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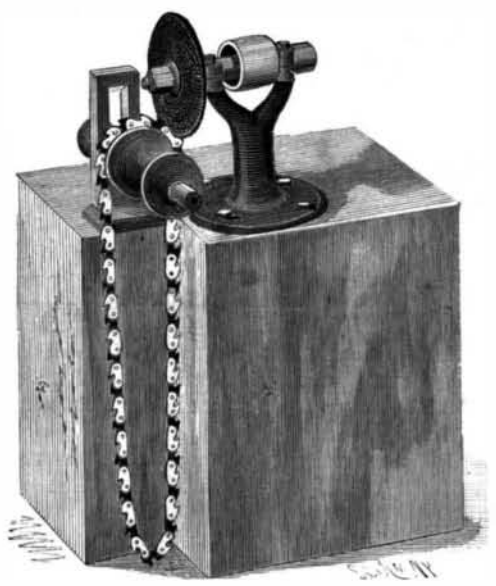
THE CHAIN SAW MORTISER.

No branch of mechanics has received greater development in the United States than that which relates to woodworking. America has been pre-eminently a wood-producing country, and has brought shaping, planing and sawing machinery into the greatest perfection. Soon after its introduction the apparently weak band saw was developed so as to cut the hardest wood of any thickness with accuracy, economy and convenience undreamt of. We illustrate in our present issue a machine which has aptly been said to be an invention as revolutionary as that of the band saw. It is known as the chain saw mortiser.

In indoor woodwork especially, an immense quantity of mortise and tenon work has to be done, and machines for the purpose have been used for many years. The mortising machines have been constructed on the general principles of the old hand chisel and auger, representing in their operation the processes of the human operative. These machines the chain mortiser replaces, throwing into disuse the old chiseling processes, and substituting therefor a cutting tool which eats its way into the heart of the hardest or softest wood with the utmost rapidity, making therein a mortise of mathematical accuracy of shape, clearing it of even the smallest chip and leaving no core to be knocked out. This work it does silently; the old chisel mortiser in full operation was a most disagreeable machine in the shop, while the chain mortiser works almost in silence.

The chips which it makes are by its own action brought opposite to the suction orifice of a rotary blower, by which they are blown away, making it one of the cleanest machines which can be used in the shop.

The soul of the machine is in its chain, which, with its sprocket and feeder bar, we illustrate in one of our cuts. The chain is an endless one, somewhat similar to a bicycle chain, but with links toothed on the outside. The links may be divided into three kinds, arranged in succession as shown in the small cut; some



CHAIN SAW SHARPENING MACHINE.

with two outside teeth and a clearance space between, others with two intermediate spaces with clearance spaces outside and between, others with a single central tooth. The chain is rotated from a sprocket wheel at its upper end, as shown in the cut, while it is brought to a proper state of tension by the feeder bar which is seen at its lower portion. A wheel rotating on accurate roller joints is carried by the lower end of the feeder bar. The right hand figure shows this roller with the journal cover plate removed.

It is obvious that, if the chain is rotated in the proper direction, the edges of the teeth will cut their way through a piece of wood. In the machine the chain is mounted on the front. Beneath it is a working table on which the work is placed and clamped. By the action of the machine the face of the work is brought up against the chain so as to effect the mortising. The chain rotates with high velocity, and a deep mortise is made in the hardest wood, complete and ready for gluing in one or two seconds.

The machine is carried on a large substantial base, on which a compact frame is supported, which carries the necessary band wheels and feed mechanism. When in action, the chain is kept constantly in rapid motion, its speed varying from 1,800 to 2,300 feet a minute, and its feeder bar projecting down over the work table. The work table on its front is adapted to be placed at different angles, so that the mortises can be made in any desired direction. From the front of the base projects a foot lever, by which the belts are shifted back and forth, a very ingenious arragement of parallel motion levers being employed at the inner end of the footlever. At the right side of the frame rises a spindle, with two adjustable collars.

