

**A NEW SMELTING FURNACE.**

The remarkable increase within the last few years in the production of argentiferous lead in connection with the great commercial success of the operations as exemplified at Leadville, Colorado; Horn Silver Mining Company, Utah; Eureka and Richmond Consolidated, Nevada; and numerous other almost equally great enterprises, has naturally stimulated improvement of methods of reduction. The new smelting furnace, manufactured by the Lane & Bodley Company, Cincinnati, possesses several features that we think of sufficient importance to describe in this article.

Whenever the use of cast iron has heretofore been objectionable on account of liability to breakage from unequal expansion or other cause, wrought iron has been substituted; also in other places where the use of cast iron resulted in great weight, a similar substitution of wrought metal has been resorted to, thus producing a furnace of maximum strength and durability with minimum weight.

The ground plan of the crucible binders is that of a rectangle with the corners chipped off, thus allowing the upright supports of the deck-plate to be entirely independent of the masonry within the binders. The uprights are wrought iron I beams in lieu of the usual cast iron columns, thus avoiding weight, securing more room, and the flanges on the sides forming excellent racks for supporting bars and other implements used about the furnace.

The usual troublesome cast iron deck-plate is superseded by I beams, the space between them being utilized as a channel to conduct off the noxious gases and fumes that escape to a greater or less extent from all furnaces, owing to the pressure within, due to the blast pressure; from the channel above mentioned are flues to conduct the gases, etc., to the outside of the stack building.

At the feed door is a ledge a few inches high, thereby requiring the feeder to throw the charges over it into the furnaces, thus preventing the charges being shoved in, and the fine materials all falling in on one side of the furnace.

The space between the crucible and deck plate can be filled with brick and water tuyeres or spray jackets, or water jackets of cast iron, wrought iron, or steel, with closed or open tops; the engraving represents open top steel jackets. Jackets of this construction have been thoroughly tested at the large new smelter of the Horn Silver Mining Company near Salt Lake City, Utah, and proved to be the most economical, although of somewhat higher original cost, than other forms of jackets. These jackets are constructed by forming the sheet next to the fire into a box-six inches deep, the corners being shaped up without cutting, welding, or riveting (the back is formed by a shallow box fitting into the deep one), resulting in a presentation of no welded or riveted joint to the action of the fire, excepting where the bronze metal tuyere thimble is secured by countersunk rivets to the inside sheet of the jacket, and from which no trouble has resulted, owing to precautions taken in the details of construction.

The end jackets do not run down to the crucible, the spaces so left being closed by small jackets with the tap hole through them; these small jackets can readily be removed without disturbing the main end jackets, in cases of necessity admitting the introduction of a bar without "running down the furnace."

One of the most fruitful sources of annoyance about furnaces is the blast and water pipes; in this furnace the details of these pipes have received great care. The blast pipes do not interfere with putting in or removing jackets, and they are out of the way of water pipes, permitting of readily repairing the same. The blast pipes are not in the way in bricking up from top of jackets to deck-plate. All the water pipes are readily accessible for repairs, and the water pipe valves are within easy reach of the furnaceman, yet out of the way in working around the furnace. The water pipes and valves are so arranged as to admit of removal, and repair of any jacket without disturbing the water supply, or connections of other jackets.

There is frequently considerable trouble in keeping jackets properly cool, when first starting, upon account of their not being protected with a layer of chilled slag; this trouble is found to be entirely overcome by the use of an auxiliary supply, obtained through the connection to the blow-off hole in each jacket, which supply is only used under the circumstances above indicated.

The brace under the slag spout is notched in steps for the purpose of catching the edge of slag pots, thus holding them level without putting a block under the foot of the pot carriage; such blocks being a source of annoyance, as

the slag pot wheels frequently strike them, causing the hot slag to be spilt.

