(No Model.) 4 Sheets—Sheet 1.

H. J. HENDEY.

COMBINATION METAL SHAPER.

No. 517,613. Patented Apr. 3, 1894.

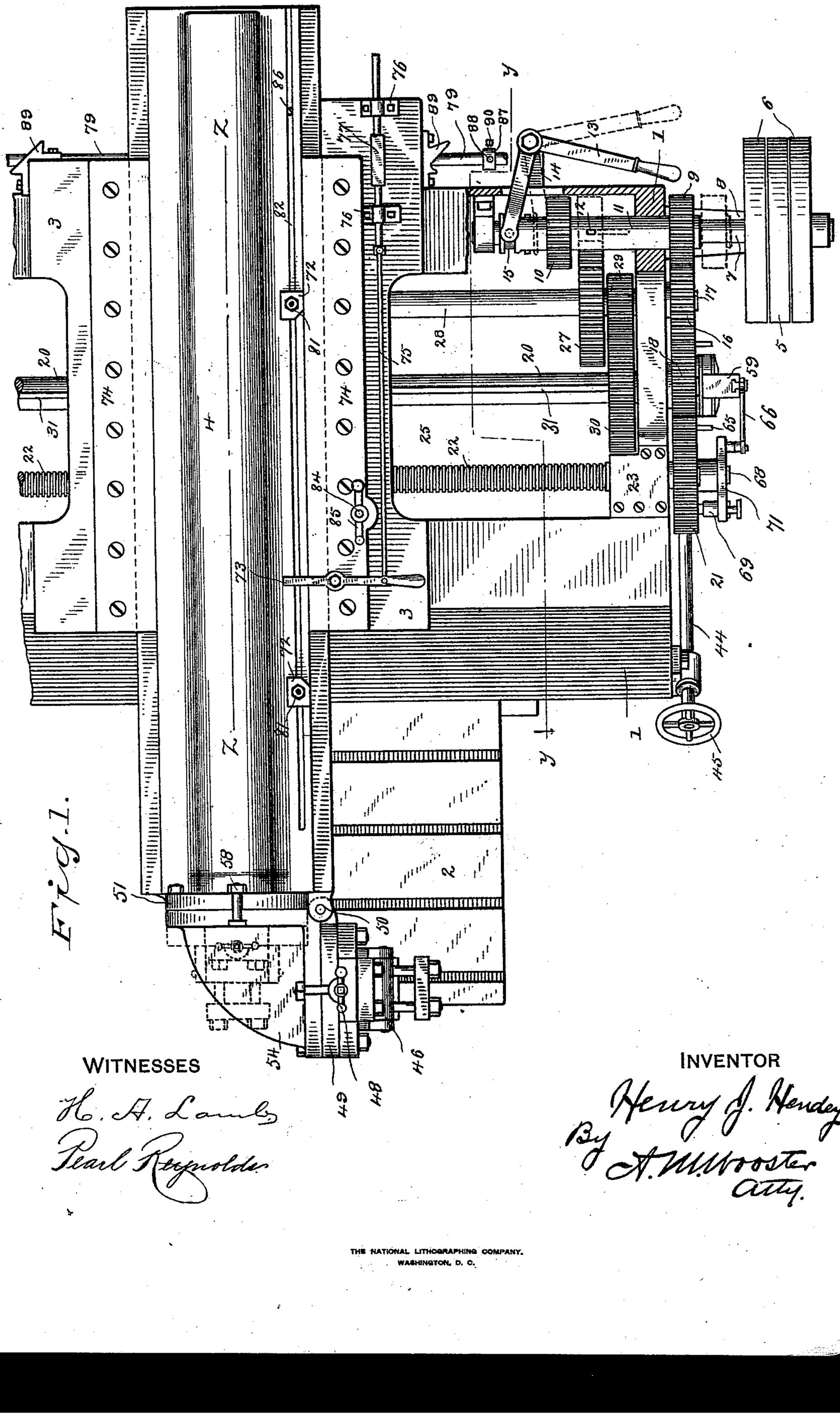

Fig. 1.

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COMBINATION METAL SHAPER.

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Fig. 2.

