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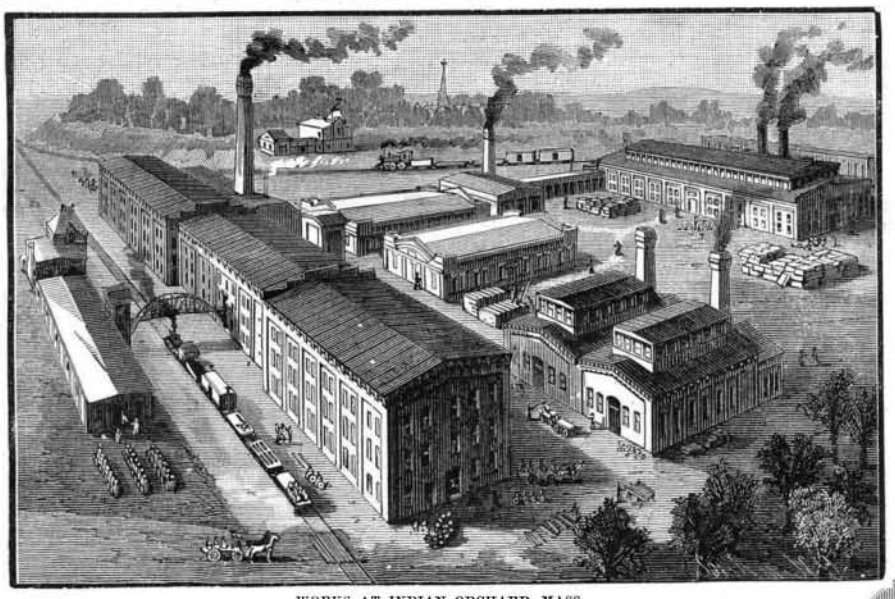
VALVES AND HYDRANTS.

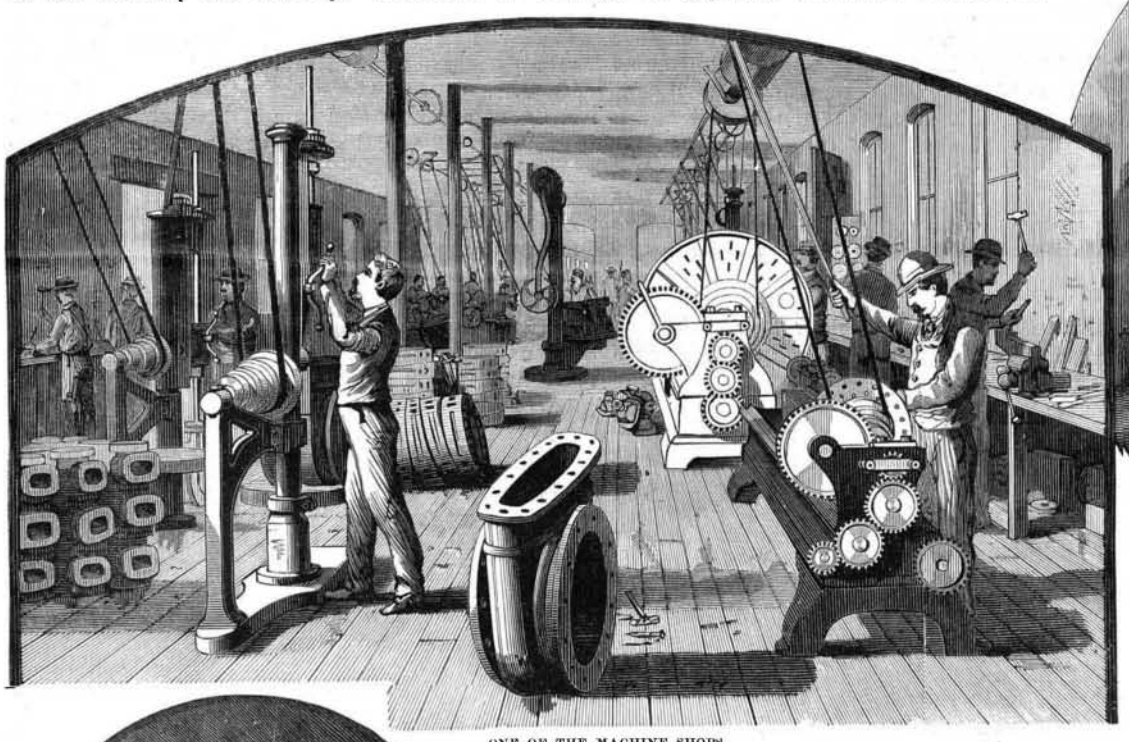
WORKS OF THE CHAPMAN VALVE MANUFACTURING CO., OF BOSTON AND INDIAN ORCHARD (SPRINGFIELD), MASS.

