Nov. 17, 1931. R. L. WILCOX 1,832,165

FEED MECHANISM

Original Filed Feb. 13, 1928 5 Sheets-Sheet 1

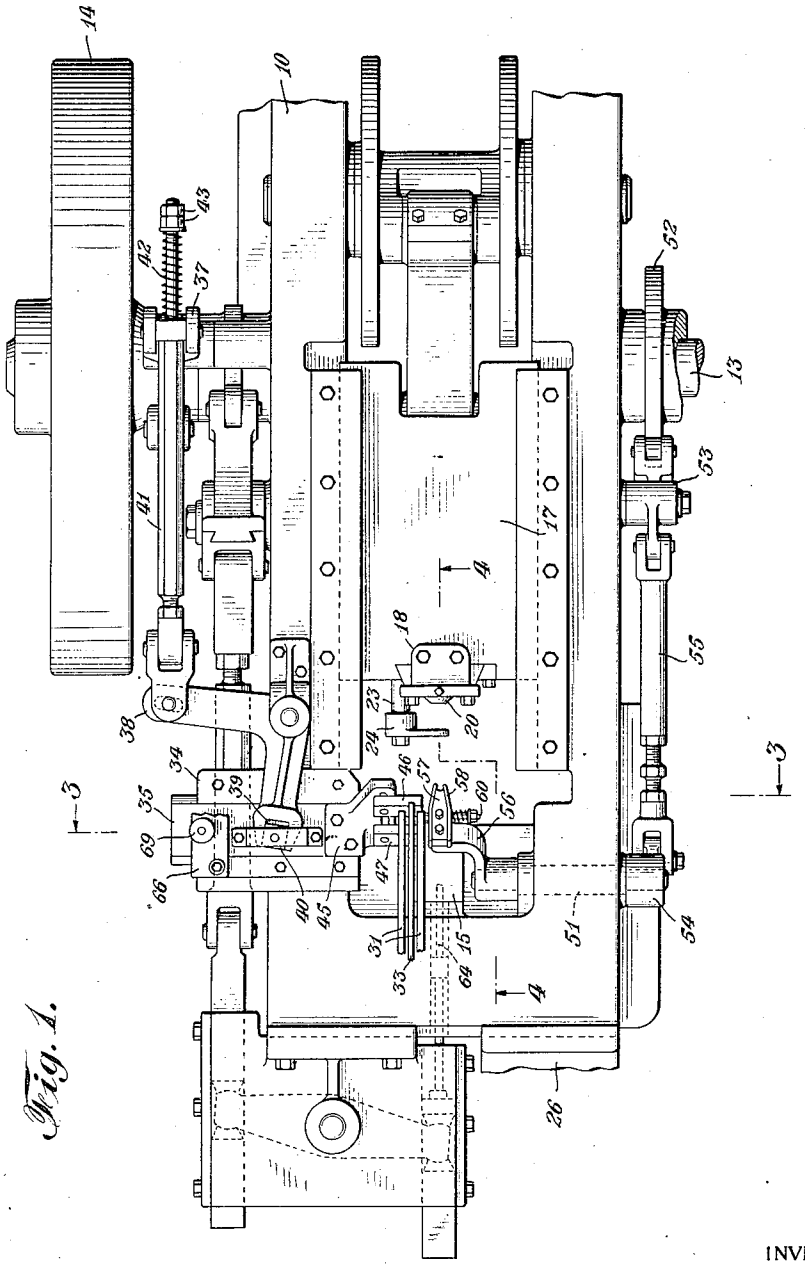


Fig. 1.