As the machine is automatic in its motion, the upper collar is applied to regulate the depth of the mortise and its position determines the rise of the table. The work being put in position and clamped, a

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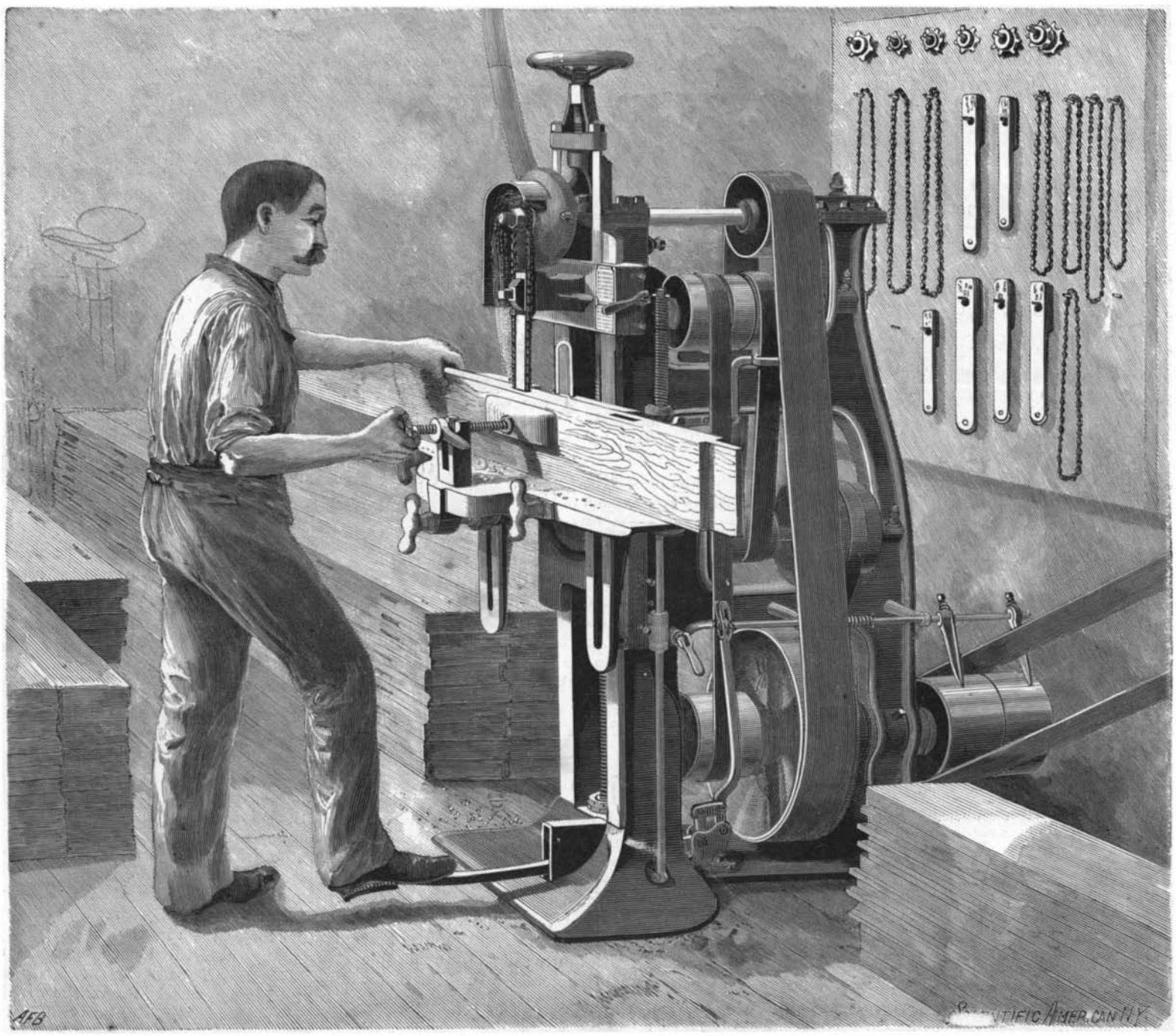

THE CHAIN SAW MORTISER.

