horton and Wood

are manufacturers of light sheetings, print cloths, cheese cloths, threads and yarns. G. P. Thurber is Superintendent; Augustus Horton, Agent; Herbert R. Wood and Joseph Wood, partners. They occupy a stone mill erected in 1824 by Uriah Benedict, Bosworth Walker and William Allen, all of whom are now deceased. This mill passed in 1856 or '57 into the hands of William Dyer, of Connecticut, and was purchased of him in 1867, by Stephen Benedict. It is a very substantial and handsome structure, 78x44 feet; 4 stories high, with an ell built of brick, 28x16 feet. Another mill occupied by this firm is a wooden building 82x32 feet, 3 stories in height. They also occupy, in Pawtucket, the Edward Walcott mill, 4 stories high, 70x46 feet. Connected with the premises in Central Falls is a stone building 32x50 feet, two stories of which they use. The entire power used—water—is 115 horse power; they run 7,800 spindles and 125 looms. They employ 125 hands; turn out 800 pounds of thread per day; use 270,000 pounds of fine quality of cotton yearly, and the annual value of their product is $125,000. In this concern there s that combination of capital, practical knowledge, youthful enterprise and facility for production which ensures success in the legitimate conduct of the business in the ordinary state of trade.

Cushman, Philips & Co.

—Robert Cushman and Abner Atwood—are manufacturers of spools for cotton, linen and silk threads, and other articles. This business was started by Mr. Cushman about the year 1847, and he has invented for use in its prosecution a number of machines, which, with his long experience and the promptness and excellent work of the firm, have given it a leading, if not the most prominent place in this line of manufacture in the country. Indeed, so uniform is the superior quality of the articles here made, that this concern more than competes with the producers situated where the wood used is purchased at a nominal price. This firm owns two acres of land on the east bank of the Blackstone river at Pleasant View, and their building is constructed outwardly of brick, 77x41 feet, 3 stories high, with a 2 story ell, 22x40, of same material, for boiler and dry-house. They have a wooden store house 230x40 feet; one 32x68; and one 24x32. They use steam power—40 horse; employ 45 hands, and use yearly 800,000 feet of white birch, mostly brought from Maine. Their pools are sold from 10 cents to two dollars per gross, and their yearly sales of their own manufacture amount to $60,000, besides the whole product of a shop in Maine capable of using 250,000 feet of lumber per year, of which this firm is half owner. This establishment is fully employed, and its articles find a ready sale at home and in other markets.

Cushman & Fuller,

manufacturers of Stockinett, employ 14 hands, 24 rotary knitting machines; and their annual sales are from twelve to fifteen thousand dollars per annum. The material is used for under wear, and for lining India rubber shoes. Each machine produces from thirty to thirty-five yards of goods per day. The machines are novel, and readily understood and easily managed. The product, made of cotton, is soft as wool, and for summer wear everything that is desirable.

E. L. Slocum,

manufacturer of men's and boy's boots and shoes, commenced business in 1867; employs 25 hands; makes 1,100 cases of goods per year, and his annual sales amount to $45,000 to $50,000.

Edwin Evans,

manufacturer of glue of all kinds, employs eight hands; and his annual product is something like $20,000.

Weatherhead, Thompson & Co.,

manufacture Oak Tanned Leather Belting, and Patent Lace and Picker Leather. Weatherhead and Thompson commenced business in 1858, in a couple of buildings aggregating 70x20 feet, only one of which was two stories high, and their first year's sales amounted to twenty thousand dollars. In this year, however, they received the diploma of the Rhode Island Society for the Encouragement of Domestic Industry. Their work was then entirely done by hand power. In fact their establishment was officered and manned by the two members of the firm and one employe. They now occupy a building 110x40 feet, built of wood, and five stories high; one 100x28 feet; one of brick, 70x30 feet, two stories in height; use an engine of 70 horse power; employ 35 hands; and their annual sales amount to $200,000.

This concern also manufactures all kinds of spools for silk and cotton thread; employ in this department 15 hands; engaged in this branch of business in 1868; propose to increase it, and now have a ready market for their production.

Bacon Brothers & Company,

Tanners and Manufacturers of Oak Leather Belting, Lace, Moccasin, Factory and Harness Leather, have commenced business, (January 1, 1870) with their factory here, and a branch sales room at Chicago.

The Messrs. Bacon are practical men, one having been in the employ of and partner with James Davis of Pawtucket, and the other a partner of H. L. Fairbrother, of Pawtucket. This company has purchased a lot of land on the Blackstone river about 200x250 feet; and are making improvements thereon, and, notably, constructing a wall of stone of the most substantial character. Their building is 150x40 feet, 3 stories; engine and boiler house, 40x40 feet; engine 30 horse power; number of hands employed 35, and, estimating from the past eight months, this year's business will amount to $150,000.

The leather is tanned from the hide, and everything about the establishmet betokens skill and a determination to attain and maintain a position in the front rank of leather manufacturers, which they are like to do with their knowledge of the busin ess, and Central Falls for a base of operations and Chicago for a distributing market.

M. B. Arnold & Co.,

Manufacturers of plain and fancy confectionery, occupy a very central position, and have very much increased their business within the last few years. For 33 years prior to 1862 S. C. Pierce had carried on this manufacture in this place in a small way, and in that year M. B. Arnold and O. S. Horton purchased the concern for the moderate sum of $2,440. Their capital is now $15,000. Like many other firms they made considerable money during the war on the rise of material, and were sagacious and prudent enough to put their profits into land and buildings, which in this thriving village are likely to improve in value. Their building is 67½x30 feet, constructed of wood, 2½ stories high. They employ 16 hands; keep two double teams constantly on the road; and their annual sales amount to from $86,000 to $100,000 per annum.

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PROVIDENCE JOURNAL.
MONDAY MORNING, AUG. 29, 1870.

MANUFACTURING AND MECHANCIAL INDUSTRY OF RHODE ISLAND.

TWENTY-FIFTH ATTICLE.

Central Falls.

We doubt if there is anywhere a more distinctive and noteworthy manufacturing village than Central Falls; one where within the same area of territory there are so many mechanics and operatives who own the houses in which they live. No one conversant with this place can have failed to notice the great number of small but comfortable houses, each with a small garden plat, which distinguishes this thriving village. It bears evident marks of thrift, comfort and independence. There have been indeed, within the few years last past, some large establishments erected, and those employed in these, like the great majority of operatives in manufacturing establishments, do not own premises of their own; but there are yet a great number of well-to-do persons, neither possessed of riches, nor dependent upon boarding houses, who form a population industrious, prudent and substantial. The business is varied; large capital is employed; the streets are well graded and curbed; and activity and public spirit prevail.

It happened to us to visit first here the unique establishment of Thomas D. Rice & Company, manufacturers of wooden jewelry, curtain fixtures, chairs, and of every variety of goods, turned in wood. This is the only concern in the country where wooden jewelry is made. At first blush, one would hardly suppose that an article of this kind would appeal very strongly to an esthetic taste, or meet with a large demand. But a little reflection suffices to recall the fact that those who cannot afford diamonds, nor coral, nor gold, nor yet shell ornaments, are still as fond as the rich of whatever is convenient, graceful and fashionable. The belles and beaux of the rural districts; the young men and ruddy maidens of the villages, who are compelled to economy in expenditure for personal adornments, imitate as far and as nearly as they can those more favored with this world's goods, and display quite as insatiable a desire for external embellishments. And in regard to the articles under consideration, as in respect to much more showy and costly trinkets, it may be said in the language of the poet, that "things are not what they seem." Many an apparent diamond, which to the unitiated eye appears a gem of purest ray serene, is nothing but paste; many a pretended pearl, is but glass; and many a chain of estensible gold, in lengthened links of glittering metal, long drawn out, is simply brass within, and a film of gold without. And so we shall rightly expect that our sylvan jewelry will betray no glimpse of wood.

Of course the work is done by machinery. Five thousand sleeve buttons are turned out in a day, and breast pins and other articles in like proportion. These are then enameled; some in gay single colors; some in variegated hues; and some in black. These latter are a useful and tasteful article for every day wear as sleeve or dres sbuttons; neat, unobtrusive and admirably adapted to sedate attire. Nor should we forget to mention the cheap and handsome rosaries upon which the unlettered Catholic may tell her prayers, with as true a devotion and as spiritual a fervor as animates her educated sister in perusing the illuminated page of her gold-clasped missal.

This concern has been in operation only one year, and yet its orders for children's chairs range from one to five thousand, and for certain kinds of jewelry from one gross to two barrels. It uses five horse power of water, and, in dry seasons, a ten horse power engine, and employs five hands. It is certainly a curiosity and exhibits most conspiciously Yankee ingenuity and Yankee enterprise.

Greene and Daniels,

manufacturers of spool thread and fine yarns, own and occupy a splendid establishment on the east side of the Blackstone river, the erection of which was commenced in 1860, and to which additions have been made until it is one of the finest concerns in the county. Looking at it from the west, it presents a very fine appearance, which is fully carried out upon inspection of the interior. The land immediately occupied by the mill and its complementary buildings is one thousand feet in length on the river, running two hundred feet back. The mill is built of brick, as are all the other buildings with one or two exceptions; it is 407x67 feet, five stories in height, with two towers in front, one of which is 123 feet high, containing a very fine bell, weighing 2,172 pounds, and a large clock. The rooms of this mill are high, well finished and everything is substantial and well arranged. The engine room is 35x43, in which is a Corliss engine of 500 horse power, driving a drum of 20 feet in diameter, eight foot face, with four leather belts, each two feet wide, imparting motion to the various rooms. The barn is 40x40; waste house, 60x20; boiler house, 70x40; machine shop, &c., 32x100; cotton house, 45x32, with an ell 25x24; and to accommodate their operatives, Messrs. Greene & Daniels have built and purchased 65 tenements. The dye house is 45x30; office, 42x25; wooden buildings, 100x25. The boarding house is 68x36 feet; two stories high, with basement, and an ell 20x34, one story high. This boarding house will accommodate about forty boarders, and is in every respect a model establishment. Fully supplied throughout with hot and cold water and gas, it combines every requisite for health, comfort and a proper individual seclusion.

The mill, and the tenements pertaining to it, are beautifully situated. With ample space, overlooking a wide and varied landscape; pure air, and pure water always at hand; with lofty and airy rooms to work in, there is no reason why the operatives should not enjoy health, and attain to as much happiness as falls to the common lot.

In the manufacture of spool thread it is necessary to use the finest grades of cotton; and for the finer numbers, the best quality of Sea Island. The machinery is of the best quality, and perfect cleanliness is indispensible in order to a high quality of product. A blemish hardly noticeable in cloth, would be conspicious if not fatal in thread. Having selected the cotton, and passed it through the preliminary processes, the operator begins to double the laps; and then the threads, until the common numbers have been doubled 165,000 times, and the highest number, 1,327,000 times. This is to give the thread the needful evenness and strength. In the winding room are employed usually about one hundred girls, each of which will wind 168,000 needlesful of thread per day.

This concern requires about eight cords of birch wood per week for spools, and about ten thousand dollars worth of labels, &c., per year. The paper boxes in which the thread is packed are made upon the premises. The bleachery is commodious, and its work excellent. The colored thread sold by this Company is dyed upon the spot, and it is not too much to say that in brilliancy, variety and durability of color, the dyeing of this establishment cannot be surpassed in this country. As for the quality of the thread here manufactured, the amount of sales is a better criterion than any judgment which a layman could offer.

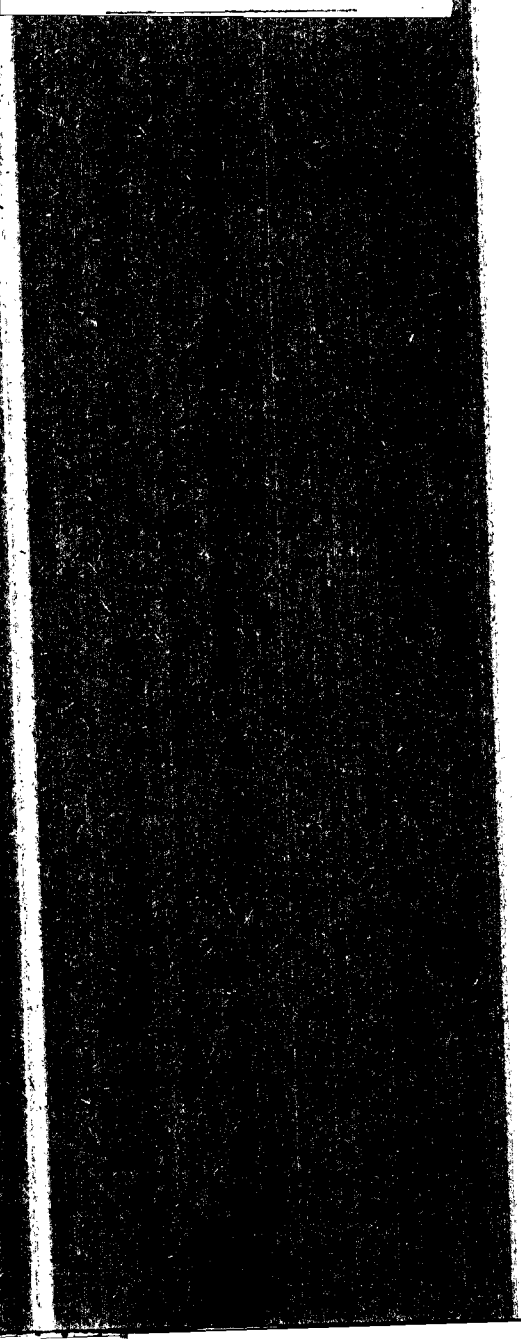
Of course the precautions against fire are most full and exhaustive. Connected with the engine, is one of Fales, Jencks & Son's largest force pumps, which with some forty hydrants, conveying water to every room, and even to the top of the highest tower, give as much assurance of safety from the devouring element as can be attained. The electric clock, which, situated in the counting room, gives each morning the precise moment when the watchman was in a given room the night before, is very appropriately embellished with the answer, so often sought, and seldom found, in practical life—"*custodi s ipsos custodes.*"

Mr. Benjamin F. Greene, the senior partner of the firm, came to Central Falls in 1824, when seventeen years of age, with health, an industrious disposition, and a silver dollar given him by his mother when he left home, as a keepsake. He commenced life here by accepting the position of second hand in a mill of seven hundred spindles, working as overseer until the year 1840, when he commenced the manufacture of thread in Central Falls, in a room 80x36, leased of Fales & Jencks, over their machine shop; and having for partners Joseph Wood, Stephen Benedict and Thomas J. Benedict, running about 600 spindles, all on thread, which was put up in the skein, in pound packages. This Company imported four machines from England for winding thread in spools, which was done by hand, a girl doing about 90 dozen per week, of 100 yards. This, not proving a successful operation, was abandoned, and in the year 1845 Mr. Greene sold out his interest to the other partners and removed to Mapleville, and there commenced business by himself, with some 1,250 spindles, all new and running on thread and warps. It was here, and by Mr. Greene, that the first twister made by Fales & Jencks was run. In 1850, the machinery was removed to Richmond, R. I., in the Clark mill, so called, where it was increased to about 2,000 spindles. In the year 1850, Mr. Daniels, the junior partner, became interested with Mr. Greene in the manufacture of thread and its spooling. In the beginning there were fifty yards put upon each spool, and from 1,500 to 2,000 dozen per week were finished. In 1855, Greene & Daniels came to Central Falls, leasing the Moies & Jenks mill, making as well all the fine numbers of thread used by the Willimantic Thread Co., as that which they sold on their own account.

Horace Daniels is a native of Massachusetts, but for twenty years and over a citizen of Rhode Island. His early education was literary instead of mechanical. He made the machines to wind the spools, when the manufacture of spool thread was begun at Richmond; the dressing machinery is of his invention, and patented; he designed the mill, and was his own architect, and the improved winder now in use is his invention. Mr. Daniels is a clear-headed, sagacious business man, with a mind fertile as well as practical; and one who combines in his character, as the establishment clearly proves, taste with utility.

This concern uses 1,800 tons of coal per annum; 850,000 pounds of cotton; and produces 1,250,000 dozen 200 yard spools of thread. The capacity of the mill is 1,800,000 dozen, but the excess is sold in yarn.

The value of the yearly product is about $700,000.



MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

TWENTY-SIXTH ARTICLE.

Central Falls. 9-3-70

The Pawtucket Hair Cloth Company was incorporated in 1861, and the organization is as follows:

Lyman A. Cook, of Woonsocket, President; Olney Arnold, of Pawtucket, Treasurer; Daniel G. Littlefield, of Pawtucket, Agent. Capital, $500,000.

This concern has grown out of the efforts of individuals to establish this branch of industry, which is to so great a degree a novelty in this country. Germany has hitherto furnished, almost exclusively, the hair cloth which is so common, and was for a long time so fashionable and aristocratic a covering for the best class of furniture. In the last edition of the Encyclopædia Brittanica, we find the following paragraph in relation to its manufacture: "In the manufacture of hair-cloth, either plain or damasked, the weaver uses a sort of hook-shuttle, which he passes between the threads of the warp, or shed, towards his left hand; the assistant or "server," places a single hair over the end of the hook, and the weaver draws it through the warp. The placing of the hairs one by one renders this a tedious operation, and *one that does not admit of the application of machinery*, which is so advantageously employed in fabrics where the shot or weft consists of a continuous thread." And this statement is in accordance with the present state of the manufacture abroad. There, two hands are required for each loom, and these looms are of the most cumbrous character, resembling the old-fashioned hand looms, which, in the last century, were to be found in almost every New England farm house.

