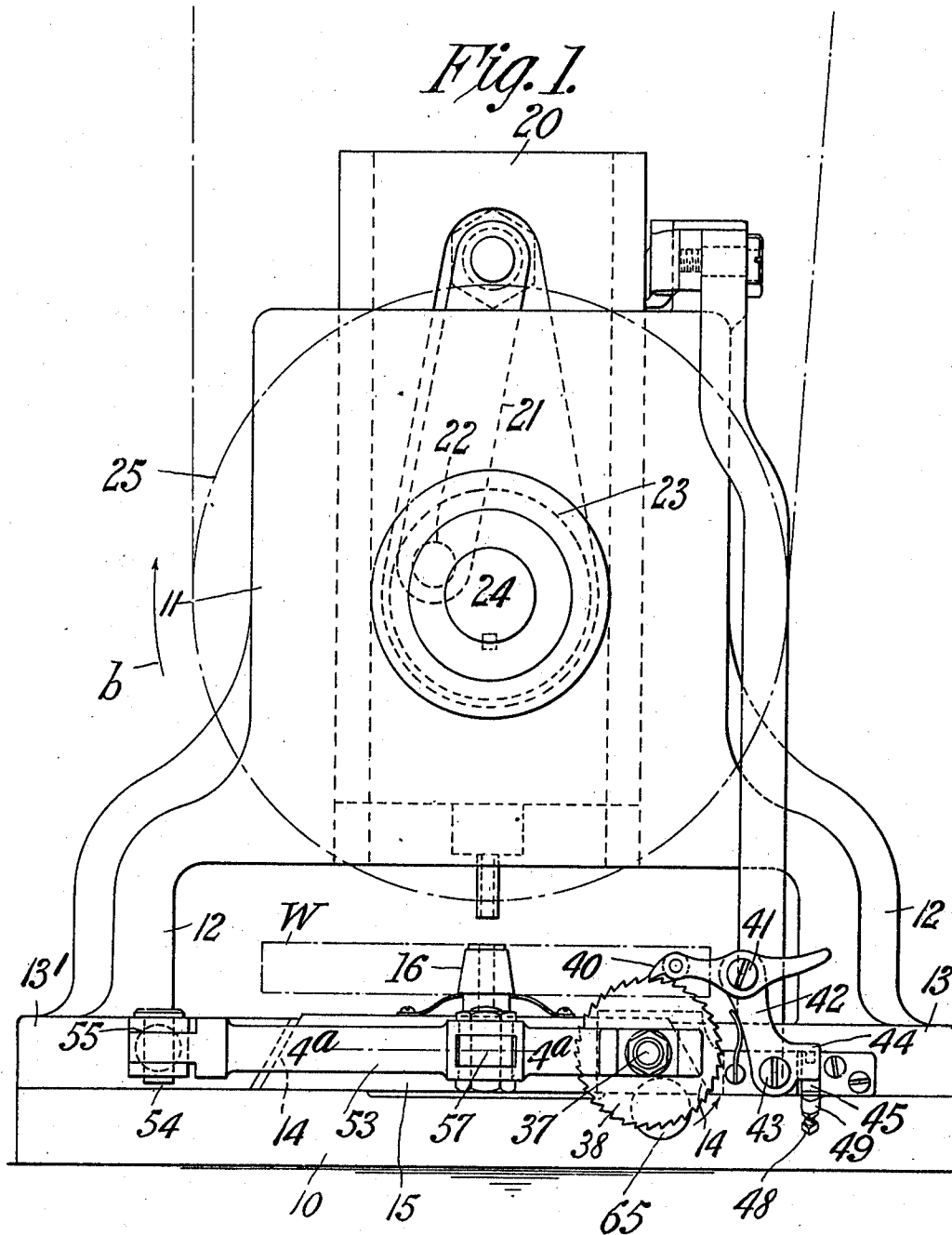


B. F. STOWELL.
 SLOTTING MACHINE.
 APPLICATION FILED MAY 10, 1909.

978,073.

