UNITED STATES PATENT OFFICE.

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AUTOMATIC THREAD-ROLLING MACHINE.

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To all whom it may concern:

Be it known that I, Lars W. ThorSELL, a citizen of the United States, residing at Waterbury, county of New Haven, State of Connecticut, have invented an Improvement in Automatic Thread-Rolling Machines, of which the following is a specification.

This invention relates generally to machines for threading screw blanks, with more particular reference to machines for rolling a thread upon the headed blanks in the manufacture of machine screws. The more important objects of my invention are, among other things, the provision of a comparatively simple machine of relatively large capacity, one which is more nearly completely automatic, one which is exceedingly compact and therefore occupies comparatively little floor space, and one which is strong and durable, having few parts to get out of order and such parts easily accessible for repair or replacement.

My invention will be more readily understood by reference to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of a machine embodying my invention, with a portion of the supporting base cut away;

Fig. 2 is a plan view of the same;

Fig. 3 is an elevation of the other side of the machine, partly in section on the line 3—3 in Fig. 2 and with one side of the hopper removed;

Fig. 4 is a vertical section taken substantially on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged plan view of the reciprocating dies and their actuating mechanisms;

Figs. 6 and 7 are fragmentary plan views of the same with the dies in different operative positions;

Figs. 8 and 9 are sectional detail views taken substantially on the lines 8—8 of Fig. 4, respectively;

Fig. 9 is a sectional detail view taken substantially on the line 9—9 of Fig. 6;

Figs. 10, 11, and 12 are fragmentary side elevations of the chute from the hopper and the screw-blank retaining and releasing mechanism, with operative parts of the latter in different positions, as hereinafter explained;

Fig. 13 is a similar view with the retaining and releasing mechanism removed;

Fig. 14 is an end elevation of the same;

Figs. 15 and 16 are sections taken substantially on the lines 15—15 and the line 16 of Fig. 13, respectively, and

Fig. 17 is a plan view of the retaining and releasing mechanism detached.

Referring now to the drawings in detail, I have shown all of the operative parts of my machine mounted upon a suitable frame which includes the vertical standard 21 and the horizontal arm 22. A hopper 24, which tapers in the usual manner from a relatively large open top to a relatively small open bottom, but preferably having at least one vertical side or wall, as shown in Figs. 2 and 3, has one side thereof pivoted at 23 to the horizontal arm 22 of the supporting frame. This hopper 24 is normally secured in an upright position by means of a bracket 25 thereto detachably secured to a bracket 26 on the arm 22 by means of a bolt 27, the bracket 25 preferably including a strengthening lug 28. It will thus be seen that upon removal of the bolt 27, the hopper 24 may be tilted to the position shown by the dotted lines in Fig. 1. This tilting of the hopper has nothing to do with the operation of the machine, but does provide for the withdrawal of certain parts to afford ready access to other parts in a manner which will be hereinafter described. In fact, the hopper 24, with other parts about to be described attached thereto, may be entirely removed by removing both the bolt 27 and the pivot bolt 23. The lower mouth of the hopper 24 is of rectangular configuration, and is closed by a bar 29 which is vertically slidable in suitable ways on the arm 22 of the frame. This bar 29 is adapted to be vertically reciprocated by means of a connecting-rod 30 pivoted to the lower end thereof and to the wheel 31, the latter being driven in a manner which will be hereinafter described. The vertical side wall 32 (Fig. 3) of the hopper is provided with an off-set portion for the reception of the bar 23, which is provided with the relatively deep groove 34 in its upper face so dimensioned as to receive the shank of a screw-blank to be threaded, the blank being supported through its head which is engaged by the top face of the bar, and which is given sufficient inclination (as best shown in Fig. 3) to cause the blanks to slide down the bar under action of gravity, in single file, guided by the groove 34 in which the screw-blank shanks travel. It will
be noted that the upper face 35 of the sliding bar 29 is beveled, the inclination thereof being downwardly in direction of the side wall 32 of the hopper. The screw-blanks being dumped indiscriminately into this hopper, it will be apparent that as the bar 29 is reciprocated in an upward direction the beveled face 35 thereof will engage a certain number of the screw-blanks, carrying the same upwardly until the upper face of the bar 33 is reached or passed, when said blanks will be discharged upon the upper face of said bar 33 and the shanks of a large proportion thereof, at least, fall into the groove 34, under which conditions the blanks are in position to be properly directed downwardly along said bar, as suggested, for disposition in a manner which will be hereinafter described.

