5 Sheets—Sheet 1.

R. HALE.

Machine for Bending, Cutting and Punching Metal Bars.

No. 197,357. **Patented Nov. 20, 1877.**

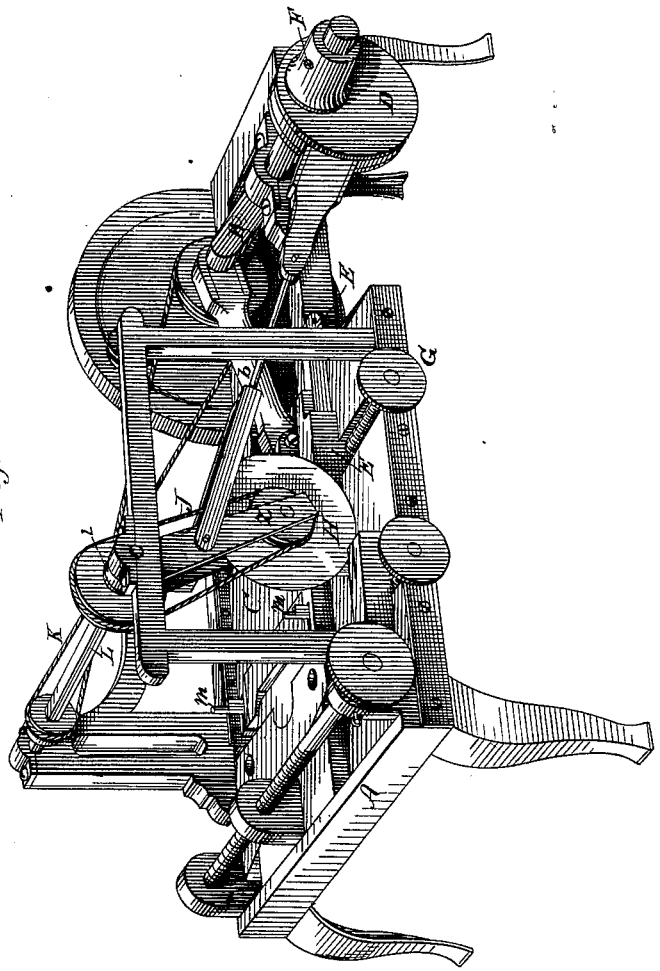

Fig. 1.

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Fig. 2.