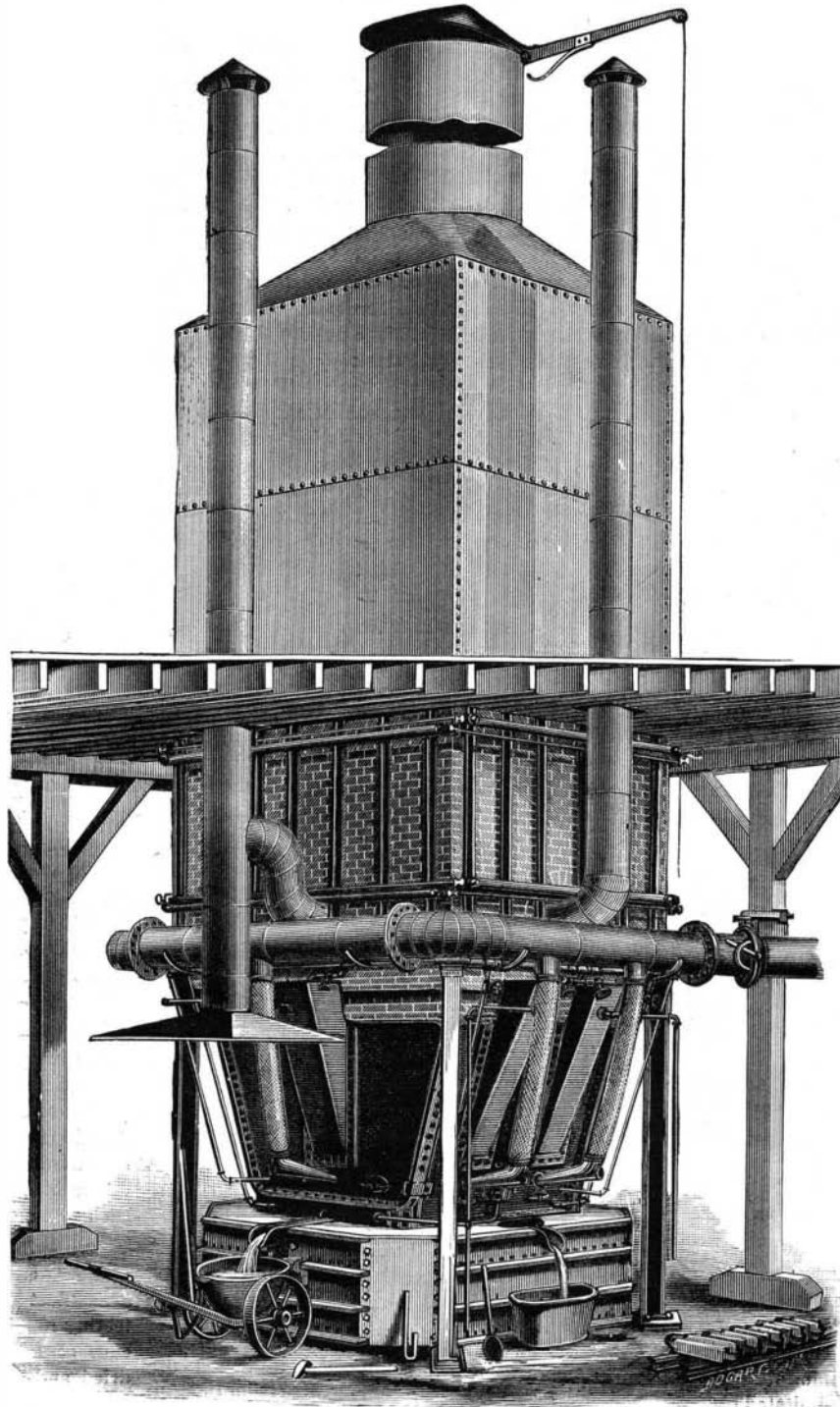
Frequent reference has been made to details, as they are an indication as to the convenience in the practical operating of any device.

In this furnace the maximum strength and durability with minimum weight are secured, and there is no piece but admits of ready transportation. The total weight is very small, consequently cost of transportation small. There are no cast iron parts liable to break, and all parts are readily removable for repairs. The escaping noxious gases and vapors are carried off. The forms of all essential parts have been approved in practical working.

**Magazine Guns.**

The Board of Army Officers designated to examine into the merits of the different magazine guns have just concluded their report and transmitted it to the Secretary of War. The tests of the different guns were commenced in the early part of July, 1881, and included every magazine rifle brought before the Board.

The Lee gun, No. 36, the Chaffee-Reece, No. 33, and the



SMELTING FURNACE MANUFACTURED BY THE LANE & BODLEY COMPANY, CINCINNATI.

new Hotchkiss, No. 34, representing the different systems of the detachable and fixed magazines, passed these tests in a satisfactory manner, possessing in a remarkable degree efficiency as single loaders, safety, ease of loading, rapidity of fire, endurance, moderate weight, and simplicity of construction. The Board, therefore, regard them as suitable for the military service, and recommend them in the order named.