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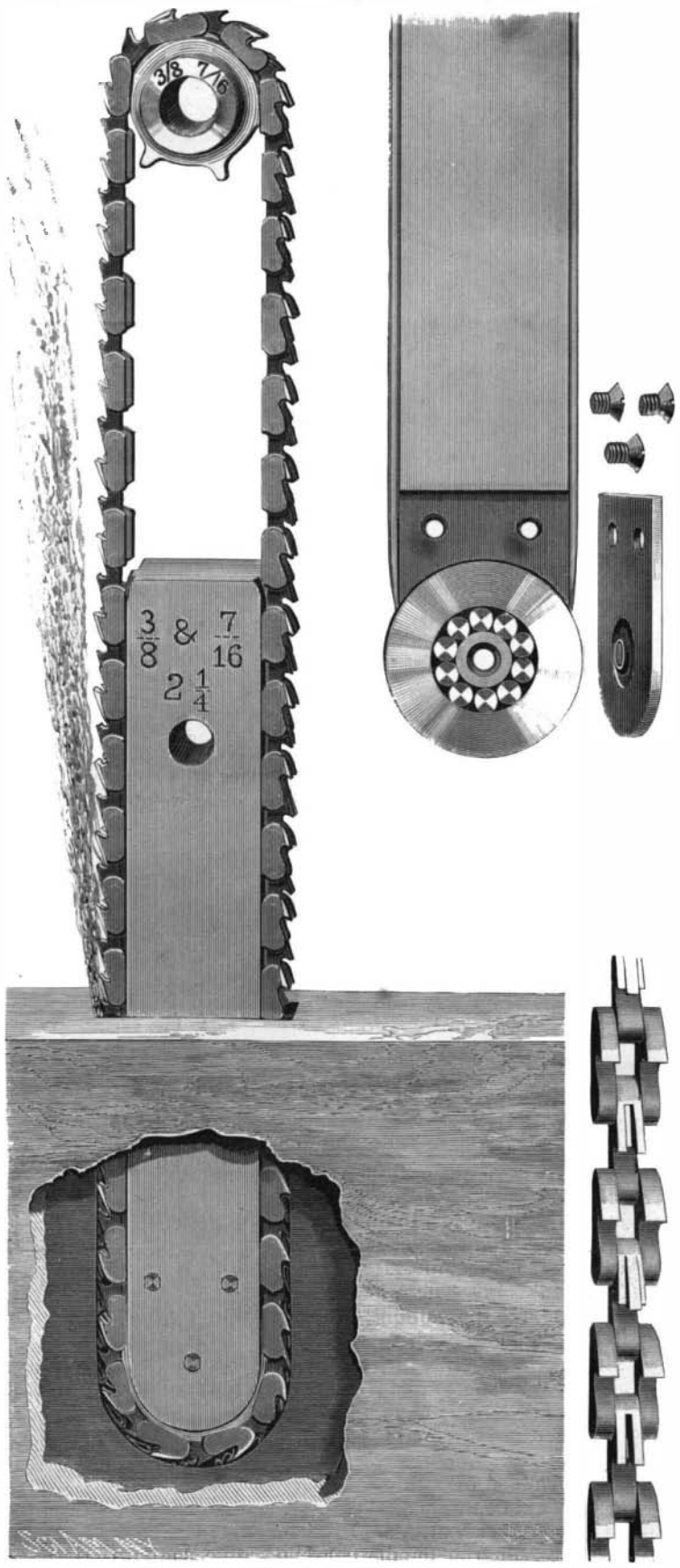
simple depression of the foot throws the belts and the table moves upward, pressing or rather feeding the work against the rotating chain. As fast as the table lifts the work the chain cuts into the wood until the limit of the depth is reached and the feed automatically ceases, the table is dropped and the work can be moved or shifted, the mortise being made absolutely complete by this operation.

