

June 5, 1945.

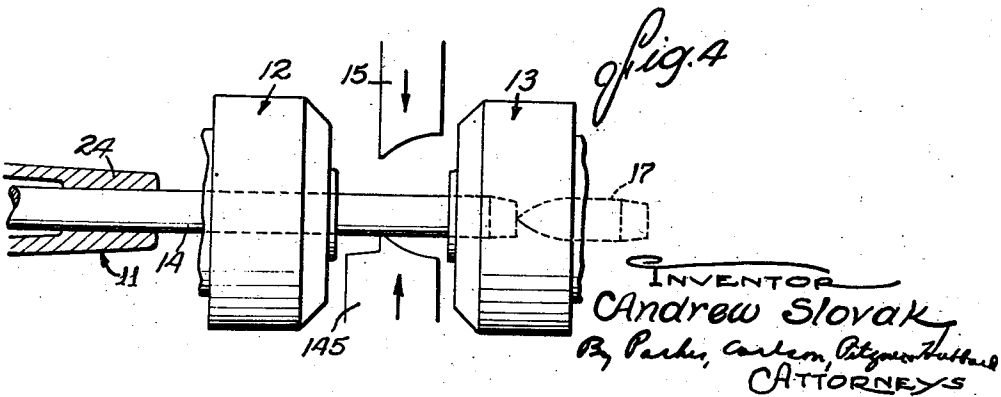
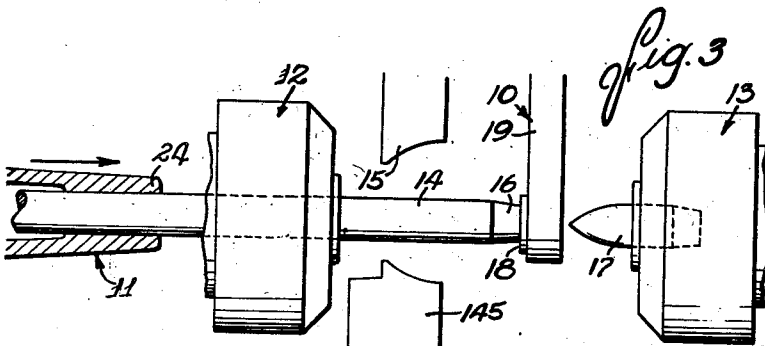
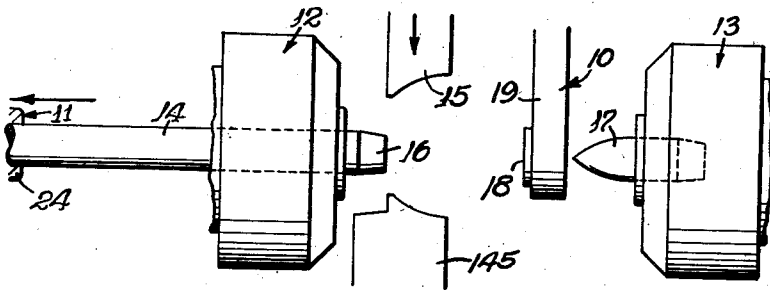
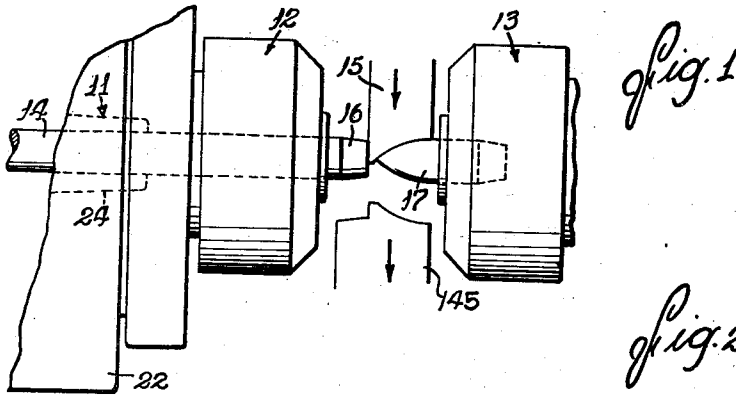
A. SLOVAK

2,377,384

FEED CONTROL FOR AUTOMATIC SCREW MACHINES

Filed April 17, 1943

6 Sheets-Sheet 1



INVENTOR
Andrew Slovak
By Parker, Carlson, Fitzgerald & Hubbard
ATTORNEYS

June 5, 1945.