On account of the novel and meritorious features of the Spencer-Lee, No. 35, and its record made before the Board especially for rapidity with accuracy, it is recommended that the manufacturers be invited to produce models embodying suggestions of the Board as to weight, etc., and to submit them to the War Department with a view to the trial of a limited number in service.

TRADITION says that beer was first made at Pelusium, on the Nile, 400 B. C.; but nowadays only a crude kind of barley beer is made by the natives in Egypt. There is, however, a brewery in Cairo, owned by a Geneva company, and worked on the German system, which can turn out 400 barrels a week.

**Oxygen from the Air.**

A method of obtaining oxygen from air, for technical purposes, has been recently devised by M. Margis, of Paris. The principle is that of dialysis, or diffusion under pressure. Atmospheric air being forced against a first caoutchouc membrane by suction, a mixture of about 40 per cent of oxygen and 60 per cent of nitrogen is obtained on the other side. A second membrane increases the proportion of oxygen to 60 per cent; that of the nitrogen being reduced to 40. A third gives 80 per cent of oxygen; a fourth, 95 per cent. M. Margis prepares his membranes by immersing taffeta in a solution containing sulphide of carbon (or light petroleum ether), spirit of wine, ether, and caoutchouc. After drying, the taffeta has a fine layer of caoutchouc on it.

A bag of the membrane, with a framework of rings of galvanized iron wire, is placed in a cylindrical iron vessel admitting air. It is connected by means of strengthened caoutchouc tube with the suction apparatus, which is (preferably) formed of a cylinder containing a series of conical cups with small spaces between. Steam is forced through these, and draws in the gas obtained from the first diffusion, passing on with it through a cooler, where the steam is condensed and the gas separated for its second diffusion. This latter occurs through a similar apparatus, except that the space round the bag is provided with a tube passing down into water. The pressure can thus be regulated, and the superfluous gas let off. Four sets of the apparatus are generally used (as already indicated), and the final gas with 95 per cent of oxygen is collected in a holder. Even the mixture obtained from the first dialysis is strong enough to considerably increase the luminous power of a gas holding hydrocarbons, M. Margis says as much as tenfold.

**Parisian Real Estate.**

It is calculated that no less than eleven hundred dwelling houses are now being constructed in Paris. In order to realize what this means, attempts at comparison with English houses must be put aside, for by far the greater part of these new buildings are of immense size—what the French call *maisons de rapport*—i. e., destined to be let out in suites of apartments, each of which is a complete dwelling in itself, so that the average number of inhabitants per building will be at least ten times greater than that sheltered by London houses. Notwithstanding this abnormal activity in the building trade, which has, moreover, continued for upward of three years, the value of house property is rising every day. Taking at random a few instances from a list of recent sales in the French metropolis, we find that No. 62 Boulevard Malesherbes has just realized 1,200,050 fr.; No. 64, 1,030,000 fr.; the private residence of M. Secretan-Overnay, 59 Rue de Ponthieu, 1,500,000 fr.; and that of the Comte d'Haussonville, 35 and 37 Rue Saint Dominique, 2,900,000 fr.—*The Architect.*

**The London Fisheries Exhibition.**

The prospects of the International Fisheries Exhibition in London, next year, as indicated by a report of the Executive Committee just issued, are exceedingly bright. Applications for space have been received from all parts of the world, and the expectation is that the successful exhibition at Berlin will be surpassed.

The exhibition area will cover about 250,000 square feet. A prize of \$500 is offered for the best essay on catching and distributing sea fish, and another, also of \$500, for the best essay on the food of fish; while the best lifeboat exhibited will carry off the fine gift of \$3,000. Among the other money prizes are four, offered by Ashmead Bartlett Burdett-Coutts for the best collections of fishing rods; a prize of \$100, given by the Baroness Burdett-Coutts, for the best plan of a fish market; and a prize of \$300 for the best model of a carrier boat, the boat to be specially adapted for preserving the lives of her crew. The English Government will strike medals at the Mint as rewards of merit, will issue diplomas of honor, and will probably make a grant of public money toward the expenses of the exhibition.