It will be seen that a constant rush of chips must ensue upon the operation of the rapidly moving chain. These are thrown almost vertically upward to be caught by a hood bent over the upper sprocket wheel, from which hood opens the suction aperture of a small fan. The chips are drawn into the fan, which expels them by a pipe. For different mortises, chains and feeder bars of different widths are provided. In hard service a chain runs two weeks or more without sharpening. The sharpening is executed by an emery (or carborundum) grinder, the curve of the face of which is so regulated as to cause a slight protrusion of the outer corners of the teeth, in order to give the chain the proper bite. It is computed by absolutely disinterested parties that one chain saw mortiser will replace and do the work of three to five ordinary machines.

Every conceivable contingency is provided for in the machine The action is so purely a cutting one that it never splits the wood and can work in the most resinous kind of Georgia pine, in hardest hickory and elm or in smooth white pine with equal facility. For hard wood it is computed that it will sink a mortise with five or six times the rapidity of the ordinary machine. It never splits the wood and a mortise can be made so as to leave hardly the thickness of a piece of paper between the aperture and the side of the wood without splitting.

The machine is manufactured in a large and well equipped plant at New Britain, Conn., and the general agent is Mr. Sidney B. Whiteside, No. 139 Liberty Street, New York City. The machine can be seen in operation in numerous representative woodworking factories, among them the works of the Bradley & Currier Company of this city.



DETAILS OF CHAIN AND FEEDER BAR.

Improved Arms for the National Guard, New York State.

The New York State Board of Examiners, consisting of Albert D. Shaw, Eliphalet W. Bliss and Robert H. Thurston, appointed to select an improved magazine breech-loading rifle for the National Guard of the State of New York, in accordance with the terms of chapter 600 of the laws of 1895, gives notice that it will, on or before Tuesday, December 17, 1895, accept for examination and test, in compliance with the terms of said act, any magazine breech-loading rifle of American invention and manufacture, subject to such rules as may be prescribed in conformity with said act, due notice of which hereafter to be given. Said rifle may be delivered to the board or its representative at the office of the board, No. 17 Adams Street, in the city of Brooklyn, N. Y., on or before the 17th of December next. Notice of the time of examination and test and the methods to be adopted will be made later. Guns offered for test must be shipped at owner's risk and expense, each in a wooden case with hinged lid fastened with two suitable padlocks of different combination, each lock to have two keys, the keys of one to be retained by the owner, the others to be delivered to the secretary of the board when the case is received by him; all cases containing guns to remain in the custody of the board of examiners and at its disposal until the examination and test shall have been completed. No gun will be received without satisfactory proof that it is of American invention and manufacture; and every applicant will be required to furnish reasonable guarantee of compliance with the conditions contemplated by the law and the regulations made in pursuance thereof.

Printing in Several Colors.

According to F. Barnwell, Manchester, England, ordinary printing inks are treated with three mixtures successively. The first contains castor oil, turpentine, glycerine, oil of tar, and copaiba balsam; the second consists of sulphuric ether and chloroform; the third of liquid ammonia, spirits of ammonia (aromatic), and ipecacuanha. After pouring off any liquid, the ink is ready for use. Inks of various colors so prepared may be used side by side on the same inking roller without in the least flowing sideways and mixing with one another, and thus several colors may be printed in one impression.

Photographic Mordants.

BY JEAN HELOUIS AND CHARLES DE SAINT-PERE.

This process allows to fix upon tissues, by the aid of the light, mordant dyeing dyestuffs, so as to produce designs or photographs upon the tissues by simple dyeing. After carefully cleaning the material by the usual processes, it is dipped into the solution of a substance which is sensitive to the action of light and susceptible of leaving a basic metallic oxide upon the fiber such as: the alkaline chromates and bichromates which leave a brown chromium oxide (ammoniacal sodium chromate, ammoniacal potassium chromate, bichromate of potash, of soda and of ammonia); the highest degrees of iron salts (perchlorids, oxalates, citrates, tartrates, bioxalates, bicitrates and bitartrates of iron); the uranium salts, especially nitrate of uranium; and the salts of copper, especially perchlorid. The salts of gold, silver and platinum, although sensitive to the rays of light, are not available, because the finely divided metal which they leave upon the fiber has no affinity for dyestuffs. The material is in the dark impregnated with one of the above named salts, or a mixture of them, is dried likewise in the dark, and then under a photographic negative for a suitable time exposed to the light, when an image is formed, whose color and intensity vary according to the nature of the salt used. The tissue is then washed, in ordinary water acidulated with hydrochloric or sulphurous acid, for the alkaline chromates and bichromates, when the brown oxide, which has little affinity to dyestuffs, is transformed into a green oxide, which is a powerful mordant; or in ordinary water for the salts of uranium, iron, copper, etc. The materials can thus be dyed at once, or may be dried and put away until wanted to be dyed, either with natural or artificial mordant dyeing dyestuffs, as usual.—Mon. d. l. Teint.; Textile Colorist.

