AMERICAN INDUSTRIES, No. 32.

ROTARY PRESSURE BLOWERS.

Our large engraving represents the extensive rotary blower manufactory of Messrs. P. H. & F. M. Roots, of Connersville, Ind. These gentlemen, as many of our readers are already aware, were pioneers in this branch of industry, and were the first to introduce in this country and in Europe a successful positive blast rotary blower.

In 1860, to test thoroughly the capacity and merits of the newly-invented blower, the Messrs. Roots built two blowers, capable of melting from six to eight tons of iron per hour. These blowers were the first that were built of sufficient size for large foundries. One was placed in the large works of Miles Greenwood, Esq., Cincinnati, and the other in the stove foundry of G. W. Ball, Esq., Covington, Ky., where they were in daily use for nearly two years before others were built, melting daily from eight to twelve tons of iron. The results of these tests more than realized the most sanguine expectations of the inventors, and received the highest commendations from all who witnessed their performance, both as to economy of power and fuel and the quality of iron and castings produced. These tests were considered satisfactory and sufficient to warrant making arrangements for the manufacture of the blowers. It was soon ascertained, however, that, in order to make their manufacture a success, special tools were required, and that the business should be made a specialty, in order to bring the blowers up to the standard of first class machines. As the inventors were already receiving many orders, they decided on commencing the manufacture themselves. They purchased a small machine shop and foundry in Connersville, which they immediately enlarged, and furnished with such special tools as it was found from time to time were required to perfect their construction and increase the turn out.

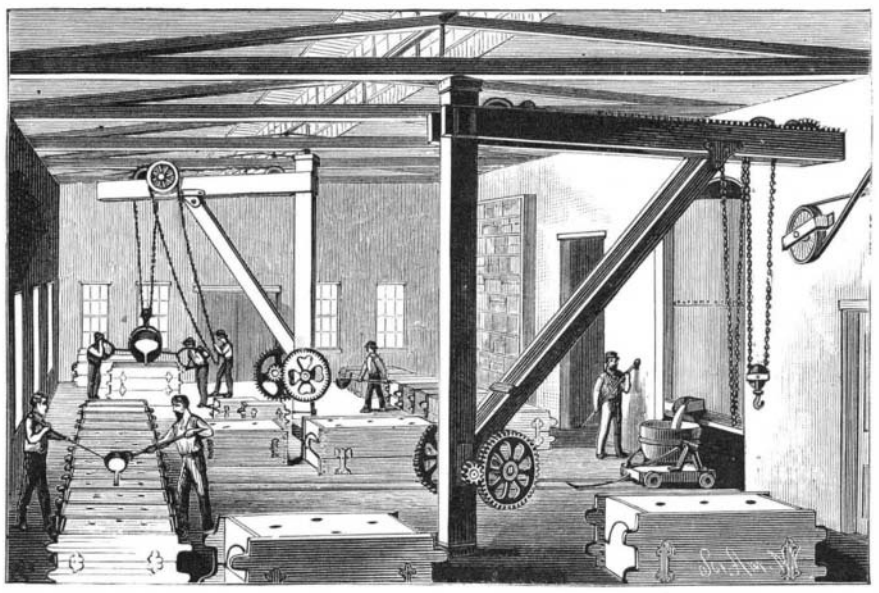
The manufacture of rotary pressure blowers was thus begun in 1863. From that date to 1873 to 1874 the works were frequently enlarged until over one hundred men were employed, and during this time orders for blowers were always in excess of the capacity of the works. The blowers were not only sold in all parts of the United States and Canada, but were sent to almost all parts of the world where machinery is used. The trade extended to the West Indies, Mexico, South America, the Sandwich Islands, Australia, the Cape of Good Hope, and elsewhere,

In Europe, patents were obtained in England and the principal countries on the continent, and arrangements were made for their manufacture in England, France, Belgium, Austria, and several places in Germany. There are already over three thousand of these blowers in use in England alone, and probably as many more on the continent, ranging in size from those capable of blowing a single blacksmith forge to those having sufficient capacity to ventilate the largest coal mines, discharging with ease 200,000 cubic feet of air per minute. They are used by such firms as the following, viz.: Sir William Armstrong & Co., Newcastle; Sir Joseph Whitworth & Co., Manchester; the Barrow Hematite Steel Co., Barrow-in-Furness; London and N. W. R. R. Co., Crewe; Messrs. Platt Bros., Oldham, and hundreds of others in England; and by Herr Krupp, at Essen, Prussia; William Hartmann & Zimmermann, Chemnitz, Saxony; Phenix Works, Ghent, Belgium; M. Sigle, Vienna, Austria; Messrs. Heilmann, Ducommun and Steinlin, Mulhouse, Alsace.