Patented Dec. 6, 1910.

8 SHEETS—SHEET 1.



WITNESSES:

H. L. Sprague
R. M. Mowry

INVENTOR,

Byron F. Stowell,

BY

J. H. Rees
 ATTORNEY.

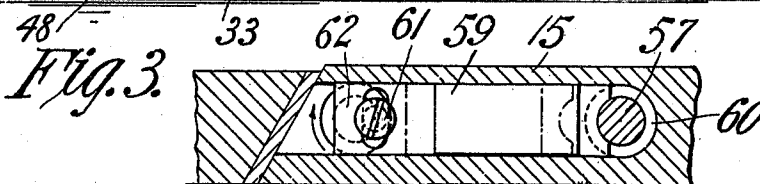
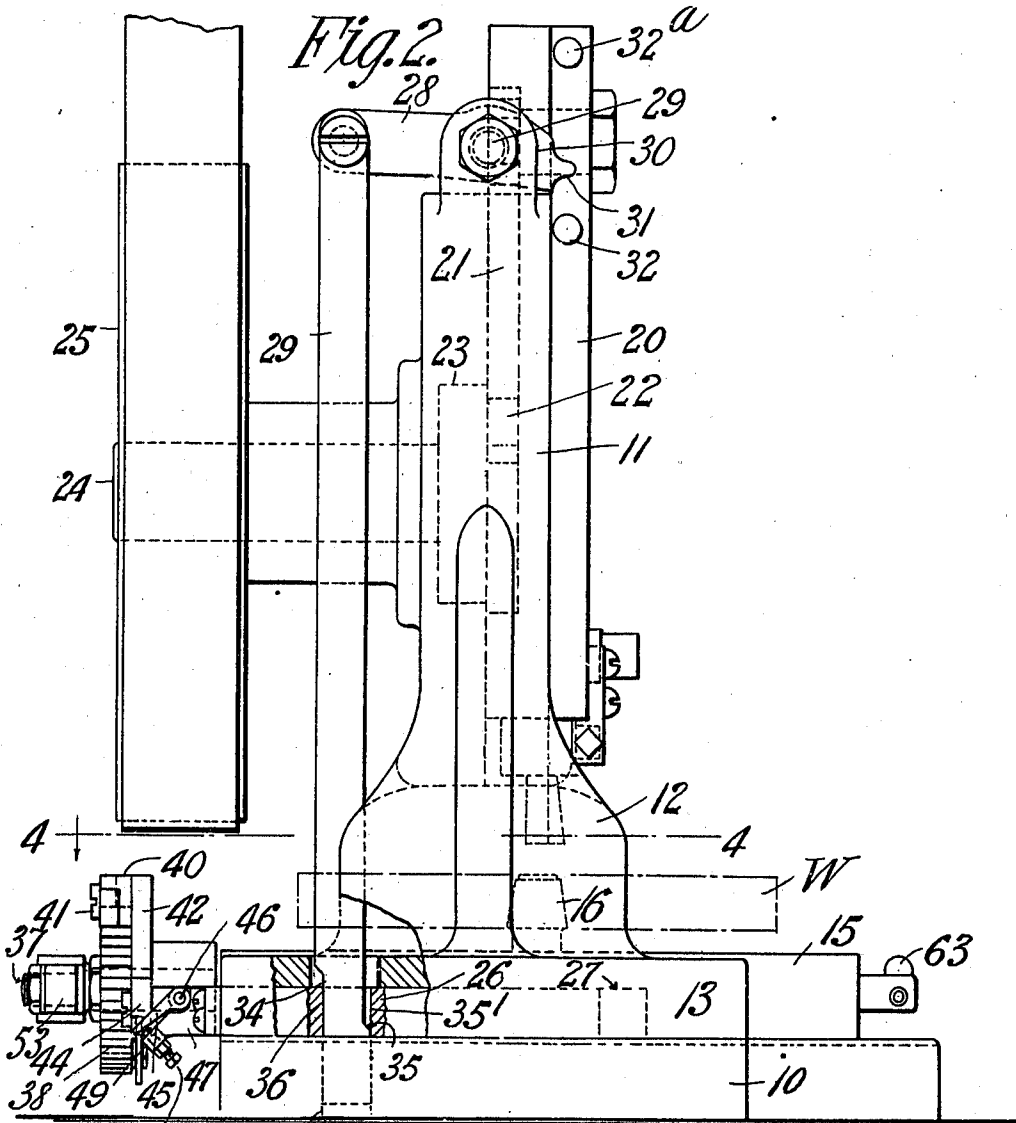
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3 SHEETS—SHEET 2.