**Vegetable Butter.**

N. Jepson, an English vegetarian, not wishing to use poor and adulterated animal fats, has sought a substitute, and found it in a composition for which the following is the formula: Take four ounces of the finest Brazilian nuts, pounded very fine in a mortar; four ounces pure olive oil; rub them into a smooth jelly; add eight ounces of fine wheat flour and a quarter of an ounce of salt. Rub the whole into a smooth paste, and use as butter. This would certainly be preferable to much that goes by the name of butter.

**The Ames Monument.**

To commemorate the services of Oliver and Oakes Ames in connection with the building of the first railway across the United States, connecting the Atlantic with the Pacific, the Union Pacific Company are erecting a granite pyramid on the highest point near its track. The monument is now nearly finished. It is 60 feet square at the base and 60 feet high, laid up in undressed red granite, in a style calculated to last for centuries. On the west side is a medallion bust of Oakes Ames, 9 feet high, with the date of his birth and death. On the north is the inscription: "In memory of Oakes Ames and Oliver Ames." On the east side the bust of Oliver Ames has yet to be placed. The top is rounded off, and does not make an acute angle. The cost is said to be nearly \$90,000.

**A Curious Tree.**

Lieutenant Houghton, who has recently visited New Guinea and several other groups of islands in the Pacific, reports the existence of a prehensile tree. It appears to be a species of ficus, allied to the well-known banyan-tree, which throws out from its branches air roots, that eventually reach the ground, and take root there, and in their turn become new stems, which perform the same function; so that a single tree will eventually extend so far as to form a complete forest, in which the stems are united by the branches to each other. The prehensile tree in question similarly throws out from its branches long, flexible tendrils, which, touching the ground, do not take root there, but twine around any article that may lie within their reach. After a time these *quasi* branches contract, so that they fail to reach the ground; but the finger-like processes continue to closely gripe the article round which they have twined themselves, and which are consequently suspended in mid-air. In this way, articles of considerable weight may be literally picked up from the ground and held in suspension.

**Aluminum.**

At the recent meeting of the British Association, Mr. Barlow read a paper "On the Mechanical Properties of Aluminum." This metal is used chiefly as a substitute for silver, but the author had found it to be exceedingly strong in proportion to its weight. Experiments had been carefully made for him by Prof. Kennedy, from which its valuable properties of ductility, tensile strength, and elasticity were fully demonstrated. This was well illustrated by the comparative length of rods of uniform section, but of different metals, which could be suspended without rupture, the lengths in the case of steel and aluminum being equal and exceeding all others. Unfortunately it is an expensive metal, and the process by which it is at present extracted leaves little hope of its use being greatly extended. Sir H. Bessemer said he did not think any metal could be depended on like the one in question, from the small part its weight took in producing its rupture. He exhibited a key of the material (about the size of a large latch key), and it was stated that forty-five of these would only weigh one pound.

OBSERVATIONS upon Russian railways have resulted in showing that for the period of six months 77 per cent of the fractures of tires occurred when the temperature was below zero, 4 per cent at zero, and only 19 per cent at higher temperatures.

**IMPROVED CIRCULAR SAW MILL.**

We present an engraving of a circular saw mill lately introduced by the Taylor Manufacturing Company, of Westminster, Md. Circular saw mills have, to a certain extent, displaced the reciprocating mills, and are now chiefly used in the

liable to deceive those who are not familiar enough with the subject to know how much a mill should do. They work very fast, and when the stuff is badly sawed, as is invariably the case when a mill is built regardless of quality, so that it can be sold at a low price, the loss is very great.

The object of the manufacturers in designing this mill is to furnish the machine at a fair price, and at the same time present entirely new valuable features in construction and design. The main frame is of cast iron, of girder shape; it is well proportioned for strength, and being cast in one piece cannot spring out of line. The mandrel is made of steel, and of large diameter so as not to spring. The mandrel boxes are self-oiling, and have large bearing surfaces; they are provided with an ingenious device for giving lead to the saw. The feed and the backward motion of the carriage are operated by friction, thus doing away with belts and complicated gearing. There are three fixed changes of feed operated by one lever, and the feed can be varied or stopped instantly by a slight movement of the lever. The gidding back is controlled by the same lever, and can be speeded slow or as fast as seven hundred feet per minute. This rapid gidding back saves much time, and is secured without any injurious jar on the machinery, as the movement of the carriage is gradual to its fastest speed. A rapid movement for setting up the log to the saw is secured by the combined gear for moving up the head block, and a novel quick-acting accurate gauge roller. This gauge roller, shown in Fig. 1, is placed on the end of the frame in front of the saw and at the feed lever where the sawyer stands, thus being convenient to his hand. The roller is