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Nov. 17, 1931. R. L. WILCOX 1,832,165

FEED MECHANISM

Original Filed Feb. 13, 1928 5 Sheets-Sheet 2

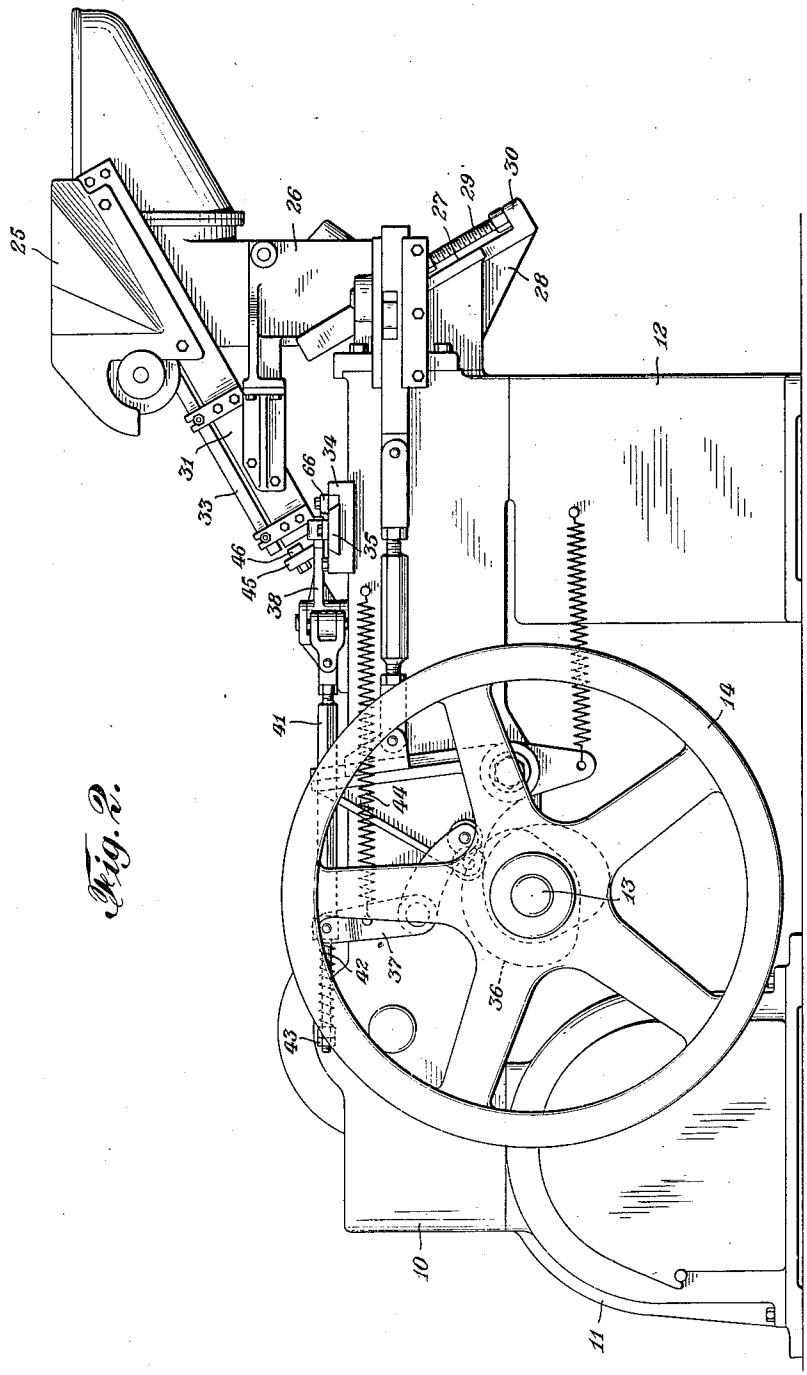


Fig. 2.

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Nov. 17, 1931. R. L. WILCOX 1,832,165

FEED MECHANISM

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Fig. 3.