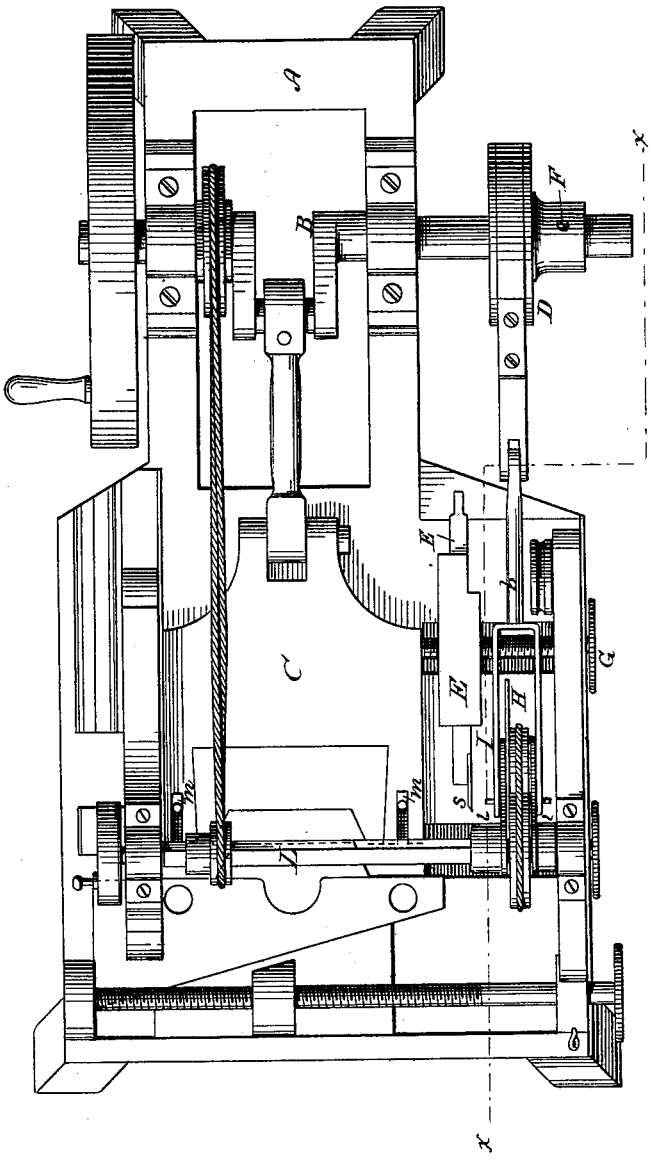

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Fig. 3.

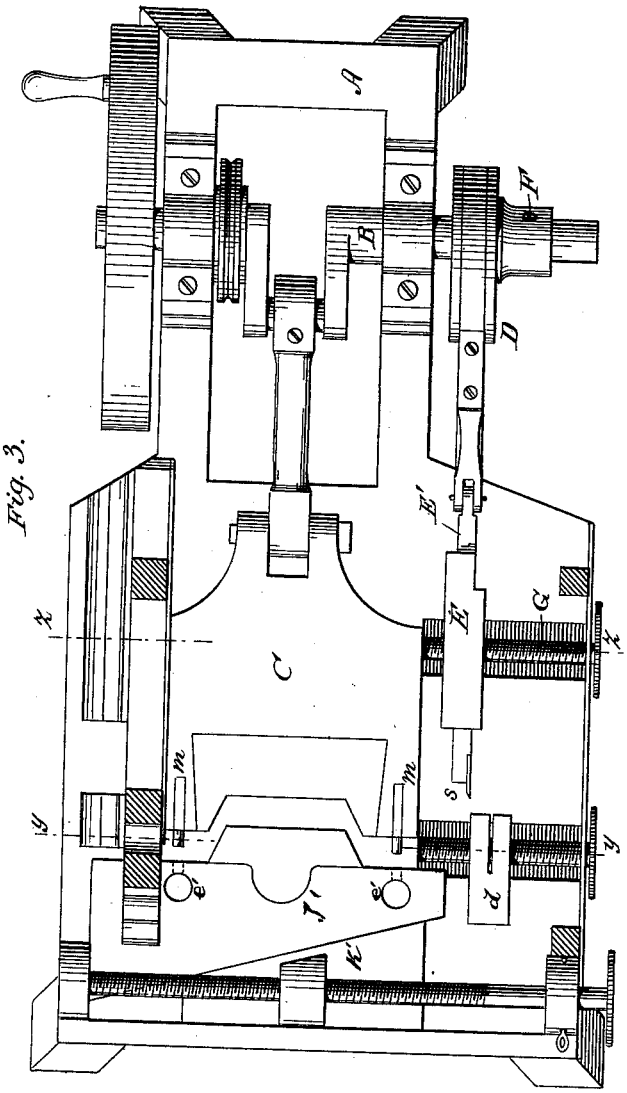

Fig. 9.

Fig. 8.

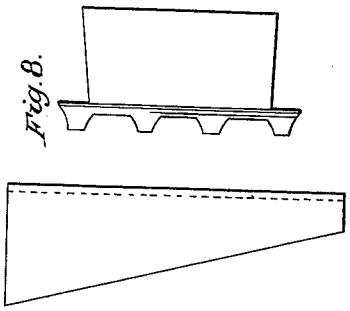

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Fig. 4.