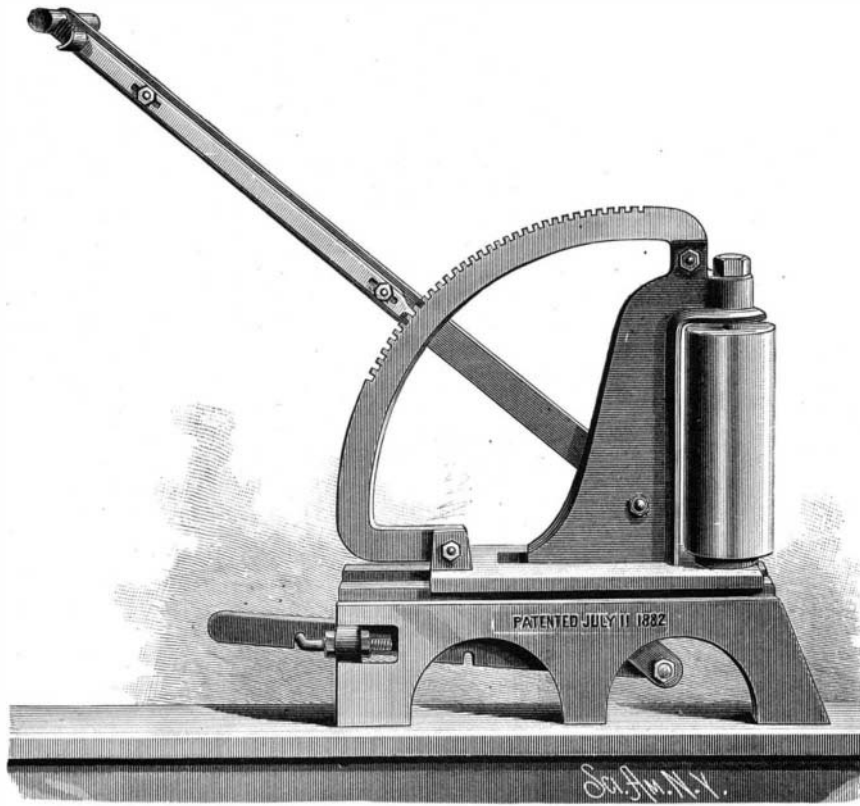


Fig. 1.—GAUGE ROLLER.

manufacture of lumber. The improvements made in saws in the last few years have done much toward bringing the circular mill into popular favor. To keep pace with these and other improvements, and to more perfectly meet the wants of saw mill men, the mill illustrated has been designed.

operated by one lever to set it in position, and the lever is held in place by a latch in notches cut in an arc, as shown in the engraving. These notches are marked in one-quarter inches, and serve as a rule to saw by, so that the sawyer only has to set the roller, and an attendant who rides on the carriage brings the log up to the gauge-roller, while the carriage is moving toward the saw, and the result is the lumber is sure to be straight, and of whatever thickness the roller is set for. The connections of the lever to the gauge roller are provided with an adjustable link, by means of which all lost motion of parts connecting the roller and the lever can be corrected and the roller always kept true to the saw and the figures on the notched arc. This adjustment can also be used for setting the roller to any fraction less than a quarter inch; for instance, for lumber that is one inch full, or one inch and an eighth, and so on, it is only the work of a few minutes to set the roller for it. This gauge roller is an entirely new feature, and has been patented. It is very important on any saw mill, and is applicable to all mills.

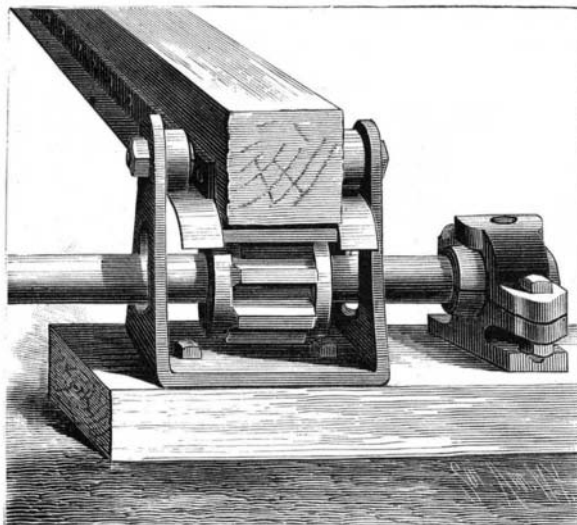


Fig. 3.—EXTENSION GUIDE.

