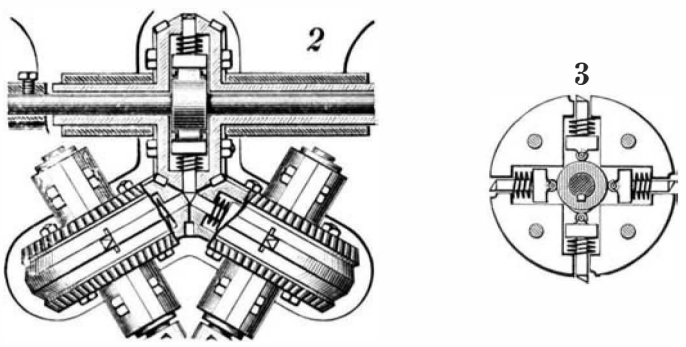
A NOVEL NAIL-FORMING MACHINE.

An ingenious apparatus for rolling nails from a continuous length of stock has been devised by Mr. Sextus L. Reed, P. O. Box 31, Gallatin, Tenn., which apparatus is designed especially to produce a triangular nail, although other forms can also be made. The features of novelty in the invention are to be found in the means for cutting the stock into lengths and for forming the points and heads. Fig. 1 is a general perspective view of the machine; Fig. 2 is a sectional elevation; and Fig. 3 is a section showing the cutting devices.

The machine includes in its construction a substantial frame on which is mounted a driving-shaft, actuated at one end by a pulley, and provided at the other end with a pinion, engaging a spur-gear, rigidly secured to a hollow shaft formed in two sections. Two additional hollow shafts are also employed, each of which is likewise formed in two sections. The three hollow shafts are triangularly arranged and carry dies, each comprising two circular side sections rigidly secured to the sections of the corresponding hollow shaft. Bolted between the side sections is an intermediate or face section of hardened steel, serving to roll the stock in conjunction with the intermediate or face sections of the other hollow shafts. Upon the side sections, it will be observed, are gear-teeth, meshing with those of a mating die and transmitting the motion received from the driving shaft first mentioned. The intermediate sections are formed with radial recesses which receive beveled, spring-controlled punches. The butt of each punch carries a roller which, as the die turns, travels over a stationary shaft provided with a cam and contained within the hollow shaft of the die. As the die rotates, it is evident that the punches will be periodically projected to cut the stock, and automatically returned by their springs. The side sections of the dies, at the outer ends of the radial recesses, are formed with transverse openings into which the stock is pressed to form the triangular head of the nail, the beveled ends of the punches serving to produce the points. Any desired number of punches may be used; but in the machine illustrated, four punches are provided for each die, so that four nails are formed at each revolution. The dies are so arranged that, in turning, they cause the punches to register with one another. The cams are so disposed that three meeting punches (Fig. 2) are thrown out and made to sever the stock to form a nail. The meeting bevel ends of the punches produce the point of the nail. At the same time the stock is pressed into the transverse openings of the side sections to form the head. Each of these operations, of course, is performed on a different section of the stock, the nail having its point formed by one set of punches and its head in the set of punches immediately following. By changing



REED'S NAIL-FORMING MACHINE.

the form of the face or intermediate sections of the dies, nails of any desired shape can be made.

WE have already referred to the restoration of the Crystal Palace. The first portion of the work has been done, that is, the re-roofing. The transept which has been completed is 384 feet, long, has semi-circular spans of 120 feet and the height from the floor to the central point is 170 feet. The original form of the roof, that is, of the ridges and furrows, designed to resist the attacks of hail storms, has been preserved.

ELECTROENGRAVING.

It is only within recent years that mechanical processes have been devised which have very considerably simplified the work of producing engravings. And of all mechanical means of making plates, that of embossing

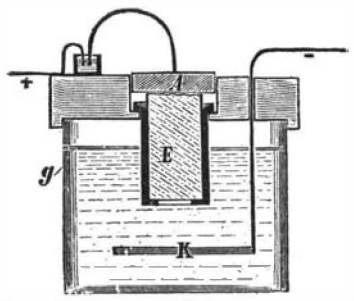


Fig 1.—DIAGRAM OF BATTERY AND PLASTER CAST.