The multiplied uses to which straightway valves and gates are now applied in all the various services of steam, water, gas, etc., have of late years occupied no little attention from all parties concerned in their use, in order to overcome the difficulties incident to their services, such as water hammer, corrosion of parts, difficulty of operating, especially under heavy pressure, etc., and to determine if possible the best principles upon which they should be built to best serve the interests of the purchaser and user in points of real economy and security. The same or more might be said in regard to fire hydrants. Perhaps no appliance known so much needs the very best applied principles in construction as well as good and reliable workmanship as the fire hydrant, to enable it to perform its service perfectly under all of the varying contingencies to which it is subject.

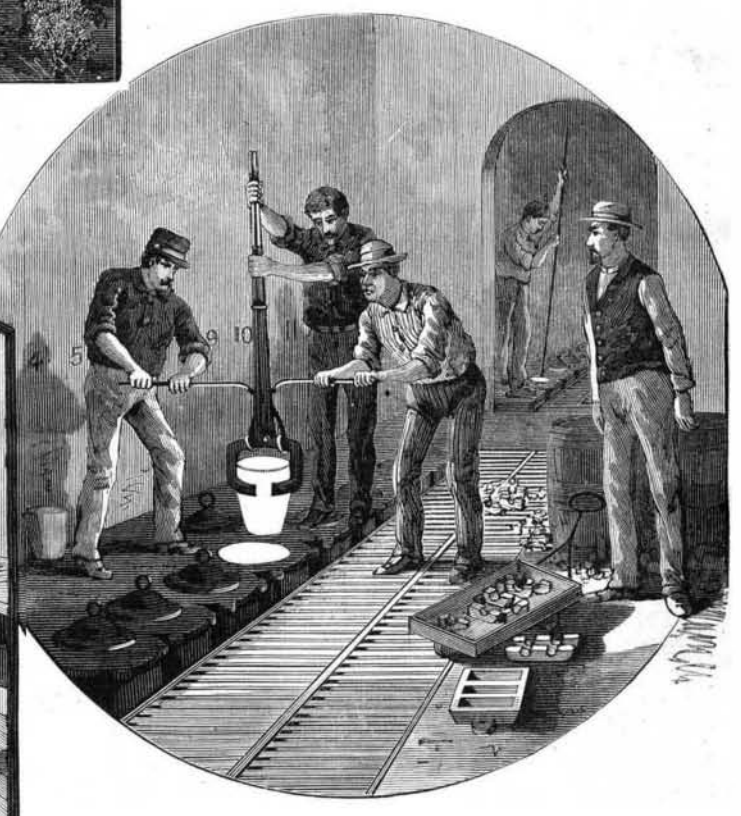


WORKS AT INDIAN ORCHARD, MASS.

The aim of the Chapman Valve Mfg. Co. has been and is to produce the best from designs both practical and symmetrical. The best of material, first-class workmanship, interchangeability of parts, all work thoroughly tested and promptly delivered to their customers, are among the claims they make for their manufactures; and they point to the testimonials of hundreds of the most reliable engineers and mechanics of the country, and to the unprecedented growth of their business without any solicitation on their part, to any extent, as proofs of their claims. Backed with these principles, plenty of capital, a first-class plant, splendid machinery, able and efficient management in all branches, we know of no reason why they are not justified in their claim of being the largest and best equipped manufactory in the country for the production of their goods.



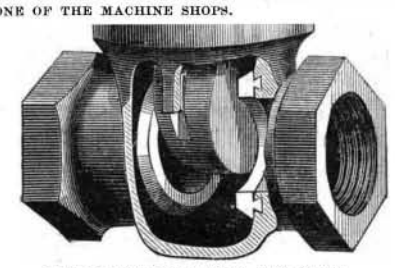
ONE OF THE MACHINE SHOPS.



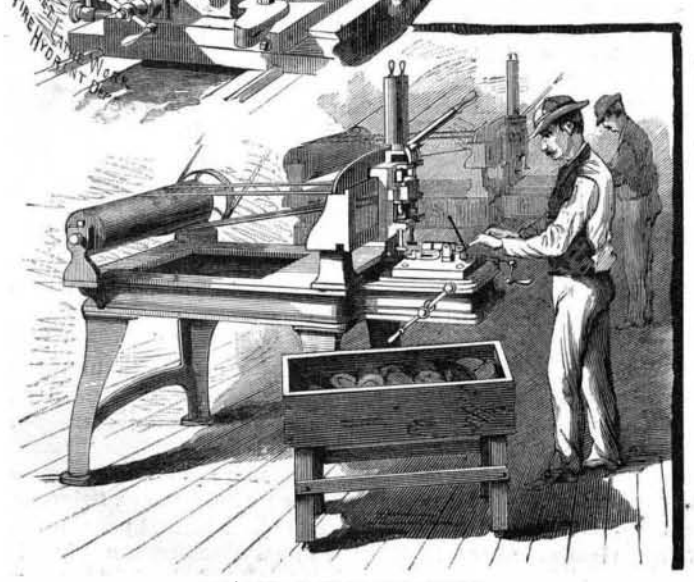
VIEW IN THE BRASS FOUNDRY.

