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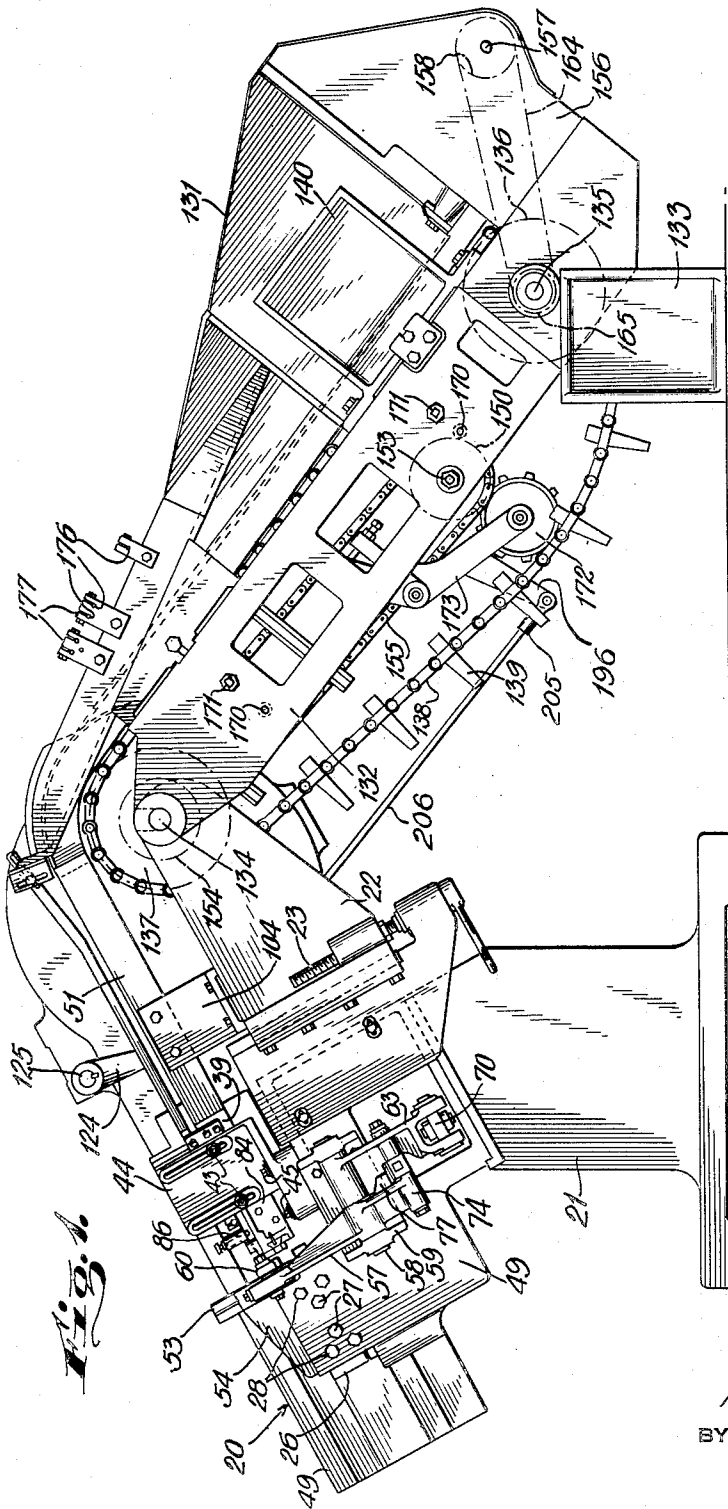
R. L. WILCOX

2,244,817

FEED MECHANISM

Filed July 21, 1938

9 Sheets-Sheet 1



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June 10, 1941.

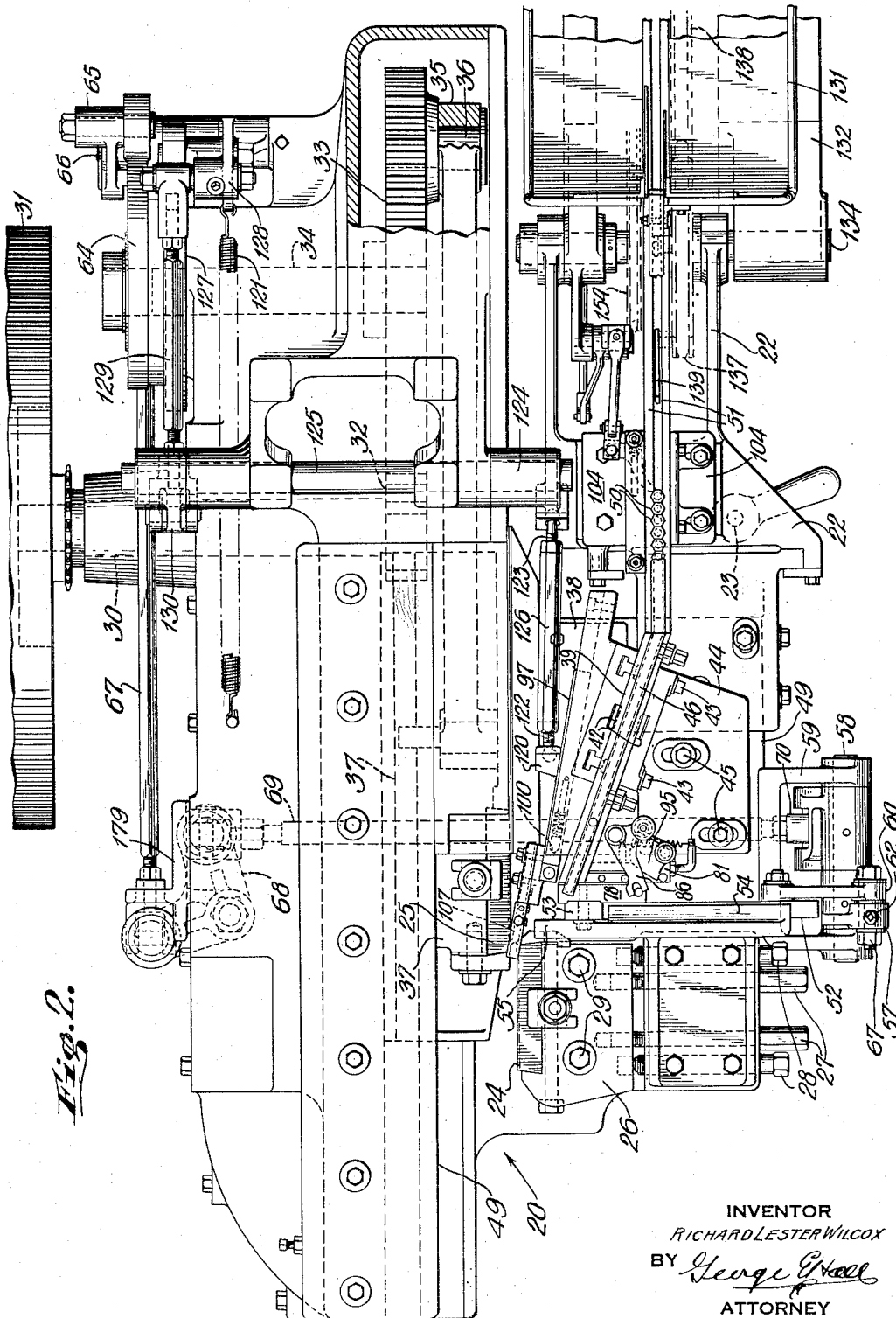
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FEED MECHANISM