WITNESSES:

A. L. Sprague
R. M. Mowry

INVENTOR,

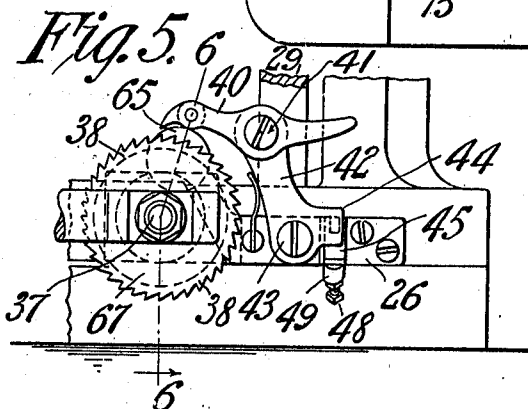
Byron F. Stowell,

BY

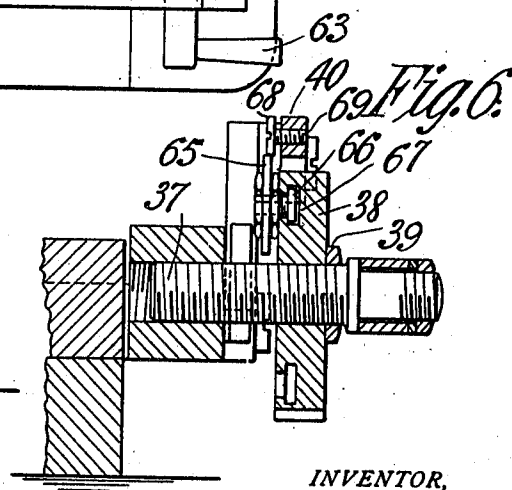
W. S. Bellows
ATTORNEY.

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H. L. Sprague
R. M. Mowry.



Byron F. Stowell,

BY *Wm. J. Bellows*
ATTORNEY.

UNITED STATES PATENT OFFICE.

BYRON F. STOWELL, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR OF ONE-THIRD TO ROBERT W. ELLINGHAM AND ONE-THIRD TO WILLIAM HADLEY, BOTH OF SPRINGFIELD, MASSACHUSETTS.

SLOTING-MACHINE.

978,073.

Specification of Letters Patent.

Patented Dec. 6, 1910.

Application filed May 10, 1909. Serial No. 495,132.

To all whom it may concern:

Be it known that I, BYRON F. STOWELL, a citizen of the United States of America, and resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Slotting-Machines, of which the following is a full, clear, and exact description.

10 This invention relates to metal working machines, and more especially to slotters or shaping machines which may be employed for the purpose of cutting key ways in the hubs of pulleys, fly-wheels, etc., and it has for one of its objects the provision of a machine of this character in which the work will be automatically fed to the tool preparatory to the working stroke thereof, and in which the work will be slightly retracted to clear the tool during the return stroke of the tool.

My invention has, furthermore, for its object the provision of an improved feeding mechanism which may be regulated so as to feed the work to the tool for any desired amount, said feeding mechanism being thrown automatically out of action after the feeding operation has been accomplished for a predetermined distance.

30 My invention has, furthermore, for its object, the combination with the work-supporting carriage, of a work-supporting table, the position of which relative to the support will always be the same but which may be unlocked and removed from the support in order to replace the work thereon by a new blank as desired.