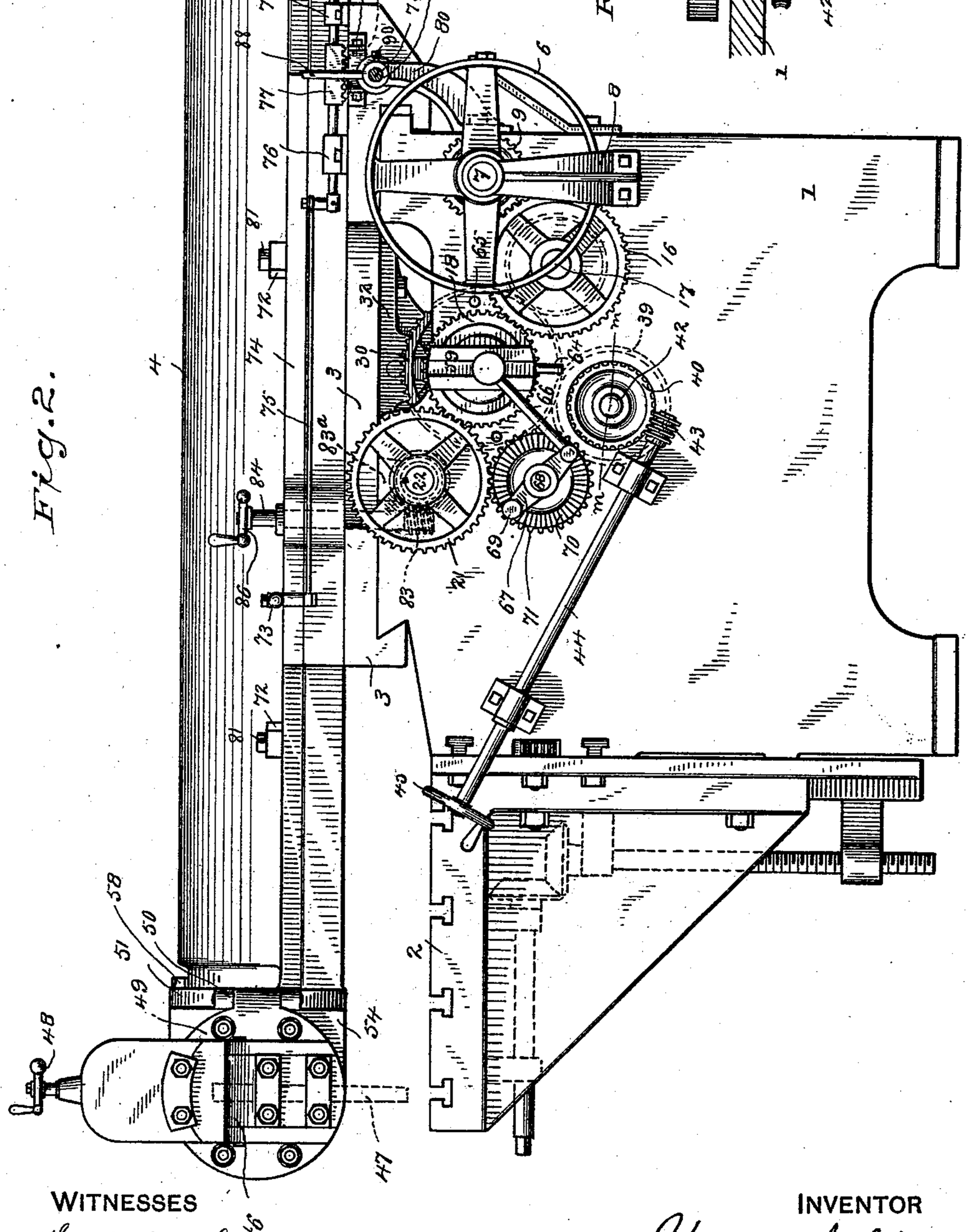

Fig. 3.

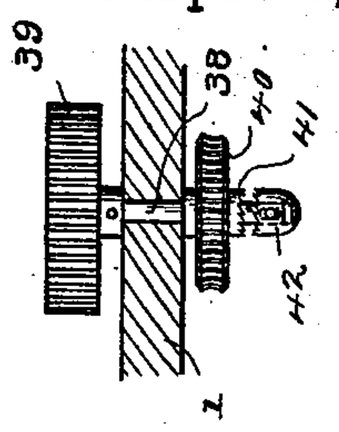

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Fig. 5.

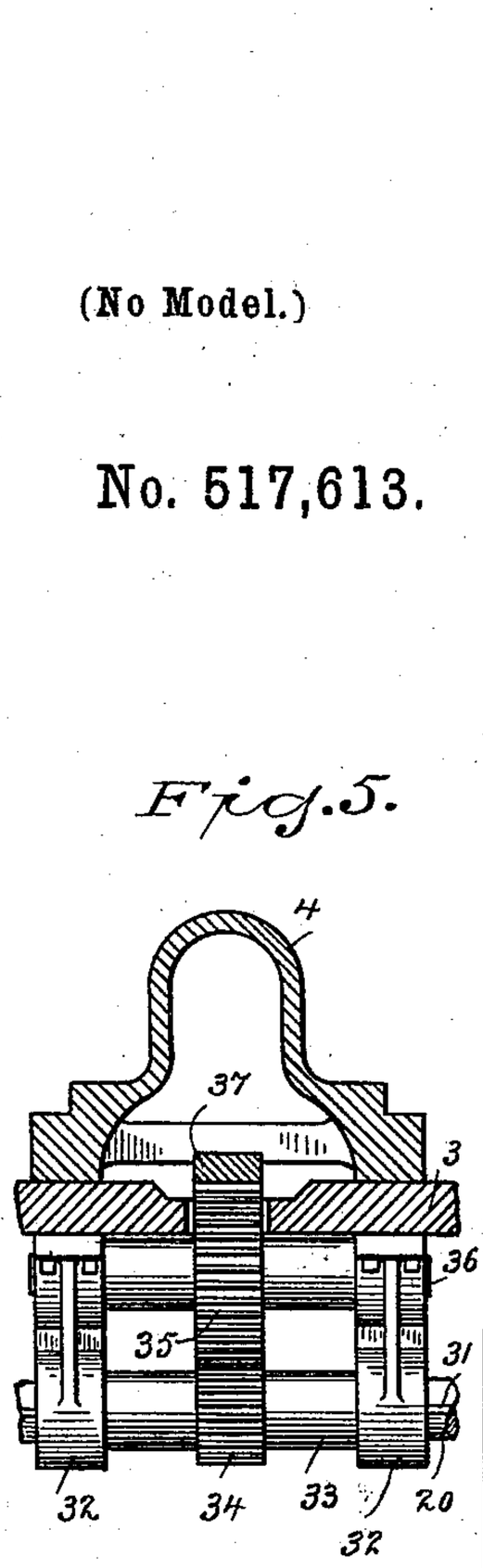

Fig. 4.