But let us begin at the beginning. The hair used is that of horses' tails, and is imported from South America, and Russia, mostly from the latter country. It is purchased at the great annual fairs of Isbilt and Nijui Nooyorod. That purchased in June at the latter place will be received in about sixty days; and that bought at Isbilt in February, in about six months. As it comes of various colors, it is, for the purposes of this concern, all dyed black. A certain proportion, however, is purchased in England and France, already prepared for the loom. It is worth from fifty cents, to four dollars per pound, according to length, the price increasing in rapid ratio after the length attains twenty-four inches.

The "rough hair," or that which is imported in its natural state, is hackled, and the shortest sold to the manufacturers of matresses, it being first curled. After being hackled, the different lengths are combed out, assorted, tied in bunches, and ready for coloring. After this process, the bunches are carefully inspected, measured and put away for the loom. The cloth is made in widths of from fourteen to thirty-two inches.

Contrary to the popular idea, the hair is not as a rule, round. A section under the microscope shows a form as though a third of a circle had been cut off, and the flat portion slightly indented. This conformation caused some difficulties in the manipulation which required great skill, and the most delicate machinery to overcome. The warp used is made of cotton, and prepared with great care. A bunch of hair which has been soaked in water, is placed in position, and the individual hairs are picked up to be by the shuttle laid carefully in the weft. If the machine fails to take a hair, which occasionally happens at the first trial, it continues its efforts until it succeeds, the other portions of the machinery standing still in the meantime. The shuttle is an awkward looking, but most delicately operating implement. The hair must not be bruised, and it must not be stretched; the necessity for such gentle manipulation led to the idea embodied in the Encyclopædia, that no machinery could be constructed capable of performing the operation with sufficient exactitude and regularity. It is impossible to appreciate this loom without seeing it in operation, and having the benefit of the explanations of its ingenious inventor, Mr. Isaac Lindsley, who has been many years at work upon it, and who, after surmounting obstacles which would have been insuperable to one less tenacious and skillful, has brought it to what to the common comprehension seems perfection. The precision of the loom will be seen, when we state that one girl attends ten of them.

It will be readily understood that a manufacture of this kind has not grown up in a day, and that almost every process has required new inventions in order not only to cheapness and excellence of production, but to any product. Thus, in shearing by hand the cloth to get rid of the ends of hairs, which, more or less, would be found sticking up in the surface, it was impossible always to perform the work as rapidly as was necessary. Mr. Lindsley therefore invented an apparatus which takes the place of twenty-five girls, and answers the purpose completely. It is overlooked by a girl who earns a dollar and a half a day without manual exertion save of the slightest character, but who gives the machine strict attention to see that it receives no impediment from clogging or otherwise. The finishing of the cloth is the same as in the manufacture of woolen goods—with differences. The quality of the cloth is better than that made by hand, but it comes in the market in competition with that made where twenty-five cents a day is ordinary wages. In Germany the awkward hand-looms are found in

the peasants' homes, and whatever the children earn by working them, is so much gain.

In 1864 this company erected the spacious building in Central Falls, now occupied by it. It is built of brick, 204x54 feet, four stories in height, with an additional basement story under one-half its length, with an ell 75x24 feet, 4 stories. It is operated by water,—90 horse power. 100 hands are employed, and 400 looms are run. Eventually 525 looms will be put in. 3,500 yards of hair cloth are made per month.

The girls who tend the looms earn, on an average, nearly a dollar and fifty cents per day To Col. Arnold, the treasurer, is due great credit for the conduct of the business in its earlier days, and to Mr. Lindsley the praise of a perseverance which knew no flagging, and a fertility of resource which surmounted every difficulty. The various inventions of Mr. Lindsley are patented as well in England, France and Germany as in this country, and there is no reason to doubt that in his case his labors will receive a generous reward, a fate which too many inventors have never enjoyed.

The Central Falls Woolen Mill.

The company was incorporated January, 1870, but is not yet organized. Phetteplace & Seagrave of Providence, and Isaac L. Pierce are the owners.

The building is of brick, very substantially built, 150x50 feet, four stories high, with an ell constructed of wood, 81x88 feet, with basement, 88x38 feet. The boiler house is of brick, 50x30 feet. Water power is used, the capacity being 50 horse power, and is to be supplemented when the mill is filled with machinery, by an engine. This mill is just starting up with 24 broad looms, and six setts of cards. The product is to be cassimeres and doeskins.

The full capacity of the mill is fourteen setts.

Mr. Pierce is a practical manufacturer, having been with Edward Harris of Woonsocket, for some fifteen years, and a member of the manufacturing firm of J. T. Seagrave & Company, (Granite Woolen Company,) Burrillville. He will have the charge of the mill, and will make a medium and fine quality of goods, having introduced all the newest and most improved machinery. With the capital of the old established firm in Providence, and the skill and energy of Mr. Pierce, success is not doubtful.

The Stafford Manufacturing Company make white and colored, soft enameled spool thread, for hand and machine sewing. This company was incorporated in 1854, with a capital of $300,000. It is named in honor of the late Rufus Stafford, who originated the business in 1859, raised it to about one-half its present dimensions, and died in 1863. The organization is as follows:

John A. Adams, of Central Falls, President and Agent; Joseph Wood, of Central Falls Treasurer; John A. Taft, of Providence, Secretary.

The premises occupied by this company are situated on the west side of the Blackstone river, and consist of a very eligible lot of land, and two mills, with the requisite buildings. Very great improvements have been made, and are now making. One mill is stone, 102x40, three stories high, and was formerly used for the manufacture of cotton cloth. The other mill was built in 1824, of brick, and was originally about half its present size. It is now 204x40 feet, five stories high. The dye house is also of brick, 60x30 feet, an addition to the mill has been made by the present company, of brick, 140x30 feet, three stories high; and one of the same material 70x36 feet, four stories high. The store house is ofstone, 60x30 feet, two stories in height.

This mill was erected by Almy & Brown, was afterwards owned by John Gardner, then by Stafford & Wood, and finally passed into the hands of the present owners. During the war the business, like all other branches of manufacturing industry, was very profitable, and many parties not foreseeing the inevitable reaction, entered into it, and, perhaps, enhanced the supply beyond the demands of the markets. Those who have large capital, great experience, facilities for making goods cheaply, no interest to pay and the command of the channels of distribution, will keep the trade, others will have to take the chances. When in full operation, this concern pays about two thousand dollars per month for spools, and about five thousand dollars per year for printing labels, &c. Every spool of thread is inspected before it is packed, and the number of yards warranted is conscientiously given. The girls who wind the thread earn from one dollar to one dollar and a quarter per day. The work is of course light, requiring rather care and dexterity, than severe labor. The establishment is evidently managed with that judgment and scrutinizing care which are essential to success in so large a concern.

The number of spindles, is 13,000. 25,000 dozen spools of thread are manufactured per week; about 300 hands are employed; the pay roll is $6,500 per month; the water power used, is 300 horse power; 500 tons of coal are consumed per annum; and 500,000 pounds of cotton.

The President, Mr. Adams, is a thoroughly practical manufacturer, having begun at the beginning, and witnessed, and made the business as it has grown in magnitude and the excellence of its product. Competent to superintend the mills, and manage the out of door affairs of this extensive manufacture, it is not surprising that this company should stand in the front rank in its own line of trade.

It is always as pleasant as it is instructive, to meet one, who, fully conversant with an important branch of business, is yet willing to communicate general information respecting it to those who are in pursuit of knowledge. Abernethy was a very great physician, but an unchary man to interrogate largely. We are indebted to Mr. Adams for the pleasure of a good deal more than a merely formal interview, and for ideas concerning topics of a wider scope than his immediate personal interest.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

TWENTY-EIGHTH ARTICLE.

Central Falls. 8-15-70

Fairbrother & Fales's Tannery is situated in the village of Central Falls, and the town of Pawtucket. It is one of the largest establishments of the kind in this section of the country, and ranks among the first for the quality of its production. This firm, consisting of Nathaniel Fairbrother and George S. Fales, commenced business in 1862, in the manufacture of leather belting, lace leather and picker leather. Beginning in a small way they have increased their product and sales until their goods are sold in every part of the United States. The senior partner of the firm has been engaged for thirty-two years in the practice of his trade, and is in theoretical and practical knowledge of it not surpassed by any of those who have helped to create and maintain this now very important branch of industry.

The main building occupied by this concern, is 81x44 feet, 5 stories in height. There are three additions of the following dimensions: 63x42 feet, 4 stories high; 44x44 feet, 2 stories in height 50x42, 1 story. Their belts are made from Philadelphia oak-tanned leather, selected by Mr. Fairbrother. In the manufacture of belting, they used in the year 1869, 15,470 sides of leather. In 1866 the firm purchased, for the sum of five thousand dollars, of Moses W. Page, the exclusive right for the State of Rhode Island, to manufacture, under his patent, "Page's Sweet Fern and Chemical Lacing," under which patent they tanned in 1867, 50,974 sides.

The manufacture of picker leather is an important branch of their business, although its use on the power loom is superceded by one of those inventions which our ingenious mechanics are constantly bringing into use to simplify and cheapen production. For this branch of the trade there were tanned in 1869, 14,064 sides, making a total of sides tanned and purchased, all being manufactured, of 80,508 sides.

The pay roll for the year 1869 was $35,045 33 and the amount of business due, $374,000. They have in use an engine of 20 horse power; consume 175 tons of coal per year; have 65 vats in their tan yard; and employ, when running full capacity, 70 men.

The establishment of Hon. E. L. Freeman is not only creditable to the village, but to the State. He publishes the first and only newspaper published, in the town of Smithfield, and both in the size of his sheet and the quality of his articles, his paper compares favorably with older establishments. Mr. Freeman is a practical man, who has as well the interests of the community at heart, as the building up of his individual fortune. His job printing establishment is something extraordinary for a rural village, and a look through it interested us much.

Among other things we were much struck by the lithographic printing or printing from stone, and as many are not acquainted with the process, we will give a brief description of it. The art of printing on stone was discovered about the beginning of the present century by Alois Lenefelder, an actor, of Munich, Bavaria. Differing from all other methods of printing, the impressions are obtained (by strict attention to chemical affinity) from a level surface. The stone used is a sort of calcareous slate found only in Germany, and is prepared for use by grinding and polishing the stone until it attains a perfectly smooth surface, when the design is put upon it for printing. The ink used is different from other printing inks, having a much larger proportion of greasy substanees for which the stone has an affinity, while it repels or throws off water.

The design having been placed upon the stone, the printer dampens the surface of the stone with water from a sponge, which of course will not take, where the design is, from the simple fact that oil and water will not mix. A roller made of French calfskin, covered with ink is now passed over the stone and while it puts ink on the design or parts intended to be printed, will not even soil the parts of the stone which are damp. A sheet of paper is then put over it and it is passed through the press and an impression obtained.

We were shown some very superior work of this description scarcely to be distinguished from printing on steel plate, except by an expert; in fact many jobs are transferred from steel plate to stone and look nearly or quite as well. Mr. Freeman has the largest establishment of this kind in the State, in fact there is but one other, and showed us samples of printing for several of the largest manufacturing concerns within our borders, which was done in New York or Boston, before he started this enterprise. Also some very fine specimens of checks and notes. He has nine lithographic presses, six of which are in constant operation; and we were certainly surprised to find so complete and well furnished shop in a country village, and there can certainly be no need for our citizens to go to New York or Boston for work of this kind when it can be done equally as well in our own State, and at the same time tend to build up a home industry.

The "Wanskuck Company" own and occupy a pleasant tract of land containing twenty acres situated in the town of North Providence, two and a half miles northwest of the city. The water is supplied to the woolen mill from the Wanskuck reservoir, and the dam on the estate of the company is an exceedingly fine stone structure some three hundred feet in length. The mill was commenced in 1862, and was in operation in 1864. The contracts for labor and material were made before the rise of prices, and the establishment consequently organized at a cost much less than it could be built and filled with machinery for at the present time. The appearance of the estate is pleasant; the village is new and well arranged, and a handsome stone (Baptist) chapel overlooks it on the one side, and a Catholic church on the other. No intoxicating liquor is sold within the village, and the stimulus afforded by active business is apparent in the improvements going on in the neighborhood. The new residence erected by Mr. Metcalf, the agent, on his farm in the vicinity, and the higher style of farming and better grades of stock introduced, exert very naturally and inevitably a beneficial influence.

The main mill, which like all its supplementary buildings, is built of brick, is 300x50 feet, 4 stories high. To this, there is an addition, 120x40 feet, of the same height. The dye house is 60x40 feet; the boiler house 50x50 feet; the machine shop and waste house, 110x50 feet; gas house 60x48 feet, with a gasometer 47 feet in diameter; there is also a stone store, 50x20 feet. The office is 40x20 feet, built of brick; and the barn 45x35 feet.

In the village there are eighty-seven tenements, and a boarding house capable of accommodating one hundred boarders. 350 hands are employed, and an engine used of 200 horse power; 96 broad Crompton looms are in operation, with 21 sets of machinery. The whole arrangement in, and outside, is compact; from the reception of the raw material to its dismissal in the cloth, there is no unnecessary handling, and the most recent and perfect machinery is employed. In the drying room, for instance, 120 yards of cloth are dried in 20 minutes by means of an imported apparatus costing five or six thousand dollars, the heat 154°, being furnished by exhaust steam reheated, and a donkey engine performing the requisite labor. Means are taken, also, so to dispose of the waste, as not to incur any preventable loss.

In the machine shop we find another engine of 25 horse power, and in the dye house facilities for coloring 12 pieces of cloth at once. While the surroundings are neat and substantial, utility seems to have inspired the expenditure upon this establishment, rather than an outlay for ornamentation not immediately and pecuniarily reproductive. There is, to be sure, a well kept lawn in front of the mill, and some thriving shade trees which time will render yearly more and more useful. The idea one forms from an examination of this concern, is, that every dollar put into it was expected to return a fair interest.

Incorporated in 1867, the Company is now organized as follows:

Henry J. Steere, Treasurer; Jesse Metcalf, Agent; Thomas Sampson, Superintendent. The capital stock is $500,000; Two hundred and fif

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

TWENTY-NINTH ARTICLE.

Newport.

Newport has never been distinguished for its manufactures, although as early as 1792, or thereabouts, David Buffum, who was born in Smithfield, commenced the manufacture of sheetings shirtings, jeans, corduroys and velvets, in the basement of the State House. Of course the weaving was done by hand, and the warp was purchased of Slater & Co., after they commenced business at Pawtucket. George Buffum, recently deceased, the son of David, gave, in 1861, the following sketch of his father's early operations: "He commenced the manufacturing of cotton cloth in the cellar of the Court House at Newport, carded his filling by hand, and roped it on a spinning wheel. He made a kind of muslinet. About the year 1788, (?) he formed a copartnership with Joseph Anthony and Nathan Spencer; they obtained a carding machine, probably from the East Indies; it was turned by hand, would drop about sixty rolls an hour, and was a great curiosity. They also obtained a billy for making their roping, and a sixty spindle spinning jenny." David Buffum owned at one time the Slatersville water power and farm; he had a saw mill, corn mill, fulling mill and country clothiers works. Mr. Buffum, with the late Asher Robbins and Samuel Vernon, were the first introducers of the merino sheep into Rhode Island, and his son David Buffum, still living, had a piece of broadcloth manufactured from merino wool in 1812, from which, after taking his own wedding suit, there were made coats for the late William Almy, Obadiah Brown, and pantaloons for William Hunter.

It would not be difficult to trace the causes which prevented this germ of manufacturing from springing into full flower and fruit in Newport. To allude to no other reason, it was essential to success in the early days of manufacturing, when the business was new, and carried on on a small scale, that power should be cheaply obtained. This was only feasible in Rhode Island, on the main land where the small streams could be brought into play. That, in these later days of steam and large capital, there have been other influences which have had great effect, is seen in the varied fortunes of the mills started in Newport, and the ill-fortunes which, on the whole, attended them until a very recent date. There would seem to be no reason why now Newport should not compete with the steam mills in the other parts of the State, if the capital and energies of her citizens were turned in this direction.

There are only two cotton mills in this place, both, of course, operated by steam. The "Newport Steam Mill," now owned and occupied by the Richmond Manufacturing Company, was at first a stone edifice, erected in 1831, of the most substantial character. It was 102x46 feet, four stories, with a tower 12x14. In 1865, there was erected a brick addition, 102x46 feet, four stories, and a boiler house 54x52; a picker house 45x40; store house, two stories, 41x20; cotton house 32x40; blacksmith shop, 15x18; and a machine shop, two stories, 36x22 feet. The office and cloth room are 59x17 feet, with ell.

The company own one two story wooden dwelling house, 65x32; one two story, 32x28, two, 32x28; two tenement houses, each 151x28 feet, one and a half stories, and a boarding house, two stories, 50x30 feet. There are 210 looms; 9,632 spindles; the engine is 125 horse power; about 175 hands are employed, and the annual product is about 2,500,000 yards of print goods, 64 square, consuming some 1,200 bales of cotton. The Superintendent is Mr. Nathan Chamberlain, who informed the writer, that only about a year and a half ago were the last slave pens, standing on the grounds of the company, demolished. If pathos, or poetry, or philosophy, or protestations were appropriated to this series of articles, what a text is afforded by this, only to-day obliterated sign of the horrors of the middle passage, and the sweet savor of Guinea-money.