The invention has been clearly illustrated in the accompanying drawings in which similar characters denote similar parts, and in which—

Figure 1 is a front view of a slotting machine embodying my invention. Fig. 2 is a side view thereof looking from the right of Fig. 1. Fig. 3 is an enlarged detail section on line 3, 3 of Fig. 4 looking in the direction of arrow A. Fig. 4 is a horizontal sectional view on line 4, 4 of Fig. 2. Fig. 5 is a front view of the feeding mechanism corresponding to Fig. 1, but showing said mechanism in its "thrown out" position, and Fig. 6 is a section on line 6, 6 of Fig. 5.

Briefly stated, the present machine comprises a vertically movable tool-slide which may be reciprocated by a crank-shaft, and a horizontal plate adapted to receive the work, which, as above stated, may be a pulley, fly-wheel or similar element. After the tool has descended to the end of its full working stroke, the work-slide is slightly retracted by the movement of the feed mechanism bodily, so that the tool during its return movement will not contact with the work. When the tool has reached the upper end of its return stroke, the work-slide will again be advanced to the position previously had; but at the same time the feeding mechanism will have become operative in feeding the work-slide forward so as to enable the tool to take another chip from the work. In other words, while the slide has a small reciprocatory movement relative to the line of tool travel, the amount of such movement being constant, the work-support is also fed gradually forward during each reciprocation of the tool.

Referring to the drawings, 10 denotes a base-plate upon which the several parts of the machine are mounted. Of these 11 denotes a vertical stand having foot branches 12 which at their bottoms have plates 13, the inner faces of which are beveled as at 14 to receive between them the work-carrying support or slide 15 having a central stud 16 of such size and shape as to correspond to the opening in the hub of the work W to be operated upon. The central opening 16' of the stud 16 is shaped to correspond to the tool and so as to clear the latter and at the same time provide room for the proper feeding distance thereof.

The tool-slide is designated by the numeral 20 and is movable in the upright 11 as controlled by a link 21 which connects said slide with a crank-pin 22 on a disk 23 which constitutes a part of the crank-shaft 24 to which power may be imparted through the belt pulley 25 from any convenient source. Means are provided for feeding the work-slide step by step during the reciprocation of the tool, in one form embodying a feed-slide 26 preferably L shaped as shown in Fig. 4 and adapted to move in a recess 27 provided therefor in one of the foot-plates

13 of the upright 11. This feed-slide 26 carries the entire feed mechanism which may be progressively advanced during the cutting operation, or more particularly speaking, during the reciprocation of the tool-slide. It should be noted that a reciprocatory movement is imparted to the slide 26, such movement being constant in amount to bring the work clear of the tool during the return stroke thereof, this result being accomplished by virtue of the feed mechanism being directly carried on said slide and connected with the work-carrying slide.

The mechanism for imparting this small reciprocation to the slide 26 comprises a lever 28 (see Fig. 2) pivoted at 29 to an ear 30 at the upper edge of the upright 11, said lever 28 having a forward projection 31 adapted to be engaged by a pair of pins 32, 32, secured to the tool-slide 20 near the extreme ends of the stroke of said slide in opposite directions. The lever 28 is connected with a vertically movable slide-rod 29 guided in a suitable aperture 33 in the base and having cam faces 34 and 35 disposed at opposite sides of said rod (see Fig. 2).

The pulley 25 of the main driving shaft is rotated in the direction of arrow *b* Fig. 1, and it will therefore be seen that the tool-slide 20 is moving in its upward stroke. This movement will finally result in bringing the pin 32 into engagement with the nose 31 of the lever 28, thereby moving the rod 29 downward and bringing the cam face 34 of said rod into engagement with the wall 36 of the feed-slide 26, so that the latter will be moved bodily forward thus carrying also the feed mechanism forward and, therefore, advancing the work-slide into position for the tool to take another chip.