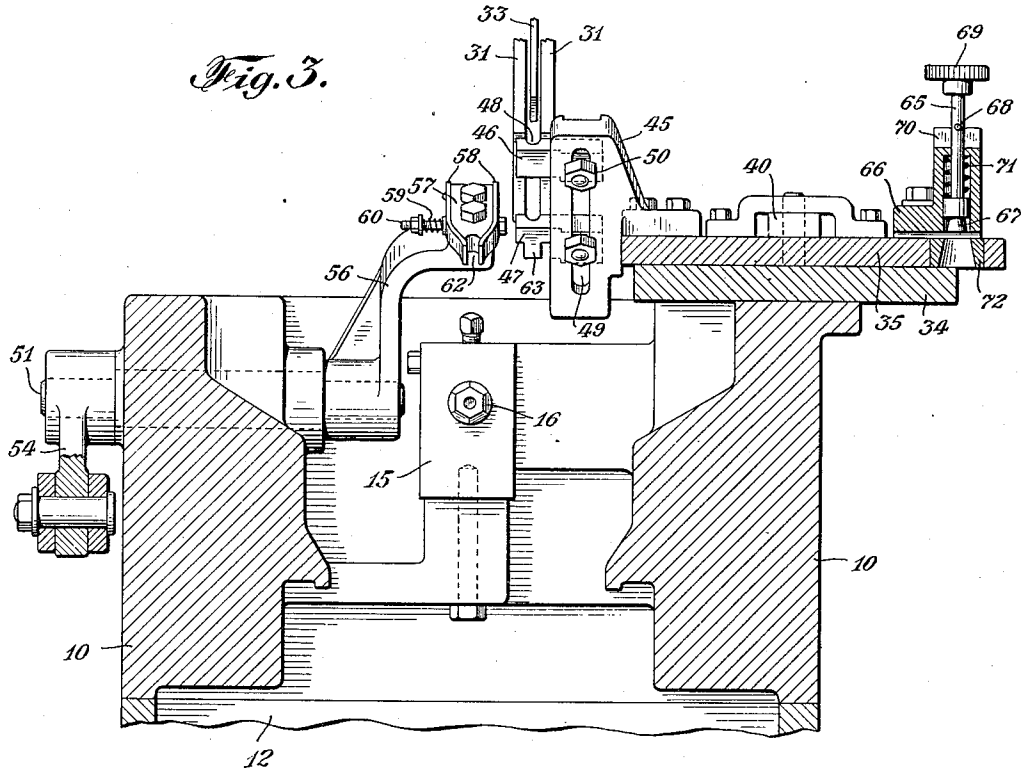
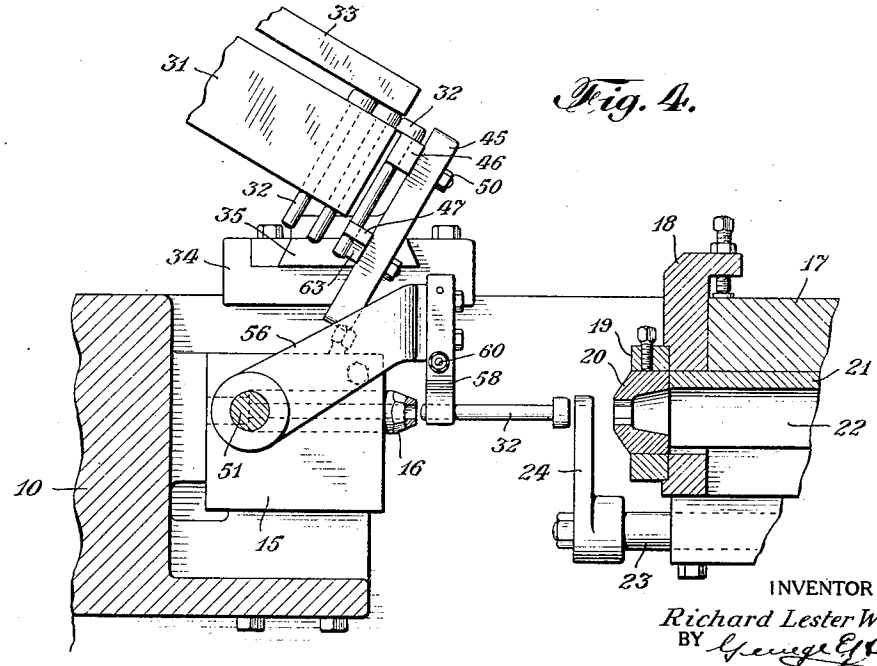


Fig. 4.