The accompanying engravings represent their works at Indian Orchard (Springfield), Mass., and are so selected as to show the various stages through which a valve passes, from the foundry to the finishing and testing departments. The works occupy sixteen acres, and are situated on branch lines running from the Boston and Albany and Athol Railroads, spur trucks running around the entire plant, facilitating the receiving of material and the shipping of finished goods. The buildings are all of brick, and are constructed in a substantial manner. The interior arrangements are well calculated for the several kinds of work; everything inside and outside is kept thoroughly in order, and the utility of "A place for everything,

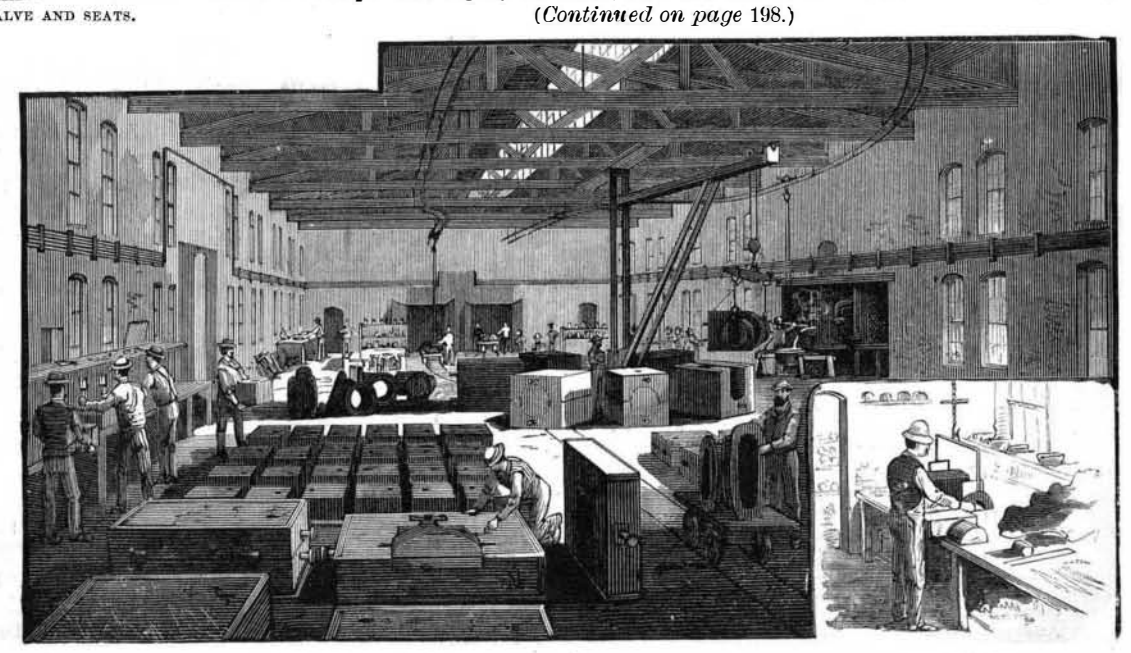
(*Continued on page* 198.)



SECTION SHOWING VALVE AND SEATS.



PROFILING MACHINE DEPARTMENT.



IN THE IRON FOUNDRY.

CORE MAKING.

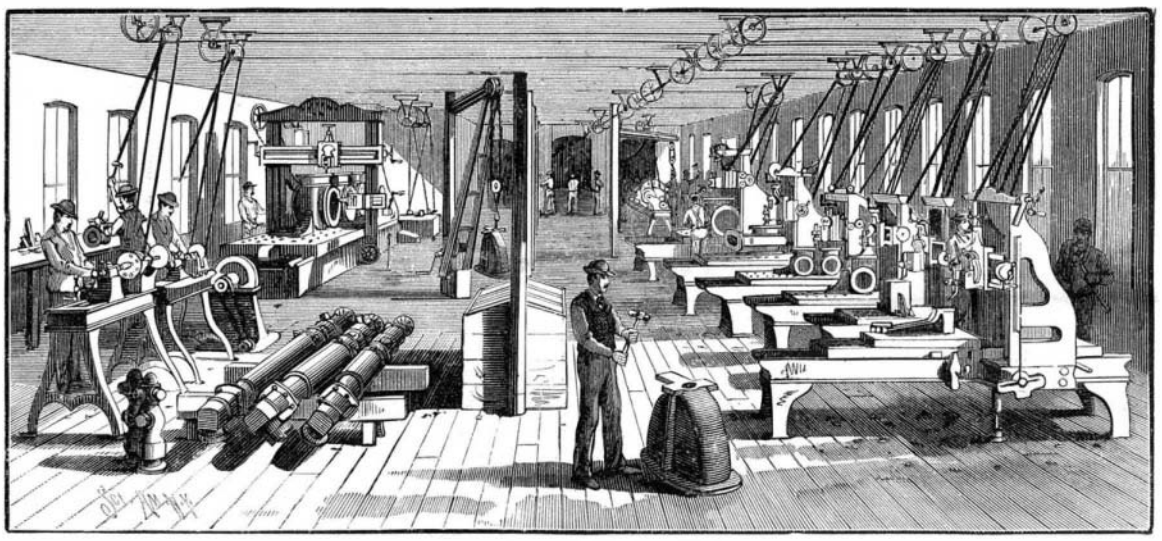
VALVES AND HYDRANTS.—WORKS OF THE CHAPMAN VALVE MANUFACTURING COMPANY.