The particular device for feeding the work-slide forward relatively to the feed-slide 26, is a feed-screw 37 (see Figs. 5 and 6) in screw threaded engagement with the overhanging arm of said feed-slide and having at its forward end a ratchet wheel 38 rigidly secured thereto, as for instance by a check nut 39. During the forward movement of the feed-slide 26, the ratchet wheel 38 is partially rotated by a gravitative pawl 40 pivoted at 41 to a lever 42 which in turn is pivoted at 43 on the front end of the slide 26 and which has a tail 44 adapted (during the inward movement of the slide 26) to be engaged with a cam-dog 45 pivoted at 46 to a bracket 47 which is secured to the foot 13 above mentioned. This cam-dog 45 may be adjusted so as to produce more or less throw on the tail 44 of the lever 42, thus varying the feed distance of the work-slide relative to the feed-slide during each reciprocation of the latter. The adjustment just mentioned consists substantially of an adjust-

ing screw 48 in screw threaded engagement 65 with an ear 49 of the bracket 47.

It will now be understood that the bracket 47 and the cam-dog 45 are substantially stationary during the operation of the machine. Furthermore, when the slide 26 is pulled inward by the cam-face 35 on the rod 29 during the upward movement thereof, the tail 44 of the lever 42 will be brought into engagement with said cam-dog 45, and the latter will be rocked to move the ratchet 38, thus turning the screw 37 and therefore advancing the latter toward the left as seen in Fig. 6, which movement will result in moving the work-slide relative to the feed-slide in correspondence to the rotative movement of said screw, it being understood that the work-slide is connected with said screw, such connection being clearly shown in Fig. 4. Here it will be seen that the forward end of the screw 37 has a collar 50 and washer 51 between which is disposed the fork end 52 of a lever 53 which is fulcrumed at 54 on a stud 55 secured to the foot-plate 13' of the upright 11. Intermediate its ends the lever 53 is connected to a stud 56 carried by a link-rod 57, the rear end of which projects in an aperture 58 provided in the front end of the work-slide 15 and is movably held therein as for instance by a lock-bolt 59 which is bifurcated at its end to enter a groove 60 in the bolt 57. The lock-bolt 59 may be withdrawn from said groove by a crank-pin 61 secured to the forward end of a rod 62 which is journaled in the slide 15 and has at its rear end a handle 63 whereby the same may be rocked either to unlock the bolt 57 or to lock the same for the purpose of uniting said slide and bolt together.

Means are provided for throwing out the feed mechanism after the work-slide has been advanced to a predetermined position and as controlled by the total amount of rotative movement of the ratchet 38, these means consisting substantially of a roller 65 (see Figs. 5 and 6) journaled on a stud 66 which may be moved along to any desired position in an annular groove 67 in the ratchet 38. The roller 65 is adapted to contact with the head 68 of a screw stud 69 which may be adjusted longitudinally in the pawl 40 so as to permit the ratchet 38 to make a certain number of complete rotations before the roller 65 in its revolution around the axis of said ratchet 38 will come into contact with the head 68 of said screw.

The operation of the machine is as follows: In the drawings, the tool-slide 20 is shown in its upward stroke. Just before the slide has reached the limit of the stroke, the pin 32 will engage the nose 31 of the lever 28 and rock the same to move the rod 29 downward, thus bringing the cam-face 34 into engagement with the face 36 of the