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Nov. 17, 1931. R. L. WILCOX 1,832,165

FEED MECHANISM

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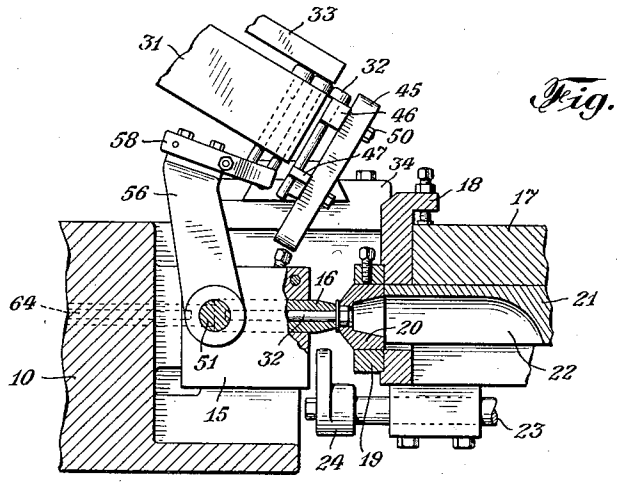


Fig. 5.

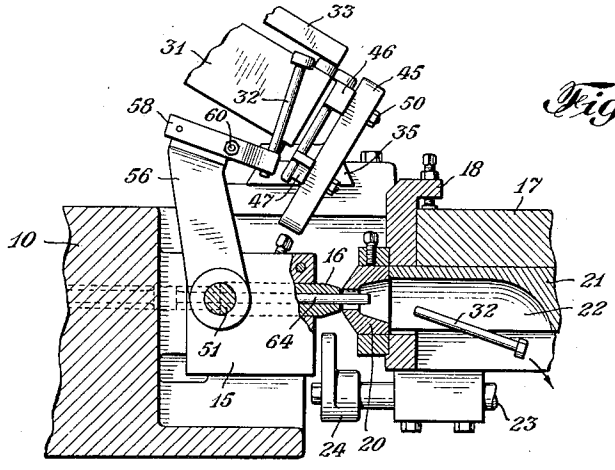


Fig. 6.

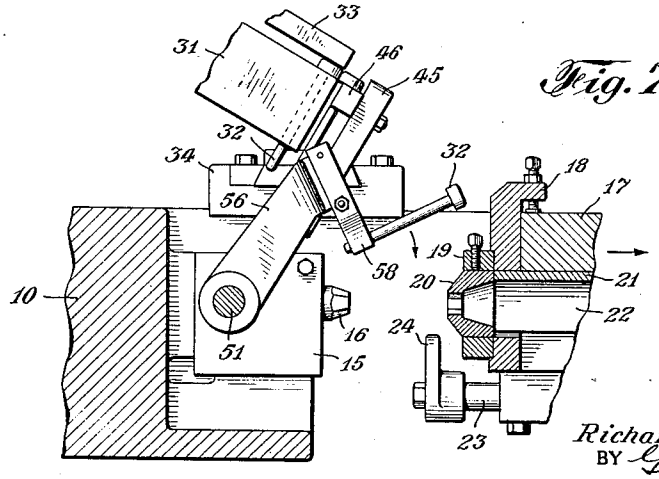


Fig. 7.

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Nov. 17, 1931. R. L. WILCOX 1,832,165

FEED MECHANISM

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Fig. 8.

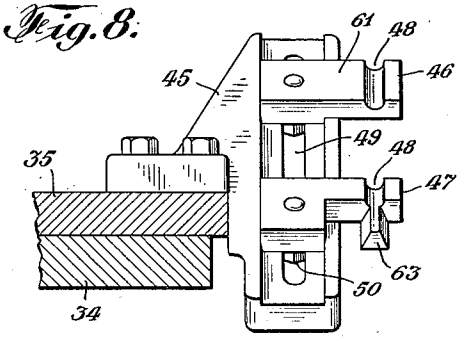


Fig. 11.

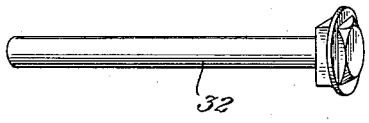


Fig. 10.

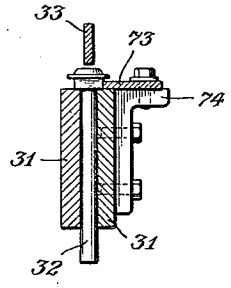
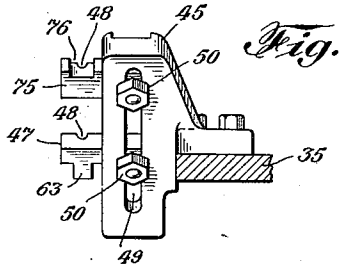


Fig. 9.



