L. E. RHODES.

METAL SHAPING MACHINE.

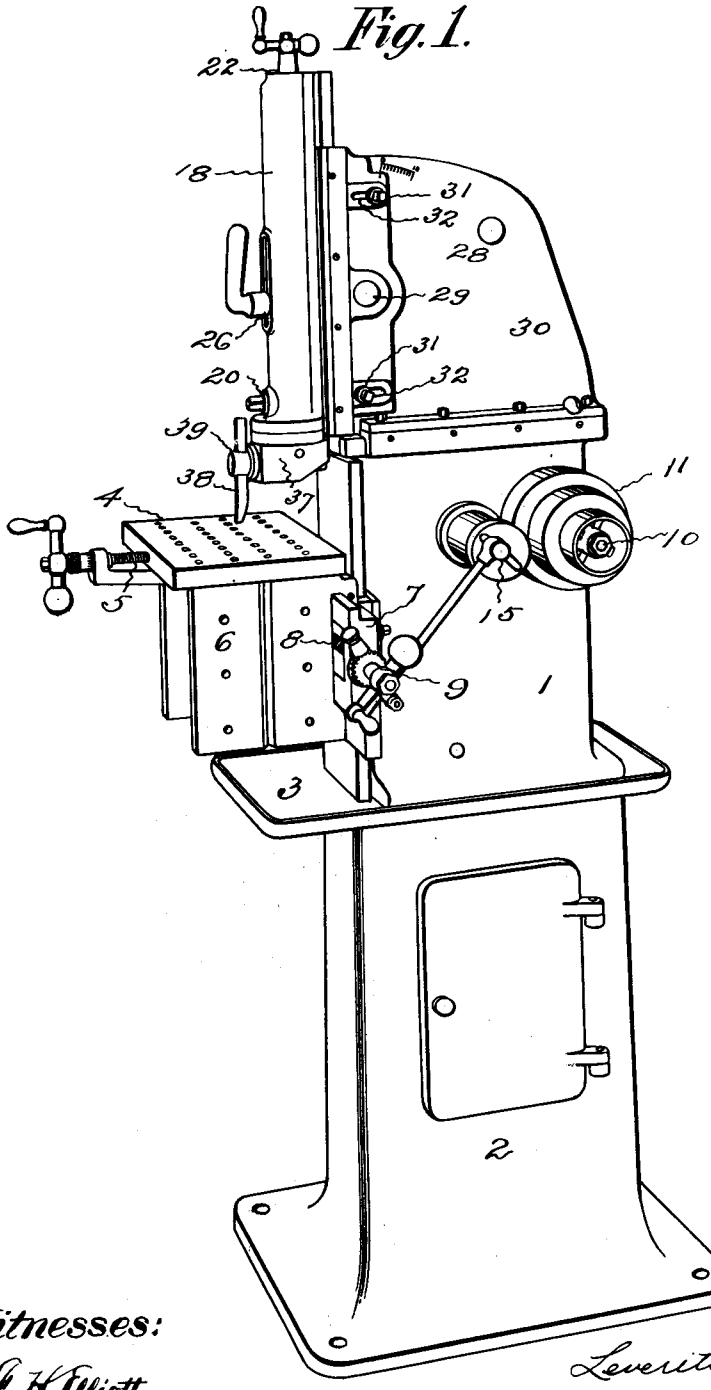
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1,100,990.

Patented June 23, 1914.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

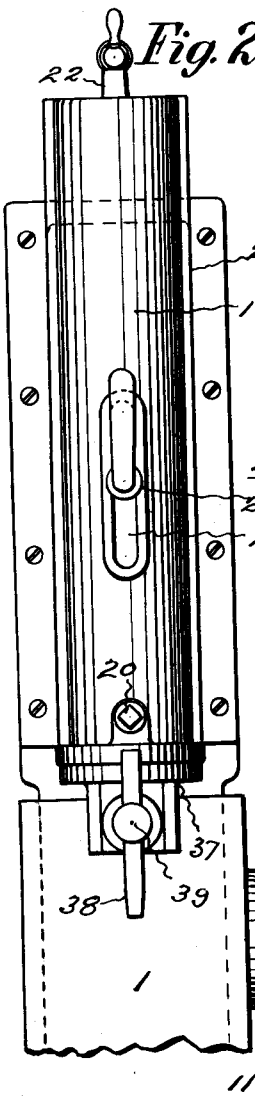


Fig. 3.