These blowers have been awarded prize medals by three International Exhibitions. At Paris, in 1867, they received the highest award given to machines of that class. At the Vienna Exhibition, Vienna, Austria, 1873, they were also awarded the highest medal for progress. At the Centennial Exhibition, held in Philadelphia, 1876, they again received the highest award for *design, workmanship, material,* and *efficiency*. They have also received numerous other medals and awards from the American Institute, New York, and from the Cincinnati Industrial Exhibition, Cincinnati, Ohio, and other exhibitions and State fairs, all of which were awarded to this blower on account of the excellence of the principles of its construction, its simplicity, and efficiency, before many of the constructive and mechanical improvements which have since been made were added, and without any of the improvements published for the first time in this article. The manufacturers justly claim that if its intrinsic excellence was so great as to merit the high awards under the circumstances mentioned, they are now much more entitled to them after the great improvements that have been made in their construction.

Some ten years since the Manhattan Gas Company, at the suggestion of Mr. Sebattan —then their chief engineer—ordered two of these machines of the largest size to be used as gas exhausters. They worked very successfully, and since that time the largest and best companies in the United States and Canada have adopted this style of exhauster. In common with all other iron manufactures, this business was seriously affected by the years of depression that followed the panic. But the works have been kept in constant operation, and have had a steady though comparatively small trade.

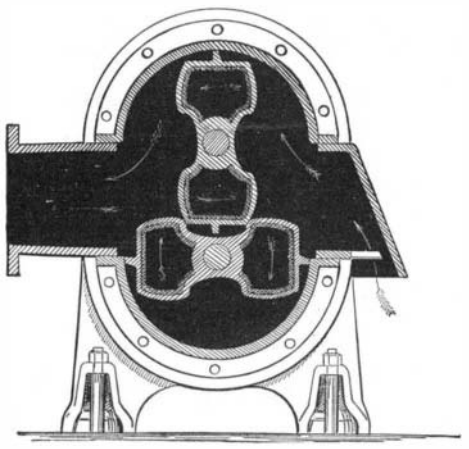
With the general revival of business this branch of industry has improved, and we are informed that to-day the Messrs. Roots have more orders than they can promptly fill, and are constantly increasing their force to meet the increased demand.



INTERIOR OF FOUNDRY.

The leisure afforded by the dull times has been improved to the utmost in perfecting all the constructive details of the blower, and bringing it up to the highest standard of mechanical perfection, till in these directions it seems impossible to make further improvements.

These improvements have simplified and reduced the number of parts of the blower, both external and internal. As now constructed, the internal operating parts of these blowers consist simply of two iron revolvers, each cast entire in one piece. There are no bolts, nuts, screws, washers, or other internal parts that can by any possibility get loose and require adjustment or cause injury. These revolvers are perfectly balanced, and this is a very important point, as they will bear much higher speed than unbalanced ones; for this reason a much smaller blower will do a given amount of work, and at a greatly reduced cost.



SECTION OF BLOWER.

The parts coming in contact and requiring to be finished have been reduced to less than a fourth of that required formerly, by which the friction of the parts passing each other has been greatly reduced, and iron revolvers can be made at much less cost. As no wood is used in the construction of the blower, all danger of shrinking or swelling of any of the parts is entirely obviated, and the parts can be made to run in close contact, and damp or dry, hot or cold air, or dust, can be passed through the blower without injury.