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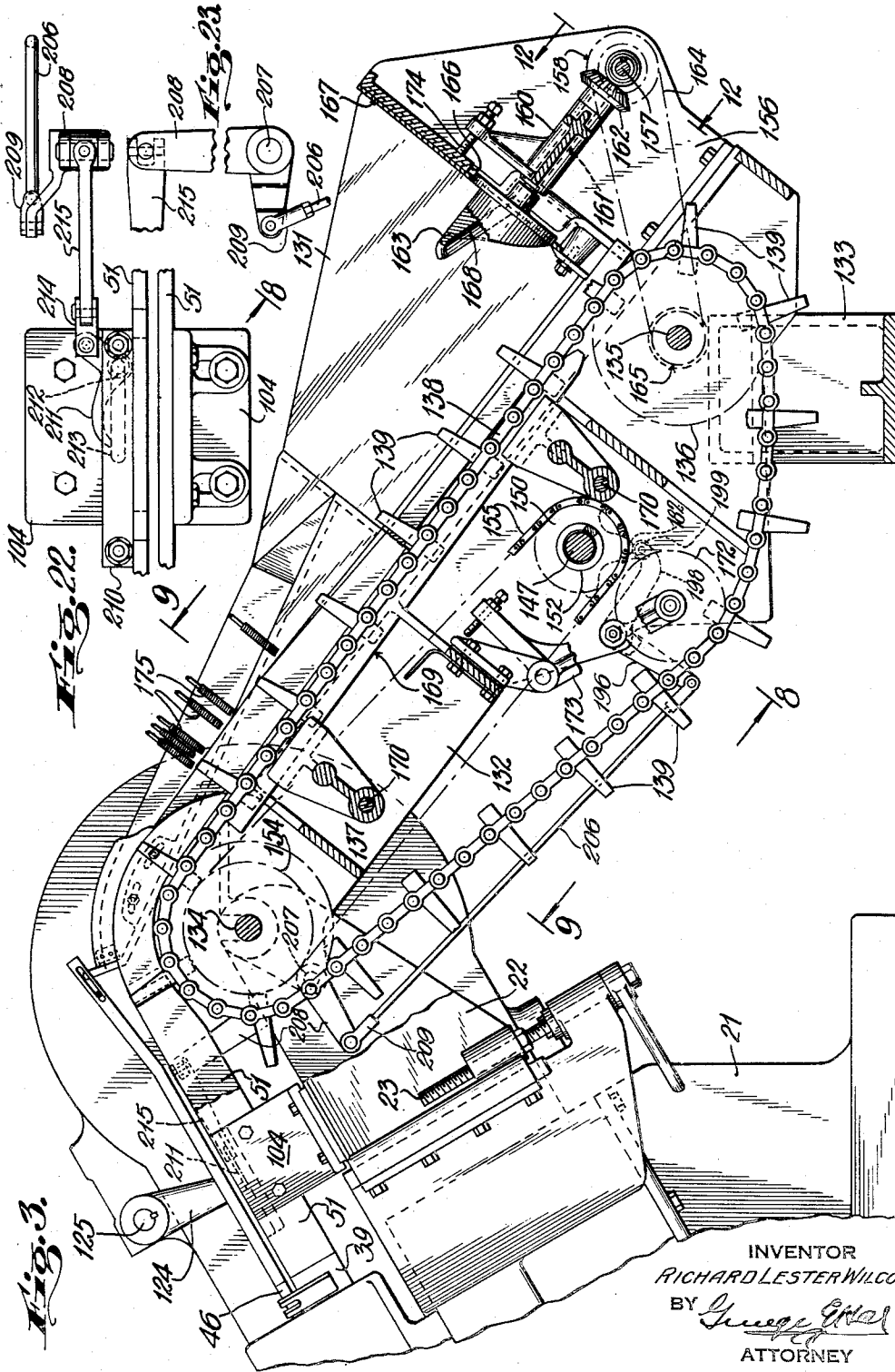
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FEED MECHANISM

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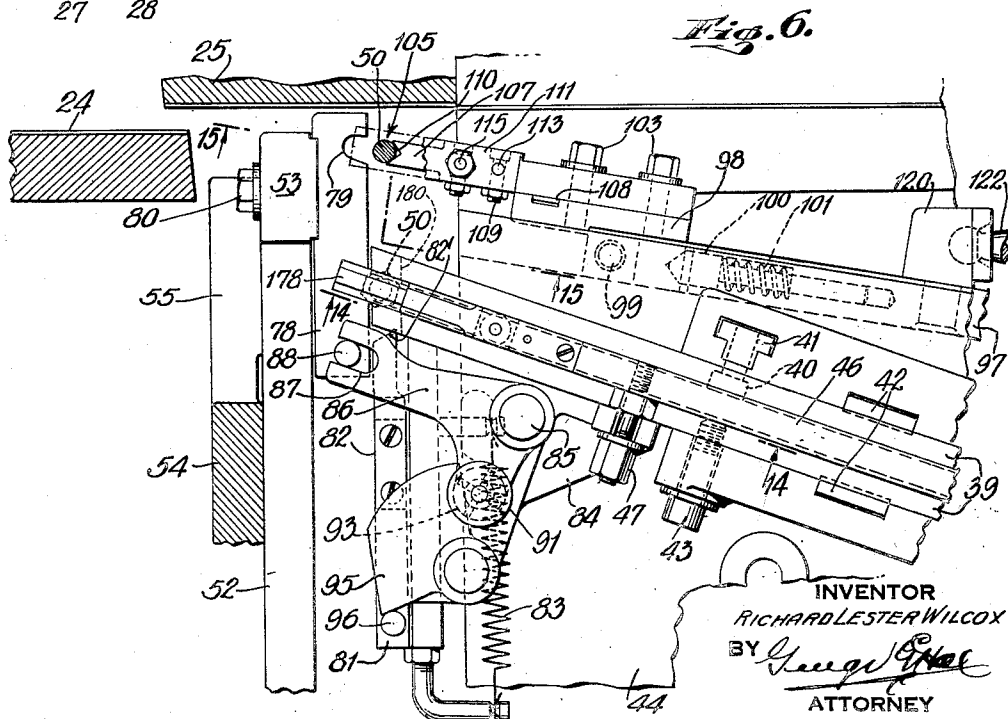
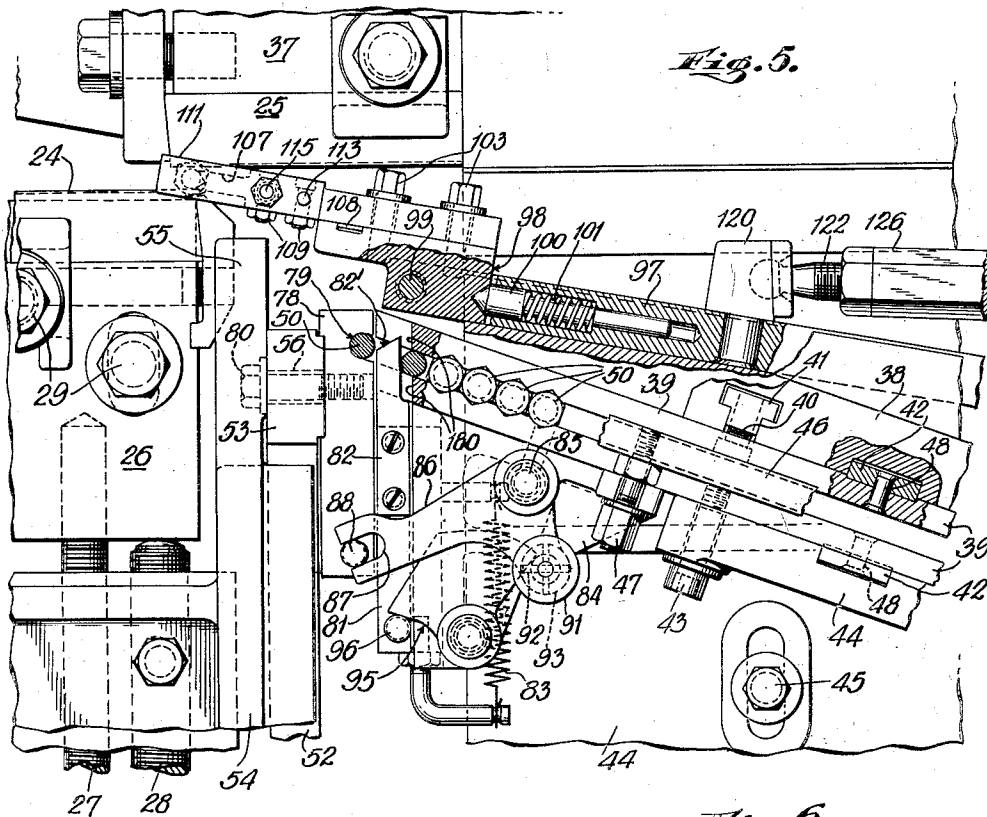
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FEED MECHANISM

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9 Sheets-Sheet 5



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FEED MECHANISM

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Fig. 8.

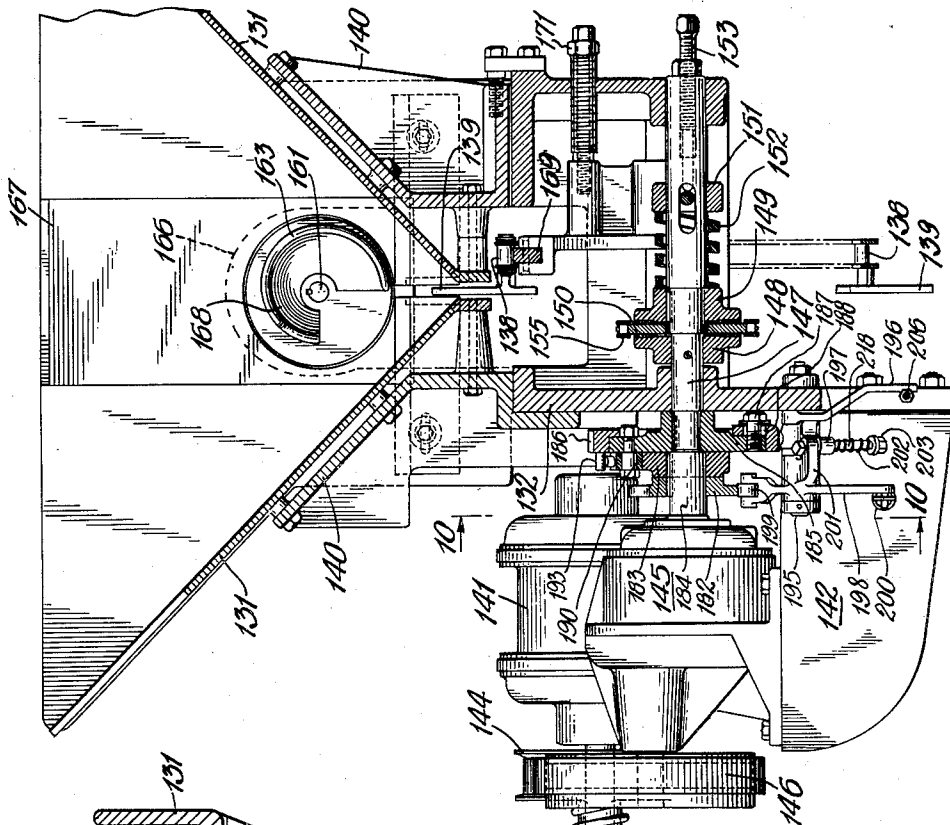


Fig. 9.

