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## Improved Bolt Cutter.

This machine is designed to cut threads on screw bolts, and is intended to simplify and expedite the process as well as improve the quality of the work. There is no strain on the thread in backing off the dies, and the bolt is cut complete at one operation.

Appended is the inventor's description of his machine:—

"The mandrel is hollow, and on the end of it is fastened the face plate, A; to this is fitted two slides, as shown in Fig. 1; these slides have the dies fitted to them. The sliding ring, C, encircles the face plate and prevents the dies from opening while the bolt is being cut. When it is moved by means of the lever, D, toward the cone it causes the dies to open sufficiently to allow the bolt to be withdrawn without stopping or reversing the machine. The jaws for holding the bolt are shown at E, and are operated by means of a right and left-hand screw, cut upon the shaft of the hand wheel, F. The slide, G, to which the jaws are attached, is worked by means of the hand wheel, H, with a rack and pinion. The tap chuck is shown beneath, with a tap in it. In arranging the machine for cutting nuts the slides in the face plate are removed, and this chuck is slipped into the same place. The ring, C, is then moved over the ends, when it is held firmly.

"The nuts are held by the same jaws that hold the bolt, and are cut by running them across the threaded portion of the tap, on to the plain portion, in numbers sufficient to fill the same. The tap is then removed, the nuts slipped off, and the tap restored to its place for further use. The tap is fitted to a square socket in the chuck, and, consequently, can be removed and replaced without unscrewing or screwing up any bolts. This machine will cut bolts of any size, from one-fourth of an inch up to two inches diameter, by once passing over them, cutting the standard number of threads to the inch on all the sizes."

For further particulars and prices inquire of Avery Babbett, of Auburn, N. Y. A patent is ordered to issue on this machine through the Scientific American Patent Agency.

## PUDDLING IRON BY MACHINERY.

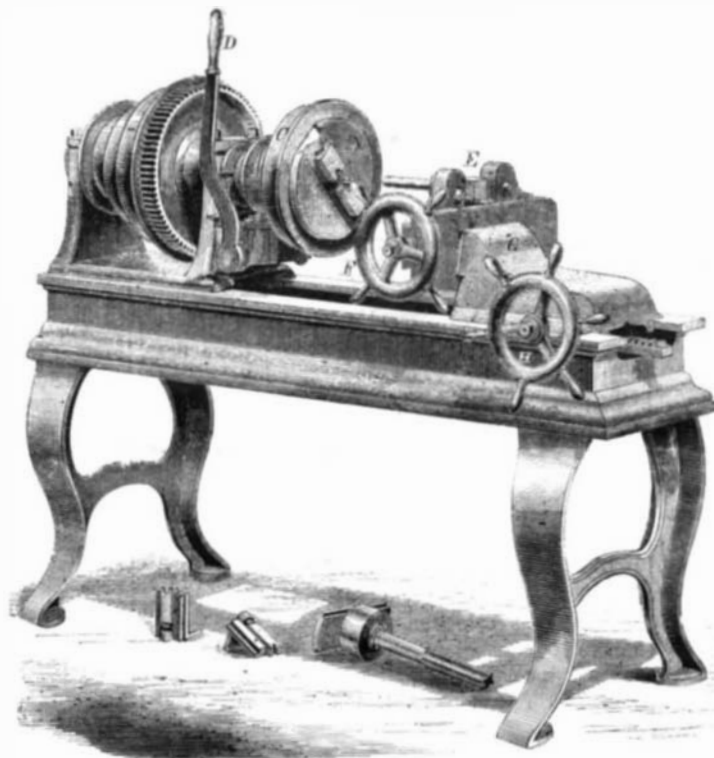
At the last meeting of the Mechanical Engineers' Society, of Birmingham, a paper was read by Mr. Henry Bennett, of Wombridge Iron Works, on puddling iron by machinery, from which we take the following extracts:—

### DESIRABILITY OF THE IMPROVEMENT.

"In the manufacture of wrought iron from the crude pig iron, the purifying of the metal by the process of puddling involves very heavy and long-continuous hand labor, since the metal, after being melted in the puddling furnace, has to be continuously stirred for a considerable time while boiling, in order to expose it thoroughly to the action of the current of air passing through the furnace, so as to effect the chemical changes required for the separation and removal of the impurities originally combined with the iron. The metal has then to be balled up into separate masses of about  $\frac{3}{4}$ -cwt. each for the shingling ham-

mer; and the whole process extends over about an hour, from the time of melting the pig iron for each heat, of which six are worked in the day.