There is probably no machine made by which purchasers are in so great danger of being misled by appearances as in circular saw mills. The chances for deception are numerous; circular saw mills cut so much faster than old fashioned sash or muley mills, that they seem to be doing wonders, and are

Another very important feature of this mill is a continuous log beam in combination with a main head block for dogging the log. This log beam extends the whole length of the carriage, and is arranged every eighteen inches of its length with fending blocks that are dovetailed into the beam as shown. The blocks virtually serve as head block knees in keeping the lumber to the saw and prevent its springing, and the face of these blocks can be trued in perfect line with the saw by taking a cut-off of them after the mill and carriage has been set in position, and it may be kept true by same means, and when worn out can be replaced. It can readily be seen that the lumber, by having to pass between these blocks, and the gauge roller and the

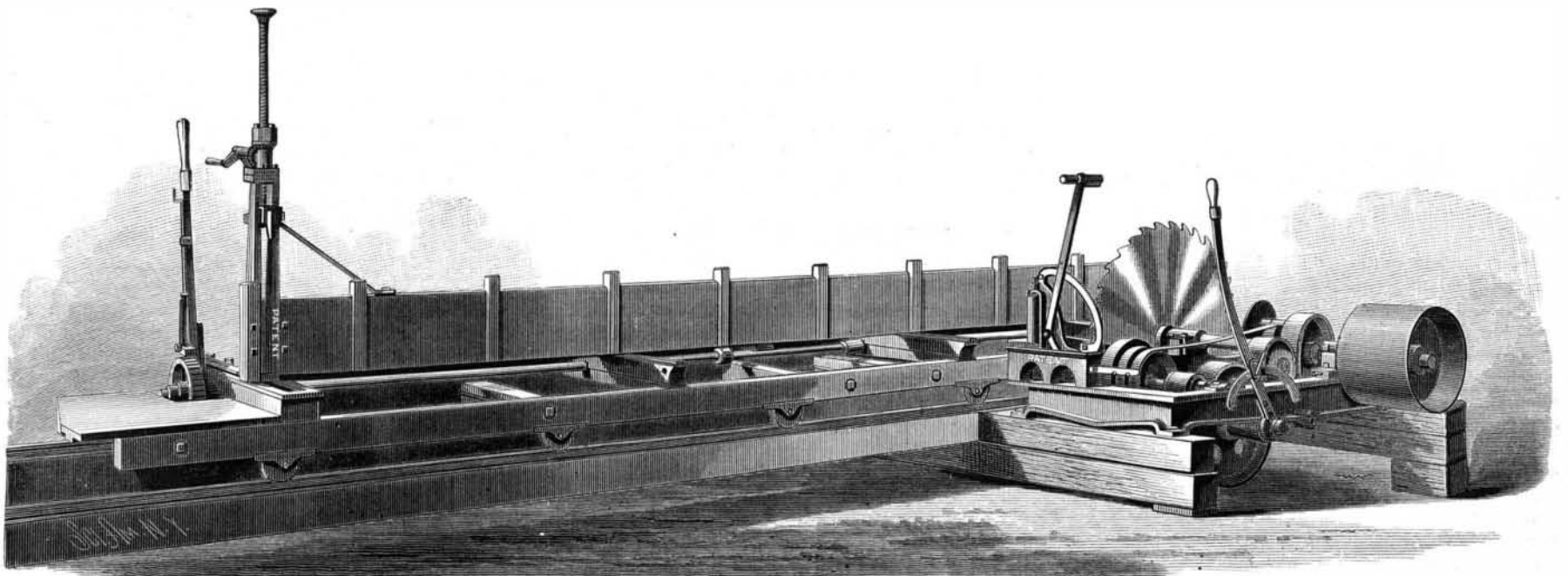


Fig. 4.—NEW CIRCULAR SAW MILL MADE BY THE TAYLOR MANUFACTURING COMPANY.