feed-slide and moving the latter bodily outward before the tool-slide commences to descend again. When the slide 20 now descends, the tool will be carried into engagement with the work taking a chip therein. After the tool has passed the limit of its working point, the pin 32^a of the tool-slide will engage the nose 31 of the lever 28 therefore rocking the latter to move the rod 29 upward and therefore bringing the cam-face 35 into engagement with the face 35' of the feed-slide, consequently moving the feed-slide inward and bringing the tail 44 of the pawl-lever 42 into engagement with the cam-dog 45 to rock said lever 42 and advance the ratchet wheel 38 for a few teeth, this advance movement, however, being less than the inward movement of the feed-slide so that as a matter of fact, the tool-slide 20 can now move upward without dragging over the work. As the slide 20 now approaches the uppermost limit of its stroke, the pin 32 will again encounter the nose 31 of the lever 28 therefore again depressing the rod 29 and therefore restoring the feed-slide 26 to its forward position and at the same time advancing the work-slide which now, however, has been slightly moved relative to the feed-slide so that the tool on its next downward stroke can take a fresh chip. This operation is automatically repeated until the roller 65 carried by the ratchet will come into contact with the screw head 68 carried by the pawl to bring the pawl beyond reach of the teeth of the ratchet. The slotting operation is now completed and the work-support may be disengaged from the feed mechanism, or more particularly speaking, the bolt 57 thereof, by partially rotating the spindle 62 to withdraw the bolt 59 from the groove 60 of said bolt, whereupon the work-slide itself with the work on it, may be removed toward the rear of the machine, the finished work may then be removed, and a new blank may be placed thereon. The work-slide may then be again connected with the bolt 57 as will be readily understood, and the machine will thus again be ready for operation as before.

Many changes may be made in the construction and organization of the several elements without departing from the spirit of the invention.

I claim:—

1. In a machine of the character described, a standard, a tool holder mounted to reciprocate on the standard and carrying spaced projections, a work carrier movable relatively to the tool holder, a slide having operative connection with the work carrier to feed the latter, said slide having an aperture, a lever pivoted on the standard and having a projecting nose portion disposed in the path of movement of the projections

on the tool holder and adapted to be rocked upon its pivot in opposite directions by engagement therewith of said projections during the reciprocation of the work carrier, and a rod having connection at its upper end with said lever and at its lower end projecting through said aperture of the aforesaid slide and provided with cam surfaces on opposite sides thereof and at different places in its length for engagement with the walls of said aperture to force said slide transversely of the bar in opposite directions to effect a sliding movement of the work carrier relative to the movement of the tool holder.

2. In a machine of the character described, a standard, a reciprocatory tool holder mounted on the standard and provided with spaced projections, a work carrier movable relatively to the tool holder, a slide having operative connection with the work carrier to feed the latter, a lever pivoted on the standard and at one end projecting between the projections of the tool holder, whereby the lever is rocked upon its pivot by engagement therewith of said projections, and a rod connected to said lever and having operative connection with said slide to shift the same alternately in opposite directions and thereby effect an alternate sliding movement of the work carrier in opposite directions relative to the reciprocation of the tool holder.

3. In a machine of the character described, a standard, a tool holder mounted to reciprocate on the standard and carrying spaced projections, a work carrier movable relatively to the tool holder, a slide having operative connection with the work carrier to feed the latter, said slide having an aperture, a lever pivoted on the standard and having a projecting nose portion disposed in the path of movement of the projections on the tool holder and adapted to be rocked upon its pivot in opposite directions by engagement therewith of said projections during the reciprocation of the work carrier, a rod having connection at its upper end with said lever and at its lower end projecting through said aperture of the aforesaid slide and provided with cam surfaces on opposite sides thereof and at different places in its length for engagement with the walls of said apertures to force the aforesaid slide transversely of the bar in opposite directions to effect a sliding movement of the work carrier relative to the movement of the tool holder, a lock bolt carried by the work carrier to effect the aforesaid operative connection between the latter and the aforesaid slide, and means to manually effect a disconnection between the work carrier and the aforesaid slide.

4. In a machine of the character described,

a standard, a reciprocatory tool holder mounted on the standard and provided with spaced projections, a work carrier movable relatively to the tool holder, a slide having operative connection with the work carrier to feed the latter, a lever pivoted on the standard and at one end projecting between the projections of the tool holder, whereby the lever is rocked upon its pivot by engagement therewith of said projections, a rod connected to said lever and having operative connection with said slide to shift the same alternately in opposite directions and thereby effect an alternate sliding movement of the work carrier in opposite directions relative to the reciprocation of the tool holder, a lock bolt carried by the work carrier to effect the aforesaid operative connection between the latter and the aforesaid slide, and a rod having connection with the lock bolt whereby the latter may be operated to disconnect said operative connection between the work carrier and said slide.