Adjustably secured to the side wall of the hopper 24, is an inclined chute which comprises the plate 36 and its opposite counterpart 37 secured at a distance therefrom which approximates the width of the groove 34 in the bar 33. I prefer to attach this chute to the interior face of the vertical wall 32 of the hopper 24 by means of the plate 35, bolted to said wall and having screws 39 which pass through both plates of the chute, and screws 40 which pass through the plate 36 only with the ends thereof abutting against the plate 37, whereby the distance between these plates may be adjustably varied for screw-blank shanks of different diameters.

The upper end of this chute is so shaped and located as to register with and fit against the lower end of the bar 33, of which it thus substantially forms a continuation, as best shown in Fig. 3, whereby a blank will pass readily from said bar 33 to the chute and continue down the latter. In order to prevent such passage by blanks which are not properly positioned in the bar 33, I provide what may be termed a pair of “kickers" 41 and 42, adjoining each other and pivotally mounted on the wall of the hopper to oscillate alternately over the top face of the chute near the upper end thereof in such manner that the curved lower ends of said kickers will pass freely over the heads of such screw-blanks as are properly positioned in the groove of the chute, but will engage blanks the shanks of which are not in said groove and knock the same off the top face of the chute and back into the hopper 24.

To operate these kickers, I prefer to make each thereof one of the arms of a bell-crank lever pivoted at 43, the other arms 44 and 45 thereof being adapted to be actuated by the cams 46 and 47 on the shaft 48, whereby the arms 41 and 42 will be alternately oscillated in the direction of the chute and over the top face thereof in the manner described.

The shaft 48 is driven by means of a belt 49 passing around a pulley 49 on said shaft and around the pulley 50, which is driven in a manner which will be hereinafter described.

The main driving shaft 52 of the machine, is journaled in any suitable manner in bearings in the frame of the latter, and is driven by means of a pulley 53 mounted thereon and connected in the usual manner with any suitable source of power. Mounted upon this main driving shaft 52 is the pinion 54, in mesh with a gear 55 on a shaft 56 suitably journaled in the horizontal arm 22 of the frame. This shaft 56, as clearly shown in Fig. 4, is a double crank-shaft provided with the alternately-acting pitmen or connecting-rods 57 and 58. The head 60 of the pitman or connecting-rod 57 is pivoted to a die-block 59 which is horizontally slidably in suitable ways provided therefor in the arm 22 of the frame of the machine, in which ways it is retained for reciprocation by means of the horizontal plate of a bracket 61 secured to said arm of the frame, as best shown in Figs. 8 and 9. The pitman or connecting-rod 58 is similarly provided with a head which is pivoted to the sliding die-block 62, similarly reciprocable in ways in the arm 22 of the frame of the machine and similarly retained in said ways by means of the horizontal plate which forms a part of the bracket 63.

On the top face of the die-block 59, is transversely slideable in suitable ways the plate 64 which has adjustably mounted thereon, by means of the retaining screw 65, the relatively smaller plate 66 at the end of which is mounted the finger 67. At the lower end of the chute which comprises the plates 36 and 37, are mounted the small jaws 104, 105 (presently to be described) which form a relatively short platform or jaw rest 68 upon which the screw-blanks are fulfilled from the chute. The parts which carry the finger 67 are so mounted and adjusted that said finger 67 is located in a horizontal plane below the plane of the jaw rest 68, whereby said finger may engage the shank of the screw-blank after the same has passed through the groove of the chute and over the top face thereof in the manner described.
been delivered to said jaw rest and carry the latter in a forward direction. The plate 64 is reciprocated by means of an arm 69 which has a nose 70 projecting into a recess 71 in said plate, said arm being pivoted at 72 on the top face of the die-block 59, whereby oscillation of said arm causes transverse reciprocation of said plate 64.

Properly-timed oscillation of the arm 69, to effect intermittent reciprocation of the plate 66, may be secured through the usual cam-and-roller instrumentality in many different ways. I prefer, however, to provide a stud 125 upon which is journaled the roller 73, and immediately above this roller 73 the supplemental roller 128 the lower face 127 of which is beveled and which is yieldingly pressed against the roller 73 by means of a spring 128 in compression between the upper face of the roller 126 and the washer 129 secured to the upper end of the stud 125 by means of the screw 130. The upper face of the horizontal plate of the bracket 61 is recessed for the reception of a plate 75, which is secured in place by means of plate 131, through which pass screws 132 which are threaded into the plate 61 and thereby rigidly secure in place both the plate 131 and the plate 75, the latter being made laterally adjustable by means of adjusting screws 133 passing through a vertical wing 134 of said plate 61 and abutting against the vertical wing 135 of said plate 75. The operative edge of the plate 75 projects slightly beyond the contiguous edges of the plates 61 and 131, and acts against the roller 73 to hold the finger 67 in the position indicated in Fig. 4.