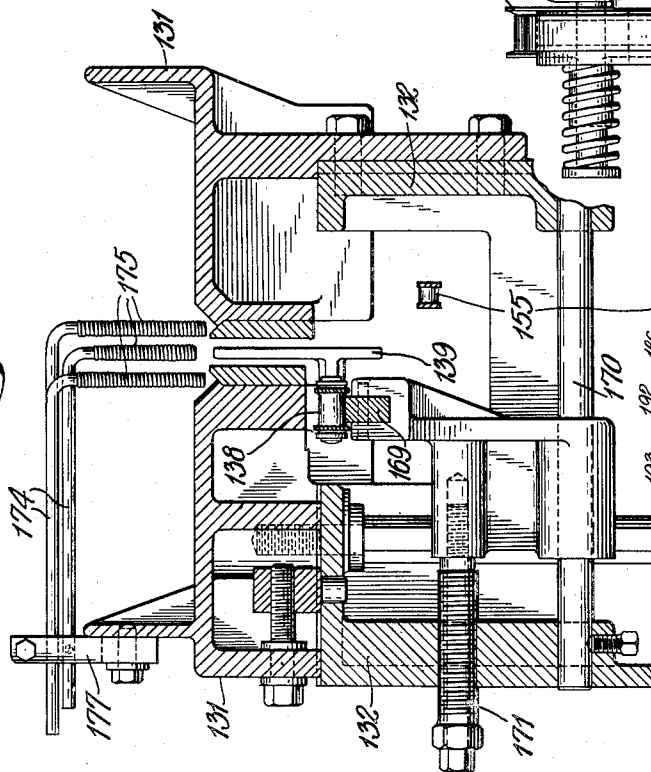
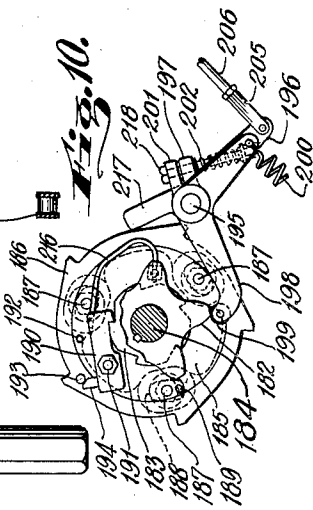


Fig. 10.



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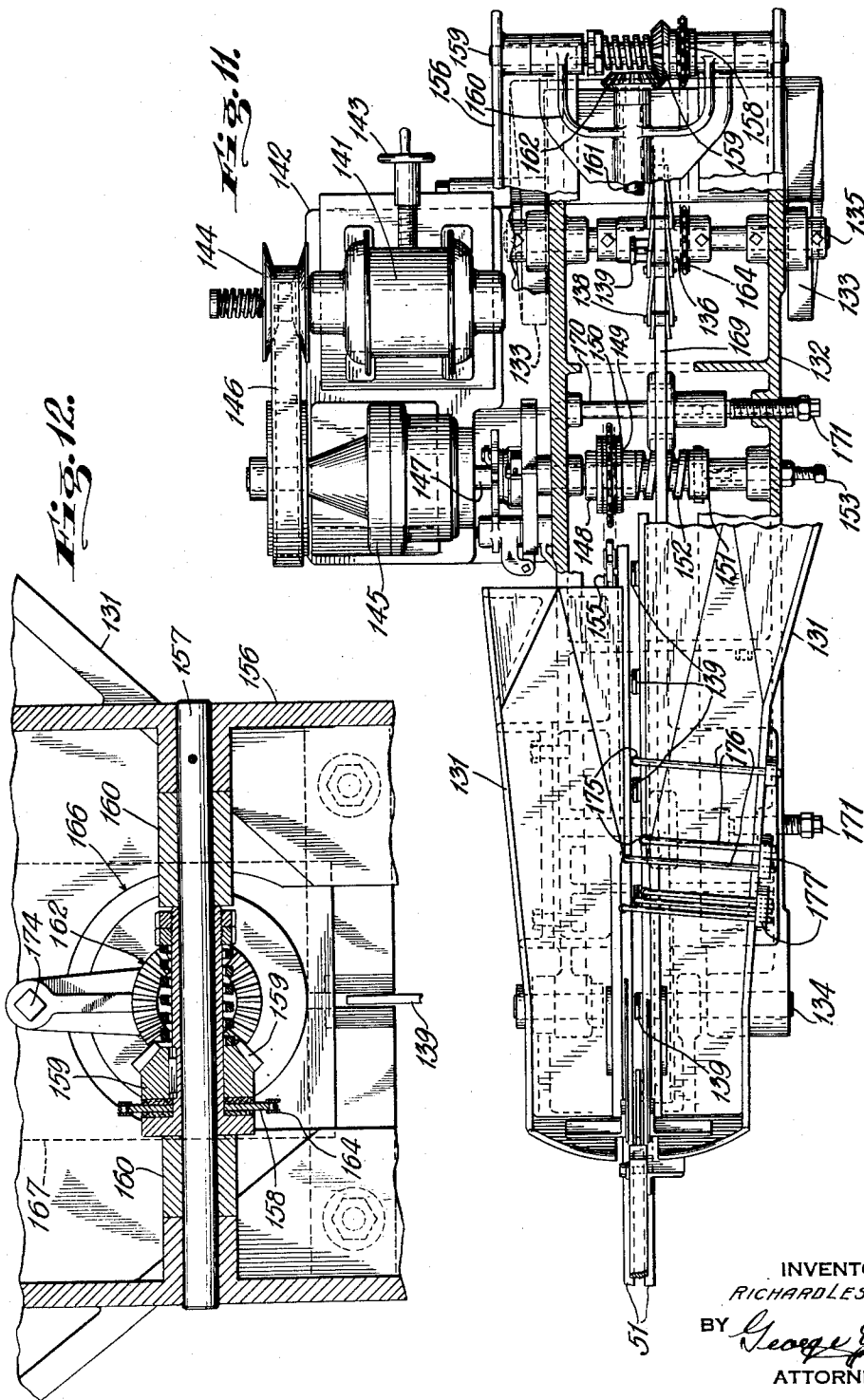
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9 Sheets-Sheet 8



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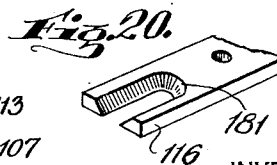
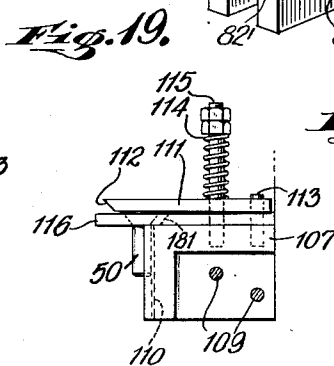
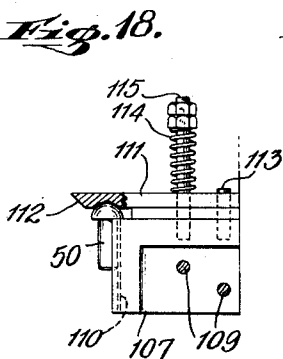
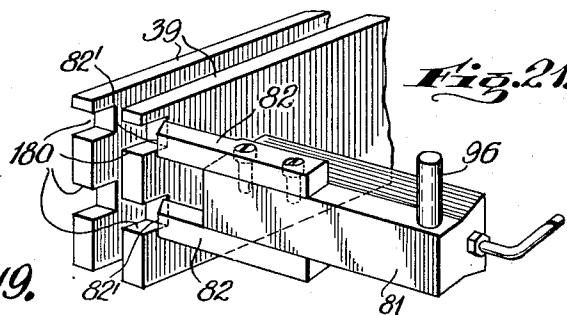
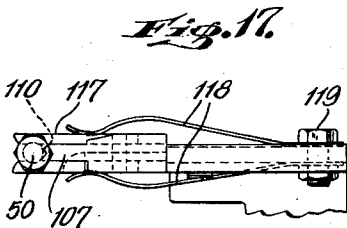
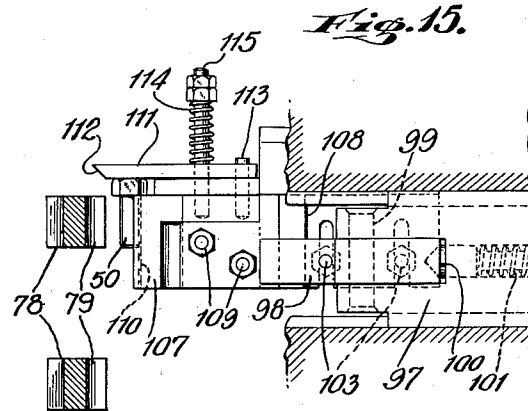
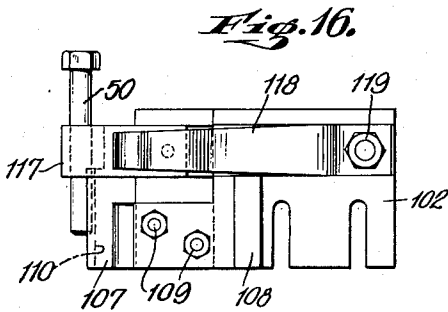
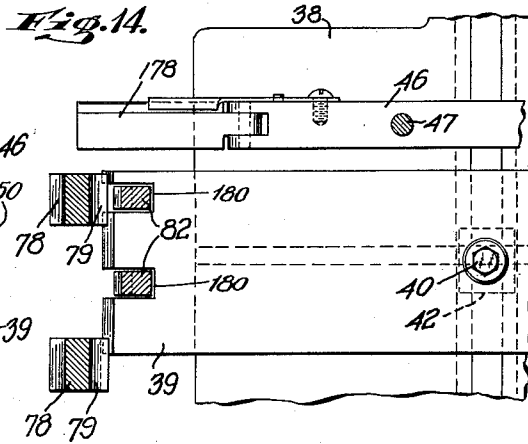
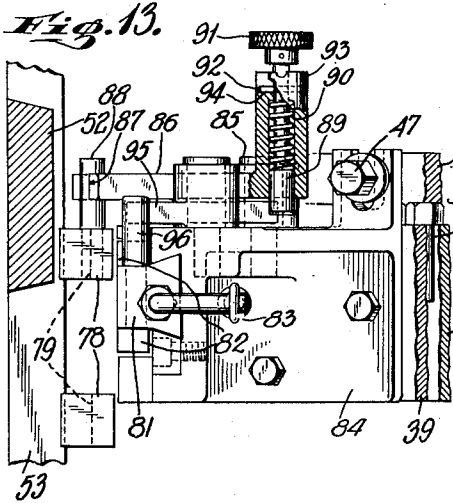
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9 Sheets-Sheet 9