The "Perry Mill" was erected in 1835, and is a fine granite structure. It was built by a company of which Daniel S. Ruggles was the principal partner; it was run on cotton goods until about 1855, when new associates changed the production to delaine. This experiment was disastrous in its results, and the mill was sold at auction, at a very low price, to Captain Bailey, Benjamin Finch and George B. Knowles; Knowles sold afterwards to Sumner M. Stewart, who, with

Capt. Bailey and Mr. Finch, constitute the present proprietorship. The mill, when changed again to cotton, was filled with new machinery, and has been run ever since upon print goods. It contains 259 looms; 10,200 spindles; its size is 200x40 feet, four stories in height; employs 150 hands; requires 900 bales of cotton per year; the pay roll is $21,000 per month; the engine is 100 horse power, requiring two cars of coal per day; and the annual product is two and-a-half millions of yards of cloth, which is sold in Providence. The operators in this mill are mostly English, and of a very permanent character, families remaining year after year. The houses of this company are of an uncommonly good description for tenement houses, and we can well believe that the company, as it never has had, is not likely to have any trouble with its help. We did not see the superintendent, but if the partner, who gave us the above information, is the controlling spirit of the concern, there will never be a strike in the Perry Mill.

The "Newport Shot and Lead Company" are not now operating their establishments, although they have all the facilities in the way of machinery, &c, for doing a good business. Their sheet lead and lead pipe, on hand, appeared to be of the very best quality, and their lead paint is of a quality equal to any made. Sheet lead is rolled cold from a mass of two and-a-half tons, two inches thick and 7x4 feet in size. The rollers through which it passes weigh about two tons each, and a sheet is made some sixteen feet long. The lead does not gain in width materially during the operation.

Connected with this concern is the apparatus for making shot, which is a very simple manufacture. The lead is melted in the top of a tower 150 feet in height, and falling through sieves, and cooling in drops of different sizes as it descends, the latter are readily sorted by sieves in which they are caught, and made ready for market. This shot tower was built in 1859, and in such a solid manner that it has never settled in the least, albeit there is always more or less vibration at the summit. The lead and coal are carried to the top by steam power, and the upper chamber has a diameter of ten feet. It would, we think, have been a rather wide-awake place during the September gale of 1869. This establishment is owned by Mr. Griswold, and is so small a fraction of his property that he hardly considers it worth looking after. As this is the only shot tower east of New York, it would seem that it ought, under proper management, be profitable.

PROVIDENCE JOURNAL.

SATURDAY MORNING, OCT. 29, 1870.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

THIRTIETH ARTICLE.

Burrillville.

The town of Burrillville, situated in the extreme northwestern corner of the State, is about twenty miles from Providence. It is one of the few towns which has a written history. Originally one of the least likely of the towns in the State to become a manufacturing district, it has with the last fifteen years grown to be a very considerable producer of cotton and woolen goods, but more especially the latter. Originally, a part of the town of Providence, it was included in the town of Glocester, when the latter, together with Scituate and Smithfield, were set off from Providence in 1730. In 1806, Glocester was divided, and Burrillville was erected into a town, it being the northern half of the town of Glocester, as at first formed. The first town meeting was held in November, 1806, Simeon Steere, Esq., issuing the warrant therefor; and the preliminary business of the town makes us acquainted with the still familiar names of Thomas Mann, Jesse Tourtellott, Thomas Owen, Esq., and Colonel Elijah Armstrong.

The town was named in honor of the Hon. James Burrill, of Providence. Daniel Smith, Jr., was the first Town Clerk, and the first Town Council consisted of John Esten, Esq., Simeon Steere, Esq., Samuel Smith, Amaziah Harris, William Ross, Moab Paine and Levi Lapham. In those days the poor of the town were sold each year, the price paid being about two hundred dollars, which was paid by the town for the support of each pauper. The town meeting of June, 1808, voted—"that the next August town meeting be at Russel Aldrich's, upon these conditions: That he pay to the Town Treasurer the sum of $16 25, within one week after said meeting, to which condition said Aldrich agrees, and also voted that said Russel Aldrich have privilege to prosecute any other persons for selling liquors on that day and place."

The following awful example of the presumption of the rural *parvenu* we cite from Keach's history of Burrillville, as a warning to the city shoddyite: One William Rhodes, having risen from coopering to privateering, became so wealthy that on viewing his cargoes on the wharves of Providence, he exclaimed that he "didn't care for John Brown, Clark & Nightingale, nor the devil." As a just and monitory retribution, the continental money for which he had sold most of his prizes, becoming nearly worthless, he was left a comparatively poor man.

In 1856, there were in Burrillville two cotton and twenty-two woolen mills. One of the cotton mills was constructed of wood, and the other of stone. Seven woolen mills were built of stone, and fifteen of wood. The amount of cotton used in 1855 was 300,000 pounds; of wool, 2,400,000 pounds. There were in operation 4,200 spindles for spinning cotton, and 47 sets of woolen machinery, with 322 looms. Seven hundred and thirty-one thousand yards of fancy cassimeres were made, and 1,600,000 yards of satinets. The poor farm was worth three thousand dollars, and there was not a pauper. The total value of the property of the town was $1,472,255. The number of families was 659, and the number of papers and magazines taken, 605. The number of families is now 947; and there are 813 dwellings, as against 633 in 1856. The entire population of the town in 1856 was 3,538 it is now 4,674. The one great need of Burrillville is railway communication with the centre of trade, and especially with Providence. It has a large amount of unoccupied water power, which would be speedily improved if transportation were not so expensive.

The Glendale Manufacturing Company occupy the mill and privilege owned by Lyman Copeland, one of the oldest manufacturers in the town. The mill was built in 1854 and is now run on fancy cassimeres of a fine quality. The capacity of the mill is 9 sets, and there are 50 looms. The main building, which is of stone, is 150x40 feet, five stories high, with an ell 24x60 feet; one of 22x50 feet, a dye house 100x36 feet, two stories, all of stone, and there are sixteen acres of land belonging to the establishment. The fall is 17½ feet; there are 42 tenements, a store, store houses and all the supplementary requisites of a well conducted concern. One hundred and eighty hands are employed, and the pay roll is about $4,000 per month. 260,000 pounds of American fleece wool, and about 50,000 pounds of other kinds are consumed annually, and the product is 300,000 yards of goods. Francis Carpenter, of Glendale, is the lessee.

The next establishment above is that of James Legg & Co., of Mapleville. This village is very prettily situated, and very considerable improvements are going on. It is destined to be one of the finest places in Burrillville. There are two mills here owned by James Legg, who is also the owner of some two hundred and fifty acres of land, some of it fine meadow. The principal mill was built by Daniel S. Whipple, now of Providence, and purchased by Whitehead & Legg in 1865. Since then Mr. Legg has become sole proprietor of the real estate. The larger mill is a six set woolen mill, built of stone and wood, four stories in height. It runs 36 looms; there are fifty-two tenements, and the fall is 18 feet. The lower mill contains only 3 sets of machinery; it is built of stone, three stories; has 9 feet fall, and 18 looms. Three sets more of machinery are to be put in in the spring, and if the long-contemplated reservoir should be built, the capacity of this privilege, and its excellent situation, would make it one of the pleasantest, as well as most valuable, in the vicinity. About one hundred and seventy-five hands are employed, and the product of the two mills is 408,000 yards of fancy cassimeres per year.

Mohegan, lower on the same stream, the Slatersville branch of the Blackstone river, is also owned and the mill run by Mr. Legg. The mil here is an 8 set mill; the fall is ten feet, seventy-five hands are employed; there are 38 looms; 30 tenements; 12 acres of land, and 300,000 yards of fancy cassimeres are made per annum.

Gaza is the name of the establishment some mile-and-a-half above Mapleville. Daniel S. Whipple commenced manufacturing here nearly 30 years ago, in a small mill, with two sets of machinery. In 1869, the mill was remodeled, and is now a very handsome structure, containing 5 sets, 22 broad looms and 6 narrow. It is 128x30 feet, 4 stories high, consisting of a stone basement with wooden superstructure. Mr. Whipple still owns the privilege, and it is run by F. W. Whipple. The fall is 13 feet; 100 hands are employed; there are 20 houses, and the production is 180,000 yards of fancy cassimeres. This is one of the newest and best appointed mills in Burrillville.

The village of Pascoag is a thriving place, which owes its importance to the manufacturing establishments which have grown up there, the most of them within a comparatively recent time. The mills are well built of excellent stone, most of them, and present a very fine appearance. The first which we notice is that of Albert L. Sayles, which stands on a site long used for manufacturing purposes. It is the first mill on the Pascoag river, and the water power is derived from a large reservoir just above, which was constructed in 1860, and has a head of some sixteen feet, flowing about six hundred acres, and never failing, even in the dryest times, to afford a sufficient supply of water, not only for this mill but beyond its requirements. This privilege, now so valuable, was owned in 1792, by Daniel and Elisha Sayles, Daniel being the grandfather of the present owner. At that time the site was occupied by a grist mill and a saw mill. Soon after 1792, the brothers Daniel and Elisha dissolved partnership and divided their real estate, Daniel retaining this privilege, and Elisha taking one next below on the same stream. Hardin and Pitts Sayles, were sons of Daniel, and inherited from him this property, about the year 1819, at which time there was here a fulling mill, and a custom cloth dressing establishment. Soon a carding machine was added, which was operated for a series of years by Hardin & Sayles. In those days the farmers for miles around brought their wool here to be carded into rolls, which they then took home and had spun, and wove by hand looms in their own houses into cloth, bringing it back to be fulled and finished.

About the year 1834, this privilege was enlarged by raising the dam, making what was then called the Phetteplace reservoir, and about this time the first set of satinet machinery was put in operation, which was done by Hardin and Pitts Sayles, and John Chace, son-in-law of Daniel Sayles. The carding and dressing of custom cloth was now given up. This set of satinet machinery was one of the first introduced into the town of Burrillville. In those days it was customary for the owner of mill and machinery, to seek the aid of the city capitalist, usually a commission merchant, in order to procure the raw materials and supplies for his mill. Hill & Chapin, of Providence were the agents of this concern in these times of small things. The owner drove his own team to Providence, procured a bale or two of wool, carried it home and manufactured it into cloth, and in the same homely, but inexpensive, way carried his product to town. This was the style of doing business until 1837, when the mill gate was shut down, owing to the financial disasters of that period. In 1838, however, another set of machinery was added, and the Messrs. Sayles & Chace, with Josiah and Jacob Seagrave, of Providence, recommenced business, forming what was for many years known as the "Union Woolen Company."

About the year 1844, the water power was still further improved, and two additional sets of machinery put in, and the manufacture of fancy cassimere begun. This was the first fancy cassimere mill in Burrillville, as it was one of the earliest in operation in the country. In 1848, the water power was still further increased by the construction of the Kanoda Rock dam, so called. In 1847 or 1848, Messrs. Seagraves and Mr. Chace retired from the concern, and Lyman Copeland, of Burrillville, became interested, the business being conducted under the name of L. Copeland & Co. In 1850, Mr. Copeland retired, and Messrs. Hardin and Pitts Sayles resumed the business, and added another set of machinery, now making five sets, and this continued until 1854, when Pitts Sayles sold his undivided one-half part, to Albert L. Sayles, the present owner. The concern was now composed of Hardin and A. L. Sayles, the style of the firm being Hardin Sayles & Son.

Hardin Sayles died in 1861, but the business was continued, and the present mill built by A. L. Sayles and the heirs of Hardin Sayles, in 1865. In the year 1868, A. L. Sayles bought out the interest of the heirs, except two-eighths now owned by Addison C. and Elliot S. Sayles. But since 1868, the business has been carried on by A. L. Sayles, he hiring the two-eighths owned by his brothers.

The present mill is a fine stone structure, resting on a ledge of rocks, and contains ten sets of of woolen machinery. It is built of split stone, and is not only a substantial but handsome building. The main building is 112x55 feet, 5 stories in height, with an ell 175xE2 feet, 4 stories high; dye house 60x45 feet; picker house 50x50 feet. The fall is 16 feet, 50-horse water power. There is in use, also, an engine of 50-horse power. There is in course of construction a stone storehouse, 46x32 feet, 3 stories and basement. The present dam is of undressed stone, but Mr. Sayles is putting in one of dressed stone, having already a flume of that description. Two fine towers give additional space, and add much to the elegance of the mill. The rear tower is 18x20 feet, and in it are two tanks of 500 gallons capacity each, which supply water to the wash-rooms below, which are so arranged that the men and women have entirely separate accommodations. The front tower is 20x22 feet, 165 feet in height, and is finished in a very admirable manner, making a striking appearance as one enters the village. The machinery is belted from above, and requires to be oiled only once a month, having patent oilers. The floors and supports are of the most substantial character. The wheel (breast) is 18 feet in height, and 15 feet wide, and there are 3 boilers, of 40 horse-power each. The Tatem (English), self-operating mule is in use. Hydrants are placed in each room of the front tower, and outside of the mill. Mr. Sayles owns 30 tenements, and a large boarding-house, and hires 15 tenements. He employs 175 hands, and as proof that labor is fairly remunerated in Pascoag, it may be mentioned that the overseer of the carding-room receives six dollars per day, and the superintendent of the mill a salary twice as large as is usually paid to clergymen in large and wealthy towns. The pay roll is $4,500 per month; the mill contains 32 broad Crompton looms, and 5 narrow Greenhalgh looms; 600,000 lbs. of wool are consumed annually, and the product is 450,000 yards of fancy cassimere per year. All the processes of manufacture are carried on in the speediest and most economical manner, and the entire concern is well appointed, and entitled to rank among the first-class mills of the State. Many improvements are going on, and the residence of Mr. Sayles, as well as that of the superintendent, evinces a good architectural taste, and displays in its surroundings, as does the latter, taste and a liberal expenditure. It is gratifying to find, that in Burrillville, at any rate, land sometimes remains in the same family for three generations, and improves in value through the industry and skill of its possessors.

The mill of Horace A. Kimball, also situated in Pascoag, is built of stone, and is a neat, compact, and well-kept building. It was erected in 1864, by Lafayette Reynolds, and run by him until 1867. It is now operated, as well as owned, by Mr. Kimball. It is a 6 sett mill; 150x56, 4 stories high. The fall is 12 feet, 30 horse power; engine, 60 horse power. The dye house is 20x50 feet, 1 story; wool house, etc,, 50x30 feet, 3 stories. There are five acres of land, and 19 tenements. One hundred hands are employed. There are 20 broad looms; 500,000 pounds of wool are used yearly, and the annual product is 208,000 yards of fancy cassimeres.

The "Clear River Woolen Mill," owned and occupied by Jas. O. Inman, is located just on the edge of the village of Pascoag. It is one of the prettiest mills to be seen anywhere. It was built in 1866; is a 4 sett mill; contains 14 broad looms; is 150x50 feet, 4 stories, with a handsome tower. Sixty hands are employed; the fall is 17 feet, 60 horse power, and 151,000 yards of fancy cassimeres, of a high grade, are manufactured annually.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

THIRTY-FIRST ARTICLE.

Burrillville. 1-10-70

Harrisville is one of the older villages of Burrillville, and is a very neat and attractive place. In 1829, Andrew Harris bought the privilege here, and built a machine shop and cotton mill, the latter about 40x50 feet, two stories in height, which was run by different parties until 1858. This mill was moved away and is now used as a store house and hall. Stephen and Jason Emerson, of Burrillville, bought of Harris in 1853; they built the old part of the present stone mill, and Steere and Tinkham purchased in 1856, finished the old mill and enlarged the present mill, to which an addition was made in 1857. In 1869, another mill was erected by Steere and Tinkham, both mills being built of stone. The firm own about 100 acres of land. The mill is at present an 8 set mill, although the purpose is to make it 12 set. The fall is 18 feet, 150 horse power. Mill 166x46, 5 stories, with an addition 44x40 feet 3 stories. There are 34 tenements, and fifty acres of the land lies along the river, in the village. 122 hands are employed, and 40 narrow looms run. This firm commenced business in 1853, at Mapleville, with one set of machinery. Their consumption of wool is about 300,000 pounds per year, and they produce 250,000 yards of cloth, annually.

The goods, fancy cassimeres, tricots and doeskins, of this firm, have always maintained a high reputation. At the fair of the Rhode Island Society for the encouragement of domestic industry, the contribution of this firm received a diploma, and they claim that they are now making the finest tricots made in this country. They, as well as their doeskins, are certainly fine enough for any one's wear. Mr. Boutelle, formerly of Woonsocket, is the superintendent of these mills, and he, as well as his brother, with Taft, Weeden & Co., at the Harris New privilege, is master of his business.

Pascoag.

Fish & Sayles, manufacturers of fancy cassimeres, run a 6 set mill, in this place. They began business in 1868, own their privilege; have a mill 104x40 feet, 4 stories in height, with one wing 70x28 feet, and one 70x36 feet, both 3 stories. They own 15 tenements and employ 80 hands; the fall of water is 19 feet 5 inches, 80 horse power. They run 10 broad and 19 narrow looms; consume 150,000 bales of stock, and produce 150,000 yards of cloth per annum.

F. T. Fiske & Sons own their privilege, and run 2 sets of satinet machinery. Their mill is 100x40 feet, 2 stories; the fall is 16 feet, 25 horse power; they employ 30 hands, and run 18 looms, producing 200,000 yards of satinet annually.

T. E. Hopkins, satinet manufacturer, runs 2 sets; employs 30 hands; 12 feet fall of water, 40 horse power; 18 looms, producing 225,000 yards of goods annually.

A. Hopkins & Co., manufacturers of spindles and flyers. The grandfather commenced business here 35 years ago, and the concern is now the largest in the State in its especial line. The fall is 12½ feet, 40 horse power, and 40 hands are employed. This, and other manufacturing establishments, are stopped for want of water.

Glen River Mills.

