MANUFACTURING INDUSTRY.

R. HOE & CO.'S ESTABLISHMENT.

A DAY AMONG MACHINERY.

A day passed in a great establishment like that of HOE, is an entertaining experience. It is not necessary for us to tell who R. HOE & COMPANY are, for wherever the Printing Press runs, and the Saw buzzes, their name and works are famous. The rapid growth and extension of their establishment is a significant indication of the progress of Industry in America. It employs four hundred operatives, occupies an extensive range of buildings for manufacturing purposes, has a large warehouse in the tower part of the City, and is doing a thriving business. We propose to sketch the operations of the establishment, by way of exhibiting the extent of the demand for the peculiar fabrics which it turns out, and also to show how great a branch of industry a single firm may manage.

A BIT OF HISTORY.

In the first place, the history of the HOES is noteworthy.

It was in the year 1805, when the yellow fever was raging in the City of New-York, that a young mechanic landed on our wharves and made application for board to the well-known GRANT THORBURN. This young man was ROBERT HOE, the father of the present members of this firm. He was at that time but eighteen years of age. In the space of a week after his arrival he was prostrated with the fever, and recovered only after careful nursing and the watchful care of the benevolent Scotchman. ROBERT HOE, however, did not die; nor did his genius wither. He became a master-builder, carried on a very extensive business in this City; took up the manufacture of Printing Presses in the year 1819; took into partnership a brother-in-law, Mr. PETER SMITH, who was the inventor of the Smith Press; dispatched a skillful hand to England to examine all the improved machinery for printing purposes; introduced many important improvements in the manufacture of American Presses; and in 1833 retired from active business to make way for his son, Mr. RICHARD M. HOE, who, in conjunction with SERENO NEWTON and MATTHEW SMITH, conducted the operations of the firm. In the year 1833, the business of making saws was added to the works, and this has since become a very prominent and lucrative feature of the establishment. In 1837 Mr. RICHARD M. HOE visited England for the purpose of patenting a valuable improvement in grinding saws,—of which we shall have occasion to speak more fully. While there, the printing machinery of the country attracted his attention, and upon returning to this country he was able to improve very materially upon the methods of printing which were at that time in use either in Great Britain or the United States. Mr. HOE satisfied from the experiments he had already undertaken, that much greater successes could be attained, prosecuted his investigations with great industry; in 1842 began to realize his plans; and in 1846 filed at Washington a caveat for the patent he now holds for the *Lightning Press*. From that period to the present these Presses have been in unceasing demand; and the several branches of manufacture which are conducted in the establishment have increased in corresponding ratio.

The present members of the firm are RICHARD M. HOE, ROBERT HOE, and PETER SMITH HOE. The Superintendent of the works is ALFRED S. BOWEN. He has been connected with the establishment since 1830.

THE DEPARTMENTS.

A range of workshops on Broome, Sheriff, and Columbia streets, is occupied by the different branches of manufacture carried on in this establishment.

The departments are divided in the following manner:

1. Cylinder Press Shop.
2. Type-revolving or fast Press Shop.
3. Washington and Smith Hand Presses.
4. Job and Card Presses, and Inking Machines.
5. Iron Foundry.
6. Brass Foundry.
7. Forge or Smithy.
8. Millwright and Pattern makers.
9. Type-cases and Printers' Joiners.
10. Saw makers.
11. Saw grinders.
12. Saw hardening.
13. Draughtsmen.
14. Experimenting Shop.
15. Storage and Patterns.

THE SAW DEPARTMENT.