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UNITED STATES PATENT OFFICE

2,244,817

FEED MECHANISM

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Application July 21, 1938, Serial No. 220,585

42 Claims. (Cl. 80-8)

This invention relates to new and improved feed mechanism, and particularly of the type for the successive presentation of single blanks to threading dies or the like. As disclosed herein it is applied to a threading machine, wherein threads are rolled on the blank. It is equally adapted, however, for other types of machines, wherein a feed mechanism may be desirable.

A principal object of the invention is to provide an efficient mechanism of this character which will facilitate the production of a perfect product at high speed.

According to this invention a plurality of blanks are assembled indiscriminately in a hopper that occupies a lower horizontal plane than the threading dies and are automatically taken therefrom and presented one at a time to the threading dies. In the travel of the blanks from the hopper they are conducted in a chute to an auxiliary chute which is disposed at an angle or obliquely to both the line of action of the dies and to the chute. By cut-off mechanism or the like, the lowermost blank in the chute is separated from the column of blanks in the auxiliary chute and projected into a transfer mechanism. This mechanism moves the blank from the auxiliary chute to a point where it is taken therefrom by carrier mechanism interposed between the chute and the dies and actuated in a path at an angle or obliquely to the line of action of the dies.

This carrier mechanism is provided with fingers that have a relative floating movement, whereby the fingers will move laterally of the path of travel of the carrier mechanism and thus accommodate themselves to the path of travel of the blank between the dies and also permit their withdrawal from the blank with the minimum of lateral pressure.

Also associated with the carrier mechanism is a device for applying pressure to the blank when in the bight of the dies to insure its proper entrance therebetween.

In this invention the cut-off mechanism may be instantly stopped manually, if desired.

If the thread is to be rolled on the shank its full length the blank is transferred supported by the head by new and novel mechanism which applies a limited pressure thereto, thus insuring its permanency of relative position during transfer. If the blank, however, is to have the thread rolled on only a portion of the shank, then the blank is supported by the shank as distinguished from the head, likewise under a limited pressure. So far as at present advised,

heretofore all blanks have been supported either by the head, and by gravity hang in a vertical position or by the end of the blank, in which case other mechanism is provided to prevent relative tilting. If the dies are inclined, the presentation thereof into the bight of the dies is such that the blank is frequently misaligned relative to the dies, with the result that an imperfect thread is produced. In both cases the blank is positively assured of presentation to the dies at a right angle to the working faces of the dies and held in such relative position as it starts its travel between the dies.

Occasionally a blank will not start through the dies at the correct relative time. This results in the blank traveling across only a portion of the working face of the stationary die during the stroke of the moving die. In such case the blank is rolled back again to its starting point during the return travel of the movable die. A blank subjected to such an imperfect operation is damaged and is quite likely to injure or break adjacent parts, such as portions of the feed mechanism. In the present mechanism such action of the blank is practically impossible, but if perchance it should happen, no damage will result, as the chute parts are distant from the dies instead of immediately adjacent thereto, as in the conventional threading machine, and the mechanisms for conveying the blank from the chute to the dies are so constructed and operated that they will discontinue their operations under abnormal conditions.

A source of trouble in mechanism of this character is the difficulty of stopping the feed of blanks from the chute if conditions demand or seem desirable. Generally the lowermost blank in the chute is uncontrolled and is a possible source of damage. This difficulty is overcome in the invention herein by so arranging and operating the cut-off mechanism that it may be instantly stopped, at which time no blank in the column of blanks will pass out of the chute.

In addition to the above and other new and novel features, which will appear from the following description and the accompanying drawings, there is illustrated one form of the new and novel mechanism, the several parts of which are so arranged that they may be readily adjusted for blanks of varying lengths and diameters, as well as for different shaped heads.

To these and other ends, this invention consists in the new and improved feed mechanism hereinafter described and more particularly pointed out in the claims.

In the drawings, wherein like numerals of reference indicate like parts in the several figures;

Figure 1 is a view of one side of a machine embodying the invention herein;

Figure 2 is a fragmentary plan view of that portion thereof adjacent to the threading dies;

Figure 3 is a fragmentary side view of the hopper end of the machine;

Figure 4 is a fragmentary view of one side of that portion of the machine illustrated in Figure 2;

Figure 5 is a plan view of the chute, transfer and carrier mechanisms and adjacent parts, the transfer mechanism being in substantially its out position and the carrying mechanism in substantially its in position;

Figure 6 is a similar view with the transfer mechanism in substantially its inward position and the carrying mechanism in substantially its out position;

Figure 7 is a transverse view of the mechanism adjacent to the dies, the parts in section being taken generally upon line 7—7 of Figure 4;

Figure 8 is a transverse view of a portion of the hopper mechanism, the parts in section being taken generally upon line 8—8 of Figure 3;

Figure 9 is a similar view, the parts in section being taken generally upon line 9—9 of Figure 3;

Figure 10 is a detailed view of the segment and guide plates and some adjacent mechanism;

Figure 11 is a fragmentary plan view of the hopper end of the machine;

Figure 12 is a transverse sectional view of a portion of the lower end of the hopper mechanism, the parts in section being taken generally upon line 12—12 of Figure 3;

Figure 13 is a detailed view of the escapement mechanism and adjacent parts partly in section;

Figure 14 is a view of the lower end of the auxiliary chute and adjacent parts;

Figure 15 is a detailed view of a portion of the carrying mechanism, illustrating the type thereof for a blank with a hexagon or like head upon which a thread is to be cut the full length of the shank;

Figure 16 is a view of similar mechanism illustrating a blank positioned therein and supported below the head thereof;

Figure 17 is a plan view of the mechanism as shown in Figure 16;

Figures 18 and 19 are views illustrating a portion of the carrier mechanism arranged for round or button head and beveled screw blanks, respectively;

Figure 20 is a perspective view of a portion of a blank supporting plate;

Figure 21 is a view of the cut-off slide, a portion of the auxiliary chute, and some adjacent parts; and

Figures 22 and 23 are detailed views of the monitor mechanism.

Referring to the drawings, the reference numerals 20 indicate a threading machine or the like, which is supported upon a standard 21, and 22 is a bracket which is adjustable by a screw 23 or the like.

The threading machine is supplied with the usual stationary die 24 and movable die 25, each of which has thread rolling grooves in the working face thereof.

The stationary die 24 is movably mounted on a die holder 26 which is adjustable to vary the width of the open space between the faces of the dies by the screws 27 and stop screws 28 and secured in its adjusted positions by the bolts 29.

The movable die 25 is secured to a reciprocating slide 37 in the frame 49 and is actuated from the main shaft 30, driven through the drive wheel 31, pinion 32 thereon which actuates the gear 33 upon the shaft 34, and the pitman 35 connecting the slide 37 with the pin 36 in the gear 33. The dies, slide and mechanism for actuating the same, are of the conventional type and constitute no part of this present invention. As shown, the dies are in a plane at an angle to the horizontal, with the delivery end of the dies lower than the receiving end, but within the invention, the dies may be horizontal, or in any other position, as may be desired.

On the frame 49 are two brackets 38 and 44, the former fixed and the latter adjustable, being held in its several positions by the screws 45.

Adjustable against one face of the bracket 38, by the screws 40, is the inner auxiliary chute plate 39. The screws 40 are threaded into T-head nuts 41 slidable in T-grooves in the bracket 38. It is thus assured a positive relative position of the chute plate with the bracket.