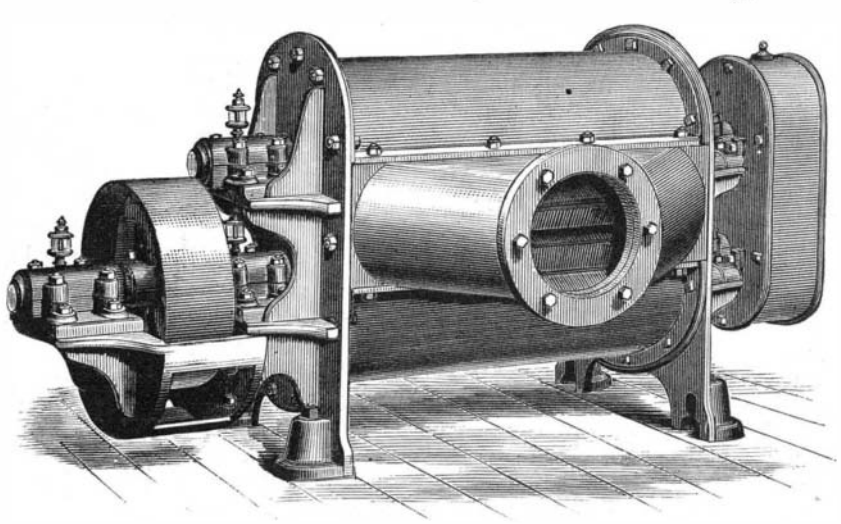
Externally the blower has been very much simplified and improved. Only two gears and one driving pulley are now used. The gears are cut in the most perfect manner, and are inclosed in iron housing and perfectly protected from dust and accident. The driving pulley has a large belt surface, and the blower can be driven under high pressure with a loose belt. The driving shaft is provided with a bearing outside the driving pulley, which is rigidly attached to the blower. This gives double bearing surface to the driving shaft, compensating for the stress of the belt. The shafts are of steel; the journal boxes are of the best known construction, and are so arranged that when the bearings, which are of phosphor or carbon bronze, are adjusted or renewed, the shafts will be brought exactly into their original position. The attachments are very easy and simple. As the speed is slow the blower can be run directly from the main line of shafting, dispensing with counter shafts, etc. As the discharge pipe comes out horizontally from the blower, one quarter-turn will carry it in any direction.

We have been thus explicit in giving the history of the growth of this industry, as it is a notable example of the healthy development of a valuable invention. From a small beginning it has expanded until it is known all over the world.

The works, which are in many respects unlike anything else in this country, are well represented by the engravings. The small vignette in the larger engraving gives a view of the exterior of the works, while above it is represented the room where the blower cases are bored and fitted, and where much of the larger and heavier work is done. The shafts and revolvers are turned, and the gear wheels are bored and cut, in the department represented by the central figure. All of the finished parts are brought into the large room shown in the lower view, to be put together to form the completed machine. The small view on this page represents the interior of the foundry, and the improved blower is also represented on this page in perspective and in vertical transverse section.

It will be observed by an examination of the internal part of the blower, as shown in these engravings, that it does not operate at all on the principle of a fan, that is, by imparting momentum to the air by running at a great velocity, but by a regular displacement of the air at each revolution, whether it runs fast or slow. When the air enters the case at the opening for induction, and is closed in by the wings of the revolvers, it is absolutely confined, and positively forced forward until brought to the eduction pipe, where it must be discharged or the machine stop if perfectly tight, as there can be no backward escapement of the air after it once enters the case, the contact being kept up at all times in the center of the blower between the pistons or revolvers, thus preventing any escape of the air in that direction. The advantages of a positive blower of this kind will be readily admitted by any one competent to compare it with other forms.

Mr. S. S. Townsend, 6 Cortlandt street and 8 Dey street, is general agent for the manufacturers of these blowers. Wm. Cooke, of 6 Cortlandt street, and James Beggs & Co., 8 Dey street, New York City, are selling agents.



IMPROVED POSITIVE BLOWER.

Crystallized Chlorophyl.