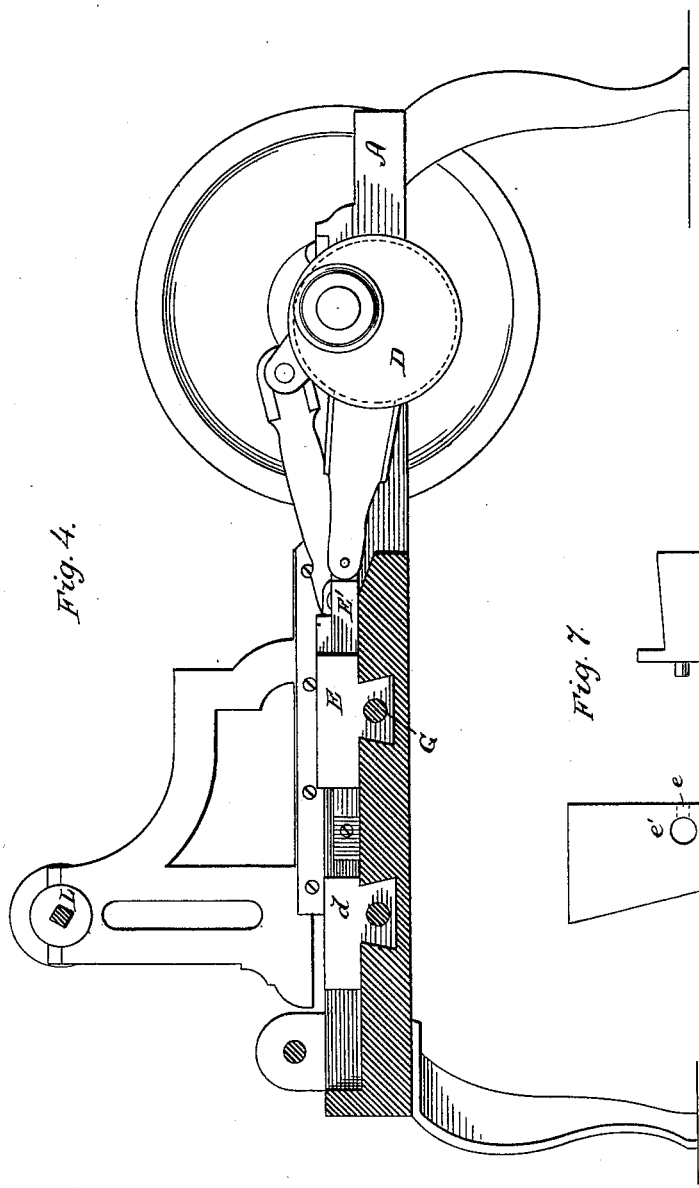

Fig. 7.

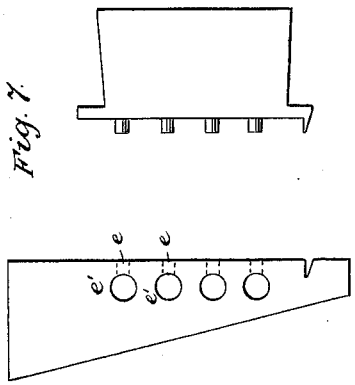

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Fig. 6.