Job A. Walden owns one-half of the real estate, and hires the other half. The business is his. Manufactures fancy cassimeres. Runs 4 sets of machinery. Mill is built of wood, 100x50 feet, 3 stories. The fall is 18 feet; 80 hands are employed, and 120,000 yards of goods made yearly. Stopped for want of water.

Graniteville.

This is a pleasant village with a fine stone mill of large size, which is not in operation and has not been since May last. It has been operated for years by Phetteplace & Seagrave, of Providence, whose lease expired this spring.

Plainville Woolen Mill.

This establishment is owned by Charles H. Whipple, of Providence. It is a 5 set mill, for the manufacture of fancy cassimeres. This privilege was originally owned by David and Erastus Mathewson, of Burrillville, who built a cotton mill on it, about the year 1854, which was rented to Colby and Remington. The estate was afterwards sold to Jordan, and was purchased by Mr. Whipple in 1855, and 3 set satinet machinery put in, which was increased to 5 set about 1861. During the war army goods were manufactured, and at its close the present fabrics were for the first time made. The mill is of wood, 100x35 feet, with an ell 100x35 feet, 2 stories; dye house, stone, 35x50 feet, wool house, 30x20, one story and basement; office, 26x30, one story; picker house, stone, 1 story 40x50 feet, machine shop, wood, 30x25 feet, 2 stories; 25 tenements; 25 acres of land; 9 feet fall, 60 horse power; 65 hands; 16 broad, 4 narrow looms; 160,000 pounds of wool per year; and 160,000 yards of cloth. The mill is lighted by gas made on the premises from rosin. Superintendent, Benn Ainsworth.

Nasonville.

Owned by George Johnson, of Smithfield. Run by James Waterhouse, of Warwick. 4 sets of fancy cassimere machinery; 13½ feet fall, 40 horse power. Mill built in 1867. 20 narrow looms; 50 hands. Benjamin Waterhouse, Superintendent.

Oakland.

This village and privilege are owned by John L. Ross, of North Providence. It is one of the neatest little villages in Burrillville. This is a cotton mill, and run on white and colored warps. There are 30 acres of ground connected with the privilege, and the mill was erected of stone in 1849. It is 100x53 feet, four stories in height, picker house, stone, 32x40 feet; dye house, 100x20, one story. The dam is of stone, well and substantially built. Engine house, 32x40 feet; 21 tenements; 8 feet fall, 75 horse power; 70 hands; 3,000 spindles. The tenements are all supplied with spring water, which flows into every house.

Glocester: Chepachet.

From the time of the Revolutionary war, till the construction of the Norwich and Worcester railroad, Chepachet was the seat of a thriving trade. It supplied a large section of the country by its retail establishments, many of its customers living as far distant as Blackstone, and many in Connecticut. The first cotton mill was erected in or about the year 1812, and on a store house, built of stone, and standing on the main street, is the date 1814. The "Chepachet Manufacturing Company" was the name of the first concern here, which made cotton yarn. The firm was composed of Wilmarth, Bowen and Cook. Dr. Bowen was for thirty years town clerk of Glocester. The enterprise was not a successful one Then Walter Paine and Joseph Haines, of Providence, run the mill, which afterwards passed into the hands of Daniel and Henry B. Lyman, and Gov. Arnold, of Providence.

In 1864, the estate was purchased by Joseph B. Smith and Leonard Sayles, of Glocester. The yarn made in the earlier days of the business was put out and wove, in the families living in that section of country. The present proprietors use the original mill for the manufacture of fancy cassimeres, 3 setts. It is 32x55 feet, 3 stories, and basement for machine shop. This was the largest machine shop anywhere about when it was built. In this mill are 8 looms.

The new mill, built in 1828, is a cotton mill, 33x55 feet, with an ell 34x70 feet, wood, 2 stories; 50 looms; 2,500 spindles; 100 hands, in both mills. The fall is, upper mill 18 feet; lower mill 23 feet. The product of cassimeres is 100,000 yards annually, and of print cloths 500,000 yards. One half of the power only is improved, and the power is only one third what it might be made at an expense of say thirty thousand dollars in building a reservoir, the land for which Messrs. Smith and Sayles own already.

The Benefit mill is owned by F. R. White & Co., and is a 3 sett fancy cassimere mill. The fall is 18 feet; 50 hands are employed, and 10 broad looms and 8 narrow looms run.

The necessity and value of reservoirs have been amply demonstrated this year. Great as has been the improvement of the Blackstone river in this respect, it is undoubtedly true that much more might profitably be done in this direction. Wallum Pond, which is now used to some extent as a reservoir, parties are now preparing to utilize to the further depth of four feet. The proprietors above Slatersville appear to be willing to subscribe liberally to increase the water power, and although the project has hung fire for many years, it will be carried out eventually. The completion of the railroad from Woonsocket to Pascoag, is another improvement which ought not to be delayed. So much work has already been done, that somebody should finish it up. The Hartford and Erie road, have, there cannot be much if any doubt, forfeited their charter rights. The track is graded for a good share of the distance, abutments for bridges are constructed, and much of the heavy work accomplished. From an outside view of it, it would be a paying investment for the Providence and Worcester road to procure a charter and build the road.

No one who has known the roads and farms in Burrillville for the last fifteen years, can have failed to perceive the vast improvement which has followed success in manufacturing. A railroad and the additional power which reservoirs would afford, would give a still further impetus to the energy and skill which have done so much for this thrifty and improving town.

Note.

In the Newport *News*, is a letter from the agent of the Newport Shot and Lead Works, of date, October 28th, 1870, impugning a statement made by the writer of these articles, that these works "are not now being operated," and assuming that the information in regard to them was not sought from those authorized and able to give it. To which, this answer: In this case, as in all others, application was made on the premises. The facts, stated in a way not to give offence, if possible, were related as they were given by a person familiar with every detail, who very politely showed the writer through the establishment, and gave as a reason for not exhibiting the working of the machinery, that the shot tower and lead works were not in operation. And this was very evident, although of course a merely casual visitor could only know from information whether this was a temporary or some time existing fact. That which was stated was precisely true, although not stated with that breadth which truth warranted, it being the purpose always to avoid even the appearance of evil in regard to what might be unpleasant to have published. There was no mistake made in this case. There has been no shot made lately in that tower; the manufacture of lead pipe was not going on when the article was written; the person who gave information did not intimate that there would be immediately, and the reasons given by the agent, but not in the article criticised, why the manufacture was not profitable, were fully placed in possession of the writer. Suppression, not detail, of annoyances, was his aim.

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MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

THIRTY-SECOND ARTICLE.

Smithfield.

Among the many new establishments which have been put in operation within the past few years, that known as the Stillwater Woolen Mill, on the north branch of the Woonasquatucket river, is one of the most noticeable. It is owned and operated by Edward Pearce, of Providence, President of the Corporation, which was chartered in 1867; E. W. Brown, of Georgiaville, Superintendent, and the heirs of the late Tully D. Bowen. Edward Pearce, Jr., of Providence, is Treasurer. The mill was planned by Mr. Brown, and its erection commenced in 1865. It is a ten set mill, making fancy cassimeres, built of brick, 130x52, with one ell, 40x65, and one 45x32, and is five stories in height. The fall is 22 feet; affording 100 horse power. The company has this fall put in a steam engine of 75 horse power, having been discommoded, in common with the great majority of mills, during the past season by the want of water. There are in this mill 56 narrow looms; 175 hands, and 600,000 pounds of wool are used annually, making 450,000 yards of goods. The office is a fine brick building, 22x38 feet, and the company own forty-eight tenements. There are 80 acres of land belonging to the corporation, and everything pertaining to the estate is new, substantial and neat. The buildings, other than the mill and its immediate appurtenances, are in a straight row on the street, well set back, and admirably arranged. A pleasanter village it would be difficult to find. Each tenement is supplied with pure spring water, brought into the house. The mill is studded 12 and 14 feet in height, and the windows are unusually large, giving the rooms a very light and airy appearance. The grounds are in process of improvement, grading, enriching and planting of trees going on in such way and at such a rate as to show that in a few years a naturally unattractive spot will be handsomely adorned.

Mr. Brown, whose knowledge of the practical part of the manufacturing has already secured him what a few years ago would have been considered a fortune, and which is now enough for a young and energetic man, was formerly in company with Steere & Tinkham, of Burrillville, and is an excellent manufacturer.

The whole aspect of the place is proof, *a priori*, that the goods there made are of superior quality. The same taste and order which characterizes the dwellings, store and other buildings are a guaranty that the main feature and prime production—cloth—is not of a less worthy character. The *prima facie* evidence is verified on inspection of the goods. Without going into detail, suffice it to say, that this concern bids fair to hold, as it has already attained, a high rank in its line of manufactures. It was especially gratifying to see that some low land in the immediate vicinity of the mill was being filled in, and prepared for grass, of which it will bear a crop pleasant to look upon, and valuable for use. Only some seven miles from Providence, this, with other establishments in this valley, cry aloud for that railroad about which so much has been said, and in aid of which so little has been done.

Granite Mill Company, Sprague ville.

This concern was started in 1825, by the late Thomas Sprague, as a cotton mill, with 20 looms and 500 spindles; it was enlarged in its capacity in 1828; now there are in operation 112 looms and 5,000 spindles. The mill is built of stone, 120x80 feet; there is 19 feet fall, giving 60 horse power, and 75 hands are employed. It is now owned and operated by Wanton Vaughan, of Providence, and turns out 18,000 yards per week of sheetings, No. 36 yarn.

Although a small privilege, this is one of the most pleasantly situated that we have visited; nestled under the hills close by Greenville, compact and picturesque, it only needs the railway to Providence to make it a perfect specimen of a small manufacturing property.

Greenville.

This place wears a deserted air. The mills are stopped, and consequently but little is going on in the way of business. In the two establishments lately owned and run by Pooke & Steere, now owned by Hunt, Tillinghast & Company, of New York, there are 15 sets of woolen machinery with a fall of 45 feet in two falls, the upper being 33 feet, and the lower 12 feet. 200 hands were employed here making fancy cassimeres of which 420,000 yards were manufactured per annum.

There is now in full operation in this place, the establishment of Whipple & Co., wheelwrights, employing 12 hands and turning out 75 heavy wagons each year.

PROVIDENCE JOURNAL.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

THIRTY-FOURTH ARTICLE.

Georgiaville, in Smithfield, and the Bernon Manufactory.

The village of Georgiaville owes its origin and name to the construction of a cotton mill in that locality by the "the Georgia Cotton Manufacturing Company," in the year 1813.

The original company, composed of Samuel Nightingale, Samuel G. Arnold and Thomas Thompson, built a stone mill, 80x36, on a fall of 18 feet of the waters of the Woonasqutucket river. They placed therein 1,000 spindles, without looms, the power loom not having been introduced into common use in Rhode Island until the year 1817.

The yarn was spun and dyed at the mill, and made into webs which were put out to be woven by hand-loom weavers in various parts of New England.

As this was one of the pioneer mills early established in Rhode Island, a retrospective glance at the records of this old establishment will disclose the primitive state of the cotton manufacture at its commencement there; and also serve to show the contrast between the present improved processes and those of past days.

The cotton was at first picked by hand, and was distributed over the country in small parcels to be cleaned of seeds and motes by industrious housewives and their children gathered around the domestic fire side. The loose cotton in their laps sometimes took fire, and accounts of burning up parcels of cotton, and also the dresses and houses of the industrious cotton pickers, sometimes formed a part of the business correspondence.

The price paid for hand-picking the cotton was about as much as a manufacturer now expects to obtain as the net profit for the labor of spinning it.

Equally remarkable was the price once paid for weaving yard-wide sheetings, which, as fixed by the tariff rate for No. 20 yarn, as printed on one of the old weaver's tickets, appears to have been 13 cents per yard. This is the present selling price of similar cloth. For weaving ginghams, the fixed price was one cent additional per yard for every different color.

Another building of stone, 80x40, was built in 1828, and a third addition of the same extent in 1846.

The first power looms were introduced, in 1819, by Mr. Gilmore, from England, and a receipt signed by him for a contribution of fifty dollars, is evidence of the small remuneration he received from a few manufacturers for his very useful labors.

After the power loom was introduced in 1819, the manufacture of ginghams was superseded by that of sheetings. The number of spindles was gradually increased from 1,000, in the year 1813, to 7,700 in 1853; when the estate passed into the hands of Zachariah Allen.

With only the small number of 1,000 spindles, it appears, by the records of the stoppages for want of water, in the year 1822, during the extraordinary drought of that year, there were 47½ days loss of time. The Blackstone river was correspondingly low that year. This extraordinary dry season demonstrated the necessity of resorting to an artificial supply of water from reservoirs for retaining the floods of winter, to swell the scanty summer streams. The first act of incorporation in New England, for the special purpose of constructing reservoirs for the supply of mills in seasons of drought, originated with the mill-owners on the Woonasquatucket river, in the year 1822.

The recent stoppages of mills in New England by a want of water, and the great loss to unemployed laborers resulting therefrom during several months past, now imparts a revived interest in the construction of new reservoirs to provide against a recurrence of this evil.

For this special reason a statement of what has been accomplished on the Woonasquatucket river may afford profitable information to encourage mill owners on other streams to "go and do likewise:"

Reservoirs on the Head Waters of the Woonasquatucket River.

	Acres.	Average depth.	Superficial acres, one foot deep.
The Greenville reservoir, constructed in 1822, contains	153	10	1.530
The Waterman reservoir, constructed in 1837, contains	318	9	2.862
The Thomas Sprague reservoir, constructed in 1830, contains	95	13 & 7	.815
Hawkins's reservoir	30	10	.300
Bernon Mill Pond, 1853	133	3	.399
Other mill ponds, about	150	2	.300
Acres land	879	Water acres	6.196

The capacity of these reservoirs is sufficient for the storage of a supply of water for the mills below them, during four months, the fall being nearly 200 feet of descent to Olneyville.

The public benefit derived from these reservoirs is manifest in the fact, that the increased water power, thus rendered available, has proved sufficient for operating additional machinery that furnishes employment to about two thousand more people, who directly or indirectly gain a living thereby.

Thus a few hundred acres of swamp lands flowed artificially as reservoirs, contribute more to the wealth and population of Rhode Island than would several thousand acres of the best lands of the fertile regions of the west.

In constructing the dam and the water fall at this village, a safe plan has been adopted for the security of the work, by turning the descending floods upon a ledge of rocks on the river side, in successive cascades over the cliffs.

By artificial improvements of the water in raising the dam to double the waterfall to 35 feet, and by the additional supply of water stored in the reservoirs, 15,000 spindles have been operated without interruption by droughts for three years past, until the droughts of last autumn. This is certainly a remarkable contrast with eight weeks of stoppage, caused by drought, with only 1,000 spindles in operation in 1822.

This advantage, resulting from the construction of reservoirs, affords encouraging inducement to the mill owners on the Blackstone river to proceed vigorously, at their proposed meeting, to make new reservoirs and to carry out their projected enterprise.

One of the principal objects of interest here is the system adopted for transmitting the motive power by belts, moving with extraordinarily swift velocities, combined with the use of light hollow shafting, made of turned and polished gas pipes, and without any pulleys thereon for belting off.

All the cards, drawing frames and fly frames contained on one floor of the mill, (250x70 feet,) and nearly 300 looms contained in the room above, of the same diminsions, are belted from only three lines of shafting extended the whole length of the mill. The belts all appear clinging around the naked shafts, and diverging both upward through the floor above and downward to the numerous machines below the shafting. Nearly every foot of their length is occupied by a belt.

This novel plan of swiftly moving belts and swiftly revolving light hollow shafting has been described as follows in compliance with repeated requests for information:

The hollow or tubular shafts are made 2¾ inches in diameter and 18 feet long, and connected by ring couplings screwed together. The weight is 5½ lbs. to each foot in length; being about 1-5 of the weight of the solid shafting commonly used with their heavy plate couplings, bolts and pulleys.

To impart the same velocity to the belts used on their naked surfaces, as when pulleys are employed, it is manifestly necessary to cause them to revolve with a correspondingly increased velocity, which has been found to be about three-fold faster; being about 600 revolutions per minute, while the heavy solid shafting with pulleys make about 200 revolutions per minute.

This three-fold increase of velocity increases the friction is the same ratio; while the five fold greater weight of the solid heavy shafts and pulleys correspondingly increases the friction; so that the result shows a saving of friction of 2-5ths in favor of the light hollow shafting, as a saving of motive power.

As the light shafts make 600 revolutions to do the same work that the common solid shafting accomplishes by 200 revolutions, the immediate stress is subdivided and reduced, in the ratio of 6 to 2. The receiving pulleys require to be only one-third as large on the swiftly revolving light shafting, as on the slower revolving solid shafting; while there are no driving pulleys used. An increase of speed of any machine is readily effected by winding a piece of belt leather around the shaft. The circulation of the air within and through the whole length of the hollow shafts keeps them cool.

The cost of the light shafting is also much less than that of solid shafting with faced and turned couplings and pulleys.

In regard to the velocity of motion of the main driving belts, the speed of a mile a minute has been adopted as a safe and advantageous rule. This may appear to be somewhat dangerous for practical use; but when it is considered that ponderous English locomotive engines weighing thirty-five tons or more, fly over the rigid rail road bars, and around curves, with the calculated speed of a mile a minute; and, that car-loads of passengers trust themselves to be whirled over regions of country at this rate of speed, the doubter may smile at the idea of hazard in trusting a slip of leather belt to travel with the same speed on a smooth and regular course.