The outer auxiliary plate 39 is adjustably secured, by screws 43 to the bracket 44. A chute cover 46 having a latch 178 of conventional form is adjustably and separably secured above the chute plates 39 by screws 47 having nuts thereon. This chute cover is not an essential part of the mechanism.

Keys 42 fixed to the chute plate by rivets 48, project in part in the chute plates 39 and in part in the brackets 38 and 44, insuring proper relative position of the chute plates.

The chute plates 51, supported by the brackets 104, are of the conventional type, one of which is laterally adjustable, and spaced apart a distance sufficient to permit the shanks of the blanks to pass therebetween, with the heads resting upon the top of the chute. Heretofore it has been the practice to have these chute plates extend to a point adjacent to the dies, which practice, however, has objectionable features. The chute plates in this machine terminate at a point distant from the dies and therebetween is an auxiliary chute that forms an extension of the chute and is disposed at an angle or obliquely to both the line of action of the dies and to the chute.

The blanks 50 are delivered to the chute plates 51 from a hopper in a manner hereinafter described and slide therebetween and between the auxiliary chute plates 39 to the lower end thereof, a position substantially as shown in Figure 5. Adjustment for various size diameters of blanks is accomplished by positioning the bracket 44 and for various blank lengths by positioning the auxiliary chute plates 39 upon their supporting members.

The blanks are singly and successively transferred from the auxiliary chute plates into a position approximately as shown at 105 in Figure 6, to be engaged by carrying means for presentation to the dies. Such transfer means comprises generally a slide 52 having a T-head 53 with a slot 56 therein, which is mounted in a fixed bracket 54, the arms 55 of which form a back support for the T-head 53. This slide is actuated through a rock lever 57 fulcrumed on the stud 58 mounted in a bracket 59 through a link 60 adjustable on the rock lever by the bolt 61 and screw 62. The length of stroke of the slide 52 is thus made variable.

Also pivotally mounted on the stud 58 is a rock arm 63, which receives an oscillating motion

from the shaft 34 through the cam 64, rock lever 65 journaled on the stud 66, connecting rod 67, swivel mechanism 68 of conventional form journaled on bracket 179, rod 69, and swivel block 70. The connections between the swivel block 70 and rod 69, the rock lever 65 and the rod 67, and the rod 69 with the swivel mechanism 68, are all adjustable. Surrounding the rod 69 are a plurality of compression coil springs 71 with washers 72 therebetween. The washer nearest the swivel mechanism 68 bears against a wall of the frame 49 and the springs are held under compression by the nuts 73.

The slide 52, with the blank, is thus carried to the position 105 and aligned with the carrier mechanism by yielding mechanism, and positively in the opposite direction by action of the cam 64. Utilization of a plurality of spring units 71, instead of a single compression spring, facilitates the substitution of a new unit if one is broken. The movement of the slide 52 while transferring a blank is therefore actuated by mechanism that will yield under abnormal conditions, and is practically positive for its movement in the opposite direction. Such limited positive movement is designed to prevent a full return of the slide if anything should obstruct its movement, or perchance, the blank is not taken out of the slide by the carrying fingers. This result is obtained from the following mechanism.

Integral with the rock lever 57 is an arm 74 which has a flexible connection with the rock arm 63 through the rod 75, swivel block 106 and spring 76. These arms, under normal conditions, are thus held with the contact lugs 77, one upon arm 74, and the other upon the rock arm 63 in engagement with each other, but under a yielding pressure, which lugs will be separated if the slide 52 is not returned to its full stroke to receive a new blank.

If perchance the slide 52, or any of its associated parts, should meet an obstruction, or a blank should be out of place for any reason, the slide 52 will discontinue its movement without interfering with the movement of any of the parts that actuate the rock arm 63. On the slide 52 are two transfer plates 78, each having a blank receiving recess 79 in alignment with each other. The walls of the recesses are at an angle to the face of the plate, and when in register with the auxiliary chute are in the same plane as the inside faces of the auxiliary chute plates. The plates 78 are adjustably secured by bolts 80 or the like that project through the slot 56 in the slide 52. When this latter slide is in its approximately out position, the blank receiving recesses 79 are in register with the open space between the auxiliary chute plates, and in its inner position is opposite the carrier mechanism hereinafter described. There are usually two of the transfer plates 78, the upper one being located to hold the blank directly under the head and the lower one to steady the blank at its lower end.

Slidably mounted in the bracket 44 is a cut-off slide 81 having one or more fingers 82, each with a pointed nose 82'. The fingers pass through the slots 180 in the ends of the chute plates 39 and across the open space therebetween. While moving in one direction these fingers are projected between the two lowermost blanks in the column of blanks between the auxiliary chute plates, forcing the lower one definitely into the recesses 79 and holding the other blanks against movement. For varying diameters of blanks other

fingers 82 may be substituted, each of which has a different width of pointed nose. This slide during its inward or cut-off motion is actuated by the spring 83 and outward positively by an escapement mechanism. This latter comprises in part a bracket 84 which is secured to the outer auxiliary chute plate 39 and moves therewith into its various adjusted positions.

Fulcrumed on a fixed stud 85 in the bracket 84 is a rock member 86, one arm of which has a slot 87 at its outer end to receive the pin 88 fixed in one of the transfer plates 78. On the other arm is a cylinder lug 93, in which the cam pin 89 is movably mounted, being pressed downwardly by a spring 90. It is moved upwardly manually through the knurled head 91 and held in its up position by the cross pin 92, resting on the top of the lug 93. When in its up position the lower end of the cam pin 89 is flush with or above the lower face of the lug 93 and projects therebelow in its down position, which position is determined by the pin 92 engaging the bottom wall of a radial slot 94 in the lug 93, substantially as shown in Figure 13.

The reciprocating movement of the slide 52 actuates the rock member 86 and imparts an arcuate movement to the cam pin 89 about the center of the stud 85.

Pivotally mounted upon the bracket 84 is a cam piece 95, one face of which engages a pin 96 in the cut-off slide 81. Movement is imparted to the cam piece 95 through the cam pin 89 when in its down position.

As the transfer plates 78 move to their in position, the rock member 86 is actuated in one direction thereby, and the cam pin 89 engages one wall of the cam piece 95, and through the engagement thereof with the pin 96 the cut-off slide 81 is moved outwardly against the tension of the spring 83. At this time the pointed nose of each of the cut-off fingers 82 is out of the path of the blanks between the auxiliary chute plates, and the lowermost blank in the column enters the blank receiving recesses 79. The transfer slide 52 now carries the blank in the recesses 79 to substantially the position 105 in front of the carrier mechanism. During this in-movement of the slide 52 the column of blanks slides downwardly until the lowermost one in the column engages the face of the slide.

While the slide 52 is returning to its out-position, the spring 83 moves the cut-off slide 81 inwardly and returns the rock arm 86 to its former position. As the recesses 79 are again in register with the open space between the auxiliary chute plates 39 the pointed nose of each of the cut-off fingers 82 are again projected between the two lowermost blanks in the column of blanks holding the entire column of blanks against further downward movement and forcing out the lowermost blank into the recesses 79. The carrier mechanism grips the blank while in the recesses 79 when in substantially the position designated 105, in Figure 6, and thereafter presents it in the bight of the threading dies properly aligned therewith.

The particular form of gripping means varies with the character of the blank, that is, the length thereof, the position of the thread to be rolled thereon, and the shape of the head. Various forms of such means are illustrated in the drawings, Figures 15 to 19, inclusive. If the thread is to be rolled the entire length of the shank the blank is held rigid by the head, substantially as shown in Figures 15, 18 and 19, in

which three different types of heads are illustrated—hexagon as in Figure 15, round or button head as in Figure 18 and a beveled head screw as in Figure 19. For blanks to be so threaded the forward end of the finger block 107 is provided with a V-notch 110 (Figure 6) to receive the shank of the blank. In the forms shown in Figures 15, 18 and 19, the blanks are held against accidental displacement by the application of a limited pressure upon the head of the blank. This is accomplished by a plate 111 having a beveled end 112, to insure a ready entrance of the blank, loosely held in alignment with the block by a pin 113 and subjected to pressure by a spring 114 upon the stud 115. Shifting the nuts upon the stud 115 will vary the tension of this spring. For the round or button head blank (Figure 18) the underside of the plate 111 is slightly concaved so as to fit over the top of the head and additionally prevent its accidental displacement in relation to the finger block 107. As the underside of the screw head shown in Figure 19 is beveled, a support is provided therefor by a plate 116, which has an open slot 181 with beveled walls to suit the diameter and height of the head. The finger block 107 is separably secured to a carrier plate by bolts 109 or the like.

In the form of mechanism shown in Figure 16, the blank is gripped below the head and at a point just above the end of the thread to be rolled, by companion spring fingers 117, which have a beveled outer end to permit ready entrance of the blank therebetween. As so positioned, the fingers just clear the top of the dies, shown in Figure 5, when the blank is presented thereto. Each of these fingers is subject to the pressure of a spring 118 fixed to the finger block 107 by a bolt 119 or the like. The fingers 117, as the finger block 107 approaches the blank, in position 105 (Figure 6), yield under the pressure of the springs 118 and engage the shank of the blank upon opposite sides thereof, and are held thereagainst under a yielding pressure by the springs 118, the shank of the blank resting in the V-notch 110.