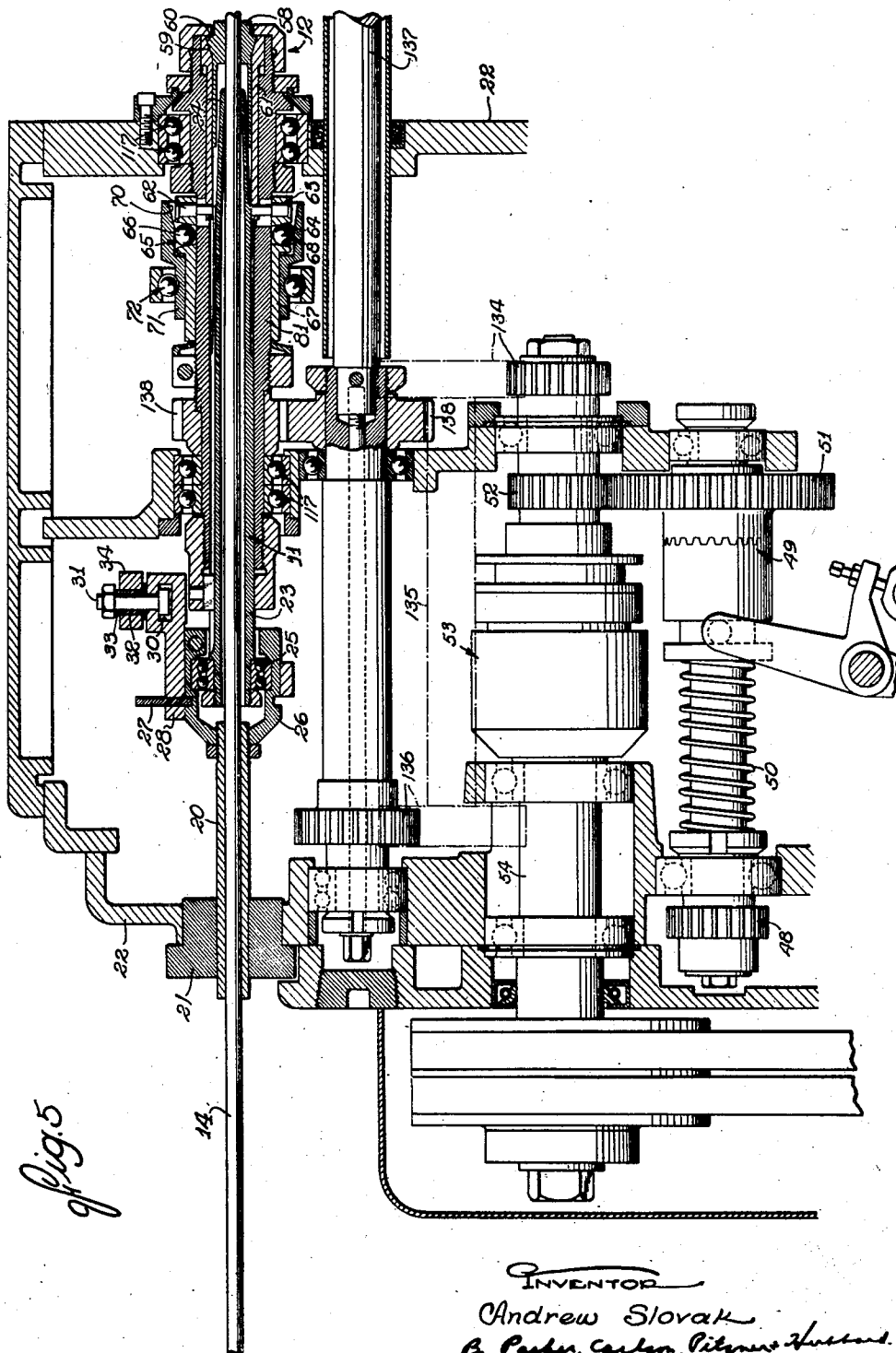
A. SLOVAK

2,377,384

FEED CONTROL FOR AUTOMATIC SCREW MACHINES

Filed April 17, 1943

6 Sheets-Sheet 2



June 5, 1945.