As shown in this figure, the die-block 59 is about to start upon the return stroke of its reciprocation, and when the end of this edge of the plate 75 is reached, the roller 73 engages the cam 74 (best shown in Fig. 4), thereby oscillating the arm 69 to withdraw the finger 67 from the path of movement of the shanks of the screw-blanks 85. The plate 121 is provided with a cam 136 which projects slightly beyond the face of the cam 74 and which terminates in a curved seat or stop 137 which is beveled, as best shown in Fig. 4, in such manner that the tapered edge thereof passes between the rollers 73 and 126 and engages the beveled face 127 of the latter to raise the same, whereupon under action of the spring 128 the roller-end of the arm 69 is pressed outwardly until the stud 125, instead of the roller 126, engages the cam surface 136, as shown in Fig. 9, whereby the finger 67 is again pressed inwardly to engage the shank of the foremost screw-blank on the jaw rest 68, as shown in Fig. 12.

The die-block 59 now starts upon its forward stroke of reciprocation, with the roller 126 held in its raised position and the stud 125 sliding against the cam surface 136, whereby the finger 67 is retained in its partially advanced and engaging position, and substantially this positional relationship of parts continues until the roller 73 passes off the cam 74 and on to the edge of the plate 75, this having the effect of further advancing the finger 67 in the direction of the die 90 for the purpose of pinching or wedging the shank of the advanced screw-blank between the dies 89 and 90, whereby operative engagement of said shank between said dies is insured.

Similarly, there is mounted on the upper face of the die-block 62 a plate 76 transversely slidable in suitable ways provided in said block and reciprocated by means of the oscillating arm 78, the nose 77 of which projects into a recess 79 in said plate 76, and the other end of which is provided with the roller 80 movement of which is controlled by the cam surface 81 provided on the plate 82 which is adjustably mounted on the bracket 63, the roller 80 being yieldingly held against the cam surface of the plate 82 by means of a spring 83. Adjustably mounted on the top of the plate 76, by means of the screw 86, is the small plate 85, the end 87 of which provides a finger the function of which is similar to that of the finger 67 and which is located substantially in the same plane.

Referring now particularly to Fig. 4, it will be noted that the pitman or connecting-rod 88 is in its most retracted position, with the pitman or connecting-rod 57 in what may be termed its most advanced position. The die-block 62, therefore, is in its most retracted position, and has carried therewith the plate 76 upon which is mounted the plate 85 the end of which provides the finger 87. During this retractive movement, the cam surface 81 has acted upon the roller 80 to reciprocate the plate 76 and withdraw the finger 87 from the path of movement of the shank of the foremost of the screw-blanks 88, which are shown at the lower end of the chute. In this figure, this foremost blank 88 is shown as about to be delivered to the jaw rest 68, and in Fig. 5 I have shown this foremost blank as having been delivered to the jaw rest 68, the die-block 62 having been advanced by the pitman or connecting-rod 57 to such position that the finger 57 is in position to engage the shank of said blank.

When this position is reached, the roller 80 has reached the end of the projecting cam surface 81, and under action of the spring 84 the arm 78 is operated to advance the finger 87 into the path of movement of the blanks 88 and just to the rear of the foremost of said blanks, which is now located on the jaw rest 68. After this operation, the finger 67 is carried rearwardly by movement of the pitman 57, and at the same time is similarly withdrawn from the path of movement of the
blanks 88, and it will be apparent that the ends of the fingers 67 and 87 may be made to meet at or near the forward edge of the jaw rest 68, and when the foremost blank 88 (Fig. 5) is forced off the jaw rest 68 by movement of the finger 87, the roller 128 will have been raised, operating to advance the finger 67 underneath the head of the blank 88, whereby the latter is now supported by the ends of both fingers underneath the same and the rear corner of the die 89 which has been carried rearwardly with the finger 67.