With the velocity of a mile per minute, the tension on our main belts is reduced to only 6½ lbs. in transmitting 1 horse-power; and 250 lbs. tension will transmit 40 horse-power. With 6 000 feet velocity the tension is reduced to only 5½ lbs. for 1 horse-power.

To calculate the tension imposed on a leather belt for the transmission of any given horse-power, it is only necessary to divide the standard measure of a horse-power viz: 33,000 lbs. lifted one foot high per minute, by the proposed number of feet assigned as the velocity for the belt. With 33,000 feet velocity per minute of a belt, the tension would be only 1 lb. for transmitting one horse-power; and, on the contrary, with 1 foot velocity per minute, the tension would be increased to 33,000 lbs. for transmitting one horse-power.

Were it practicable to employ the same velocity of motion to a leather belt as is naturally employed in celestial mechanics between the sun and the earth, in the modified form of the transmission of light, heat, and electro-mechanical actions through a space of 95 millions of miles in about 8 minutes, or, at the rate of over 11 millions of miles per minute, a single thread capable of lifting one pound weight, would serve to transmit more than 1,800,000 horse-power. A pack thread, indeed, would be sufficient to transmit a greater moving force than all the combined natural and artificial motive power used in Great Britain for propelling machinery on the land, and vessels on the water.

In celestial mechanics, the swiftest velocities are made equivalents for the feeblest intensity of force in transmitting the sublime extents of mechanical action and reaction to hold the earth and other planets to their circular orbits about the sun, as their common centre of motion.

Human science has partially succeeded in actually transmitting mechanical action through the medium of stationary telegraph wires with a somewhat corresponding velocity, even across the depths of the Atlantic ocean, in less than half a second of time.

While contemplating the various modes of transmitting motive power, it may afford a little refreshing variety to take a glance at the more refined and admirable system of the imperceptible transmission of impulses of mechanical force through the medium of invisible electric matter, as was exhibited more than twenty years ago by a great magneto-electric machine constructed in Providence by a speculative joint stock company. This machine, devised for transmitting a perpetual motion and for filling the pockets of some of the shareholders, served rather to drain them. Hence it originated the new term of "Hifalutin machine." But the mechanism developed a new mode of transmitting the power from the steam engine that turned it, to a distance through conducting wires, with so great force as to be capable of operating machinery.

The motive power was transmitted not only with steam engine velocity, but also with wonderful efficiency, through stationary conducting wires instead of swiftly moving leather belts or revolving shafts. The extension of this mode of transmission of motive power from remote waterfalls or steam engines might be made through wires arranged like the present telegraph wires to enter the windows of workshops instead of telegraph offices. The rapid vibrations of the electro-magnetic telegraph apparatus, and their clicking sounds demonstrate the fact of the actual transmission of motive power through telegraph wires. The extent of the power thus transmitted yet remains to be discovered.

To descend from celestial to the terrestial engineering of a cotton mill, in conclusion of this rambling digression, a few facts may be stated of the practical results of using belts and shafts, with swift speed, as tested by actual operations:

A belt or bridle of good leather of an inch width will sustain a weight of one thousand pounds; but the adhesion of it to the surface of pulleys is limited to forty or fifty pounds tension, while it operates with proper slackness to prevent straining it tightly to impair its durability. With the velocity of a mile per minute a leather belt of 6 inches width, at forty pounds tension to the inch, will durably transmit about forty horse-power. With a velocity of 6,000 feet per minute a main belt of 12 inches width has served to transmit the power of two water wheels, each 19 feet long and 18 feet diameter with sixteen feet fall of water, during a period of more than twelve years, and still remains serviceable. Another belt of 8 inches width has operated 10,500 spindles of self-acting mules, with spoolers and warpers, more than 10 years.

By means of light belts and shafts, with high velocities, the use of the ponderous old shafting and massy cog wheels, formerly employed, has been here dispensed with. Not a single cog wheel is retained, to require replacing for broken tooth, excepting only in the wet positions of the gearing of the wheel pits, there necessary to increase the speed to the desired velocity.

These suggestions for improving and economizing the transmission of the greatest extent of motive power in mills, with the least cost of materials, may be found practically useful to engineers as hints for further improvements.

Among the old papers and accounts of this mill was found the following amusing letter from one of the first superintendents, at the commencement of the business of manufacturing cotton. His pathetic account of his troubles in managing 1,000 spindles, in the olden time, may excite a smile in managers of the great cotton manufactories of the present day:

To —— ——, Agt, Providence.

We spun 14,560 skeins last week; but who can count the yarn spun this week? "Why?" you will probably say; because some of it is reeled, some twisted into mule banding, and a large quantity held in reserve on bobbins. Presuming you will probably say that we ought to do as our neighbor manufacturer, P. Allen, has done, and weigh the bobbins and yarn, and then subtract the weight of the bobbins. My dear sir, we have no scales suitable to do this. Then you will say, "Why did you not send for them?" Dear sir, it is for the want of foresight and knowledge in our business. If you will send to me a suitable scale-beam of good length, say 2½ feet long, we will try to keep some account of yarn spun. Yet, however, it is a confused mess, and wants some of your information on the subject. There are so many things to hear, see, settle, transact, digest, add, take off, increase and command,—all in and through the cotton dust, that I can hardly tell what thing ought to come first.

The dressing machine begins to rattle and blough; the looms begin to thump; and, the next you will say, "I wonder what will come next?"

Your servant wishes to know!

—— ——.

P. S.—Wanted—Codfish.
Ginger.
Pearl-ash.
Indian and Rye Meal.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

Silver Ware.—Gorham Manufacturing Company.

The house of Gorham & Company was founded by Jabez Gorham, of Providence, who, until within a few years past, has been among us as one of the substantial business men of the town, growing up with it, and aiding in its growth. In 1805, Mr. Gorham was an apprentice with Nehemiah Dodge, who was one of the earliest jewelers in Providence, and who manufactured ear-rings, breast-pins, and rings, and watch seals, chains and keys of solid gold, the only articles manufactured by Providence jewelers for many years after this business was started here. When Mr. Gorham set up in trade for himself he added to these articles the manufacture of gold chains, long known as the "Gorham chain," composed of plain rings, linked together, and of a style now obsolete. They were made of solid gold, and in their day were considered as a distinguished ornament. We happen to have in our house two of these, of the same weight but of different lengths and size of ring, which were made when Jabez Gorham himself was in the prime of life and his own workman in the shop. If not so fashionable as once, they still prove that a genuine article of valuable material is always in order and always in good taste.

Mr. Gorham, in the earlier days of his business, was accustomed, whenever he had made a trunkful of goods, to take them to Boston, and receive in his room, at a given hour the next morning, (for it was a day's journey then from Providence to Boston,) the Boston jewelers, who were always anxious to make purchases. In 1820, a small room sufficed to hold all the purchasing jewelers then doing business in that city, and two trips in the year sufficed to dispose of all the jewelry which Mr. Gorham then manufactured. It was only after sixteen years of this kind of trade that Mr. Gorham entered upon the manufacture of silver ware. It should be stated, as a noteworthy fact, that during the half century in which Mr. Gorham was active in the manufacture and sale of gold goods and silver ware, his articles were universally of a standard equal to that established by law, or the nature of the precious metals. Everything was just what it purported to be.

In 1831, Mr. Gorham commenced the manufacture of silver spoons. In about sixteen years he had fifteen men employed in his shop. On his spoons are to be found, impressed, the words, "pure coin," and that stamp carried with it an authority as sacred as the imprint of the government stamp in Great Britain. The thorough honesty of the man had been established in the minds of the trade, and of retail purchasers, for a long time before this, and in his day, as now, the concern sold goods with the understanding that any article found below the standard in quality could be exchanged, or would be paid for. With the immense growth of the business, the fundamental ideas of honesty in quality, and excellence in workmanship, have been retained.

In 1839, Mr. Gorham retired from business, but repurchased in 1841 the establishment he had sold out, and associated with him his son, John Gorham, the name of the concern being Jabez Gorham & Son. In 1847, Mr. Jabez Gorham finally quit the business, and John Gorham erected the building south of the one then occupied, and put in steam power, which was now first applied in this branch of manufacture. Before this, manual labor had been chiefly relied upon, although a few of the larger firms had used horse power as the Gorhams had done. The new building, still a part of the present establishment, is five stories high, 110x40 feet. At this time there were only twenty hands employed. In 1850, Gorham Thurber, son of Dexter Thurber, became a partner, and the firm was Gorham & Thurber. In 1852, Lewis Dexter, Jr., son of the late Lewis Dexter, Esq., of Smithfield, joined the firm, and the name was changed to Gorham & Co. At about this time Mr. John Gorham visited Europe, and examined critically all the leading establishments there in this line. Intending to infuse into the manufacture new life, and a higher style of production, he procured a number of skilled workmen, and from time to time has secured others, artists in their various departments, until the [illegible]

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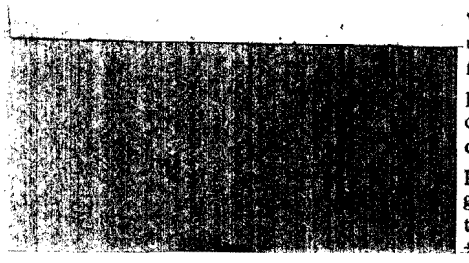
amounted to about seventy-five persons. In 1861, the Gorham Company employed about one hundred and fifty men, increasing until 1866, when the establishment contained 430 persons. At present there are not quite as many at work, as owing to the sudden accumulation of wealth by the war, of certain classes, the demand for rich goods of all kinds culminated in its spasmodic character, about 1866. Aside from this abnormal condition of trade, the business has been constantly growing, and at all times may be seen, in the packing room, cases for the most distant cities of the Union. In 1861, Mr. Dexter retired, and the company consisted of Messrs. Gorham & Thurber until January, 1865, when it was incorporated. The production, owing to increased mechanical facilities, is now greater than in 1866, when a larger number of hands was employed.

About the year 1855, Mr. George Wilkinson, an Englishman, who had come to this country as a designer and modeller of silver, with the intention of associating himself with the concern which promised to take the lead, and who exhibited ample proof of his artistic ability, and who designed the gate at Boston Common, presented his credentials to Mr. Gorham, and was immediately employed. The members of the corporation are John Gorham, President, Gorham Thurber, Treasurer, C. C. Adams, who is the agent in New York, George Wilkinson, and J. F. P. Lawton, Secretary. Henry E. Lathrop, the superintendent of the works, was an original member of the corporation, and deceased January, 1871.

A moment's conversation with Mr. Wilkins, and a glance at his work, will give an appreciative visitor an understanding of how greatly the reputation of this establishment is due to him. With all the wealth of raw material, the resources of machinery, the suggestions of other members of the firm, the conception of the design, the formative preparation, the ideal to be executed, is his. The almost innumerable patterns of every variety, and of the most attractive forms, as well as exquisiteness of finish, which are stored in his rooms, declare how faithfully, how earnestly and how enthusiastically he has labored. And in this connection it is not improper to state, as the fact was not learned from any one attached to the concern, that in some cases the love of art has led to the manufacture of articles specially ordered as gifts, at an expense considerably beyond the price received. The elegance of the articles was not limited by the money value, but was commensurate with the ability and fame of the establishment.

In 1865, this company added to its already large and varied business, the manufacture of plated silver ware, but of only one, and that the best quality. The purpose was to make a style of goods equal in quality to "Elkinton's" best, and to surpass it in beauty and variety of design. That purpose has been fully carried out. Indeed, the importation of plated silver ware is an "obsolete idea," and no concern in this country rivals the Gorham Company in the fineness and uniform excellence of its articles. This is well understood by the trade, and the company are guided in its manufacture by the same rule o one standard that was the leading principle of Jabez Gorham in his day, and which is now, as it ever has been, an inviolable maxim in the establishment, and every part of it. In regard to the design and ornamentation of their goods, the Gorham Company bestow the same labor and skill upon their plated ware as upon solid silver. And this they can well do, and its intrinsic merit demands it, because it costs about one-third as much as solid silver, and is in durability equal to the wear of generations. A set of table silver, made here, is a work of art. The rooms in which the designing is done are a museum of works of taste and vertu. Books, bronzes, casts and engravings fill the shelves and adorn the walls. The very air is redolent of refinement. And when a special piece or set is to be made, like that presented to Vice President Colfax, or a prize given by a yacht association, there is as much study involved, and as much genius displayed, as



the production of a fine painting, or a group of statuary.

In preparing for the more elaborate works, the first thing is to make a drawing on Bristol board of each individual piece. These are not merely sketches, they are finished to the minutest detail, and in certain cases, colored. Always they are so shaded as to show the ultimate effect. They would ornament the portfolio of drawings in the most elegant parlor. The next step is to model the parts in wax. Another model is made in plaster, and still another in brass. This latter is worked out with the utmost care and delicacy of finish. Upon the perfection of this, depends greatly the excellence of the cast. We are now speaking of the ornaments, such as handles, figures, and so on, which beautify the table ware, cups, centre pieces, &c. This brass form is enclosed in a matrix of black sand, and in the latter is cast the silver ornament. It is almost needless to say that every operation, even to making the cases in which the goods are at last packed, is carried on in the establishment. Some of the morocco and velvet cases would, it seems to the uninitiated, cost as much as the "setting out" in spoons, of a well-to-do girl of the period, A. D. 1825. None but sterling silver is used, and no one who has not witnessed for himself can imagine the thorough order, and, save in the heavier operations, the scrupulous neatness which pervade the entire concern. The most perfect system, of course, prevails, and from the counting room to the stock room, all is in keeping with an artistic idea, and artistic purpose. With all this, there is a never-ending succession of new styles, and a constant improvement in the richness and purity of design.

It is worthy of notice that a photograph of the buildings now occupied by the company, taken before the alterations, discloses the name, so long conspicuous in one place, of George Baker, who still survives as the respected President of the Providence Mutual Fire Insurance Company; and in dim letters "The Providence Museum." That old museum, with its gorgeous and hydras dire, was a wonder to the young; the present institution is a marvel to grown men. Mr. Jenks, the proprietor of the museum, who, by the way, was as well worth studying as any of the curiosities he displayed, was a man of very active imagination, but we doubt if he ever dreamed of the things which have been done, since his day, in the old premises. We believe his son Robert, one of the best engravers of the day and city, has been heretofore for many years employed in this establishment.

As now organized, this establishment occupies, with a trifling deduction, the entire square bounded by North Main, Steeple, Canal and Friend streets. On the northwest corner is the casting and silver spoon room, 42x70 feet; the stock room is 42x30 feet; the marking room, 27x50 feet; offices, about 40x60 feet; plate rooms, 40x63 feet; machine shop, 40x80 feet; stamping room 40x42 feet. The buildings are mainly of brick, and are, in height, from three stories, basement and attic, to five stories, basement and attic; making, in some portions, seven stories in use. The entire extent is about 140x200 feet, and includes 69 rooms.

We have thus given a very condensed exhibit of the largest and most complete concern of its class in the country, or elsewhere. In this branch of manufacture, at least, even the wealthiest and most æsthetic need not go from home to meet their requirements, and the careful and close-dealing may find here the ordinary articles of household use, of precisely the quality they purport to be. The spoons, and the forks, and the silver cup for the unconscious juvenile, will be found to be sterling silver. There is nowhere about the concern, or the goods it sends out, any sham, but there is solidity, grace, beauty and the highest art. The integrity of Jabez Gorham is embodied in each article, and the spirituality of a new era is transfused into every piece of elaborate workmanship. The precious metal is worthily manipulated, and to its inherent value is superadded the care and skill and intelligence, of those who are imbued with a proper sense of what is due to it, and to those who will purchase it. Such goods are at once the most economical and the most elegant. And Providence has reason to be proud, that amid its multifarious industries, it possesses one which is so important, so idealistic, and which commands in all the marts of trade the most perfect confidence of all who have dealings with its proprietors. In this class of goods, above all others, fraud is easily committed, and most difficult of ascertainment by the consumer. Whoever purchases the Gorham Company's wares, has the guarantee of a character for uprightness of nearly three-fourths of a century's standing, that the quality will be as represented.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

No. XXXVI.

Chemicals.—The Rumford Chemical Works.

The Rumford Chemical Works are situated in East Providence, about two miles and three-fourths from Market Square, in a straight line, but some four miles by the present means of communication. They owe their origin to the scientific skill of Professor Horsford, and the chemical knowledge and business ability and perseverance of George F. Wilson.

Professor Eben Norton Horsford was born in Geneseo, near Rochester, in the State of New York, in the year 1818. He was for some time Principal of the Albany Female Academy, subsequently went to Germany, where he studied under Baron Liebig for several years, and was a fellow student of Muspratt, Hoofman, and others, now distinguished chemists. On his return from Europe, he was appointed Rumford Professor in Harvard University, and teacher of Chemistry in Lawrence Scientific School, a department of the University, and to his exertions the establishment of that school is chiefly due. These positions Prof. Horsford filled for a period of about eighteen years, and during this time was employed as chemist by the Boston Board of Water Commissioners, and contributed many interesting and valuable papers to the scientific journals, in relation to, and in elucidation of, the science of chemistry.

Mr. Wilson was born in Uxbridge, Massachusetts, and descended from the genuine Puritanic stock, his ancestor, Roger Wilson, having left Scrooby, England, with the Pilgrims in their migration to Leyden. He was a silk and linen draper, a man of wealth and influence among the Pilgrims and in the city of his residence. He was bondsman for the only three men who ever obtained the freedom of the city of Leyden—Governor Bradford, Isaac Allerton, and Degory Priest. His wife was a sister of Dr. Fuller, physician, and his sister was the wife of Dr. Robinson, first minister of the Pilgrim church and society, and it is recorded that the fitting out of the Mayflower was chiefly due to his liberality and enterprise. His son, John Wilson, subsequently came over to the Massachusetts colony, and finally settled in Woburn, Massachusetts. Mr. Wilson is of the fifth generation from Roger.