VALVES AND HYDRANTS.

(Continued from first page).

and everything in its place" is well illustrated in every department.

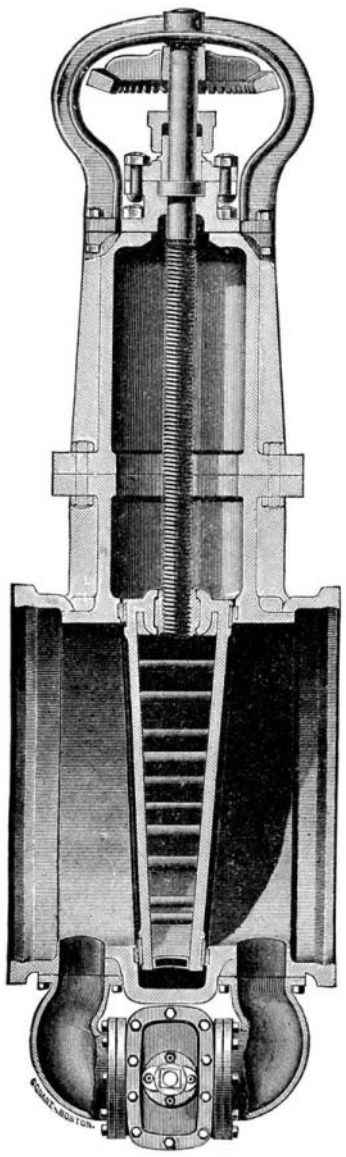
To give the reader some idea of the scale of their buildings, we will add that the finishing shops in front are 300′ × 50′, 3 stories high. Office and storeroom in front 150′ × 35′, part of which is 2 stories. The iron foundry, with annex buildings for power, cleaning, core making, etc., covers an area of 16,000 sq. feet; brass foundries, pattern shop, and pattern storage building, sand and coal storehouses, stables, and engine houses complete the list, and may be measured substantially by the scale already given.



IRON PLANING SHOPS.

Their motive power consists of three 50 h. p. boilers and two 50 h. p. Corliss engines. The buildings are protected inside and outside from fire by a well organized system of hydrants and standpipe, automatic sprinklers, etc., managed and operated by a hose company formed from the employes.

The Chapman valve has a straightway passage the full diameter of the connecting pipe. The engraving on first page shows the valve with part broken away, in order that the form and construction of the interior may be seen. The plug, or gate, is in one piece, made hollow and tapering, and guided upon its sides to prevent its coming in contact with the seats, until closed, by splines in the body, which engage with the plug, and which are of unequal thickness, to prevent the plug from being inserted wrongly in case of its being removed for repairs or otherwise. The plug is double faced and equally tight on either face, thus either end of the valve may be used for inlet or outlet. In stationary spindle valves the plug rises and falls on the spindle, and in rising spindle valves, with the spindle. The spindles are all of extra diameters, to prevent twisting, of solid gun metal composition for steam and water, and of best iron or steel for gas and ammonia.



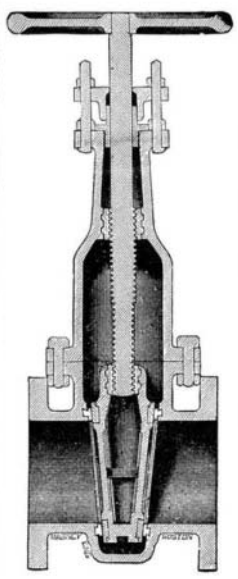
LARGE WATER GATE, WITH BY-PASS.

The seats of the valves and gates are composed of alloys similar in application to Babbitt metal. Different alloys are employed for different uses—one for steam, one for water, another for gas and ammonia, and a fourth for steam valves liable to be subjected to extreme heat. The seats are securely and firmly held to the body by means of dovetailed grooves in the body, and are formed upon the plug itself, producing an exact counterpart of the faces of the plug on both sides, thereby making a perfectly tight joint, which by the construction of the valve wears tighter in use and always preserves its bearings. These seats will not corrode either when in contact or when separated, and hence the valve may be easily started, even after it has been closed for years.