The dies 89 and 90 may be mounted in the die-blocks 59 and 62 in any desired manner, but at least one thereof should be adjustably secured in order to provide for operations upon blanks having shanks of different diameters. I have shown the die 90 provided with beveled ends and set into a correspondingly shaped recess which forms a seat or pocket therefor in the die-block 62 wherein it is retained by means of the plate 138 projecting over the same, this plate being secured to the upper face of the die-block by means of the bolt 139. The die 89, on the other hand, instead of being set into the die-block, is correspondingly set into a carrier 140 which is slidable mounted in suitable ways in the upper face of the die-block 59, the die being retained in said carrier by means of the plate 141 projecting over said die and secured to the carrier by means of a screw-bolt 142. A screw-bolt 143 is threaded into a correspondingly threaded aperture in the boss 144 on the carrier 140 and acts against the washer 145 to draw said carrier against the spacing screws 146 threaded into the die-block and providing adjustable stops against which the carrier is adapted to abut. In this manner I am enabled to adjust the position of the die 89 with reference to the die 90 to vary the distance therebetween and thereby readily adapt this mechanism to blanks having shanks of a different diameter.

The operative faces of these dies co-operate in the usual manner, through engagement of the shank of the blank as the latter passes therebetween during movement of said dies in opposite directions, to roll threads in said shank or otherwise operate upon the same. The die 89 in the die-block 59 is located in close proximity to the end of the finger 67, whereby when a blank has been forced off the jaw rest 68 by the finger 87, and partially supported through the head thereof by means of the end of the finger 67, the die 89 is in position (as shown in Fig. 6) to engage the shank of the blank and complete the stable support thereof prior to positive engagement of said shank between the two dies 89 and 90. The die-block 59 has now been advanced, under the return action of the pitman or connecting-rod 57, carrying therewith the finger 67 and the foremost of the blanks 88, the latter being supported between the die 89, the finger 67 and the edge of the plate 91 on the die-block 62. At the same time, the die-block 62 is being retracted under movement of the pitman or connecting-rod 58, and as it passes the now advanced blank 88, it will have no effect thereupon, due to the fact that this blank is not in engagement between the two dies. However, as the die 90 starts to move in a forward direction, and the die 89 starts to move in a rearward direction, the shank of this blank will be engaged between the two operative faces of the dies and roll along therebetween, as shown in Fig. 5, to form screw threads on the shanks thereof or otherwise operate thereupon, and at the same time advance the blank along the face of the die 90. When the blank reaches the end of the die 90, it merely drops off into the bed of the machine, where a suitable receptacle is provided for the reception of the finished articles or where the upper end of a suitable chute may be located to direct their final disposition in such manner as may be desired.

In order to provide against too rapid delivery of the blanks 88 upon the jaw rest 68, or, rather, to insure the delivery of one blank at a time thereupon, I may provide mechanism such as that shown in Figs. 10, 11 and 12, which includes an arm 92 pivoted at 93 to a bar 94 which is slidable in a way 91 (Fig. 14) in the plate 37 of the chute and retained in said way by the plate 95 secured to the plate 37 and the bar 108 also secured to said plate 37. In the end of the arm 92 is adjustably mounted a preferably inclined finger 96, the lower end thereof being provided with a tapered or beveled edge normally located and disposed as to engage the head of the foremost blank in the chute and prevent delivery of the same upon the jaw rest 68. The finger 96 is normally retained in its most depressed position, in which position it is adapted to engage the head of the foremost blank, by means of a spring 97 mounted on the plate 95. It will be also noted that the top face of the arm 92 is of irregular outline, and that the lower face of the contiguous end of the plate 95 is similarly of irregular outline, these two surfaces forming cam faces by means of which the finger-end of the arm 92 is raised against the action of the spring 97 and depressed under action of said spring, at certain intervals, as the bar 94 reciprocates in the guide-way 91. On the side of the bar 94, I provide a lug 99 having an interiorly screw-threaded surface for the reception of a screw-pin 100, the end of which is adapted to be engaged by the lug 101 on the strip or plate 102 which is suitably secured to the die-block 62. It
will be apparent that as the die-block 62 is reciprocated, carrying therewith the plate 102, at the end of the forward stroke of reciprocation the lug 101 will engage the end of the screw-pin 100 and slightly advance the bar 94 carrying therewith the finger 96. As this finger is advanced, the cam faces on the upper side of the arm 92 and the lower side of the plate 93 permit depression of the arm 92 under action of the spring 97 to positively engage through the finger 96 the head of the next succeeding blank as the foremost of said blanks is being further advanced, as shown in Fig. 12, to hold the same at the rear end of the jaw rest 68. As the die-block 62 starts in a rearward direction, carrying therewith the plate 102 with the lug 101, the latter will be withdrawn from the end of the screw-pin 100, and the spring 103, in tension between suitable anchorages on the plate 93 and the lug 98 on the bar 94, will operate to return said bar 94 to its initial position, the cam surfaces referred to causing the elevation of said arm 92 against the action of the spring 97 in such manner that the finger 96 will clear the head of the blank which during this operation is being delivered upon the jaw rest 68.