Mr. Wilson, at the age of 17 years, was apprenticed to the then well-known and leading firm of woolen manufacturers, Welcome & D. D. Farnum, at Waterford, Massachusetts. With them he spent three years in acquiring a knowledge of their business, and in the pursuit of general knowledge, giving his evenings to the study of such books as he deemed essential to the formation of a cultivated mind, both in science and literature. From the age of 21 till 30 he was constantly engaged in study and teaching, save the years 1839-40-41, when he had charge of a large farming and mechanical establishment at Worcester, Massachusetts. In the winter of 1847-8, he sold the good will and chemical and philosophical apparatus of the Chicago Academy, of which he was then principal, and came to Rhode Island and was employed by Gov. Jackson. Afterwards he went to the Quidnick establishment of A. & W. Sprague, and thereafter to the Atlantic Delaine Mills. In 1854 he commenced, with Professor Horsford, the manufacture of chemicals, at Pleasant Valley, his studies having led to, as they were stimulated by, a love for scientific investigation and pursuit.

The object and purpose of the firm, as stated in the following clause of their agreement of partnership, under date of January 1st, 1855, was that of "building up a chemical manufacturing establishment, of respectability and permanency, such as shall be an honor to ourselves and our children, and a credit to the community in which it is located, and which shall afford to us a means of reasonable support."

In the fall of 1858, the works were removed to East Providence, on the old Seekonk Plains, than which a more unpromising or uninviting field never presented itself, so far as the ordinary mind could perceive its agricultural or manufacturing resources. Much, probably most, of these lands had not been ploughed for a century, and the soil was too poor to grow mullen. Here, however, Mr. Wilson found an indispensable element for his proposed operations in pure water. He saw, also, what no one else at that time could discover, the capacity of the land for farming purposes, and at profitable rates. The first purchase was of 20 acres, at less than twenty dollars per acre. On these acres the works were erected. In 1863, ninety acres were purchased and the "Riverside Works" put up, where the primary processes are conducted in the manufacture of cream of tartar, and where superphosphate of lime is made. Other purchases have been made, until the company now own some seven hundred acres of land, the last purchase, adjoining the first, and of the same quality of soil, without buildings, being made at a cost of two hundred dollars an acre.

The principal manufacture, at present, at the Rumford Works, as distinguished from the Riverside, is that pulvurelent phosphoric acid, commonly known as Horsford's cream of tartar. The main ideas were to avoid, in bread making, vegetable fermentation, and to return a wanting ingredient (phosphorus), which should add to the nutritious quality of the bread. "Of all the salts taking part in vital processes, the most important are the phosphates. They enter into the composition of the bones, the muscles, the nerves, the brain, and indeed of every higher tissue; and whereever an important function is to be performed, there nature has supplied a store of phosphates. They are present in the forms of substantial food." The medical faculty are just now paying great attention to the various preparations of phosphorus, and for debility, and especially in diseases of the brain, they are constantly administered. The whole tone of the system is lowered by a diet deficient in the phosphates, and is raised by food containing a large proportion of them. As is well known, in the preparation of superfine flour, the normal quantity of phosphates is decreased by a large fraction in consequence of bolting it so closely; the bran containing weight for weight more than *fourteen times* as much phosphoric acid as the superfine flour. This loss of phosphorus deprives the flour, so far, of one of its most important elements. In order to save the phosphates, it is recommended by physicians that coarser or Graham flour be used; and to dyspeptics the superfine flour is prohibited. If, then, we can get back the phosphorus which has been so uselessly thrown away, we shall be doing a service to the general health. This is precisely what this manufacture does, as will be seen by following the process.

The first thing to be done is to procure the raw material, and this is secured by agents all through New England who buy up from families in city and country the beef bones which would otherwise be thrown away and wasted, or which until within a few years, have been so wasted as a rule. These bones are placed in a close iron retort and burned to coal. The coal is run through a series of bolters which return five sizes. The largest two are sold to the sugar refiners, the next two sizes are used from which to extract the acid phosphate of lime for the manufacture of cream of tartar, and the finest is used for making superphosphate of lime for fertilizing purposes. The coal which is employed in the manufacture of cream of tartar, is subjected to another burning in a retort, into which air is admitted, and after being cooled, combined with sulphuric acid, stirred by machinery for 18 hours, until the bone coal is thoroughly dissolved. The mixture is then drawn off and leached through thick felt, coming out a colorless fluid, being acid phosphate of lime, the residuum, sulphate of lime, being used in making superphosphate. The acid phosphate is evaporated in porcelain lined iron kettles, the process occupying from seven to nine hours. It is then poured into large wooden vats and cooled over night, when it is of the consistency of cheese. It is now mixed with pure starch. This mixing is first done in vats, and then it is run through granite rollers for more perfect comminution and combination. Then it is taken to the drying-floor and spread, and allowed to remain eight to ten days, when it is subjected again to heat the more perfectly to dry it. Again it is ground, bolted, and put in packages for market. It will be seen that the use of this article in making bread, supplies to a certain extent the phosphorus lost in the excessive bolting of our superfine flour.

The buildings at Riverside are, first, the one where the coal is burned, 95x45 feet; store house, 64x132 feet; store house and cooper shop, 85x30 feet; store shed, 175x16 feet; slaughter house, 16x30 feet. A building is in process of erection 80x120 feet, in which is to be manufactured nitric and muriatic acid and tin crystals. The buildings at the Rumford Works are, one wooden, 210x50 feet; one wooden, 160x40 feet; one 153x40 feet; in which the different processes of manufacture are carried on; Freight house, 26x135 feet; store house and blacksmith shop, 180x20 feet; store shed, 20x100 feet; office and store, 25x55 feet; barn, 33x36 feet; barn, 105x36 feet, and dwelling house. To accomodate the business a switch has been constructed from the Boston and Providence Railroad, and another is building for the use of new and large buildings, which are needed.

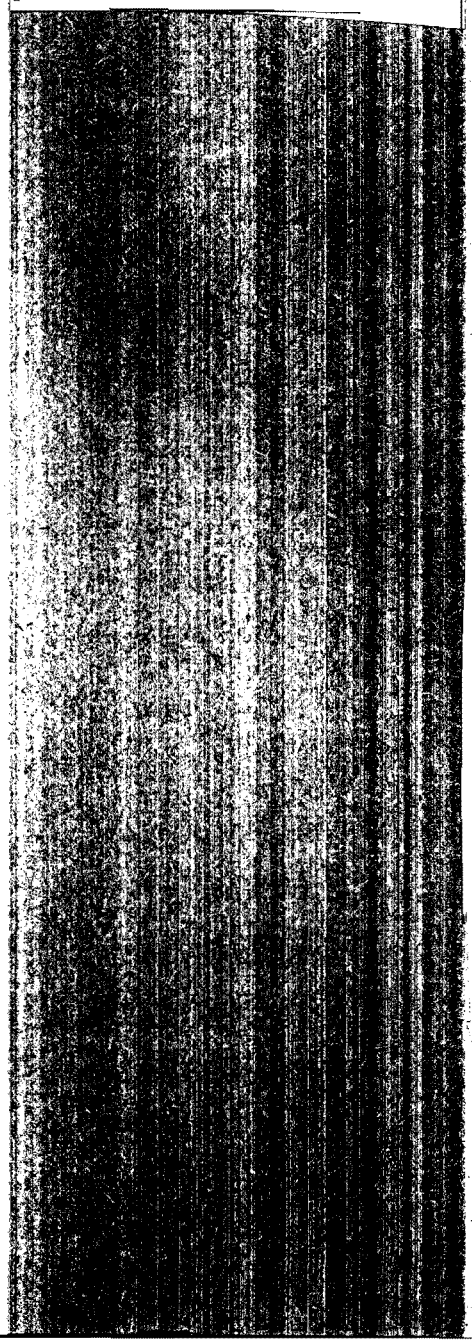
At the Riverside Works a steam engine of 40 horse power is in use, and 50 men are employed; at Rumford an engine of 55 horse power is used, and 80 men are employed. Both works give

employment, in addition, to 40 mechanics, and on the farm there are 40 hands, and more are engaged during the summer. The preparation of the cream of tartar for market is done in Providence, where the company occupy three floors of the Butler building, 60x60 feet, being numbers 58-60, on South Water street. Here are employed 45 girls and eight men. To do the printing necessary for the business, three printing presses are used, one of them the largest single cylinder press in the State. The printing of this company would cost at regular rates some twelve thousand dollars annually.

The amount of cream of tartar made is 600 tons per annum. Fifteen hundred to two thousand tons of superphosphate of lime and tobacco grower are manufactured yearly, besides anti-chloride of lime for paper makers' use, rosaline, a color for the same purpose, blueing, for family use and for calico printers, and writing and copying ink.

In connection with this establishment, and naturally resulting from it, is the farm of which we have spoken, upon which the superphosphate of the manufactory has been thoroughly tested in connection with systematic high farming. Mr. Wilson has demonstrated by actual experiment that even upon the poorest soil, near a market, it pays to cultivate the land upon the European plan of returning to it the nourishment necessary to the growth of crops, and that land naturally worthless can be made profitable by judicious and persistent tillage.

Seekonk Plains had for generations been a synonym for barrenness. When Mr. Wilson had raised large crops of grass and corn, it was said that well he might, as he had a mine of manure in his superphosphate which he could apply without regard to cost. Now the fact is that every farm he occupies is platted into lots, and with every lot an account is opened on books regularly and completely kept, and to every lot is charged the manure, phosphate and other fertilizers put thereon, at the market price. We shall not here go into detail, as we have alluded to this department only as it grew almost inevitably out of the purely manufacturing business. We see here illustrated, in the most forcible manner, the intimate relations between manufactures and agriculture, each aiding and necessitating the other. And we have proof, if proof were needed, of the fact that every manufacturing establishment on a large scale, is a direct and important addition to the wealth of the community; not more in its direct than in its indirect and stimulating effect. In this vicinity, where formerly there were no houses, there are now new and commodious ones; where there were old houses, tenantless, there are now persons demanding houses; where there was nothing done, there is now a business which gives a trade to the city of Providence of two hundred thousand dollars per annum. And it is a growing business, as every one will perceive who takes a look at the foundations laid, the lumber piled up, and the activity which pervades the entire place.



PROVIDENCE JOURNAL.

SATURDAY MORNING, JUNE 24, 1871.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

No. XLII.

Furniture.—Potter, Denison & Company.

In 1854, Asa K. Potter, Russell A. Denison and David C. Anthony commenced the wholesale and retail business in household furniture, with the purpose of manufacturing to order such articles in their line as they might find a demand for. They employed the cabinet makers, and their place of business was in Duncan's building, West Water, now Dyer, street. After a few years, a demand for a better quality of goods than had been furnished by the dealers, who bought their furniture abroad, induced Messrs. Potter, Denison & Co. to abandon their wholesale department and confine themselves to a retail trade, and the manufacture of the finer qualities of articles, at the same time enlarging their operations in the house decorating line, and establishing a manufactory. Mr. Anthony went out in 1864, since which time the firm has consisted of Messrs. Potter & Denison. The growth of the business has been steady, and from a capital of $20,000, at the start, has increased to $120,000. The factory, situated on William street, is a brick building, 40x50 feet, four stories high, and the motive power is an engine of 30 horse power. From seventy-five to eighty men are employed, most of them heads of families, and some of whom have been for sixteen and eighteen years in the employ of this firm. These mechanics are, with two exceptions, persons who learned their trade in the various capitals of Europe—in Stockholm, St. Petersburgh, Berlin and Dresden. Mr. Denison himself is a practical man, having learned his trade thoroughly and practiced it conscientiously in those days when it was a credit to a man to labor with his own hands and to make his wares upon honor. In 1867, Mr. F. O. Scholze took charge of the manufacturing department, and still continues to manage it. The furniture manufactured is almost exclusively upon orders, and of the very highest style. Some idea will be gained of it, when we say that the chamber sets range in price from two hundred and fifty to a thousand dollars, and when it is known that a log of the French walnut, now imported from Turkey, of less than two feet in length, is worth $1,500 in currency.

It is needless to say that the workmanship, for solidity, durability and nicety of finish, is of the very best. In Mr. Scholze the firm have an artist well worthy of the beautiful material he uses—as rosewood, mahogany, Hungarian ash, and French walnut. The designs for chamber sets, mantels, cabinets, and so on, are by him carefully drawn, from them working models are prepared, and there is throughout an elegance and harmony, a simplicity and tastefulness evidencing high culture, and which only an educated taste is prepared to admire and appreciate. Some very fine work has just been finished for one of the largest and most elegant stores in the city of New York, and it may be said with perfect confidence, that the best work of this concern is unsurpassed by any made either at home or abroad.

The salesrooms are in Howard Building, Westminster street, which is 200x64 feet, and three full stories of which they occupy. Here is carried on many of the finer operations, and the upholstering. Here are satins at twenty dollars per yard, chintzes from France, embossed paper for walls, and embossed leather for furniture to match, and all that variety of goods which goes to make a complete assortment of articles for the house, the counting room and the bank parlor. Last year Mr. Denison visited Europe and had access to all the principal houses engaged in the same business, and this firm now imports directly from the leading manufacturers in England and France the material for upholstering, curtains, and choice porcelains for the finest cabinets, &c.

Messrs. Potter & Denison not only furnish houses, in the ordinary acceptation of the term, but they provide doors, put up carved wooden mantels, paper the walls, and fresco ceilings, finishing rooms and residences with a unity of design, and symmetry of form and color, which is impossible where the work is entrusted to different persons. Rich as are their goods, they all bear the mark of a chaste taste. Nothing could exceed the elegance of their book-cases, save the books which would appropriately fill them. Of course such furniture, so designed and made by hand rather than by machinery, is expensive when compared with the goods usually met with in the sales-rooms, but it will last for generations, and amid all the fluctuations of fashion will ever remain as pleasing to the eye as it is graceful in form and substantial in appearance and in reality.

PROVIDENCE JOURNAL.

WEDNESDAY MORNING, JUNE 7, 1871.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

No. XXXIX.

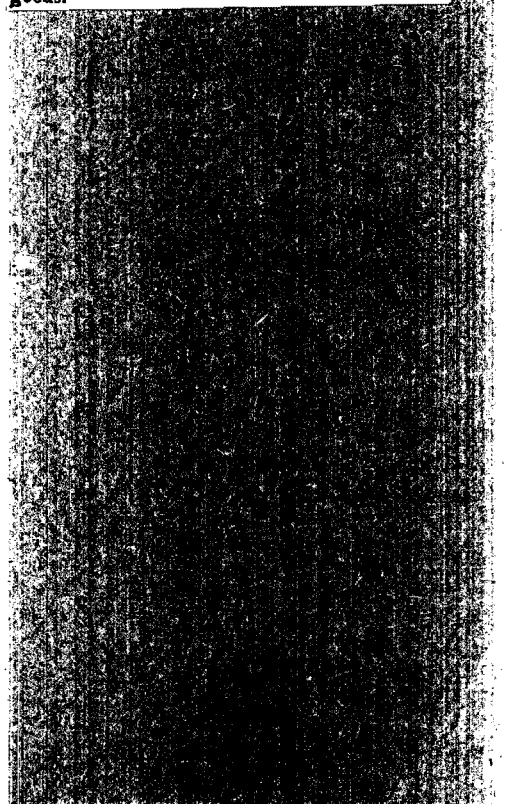
"Providence Shell Work."—Adams & Knight.

Since the time when the eldest servant of Abraham, with a golden ear-ring of half a shekel weight, and two bracelets of ten shekels weight of gold, found favor for his master Isaac in the eyes of Rebekah, jewelry has been one of the most universal desires of womenkind, and a mark and symbol of the progress of civilization. Among rude people common and merely glittering ornaments have sufficed, but in polished communities legance of form and fineness of finish have been superadded to the intrinsic value of the material. The diamond is cut with elaborate care, gold is burnished or otherwise, according to the prevailing taste; in the British Museum some ancient Roman ornaments in Etruscan style are preserved as wonders of art, and in our day and city some seventy establishments are engaged in producing jewelry of all qualities and styles. Among these the shell work of Adams & Knight stands pre-eminent for its unique styles and superior workmanship. The only manufactory of the kind in the State, it is at the same time the most complete and perfect in the world. This establishment is the result of small beginnings. Nearly a quarter of a century ago Oren Claflin commenced the manufacture of tortoise shell combs in Providence. His shop was at first on Bowen street, and was afterwards removed to North Main street, where Mr. Claflin remained during his life. For many years he occupied, for the coarser work of making horn combs, a windmill on Prospect Hill. When he commenced making shell combs, he took into partnership Mr. Jeremiah S. Adams, then a young man who had learned the trade in Boston, and the firm of Claflin & Co. continued until the death of Mr. Claflin, in 1867. In 1868 Mr. Adams and S. F. Knight entered into partnership under the name of Adams & Knight, and opened a store on Westminster street. They were burned out in 1869, and soon commenced anew in the large and elegant Fletcher Building, at the corner of Westminster and Eddy streets.