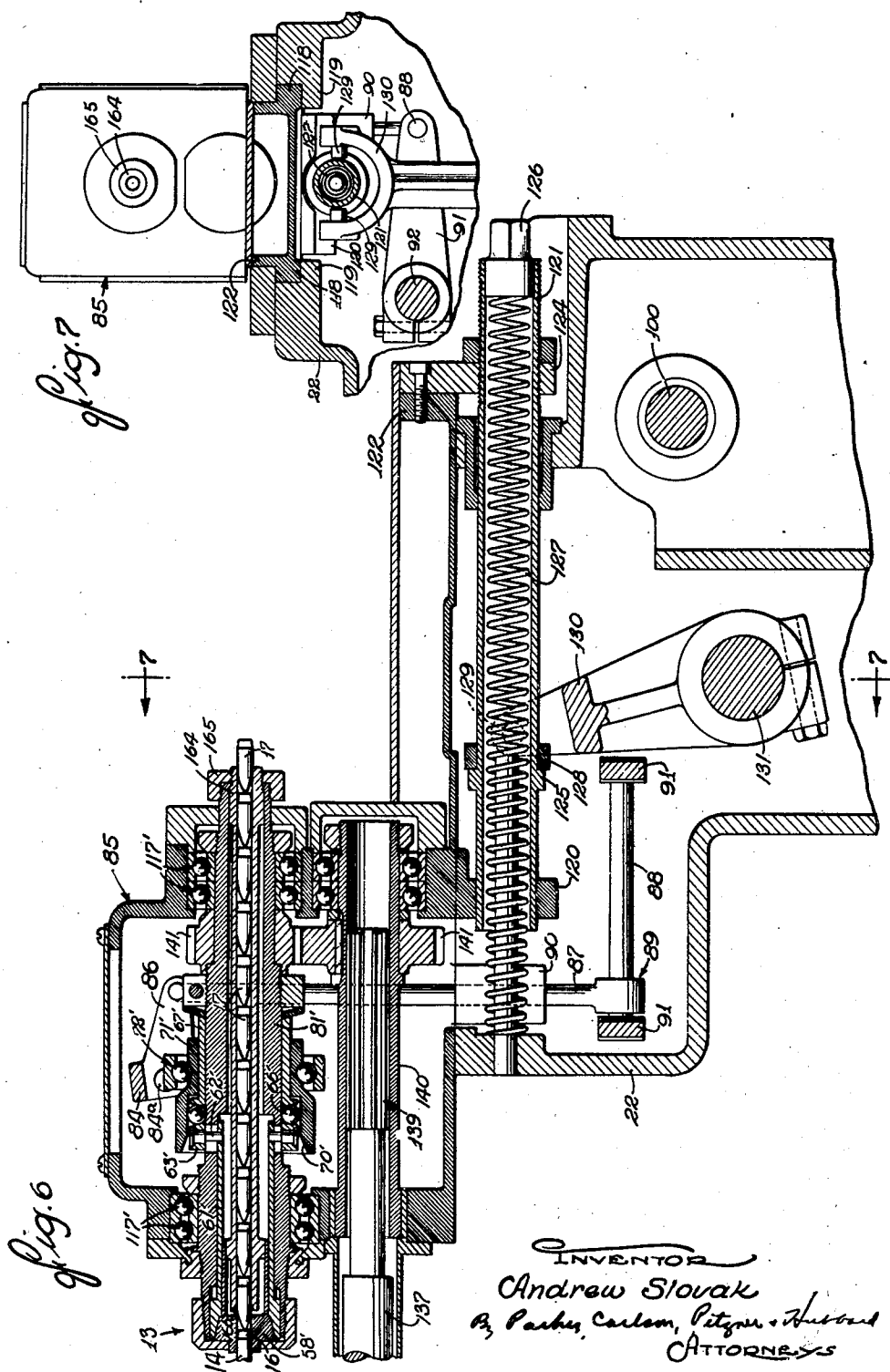
A. SLOVAK

2,377,384

FEED CONTROL FOR AUTOMATIC SCREW MACHINES

Filed April 17, 1943

6 Sheets-Sheet 3



June 5, 1945.