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Patented Nov. 17, 1931 1,832,165

UNITED STATES PATENT OFFICE

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FEED MECHANISM

Original application filed February 13, 1928, Serial No. 254,092. Divided and this application filed February 18, 1929. Serial No. 340,906.

This invention relates to new and improved feed mechanism, particularly of the type that automatically and successively takes blanks, such as bolts, screws and the like one at a time from a stream of blanks and presents them to operating tools.

Among other things, it is the object of this invention to provide a feed mechanism that will effectively perform its functions at greater speed than heretofore possible and gradually move the blanks into progressively increasing open space between the operating tools, whereby the speed of operation of the mechanism may be increased.

To these and other ends my invention consists in the feed mechanism, having certain details of construction and combinations of parts, as will be hereinafter described and more particularly pointed out in the claims.

Referring to the drawings, in which like characters of reference designate like parts in the several figures;

Figure 1 is a plan view of a trimmer having my new and improved feed mechanism associated therewith;

Figure 2 is a side view thereof;

Figure 3 is an enlarged transverse view thereof, partly in section, the parts in section being taken generally upon line 3—3 of Figure 1;

Figure 4 is an enlarged fragmentary view illustrating a blank as presented in line with the die and punch, the parts in section being taken generally upon line 4—4 of Figure 1;

Figure 5 is a similar view with the blank in the punch and the die adjacent thereto, with the blank carrier arm in one of its up positions;

Figure 6 is a view similar to Figure 5, showing the blank after it is ejected through the die with the blank carrier arm in one of its up positions with a blank held therein.

Figure 7 is a similar view with the die moved away from the punch during its return stroke and the blank carrier arm in another position and the blank therein partially between the punch and die;

Figure 8 is a view of a portion of the transfer mechanism;

Figure 9 is another view thereof;

Figure 10 is a sectional detail view of the chute mechanism with the blank therein; and

Figure 11 is a perspective view of one form of blank that may be conveniently handled in my new and improved feed mechanism.

In the trimming machine of the type herein shown, the blanks which are to be formed into bolts, screws, rivets, studs and the like, are arranged so as to move in a single column of blanks to a delivery point, from which they are transferred from an approximate vertical position to a substantially horizontal position for operation thereon by a punch and die, whereby the blank head may be trimmed into the desired cross section, usually square, hexagon or octagon.

The blank is grasped adjacent to that end of the shank away from the head so that it is held rigid and there is no vibration or unsteadiness in its action. The blank is so controlled in its movements that the end of the shank opposite to the head is first moved toward the tool and the other end moved in a circle gradually occupying the space formed between the punch and die as one moves relatively to the other instead of waiting for the dies and punch to be completely separated from each other their maximum distance before the blank is presented in line therewith. The result is that the speed of the operations is very materially increased because the space at the extreme limit of the stroke of either the punch or die is occupied by the blank, hence the return of the punch or die is begun immediately and there is no dwell of either punch or die to permit a blank to be moved therebetween. Thus, after a blank has been operated on and ejected from the tools as a finished product, the next succeeding

blank is being moved into position and the punch or die immediately begins to move forward again for operation upon the next succeeding blank after the completion of its return stroke.

In the embodiment of the invention as shown herein, which is one only of its many forms, 10 designates the body of the machine, which is supported by the standards 11 and 12; 13 is the crank shaft having a balance wheel 14 thereon, and through which power may be transmitted; and 15 is the punch holder having a punch 16 therein.

At the forward end of the reciprocating gate 17 is a die plate 18, to which is secured a die holder 19 that supports the die 20. The opening in the die has the same cross sectional shape and area as the trimmed portion of the blank.

Within the gate is a backing block 21, having an opening 22 in one side thereof, the outer end of which engages the die 20.

Mounted on the gate 17 is a pusher mechanism, comprising in part a shaft 23 that has both a reciprocatory and a rotary movement relative to the gate by means not shown herein, and having a finger 24 fixed thereon.