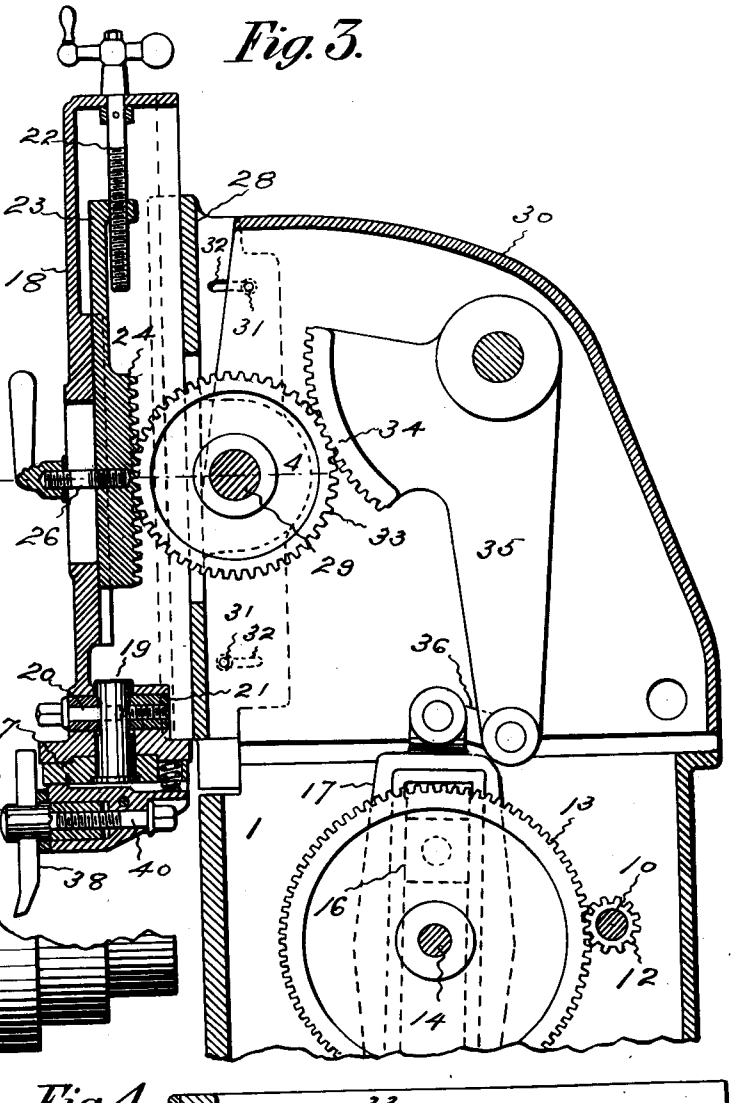
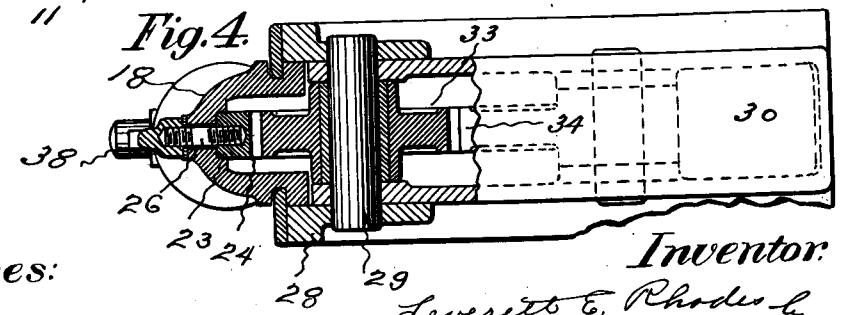