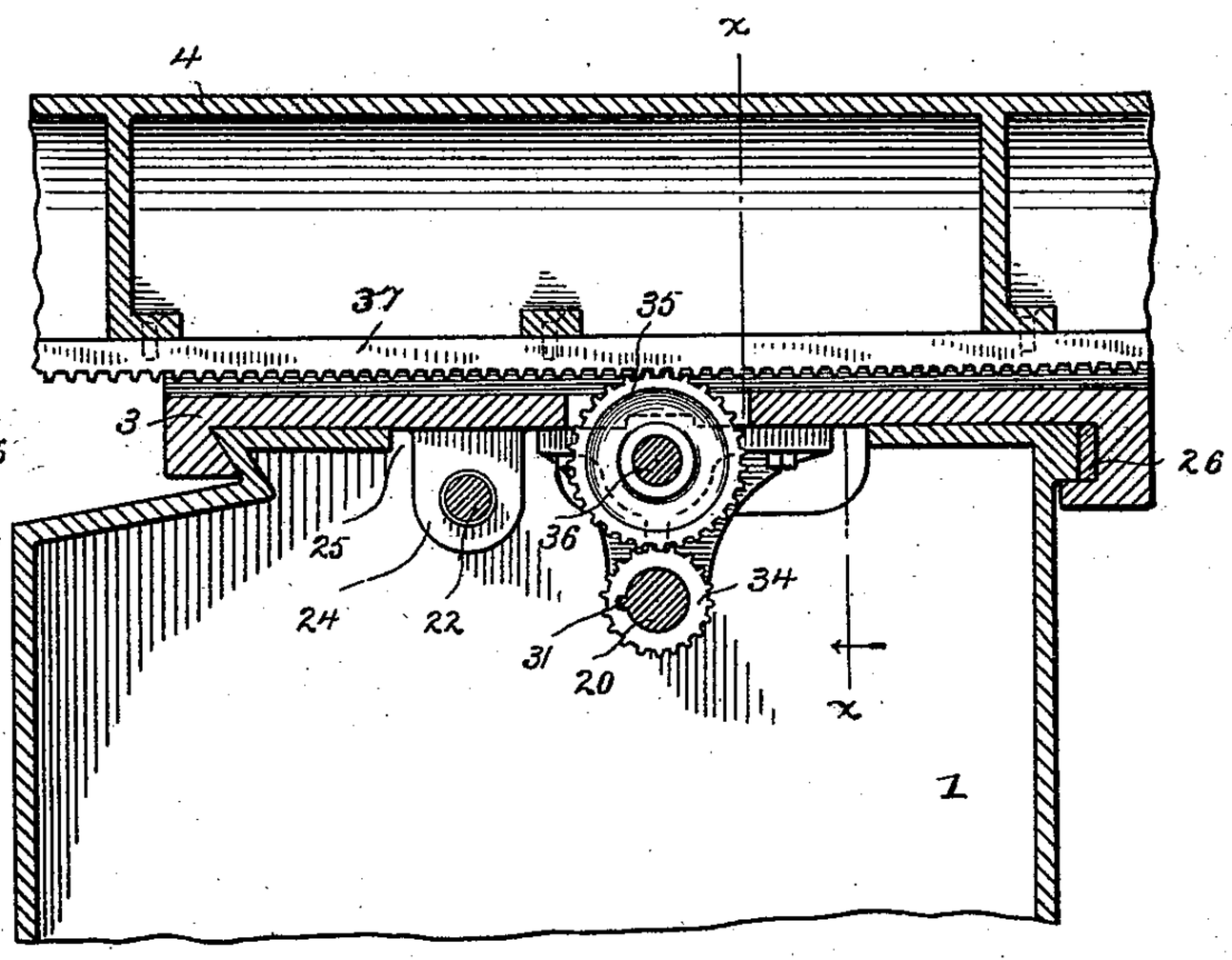

Fig. 6.

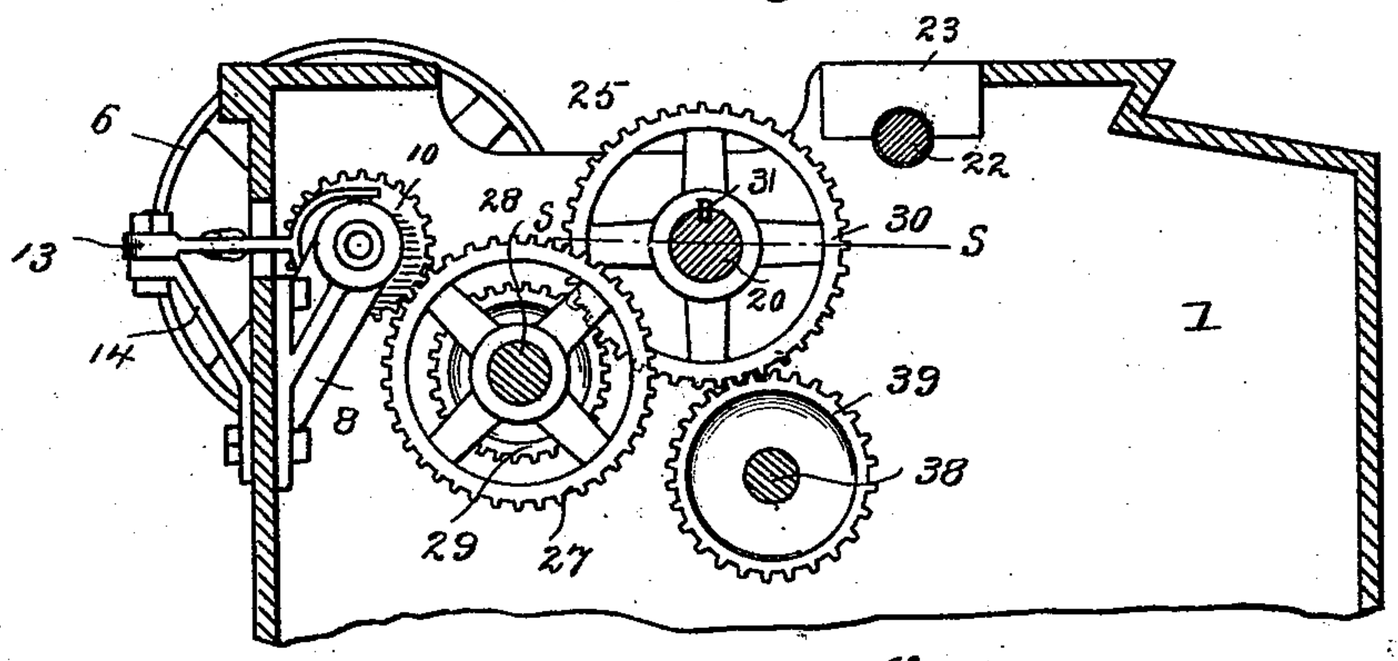

Fig. 7.