During the forward movement of the gate, the finger 24 is in line with the punch 16 until it has reached a predetermined advance position, when the finger is moved out of alignment with the punch. The gate, however, continues its forward movement and the shaft 23 slides rearwardly through its bearings.

The hopper mechanism 25, which may be of any preferred type, is supported upon a standard 26, which rests upon an angular face 27 of the bracket 28, and threaded in the lower end thereof is a screw 29, the head of which rests against a bracket lug 30. By this method of supporting the hopper, its position, and the chute connected therewith, are conveniently adjusted to accommodate blanks of various lengths, the hopper and chute moving as a unit by rotation of the screw 29. Leading from this hopper is the chute mechanism, comprising chute plates 31, between which the blanks 32 travel in orderly procession, and a cover plate 33 being over the open space therebetween.

Fixed to the body is a bracket member 34, within which is the transfer slide 35, which has reciprocatory movement at substantially a right angle to the path of movement of the gate. This movement is derived from a cam 36 on the shaft 13, a rock lever 37 actuated thereby, a rock lever 38 slotted at 39 to receive the roll 40 on the slide 35, the levers 37 and 38 being joined by an adjustable connecting mechanism 41, having as a part thereof the compression spring 42, held under the tension of the nuts 43. A spring 44 exerts its tension so as to maintain contact between the roll on the rock lever 37 with the cam 36. Its action is such that the slide 35 moves in one direction under a yielding pressure. Fixed to the slide 35 is a bracket 45, the outer portion of which is substantially parallel with the end of the chute plates. Adjustably secured within this bracket are the fingers 46 and 47, each of which has a recess 48 and a shank that projects through a slot 49 therein and having a nut 50 threaded thereon. These fingers are generally arranged on the bracket 45 so that the upper edge of the finger 46 is substantially an extension of the top of the chute plates 31 and the finger 47 adjacent to the lower end of the shank of the blank, substantially as shown in Figure 6.

Journaled in the body 10 is a rock shaft 51, which derives its motion from a cam 52 on the crank shaft 13, through a rock lever 53, a rock arm 54 fixed on the shaft 51, and an adjustable connection 55 therebetween.

Fixed on the shaft 51 is a transfer arm 56, to which is secured a finger block 57, having transfer fingers 58 connected therewith, which are preferably made of yielding material and have a limited outward movement at one end against the tension of the spring 59 upon the stud 60.

When the slide 35 is in its outward position, the recesses 48 in the fingers 46 and 47 are substantially opposite the open space between the chute plates 31, substantially as shown in Figure 3. When thus registered, the lowermost blank in the column of blanks drops into the recesses and the blank is supported by the fingers 46 and 47 with the underside of the head resting against the top of the finger 46. The slide 35 then moves inwardly and carries the blank to a point opposite the fingers 58. During this transfer movement the next blank in the column is prevented from escaping from the chute by the straight face 61 of the fingers which is adjacent to the end of the chute plates 31. The transfer arm 56 is now moved about the axis of the shaft 51 until the fingers 58 engage and grasp the lower end of the shank, the blank then being held between the fingers within the recess 62 in the finger block 57. This action is facilitated by cutting away the lower portion of the finger 47 so that the lug 63 thereon will not prevent the engagement of the transfer fingers 58 with the sides of the blank. When thus gripped, the movement of the transfer arm 56 is reversed until it and the blank held therein assume the position substantially shown in Figure 6, this latter movement lifting the blank out of the fingers 46 and 47.