We speak first in detail of that department of the concern which is devoted to the manufacture of Saws. This has grown into an important branch of trade. The demand is constant, and the supply is equal to the demand—an effect of the facilities which the establishment enjoys. In all their shapes and sizes, HOE's saws are universally known. Large gangs of men are employed in this portion of the works. Shipments of goods are made daily to all parts of the country. Saws from this factory buzz to-day among the forests of Maine, ripping up the great pines, and forming the lumberman's only music. In the wilds of Texas; along the banks of the Mississippi; on the borders of the Lakes; up among the mountains of the Delaware; by the banks of streams upon which float the logs of the raftsman; wherever timbered districts repay hard labor with rich returns, where trees grow and are felled,—in among the shipyards of the city—in the joiners' shops,—by the stand of the cabinet-maker,—in a hundred places besides, where work is done and saws are needed,—there is HOE's saw. The extent of the trade is something extraordinary. There is a constant demand. There is a continual wear and tear. New mills go up, and old ones need replenishing. So the trade is steady and increases rapidly. As we before said, the saw factory is a prominent feature of the works. We propose to describe it briefly.

The operations that are rendered necessary before a simple-looking saw is ready for the customer are complicated. A number of hands are required to shape it; machinery to complete it; care to finish it for market.

The saw shop, located in the first of the Broome-street Buildings, is a large apartment. Below it is a section of the works devoted to the grinding processes. In these two places are conducted all the operations that follow the casting of the metal. The operations through which a saw passes, from the time it leaves the smithy to the period when it becomes the property of the customer, are:

1. Paring; 2. Drilling; 3. Toothing; 4. Flattening; 5. Filing; 6. Hardening; 7. Tempering; 8. Smithing; 9. Grinding; 10. Glazing; 11. Oiling; 12. Marking; 13. Blocking; 14. Trying; 15. Second Glazing; 16. Second Trying; 17. Setting; 18. Sharpening.

Each of these processes demands the application of a special set of machines, a special set of workmen to manage it, a special care in the conduct of the work. We will consider the more important of the operations in their regular order:

First—The Teething. This is an operation that appears simple, but which is in reality a complicated affair, accomplished by machinery so delicately adjusted as to be apparently of no particular value. You see sundry machines of similar pattern, ranged along one side of the long apartment devoted to this purpose. On the opposite side are ranged the platforms upon which rest the anvils used for straightening the saws. The teething instruments are ponderous arms of iron which descend vertically upon the plate of steel that rests upon a plane surface below. The machine, by a simple contrivance worked by the foot of the workman, is thrown in and out of gear at pleasure. The descent of the cutter notches a tooth in the plate, and the size of the cutters determine the size of the teeth of the implement. The work is performed very readily and nicely. There is little difference between the operations of teething the circular and the long saws. The circular saw revolves upon a pivot beneath the cutter; the long saw is managed by hand. It is a remarkable fact in connection with this department, that the same style of cutting machine has been in operation for twenty years past, since the manufacture of saws was commenced by the Messrs. HOE; while a similar pattern has been patented in England within a few months past. It is needless to add that HOE's machines are all worked by steam, not by hand-power.

2. The Blocking. This operation is simple and requires no illustration.

3. The Hardening. This operation is effected by heating the saws in charcoal furnaces to a white heat, and cooling them by plunging them into a bath of oil, prepared with drugs, a combination which is peculiar to this establishment and which of course does not need to be mentioned more particularly.

4. The Grinding. The saws having been toothed and hardened, are taken below to be ground. The long saws are ground by hand. Powerful grindstones, many of them six to seven feet in diameter, and a foot in thickness, are turned by steam power. The saddles upon which the workmen sit, are placed in front of the stone. The grindstones used in this work are imported from England expressly for this establishment, weigh two tons each, and are each six feet in diameter. The hard usage which they undergo wears them down rapidly, so that it becomes necessary to renew them every eight or ten weeks. Several times in a day, each stone is chipped upon the grinding surface with an adze, in order to bring out the harder portions of the stone, so as to render the process more effective. Great care is exercised in running them, so that they rarely fly, and we believe that but one or two instances have occurred in which workmen have been injured. The process of grinding a saw requires a nicety of touch and a firmness in handling that can only be done by an expert hand. The grinding of a long saw is intended to occupy only a few minutes.