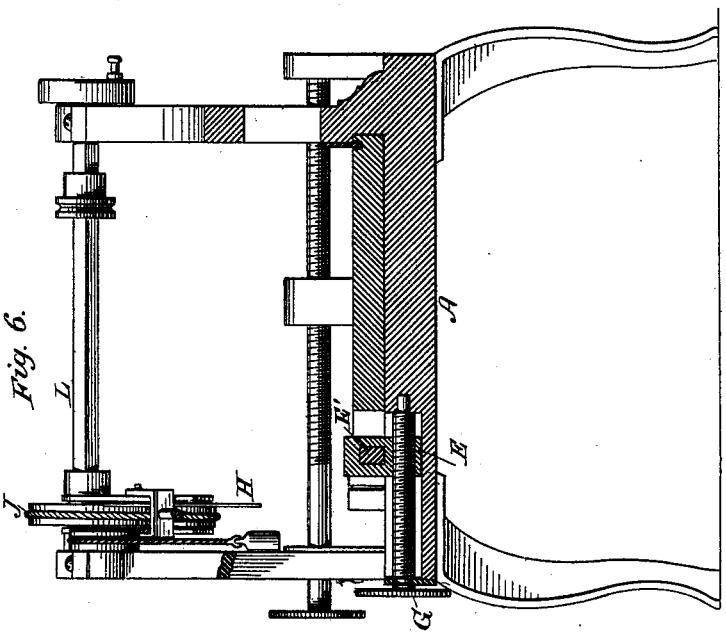
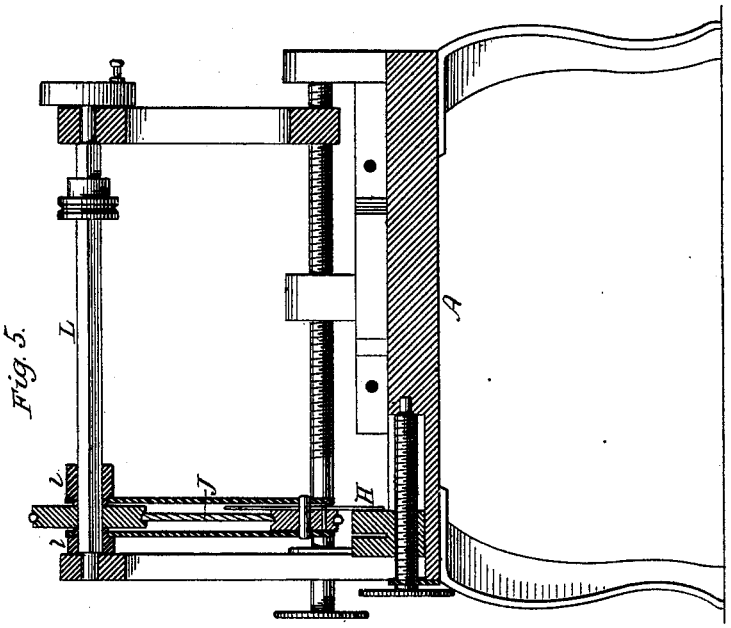


Fig. 5.



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UNITED STATES PATENT OFFICE.

ROBERT HALE, OF MINNEAPOLIS, MINNESOTA.

IMPROVEMENT IN MACHINES FOR BENDING, CUTTING, AND PUNCHING METAL BARS.

Specification forming part of Letters Patent No. **197,357**, dated November 20, 1877; application filed October 26, 1877.

To all whom it may concern:

Be it known that I, ROBERT HALE, of Minneapolis, county of Hennepin, in the State of Minnesota, have invented a new and useful Improvement in Machines for Bending, Cutting, and Punching Metal Bars and Plates, of which the following is a clear, full, and exact description, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of a metal-bending machine with my improvements for cutting and punching attached. Fig. 2 represents a plan view of the same, with the saw-cutting device attached to the eccentric. Fig. 3 represents the same view with the chisel-cutting device in working position. Fig. 4 is a longitudinal vertical section through *x x* of Fig. 2. Fig. 5 is a vertical cross-section through *y y* of Fig. 3. Fig. 6 is a vertical cross-section through *z z* of Fig. 3. Figs. 7, 8, and 9 are details referred to.

My invention relates more particularly to that class of machines used in straightening and bending metal bars, and is an improvement upon Patent No. 194,675, granted to me August 28, 1877; and it consists in adapting and attaching devices for cutting and punching the metal, in a manner hereinafter more fully explained and claimed.

To enable others skilled in the art to make and use my invention, I will proceed to describe the exact manner in which I have carried it out.

In the drawings, A represents the frame-work of the machine, B the crank-shaft, and C the cross-head, all constructed and operated with movable die-plates and changeable dies, as shown and described in my patent before referred to for straightening and bending metal bars.

The object of my present improvement is to utilize this same mechanism to accomplish further valuable results, by adapting two series of attachments by which the metal may be cut to any desirable lengths, within certain limits, and be immediately punched without being removed from the machine.

The series of dies shown in Figs. 7, 8, and 9 are interchangeable, and are inserted in the movable die-plates, and operated in combination with the wedge and transverse screw, and the cutters are worked independently of the die-plate and dies by an eccentric, D, adjustable on the crank-shaft B, outside of the frame. The guide E and chisel-cutter S and its connection are also adjustable transversely, and are held firmly in position. The eccentric is held by a set-screw, F, and the guide E by the screw G, both to be in a line parallel to the outside of the frame A. By disconnecting the chisel-cutter S, and moving the guide E out of the way by means of the screw G, or by removing the guide and connection E′ entirely, the saw H, in its swinging frame I, can be brought into action by connecting it with the eccentric D, and by means of the belts J K and pulleys, as shown in Fig. 1. The swinging frame carrying the saw is adjustable on the shaft L by means of the collars *l l* and set-screws to meet the various requirements of the different lengths.