In Figures 5 and 6 the carrier mechanism, therein shown, is the form illustrated in Figure 15, the blank having a hexagon head.

The carrier plate 102 is adjustably mounted upon a swivel block 98 by the screws 103 or the like, the correct alignment of the parts being maintained by a key 108.

The swivel block rotates upon a stud 99 mounted in a slide 97 that reciprocates in the bracket 38. It is yieldingly held in a relatively fixed position on the slide by a pin 100, having a pointed nose that projects into and is held in a conical recess in the rear face of the swivel block 98 by a spring 101, substantially as shown in Figure 5.

Fixed in the slide 97 is the joint block 120 that receives the ball end of the connection 122. A similar connection 123 having a ball end engages the rock arm 124 on the shaft 125. A rod 126 adjustably unites the connections 122 and 123. An oscillating motion is given the shaft 125 from the cam 127 upon shaft 34 through the rock lever 128, on the stud 66, and the member 129 adjustably secured to the rock lever 128 (Figure 4), and rock arm 130 fixed on the shaft 125. As the cam roll on the rock lever 128 is held against the cam 127 by the pressure of spring 121, movement of the carrier mechanism in its travel with the blank toward the dies, will stop, if perchance conditions are abnormal for any

reason, such as a misplaced blank or otherwise.

The carrier mechanism is in its rear position (Figure 6) when the slide 52 approaches its in-position, with a blank in the recesses 79. As the blank nears its in-position 105, the carrier mechanism moves toward the blank and engages it in such position, during a slight dwell of the slide 52. It is held fixed therein by the gripping means in the manner hereinbefore described, depending upon the character, length of the blank, shape of the head thereof, and the length of the portion to be threaded. With the blank so gripped the carrier mechanism moves rearwardly a limited distance and takes the blank from the recesses 79. The slide 52 now returns to its out-position, and the carrier mechanism again moves forward and presents and pushes the blank into the bight of the dies substantially as shown in Figure 5. When the dies have gripped the blank therebetween sufficiently to insure its passing between the dies, the carrier mechanism releases its hold thereon and is withdrawn. The blank then passes between the dies, the thread rolled thereon and discharged at the rear end of the stationary die in the conventional manner. As the path of the blank between the dies is at an angle to the direction of movement of the gripping mechanism toward and away from the bight of the dies, any tendency of the gripping mechanism to drag on the blank while being withdrawn, and thereby possibly throwing it out of alignment, is overcome by the flexibility of the gripping mechanism in relation to other parts of the carrier mechanism. Such flexibility results from the pivot mounting of the finger block 107 and the action of the spring pressed pin 100. As the fingers remain in contact with the blank during a portion of the travel thereof between the dies, this difference of direction of travel is accommodated by the same flexibility of the gripping mechanism.

The hopper 131 is mounted upon a frame 132 which is supported at its lower end by the standard 133 and at its upper end by the shaft 134 journaled in the bracket 22. Journaled in the frame 132 is a shaft 135 carrying a sprocket wheel 136 and upon the shaft 134 is a similar sprocket wheel 137. Connecting these sprocket wheels is a feed chain 138 having a plurality of fingers 139 which project therefrom and in spaced relation to each other. The walls of the hopper 131 incline toward each other and at their lower ends are spaced a sufficient distance apart to permit the fingers 139 to pass there-through, these fingers being of sufficient length to project above the bottom of the hopper. The hopper walls are adjustably supported upon the frame 132 by suitable brackets 140, at least one of which is adjustable, to provide for a movement of the hopper wall fixed thereto toward and away from the other wall, and thus vary the width of the open space at the bottom thereof.

The feed chain 138 is driven preferably, but not necessarily, by a motor 141 adjustable on a bracket 142, through a hand wheel 143. Upon the shaft of this motor is a variable speed pulley 144 of conventional type, which is connected with a gear reduction unit 145, by a V-belt 146. Actuated through the gear reduction unit 145 is a shaft 147, upon which is a fixed friction plate 148 and a free plate 149, between which is the sprocket wheel 150. Upon the shaft 147, and between the plate 149 and collar 151, is a spring 152, which exerts its tension against the plate 149 so as to firmly press the same against one

face of the sprocket wheel 150 and drive the latter by a friction grip, the pressure of which is variable through a screw 153.

Upon the shaft 134 is a sprocket wheel 154 which is connected with the sprocket wheel 150 by the sprocket chain 155. Motion of the feed chain 138 is thus acquired from the motor through the shaft 147 and sprocket chain 155 which rotates on the shaft 134. The speed of this feed chain is changed by variation of the speed of the shaft 147, which is accomplished through adjustment of the position of the motor 141 toward and away from the gear reduction unit 145 by manipulation of hand wheel 143. By this drive the sprocket wheel 150 will slip, causing the chain and parts associated therewith to come to a full stop if perchance the fingers thereon or the chain itself should meet some obstruction. This type of drive insures a positive motion of the feed chain so long as conditions are normal, but as soon as an abnormality is presented, whatever its nature, the same stops and thus prevents injury or damage to the blanks or any of the hopper mechanism.

The fingers 139 attached to chain 138 (Fig. 3) used to be set at intervals in the chain more or less suiting a frequency requirement of blanks to be elevated. For certain workpieces which fed easily or readily the spacings were greater distances apart. For blanks not readily fed more fingers and shorter spacings were required to get more blanks up the track.

Now by means of the pulleys 144 and 146 a change of speed of the chain 138 is effected, thereby causing a standard number of the fingers 139 to act more or less frequently on the blanks. This results in a better control of the number of blanks elevated without the necessity of a laborious change in the number of fingers 139. The speed change of the chain also obviates the frequent stoppage thereof so that, for example, when blanks feed too freely or more than the machine requirements, there are not so many interruptions of the chain operation but rather a steadier flow.

At the lower end of the frame 132 is a bracket 156, one wall of which forms an end wall of the hopper and rotatable therein is a shaft 157 carrying a sprocket wheel 158 and a beveled gear 159, and journaled thereon is a bracket 160. In the bracket 160 is a shaft 161 having a beveled gear 162, the teeth of which mesh into those of the beveled gear 159 and upon the inner end of which is an agitator 163, cylindrical in form. The shaft 157 is driven from the shaft 135 by a sprocket chain 164 between the sprocket 165 upon the shaft 135 and the sprocket 158.

Over the opening 166 in the bracket 156, through which the agitator mechanism moves up and down, is a closure plate 167. This plate is held against the bracket 156 by the blanks in the hopper. The agitator 163 is spiral in form and the inside walls 168 of the spiral taper toward the axis of the shaft. As so constructed the blanks will not wedge between the outer diameter of the agitator and the walls of the hopper, and the inner tapered walls of the spiral prevent the clogging of blanks inside of the spiral. With this form of agitator there is no possibility of blanks becoming clogged either inside or outside of the agitator by reason of the operation thereof.

The upper portion of the sprocket chain 138 is supported by the guide rails 169 slidable on the rods 170 when adjusted by the screw 171 to vary the lateral position of the fingers 139. An idler roll 172 journaled in the rock arm 173 rides

against and holds the lower portion of the sprocket chain 138 taut and in alignment.

The outer end of gear reduction unit shaft 184 is spaced slightly from the end of shaft 147 (Figure 8) and fixed thereon are the notched wheel or cam 182 and the ratchet wheel 183, both having the same number of teeth, as shown herein, five in number. On the shaft 147 is fixed the disk 185 and on one side thereof a ratchet wheel 186 is movably mounted, being held against lateral movement by a plurality of screws 187 which project through slots 188 in the ratchet wheel. Thus the ratchet wheel 186 is free to rotate upon the disk 185 a limited distance. A pin 189 fixed in the disk 185 projects into one of the said slots and its engagement with one end thereof limits such movement in one direction and the engagement of any of the screws 187 limits such movement in the opposite direction. A pawl 190 is mounted on a stud 191 in the disk 185 and moved and held in the path of the teeth on the ratchet wheel 183 by a spring 216. Outward movement of the pawl 190 is prevented by a pin 192 if perchance the spring should break or become dislodged.

In the ratchet wheel 186 is a trip pin 193, which is movable in the path of the lug 194 on the pawl 190 and when in engagement therewith will swing the pawl upon its pivot mounting and the tooth thereon out of engagement with the ratchet wheel 183, whenever there is a limited counter rotation of the ratchet wheel 186 relative to the disk 185, thus stopping the rotation of the latter and the shaft 147, and stopping the feed of blanks from the hopper to the chute. Fixed in the frame 132 is a stud 195, upon which oscillates a rock lever 196, having a lug 197. Also journaled on this stud is a rock arm 198, carrying a roll 199 which is constantly under pressure toward the periphery of the wheel 182 by the action of the spring 200. Upon this rock arm is a lug 201, through which and the lug 197 projects a bolt 218 having a spring 202 thereon between the lug 197 and nut 203. To the lower end of the arm 196 is attached a yoke block 205 within which is adjustably secured one end of a connecting rod 206. The purpose of the bolt 201 and spring 202 is to yieldingly hold together the arms 196 and 198 providing thereby a motion compensating means between the two levers.