In Figs. 13 to 16, inclusive, I have shown the slotted blank-receiving jaw rest 68 at the lower end of the chute which consists of jaws 104 and 105, the former being stationary, and the latter being formed at the end of a strip or bar 106, pivoted at 107 to the bar 108. On the operative face of the jaw 106, I have shown a teat 109, projecting into the path of movement of the shanks of the screw-blanks which pass between said jaws. At the free end of the arm 106, which carries the jaw 106, I provide a spring 110, in compression between the end of said lever 106 and the bar 108, whereby said jaws are yieldingly pressed in the direction of each other. It will be apparent that the teat 109 will engage the foremost of the screw-blanks, as the same passes out of the chute, and retain it upon the jaw rest 68 in position to be engaged by the finger 87, while the remaining blanks in the chute are so disposed as not to be engaged by said finger. This foremost blank being yieldingly held by the teat 109, it will be apparent that the positive movement of the finger 87 in a forward direction may be with such force as to readily overcome the action of the spring 110, and force this foremost blank to position for engagement with the finger 87 and the die 89, in the manner which has been heretofore described.

It is quite possible that the spring-pressed teat 109 might alone suffice to insure proper retention of the foremost blank from the chute on the jaw rest 68 in position to be engaged by the finger 87, but I prefer to employ this device in connection with the blank retaining device which I have just described in connection with Figs. 10, 11 and 12, in order to insure absolutely perfect positioning and avoid any possibility of clogging up the mechanism through inopportune delivery of a blank or too rapid successive deliveries of said blanks.

It might be stated that the integral grooved bar 33 is employed at the upper end of the chute, forming a separate continuation or prolongation of the latter, instead of increasing the length of the plates 36 and 37 which form the chute proper and thus carry the chute itself through the hopper with the end thereof located above the reciprocating bar 29, on account of the fact that when it becomes necessary to adjust the lateral dimension of the chute to accommodate blanks having shanks of greater diameter, the upper end of the plate 36 of the chute might necessarily project out of the recess in the hopper wall 32, provided to receive the bar 33, and thus interfere with reciprocation of the bar 29—or, if the width of the chute were reduced, in order to properly dimension the same for blank-shanks of relatively small diameter, there would necessarily be a gap between the bar 29 when in its raised position and the bar 33, or between said bar 33 and the side wall 32 of the hopper, either of which conditions would be objectionable on account of the fact that a much greater proportion of the blanks delivered by the bar 29 to the upper end of the chute would fail to naturally position themselves with the shanks thereof directed into the groove. It will be apparent that by slightly shortening the chute proper, and providing a separate extension thereof in the form of a grooved bar, the latter, being comparatively short and light in weight, may be readily removed when it is desired to vary the width of the chute, and another bar substituted therefor, the groove in the latter being of a width which corresponds to the width of the groove in the chute proper as adjusted. Therefore, the width of a number of selective bars 33 may be made uniform, the only variations being the widths of the grooves therein, thus permitting of adjustable variation in the width of the groove of the chute within the range of the standard dimensions or gages of ordinary screw-blanks.

As will be clearly apparent from the drawings, the disk-wheel 51 which through the medium of the connecting-rod 30 reciprocates the bar 29, is driven from the crankshaft 58 by means of a belt 110 passing around the wheel-crank 111 on said shaft, which is grooved to form a pulley, and around said wheel 31. I have also shown a belt-tightener for the belt 110, the same comprising the idler pulley 112 controlled in the usual manner from the hand-wheel 113.
The shaft 48 which through the cams thereon actuates the "kickers" 41 and 42, is driven, as hereinbefore stated, from the pulley 50 by means of the crossed belt 49. This wheel 50 is mounted upon a short shaft 114 which is journaled in bearings in a plate or bracket 115 which is adjustably mounted upon the horizontal arm 22 of the frame of the machine, whereby may be properly tensioned, in a common and well-known manner, not only the belt 49 but also the belt 116 which passes around the pulley 117 on the driving shaft 62 and around the pulley 118 on the shaft 114 to drive the pulley 50.