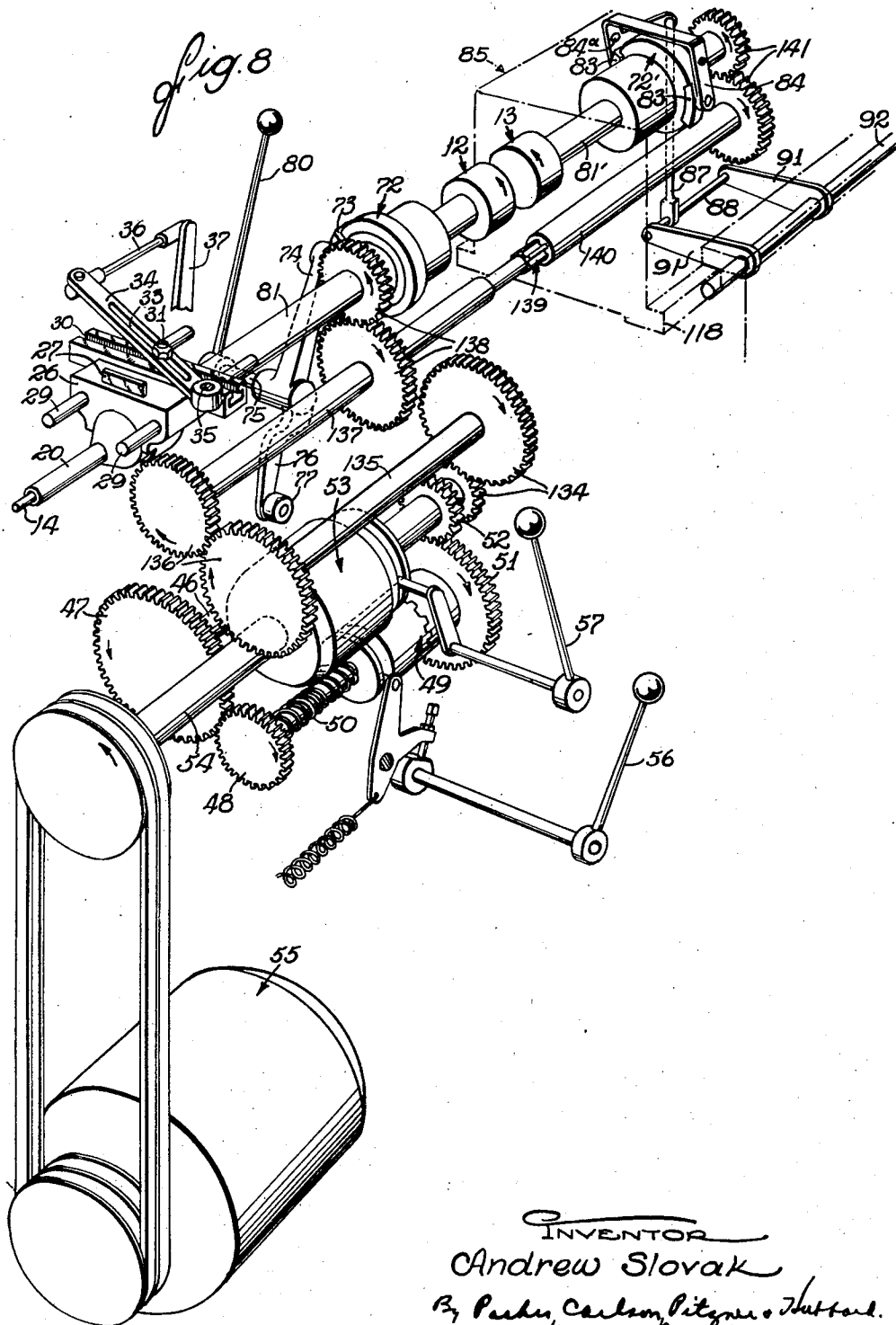
A. SLOVAK

2,377,384

FEED CONTROL FOR AUTOMATIC SCREW MACHINES

Filed April 17, 1943

6 Sheets-Sheet 4



June 5, 1945.