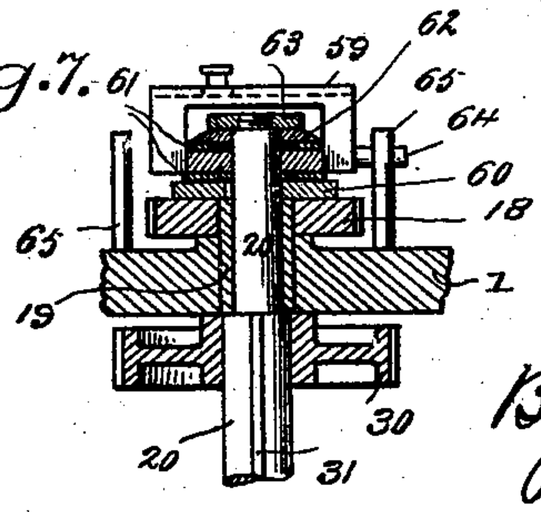

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Fig. 8.

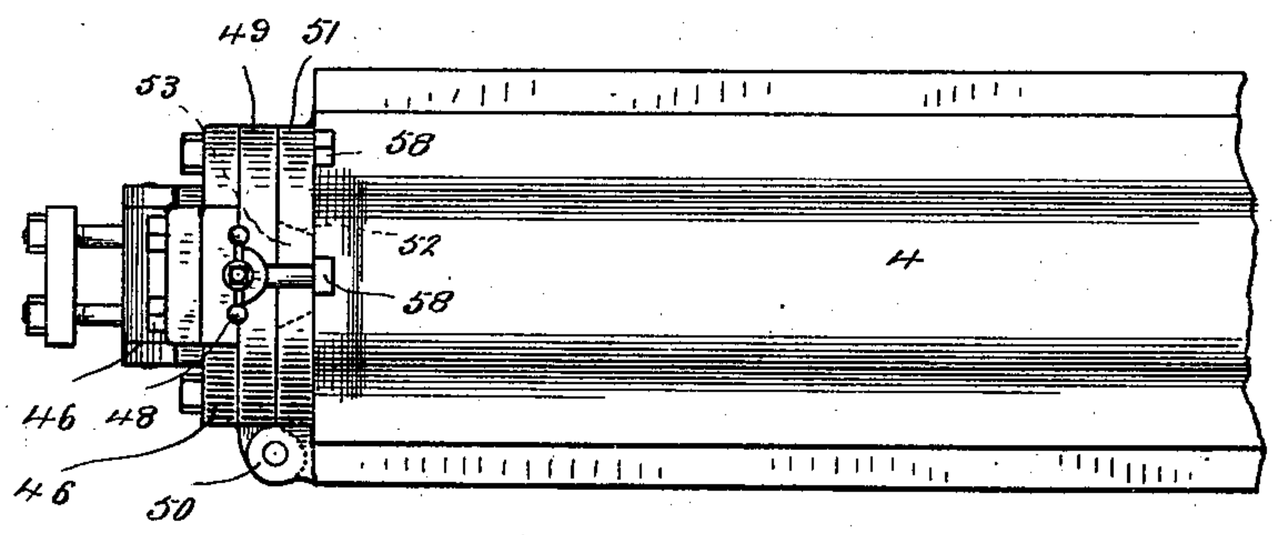


Fig. 9.

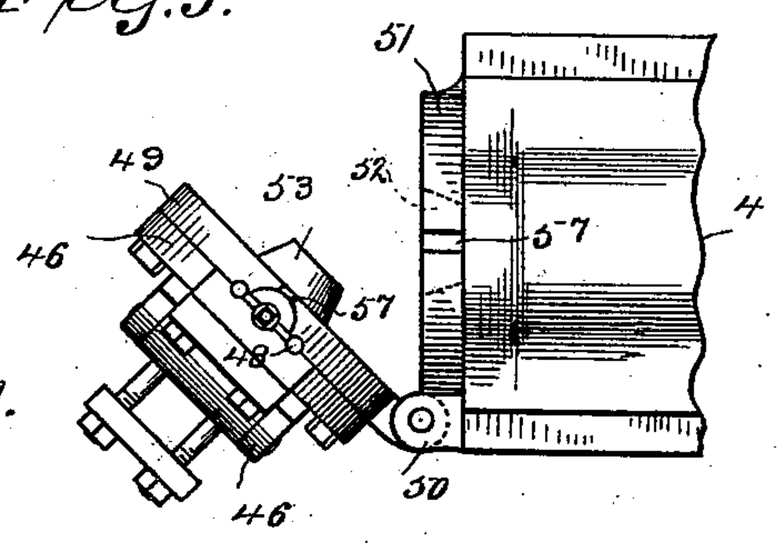
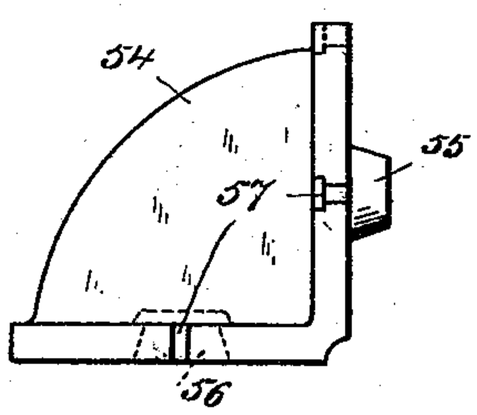
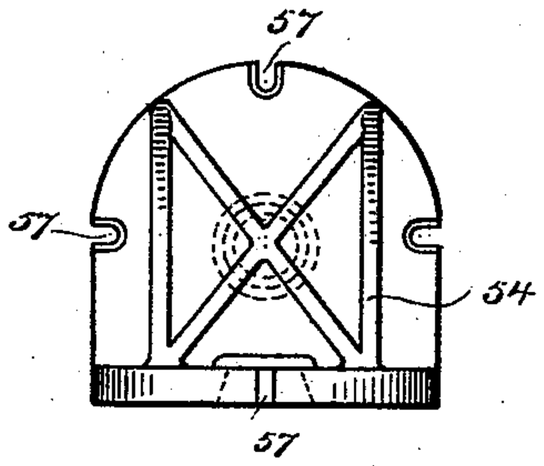