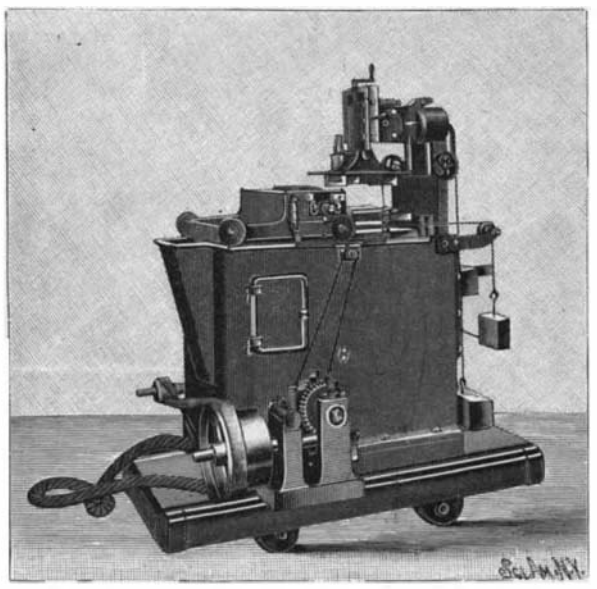


Fig. 2.—AUTOMATIC MACHINE FOR CLEANING THE PLATE.

or stamping is the most important. But in order to produce a steel plate by the process of embossing, a die is necessary which must be laboriously cut by hand. Casting and electroplating have been resorted to, in order to reduce hand-labor; but the results have been so exceedingly poor, that the art of a skilled craftsman has ever been required to engrave the wrought or rolled steel dies. With the object of accomplishing results which could not be attained by casting or electroplating and of performing mechanically much of the work which has hitherto been done only by hand, Herr Josef Rieder, a German inventor, has devised a process which he terms "electroengraving."

In electroengraving an electrochemical etching agent is employed. If two steel plates be plunged in a solution of ammonium chloride, and the one plate connected with the positive pole, the other plate with the negative pole of a source of electricity, iron will be eaten from the positive plate, and will form a solution of iron chloride, from which iron is again precipitated upon the negative plate. If parts of the positive plate be covered with shellac, only the unprotected portions will be eaten away, and thus a pattern will be produced. This process of etching has long been known and has been applied in the arts. But it has been applied only to plane surfaces, and not to such plastic forms as reliefs. In electroengraving, on the other hand, the plate is not covered; but, nevertheless, means are employed for bringing the solution into contact only with the desired portions of the plate.

The most approved form of apparatus at present in use consists of a glass vessel, *g*, provided with a cover having a central aperture flanged to hold a rubber cup, the bottom of which is perforated. Within the rubber cup a plaster of paris form is held, upon which the design to be reproduced has been cast. Upon the upper or modeled surface of the form a steel plate, *A*, rests, which snugly fits the aperture in the cover of the vessel, so that it cannot be laterally displaced. The vessel, *g*, contains a solution of ammonium chloride in which is plunged a steel plate, *K*, connected with the negative pole of a source of electricity and constituting the cathode. The steel plate, *A*, is connected with the positive pole and constitutes the anode. The ammonium chloride is absorbed by the plaster form, *E*, so that the steel plate, *A*, is practically in contact with the solution. When the circuit is completed, chlorine is released at the anode, which, combining with the iron, forms a solution of iron chloride. The anode is gradually eaten away, so that new points of the metal come into contact with the plaster cast. The process is completed when all parts of the anode have been acted upon by the plaster cast. With this apparatus the inventor found it necessary to remove the steel-plate, *A*, at intervals of 20 seconds, to clean it with gum water and to brush fresh ammonium chloride upon the relief surface of the plaster cast.

The inventor attained good results with this apparatus. But evidently the constant cleaning by hand was a process too laborious for the practical utilization of the inventon. A machine was, therefore, devised, the function of which was to accomplish automatically what was formerly effected by hand.