From the foregoing, it is believed to be apparent that I have provided a machine for forming threads upon the shanks of screw-blanks, or analogous operations upon the shanks of headed blanks—such as knurling the shanks of wire nails—which is comparatively simple in construction, substantially completely automatic in operation, exceedingly compact, and one in which the parts subject to the greatest wear are readily accessible for replacement or repair; and in connection with this last-mentioned advantage, attention may be called to the fact that in the machine shown and described even the crank-shaft 56 may be removed for the replacement of worn bearings, or for other purposes, without the necessity for dismantling the machine to a degree which has heretofore been necessary in connection with machines of this character. As shown by the dotted lines in Fig. 4 of the drawings, the bearing block 119 for the shaft 56 at the end of the arm 120, which includes the heavy flange 151 and which is secured in said arm 120 by means of the screws 122, is made of such diameter that after withdrawal of the same, and detachment of the divided heads 123 and 124 of the connecting-rods 57 and 58 from the wrist-pins, the crank-shaft 56 in its entirety may be withdrawn through the arm 120.

Many modifications of minor details of my improved machine for threading screw-blanks, within the scope of my appended claims, will doubtless readily suggest themselves to those skilled in the art to which it appertains.

I claim as new and desire to secure by Letters Patent:

1. In a machine of the character described, the combination, with a chute and means for delivering blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, a reciprocating die adapted to engage said blank and operate upon the same in transit, and means for successively advancing said blanks from said jaw rest to the point of engagement by said die.

2. In a machine of the character described, the combination, with a chute and means for delivering blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, means for checking movement of the remaining blanks in said chute while the foremost thereof is being delivered to and retained upon said jaw rest, a reciprocating die adapted to engage said blank and operate upon the same in transit, and means for advancing each blank in turn from said jaw rest to engagement by said die.

3. In a machine of the character described, the combination, with a chute and means for delivering blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, a pair of oppositely reciprocating dies adapted to engage said blank and operate upon the same in transit, and means for successively advancing said blanks from said jaw rest to engagement by said dies.

4. In a machine of the character described, the combination, with a chute and means for delivering blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, means for checking movement of the remaining blanks in said chute while said foremost blank is being delivered to and retained upon said jaw rest, a pair of reciprocating dies adapted to engage said blank and operate upon the same in transit, and means for advancing each blank in turn from said jaw rest to engagement by said dies.

5. In a machine of the character described, the combination with a chute and means for delivering blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, a pair of oppositely reciprocating die-blocks carrying dies adapted to engage said foremost blank and operate upon the same in transit, and means carried by said die-blocks for successively advancing said blanks from said jaw rest to engagement by said dies.

6. In a machine of the character described, the combination, with a chute and means for delivering blanks thereto for
transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, means for checking movement of the remaining blanks in said chute while the foremost thereof is being delivered to and retained on said jaw rest, a pair of oppositely reciprocating dies carrying dies adapted to engage said blank and operate upon the same in transit, and means for advancing each blank in turn from said jaw rest to engagement by said dies.

7. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, said blanks being supported in said chute and on said jaw rest through the heads thereof, a reciprocating die adapted to engage the shank of said blank and operate upon the same in transit, and means for successively advancing said blanks from said jaw rest to engagement by said dies.

8. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, said blanks being supported in said chute and on said jaw rest through the heads thereof, means for checking movement of the remaining blanks in said chute while the foremost thereof is being delivered to and retained on said jaw rest, a reciprocating die adapted to engage the shank of said blank and operate upon the same in transit, and means for advancing each blank in turn from said jaw rest to engagement by said dies.

9. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, said blanks being supported in said chute and on said jaw rest through the heads thereof, a pair of oppositely reciprocating dies adapted to engage the shank of said blank and operate upon the same in transit, and means for successively advancing said blanks from said jaw rest to engagement by said dies.

10. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, said blanks being supported in said chute and on said jaw rest through the heads thereof, means for checking movement of the remaining blanks in said chute while the foremost blank is being delivered to and retained on said jaw rest, a pair of oppositely reciprocating dies adapted to engage the shank of said blank and operate upon the same in transit, and means for advancing each blank in turn from said jaw rest to engagement by said dies.

11. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, said blanks being supported in said chute and on said jaw rest through the heads thereof, a pair of oppositely reciprocating dies adapted to engage the shank of said blank and operate upon the same in transit, and means for advancing each blank in turn from said jaw rest to engagement by said dies.

12. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, said blanks being supported in said chute and on said jaw rest through the heads thereof, means for checking movement of the remaining blanks in said chute while the foremost thereof is being delivered to and retained on said jaw rest, a pair of oppositely reciprocating dies adapted to engage the shank of said blank and operate upon the same in transit, and means for successively advancing said blanks from said jaw rest to engagement by said dies.
finger adapted to successively engage the blanks as they are delivered on said jaw rest and advance each thereof from said jaw rest to engagement by said die.

14. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a rest at the foot of said chute adapted to receive the foremost blank and support the same through the head thereof, a reciprocating die adapted to engage said blank and operate upon the shank thereof in transit, and a pair of oppositely reciprocating fingers, one adapted to engage the blank on said rest and advance the same from said rest to engagement by the other finger and said die.

15. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a jaw rest carried by said chute at the foot thereof and adapted to receive the foremost blank and yieldingly support the same through the head thereof, means for checking movement of the remaining blanks while said foremost blank is being delivered to and supported upon said jaw rest, a reciprocating die adapted to engage said foremost blank and operate upon the shank thereof in transit, and a reciprocating finger adapted to engage the blank on said jaw rest and advance the same from said jaw rest to engagement by said die.

16. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a rest at the foot of said chute adapted to receive the foremost blank and support the same through the head thereof, means for checking movement of the remaining blanks while said foremost blank is being delivered to and supported upon said rest, a reciprocating die adapted to engage said foremost blank and operate upon the shank thereof in transit, and a pair of oppositely reciprocating fingers, one adapted to engage the blank on the rest and advance the same from said rest to engagement by the other finger and said die.

17. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a rest at the foot of said chute adapted to receive and support the foremost blank, a pair of oppositely reciprocating dies adapted to engage said foremost blank and operate upon the shank thereof in transit, and a pair of oppositely reciprocating fingers, one adapted to engage the blank on the rest and advance the same from said rest to engagement by the other finger and one of said dies, and said other finger further advancing said blank to engagement between said dies.

18. In a machine of the character described, the combination, with a chute and means for delivering headed blanks thereto for transmission therethrough in processional order and similar disposition, of a rest at the foot of said chute adapted to receive and support the foremost blank, means for checking movement of the remaining blanks in said chute while said foremost blank is being delivered to and supported on said rest, a pair of oppositely reciprocating dies adapted to engage said foremost blank and operate upon the shank thereof in transit, and a pair of oppositely reciprocating fingers, one adapted to engage the blank on the rest and advance the same from said rest to engagement by the other finger and one of said dies, and said other finger further advancing said blank to engagement between said dies.
ment by the other finger and one of said dies, and said other finger further advancing the blank to engagement between said dies.

21. In a machine of the character described, the combination with a chute and means for delivering blanks thereto, of a jaw rest at the foot of the chute which is adapted to receive and yieldingly support the foremost blank, means for checking movement of the blanks in the chute while a blank is held by the jaw rest, means for advancing the blanks singly from the jaw rest, a reciprocating die which operates on the blanks while in transit, and means cooperating with the checking and advancing means to retain the blank in position.

22. In a machine of the character described, the combination with a chute and means for delivering blanks thereto, of a jaw rest carried by said chute at the foot thereof and adapted to receive and yieldingly support the foremost blank, means for checking movement of the remaining blanks in said chute while the foremost blank is being delivered to and retained upon said jaw rest, a reciprocating die adapted to engage said blank and operate upon said blank in transit, means for advancing each blank in turn from said jaw rest to engagement by said dies, auxiliary means reciprocally mounted at the base of said chute and adapted to cooperate with the blank checking and advancing means.

23. In a machine of the character described, the combination with a slotted chute and means for delivering blanks thereto, of a jaw rest carried by said chute at the foot thereof and comprising a pair of jaws having opposed operative faces in alignment with the slot of the chute, one of said jaws being pivotally attached to the chute and yieldingly pressed toward the other, said jaws being adapted to receive and support the foremost blank, said pivoted jaw being provided on its operative face with a seat projecting in the path of movement of the blanks to check movement of the remaining blanks while the foremost blank is being yieldingly retained upon the jaw rest, a pair of reciprocating dies adapted to engage said blank and operate upon the same in transit, means for advancing each blank in turn from said jaw rest to engagement by said dies, auxiliary means reciprocally mounted at the base of said chute and adapted to cooperate with the blank checking and advancing means, and means for actuating said auxiliary means.

24. In a machine of the character described, the combination with a chute and means for delivering blanks thereto, of a jaw rest carried by said chute at the foot thereof and comprising a pair of jaws having opposed operative faces in alignment with the slot of the chute, one of said jaws being pivotally attached to the chute and yieldingly pressed toward the other, said jaws being adapted to receive and support the foremost blank, said pivoted jaw being provided on its operative face with a seat projecting in the path of movement of the blanks to check movement of the remaining blanks while the foremost thereof is being delivered to and yieldingly retained upon the jaw rest, a pair of oppositely reciprocating die blocks carrying dies adapted to engage said blank and operate upon the same in transit, means carried by the die blocks for advancing each blank in turn from the jaw rest to engagement by the dies, auxiliary means reciprocally mounted at the base of the chute and adapted to cooperate with the blank checking and advancing means, and means carried by one of said die blocks adapted to engage and actuate said auxiliary means.