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

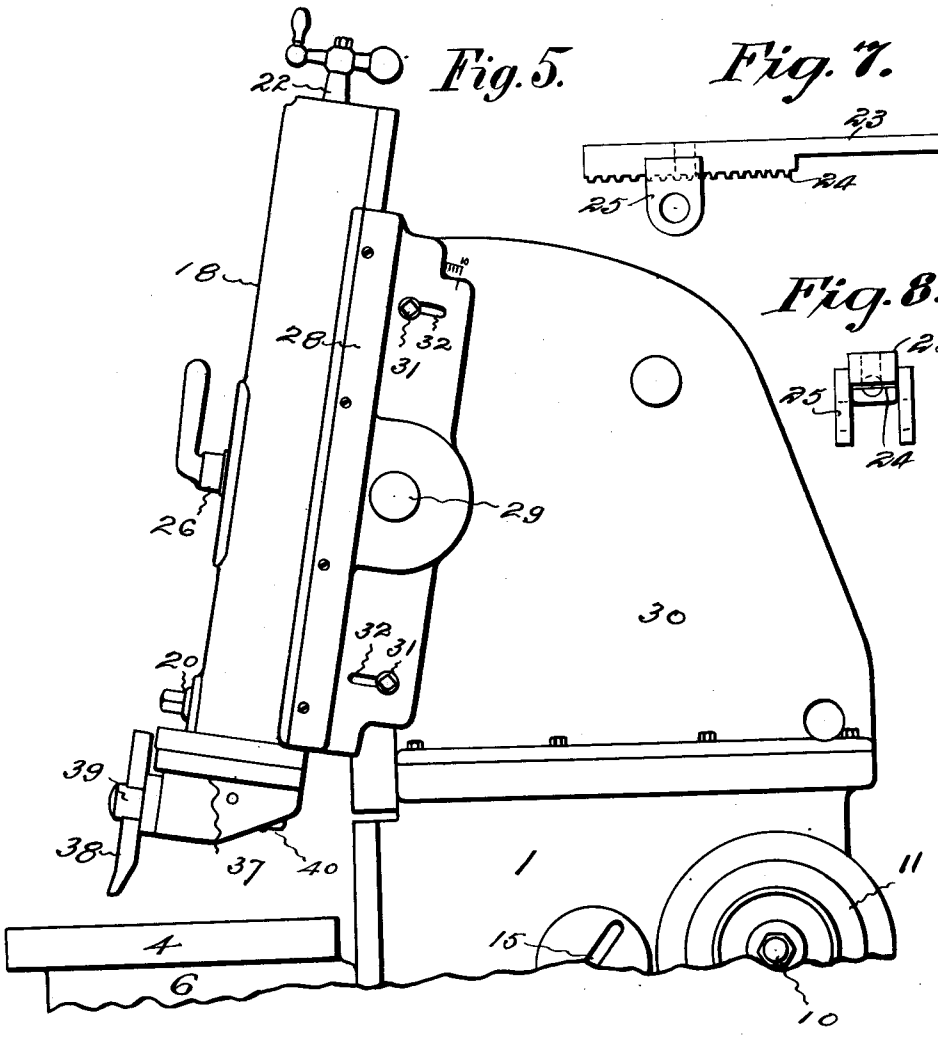
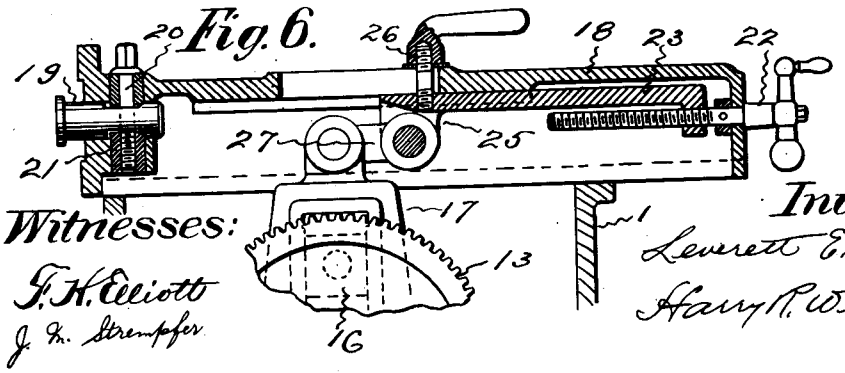


Fig. 7.

Fig. 8.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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METAL-SHAPING MACHINE.

1,100,990. Specification of Letters Patent. Patented June 23, 1914.

Application filed November 22, 1911. Serial No. 661,732.