But it is in the grinding of circular saws that the proprietors of this establishment especially pride themselves. When the Messrs. HOE started this branch of manufacture, the only process of grinding saws that was known, was by hand-power; the saw, inconvenient though it was in shape, was held by hand upon the grindstone. It should be stated in the outset that the sizes of the circular saw range *from two inches to six feet*. In order to accomplish the very important process of grinding them, so that each saw shall be perfectly true, delicate machinery, to be worked by steam-power, was found to be indispensable. A machine was contrived by Mr. HOE for this purpose. The superiority of its work in producing a complete finish of the saw-plate is remarkable. It has been made the subject of patents in the United States and Europe. It may be described as a vertical iron plate, with a raised centre, upon which the saw revolves. A lap, revolving with great velocity against this plate, in a direction perpendicular to its line of motion, distributes a compound of polishing material,—composed of a mixture of flint and emery,—upon the surface of the saw, and grinds and polishes it with perfect precision of movement. This is one operation. The second, which is carried on at the same time, is a horizontal motion of the lap against the saw, which motion is so graduated at pleasure that the saw is rendered thicker or thinner at any point. It may be here remarked that it is the intention of the workman always to increase the thickness of a circular saw from the edge to the centre. The third process drives the lap laterally along the surface of the saw; an operation which insures an equality of finish and an exact gradation of thickness. This "lap," therefore, performs not less than three distinct motions at one and the same moment. It is a marvelously ingenious and simple application of mechanical ingenuity. The laps remain good only about two weeks, and so are constantly undergoing renewal.

5. The Setting and Finishing for market. These processes involve much scraping of files between and across the saws' teeth; a noise that sets your teeth on edge, as well as those of the saw that the workman has under his hands; a bustle and a lively time in the workshop. Tackle for hoisting, piles of saws ready for the finisher, waiting for market, or packed up to be forwarded to the warehouse in the lower part of the City, are the prominent features, of this portion of the works. The makers' names are stamped upon each saw, the dirt is carefully cleaned from the implements, the saw is complete and the workman has done his duty.

This finishes the Saw Department. We have narrated what we saw. The operations of this establishment derive much of their celebrity, in common with the Printing Presses, from the excellence of workmanship and the variety of styles that are put forth. HOE's presses are famous. So are HOE's saws.

We pass to the

PRINTING PRESS DEPARTMENT.

HOE & Co.'s Presses require no laudation. They stand upon their own merits. They throw off millions of sheets daily, which carry tidings to the ends of the earth. The lines upon which your eye, reader, at this moment rests, are traced by the magic fingers of the LIGHTNING PRESS. The advance of the art of Printing has produced results which bring honor to an ingenious inventor and reputation to the country. We propose to describe but briefly the operations of the Printing Press department of this establishment.

All kinds of Printing Presses claim a share of the work at the Manufactory. The leading item is the Lightning Press; but besides this there are single and Double Cylinders, Hand Presses, Jobbing Presses, and Hydraulic Presses. Each branch occupies a large number of workmen.

The Cylinder Press shop is on the second story of the building, taking a space of one hundred feet each on Broome and Sheriff streets, with an apartment sixty feet square, extending over the yard,—making in all an area of two hundred and sixty feet in length, by an average width of fifty feet. The appearance of this part of the building is very peculiar. Sections of cylinders, bed-plates, undergoing the final processes of polish, bolts, drills, wrenches, screws, cans of oil, workmen engaged in putting presses together, boys carrying messages, a continual buzz of machinery and clatter and clang of iron, meet eye and ear. The shop is a pattern of industry. The eight-cylinder Press, which takes the name of "Lightning," is the rarest piece of workmanship in the establishment—that is to say, the call for these articles is of a character so limited, in consequence of the small number of papers which require the fastest Presses, that the manufacture is confined to a few specimens. The Messrs. HOE have constructed three of their largest sized eight-cylinder Presses, three of the six-cylinder kind, seventeen four-cylinder, and a large one is about to be constructed for a newspaper establishment in Manchester, England. Twenty-three fast Presses now in use are in operation in the offices of the following journals:

Two 8-cylinder Presses.....Philadelphia Ledger.
One 8-cylinder Press.....New-York Sun.
One 4-cylinder Press.....New-York Sun.
Two 4-cylinder Presses.....New York Herald.
One 6-cylinder Press.....New-York Herald.
One 6-cylinder Press.....New-York Daily Times.
One 4-cylinder Press.....New-York Daily Times.
One 6-cylinder Press.....New-York Tribune.
One 4-cylinder Press.....New-York Tribune.
Two 4-cylinder Presses.....Baltimore Sun.
One 4-cylinder Press.....N. Y. Sunday Dispatch.
One 4-cylinder Press.....N. Y. Com. Advertiser.
One 4-cylinder Press.....N. Y. Evening Post.
One 4-cylinder Press.....N. Y. Staats Zeitung.
One 4-cylinder Press.....La Patrie, Paris.
One 4-cylinder Press.....Boston Times.
One 4-cylinder Press.....Boston Traveller.
One 4-cylinder Press.....Boston Journal.
One 4-cylinder Press.....Phila. Eve. Bulletin.
One 4-cylinder Press.....Cincinnati Commercial.

It will be observed that the use of these Presses is general, in all offices whence circulate large editions of the daily or weekly journals. The peculiarity of the applications of mechanical ingenuity—the nicety of operation—the multitude of parts which require to be smoothly combined,—the wilderness of tapes, bolts, cylinders, rollers, "turtles," rules, tables, wheels, cranks, and levers, that have to work exactly in shape, or not work at all,—all these facts render the putting-up and the practical operation of the great Press a delicate matter. The cost of an eight-cylinder Press is in the vicinity of twenty-five thousand dollars. The time occupied in the construction of one of them is about four months.

The six-cylinder Press is of similar construction, except that it has, as its name implies, two cylinders less than the great Press. The four-cylinder machine is in very common use.

The Double Cylinder Printing Machine is made in six different sizes; the bed varies from 41 by 28 inches to 60 by 40. The prices range from $2,750 to $4,250 each.

There are eight sizes of the Single Small Cylinder, ranging from 33 by 25 to 60 by 40 inches. Price—from $1,390 to $2,600.

The Patent Single Large Cylinder Press is still another style, which is particularly adapted to book and job printing, and fine newspaper work. This press may be driven by man or steam power. It has a perfect registering apparatus and sheet-flyer, and will print from one thousand to two thousand impressions per hour. Eight sizes of this machine are manufactured; the beds range from 24 by 19 to 57 by 40 inches. The prices vary from $960 to $2,650.

The Hand Press Shop gives employment to a large number of hands. Country newspapers furnish a constant market for these machines. There are two kinds, the Smith and the Washington Press. Ten sizes are made; the beds ranging from 24 by 18 inches to 48 by 38½ inches, and the prices varying from $165 to $380. The number of these Presses that are turned out annually from this concern is calculated to impart an enlarged idea of the amount of types and ink that the American printer consumes. The Messrs. HOE are able to furnish one of the Presses for every day in the year, and their average sales of Hand Presses are *four per week*. The difference in the construction of the Smith and Washington Presses is very slight; but the former is usually preferred, and more of them are sold than of the latter. It is unnecessary to describe the parts of a machine that every boy in the country knows so well.

The "Little Jobber" is the affectionate diminutive of a Press which does wonders in its small way. Three sizes of it are made, ranging in size from 20 by 13 inches to 33 by 25 inches, and in price from $700 to $2,000.