At the time Claflin & Co. commenced making shell combs, this article was, in its finer qualities, exclusively imported. In three years the goods of Claflin & Co. had entirely superseded the foreign goods, and their importation ceased. Consequent upon the changes in fashion, these combs, which our maturer readers will recollect as having been often very large and richly chased, have ceased to be manufactured. Since 1866, probably not one has been made in this country. Apparently this was an end to the business of Mr. Adams, who was, as he still is, a practical manufacturer of shell work; but with the adaptedness which characterizes the New Englander, he turned his attention to other articles, and such has been the versatility of his powers that his firm now stands at the head of this manufacture in this country, and makes goods superior in finish to those of Europe. Their business has constantly increased, being now four times as large as it was on Westminster street; and not only so, but their orders are enough to employ double the number of hands they now have. The difficulty is in obtaining workmen who possess the requisite skill. It is not enough to import the best workmen from abroad; for, as Mr. Adams has in the course of his experience improved and invented tools, it is necessary to instruct the European workmen in their use. In France and Italy tortoise shell has long been employed and highly prized for the purposes of ornamental art. It has ranked, when carved, with cameos, and the labor expended upon it has been disproportionate to the value of the raw material as viewed by the inartistic eye; but its fine grain, and varied and delicate coloring, rendered it an object of interest to those of cultivated taste, and by the few it has been eagerly sought.

The superiority of the Providence work is attained by a critical study of artistic forms, and a greater attention to finish, rendered attainable by better implements and carried out by the genuine Yankee "knack" of doing things. A very erroneous impression is entertained by the majority of people, as to the way in which the requisite thickness of shell is attained for the heavier articles, such as breast-pins and lockets. It is generally supposed, by those who give the matter a thought, that it is by melting the shell and pressing it into form. This is quite a mistake, as such an operation would entirely destroy the texture of the shell and eradicate its finer colors. To produce the most excellent articles, the shell is carefully assorted, and, as it is on an average less than an eighth of an inch in thickness, it has to be welded until it is thick enough to bear the requisite carving. This is accomplished by carefully preparing it and placing the proper number of pieces in wet cloths and subjecting them to severe pressure under heat. The shell thus welded, and made as one piece, is treated to several manipulations with hot water and renewed pressure, and great pains has to be taken in cooling it, under such circumstances, as to retain its fibre, and prevent its cleaving, as the European article is often inclined to do, in consequence of imperfect processes. Compactness, and adequate thickness and durability of form thus obtained, the material is ready for the workman. To procure the more costly fabrics, a design on paper or a pattern in brass, is placed before the person who is to make the article. Some of the primary work is done, such as cutting out the rude blocks, by machinery, but thereafter the work is done wholly by hand. The welding presses used in this establishment were made made by Mr. Adams and are greatly superior to the means used abroad for the same purpose. In carving, there is a great waste, sometimes as much as seven-eighths of the original mass. It is in the delicacy of the carving and in the perfection of the polish that the American shell work is superior to the European article, as well as in greater thoroughness and solidity with which the individual pieces are wrought into one.

A very considerable fraction of the business done by this concern is that of making elaborate work upon special and private orders, and special orders from the trade for a limited number of the same kind of articles, preventing cheap imitations. The lockets are sold at retail for from five to fifteen dollars each, and the completeness of the work is something marvellous. The new store of Adams & Knight has been fitted up in a manner to correspond with the articles they make. Lofty, light, handsomely frescoed, and filled with goods of their own manufacture and articles of vertu imported from England and France, it is not singular that it should have proved one of the most attractive establishments in the city. It will be readily understood that the cost of such shell work as we have been describing is no slight. The day's work which costs in France one dollar costs here five. True, after having become accustomed to the improved tools given him here, the workman can perform more and better work in a given time, but the difference in wages still remains very great. Some of the men employed by this firm earn six dollars per day; the average per month is about one hundred and forty dollars. This, of course, refers to the carvers and manipulators of the more delicate processes. A four-horse-power engine furnishes motive force, and nineteen men are employed. Perhaps no business in our city has grown up to the same extent and to so wide a recognition in the marts of luxury, with so little advertising, as this. Mr. Claflin was a remarkably quiet man, and his successors have mainly depended for their success upon the merit of their goods.



PROVIDENCE JOURNAL.

THURSDAY MORNING, JUNE 1, 1871.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

No. XXXVIII.

Jewelry.—Sackett, Davis and Company.

The business of manufacturing jewelry was commenced in Providence at an early day, of course, in a comparatively small way, and has grown to be a very large and important interest. Nehemiah Dodge, was one of the pioneers in this branch of industry, and carried on a business which for those times was considerable, and which he conducted successfully. Joseph Veazie was one of those early engaged in this trade. The late Gen. Josiah Whitaker, who recently deceased, full of years, and whose memory is fragrant with the teachings of a good life, was in his youth an apprentice with Nehemiah Dodge and afterwards did an extensive business. Galen and Arroet Richmond were well known men in this line, and were at one time the leading manufacturers. Of Jabez Gorham we have lately written. Christopher Burr still lives at an advanced age, and until within a few years has actively pursued his labors as a jeweler, having been engaged in this pursuit for half a century. In former days he manufactured plain gold jewelry as did the others, and all acquired a good reputation, and made money.

Adnah Sackett first commenced business about the year 1820, the firm was Sackett & Shaw. Americus V. Potter, who is still a manufacturing jeweler, was apprentice with Mr. Sackett in 1823. Church and Metcalf commenced in 1830 G. & S. Owen began about the same time. They were laborious, persistent and successful, and still remain in the business. The firm of Sackett & Potter, (Adnah Sackett, Americus V. Potter,) was formed about 1830, and afterwards Christopher C. Potter was admitted a partner. Thomas Davis joined the concern soon after 1846. Besides these, there were up to this time a great many persons who attempted the business and failed.

As early as 1820, Sturgis Davis & Henry P. Babbitt entered into this manufacture, and won a high place among the trade. Hezekiah Willard began as a blacksmith, then learned the art of chasing with Davis & Babbitt, and was afterwards connected with Mr. Sackett. He was a steady, honest man. Willard went out of the firm of Sackett & Willard about 1846, and a new firm was composed of Sackett, A. V. Potter, & Hicks. This firm, after a while, dissolved, and the firm of Sackett, Davis & Potter was formed) A. Sackett, A. V. Potter and Thomas Davis.) In 1857, this firm dissolved, and reformed with the addition of Arthur Potter. The present concern was formed in 1846, and is composed of Thomas Davis, George P. Tew, Lauriston Towne and George H. Sackett. The building occupied by Sackett, Davis & Co., is built of brick, 35x100 feet, four stories high, and another story is to be added the present summer, which will accommodate seventy-five additional workmen. The number of hands now employed is one hundred and fifty. This concern manufactures only solid gold work for the trade. They make a general assortment of the principal articles, such as chains, rings, sets, pins, necklaces, lockets and buttons. For several years they have made, in gold, exclusively solid gold goods of the very highest quality. They manufacture also solid silver watch chains. Their purchases of gold are almost entirely of twenty dollar coin pieces, and of the kind known to the trade as "red coin." For silver they obtain dollars from the mint. Each coin is tested before it is used, in order to assure perfect conformity to the standard maintained in their work.

The goods are made 14, 16 and 18 carat fine, and every article is stamped, and the character of the firm is such that their stamp is, and is accepted as, a guaranty sufficient of the intrinsic value of their wares. In the manufacture of gold goods, the gold is melted in a black lead or sand crucible, and in order to insure the requisite texture it is in some cases, after having been melted and rolled, again melted. To know when it is sufficiently heated, the greatest experience is required, and nothing save the longest practice and the most careful scrutiny, suffices to render one proficient in this art. The skilled workman judges by the color of the metal, and a peculiar appearance which is as evanescent, as it is to him unmistakable. After being melted, the metal is turned off in ingots of various shapes, according to the use it is to be put to, some being flat, and some in the form of wire, and is then rolled by machines of immense power to the proper size. In the old days the ingots were worked down by hand; power was first introduced about 1844. Here, as in other manufactures, machinery has supplemented to great a extent manual labor, adding to the productive power, and the quality of the production. Since the war the kind and quality of the goods made has improved about fifty per cent. and this may be said of the character of the jewelry most required at the present time.

The sets of jewelry made by this concern, of solid gold and precious stones, are of the very highest style of workmanship. Their chains are made by machines invented by Mr. Lauriston Towne. These machines are themselves specimens of the skill and genius of their originator. Some of them turn out chains so fine that they could not be made by hand, and they, (the machines,) are of such exquisite mechanism, that when they require repair, it can only be done by the aid of the magnifying glass. It is unnecessary to add that Mr. Towne is a mechanic of the highest class. The firm are now running six of these machines, but have twice that number on hand They produce, each machine, two hundred feet o chain per day. They are more than equal in point of mechanical ingenuity to the sewing machine. A narrow strip of gold is placed in the machine, and comes out a perfect and beautifu chain, delicate in appearance, and yet very strong In every department there is thorough system, and the most perfect order. The senior partner, Mr. Davis, has been, man and boy, continuously in the business for half a century.

Mr. Davis has not only been for many years prominent business man, but has often and well filled important public positions. As a Democrat he was elected as Representative in the General Assembly of Rhode Island, from the town of North Providence, in the year 1844, and remained in the House for ten consecutive years, with the exception of one year when he declined a re-election. He was elected Representative in Congress, from the First District of Rhode Island, in 1853, and was again run, but defeated by the whirlwind of Know-Nothingism which swept over New England in 1855-6. He is the oldest manufacturer of jewelry, now engaged in the business, in the State, and now, in the prime of life, as a manufacturer and as a man, commands the respect of all who deal or compete with him, either in business or politics. Of the apprentices of Galen & Arroet Richmond, four, to wit, Thomas Davis, Americus V. Potter, Christopher C. Potter and Allen Mathewson, were at one time in the General Assembly together. Mr. Mathewson has some time since, retired, with more than a competence, from active business, but he does not disdain to indulge occasionally, in a quiet way, in the game of politics, and, although seeking and accepting no office, whenever he does take a hand he is pretty sure to hold, not only the right bower, but as many as are necessary to win the game. Frank, manly, earnest and true to his friends, Mr. Mathewson is a power in the State.

Mr. Tew is also well known in public life. He first came into office as a Democratic candidate for member of the Town Council of Cranston, in opposition to the Know Nothing nominees. He was afterwards, and for years, President of the Town Council, the financial member of the school committee for that town, was in the Senate two years, and when the annexation of that part of Cranston, which is now the Ninth Ward of Providence, took place, Mr. Tew was elected to the Board of Aldermen and has been continued in that position since, frequently having, in the absence of the Mayor, been the acting Mayor. Without any particular taste for public life and sacrificing ease and money in holding office the citizens of his town and ward have kept him in various positions without intermission since 1855. As a practical man, interested in the welfare of the city, and having ample knowledge of its needs and capabilities, he has been a most efficient member of the city government.

DAILY JOURNAL.

FRIDAY MORNING, JUNE 9, 1871.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

No. XL.

Brown & Sharp Manufacturing Company. Machinery, Tools and Sewing Machines

David Brown and Joseph R. Brown, his son, came to Providence from Pawtucket and commenced business as watchmakers and clock and mathematical instrument makers, and manufacturers of machinists' tools, in 1833, in the building, then occupied, on South Main street, by Peter Grinnell & Sons. They also did a considerable business in putting up turret clocks. They were burned out in 1837, and removed to North Main street, thence to Weybosset, and eventually to the building now occupied, on South Main street, as a counting room, and for the manufacture, so far as its limits permit, of sewing machines. This building is not a very striking specimen of architectural beauty; two stories high, and stories of eight feet or less, with gable roof, it is not calculated to attract the attention of the passer-by, either by its proportions or its size; and yet it is well entitled to a close look and respectful consideration. It was built by John Brown, for a storehouse, when commerce was the predominant interest of Providence, and when brigs from the West, and ships from the East Indies gave a picturesque beauty to our river, which steam tugs, however useful, and bridges, however staunch and immovable, cannot maintain. In that small building, in which once the silks, and teas, and spices, dear to womankind, were stored, are now packed, literally packed—hundreds of men, with what seems an infinitude of machinery, employed in making sewing machines. In no place have I ever seen such compactness of labor. This has resulted from the rapidly growing business, and the impossibility of accommodating it properly and permanently within the space accessible. In 1853, Lucian Sharpe came into the business, and it was conducted much as before, though with the ultimate purpose of rendering it more a manufacturing establishment, always in view, until 1860. In 1858, Brown & Sharpe commenced the manufacture of tools and sewing machines, and up to 1863 had manufactured 12,000 machines. To December, 1870, 136,000 machines. The product at present is one hundred machines per day.

The Brown & Sharpe Manufacturing Company was incorporated May, 1868. It consists of Joseph R. Brown, Lucian Sharpe, Frederick W. Howe, and Thomas McFarlane, and besides the Wilcox & Gibbs sewing machine, this establishment manufactures revolving head screw machines, universal milling machines, tapping machines, grinding lathes, watch clocks, &c., &c. On South Main street they employ 270 men, and an engine of 25 horse power. Here the sewing machines are mostly made and adjusted, every part being made in duplicate, so that in case of breakage there is no difficulty in at once, and cheaply, repairing the machine.

Fifty years ago the possibility of sewing by machine was practically demonstrated; the credit is to be assigned to the Rev. John Adams Dodge, of Monkton, Vt., of inventing the first sewing machine, he having as early as 1818 invented and constructed an instrument which made the "back stitch and sewed a perfect seam."

For nearly thirty years experiments were made by different persons, and in 1846 Elias Howe, succeeding in introducing into use that machine which is now made by different firms and under various patents, at the rate of two thousand per day. It was not, however, until 1852-3, that, upon the appearance of other machines, based upon the same general principles as that of Howe, but containing improvements, that the sewing machine came really into public favor. The radical difficulty with the earlier machines was that, in consequence of the use of two threads, the machinery was too complicated for economy and for universal use. A sewing machine must be controlable by the average intellect. The Wilcox & Gibbs machine is, as an examination of it will show, a very simple, single thread machine. The points of superiority claimed for this machine are numerous, and a perusal of the pamphlet of the manufacturers will give a good deal of information, beside that of testimonials in favor of their instruments. Without disparaging any other, it is but just to say that this appears to be an excellent, economical and durable article.

Messrs. Brown & Sharpe are also interested in the firm of Darling, Brown & Sharpe, manufacturers of United States standard rules, cast steel try-squares and other tools for accurate measurements. This concern is established at present at South street, where there are eight men employed, and an engine in use of eight horse power. At Pearl street, Brown & Sharpe Manufacturing Company have a room with seven horse power and thirty men. This company are obliged to occupy other room for various purposes, but will soon consolidate their business in the new building now going up on Promenade street. This is to be one of the finest and most substantial manufacturing edifices in the State. It will be constructed wholly of granite, brick and iron, and so made as completely fire proof as is possible. The company have three acres of land, and with arrangements for ready enlargement, the new building will be 50x161 feet; with two ells, each 50x50 feet. It will be four stories high, the basement story being nine feet six inches in height; the first story, fourteen feet nine inches in height; the remaining stories thirteen feet six inches in height. The windows are lofty and as numerous as consistent with perfect solidity. An artesian well will furnish water, and an engine of sixty horse power, motive force. The iron beams to support the floors are of rolled iron, twenty-four feet long, fifteen inches in depth, and weigh each 1,600 pounds. The roof will be supported by iron and brick, and made fire proof. The building will rest upon 1,200 piles, driven from eighteen to twenty-four feet deep. The granite foundation walls are thirty inches thick, cemented; the brick walls twenty-four inches thick. A large elevator will facilitate operations, and the means of ventilation are full and certain.

In 1848, the firm of D. Brown & Son employed five hands, and the present concern is the result of the mechanical skill and the well-known integrity of that firm, supplemented by the infusion of equal skill and honesty as the new partners successively came in. Messrs. Sharpe and McFarlane grew up in the concern, and are therefore practical men. A very well selected and sufficiently large library is placed in a room in the workshop, and is free to all the men. A considerable number of the machines employed in making the several parts of the sewing machine were invented by the proprietors of the establishment, and some of these are worth studying of themselves. Among others we notice one making at the same time five different cuts upon a piece of iron, shaping it quickly and exactly for the use it was destined for. The Wilcox & Gibbs machine has two hemmers, narrow and wide; a quilter, corder, tucker, it embroiders and braids. To the ordinary masculine intellect, this machine appears handsome enough, effective enough, and manageable enough to satisfy the requirements and very materially lessen the labors of the prudent housewife. The demand for these machines is constantly increasing, and we consider it something of no slight importance that the manufacture should have been commenced here and proceeded to such present and prospective importance. Our varied industry is mainly devoted to the necessities of life, and among the labor-saving machinery of this inventive time and people, few things ameliorate the daily toil more successfully than the sewing machine. The members of this corporation are all young men, save Mr. Brown, who is a trifle past the meridian, but who, sustained by a sense of good work done, a handsome fortune and pure democratic principles, promises to be guide and exemplar for a good many years yet.

PROVIDENCE JOURNAL.

SATURDAY MORNING, JUNE 17, 1871.

MANUFACTURING AND MECHANICAL INDUSTRY OF RHODE ISLAND.

No. XLI.

Silver Spring Bleachery and Dyeing Company.