When the arm 217 of lever 196 is all the way down to the root of ratchet 186, then roll 199 rides on the crest of star wheel 182 and there would be no yield between lugs 197 and 201. But when rod 206 is stopped as arm 217 is engaging nearer the outside crest of a tooth in ratchet 186, then roll 199 has partially dipped toward root of star wheel tooth and because of this, the levers 198 and 196 spread yieldingly apart against the tension of the spring 202.

Journaled on a stud 207, near the upper end of the frame, is a rock lever 208 having associated therewith a yoke 209, and within which is one end of the connecting rod 206.

Secured to one of the chute plates 51 is a finger block 210 within which is movable a trip finger 211 that is fulcrumed on a stud 212 which slides in a slot 213 in the finger block. A swivel block 214 and connection 215 join the trip finger 211 with the rock lever 208 and receive motion therefrom. The point of the finger 211 on its forward stroke enters toward the center of the space between the chute plates and bears against a blank traveling therethrough. If the chute is filled up to this point or slightly above the point

of the finger, then the latter in its forward motion contacts a blank which cannot be thus moved forward. This prevents motion of the finger, link 215 and rock lever 208. As a result, through the connection rod 206 the stop lever 196 is moved into the path of a tooth on ratchet wheel 186, thereby lifting the pawl 190 by means of the pin 193 out of its engagement with the ratchet wheel 183 and breaking the operative connection between the shafts 184 and 147, thus stopping movement of the feed mechanism and delivery of blanks to the chute. As soon as the blanks again move down the chute and free the action of the trip finger 211 the feed of blanks is again renewed.

The blanks are thrown indiscriminately and enmasse into the hopper and by the action of the agitator 163 are always free to be lifted out of the hopper by the fingers 139 and delivered one at a time to the upper end of the chute, through which they slide and enter the auxiliary chute. The agitator moves up and down as the mass of blanks requires pivoting upon the axis of the shaft 157, but continually rotating. Its down position is limited by the screw 174 which abuts against a wall of the bracket 156. Clearance fingers 175, shown herein as coiled springs, are supported by the rods 176, adjustably mounted in the fixed plates 177. The lower ends of these clearance fingers are so positioned that a blank traveling in its prescribed path will pass thereby, but if not, it will engage one or more of these clearance fingers and be returned to the hopper. It has been found that coil springs used as clearing fingers produce the effect and all of the advantages of a stiff, flexible brush.

Since certain changes and alterations may be made in carrying out the within described invention without departing from the scope thereof, it is intended that all matter contained in the above description and the accompanying drawings shall be interpreted as illustrative and not in a limited sense.

Within the scope of the appended claims, minor changes and alterations may be made within the particular embodiment of the invention shown herein.

What is claimed is:

1. In mechanism of the character described, thread rolling dies; and gripping means for supporting and carrying a blank to the dies, that is perpendicular to the blank and engages the shank thereof between the ends of the blank, at a place spaced from the head, which means is above the top of the dies when the blank is presented thereto.

2. In mechanism of the character described; thread rolling dies; gripping means for supporting and carrying a blank to the dies, that is perpendicular to the blank and engages the shank thereof between the ends of the blank, at a place spaced from the head, which means is above the top of the dies when the blank is presented thereto; and pusher means for presenting a blank so held into the bight of the dies.

3. In mechanism of the character described; dies for rolling a thread on a blank; and means for supporting and carrying a blank to the dies that engages the shank thereof between its ends and retains such engagement while the blank moves between the dies for a limited distance, movable obliquely toward and away from the dies, the movement of such means being controlled in part during such limited travel, by the blank between the dies.

4. In mechanism of the character described; thread rolling dies; means for carrying blanks to the dies in a path obliquely to the line of action of the dies, comprising in part a slide, a member pivotally connected therewith, a second member adjustably mounted on the member to provide for blanks of various lengths, and blank holding mechanism on the second member and whereby the second member during the travel of the slide may have an independent movement initiated by the blank while moving between the dies.

5. In mechanism of the character described; thread rolling dies; means for carrying headed blanks to the dies, having as a part thereof a mechanism that holds the blank in part by spring pressure upon the head thereof, comprising a member with a blank receiving recess in one face thereof, a finger connected therewith and projecting over one end of the recessed face thereof, and spring mechanism for pressing the finger against the head of the blank in the member.

6. In mechanism of the character described; thread rolling dies; means for carrying headed blanks to the dies in a path obliquely to the line of action of the dies, having as a part thereof a mechanism comprising a rigid member and a yielding member that holds the blank by the head, one face of the head engaging the rigid member, and another face the yielding member.

7. In mechanism of the character described; thread rolling dies; means for carrying headed blanks to the dies in a path obliquely to the line of action of the dies, having as a part thereof a blank holding mechanism, comprising a member with a blank receiving recess in one face thereof, a finger, having a beveled outer end connected therewith and projecting over one end of the recessed face, and spring mechanism for pressing the finger toward the member.

8. In mechanism of the character described; thread rolling dies; means for carrying headed blanks to the dies, having as a part thereof a holding mechanism, comprising a member with a blank receiving recess in the end face thereof, a finger connected therewith and projecting over one end of the recessed face, and spring mechanism for pressing the finger toward the member, the blank in the holding mechanism having its shank in the said recess with the underside of the head engaging the adjacent faces of the member, with a spring pressed plate engaging the top of the head.

9. In mechanism of the character described; thread rolling dies; a chute; means for transferring blanks from the chute to the dies, comprising transfer mechanism that receives a blank from the chute and moves the same to a point laterally spaced from the line of action of the dies, and carrying mechanism that takes a blank from the transfer mechanism at said point and conveys it across the intervening space to the dies.

10. In mechanism of the character described; thread rolling dies; a chute; means for transferring blanks from the chute to the dies, comprising transfer mechanism that receives and carries a blank from the chute, and carrying mechanism that takes the blank from the transfer mechanism at a point spaced from the chute and laterally from the line of action of the dies and conveys it to the dies, a member of the transfer mechanism receiving the blank at the chute and holding it during transit.

11. In mechanism of the character described;

thread rolling dies; a chute positioned at an angle to the face of the dies; means for transferring blanks from the chute to the dies, comprising transfer mechanism that receives and carries the blanks from the chute, and carrying mechanism that takes the blanks from the transfer mechanism at a point spaced from both the chute and dies and delivers them to the dies; a member of the transfer mechanism having a recess therein at the same relative angle as the chute to receive the blank from the chute.

12. In mechanism of the character described; thread rolling dies; a chute; and means for transferring blanks from the chute to the dies, comprising transfer mechanism that will receive the blanks from the chute; and carrying mechanism that first takes the blank from the transfer mechanism, then moves out of the path thereof and finally presents the blank to the dies.

13. In mechanism of the character described; thread rolling dies; a chute; means for transferring blanks from the chute to the dies, comprising transfer mechanism that receives the blanks from the chute, and carrying mechanism that takes the blanks from the transfer mechanism at a point spaced from both the chute and dies and delivers them to the dies, the transfer mechanism being positioned between the dies and the carrying mechanism as the latter takes the blank therefrom.

14. In mechanism of the character described; thread rolling dies; a chute; means for transferring blanks from the chute to the dies, comprising transfer mechanism that receives the blanks from the chute, and carrying mechanism that takes the blanks from the transfer mechanism and delivers them to the dies; and means passing between the two lowest blanks in the chute for projecting the lowest blank into the transfer mechanism and holding all of the other blanks in the column of blanks from movement in the chute.

15. In mechanism of the character described; thread rolling dies; a chute; means for transferring blanks from the chute to the dies, comprising transfer mechanism that receives the blanks from the chute, and carrying mechanism that takes the blanks from the transfer mechanism and delivers them to the dies; and means, having a pointed nose, passing between the two lowest blanks in the chute for projecting the lowest blank into the transfer mechanism and holding all of the other blanks in the column of blanks from movement in the chute.

16. In mechanism of the character described; thread rolling dies; a chute; and means for transferring blanks from the chute to the dies, comprising in part a reciprocating slide, one or more members connected therewith and having recesses therein which in one position of the slide register with the chute; means for imparting a reciprocatory motion to the slide to transfer a blank from the chute to a point to be received by the carrying mechanism, and carrying mechanism that takes the blank from the transfer mechanism and delivers it to the dies.

17. In mechanism of the character described; thread rolling dies; a chute; and means for transferring blanks from the chute to the dies, comprising in part a reciprocating slide, one or more members adjustably connected therewith and having recesses therein which in one position of the slide register with the chute; means for imparting a reciprocatory motion to the slide to transfer a blank from the chute to a point to

be received by the carrying mechanism, and carrying mechanism that takes the blank from the transfer mechanism and delivers it to the dies.

18. In mechanism of the character described; thread rolling dies; a chute; and means for transferring blanks from the chute to the dies, comprising in part a reciprocating slide, one or more members connected therewith and having recesses therein which in one position of the slide register with the chute; positive means for imparting a reciprocatory motion to the slide in one direction to transfer a blank from the chute to a point to be received by the carrying mechanism, and carrying mechanism that takes the blank from the transfer mechanism and delivers it to the dies.

19. In mechanism of the character described; thread rolling dies; a chute; and means for transferring blanks from the chute to the dies, comprising in part a reciprocating slide, one or more members connected therewith and having recesses therein which in one position of the slide register with the chute; means for imparting a reciprocatory motion to the slide that will yield and hold the slide against movement if an abnormal condition should interfere with said movement to transfer a blank from the chute to a point to be received by the carrying mechanism, and carrying mechanism that takes the blank from the transfer mechanism and delivers it to the dies.