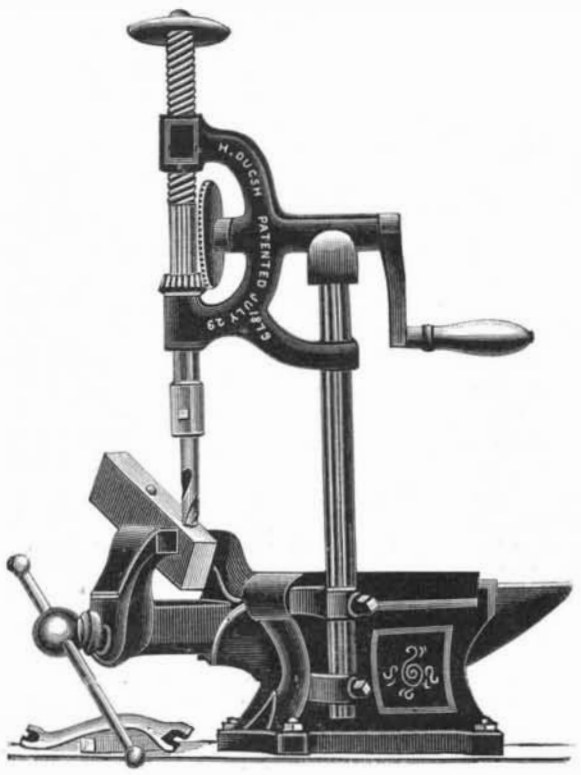
The following note by Mr. A. Gautier, on the method of obtaining pure crystallized chlorophyl, has been communicated to the Academy, and was read at a late meeting of the French Photographic Society, in consequence of its having been shown by MM. Becquerel, Cros, and Ducos du Hauron, that that substance, when added to a sensitive film, enabled the latter to reproduce colors hitherto considered out of the reach of photography:

"To obtain the chlorophyl I take the green leaves of spinach, cress, etc., and pound them in a mortar, adding to the pulp a little carbonate of soda until the liquid is neutralized, and then I submit the whole to strong pressure. The mass thus obtained I digest in alcohol of 55° C., and I again pass it through the press; then I digest it once more in alcohol of 83° C. By this process the chlorophyl is dissolved, along with all the fats, the wax, and the coloring matters. To separate these, the liquid is filtered, and then placed in contact with powdered animal charcoal previously well washed and raised to a high temperature. At the end of four or five days the liquid will be found to have turned a greenish or brownish yellow, and it will contain all the impurities. It is decanted off, and the charcoal is collected in a tube plugged with cotton wool, where it is washed with alcohol at 65° C. This liquid takes up the yellow crystallizable substance which is always found to accompany chlorophyl, and which seems to have some intimate relation with it. On the char-

coal thus deprived of the yellow substance, or containing mere traces of it, there is poured anhydrous ether, or, better still, light petroleum oil, which does not dissolve the yellow substance. Those solvents take up the chlorophyl, and yield a deep green liquid, from which the latter can be crystallized out by slow evaporation in the dark."

NEW VISE AND ANVIL DRILL.

We give herewith an engraving of a combination tool of great utility, made by the Miller's Falls Company, of Mil-



VISE AND ANVIL DRILL.

ler's Falls, Mass., and 74 Chambers street, New York city. With this tool the work can be held in the jaws of the vise in any desirable position, and a hole may be drilled either straight or at any required angle. It seems well adapted to the work of machinists and all other mechanics working in metals. It is fastened on a bench like an ordinary vise, as shown in the engraving. The drill press can be removed in an instant when the vise or anvil is wanted separately.

This combination tool is capable of a wide range of application in various kinds of iron and steel hand work. It is well made in all its parts, and only the best materials are used in its construction. The shaft to which the drill press is fastened and the spindle are both made of steel. Each machine is furnished with a chuck capable of holding drills from half an inch down.

A Supposed Unseen Outer Planet.

In a paper communicated lately to *La Nature*, M. Flammarion shows reason for supposing that probably a planet exterior to Neptune has been the determining cause of the orbit of the comet of 1862 (which has been surely determined), and describes its course round the sun, about the distance of the aphelion of this comet, and of the classical stream of meteors of the month of August. (It is known that Leverrier attributed to Uranus the introduction into our system of the stream of November meteors, and supposed the perturbation to have occurred in the year 126 of our era.)

ELECTRICAL PRESSURE INDICATOR.

The annexed engraving represents an improved pressure temperature indicator, designed to serve the very important office of indicating maximum and minimum pressures and temperatures. The importance of this class of inventions must be acknowledged by engineers, superintendents, and others who are required to give daily attention to these matters.