After various improvements and modifications this machine finally took the form shown in the second of our illustrations. The plaster casts (several are employed in the practical application of the invention) are held by means of two screws upon a vertically movable table, which receives its motion from an eccentric. Above this metallic table is an adjustable holder in which the plate to be etched is mounted. Behind the table is a carriage with a rotary brush, which is also driven by eccentrics, and which is adapted to pass between the plaster cast and the plate, in order to remove the refuse from the eaten steel. Water is supplied to the brush by a perforated pipe. Above the cast a sponge roller is mounted which distributes fresh solution over the relief surface.

The plaster cast is brought into contact with the plate by means of the movable table, for a period of 15 seconds, then returns, and permits the cleansing apparatus to operate. When the cleaning carriage has returned to its normal position, the table again brings the cast into engagement with the plate, these operations being repeated until the plate is completely etched. It is particularly important that the cast be brought into contact with the plate as gently as possible; nevertheless, it is impossible to protect the cast when but a single point touches the plate. To preserve the cast the inventor employs a safety device which relieves the single point of the pressure so far as possible. The machine is provided with an arrangement for casting plaster forms to take the place of those which have been worn away.

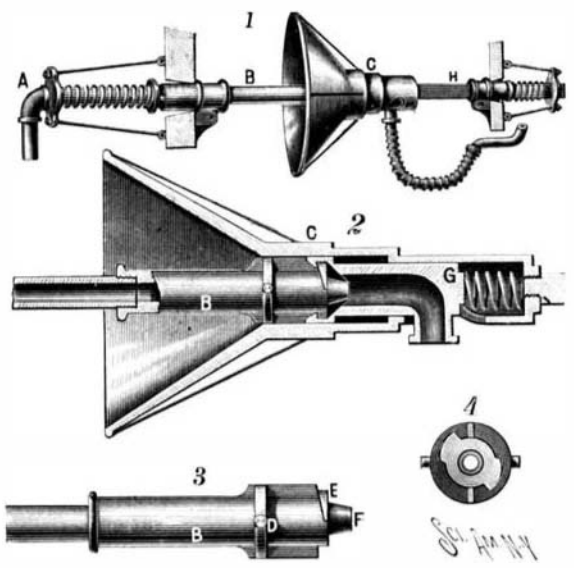
A current of 12 to 15 volts pressure is used. The current strength is automatically regulated to conform with the area of the contacting surfaces, and for plates 200 × 300 mm. (8 × 12 inches) can attain a maximum of 50 amperes.

AN AUTOMATIC COUPLING FOR AIR-BRAKES.

The illustrations presented herewith, picture a coupling invented by Thomas H. Patching, of Strathfield, and Robert H. Finch, of Burwood, New South Wales, whereby the air-brakes of a train can be connected and disconnected automatically.

The device comprises a right and left part. The left part, *A*, consists of a round tube, *B*, passing through the sole-plate of the car, and supported by a bracket in which it moves freely. The tube, *B*, furthermore passes through a collar attached to the sole-plate, and is surrounded by a strong coiled spring, which serves to keep the left part pressed forward into position, and permits backward and forward play of the cars.

The right portion comprises a square metal bar, *H*,



SELF-ACTING COUPLING FOR AIR-BRAKES.

passing through the sole-plate of the car and provided with supports and springs similar to those of the left portion. The right portion is provided with a funnel-shaped orifice and an air-pipe (Fig. 1).

As shown in Fig. 2, the tube, *B*, carries a hollow cylinder ending in a nozzel. On the cylinder are two gripping lugs, *E*, one of which is shown in Fig. 3 and both in Fig. 4, and two longitudinal guide pieces. On either side of the cylinder a pin, *D*, projects. Within the right part are two cylinders of unequal diameter, thus forming a shoulder. The larger cylinder is provided with two helical openings to engage the pins, *D*. In the smaller of these cylinders slides a spring-pressed, hollow piston, *B*, having an air-pipe connection which is designed to engage a left-handed helical