Fig. 10.

Fig. 11.





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UNITED STATES PATENT OFFICE.

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COMBINATION METAL-SHAPER.

SPECIFICATION forming part of Letters Patent No. 517,613, dated April 3, 1894.

Application filed August 5, 1893. Serial No. 482,430. (No model.)

To all whom it may concern:

Be it known that I, HENRY J. HENDEY, a citizen of the United States, residing at Torrington, in the county of Litchfield and State of Connecticut, have invented certain new and useful Improvements in a Combination Metal-Shaper; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to so improve the construction of metal shapers as to adapt them to greater variety of work and to increase the speed with which various classes of work may be performed.

My present improvements are adapted more especially to the general class of metal shapers known as traverse shapers, the special object in view being to combine in a single machine of this class, mechanism for producing, not only a rapid longitudinal movement of the cutting tool but also a rapid transverse movement of the cutting tool. Heretofore in this class of machines the longitudinal movement of the tool has been rapid but the transverse movement has necessarily been slow. In the present machine I am enabled to produce a rapid longitudinal movement of the cutting tool and an automatic feed, or by slight adjustment to so change the operation of the machine as to produce a rapid transverse movement of the cutting tool.

With these ends in view I have devised the novel combination metal shaper of which the following description in connection with the accompanying drawings is a specification, numbers being used to designate the several parts.

Figure 1 is a plan view partly in horizontal section, the hinged cutter head being shown in full lines in position to make a transverse cut and in dotted lines in position to make a longitudinal cut; Fig. 2 a side elevation corresponding therewith; Fig. 3 a detail view, the bed casting being in horizontal section on the line *m m* in Fig. 2 and the clutch being disengaged as when making a longitudinal cut with an automatic feed; Fig. 4 a section of the cutter bar, saddle and bed on the line *z z* in Fig. 1; Fig. 5 a section on the line *x x* in Fig. 4 looking toward the left; Fig. 6 a section on the line *y y* in Fig. 1 looking in the direction of the arrow; Fig. 7 a detail sectional view on the line *s s* in Fig. 6; Fig. 8 a plan view of the end of the cutter bar detached, the hinged cutter head being in position to make a longitudinal cut, this position of parts corresponding with the position of parts illustrated in Fig. 3; Fig. 9 a similar view the hinged cutter head being detached and swung open, and Figs. 10 and 11 are respectively side and front views of the angle piece, detached, which I use to retain the hinged cutter head in position to make a transverse cut, as in Figs. 1 and 2.

1 denotes the bed casting as a whole, 2 the table which is vertically adjustable in the usual, or in any preferred manner, 3 the saddle, and 4 the cutter bar.

Power is applied to drive the machine by means of two belts not shown either of which is adapted to pass over a fixed pulley 5 between two loose pulleys 6 on a shaft 7 journaled in brackets 8 secured to the bed. One of the belts is crossed so as to reverse the movement of the machine when placed in use. Both belts are controlled by a belt shifter of ordinary construction, which when the tool is cutting either longitudinally or transversely, may be shifted automatically or by hand as preferred.

As any belt shifter may be used, and as the special form of shifter is not of the essence of my invention I have not deemed it to require illustration, although I shall presently describe in full the mechanism for actuating the belt shifter automatically both when a longitudinal and a transverse cut is being made. It is of course obvious that when the crossed belt is on the fixed pulley the straight belt will be on one of the loose pulleys and vice-versa, each shifting of the belts acting to reverse shaft 7.

9 and 10 denote pinions on a sleeve 11 which is adapted to slide longitudinally on shaft 7, said sleeve being retained in place and its movement in each direction stopped by one or more pins 12 which pass through slots in the shaft, see dotted lines Fig. 1, and the ends of which are fixed in the sleeve. The movements of the sleeve are controlled by a bell

crank lever 13 pivoted on a bracket 14. The inner end of this lever consists of a yoke having bosses or rollers which engage a groove 15 in the sleeve. Pinion 9 is adapted to engage (and in Figs. 1 and 2 is shown as in engagement with) an idler pinion 16 journaled on a hub 17 extending outward from the bed casting. Pinion 16 in turn engages an idler pinion 18 which turns on a sleeve 19 which is itself fixed in the bed casting and through which a shaft 20 passes, see Fig. 7. Pinion 18 in turn engages a pinion 21 at the end of a screw 22 which may be used either as feed or power as I shall presently describe. This screw is journaled in suitable boxes 23 in the bed casting, one only of said boxes being shown, see Fig. 1. The function of this screw is to move the saddle transversely on the bed by means of a depending lug 24 which extends through an opening 25 in the bed casting, see Fig. 4, and is threaded to receive the screw. I define the movement of the saddle as transverse for the reason that it is at right angles to the movement of the cutter bar which is commonly termed a longitudinal movement. The engagement of the saddle with the bed casting will be clearly understood from Figs. 2 and 4.