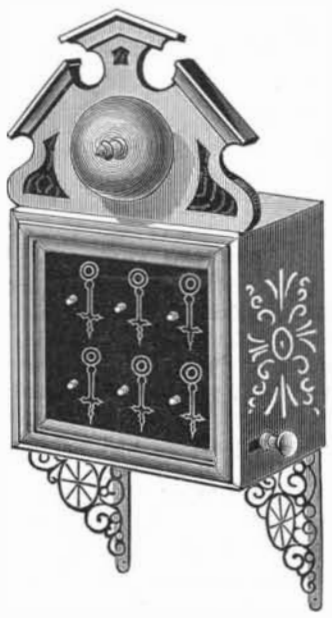
In all operations pertaining to the use of pressure or temperatures, there is generally some considerable range of pressure or temperature not in any way injurious; but extremes of high or low pressure or temperature are to be avoided for obvious reasons. If the pressure is too low, work is delayed and in some cases goods are injured. In either case loss will ensue; while, if the pressure run to the other extreme, it may reach a point where rupture must result. To avoid these extremes, the ordinary instruments indicating the pressures or temperatures are required to be carefully watched by the attendant, a duty that is sure to become wearisome in time, with a possibility of neglect at an important moment. Disaster is too often traceable to inattention of this kind.

The indicator shown in the engraving is a faithful servant, standing sleeplessly on guard day and night, ready to give warning when the extreme of either high or low pressure is approached by ringing a small bell placed in any room however distant, within hearing of the operator, thus enabling the attendant to perform other duties with an assurance that he will receive prompt notice of any considerable variation of pressure or temperature. When the device is to be used for indicating pressure it is attached to any of the ordinary spring pressure gauges, and when used to indicate temperatures it is connected with a pyrometer.

The device shown in Fig. 1 represents an ordinary spring pressure gauge, on the spindle of which is secured a crank arm, A, with a projecting crank pin on its outer end; the glass front of the gauge is bored for the reception of a post that has double washers on the opposite side of the glass to which pins, B and C, are attached. The washers turn upon a central screw in the post, enabling the pins, B and C, to be moved and secured in any desired position around the center of the post. A wire connects the central post with the batteries, passing in the circuit through a switch, D, and bell, E, back to the gauge.

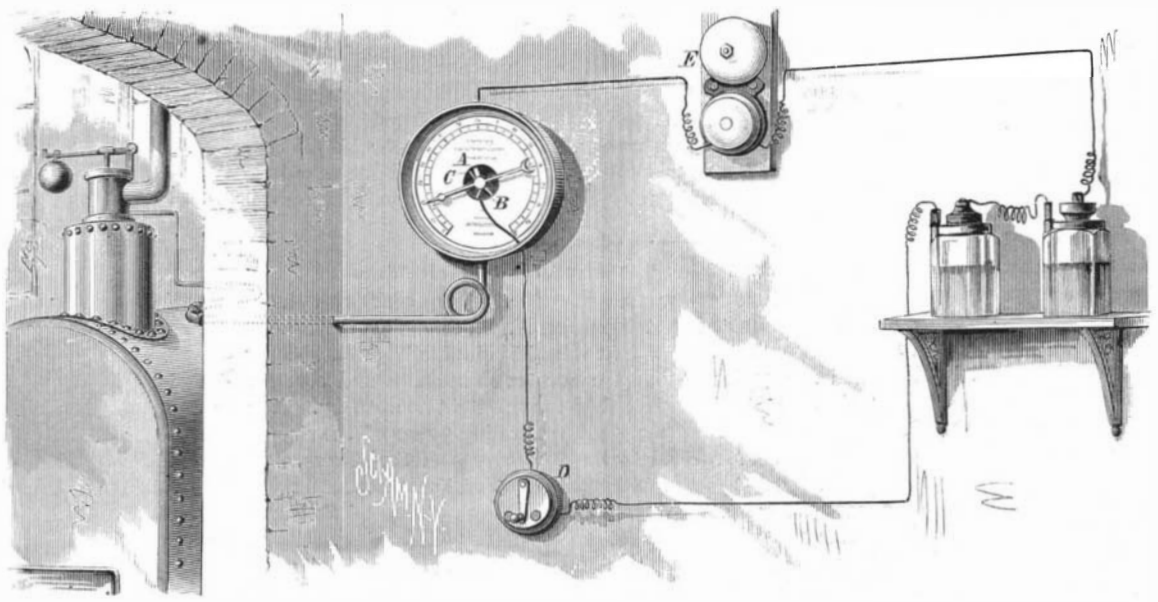
The electrical circuit is completed or broken automatically by the rotation of crank arm, A, which coming into contact with the pin, C, completes the electric circuit, and rings the bell, E. This bell may be placed at any distance from the instrument, and will indicate the minimum pressure. A reverse movement of the spindle brings crank arm, A, into contact with pin, B, indicating the maximum pressure. An alarm at either extreme signifies that the attention of the attendant is now required. The switch, D, is provided to admit of disconnecting the electrical indicator whenever desired. This is found necessary when the device is used in connection with water tanks, reservoirs, etc., to prevent the bell ringing after the proper attention has been given.