This establishment, which is situated on the Louisquisset Pike, in North Providence, but just on the edge of the city limits and population, was commenced in 1847 by Joseph Hoyt and Joseph Knowles. The firm was afterwards Frieze & Hoyt Mr. Knowles having retired; Isaac Proud was for a short time a partner, then Mr. Frieze held it alone, and again the firm was Frieze & Dow, until 1864, when an act of incorporation was obtained and Henry Lippitt was chosen President, and Charles H. Merriman, Secretary, in which offices they have remained continuously until the present time. Mr. Albert Armington, the present superintendent, became connected with the works in 1852, and has ever since occupied the same position. Until 1865, the operations were confined to bleaching, the capacity up to 1864 being about 800 pieces per day, and now being 1,000 pieces. The land, on which the old or bleaching establishment was located, was leased for a long term of years, but of late additions have been made by purchase until the company own some seventy acres. In 1865 the dyeing works were added, the capacity of which is 800 pieces per day Very great improvements have been made and are making on the real estate, including a reservoir some 300 feet long and 64 feet wide and 7 feet deep, stoned up and to be finished with a wide parapet and sodded over. This will give some 12 feet fall of water, which is to be conveyed in 20 inch iron pipe, of which 1,200 feet will be required. The water will be pumped from the pond into the reservoir. The stream, although a small one, is permanent, and within a short distance supplies the Wanskuck mills above and the Allen works below.

The bleachery is situated on the southerly side of the Pike, and the buildings are as follows: Machine shop and brown goods room, two stories, brick, 20x110 feet; brown goods room, bleach house, mangle room and finishing room, calender and packing rooms and office, 75 feet, two stories, brick; 171 feet, one story, 34 feet wide; blacksmith shop, brick, two stories, 20x20 feet; kier room, two stories, brick, 48x34 feet; engine room, one story, 20x40 feet; starch room, 22x40 feet; boiler and drying house, two stories, brick, 40x44 feet; two store houses, one story, severally 60x25 feet, and 110x30 feet; barn 30x50 feet, and 460 feet of drying sheds.

The dyeing works consist of one four-story brick building, 105x40 feet, with an ell one story, of brick, 100x38 feet, and one 184x38. A wooden, one story building, 136x34 feet, in which are to be placed three tenter dryers; one drug store house and repair shop, two story, brick, 40x38 feet; one story store house, 65x20 feet, wood; singeing house, 24x30 feet; steeping house, 25x50 feet, two story, brick; engine house, 24x40feet; boiler house, 70x40 feet; hose house, 14x20 feet; rag house, 16x24 feet, hnd 250 feet of drying shed.

In the bleachery is a press weighing 35 tons and costing ten thousand dollars, used for making the paper rolls employed in the calendering rooms. There are 185 persons employed; the amount of coal used is ten tons per day; there are boilers equivalent to 737 horse power and three steam engines, each 120 horse power. The pay roll is about $5,500 per month. Hydrants and a full supply of hose are provided, and in case a fire should break out when there was no supply of steam, horse power is so arranged as to be effective until steam could be got up. Mr. Armington takes a just pride in the trees he has planted, in his grass plats, and in the improvements which have been made, and are making handsome and available land of an original bog. The goods which are turned out from the dyeing establishment, are dress goods, cambrics, Chinese grass cloth, silesias and jaconets. The coloring is of every shade, and of fine quality, and the concern bears internal and external evidence of thrifty management and excellent success. Since May, 1866, Mr. John Burton has had charge of the dyeing establishment, and has brought it to its present state of unsurpassed excellence.

The President of this company is also President of the Board of Trade.

Wants

WANTED,

A Reed Finisher. To an expert and good workman steady employment and good wages will be given. Address Reeds, Box 247 Post Office, Troy, N. Y.
j14 1w

NOTICE.

WANTED—A young man 17 or 18 years of age, to learn the Apothecary business. One having some knowledge of the business preferred. Apply immediately to BYRON SMITH, Druggist and Apothecary, 201 and 203 North Main street, Providence, R. I.
j14 3t*

WANTED,

A Situation for two English Protestant girls to do light housework, or to take care of children. Religious families would be preferred. Apply at 12 South Main street, room No. 4. 3t* j14

WANTED.

AN Assistant Book-Keeper. Wages moderate. Good reference required. B. P. CUNNINGHAM,
j12 tf 108 and 110 Broad st.

WANTED—WOOLEN MILLS.

WANTED—A Manufacturing Agent to superintend about fifty sets of woolen machinery. He will be furnished with an exceedingly pleasant and in every respect desirable residence, and paid a very liberal salary. Address W. M. A., Boston, P. O. 5t* j12

WANTED,

FOR a Fancy Cassimere Mill, a Boss Finisher, Dyer, Dr esser Tender, and six or eight Weavers. Apply by mail to JAMES WATERHOUSE, Centreville, R. I., or to JOHN A. TAFT, 8 South Water street, Providence. 6t* j11

WANTED.

LOOM Fixers, at Wanskuck. Apply to
j10 1w WILLIAM H. SALISBURY, Sup't.

WANTED.

LARD and Butter Tubs, or Kegs, by
WALTER WILSON, Agt., 62 Canal st.
Providence, Jan. 10, 1865. 3m

WANTED.

SITUATIONS for several reliable men, as Farm hands, Coachmen, Porters, &c. Also, for good female help, as Cooks, Chambermaids, Seamstresses, Nurses, general Housework Servants. Apply at the City Intelligence Office, 257 Westminster st., room No. 5 up stairs.

CARRIAGE IRONER WANTED.

WANTED—At Millbury, Mass., a first rate Carriage Ironer, to whom fair wages and steady employment will be given. Apply at this office. 6t j10

WANTED,

A First class Folder for Bleached Goods.
W. F. & F. C. SAYLES,
j10 12t Pawtucket, R. I.

SITUATIONS WANTED,

TWO good, smart and intelligent Boys, one 11 and the other 13 years of age, want situations in the country with honorable men. They will expect to work and be humanely cared for. Inquire of L. K. JOSLIN, 207 Broad street. TUWTH4.* j10

GENERAL INTELLIGENCH OFFICE.

WANTED at the General Intelligence office, No. 12 South Main street, Room No. 4, up stairs, good help for the city and country. People wanting help will do well to call, it being the only license office in the city. Office open from 9 a. m. to 6 p. m.
JOHN A. CREIGHTON, Proprietor.
j9 6t*

WANTED,

A Copartnership in some established business, either manufacturing or mercantile. Address "Capital," Look Box 472 Providence P. O. 6t* j9

BONES WANTED.

BONES of any kind, in any quantity, delivered anywhere, are always wanted, and for which the highest market price will be paid in cash, by the Rumford Chemical Works. Office 58 South Water street.
f15 J&B GEO. F. WILSON, Treasurer.

WANTED,

A Fancy Dyer; none but those that can bring the best of recommendations need apply. Call on JOHN WORSLEY, 3 Park street, Providence, R. I., for three weeks. 3w* j3

CHESTNUT PLANK.

WANTED, for the city of Providence, 25,000 feet 3 inch Chestnut Plank, 10 to 12 feet length, straight edge. Will receive proposals till Feb. 15th, 1865.
d29 tF15 SAMUEL B. DURFEE, Surveyor.

WANTED.

A Tin Plate and Sheet Iron Worker; one capable of taking charge of the shop. Must come well recommended. B. P. CUNNINGHAM,
d26 tf No. 108 Broad st.

WANTED.

A Practical Farmer wants a situation as manager of a farm. Satisfactory reference given. Address Box No. 12 Wakefield Post Office, Rhode Island.
d21 tf

PAVING STONES.

WANTED for the city of Providence, 2000 tons o Paving Stone, for which the highest market price will be paid. Address S. B. DURFEE,
je10 tf Surveyor of Highways.

FOR SALE,

ONE Hill's Speeder, 128 spindles, six inch traverse, has been used three years, is in good running condition, and looks about as well as a new machine, is but very little worn. Apply to GEORGE M. MORSE, Putnam, Conn. tf j13

Pickles, Sauces, Fresh Tomatoes, &c.,

MANUFACTURED BY

S. M. NESMITH & CO.,

96 and 98 North Street, Bost Mass.
j12 eod1m*

White Wine Vinegar,

SUITABLE for Pickles. For sale by
HILTON BRO.'S & CO.,
j12 tr Nos. 50 and 52 Stewart street.

To Owners of Horses.

C. BRENNAN, VETERINARY SURGEON. ORDERS left at Hopkins's Hotel, High street, or at C. H. Childs's Stable, Dorrance street, will receive prompt attention.

References—Hon. Amasa Sprague, H. B. Billings, George Thayer, A. W. Corliss, R. C. Anthony, L. Smith. 2w* d30

Apples and Pickles

FOR sale at 84 Canal street by
n22 2m* J. A. BUDLONG.

PJ 1-14-65

Miss Anna E. Dickinson,

The most captivating female orator of the day, will deliver her popular Lecture,

Woman's Work and Woman's Wages,

—ON—

MONDAY EVENING, March 27th,

—IN—

Roger Williams Hall.

Every effort will be made to make this the crowning lecture of the season. The lecture will be preceded by a musical entertainment of half an hour.

Lecture commences at quarter to eight. Tickets 25 cents. Reserved seats 50 cents, to be had at Cory's Music store, and at the Bookstores generally.
m18 J&Bstutsm

World's Favorites are Coming

sion."

THE PNEUMATIC OR BESSEMER PROCESS.

TO MANUFACTURERS OF IRON AND STEEL.

THE proprietors and assignees of the several Letters Patent granted by the United States to Henry Bessemer and Robert Mushet, of England, and to William Kelley of this country, for certain improvements in the manufacture of Iron and Steel, having, for the purpose of avoiding all conflict of claims thereunder, consolidated their interests in said patents under a trusteeship, styled "*The Trustees of the Pneumatic or Bessemer Process of making Iron and Steel,*" the undersigned, the Trustees aforesaid, invite attention to the advantages of the above process, which can be fully and freely examined at the Works of Messrs. WINSLOW & GRISWOLD, at Troy, N. Y.

The great strength, toughness, perfect homogeneity and comparative cheapness of production, of the Pneumatic or Bessemer Cast Steel, as well as the enormous extent of its manufacture and use abroad, are too well known to require comment; and the undersigned are pleased to state that Works have been, and others are now being erected in different sections of the country, to supply, in part, the demand so rapidly increasing here for Steel Rails, Axles, Tires, Boiler Plates, Forgings, &c., &c., made by their process.

Licenses will now be issued on reasonable terms to all who desire to engage in the new manufacture, and the undersigned hereby give notice that they have appointed Mr. Z. S. DURFEE, of 418 Walnut street, Philadelphia, their General Agent, for the management of this department of their business, and, that all communications respecting Licenses, and inquiries concerning the Process and cost of the apparatus therefor, &c., &c, should be addressed to him as above.

JOHN F. WINSLOW, Troy, N. Y.,
JOHN A. GRISWOLD, Troy, N. Y.,
DAN'L J. MORRILL, Johnstown, Pa., } Trustees.
s26 6m

HOWE'S

WANTED IMMEDIATELY.

TWENTY first class Brick Layers, to work on the Davol Mills, now being built at Fall River, Mass. Apply to SAM'L M. LUTHER, Master Mason,
je22 6t Fall River, Mass.

WANTED.

ATTENTION, MASONS.

WANTED—10 or 20 good Bricklayers. Pay from $3 to $4 per day. Long job and steady work. Inquire of H. R. TRYON, Hartford, Ct.
jy13 3t*

WANTED.

TO go a few miles into the country a smart Protestant or colored girl to do general housework; must be a good washer and ironer, and understand good cooking. Any one that can come well recommended can find a good situation by applying at 26 Westminster street, Room No. 4. tf j10

WANTED.

BRICK MAKERS WANTED.

TWENTY men to work in a Brick Yard; also ten good Shovelers. Good wages paid. Apply immediately, between the hours of 8 and 10 a. m., at Business Agency, Room No. 7, Merchants Bank Building, 14 Westminster street. tf a15

WANTED.

Corliss Steam Engine Co.

[INCORPORATED JUNE, 1856.]

GEORGE H. CORLISS, President,
WILLIAM CORLISS, Treasurer,
Providence, R. I.

MANUFACTURERS OF

STEAM ENGINES

With Corliss' Patented Improvements.

GEARING

Cut with Improved Patent Machinery,
BOILERS, SHAFTING, IRON CASTINGS, &c.

THE CHICAGO "NATIONAL LABOR CONGRESS."—The Chicago *Tribune* lightly esteems the position and influence of the small body of men who last week gathered at Chicago to make laws for the working-men of the country. It says:

"The Journeymen's General Convention has now completed the fourth day of its session. It professes to represent all the laboring men in the United States. It claims a constituency of half a million of members in ten thousand lodges, and aspires to the dignity of title of 'National Labor Congress.' These ten thousand lodges are represented by sixty four delegates—a dozen of whom are from this city. Each lodge or branch of trade in a city or town is entitled to one member, from which it would seem that 9,900 of the lodges or 'Unions' are unrepresented, caring so little about the 'Congress' or its doings as to ignore its existence. It was confidently expected by those who engineered the Convention, that not less than four thousand delegates would be on hand at its opening and so sanguine were they of the presence of a mighty multitude that they hired the spacious Wabash Avenue Skating Rink to accommodate the vast crowd. The resolves of the little synod remind one of the five tailors of Dooley street, who 'resolved that *we*, the people of England do order and ordain' so and so. With amusing gravity this 'Labor Congress' pronounce the property holders of the United States 'enemies of labor,' who must be put down or crushed out. They issue bills of excommunication against the National Banks, and strike a mortal blow at the half million holders of the National debt. The railroads are to be swept away with a stroke of their pen. Perhaps if the banks should pay their tavern bills and the railroads 'dead-head' them home, they might be so far placated as to postpone the evil day set for the destruction of these money changers and common carriers. The 'Congress' has ordered the organization of a new party, and decreed that no man shall be allowed to charge more than *three* per cent, interest for the use of his money. What security, if any, he will be permitted to take, by a singular oversight, is not stated. If a man has money and declines to lend it to the members of the lodges at *three* per cent, the inference is strong that the Mexican system of forced loans will be applied to relieve him of his surplus greenbacks. The boys have cut out more work, we fear, than they have capacity to put together."

PJ **Wants.** 8-31-1867

WANTED—DYER—A competent man for Worsted Braids and Yarns. Must be familiar with Analine colors. Address, with particulars and references,
THOS. R. ELLIOTT, Supt.,
a31 13t* Cincinnati, Ohio.

WANTED—SHOEMAKERS—A number of turned shoe workmen can find steady employment by applying at 42 Exchange Place. None but good workmen need apply. 1w* a31

WANTED—A PARTNER—A Domestic Commission House in New York, thoroughly established with first class connections not requiring advances, would like to confer with a thorough business man, either as General or Special Partner, with two hundred thousand dollars. References exchanged, and any communication considered strictly confidential. Address E. G. B., Box 2956, New York Post Office. eod12t* a31

WANTED—Twister and Reel Tenders. Apply at the old Slater Mill, Pawtucket.
a31 tf N. P. HICKS & CO.

WANTED—An experienced Pentograph Operator Inquire at 26 Exchange Place.
a30 3t* GEO. BRIDGE.

WANTED—TIN PLATE AND SHEET IRON WORKER.—A man capable of taking charge of a shop, can find steady employment and fair pay by enquiring at the Providence Hotel from 11 a. m. Thursday to 1 p. m. Friday. 3t* a30

WANTED—A young man of experience wishes to engage with some house where his services will be required as assistant book keeper or travelling salesman; can furnish the best of reference. Address
a29 1t* "L." P. O. Box 903, Hartford, Conn.

WANTED—A first class Pattern Maker immediately. Apply to HOWARD & DANIELS, No. 4 Spring Lane, Boston, or refer to Cheney & Perry, corner of Lockwood and Conduit streets, Providence, R. I.
a28 3t*

WANTED—Spinners an Ring Frames and Mules, also a few good loom fixers. First class hands can have good pay and steady employment by applying to the Shetucket Co., Greenville, Conn. 1m. a27

WANTED—A copy of the Manufacturers and Farmers Journal of August 30, 1866, for which a liberal price will be paid. Apply at this office. a26

WANTED—TO WOOLEN MANUFACTURERS—A situation as a first class woolen dyer. Address Overseer, No. 50 Washington street, Worcester, Mass.
a26 6t*

WANTED—WEAVERS.—50 experienced Weavers wanted immediately, to whom good prices will be paid and steady employment given at the woolen mill of J. WILCOX & CO.
West Meriden, Conn., Aug. 19, 1867. 2w a20

WANTED—A first class Folder for white goods, a married man preferred, at Moshassuck Bleachery, Smithfield, R. I.
a21 2w W. F. & F. C. SAYLES.

WANTED—A situation as Superintendent of a Cotton Mill, by a man of fifteen years experience. Can give the best of references. Address M. N., at this office. 2t* a18

WANTED—MASONS.—Twenty-five good Plasterers wanted immediately at the Merchants Mill, Fall River, Mass. 15t a16

WANTED—On or before Sept. 1st, a young or middle aged American woman, as assistant in a family consisting of man, wife and four children. Must be able to do all kinds of housework, and kind to children. A suitable person, who can appreciate good treatment and deserves the same, can find a comfortable home, permanent and not arduous employment, and good wages, by addressing "Housekeeper," care Box 668 P. O., Providence, stating qualifications and other particulars. A woman from the country preferred. tf a15

WANTED—AGENTS—$10 to $20 a day, to introduce our new patent STAR SHUTTLE SEWING MACHINE. Price $20. It uses two threads, and makes the genuine Lock Stitch. All other low-priced machines make the Chain Stitch. Exclusive territory given. Send for circulars. W. G. WILSON & CO., manufacturers, Cleveland, Ohio. 3m a22

WANTED—Agents everywhere, at your own homes; $5 capital and you can clear $5 per day. We will prove to any one the above. Also, agents to wholesale and retail a variety of small articles, staple as flour, needed in every family; have been tested by thousands and given full satisfaction. Everybody buys them. Call and see for yourselves, or send 25 cents for samples and full information. No risk or humbug. S. CLOUGH, 14 Westminster st., Providence, R. I. a15