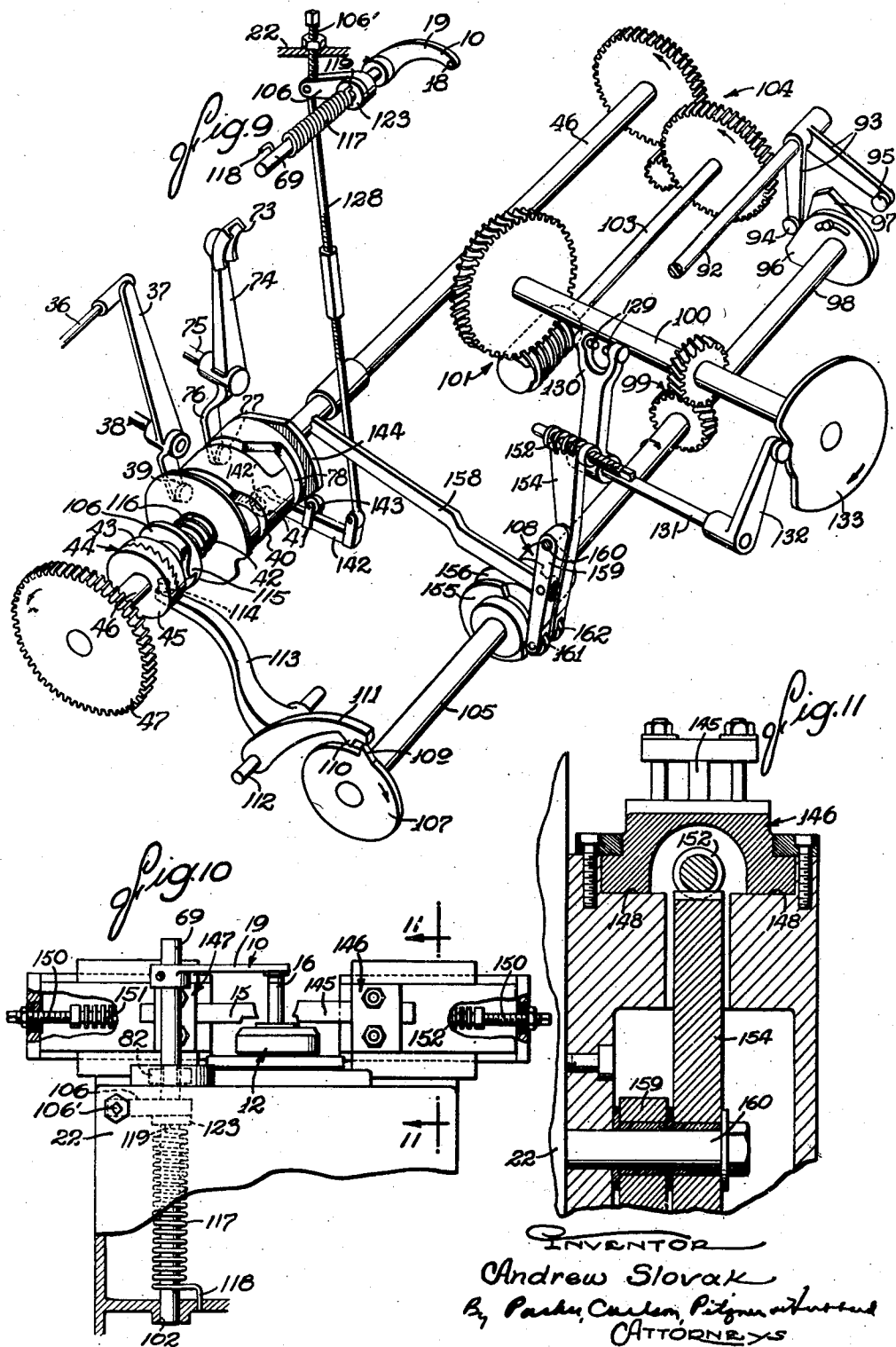
A. SLOVAK

2,377,384

FEED CONTROL FOR AUTOMATIC SCREW MACHINES

Filed April 17, 1943

6 Sheets-Sheet 5



June 5, 1945.