The slide 35 now travels in a reverse direction until the recesses 48 are again in register with the chute mechanism and receive a new blank in the manner described. This reverse or outward travel of the transfer slide 35 is a yielding or non-positive movement by reason of the spring 42 connected

with the adjustable connection 41. Therefore, in the event that the transfer fingers 58 should not pick the blank out of the fingers 46 and 47, the blank might contact with one of the chute plates 31 and possibly injure some of the mechanism but for the fact that the spring 42 will yield and thus eliminate such possibility. After the fingers 46 and 47 have been moved sufficiently out of the path of movement of the fingers 58, the transfer arm 56 is moved through an arc of a circle, carrying with it the blank, which is presented with its axis coincident with the axis of the punch and die, substantially as shown in Figure 4. When in this position it will be noted that the blank is rigidly supported directly opposite the opening in the punch 16, so that there can be no vibration or wiggling of the blank that will prevent its registering with the punch. As the blank during its last transfer is held near the outer end of the shank and travels in a circular path with the head farthest from the axis of rotation, this transfer movement is so timed that the blank may travel toward the punch while the die is being moved away therefrom. Therefore, instantly that sufficient space is left for the blank between the punch and die, the same is occupied by a new blank. When thus presented the gate moves toward the punch and the finger 24 engages the head of the blank and pushes the shank into the opening in the punch.

After being projected into the punch a sufficient distance the transfer arm 56 returns to its former position lifting the fingers 58 from the blank. When the underside of the head engages the outer face of the punch, the finger 24 moves in a rotary path out of the path of the die, which continues its movement and engages the head and trims the sides thereof.

During the dwell of the gate at this point the knock-out rod 64 engages the end of the shank, pushes the head of the blank through the die, and the same is projected into and through the opening 22. As soon as the trimmed blank is ejected the gate begins its reverse movement.

The pusher mechanism 24 is used particularly for blanks of relatively short lengths. As the timing and extent of movement of the gate and transfer arm are relatively constant, the projection of short blanks into the punch is necessary before the gate contacts therewith in order that the transfer arm may return for the next succeeding blank. The pusher mechanism that moves in advance of the die, in any adjusted relative position, performs this function and permits the transfer arm and the fingers connected therewith to move out of the path of the on-coming die without varying the relative timing thereof. Heretofore in machines of this type, means have always been provided to vary the timing of the transfer mechanism to accommodate blanks of various lengths, such mechanism consisting usually of variation in the size of the cams, etc., a practice that necessitates a number of extra parts, as well as skill and time in substituting one part for another and a non-productive machine while such changes are taking place.

One factor in determining the speed of a trimmer machine of the old form is the timing of the transfer mechanism, which heretofore could not release the blank until it had entered the punch by pressure of the die. With my pressure mechanism the transfer mechanism has released the blank and returned for another blank before being engaged by both the punch and die.

For the purpose of accessibility to some of the parts, and adjustment of these and others, it is desirable that the transfer slide 35 be held against inward movement, and when so desired, I have provided a plunger 65, movable within a fixed bracket 66, and having a conical head 67 upon its lower end. When the slide 35 is operating, for transfer purposes, the plunger 65 is in substantially the position shown in Figure 3, with the cross pin 68 resting upon the top of the bracket 66. To hold the slide 35 against movement, the plunger 65 is rotated slightly through the button 69 until the pin 68 is in register with the slot 70 in the top of the bracket, when the spring 71 will project the plunger 65 downwardly and the conical head 67 into the conical bore of the plug 72 in the slide 35. While in this position, the slide cannot be moved, although its operative mechanism will continue its action, the spring 44 yielding for the purpose. To release the slide from this holding mechanism the plunger 65 and the conical head 67 thereon are pushed upwardly manually, and then turned slightly so that the cross pin 68 will again rest upon the top of the bracket 66, as before.

The engagement of the conical head 67 with the conical walls of the plug 72 prevents the upward movement of the plunger 65, while the tension of the spring 44 holds the same in contact with each other, thus preventing a premature movement of the slide 35. The tension of the spring 44 is sufficient to prevent disengagement of these parts until the cam 36 releases the tension of the spring.

This mechanism is also adapted, with slight modifications, for trimming blanks wherein the head is partially shaped. One form of such blank is shown in Figure 11. Such partially shaped head should register with the trimming tools, a requirement not essential in the blank with a cylindrical head.

When equipped for trimming this type of blank, a plate 73 is attached, by means of brackets 74, or the like, to one of the chute

plates 31, so that one flat side of the head will ride against or adjacent to one edge of the plate and thus prevent its rotation within the chute. The blanks are thus conveyed to the delivery point of the chute in correct and predetermined alignment with each other. A finger 75 having a notch 76 of substantially the same width as the space between the flat sides of the head is substituted for the finger 46. This notch 76 registers with the flat sides of the blank and receives the latter from the chute and holds it against rotation. The fingers 58 pick this blank from the fingers 47 and 75 and deliver the same into register with the die, the angular walls of the opening therethrough being in line with the flat sides of the head of the blank as delivered by the transfer mechanism.