26 is a gib lying in a groove in the saddle and between the saddle and a flange on the bed casting.

Pinion 10 on sleeve 11 is adapted to engage, (but is shown in Fig. 1 as out of engagement with) a gear wheel 27 on a shaft 28 journaled in the bed casting in line with hub 17 but wholly independent thereof.

29 is a pinion on shaft 28 which engages a gear wheel 30 on shaft 20.

31 denotes a spline on shaft 20.

Turning now to Fig. 5, 32 denotes brackets secured to the under side of the saddle and lying in opening 25 in the bed casting. 33 denotes a sleeve which is keyed to shaft 20 so as to be carried thereby but is free to slide longitudinally thereon. This sleeve is journaled in brackets 32 and carries a pinion 34 which engages an intermediate pinion 35 on a shaft 36 which is likewise journaled in said brackets. Pinion 35 engages a rack 37 which is rigidly secured in the under side of the cutter bar, see Fig. 4 in connection with Fig. 5, thereby imparting longitudinal movement to the cutter bar. These two principal movements of the machine, *i. e.* the longitudinal movement of the cutter bar and the transverse movement of the saddle will be clearly understood from Figs. 1 and 2 in connection with Figs. 4 and 5. The movement of the saddle over the bed casting which I term a transverse movement is produced by means of screw 22 which engages depending lug 24, and the movement of the cutter bar which I term a longitudinal movement is produced by means of pinion 34 on shaft 20, said pinion engaging an intermediate pinion which in turn engages a rack on the cutter bar, said pinion 34 and the intermediate pinion being carried by the saddle, and pinion 34 and the sleeve by which it is carried sliding longitudinally on the shaft 20 which imparts movement to the cutter bar.

For convenience in description I shall adopt the technical terms used in shops and describe the movement of the tool in performing work as the power and the movement of the tool transversely to its line of work as the feed.

As already stated one of the important and novel features of my present machine is that I am enabled to perform work, that is to move the tool, either longitudinally or transversely. When the tool is cutting transversely, as in Figs. 1 and 2, screw 22 is the power and shaft 20 is the feed, and when the tool is cutting longitudinally as in Fig. 8, shaft 20 is the power and screw 22 is the feed. In the first instance, that is when the tool is cutting transversely, screw 22 being the power, the feed is performed by mechanism which I shall presently describe but will first describe the manner in which the saddle is driven in making the transverse cut. To produce this movement, *i. e.* to make screw 22 the power, sleeve 11 is moved longitudinally on shaft 7 until pinion 9 is in engagement with idler pinion 16 as already described and as clearly shown in Figs. 1 and 2, pinion 16 engaging idler pinion 18 which in turn engages pinion 21 on the screw. The number of teeth in the several pinions is so proportioned as to produce rapid movement of the screw and consequently rapid movement of the saddle over the bed casting carrying the cutter bar and tool with it. It will be understood from the above, pinion 18 being an idler and shaft 28 being wholly disconnected from shaft 7, that no movement will be communicated from shaft 7 to shaft 20, which in the present instance is the feed. I therefore provide special feeding mechanism to be used when the tool is cutting transversely and screw 22 is the power.

38, see Fig. 3, is a short shaft journaled in the bed casting.

39, see dotted lines Fig. 2, in connection with Fig. 3, is a pinion on the inner end of shaft 38 which meshes with gear wheel 30 on shaft 20.

40 is a worm wheel which is normally loose on shaft 38. The outer face of the hub of this worm wheel is provided with a clutch member 41 which is adapted to be engaged by a clutch member 42 the latter being keyed to the shaft so as to turn therewith, but free to be moved longitudinally on the outer end of the shaft so as to engage or disengage the clutch member on the hub of worm wheel 40. For convenience in illustration in Fig. 3 I have shown the clutch members as disengaged. In practice however when the machine is used as in Figs. 1 and 2, the tool cutting transversely and screw 22 being the power, the clutch members are engaged so as to lock worm wheel 40 to shaft 38.

43 is a worm on a shaft 44 which engages worm wheel 40. This shaft is shown as placed

diagonally, and is provided at its outer end with a hand wheel 45, for convenience in operation. Rotation of shaft 44 by means of the hand wheel, the clutch members being engaged, will rotate shaft 38 carrying pinion 39 which in turn carries gear wheel 30 on shaft 20, the latter by means of pinions 34 and 35 and rack 37 imparting to the cutter bar the required amount of feed as in use or when setting the tool in position to commence work.

The capability of both longitudinal and transverse cutting movement of the tool is obtained in the manner which I will now describe.

46 denotes the tool carrier, 47 a tool and 48 the usual screw for raising and lowering the tool carrier and tool. The tool carrier is secured in any ordinary or preferred manner to a cutter head 49 which is hinged as at 50 to a flange 51 at the end of the cutter bar. Flange 51 is provided with a central recess 52 and the hinged cutter head is provided with a boss 53 which is adapted to engage said recess when the cutter head is in the closed position as in Fig. 8, that is in the position in which the tool makes a longitudinal cut.

In order to impart the required degree of strength and absolute rigidity to the cutter head and tool carrier when the cutter head is in the open position that is when the tool is making a transverse cut as in Figs. 1 and 2 I provide an angle piece 54 which is provided with a boss 55 adapted to enter recess 52 in the flange, with a recess 56 which is adapted to receive boss 53 on the cutter head, and with recesses 57 in its edges adapted to receive bolts 58. The edges of flange 51 and the hinged cutter head are likewise provided with recesses 57 to receive bolts 58 to lock the cutter head in both of its operative positions.