When it is desirable to use the saw instead of the chisel-cutter, the eccentric is readily adjusted in a line with the saw, as it had been with the chisel-cutter.

By this construction I secure a saw and chisel cutter to be alternately used, as circumstances may dictate to a person skilled in the use of such machinery, in the cutting of larger or smaller bars of metal. A connecting-rod, *b*, is attached to the saw-frame for the purpose of connecting the saw-frame with the eccentric.

In order to make a clear cut with either the chisel-cutter or saw, the metal bar or rod to be cut rests against a movable bearing, *d*; or when the bar is to be bent before being removed from the machine, these tools may pass near the side of the movable bearing instead of passing into the slot, and by this means is secured a somewhat greater variety in the lengths cut from the bar or rod.

The movable die-plate J′ is adjusted by means of the wedge K′, and is provided with dies *e′*, into which the swinging punches *m* pass after punching the metal.

The cross-head C, which holds the movable dies, is operated by the crank-shaft B.

The wedge K′, die-plate J′, and cross-head

C are not claimed as new in this application, they being shown in my patent of August 28, 1877.

By the combination of devices thus adapted to operate in the same machine, in such work as bending car-truck frame truss-irons, the bars can be taken as they come from the rolls, be cut, bent, and punched, all the holes of the desired shape being punched at one revolution of the crank before the bar is removed from the table of the machine. In this operation I use punches *m m*, inserted in the cross-head, and which are so attached as to be capable of being turned up until the bending is completed, (see Figs. 1 and 2,) when they are turned down (see Fig. 3) and the holes are punched.

Such articles as splice-bars or fish-plates are cut and punched as the bar comes from the rolls by inserting in the die-plate the set of formers shown in Fig. 7. Horseshoe-blanks are cut, countersunk, and punched before the shoe is bent, by using the formers shown in Fig. 9.

For such work as cutting and punching splice-bars, where the bar is punched, a hole, *e*, is formed in the face of the die, (see Fig. 7,) and a larger vertical hole, *e'*, is made immediately back of the first, down through the plate and bed of the machine for the burr to drop through.

In cutting and punching bars which are not to be bent before being removed from the machine, the chisel-cutter attached to the former, as shown in Fig. 7, may be used; or the cutting may be done by the chisel-cutter or the saw, as may be found most convenient.

The eccentric is to be so set on the crank-shaft, by means of the set-screw, that it will move the cutting-tool forward, make the cut, and commence its return before the former (when the bar is to be bent) operated by the crank-shaft comes in contact with the bar. When the saw is not in use, it will be drawn back and up out of the way, as shown in Fig. 6.

In punching the edges of sheets for boilers, the plate should stand on its edge on the plane of the table, and a number of holes be punched at a time, and then be moved forward for the operation to continue until the plate is finished.

In all similar work to that above described, by the use of my improved machine I can do all the cutting, punching, and bending as the bars come from the rolls, if the machine be placed in proper relation to the rolls, and thus save a vast expense of working the bars into shape after they have become cold, including the expense of cutting, reheating, and shaping by hand and hammers, and the heavy expense of furnaces for reheating.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a machine for cutting and punching metal bars and plates, of the movable die-plate J', provided with the dies *e'*, cross-head C, carrying the vertically-swinging punches *m m*, sliding or swinging cutter, connection E', adjustable guide E, movable bearing *d*, and eccentric D, substantially as and for the purpose set forth.

2. In a metal cutting and bending machine, the adjustable swinging saw-frame I, collars *l l*, connection *b*, and eccentric D, in combination with the saw H, shaft L, bands K and J, with suitable intermediate pulleys and bearing *d*, substantially as described.

3. The improved machine, constructed and operated substantially as herein shown and described.

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