25. In a machine of the character described, the combination with a chute and means for delivering headed blanks thereto, of a jaw rest carried by said chute at the foot thereof and adapted to receive and support the foremost blank, said blanks being
supported in said chute and on said jaw rest by the heads thereof, means for checking movement of the remaining blanks in said chute while the foremost thereof is being delivered to and retained upon said jaw rest, a reciprocating die adapted to engage the shank of said blank and operate upon the same in transit, means for advancing each blank in turn from said jaw rest to engagement by said die, and auxiliary means reciprocally mounted at the base of said chute and adapted to cooperate with the blank checking and advancing means.

28. In a machine of the character described, the combination with a slotted chute and means for delivering headed blanks thereto, of a jaw rest carried by said chute at the foot thereof and comprising a pair of jaws having opposed operative faces in alignment with the slot of the chute, one of said jaws being pivotally attached to the chute and yieldingly pressed toward the other, said jaws being adapted to receive and support the foremost blank, said pivot ed jaw being provided on its operative face with a teat projecting in the path of movement of the shanks of the blanks to check movement of blanks in the chute, said blanks being supported in said chute and on said jaw rest by the heads thereof, a reciprocating die adapted to engage the shanks of the blanks and operate upon them while in transit, means for advancing each blank in turn from said jaw rest to engagement by said die, and auxiliary means reciprocally mounted at the base of said chute and adapted to cooperate with the blank checking and advancing means.

29. In a machine of the character described, the combination with a chute and means for delivering headed blanks thereto, of a jaw rest carried by said chute at the foot thereof and adapted to receive the foremost blank and support the same by the head thereof, means for checking movement of the remaining blanks while the foremost blank is being delivered to and supported upon the jaw rest, a reciprocating die adapted to engage the foremost blank and operate upon the shank thereof in transit, a reciprocating finger adapted to engage the blank on the jaw rest and advance the same to engagement by the die, and auxiliary means reciprocally mounted at the base of the chute and adapted to cooperate with the blank checking and advancing means.

30. In a machine of the character described, the combination with a slotted chute, and means for delivering headed blanks thereto, of a jaw rest at the base of said chute adapted to receive and support the foremost blank, said blanks being supported in the chute and on the jaw rest by the heads thereof, means for checking movement of blanks in the chute while a blank is retained on the jaw rest, a pair of reciprocating dies adapted to engage the shank of the blank on the jaw rest, and means for advancing the blanks in turn from the jaw rest to the dies.

31. In a machine of the character described, the combination with a slotted chute, and means for delivering headed blanks thereto, of a jaw rest at the base of said chute adapted to receive and support the foremost blank, said blanks being supported in the chute and on the jaw rest by the heads thereof, means for checking movement of blanks in the chute while a blank is retained on the jaw rest, a pair of reciprocating dies adapted to engage the shank of the blank on the jaw rest, and means for advancing the blanks in turn from the jaw rest to the dies, and auxiliary means reciprocally mounted at the base of the chute and adapted to cooperate with the blank checking and advancing means.

32. In a machine of the character described, the combination with a slotted chute and means for delivering headed blanks thereto, of a jaw rest comprising a pair of jaws having opposed operative faces in alignment with the slot of the chute, one of said jaws being pivotally attached to the chute and yieldingly pressed toward the other, said pivot ed jaw being provided with a teat adapted to check the movement of the blanks in the chute, a pair of oppositely reciprocating die blocks carrying dies adapted to engage the foremost blank, and fingers carried by said die blocks, one of which acts to advance each blank from the jaw rest to engagement by the other finger and one of the dies, the other finger further advancing the blank to engagement between the dies.

33. In a machine of the character described, the combination with a slotted chute and means for delivering headed blanks thereto, of a jaw rest comprising a pair of jaws having opposed operative faces in alignment with the slot of the chute, one of said jaws being pivotally attached to the chute and yieldingly pressed toward the other, and said pivot ed jaw being provided with a teat adapted to check the movement of the blanks in the chute, a pair of oppositely reciprocating die blocks carrying dies adapted to engage the foremost blank, fingers carried by the die blocks and acting successively to advance the blanks from the jaw rest to engagement by the dies and auxiliary means cooperating with the tent and one of the fingers to insure delivery of but one blank at a time from the chute to the jaw rest.

In testimony whereof I affix my signature.

LARS WM. THORSSELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."