There are other varieties of the Press manufactured here. They are as follows:

1. Hand Lever Printing Press—used for printing circulars, hat-tips, &c. Price from $45 to $90.

2. Patent Machine Card Press—worked by a crank or treadle, and used for printing cards and small circulars. It will print from 1,000 to 1,500 cards per hour. Price $300.

3. Ready Proof Press. This machine consists of a cast-iron table or bed, with a railway supported by a cast-iron frame. A solid cast-iron cylinder traverses backward and forward upon this railway, and is of sufficient weight to give the impression. Flanges at both ends of the table prevent the cylinder from rolling off. Price, $70.

4. Steam Inking Machine. This machine is described by its title; it is intended to be attached to a hand-press. Prices range from $22 to $150.

5. Inking Apparatus for the Hand-Press.

6. Self-Inking Machine, patented.

7. Iron Copperplate Press. Bed from 10 inches to 30 inches in width. Prices—from $90 to $285.

8. Improved Lithographic Press. Dimensions of the bed, from 19 by 24 inches, to 38 by 48 inches.—Prices, from $165 to $375.

9. Stereotype Planing Machine. A machine for stereotypers, employed in thicknessing plates.

10. Hydrostatic Press. For pressing sheets, and manufactured with cylinders of solid wrought iron. Prices—from $800 to $1,350.

11. Improved Geared Standing Press. Price, $500.

12. Screw Standing Press. Prices—from $115 to $213.

13. Ruling Machine for blank books, bills and letters.

14. Bookbinder's Arming or Stamping Press.

15. Paper Cutting Machine.

16. Improved Copying Presses. Various patterns of these Presses are made. A new style, of Gothic make, has just been introduced, which will be a favorite pattern.

In short, to bring towards a conclusion this sketch, the establishment contains within itself the facilities for supplying the demands of the printer, the stereotyper, the book-binder, and all other classes whose business it is to make books and papers,—with the sole exception of *type*. This branch has been left to others, but with this exception the HOES' furnish everything that is needed by the printer and the compositor. And this last word reminds us that it is time to turn into the

PRINTERS' JOINER-SHOP.

A savory smell of cedar, coming pleasantly through the opened door, salutes your nostrils. There are piles of finished, half-finished, unfinished, and finishing material. The printers' cases are made of cedar. Immense quantities of the fragrant lumber are consumed in this department. The establishment devotes a separate building to the joinery. Technically speaking, the articles that consume masses of lumber in their manufacture are: 1. Stands; 2. Galleys; 3. Furniture; 4. Cases. Cases hold the types; Galleys, the type when it is composed; Stands, the galleys when they are full; Furniture "locks up" the types and holds them fast. Thus much, for the benefit of the uninitiated. There is a large assortment always on hand in the HOE establishment.

The manufacture of an article so simple as a printer's case, involves a number of nice processes. The bottom is cut from a plank of the proper size. Buzzing saws, meanwhile, are shaping and grooving the cross pieces which enclose the boxes. Men on one side of the shop are busily engaged in placing tops and bottoms together, by the aid of a solid chunk of iron which catches the wooden pegs as they enter the interstices of the cross-pieces, and clinches each of them firmly, so that it cannot be moved from its place. The notable features of this apartment are the great heaps of material to which the workmen are constantly adding. It is here that the greatest peril from fire arises; but the premises are so well guarded by night and day, that there is, in reality, no danger. No fire is allowed about the premises; the apartments being heated wholly by the waste Steam from the boilers.

PATTERN SHOP.

Above the Joinery is the Pattern Shop. It occupies the upper floor of the building on Columbia-street. In this place are deposited all the patterns of machinery, presses, improvements in mechanical applications, &c. The value of this deposit, which has been accumulating for years past, is beyond calculation.

THE FOUNDRIES.

It would be very improper to go on without looking in at the Foundries. One is for brass and one for iron. The brass mountings of the presses and machines are a branch of manufacture by themselves. In the foundry, castings are made every afternoon. A large gang of men is employed in each of these departments.