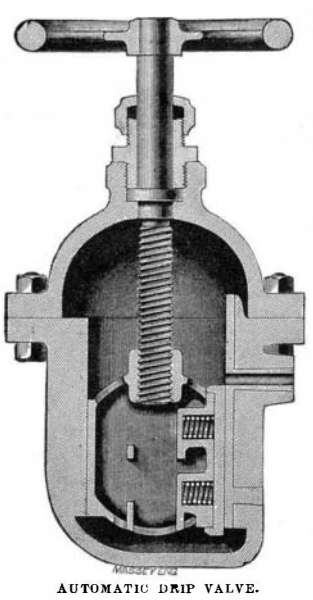
On account of the amount of space necessary to work the larger sizes of quick-opening lever valves, and the strain brought upon the pipes by the almost instantaneous stopping of the current by their use, a compound screw valve has been designed. In this, the gate rises on the spindle and at the same time the spindle rises out of the valve, thus giving a double motion. The valves open easily and quickly, a six inch valve opening in five turns.

While, from the manner of construction, the Chapman gate will open and close comparatively easy under any pressure, for excessive pressure on large gates it is better to obtain relief by the by-pass. In water works having heavy pressure, while the smaller gates work comparatively easy, the larger ones, under the excessive load they have to carry, are always a source of anxiety whenever it becomes necessary to open or close them. To obviate these difficulties, the large gates are formed with a substantial cast iron by-pass, which engages with the body each side of the plug. The size of the by-pass valve is such as to constitute a material relief. All the parts are interchangeable, and the joints are made perfect without the aid of gaskets or packing.

Both in design and construction, great care has been taken to produce a hydrant that will perform its service without getting out of order, that will close tightly and remain tight even in muddy or gritty water, that will open and close easily at all times, and that will produce no water hammer or strain upon the pipe and joints in closing. The gate rises upon the spindle, in opening, into a recess below the hydrant pipe, large enough to admit the full passage of water from the main, and closes vertically, gradually cutting off the flow of water and preventing any hammer. The gate is tapering upon its face, with a tapering pressure bar on the back, which acts as a wedge to force the gate to its seat in closing, and is guided upon its sides to prevent turning or coming in contact with the seats until the passage is closed. The seats and pressure bar are of Babbitt metal. The drip outlet is formed in the side of the valve on a level with the water in the main, and is opened and closed by the direct action of the gate without intermediate mechanism. It is so arranged that the moment the gate begins to rise the outlet is sealed, and remains sealed until the gate is closed. The drip being always open when the gate is closed, there is no liability of freezing; when necessary, all the sizes of valves can be provided with similar automatic drips. The wedge form of the gate and its non-cohesion to the Babbitt metal seats render this valve easy to operate, no matter how long it may have been closed.



COMPOUND SCREW VALVE.



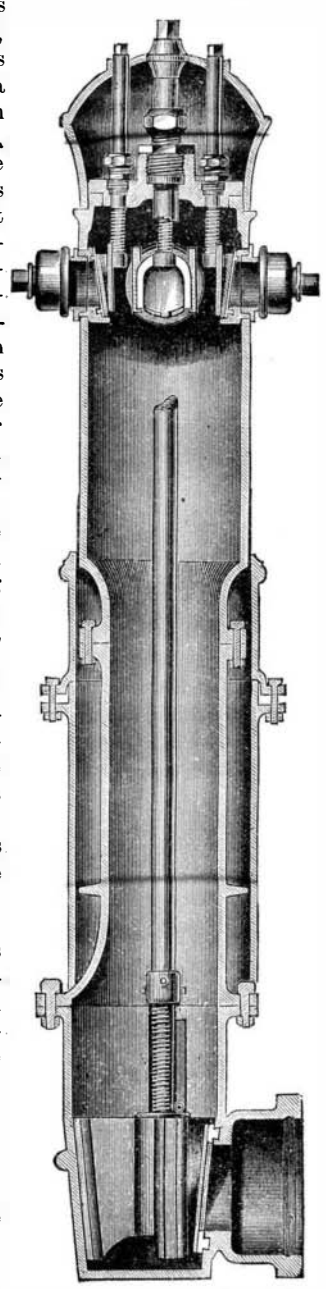
AUTOMATIC DRIP VALVE.

In order to meet the demand for a hydrant from which a large number of streams can be taken and concentrated on a fire at any one point, and yet have each stream under as perfect control as though taken from single or separate hydrants, the one shown in the engraving was designed. Independent valves for each outlet are placed on the inside of the post, each valve being operated by a spindle from the outside, independently of the other valves and of the main valve at the bottom of the hydrant. Each valve is perfect in itself, and does not depend on the water pressure to bring it to its seat. We have not the space to describe all the special forms of valves produced by this company to meet peculiar conditions; a mere enumeration would occupy more space than we can at present spare.

Notwithstanding the dull times, the force now employed by the Chapman Company is about 170 men; a part of the time it is necessary to run extra hours to fill orders. The product of the work is sold in every civilized country in the world. The officers of the company are: Samuel R. Payson, President; Percival L. Everett, Treasurer; and Jason Giles, General Manager.

The Siphon Recorder.