20. In mechanism of the character described; thread rolling dies; a chute; means for transferring blanks from the chute to the dies, comprising in part a reciprocating slide having a recess therein which in one position of the slide registers with the chute; means for imparting a reciprocatory motion to the slide to transfer a blank from the chute to a point spaced therefrom; a cut-off mechanism that projects the lowest blank in the chute into said recess; a connection between the slide and cut-off mechanism, whereby the latter is operated in timed relation with the slide; and carrying mechanism that takes the blank from the transfer mechanism at said spaced point and delivers it to the dies.

21. In mechanism of the character described; thread rolling dies; a chute; means for transferring blanks from the chute to the dies, comprising in part a reciprocating slide having a recess therein which in one position of the slide registers with the chute; means for imparting a reciprocatory motion to the slide to transfer a blank from the chute to a point spaced therefrom; a cut-off mechanism that projects the lowest blank in the chute into said recess; a connection between the slide and cut-off mechanism, whereby the latter is operated in timed relation with the slide; carrying mechanism that takes the blank from the transfer mechanism at said spaced point and delivers it to the dies; and means for breaking said connection whereby the slide will operate independently of the cut-off mechanism.

22. In mechanism of the character described; thread rolling dies; a chute; means for transferring blanks from the chute to the dies, comprising in part a reciprocating slide; a cut-off mechanism that projects the lowest blank in the chute into the transfer means; a connection between the slide and cut-off mechanism, whereby the latter is operated in timed relation with the transfer means and having a movable member

associated therewith, which in one of its positions will render the connection inoperative.

23. In mechanism of the character described; thread rolling dies; a chute; means for transferring blanks from the chute to the dies; a cut-off mechanism that projects the lowest blank in the chute into the transfer means; a connection between the slide and cut-off mechanism, whereby the latter is operated in timed relation with the transfer means and having a movable member associated therewith, comprising in part a rock member actuated by the transfer means; a movably mounted member between the rock member and the cut-off mechanism; and a trip member connected with the rock member that is movable into and out of the path of the intermediate member to make or break the connection between the transfer and cut-off means.

24. In mechanism of the character described; thread rolling dies; a chute; means for transferring blanks from the chute to the dies, comprising in part a reciprocating slide having a recess therein which in one position of the slide registers with the chute; means for imparting a reciprocatory motion to the slide to transfer a blank from the chute to a point where it is received by the carrying mechanism; a cut-off mechanism that projects the lowest blank in the chute into said recess; a connection between the slide and cut-off mechanism, whereby the latter is operated in timed relation with the slide; and carrying mechanism that takes the blank from the transfer mechanism and delivers it to the dies, said chute, cut-off mechanism and connection being adjustable relative to the dies in a path at substantially a right angle to the direction of travel of the blank between the dies.

25. In mechanism of the character described; thread rolling dies; a chute; an auxiliary chute leading from the chute at an angle thereto; means for carrying a blank to the dies from the discharge end of the auxiliary chute; and means for securing the auxiliary chute so that it may be adjusted relatively to the dies in a plane at substantially a right angle to the path of travel of a blank between the dies.

26. In mechanism of the character described; thread rolling dies; a chute; an auxiliary chute leading from the chute at an angle thereto; a hopper at a point in a lower plane than the dies; and means for transferring blanks from the hopper to the chute.

27. An agitator for stirring up blanks in a mass of blanks, or the like, having a substantially solid base portion, a spiral wall around the axis of the agitator, with an open space between the ends thereof, the outer edge of which ascends relatively to the base for a portion of its length, and descends toward the base for a portion of its length, one wall of which slopes toward the axis of the agitator.

28. In mechanism of the character described; thread rolling dies; means for carrying blanks to the dies in a path obliquely to the line of action of the dies, and having a generally reciprocatory movement in said oblique path, and a secondary or floating movement relative to the reciprocatory movement comprising in part fingers that hold the blank until engaged by the dies; and a pusher associated with the carrying means adjacent to the fingers that force the blank into the bight of the dies while held by the fingers.

29. In mechanism of the character described; thread rolling dies; means for carrying a blank to the dies, comprising in part a slide that moves

in a path obliquely to the line of action of the dies, a member movably connected therewith, and blank retaining means associated with the movable member, said member and fingers while being withdrawn from the dies having independent movement relative to the slide that is initiated and controlled by the blank last carried to the dies and while moving therebetween.

30. In mechanism of the character described; a chute; thread rolling dies spaced from the chute; and means for moving a blank from the chute to the dies, comprising in part two separately actuated mechanisms, one taking the blank from the chute and carrying it to a point that is between the chute and laterally of the line of action of the dies, and the other taking the blank at said point and conveying and delivering it to the dies and at the same time that the first mentioned mechanism is returning to the chute to receive another blank.

31. In mechanism of the character described; a chute; thread rolling dies spaced from the chute; and means for moving a blank from the chute to the dies, comprising in part two separately actuated mechanisms, one taking the blank from the chute and carrying it to a point between the chute and dies, through a path at substantially a right angle to the working face of the dies, and the other taking the blank at said point and conveying and delivering it to the dies and moving in a path obliquely to the dies.

32. In mechanism of the character described; a chute; thread rolling dies spaced from the chute; and means for moving a blank from the chute to the dies, comprising in part two separately actuated mechanisms, one taking the blank from the chute and carrying it to a point between the chute and dies, and the other taking the blank at said point and conveying it obliquely to the line of action of the dies and across the path of movement of the first of said mechanisms and delivering it to the dies and at the same time that the first mentioned mechanism is returning to the chute to receive another blank.

33. In mechanism of the character described; a chute; thread rolling dies spaced from the chute; and means for moving a blank from the chute to the dies, comprising in part two separately actuated mechanisms, one taking the blank from the chute and carrying it to a point between the chute and dies, and the other taking the blank at said point and conveying it obliquely to the line of action of the dies and delivering it to the dies, said first described mechanism coming to a rest position if it or an associated part should meet an obstructing object.

34. In mechanism of the character described; thread rolling dies; a chute spaced from the dies obliquely thereto; and means for moving a blank from the chute to the dies, comprising in part two separately actuated mechanisms, one taking the blank from the chute, carrying it to a point between the chute and dies, and the other taking the blank at said point and conveying it to the dies in a path obliquely to the line of action thereof, and non-parallel with the chute.

35. In mechanism of the character described; a chute; thread rolling dies spaced from the chute; and means for moving a blank from the chute to the dies, comprising in part two separately actuated mechanisms, one taking the blank from the chute and carrying it to a point between the chute and dies, and the other taking the blank at said point and conveying and delivering it to the dies, this last mechanism moving from

said point to the dies in a path obliquely to the line of action of the dies and comprising in part a slide; a member movably connected therewith; and blank carrying fingers associated with the member, the member being actuated at an angle to the slide by a transitory member.

36. In mechanism of the character described; a chute; thread rolling dies spaced from the chute; and means for moving a blank from the chute to the dies, comprising in part two separately actuated mechanisms, one taking the blank from the chute and carrying it to a point between the chute and dies, and the other taking the blank at said point and conveying and delivering it to the dies, this last mechanism moving from said point to the dies in a path obliquely to the line of action of the dies, comprising in part a yieldingly actuated slide; an independently movable member thereon, a finger member adjustable on the movable member, and fingers or the like associated with the finger member that receives the blank, which when delivered to the dies and started in a path therebetween will impart movement to the fingers and movable member relative to the slide; and means, as a detent or the like, for yieldingly maintaining the pivotal member in a predetermined relative position on the slide.

37. An agitator for stirring up blanks in a mass of blanks, or the like, having a spiral wall that extends for a limited distance around and spaced from the axis, the outer edge of the wall having an ascending portion and a descending portion, relatively to the base, and the inner surface thereof sloping toward the said axis.

38. An agitator for stirring up blanks in a mass of blanks or the like, having a substantially solid base portion, a wall projecting in one direction from the base portion substantially parallel

with the axis of the agitator and arranged with an open space between the opposite ends thereof, the said wall being substantially spiral in form, and thicker at its line of juncture with the base than at the rim or outer edge.

39. In combination with thread rolling dies; a hopper; chute mechanism through which the blanks travel toward the dies; and positively actuated flexible means, having spaced fingers as a part thereof, for taking blanks from the hopper, moving the blanks upwardly and delivering them successively from the fingers to the chute.

40. In combination with thread rolling dies; a hopper; chute mechanism through which blanks travel toward the dies; a rotary member adjacent to one end of the chute mechanism; a flexible member, having fingers as a part thereof, that moves upwardly and over the rotary member carrying blanks from the hopper to the chute mechanism.

41. In combination with thread rolling dies; a hopper located in a horizontal plane lower than the thread rolling dies; a chute through which blanks travel toward the dies; a flexible member, having fingers as a part thereof, which carries the blanks upwardly from the hopper and delivers the same to the chute.

42. In combination with thread rolling dies; chute mechanism, through which the blanks travel toward the dies; a hopper; a flexible member mounted so as to travel between the hopper and chute mechanism and having fingers thereon which carry the blanks with the flexible member, and in their uppermost position pass between the walls of the chute mechanism.

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