To all whom it may concern:

Be it known that I, LEVERETT E. RHODES, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Metal-Shaping Machines, of which the following is a specification.

This invention relates to those machine tools for cutting metal which are known as shapers. These machines have a tool that is reciprocated, either horizontally or vertically, for effecting the cut across the stock which is carried on a feed table beneath the tool.

The object of the invention is to so design the parts that a machine of this class can be cheaply built and equipped for use as a horizontal machine only, or can be built and equipped as a vertical machine only, or can be quickly changed from one to the other, so that a wide range of work is possible with an economical machine.

Figure 1 shows a perspective view of the improved shaper arranged as a vertical machine. Fig. 2 shows on larger scale, a front elevation of the head and tool carrying ram shown in Fig. 1. Fig. 3 shows a vertical section of the head and reciprocating ram carrying the tool holder and tool. This view also shows the mechanism for reciprocating the ram, and the provision whereby the ram and ram holder may be oscillated and set at an oblique angle so the tool will make an inclined cut. Fig. 4 shows a plan of the head with the ram cut in horizontal section on the plane indicated by the dotted line 4—4 on Fig. 3. Fig. 5 shows a side elevation of the head with the ram and ram holder tilted so that an oblique cut will be made by the tool. Fig. 6 shows a vertical section of the ram arranged to be reciprocated horizontally. Fig. 7 shows a side view of the ram slide. Fig. 8 shows an end view of the ram slide.

The frame 1 of the machine is mounted on top of an ordinary hollow base 2 that is provided with the customary oil pan 3. The work table 4, which can be adjusted forwardly and backwardly by the screw 5, is held on a carriage 6 that is fed horizontally from side to side, on the way 7, by the feed screw 8. The way 7 is vertically adjustable on the front of the supporting frame, and the carriage feed is accomplished by mechanism 9 commonly employed for this purpose (Fig. 1). All of this mechanism is well known in the art.

The driving shaft 10, which extends from side to side across the frame, on the outside has a step pulley 11, and on the inside has a pinion 12. This pinion meshes with a gear 13 on a shaft 14 which on the outside has a crank 15 for operating the carriage feed mechanism. Pivoted on one face of the gear is a block 16 which is fitted to travel in and to oscillate the yoke lever 17 that is arranged to cause the reciprocation of the tool holding ram 18 in its several positions. The ram at one end is provided with a clamping stud 19 for securing the tool holder, and a screw 20 and nut 21 for holding the clamping stud. At the other end the ram is provided with a hand screw 22 for adjusting the relation of the ram and the slide 23 which is movably located in the ram. The slide in the ram may have a rack 24, as shown in Fig. 3, or may have ears 25, as shown in Fig. 6 or both as shown in Figs. 7 and 8. A clamping screw 26 is arranged to fasten together the ram and the slide.

When the machine is to be set up so the ram will be reciprocated horizontally, the ram with a slide having perforated ears is movably located on the top of the supporting frame, and the ears are connected by a link 27 with the end of the oscillatory yoke lever, as shown in Fig. 6. Under these conditions the oscillations of the lever reciprocates the ram horizontally on the top of the frame, the path of the horizontal movement of the ram being determined by the relative position of the slide and the ram as determined by the adjusting screw carried by the latter.

When the machine is to be set up so the ram will reciprocate vertically or obliquely, the ram, with a slide provided with a rack, is located in a slideway in the ram holder 28. This holder is mounted so as to oscillate on the arbor 29 supported by the head 30 that is bolted to the top of the frame. Bolts 31 in the head pass through slots 32 in the ram holder for clamping the holder in the desired vertical or inclined position (Figs. 1 and 5). Mounted in the head, on the arbor 29, is a gear 33 that engages the slide rack. This gear is engaged by a segmental rack 34 on the angle lever 35 which is carried by the head and is connected by a link 36 with

the end of the oscillatory yoke lever. The path of vertical or oblique movement of the ram depends upon the adjustment of the ram with relation to the slide to which it is clamped (Fig. 3). The tool holder 37, which is illustrated in Fig. 3, is pivotally mounted on the clamping stud 19 so that the tool 38, which is held in the holder by a post 39 and the screw 40, may be swung around and located at any desired point from one side to the other (Fig. 3).