When it is desired to have the tool cut transversely the bolts 58 shown in Fig. 8, are loosened, the cutter head is swung around as in Fig. 9, and angle piece 54 is placed between the flange and the cutter head and then rigidly secured in place by means of bolts 58 as in Fig. 1. In changing from a transverse to a longitudinal cut, bolts 58 are again loosened, the angle piece is removed and the cutter head swung back to the position shown in Fig. 8 and locked there again by means of the bolts.

Suppose the cutter head, tool carrier and tool to be in the position shown in Fig. 8, and that it is desired to produce a longitudinal cut, the operator by means of bell crank lever 13 moves sleeve 11 longitudinally on shaft 7, throwing pinion 9 out of engagement with pinion 16 and throwing pinion 10 into engagement with gear wheel 27 on shaft 28. Movement is thus imparted by means of pinion 29 on shaft 28 to gear wheel 30 on shaft 20. Shaft 20 thus becomes the power leaving the feed to be produced by screw 22. The feed is produced automatically in the manner which I will now describe.

59 see Fig. 7 in connection with Figs. 1 and 2, denotes a rocker which is journaled on the outer end of shaft 20.

60 denotes a disk keyed to the shaft, 61 leather washers, and 62 a metallic disk against which a nut 63 bears in order to produce sufficient friction of the leather washers upon the rocker to cause the shaft to carry the rocker forward until a pin 64 on the rocker engages either of two pins 65 which extend outward from the bed casting. When the pin on the rocker engages either of the pins 65 the rocker is held thereby until the reverse movement of shaft 20 takes place, said movement being produced as already fully explained by the shifting of the belts on pulleys 5 and 6 on shaft 7. The shaft continues to move forward after the rocker is stopped by the engagement of the pins as long as may be required to make the cut, the rocker slipping on the shaft.

66 denotes a connecting rod which is adjustably secured to the rocker in the usual manner to permit the feed at each actuation to be increased or diminished as may be required. The opposite end of the connecting rod is pivoted to a lever 67 journaled on a hub 68 extending outward from the bed casting, see Fig. 2. At the opposite end of lever 67 is a spring pawl 69 which is adapted to engage a double faced ratchet 70 on the face of a pinion 71 which is also journaled on hub 68 but wholly independently of the lever. Pinion 71 engages pinion 21 on screw 22 thereby imparting intermittent rotary motion to the screw and producing the feed.

The pawl is made reversible so that the machine will feed in either direction, and suitable means are provided for locking it out of operative position as for example, when placing the saddle, and with it the cutter bar and tool by hand in position to commence work, or when it is not desired to have the feed automatic. It is not deemed necessary to describe the operation of these parts more in detail as the specific construction and arrangement thereof form no portion of my present invention.

72 denotes adjustable dogs on the cutter head which are adapted to engage a lever 73 pivoted to one of the plates 74 which retain the cutter bar in the ways in the saddle, see Fig. 1.

75 denotes a connecting rod one end of which is pivoted to lever 73 and which slides in guides 76 upon the saddle.

77 denotes a rack upon the connecting rod which engages a segment gear 78, see dotted lines Fig. 2, upon a rock shaft 79 journaled in brackets 80 secured to the bed casting. The oscillation of this rock shaft operates a belt shifter of any ordinary or preferred construction, which is not illustrated in the drawings as it forms no portion of my present invention, to shift the belts on pulleys 5 and 6 on shaft 7, and thereby reverse the movement of the cutter bar, tool, &c. Dogs 72 are adjust-

ed on the cutter bar by means of bolts 81 the heads of which lie in a T slot 82 in the cutter bar thereby regulating the length of the stroke. It will thus be seen that in making a longitudinal cut shaft 20 being the power and screw 22 the feed, the operation of the machine is wholly automatic, both the shifting of the belts to reverse the power, and the feed, being performed automatically in the manner just described. If it is not desired that the shifting of the belts shall be automatic in making a longitudinal cut bolts 81 are loosened and dogs 72 are moved away from each other in the T slot far enough so that they are not in contact with lever 73. This prevents automatic shifting of the belts which may then be performed by hand in the usual or in any preferred manner. 86 is a suitable stop in slot 82 which prevents the outer dog from being moved out of the slot.

If it is not desired to have the feed automatic spring pawl 69 is locked out of operative position so that it cannot engage double faced ratchet 70 on pinion 71, thus throwing the automatic feeding mechanism out of operation. The feed is now produced by hand by means of a worm 83 which engages a feed nut on screw 22, see dotted lines in Fig. 2 and is held against endwise movement by a bracket 83^a shown only in dotted lines in Fig. 2. The worm is carried by a shaft 84 which extends up through the saddle and is provided with a hand lever 85 for convenience in operation, see Fig. 1. In addition to producing a hand feed if desired worm 83 may be used before the machine is started, to set the saddle, cutter bar, tool, &c., in position to commence work.

Suppose now that the cutter head, tool carrier and tool are in the position shown in Figs. 1 and 2 and that it is desired to produce a transverse cut. The operator by means of bell crank lever 13 moves sleeve 11 longitudinally on shaft 7 throwing pinion 10 out of engagement with gear wheel 27 on shaft 28 and throwing pinion 9 into engagement with pinion 16, such being the position illustrated in Fig. 1. Movement is thus imparted by means of pinions 18 and 21 to screw 22 which thus becomes the power leaving the feed to be produced by means of shaft 20, pinions 34 and 35 and rack 37, see Fig. 5, and controlled by hand by means of worm 43 on shaft 44. When making a transverse cut the belt shifting to reverse the power may be performed either automatically or by hand.

87, see Figs. 1 and 2 denotes collars secured to rock shaft 79 by set screws 90 and provided with outwardly extending arms 88 (one only of said collars and arms being shown).