5. In a machine of the character described, a standard, a tool holder mounted for reciprocation on the standard, a work carrier movable relatively to the tool holder, a slide having operative connection with the work carrier to feed the latter and provided with an aperture, and a cam bar operable under the influence of the tool holder to effect a movement of said slide in opposite directions and a consequent similar movement of the work carrier to shift the work into and out of the path of movement of the tool holder during reciprocation of the latter.

6. In a machine of the character described, a reciprocatory tool holder provided with spaced projections, a work carrier, a slide having operative connection with the work carrier to feed the latter, a lever having one end disposed in the path of movement of said projections of the tool holder, and a cam mechanism between said lever and said slide to effect operation of the latter and a similar operation of the work carrier through the instrumentality of the operative connections between the feed slides and work carrier.

7. In a machine of the character described, a reciprocatory tool holder, a work carrier, a slide having operative connection with the work carrier to feed the latter, said slide having an aperture, a rod slidable at its lower end through said aperture, said rod having operative connection with the tool holder and operable by the latter and provided with cam faces on opposite sides thereof and at different places in its length for engagement with the walls of said aperture to force said slide transversely of the bar in opposite directions to effect a sliding movement of the work carrier relative to the movement of the tool holder, a feed mechanism

comprising a ratchet, and an oscillatory pawl-lever carried on said slide, and means for moving said pawl-lever to rotate said ratchet during reciprocation of the slide in one direction.

8. In a machine of the character described, a reciprocatory tool holder, a work carrier, a slide having operative connection with the work carrier to feed the latter and having an aperture, a rod slidable through said aperture, said rod having operative connection with the reciprocatory tool holder and operable by the latter and provided with cam faces for engagement with the sides of said aperture to shift said slide in opposite directions during reciprocation of the tool holder.

9. In a machine of the character described, a reciprocatory tool holder, a work carrier, a slide having operative connection with the work carrier to feed the latter and provided with an aperture, a rod having operative connection with the tool holder and movable through said aperture of the slide under the influence of the tool holder, the rod having projecting portions adapted to engage sides of the aperture to effect movement of the slide and a consequent movement of the work carrier, and means for operating the tool holder.

10. In a machine of the character described, a reciprocatory tool holder, a work carrier, a slide having operative connection with the work carrier to feed the latter and provided with an aperture, a slide rod movable in said aperture, and provided with oppositely disposed cam portions and means carried by the tool holder for actuating said rod in opposite directions near the end of the stroke of said tool holder to force said cam portions alternately into engagement with opposite sides of said aperture to operate said slides and effect a consequent operation of the work carrier.

11. In a machine of the character described, a reciprocatory tool holder provided with spaced projections, a work carrier, a slide having operative connection with the work carrier and provided with an aperture, a lever having one end disposed in the path of movement of said projections, and a rod movable in said aperture and having connection with said lever so that the rod may be moved in opposite directions near the ends of the strokes of said tool holder said rod having projecting portions adapted to engage opposite sides of the aperture of said slide to effect operation of the slide and a consequent operation of the work carrier.

12. The combination with a feed slide having an aperture therethrough, a rod or bar playing through said aperture and having cam surfaces at opposite sides thereof and at different places in the length thereof,

whereby the movement of the bar in one direction will force the slide transversely of the bar in one direction,—the opposite movement of the bar imparting a reverse transverse movement of the slide, a lever to which
5 said bar is connected, a tool carrying slide, having oppositely located abutments for alternately engaging and swinging the lever,

and means for reciprocating the tool carrying slide.

Signed by me at Springfield, Mass., in
presence of two subscribing witnesses.

BYRON F. STOWELL.

Witnesses:

WM. S. BELLOWES,
G. R. DRISCOLL.