In cases where it is desired to connect a number of boilers or tanks to one bell, a device not unlike a hotel annunciator is used (Fig. 2). The bell rings at the proper time, and the needle point shows the location of the boiler that requires attention.



SHAW'S PRESSURE ANNUNCIATOR.

This appliance is adapted to all kinds of spring gauges, and to Shaw's standard mercury gauges. The batteries employed are reliable, requiring only a little water to supply waste of evaporation once in the course of two or three months, and about once a year a few crystals of sal ammoniac are to be added.



SHAW'S ELECTRICAL INDICATOR.

In large works the electric bell may be placed in the office or any part of the building, and will give instant notice if steam is too low to perform work, or so high that it is dangerous. The device seems capable of a great variety of applications, and will undoubtedly prove a watchful, faithful, and inexpensive servant.

For further particulars address the patentee, Mr. Thos. Shaw, at steam gauge warerooms, 915 Ridge Avenue, Philadelphia, Pa.

IMPROVED ELECTRIC LAMP.

We give herewith an engraving of an electric lamp patented by the well known electrical inventor, Mr. Moses G. Farmer, of Newport, R. I. A globe made of glass, and having an air-tight stopper fitted to its lower end, contains a small bar of carbon supported by two large blocks of the same material, mounted on the ends of two bars of metal extending downward through the stopper, and provided with binding posts for receiving the wires from an electrical generator. Two small tubes enter the globe through the stopper, for the purpose of substituting for the common air contained in the globe a vacuum or an atmosphere of some suitable gas. The small carbon rod offers great resistance to the passage of the electrical current, and is consequently heated to incandescence, and produces a brilliant light without consuming either itself or the gas contained in the globe.

FARMER'S ELECTRIC LAMP.

The Harnessing of Electricity.

Mr. W. H. Barlow, the new president of the Institution of Civil Engineers, London, in his recent inaugural address, speaking of the rapid growth of telegraphy and other practical applications of electricity, said that the diminution of power, from increased length of the conducting wire, had been surmounted by relays of power at fixed stations. (This was the discovery of Morse.) By employing this ingenious expedient on the Indo-European Telegraph, Calcutta had frequently been put in direct communication with London, a distance of 7,000 miles.

He further stated that Dr. C. W. Siemens had ascertained that, including all sources of loss, 50 per cent of the original power could be realized by electric wires at a distance of one mile from the motor; and that with adequate provisions against heating it would be no dearer to transmit electromotive power to a greater than to a smaller distance. Sir William Armstrong, by means of an electro machine and wire works his circular saw at a distance of a mile from the water wheel that turns the electric machine. By the same means Dr. Werner Siemens works a locomotive that carried thirty persons.

ENGINEERING INVENTIONS.

Mr. James A. Stout, of Belleville, Ill., has patented a traction engine in which the propelling power is applied directly to an adjustable front axle, and the axle is provided with a universal or ball joint motion. The boiler is of novel construction and designed with a view to economy and safety.

An improved rock drill, patented by Mr. John Brown, of Ishpeming, Mich., is so constructed that the piston and tool may be rotated by the entering air or steam, and that the entrance and exit of the air or steam will be controlled by the movements of the piston.

Mr. James E. Purdy, of Tallahassee, Fla., has patented a means for connecting cars, which is so constructed that the cars will couple themselves when run together, and will not be liable to become accidentally uncoupled.