This machine is very simple and can be cheaply built so that it may be set up for use as a horizontal shaper, or for use as a vertical shaper. For both forms, the base, frame, and work table have the same design. The driving means, work table feeding mechanism, and the oscillatory ram-reciprocating mechanism are alike. For horizontal work the ram is placed upon the top of the frame and the slide which it carries is linked to the oscillatory lever, and then the tool will be carried back and forth horizontally across the work when the machine is set in operation. The path of the tool is determined by the adjustment of the relation between the ram and the slide which it carries, which adjustment is quickly secured by means of the hand screw when the clamp screw is loosened. Tightening the clamp screw fastens the slide and the ram together.

This machine can be very quickly and conveniently changed from horizontal operation and set up for vertical operation. Simply knocking out the pin which connects the ram slide with the link at the end of the oscillatory lever leaves the ram free to be taken from the top of the frame. The head is then bolted to the top of the frame and the lower end of the angle lever which it carries is connected with the oscillatory lever link. The ram holder is then secured by tightening the clamping bolts so that the ram will stand vertically, as shown in Fig. 1, or at any indicated angle obliquely, as shown in Fig. 5. When the machine is set in operation under these conditions the tool will be reciprocated across the work, either vertically or at an angle, depending upon the adjustment of the ram slide. The path of the tool in this case, as previously described, is fixed by the relation of the ram and slide, which is determined by turning the hand screw when the clamp screw is loose. The tool holder can be quickly turned around the end of the ram, and then clamped so that the tool will work in the desired plane.

As a result of this invention, a machine tool is provided at a minimum cost which will have a wide range of action, for it can be sent out for use only as a horizontal machine, or only as a vertical machine, or it can be sent out so as to be set up for use either as a horizontal or as a vertical machine, according to the desire of the user. The only additional parts required for adapting the machine for both classes of work being the head with the oscillatory ram holder and the gear and rack lever which the head carries.

The invention claimed is:

1. In a metal shaping machine the combination of a supporting frame, driving mechanism borne by the frame, a head detachably mounted on the frame, transmission mechanism borne by the head and detachably connected with the driving mechanism, and a tool carrying ram movable vertically on the head and detachably connected with the transmission mechanism and with the head, said ram having means whereby it may be mounted upon and moved horizontally on the frame and may be connected directly with the driving mechanism when the head and transmission mechanism are detached.

2. In a metal shaping machine the combination of a supporting frame, driving mechanism borne by the frame, a head detachably mounted on the frame, transmission mechanism borne by the head and detachably connected with the driving mechanism, a ram holder adjustably mounted on the head, and a tool carrying ram movable vertically on said holder and detachably connected with the transmission mechanism and with the head, said ram having means whereby it may be mounted upon and moved horizontally on the frame and may be connected directly with the driving mechanism when the head and transmission mechanism are detached.

3. A metal shaping machine having a supporting frame, a head detachably mounted on the frame, a tool carrying ram provided with means whereby it may be moved vertically on the head, or horizontally on the frame when the head is detached, and mechanism for reciprocating the ram.

4. The combination in a metal shaping machine of a supporting frame, a horizontal ram guide at the top of said frame, a head detachably mounted on the top of said frame, a vertical ram guide on the face of said head, and ram reciprocating mechanism.

5. In a metal shaping machine, the combination of a supporting frame, means at the top of said frame for supporting a horizontally movable tool carrying ram, a head detachably mounted on the top of the frame, and means on the head for supporting a vertically movable tool carrying ram.

6. A head for a horizontal shaping machine having means whereby it may be attached to the top of said machine when the horizontally movable ram is removed, said head having means for supporting a ver-

tically movable ram and provided with mechanism adapted to be connected with the driving mechanism of the horizontal shaper for giving a ram a vertical reciprocation on the head.

7. A metal shaping machine having a supporting frame, said frame being provided at its upper end with means for guiding a horizontally movable tool-carrying-ram, driving mechanism contained in said frame and adapted to horizontally reciprocate a ram when mounted in said horizontal guide on the frame, a head detachably mounted on the top of the frame above the horizontal guiding means, said head being provided with means for guiding a vertically movable tool-carrying-ram, and mechanism contained in said head and adapted to vertically reciprocate a ram when mounted in said vertical guide on the head.

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