Sir William Thomson's English patent for his siphon recorder (Patent No. 252 of 1871) has expired this year; and it is probable that the instrument will come into greater use than hitherto. The introduction of permanent magnets for the large electro magnets originally used to produce the magnetic field of the signal coil will probably be extended, says *Engineering*, and there is also a prospect that the troublesome "mouse mill" will be obviated. At all events, Mr. Pescad, an employe on the Central American cable lines, residing at San Juan del Sur, has invented a plan which reduces the friction between the marking siphon and the front of the paper without the necessity of electrifying the ink by means of the mouse mill. This plan has been tried successfully for some months on a cable about 1,600 miles long on the Central American coast. The plan consists in vibrating the siphon in such a manner that its point "jumps," as it were, on the paper. This is done by attaching a thread to the fiber which suspends the signal coil, about 2 inches above the latter. This thread runs behind the recorder at right angles to the suspending fiber, in a horizontal direction, and is connected to the hammer contact of a small induction coil. When the coil is started by a battery, the vibration of the hammer pulls upon the thread and vibrates the siphon connected to the signal coil, so that the point of the siphon rises and falls on the strip of traveling paper. This movement is, of course, very minute, but it is sufficient to diminish the friction between the siphon point and the moving paper without interrupting the fine ink line which the siphon marks upon the paper. Mr. Pescad states that this line is as good as the line made by the siphon of a recorder with electrified ink. The introduction of this plan, together with permanent magnets, would render the large tray Daniell batteries used with the recorder no longer necessary to its working.



FIRE HYDRANT WITH INDEPENDENT VALVES FOR EACH HOSE NOZZLE.

Nitro-glycerine for Oil Wells.

There are nine glycerine firms at work in the Bradford field, and all their men are kept busy from morning to night. The size of the shot used is rarely less than eighty quarts. The constant enlargement of the cavity in the oil-bearing rock necessitates the use of dynamite squibs for exploding the shells, and the old method of dropping a "go devil" on the firing head of the torpedo has been almost entirely superseded. The cans in which the nitro-glycerine is transported about the field have been enlarged from six to eight quarts capacity, and each shooter's wagon carries ten cans, or eighty quarts, of the powerful explosive.

The Manufacture of Cheap Artificial Teeth.

There are four, if not more, factories for the manufacture of false teeth for dentists' use in the city of Philadelphia and one in Camden. The materials used are feldspar, silex, and German clay, all finely ground, and mixed in different proportions, and kneaded with water to the consistency of moist putty. Another preparation is necessary for the production of the pink portion of the tooth, which forms the imitation of the gum. The tooth and the gum are made in one piece, and the pink tinge of the gum is given by the use of the oxide of gold in the enamel, of which platinum and titanium are the principal ingredients. The tinted enamel having also been prepared, the materials are ready for the moulders. Each mould is for a full set of sixteen teeth. It is flat, not of the shape of the jaw, for the set is broken up into twos and threes to meet the necessities of manipulation by the dentist in fitting different shaped mouths. Where the root of each tooth (were they natural) would fit in the mould are two tiny holes, in which a workman inserts the ends of two small platinum pins, with heads at each end. These heads are to prevent the pins from slipping out of the tooth at one end and at the other end out of the mouth plate, to which they are expected to hold the teeth.