A. SLOVAK

2,377,384

FEED CONTROL FOR AUTOMATIC SCREW MACHINES

Filed April 17, 1943

6 Sheets-Sheet 6

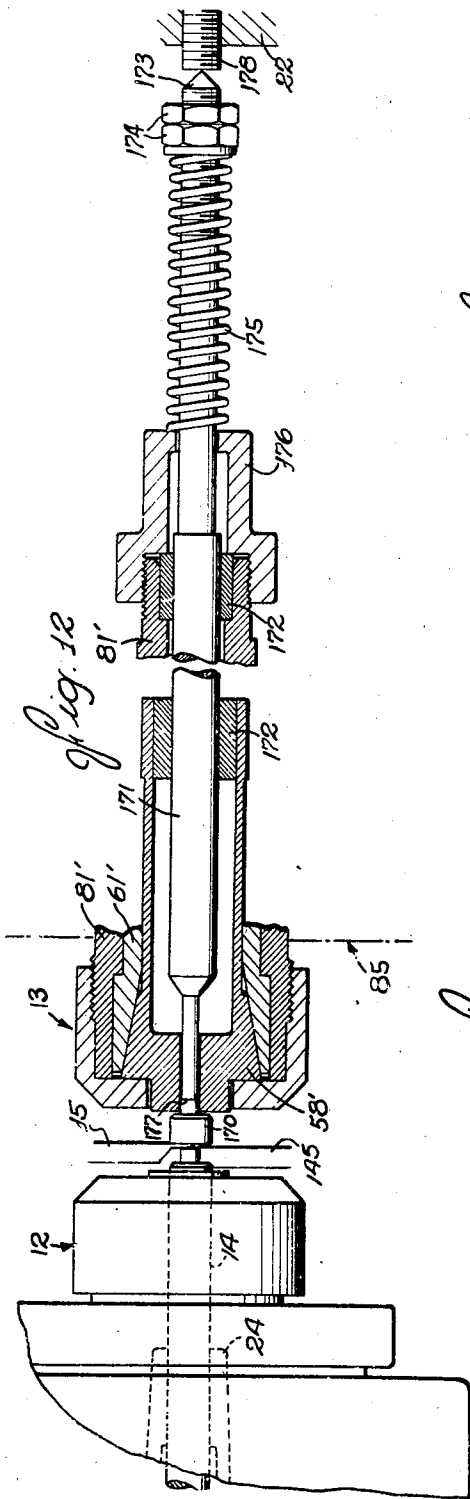
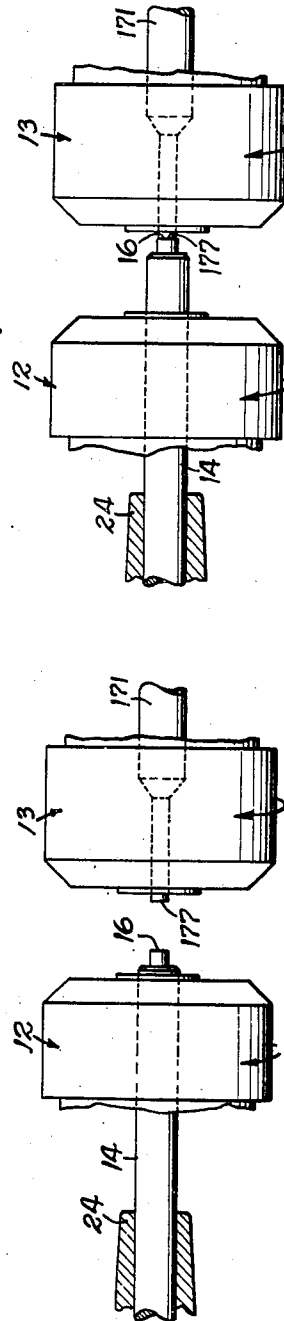


Fig. 12

Fig. 13



INVENTOR
Andrew Slovak
By Parker, Carlson, Pitzner & Howard
ATTORNEYS

UNITED STATES PATENT OFFICE

2,377,384

FEED CONTROL FOR AUTOMATIC SCREW MACHINES

Andrew Slovak, Rockford, Ill.

Application April 17, 1943, Serial No. 483,402

12 Claims. (Cl. 164—38)

This invention relates to automatic screw machines and more particularly to those of the type in which an auxiliary collet is provided to grip the advanced end portion of the stock bar while this end portion is being cut off whereby to eliminate the formation of a burr.