Minor changes and alterations may be made within my invention, aside from those herein suggested, and I would therefore have it understood that I do not limit myself to the exact construction herein shown and described, but claim all that falls fairly within the spirit and scope of the appended claims.

What I claim as new and desire to secure by Letters Patent, is:—

1. The combination with a blank support in which the blanks are positioned at the delivery end thereof at an angle to both the horizontal and vertical; of mechanism for transferring blanks from the support to operating tools, comprising in part a transfer mechanism that has a substantially straight line movement opposite the end of the blank support; and fingers associated with said mechanism to receive the blank, one finger being positioned so that the top thereof is in a plane substantially coincident with that portion of the blank support in contact with the head of the blank at the said delivery end.

2. The combination with tools; of means for operating the same; a blank support; and means for transferring blanks from the blank support to the operating tools, comprising in part fingers that travel in a substantially circular path from the blank support to the tools, the axis of rotation of said fingers being in substantially the same plane as the axis of the operating tools and substantially perpendicular thereto, the arrangement of the parts being such that the axis of the blank, when first engaged by said fingers, when extended, will pass through said axis of rotation.

3. The combination with tools; of means for operating the same; a blank support; and means for transferring blanks from the blank support to the operating tools, comprising in part fingers that travel in a substantially circular path from the blank support to the tools, the axis of rotation of said fingers being in substantially the same plane as the axis of the operating tools and substantially perpendicular thereto, the arrangement of the parts being such that the axis of the blank, when first engaged by said fingers, and when presented in line with the tools, when extended, will pass substantially through the center of the axis of rotation of said fingers.

4. The combination with operating tools; of a chute mechanism; means for transferring blanks from the chute mechanism to the operating tools, comprising in part a reciprocatory member; fingers adjustably connected with the reciprocatory member to accommodate varying positions of the chute mechanism; and finger means for taking the blanks from the reciprocatory member and presenting them to the tools, that travel in a substantially circular path from the reciprocatory member to the tools, said reciprocatory member having parts thereon that are in a plane substantially parallel with one of the radii of the arc of the circle through which the said fingers travel.

5. The combination with operating tools; of a chute mechanism; means for transferring blanks from the chute mechanism to the operating tools, comprising in part a reciprocatory member; fingers adjustably connected with the reciprocatory member to accommodate varying positions of the chute mechanism; and finger means for taking the blanks from the reciprocatory member and presenting them to the tools, that travel in a substantially circular path from the reciprocatory member to the tools, the chute mechanism being so arranged that the blanks as delivered therefrom are in a position wherein the axis thereof is substantially paralled with one of the radii of the arc of the circle through which the said fingers travel.

6. The combination with a pair of tools having a common axis; of means for operating the same; a blank support; and means for transferring blanks from the blank support to the tools, comprising in part fingers that travel in a substantially circular path from the blank support to present the blank at the termination of such circular path with the axis of the blank substantially coincident with that of the tools, the axis of said circular path being at substantially a right angle to that of the blank when held by the said transfer means.

7. The combination with a pair of tools having a common axis; of means for operating the same, one of the tools having a substantially stationary position when a blank is being inserted in work position between the tools; and means for transferring blanks from the blank support to the tools, comprising in part fingers that travel in a substantially circular path from the blank support to present the blank at the termination of such circular path with the axis of the blank substantially coincident with that of the tools, the axis of such circular path being located at the rear of the face of the tool having such

substantially stationary position and at substantially a right angle to that of the blank while held by the said transfer means.

8. The combination with a pair of tools having a common axis; means to convey a blank into position to be operated on by said tools, said means being constructed and arranged to move the blank in a curved path with the axis of the blank always making an angle with the common axis of the tools until the blank is in its final position between the tools.

In testimony whereof, I have hereunto affixed my signature.

RICHARD LESTER WILCOX.