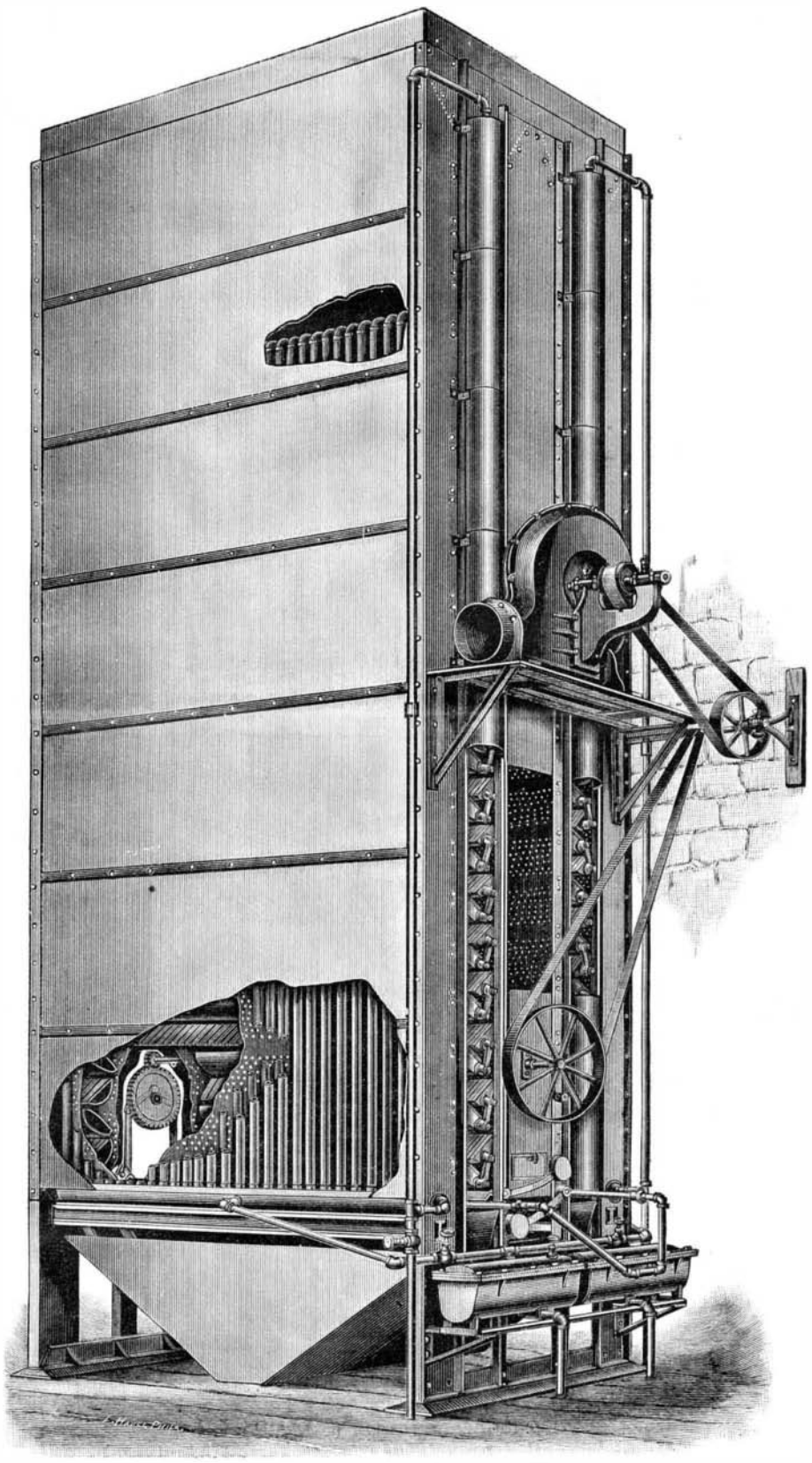
The insertion of the pins completed, the mould is passed to a fellow workman, who coats the indentations which receive the "putty" with the enamel. The mould again passes into another workman's hands, who gently presses into that part of the mould corresponding to the tinted gum the preparation of the oxide of gold. By still another workman the feldspar, silex, and clay mixture is pressed to complete the tooth. The mould is then closed, placed under enormous pressure, the excess of clay squeezed out, a clamp put on, and mould and clamp placed in the drying oven. After remaining in this oven until all the moisture is removed, the moulds are opened, and the teeth, with gum attached, allowed to drop out. They show no distinguishing characteristic, separate from that of the dirty chalk appearance of the single ingredient of the clay. The tooth and the gum appear to be homogeneous. They then pass into the hands of the finishers, generally women, who with fine saws and files cut away the rough edges and make more distinct the separation of the teeth. When these skilled fingers are through with them, eighteen sets of sixteen teeth are arranged upon a slide of fire clay, re-enforced with coarsely ground silex, which will not melt in the intense heat of the oven when uncombined with other substances. From this workroom the slides are passed to the baking ovens, which have been raised to a white heat. In these ovens one slide is baked at a time, the time of remaining therein varying from fifteen to twenty-five minutes, dependent upon the temperature of the oven. When the slides are removed from the oven, they are placed in other firebrick unheated ovens, where they are allowed to cool gradually. On cooling, the brilliancy of the white enamel and the delicate pink to which the heat has changed the oxide of gold gladden the baker's heart. The cooling process complete, the slides and the teeth are handled once more before the latter are shipped away. Thin pasteboard boxes, six inches square, and narrow strips of wax are provided. The teeth are pressed on the wax, the projecting heads of the pins holding them in place. The strips are arranged in the boxes, the lids fastened on, and the teeth are ready for the market.—*Philadelphia News.*

A NATURAL bow that is on exhibition at the Brownsville (Oregon) post office is described by the San Francisco *Examiner*. It is a maple about eight feet in length, has the curves of an ordinary Indian bow, and, strange to say, is already strung with a slender limb that grows out of one end into the other so perfectly that at first sight it would be quite difficult for one to detect at which end the limb began. The bow is about three inches thick, and the string part is about one-fifth of that thickness, and is strong enough to shoot an arrow 200 yards.

AN IMPROVED GRAIN DRIER.