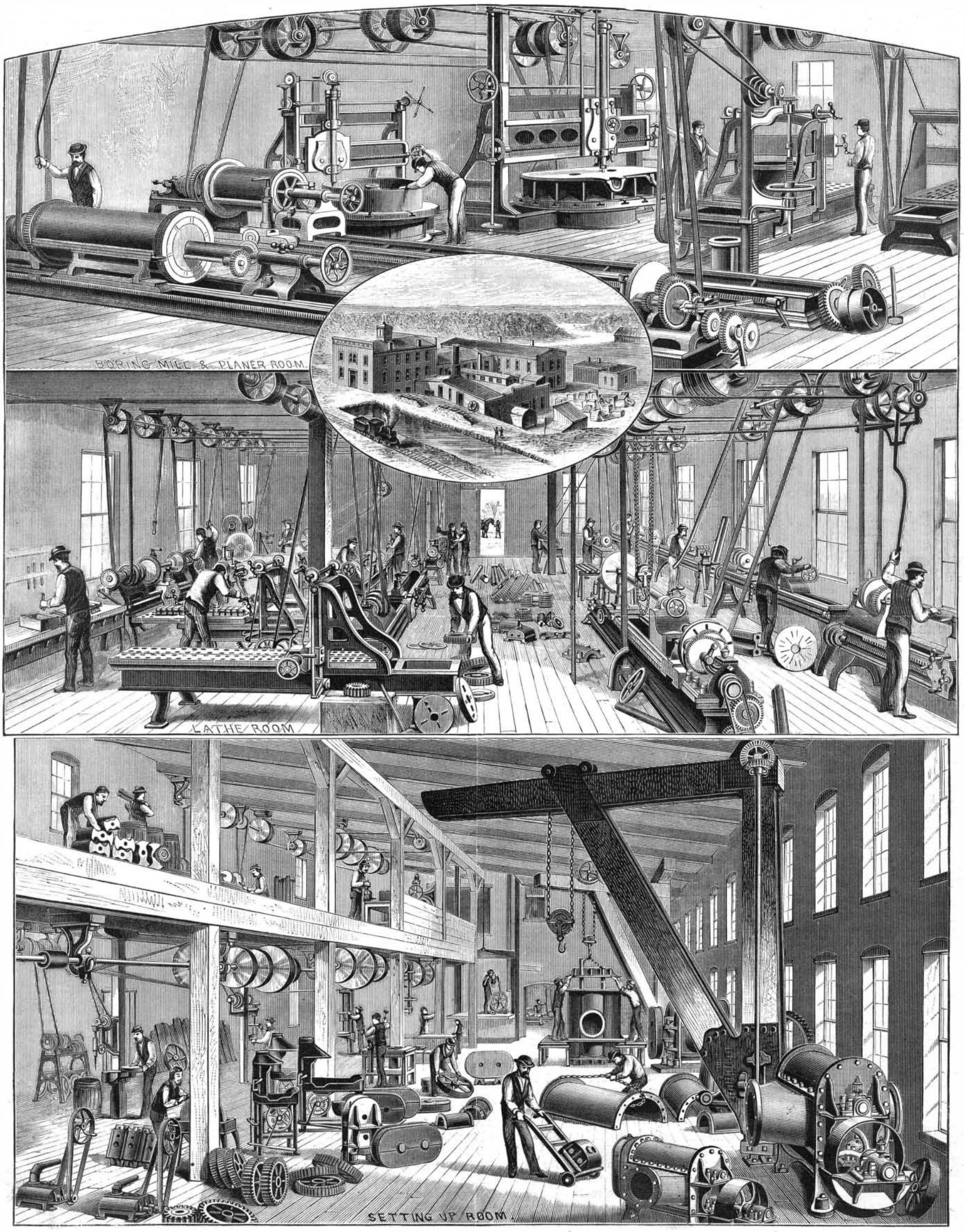
Mr. James Morton, of Philadelphia, Pa., has patented

SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XLII.—No. 9. [NEW SERIES.] NEW YORK, FEBRUARY 28, 1880. [$3.20 per Annum. [POSTAGE PREPAID.]



THE MANUFACTURE OF ROTARY PRESSURE BLOWERS.—WORKS OF P. H & F. M ROOTS, CONNERSVILLE, IND.—[See page 130.]