"The application of machinery to puddling has long been felt to be very desirable on account of the laborious nature of the process, owing to the continuous heavy work required, and the great heat to which the men are exposed; and the simple mechanical character of the greater portion of the process, which consists in merely a continuous uniform stir-



BABBETT'S BOLT CUTTER.

ring of the material, renders it very suitable in that respect for the application of machinery. But the high temperature of the furnace, and the necessity for not interfering with the current of air passing through it, which has to be regulated and changed as the process advances, cause great practical difficulties in successfully carrying out the application of machinery in place of hand labor.

### OBJECT AIMED AT.

"The object of the writer has been to employ machinery simply to aid the puddler by relieving him of the most laborious part of the work, namely, the stirring or working of the metal in the puddling furnace. At the same time the objects aimed at have been, by a more rapid and uninterrupted process of stirring the metal, to shorten the time of the puddling, thereby economizing fuel; to improve the quality of the iron, by rendering the process more uniform and perfect than with hand labor; and to increase the yield of the furnace, by working larger charges than could be both puddled and balled up at one heat by hand labor alone.

### DESCRIPTION OF THE MACHINE PUDDLER.

"The ordinary puddling tool or 'rabble' is worked backward and forward in the puddling furnace by a vertical arm outside the furnace, to which it is connected by a notch in the handle of the rabble, dropped loosely upon a pin at the bottom of the working arm. This arm is cotted at top into a horizontal square bar overhead, sliding longitudinally through two guide sockets, and worked by connecting rods from a long T-iron bar, extending horizontally across a whole row of puddling furnaces, the T bar being

carried by anti-friction rollers. A longitudinal reciprocating motion is given to the bar by a crank at one end driven by engine power. The guide frame or sector carrying the guide sockets of the sliding bar is centered on a vertical pin immediately over the door of the puddling furnace, and the outer end is moved transversely from side to side with a slow reciprocating traverse along a guiding quadrant, by means of a connecting rod from a crank, which is driven through a worm wheel and a screw shaft, extending

over the furnaces alongside the reciprocating T bar. This bar works at a speed of about fifty strokes per minute, and has a length of stroke of 2 feet 10 inches, carrying the rabble with the same length of stroke across the floor of the furnace. The transverse motion given by the crank, which makes one revolution for every seventy strokes of the rabble, causes the direction of each stroke to change gradually between the two extremes of the guiding quadrant, so that the end of the tool, instead of moving backward and forward always in the same line, is worked successively over every portion of the floor of the furnace, within certain limits, in lines radiating from the working hole in the door of the furnace, corresponding exactly to the action in hand puddling. In the double furnace with a door on each side, two traversing cranks are set at right angles to each other, so that the two rabbles are always working in different parts of the furnace. The whole of the machinery is kept clear above the furnace outside, and completely protected from the heat, and quite out of the way of the men; nothing being exposed to the heat except the

rabble or puddling tool, the same as in hand puddling.

"The double furnace is exactly the same in construction in all respects as the ordinary single-puddling furnaces, except that it is made with a working door at each side and is one foot wider inside.

### OPERATION OF THE MACHINE.

"When the charge of pig iron is melted and ready for the commencement of the process of puddling, the apparatus is put into action by simply dropping the notch, in the handle of the rabble, on to the pin in the working arm, which is kept continuously in motion by the horizontal reciprocating T bar working overhead. The puddler changes his tool from time to time, as it becomes heated, by simply lifting the notch in the handle off the pin in the working arm and replacing the tool with a fresh one, without stopping the machine; and when the iron begins to thicken, he takes the opportunity of each change of tool to make a few strokes by hand, in order to collect the metal from the extreme sides of the furnace into the center, which is found to insure the whole charge being uniformly worked. The usual time of working with the machine is about 25 minutes with ordinary forge pig iron, the tool being changed five or six times; but with gray iron the time of working is much prolonged. In the latter case the machine is especially serviceable, since the iron keeps in a fluid state much longer, and requires, consequently, so much more working; which causes the labor to be so much more severe in the case of hand puddling that there is great difficulty in getting the men to work any iron that is very