The illustration herewith shows a new form of grain drier, said to be capable of thoroughly kiln-drying from two to three thousand bushels of corn in twenty-four hours, and to be equally well adapted to drying other grain, so as to offer great advantages to maltsters and others at present using kilns. The machine consists of a series of inclined hollow shelves, supported by columns of channel iron, which form the frame of the machine, the shelves being ribbed on their surfaces and connected together at alternate ends by return bends, by which the steam introduced at the upper shelves will circulate through them consecutively until it reaches the lowest one and passes out to the steam trap. The ends of the shelves are covered by semicircular hoods, thus forming a channel, down which the grain passes, being turned over in its descent by each shelf. At the back of the shelves, also, are steam pipes to heat the air which is drawn through by a suction fan connected to the discharge chamber on the opposite side, thus carrying off the moisture taken from the drying grain. The temperature is under complete control, and can easily be regulated by changing the quantities of steam and air allowed to pass through, so that the grain may, if desired, be discharged at a normal temperature. Adjustable oscillating valves at the bottom, operated by a crank and rocker arm, regulate the discharge, the only moving parts of the machine being this discharge mechanism and the exhaust fan. This drier is said, from tests which have been made in mills at Philadelphia and Wilmington, to be much more effective and economical than the kilns in ordinary use, its work, with an ordinarily good boiler, being equal to the drying a bushel of corn for each pound of coal used.

This drier is manufactured by Mr. Henry G. Morris, of No. 209 South Third Street, Philadelphia, Pa.



THE PHILADELPHIA GRAIN DRIER.

Natural Gas at Pittsburg.

On August 10 natural gas was introduced for the first time at the Sable Iron Works of Zug & Co., Pittsburg, under five puddling furnaces and under a battery of boilers. The process is a new one, and has been invented by the bricklayer of the work, Samuel Burton, which he has remodeled, giving entire satisfaction. Natural gas is also used at the following mills in the Smoky City, according to the *Telegraph:*

Star Iron Works, Lindsay & McCutcheon; La Belle Steel Works, Smith, Sutton & Co.; Singer, Nimick & Co.'s Steel Works; Pittsburg Iron Works, J. Painter & Sons; Clinton, Millvale, and Fort Pitt Rolling Mills, Graff, Bennett & Co.; Glendon Spike Works; Dilworth, Porter & Co., Republic Rolling Mill, American Iron Works, Wayne Iron and Steel Mill, Brown & Co., Hussey, Howe & Co., Steel Works; Park, Brother & Co., Solar Iron Works, William Clark & Co., Etna Iron and Tube Works, Spang, Chalfant & Co., at Etna; Crescent Steel Works, Miller, Metcalf, Parkin & Co., Vesuvius Iron and Nail Works, at Sharpsburg; Spang Steel and Iron Mill, ditto, and the Polished Sheet Iron Works and National Tube Works at McKeesport.

The mills still supplied with coal are: Oliver Brothers & Phillips, Pittsburg Forge and Iron Works, Eagle Rolling Mill, Sligo Iron Works, A. M. Byers & Co., Chess, Cook & Co., Elba Iron and Bolt Works, Soho Rolling Mill, Keystone Rolling Mill, Pennsylvania Tube Works, Pennsylvania Iron Works, Kensington Rolling Mill, Sable Iron Works, Juniata Iron and Steel Mill, Linden Steel Mill, and the Manchester Steel and Iron Works. Some on this list are idle, the last mentioned mill having been so nearly three years.

Zug & Co., of the Sable Rolling Mill, will introduce natural gas in all departments as soon as experiments they are now making demonstrate the best methods of using it. Wilson, Walker & Co. are building in their mill one of the Owens gas furnaces for heating purposes, and will soon be ready to use gas. The Canonsburg Iron Co. is also erecting a new natural gas furnace for the same purpose. The La Belle Steel Works, of Allegheny, which are now closed for repairs, will use natural gas instead of coal when operations are resumed. Carnegie Brothers & Co. already may be said to have perfected their plant in this direction, both as to capacity and reduced cost.

Keep a Record.

Some weeks since a representative of the *Artisan* called upon an engineer friend who was thoroughly wrapped up in his machine. In the course of the conversation he produced a book in which he had for months kept a record of the coal consumed each day, and the horse power developed by the engine as shown by indicator cards taken in the forenoon and afternoon. These cards being filed served as a record of the condition of the engine in those respects which are apparent from the card. This was kept for a long time without his employer's knowledge, half in fear that some objection would be raised, but was at length produced to settle one of the innumerable little points which only such a record can definitely settle, and met with so hearty an approval that the engineer was supplied with a record book, purposely ruled and lettered, and a planimeter for the more convenient and accurate working up of the cards.

All engineers who are handling powers of any extent should inaugurate a system of this kind. Keep a record not only for your coal and power, but for changes which are made, and their effect upon your fuel consumption and the working of your engine. It will not only enable you to review your experience and retain valuable information, but suggestions will frequently arise from it which will be invaluable. It begets a habit of thought, and furnishes the material for deductions which will make you a success in your business, and gives you a means of proving what you have done and do, which no amount of assertion on your part or recommendation by others can equal.

Reliable Paste for Labels for Glass, Wood, and Metals.

Starch, 2 dr.; white sugar, 1 oz.; gum arabic, 2 dr.; water, q. s. Dissolve the gum, add the sugar, and boil until the starch is cooked.