PASSING OUT.

We find ample facilities in the yard for extinguishing fires. Several hydrants are scattered at convenient intervals about the premises, and whenever the bell rings at the hours for the workmen to leave, the hose is attached, and a watch set. One watchman is on guard by day at the entrance to the Works, and another set is on duty at night. By this careful supervision, and from the prohibition of the use of fire in the premises, apprehensions of damage from conflagration are dissipated.

THE OFFICES.

The establishment has two Offices. The principal one is at the Warehouse, Nos. 29 and 31 Gold-street. A subordinate office is open in Sheriff-street, directly opposite the Factory. At this place, the Superintendent and one of the Proprietors usually make their head-quarters.

In the second story of the Sheriff-street building, is the Draughtmen's room. Here several persons are constantly employed in drafting new plans, and remodeling.

On the basement floor is the paint-shop.

On the upper floor is a comfortable apartment, fitted up with desks and benches, and lighted with gas, intended for a *school for the boys* employed in the establishment. Here, on Winter evenings, when the day's work is over, and the lads are fed and washed, and partly rested, they have a chance for learning. A competent teacher is employed to instruct them; they receive a knowledge of the rudiments of English education, and, occasionally, are entertained by lectures and discourses on scientific subjects. Forty boys is the average number in attendance here. The tuition is wholly free to them; the members of the firm putting themselves to cost for the hire of teachers, and use of lights and books. It is an admirable institution. It does very much to keep the boys out of mischief. The teacher of the school is Mr. CHARLES O'DOWD.

A TELEGRAPH.

Messengers are apt to loiter. Lightning travels fast. Boys fail. The telegraph rarely does. It was determined, therefore, that the establishment of a connecting-link between the down-town warehouse, the up-town factory, and the residences of the proprietors, still further up town, was accordingly determined upon, and a line of private telegraph has now been in daily operation for five years past.

THE DOWN-TOWN WAREHOUSES.

Two extensive buildings at Nos. 29 and 31 Gold-street are occupied, as we have already said, as the warehouses of the firm. Here all orders are received, and hence orders and directions proceed. A considerable force of workmen is engaged in construction and repairs in the rear and in the upper stories of these buildings. The house is now shipping goods to all parts of this Continent where Presses are used, to China, the East and West Indies and to different parts of Europe.

CONSUMPTION OF RAW MATERIAL.

By way of conclusion, we present an array of figures which are not so dry as they seem, when we come to examine them. The amount of RAW MATERIAL used annually for the purposes of manufacture in this establishment, is extraordinary. The house consumes annually—in the Broome-street works alone:

600 tons of Pig Iron.
150 tons of Bar Iron.
300,000 lbs. of Cast Steel.
20,000 lbs. of Nails.
20,000 lbs. of Emery.
1,000 gallons of Oil.
1,500 tons of Coal.
225,000 ft. of Pine.
75,000 ft. of Whitewood.
10,000 ft. of Spanish Cedar.
9,000 ft. of Mahogany.
25,000 ft. of Cherry.
3,000 ft. of Ash.
10,000 ft. of Black Walnut and Maple.
2,000 ft. of Hickory.
6,000 ft. of Oak.

THE WORKMEN.

A word should be said in behalf of the workmen in this establishment. Of the four hundred operatives who are employed in the different departments, there is a large proportion of excellent mechanics, who command high wages and are honest, faithful, sober and reliable. There is no concern in the City, employing so many hands, in which there are more cheerful, sunny faces, or more intelligent and steady hands. It is the interest of the firm to encourage them in their labors, and accordingly we find them exceedingly contented. They have formed among themselves a regularly organized military company, known as the "Hoe Guards," whose appearance annually is as respectable a muster as the City numbers among its impromptu corps.

HOE's Establishment, in short, is a place worth studying, in all its departments, as an excellent example of what may be accomplished through the channels of American Industry.

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