89 denotes inclines upon the saddle which are adapted to engage arms 88 to oscillate rock shaft 79 to operate the belt shifter, in precisely the same manner that it is operated when the machine is making the longitudinal cut, to shift the belts on pulleys 5 and 6 on shaft 7, and thereby reverse the movement of the saddle, tool, &c. Collars 87 are adjusted on rock shaft 79 by means of the set screws 90, thereby regulating the length of the stroke in the same manner as when making the longitudinal cut.

If it is not desired that the shifting of the belts shall be automatic in making the transverse cut, set screws 90 are loosened and collars 87 are moved out of the way far enough so that they will not engage arms 88. This prevents automatic shifting of the belts which may then be performed by hand in the usual or in any preferred manner.

Having thus described my invention, I claim—

1. In a machine of the character described the combination with the saddle and cutter bar, of screw 22 which moves the saddle, shaft 20 and connecting mechanism which move the cutter bar, and suitable mechanism by which said screw may be made the power and said shaft the feed, and other mechanism by which said shaft may be made the power and said screw the feed.

2. The combination with the saddle, screw 22 by which it is moved, the cutter bar and shaft 20 and connecting mechanism by which it is moved, of suitable automatic mechanism by which said shaft is made the power and said screw the feed, other automatic mechanism by which said screw may be made the power, and suitable mechanism moved by hand by which said shaft may be made the feed.

3. The combination with the saddle and cutter bar having a flange 51, of the cutter head hinged to said flange, and angle piece 54 adapted to lie between the cutter head and the flange so that a tool carried by the cutter head may be made to cut either longitudinally or transversely.

4. In a machine of the character described, the combination with the saddle and the cutter bar, of the hinged cutter head and angle piece 54.

5. The combination with angle piece 54 having boss 55 and recess 56, of hinged cutter head 49 having boss 53 and recess 57, substantially as shown and for the purpose specified.

6. In combination, the cutter bar, the hinged cutter head and the angle piece.

7. The combination with the hinged cutter head having boss 53 and recesses 57 in its edge, of angle piece 54 having recess 56 to receive boss 53 and recesses 57 in its edge, substantially as shown, for the purpose specified.

8. The combination with the cutter bar having flange 51, of the hinged cutter head, angle piece 54 adapted to lie between the cutter head and the flange, said cutter head, angle piece and flange having recesses 57, and bolts 58 adapted to engage said recesses to lock the cutter head in either the open or closed position.

9. The combination with the cutter bar having flange 51 provided with a central recess 52 and recesses 57 in its edge, of angle piece

54 having central boss 55, central recess 56, and recesses 57 in its edges, and the hinged cutter head having boss 53 adapted to engage either recess 52 or recess 56 and having recesses 57 in its edge, and bolts 58 adapted to engage said recesses to lock the hinged cutter head either to the angle piece or to the flange and to lock the latter when in use to the flange.

10. The cutter bar having flange 51 provided with recess 52, in combination with the cutter head hinged to said flange and having a boss 53 adapted to engage said recess, and suitable means for locking the cutter head in place.

11. The cutter bar having flange 51 provided with recess 52, in combination with the cutter head hinged to said flange and having a boss 53, an angle piece 54 having a boss 55 adapted to engage recess 52 and a recess 56 adapted to receive boss 53, and suitable means for locking the parts in position.

12. The combination with the saddle, the cutter head and angle piece 54 for holding the cutter head in the open position so that the tool will cut transversely, of mechanism for moving the saddle constituting the power, and mechanism for moving the cutter bar constituting the feed.

13. The combination with the saddle, the cutter bar, the hinged cutter head, and the angle piece, of screw 22 by which the saddle is moved constituting the power, and shaft 20 and connecting mechanism by which the cutter bar is moved constituting the feed.

14. The combination with the saddle, the cutter bar, the hinged cutter head and the angle piece, of screw 22 for moving the saddle, mechanism for rotating said screw when used as power, mechanism for intermittently rotating said screw when used as feed, shaft 20 and connecting mechanism for reciprocating the cutter bar when used as the power, and hand mechanism for moving the cutter bar when used as the feed.

15. The combination with the saddle, screw 22 engaging the saddle and having pinion 21, the cutter bar, shaft 20 having gear wheel 30, and intermediate connections for moving the cutter bar, of shaft 7 having pinion 9, intermediate idler pinions one of which is adapted to be engaged by pinion 9 whereby rotation is communicated to the screw to move the saddle, and worm 43, worm wheel 40, and connections whereby movement is communicated to the cutter bar.

16. The combination with the saddle, screw 22 for moving the saddle and having pinion 21, the cutter bar, shaft 20 for moving the cutter bar and having pinion 30, of shaft 7 adapted to rotate in either direction, mechanism intermediate said shaft and pinion 21 to drive the screw in either direction constituting the power, and suitable mechanism connecting with gear wheel 30 to move the cutter bar constituting the feed.

17. The combination with screw 22 and shaft 20, of shaft 7 adapted to rotate in either direction, sliding sleeve 11 on said shaft carrying pinions 9 and 10, intermediate gearing adapted to be engaged by pinion 10 at one position of the sleeve to communicate motion to shaft 20, and intermediate gearing adapted to be engaged by pinion 9 at the other position of said sleeve to communicate rotation to the screw.

18. The combination with screw 22 having pinion 21 and shaft 20 having gear wheel 30, of shaft 7 adapted to rotate in either direction, sliding sleeve 11 on said shaft carrying pinions 9 and 10, and gearing intermediate gear wheel 30 and pinion 10 at one position of the sleeve whereby motion is communicated to shaft 20, and gearing intermediate pinion 21 and pinion 9 at the other position of the sleeve whereby motion is communicated to the screw.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY J. HENDEY.

Witnesses:
J. EVERETT ALDEN,
ALBERT SPERRY.