Melting Points of Metals.

M. Pictet remarks that pure metals with high melting points, such as platinum, iron, copper, and gold, are all comparatively strong, and that, conversely, metals having low melting points—zinc, lead, bismuth, and tin—are relatively weak; that metals with high melting points must necessarily be coherent and tenacious, because much heat is required to drive their molecules apart in reducing them to the liquid mobile state in which the molecules have very small coherence, and therefore at ordinary temperatures much force must be applied to overcome the cohesion of the molecules and break the mass. On the other hand, in metals with low melting points a slight elevation of temperature will overcome the molecular cohesion and render them liquid, that is, will melt them. Such metals will be weak, because if little heat is required to melt the metal, less force will be needed to tear it apart; hence melting point and tenacity are clearly connected. It is also shown that the tenacity of pure metals and alloys is greatly increased by extreme cold, that is, by the closer approximation of their molecules, proving that metals become stronger at temperatures furthest removed from their melting point.

Do Birds Reason?

In the spring of 1894 I put up two high poles in my yard; at the top of these I placed two boxes, each containing two compartments; one of these poles was intended for my old associates the purple martins (P. purpurea) who generally arrived between the middle and last week of April; to sojourn with us until the fall reminds them of their autumn migration southward.

The other pole was for the occupation of my little friends the wrens (T. aedon), who arrived a little earlier than their above neighbors.

The wrens (two pairs) duly arrived, and after closely inspecting every knot hole and crevice to be found, in or about the outhouses and barn, finally selected the box appointed for them; which, although a new one to them, occupied the place of an old one, which had been taken down the previous winter; and in which they had nested for some years. They rapidly commenced work, and soon numerous sticks adorned their respective compartments; when suddenly a pair of English sparrows (P. domesticus) put in an appearance, and driving away its occupants, took forcible possession of both compartments. The wrens retreated and disappeared, but in the short time of ten minutes returned with reinforcements, consisting of about seven or eight other wrens, who after a sharp conflict drove the intruders from the field.

The sparrows, in about fifteen minutes, also returned, they in their turn having picked up about ten recruits, and vigorously attacked and put to flight the whole army of wrens.

While attentively watching the battle, and considering it about time for my interference, I noticed a wren slip over my birdhouse, and enter one of the compartments of the martin box, which was upon a much higher pole, and distant about ten yards from their pole, upon whose box the victorious sparrows were chippering and showing every sign of victory.

The wren soon stole away and disappeared, and one of the female martins came out of its compartments, and was soon joined by the other female; in a few minutes the male martins arrived very closely together, and uttering a few notes all four charged the sparrows, and in a minute or two had completely routed the aggressors, who never returned; the martins returned to their box, and soon the four wrens came back, and settled down happily.

I thought this was a clear case of bird sense, and bird language on the wrens' part; for finding they could not hold their own, appealed to their neighboring wrens first, but where they found them so quickly I could not say, for I only knew of one nest, about two hundreds yards distant, also their shrewd policy, when the enemy was reinforced, in applying for help to their powerful neighbors.

The martins attacked the sparrows in a similar way that bee martins employ in fighting hawks or other birds who approach their nests.—E. Kroy, in the Museum.

An Immense Flywheel.

An immense flywheel, twenty-eight feet in diameter, having a face four feet broad, and weighing 180,000 pounds, is on its way from Philadelphia to Joliet, Ill. It is being transported in two sections, on two cars built for the purpose.