One object is to provide a machine of the above character which avoids the necessity of using a cut-off piece of stock as the stop for limiting the next advance of the stock bar.

Another object is to provide a machine of the above character in which each cut-off workpiece is ejected in a novel manner from the auxiliary collet. A further object is to control the advance of the stock bar by means of a stop which is movable into and out of the path of the stock in timed relation to the advance and retraction of the auxiliary collet.

Still another object is to provide a machine of the above character in which a single member is utilized to effect ejection of the cut-off piece of stock and as a stop for limiting the next advance of the stock bar.

The invention also resides in the novel method of controlling the work ejection and stock advance.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figures 1 to 4 are fragmentary views illustrating various steps in one method of practicing the present invention.

Fig. 5 is a vertical sectional view of the headstock.

Fig. 6 is a similar view of the movable head or auxiliary collet on the opposite end of the machine.

Fig. 7 is a fragmentary section taken along the line 7—7 of Fig. 6.

Fig. 8 is a perspective view showing the collet drive mechanisms.

Fig. 9 is a perspective view of the actuators for the collets, the stock stop, and the tools.

Fig. 10 is a fragmentary plan view of the cutting tools and their mountings.

Fig. 11 is a fragmentary section taken along the line 11—11 of Fig. 10.

Fig. 12 is a fragmentary view partly in section showing a modified form of the invention.

Figs. 13 and 14 show steps in the modified method.

While the invention is susceptible of various modifications and may be practiced in various ways, I have illustrated in the drawings and will

describe here in detail the preferred embodiment and methods. It is to be understood, however, that I do not intend to limit the invention by such specific disclosure but aim to cover all modifications and alternative constructions and methods falling within the spirit and scope of the invention as expressed in the appended claims.

The embodiment illustrated in Figs. 1 to 11, involves the use of the usual feed finger 11 for advancing the stock bar 14 step-by-step, a retractable stock stop 10 for limiting each advance, hollow rotary collets or clamps 12 and 13 for gripping the rotating stock 14 on opposite sides of a tool 15 which is fed transversely of the work to cut off the advanced end portion 16. One method of practicing the invention comprises applying the collets 12 and 13 to grip the stock on opposite sides of the tool 15 (Fig. 1), advancing and retracting the tool (Figs. 1 and 2) to cut off the leading end portion 16 and form a finished workpiece 17, axially advancing the auxiliary collet 13 to carry the piece past the stop while continuing to grip the finished workpiece (Fig. 2), moving the stop laterally into the path of the leading end 16 of the stock, releasing the clamp 12, advancing the feed finger 11 to feed the leading end of the stock against the stop surface 18, applying the clamp 12 to grip the stock in its new position, withdrawing the stop, releasing the clamp 13 and retracting the same to a position overlapping the advanced end portion of the stock, and finally applying this clamp. By controlling the advance of the stock in this manner, and holding the stock end during cut-off, great accuracy is obtained irrespective of the shape of the end on the finished piece. Also, the formed surfaces of the finished workpiece are protected against damage, are cleanly finished and without burrs, and are kept separated from the chips.

Referring now to Figs. 5 and 8, the stock 14 extends through a guide sleeve 20 supported in a block 21 on the headstock frame 22. Beyond this sleeve, the stock projects into the shank 23 of the feed finger 11 whose spring jaws 24 grip the stock. The feed sleeve 23 is journaled at one end in a bearing 25, the outer race of which is enclosed by a head 26 threaded onto the sleeve 20 and connected by a key 27 to a block 28 slidable parallel to the stock on stationary bars 29 (Fig. 8). The block has a T-slot 30 along which a bolt 31 is adjustable. This bolt supports a bushing 32 projecting through a slot 33 and pivotally connected to a lever 34 fulcrumed on a fixed pivot 35. The free end of the lever is con-

ected by a link 36 to a lever 37 pivoted at 38 (Fig. 9) and having a follower roller 39 riding in a slot 40 of a barrel cam 41. This cam is fixed on a sleeve 42, rigid with the driven member 43 of a one-revolution clutch 44 having its driving member 45 fast on a shaft 46 carrying a gear 47, which meshes with the gear 48 (Fig. 8) and is driven through the medium of a jaw clutch 49 normally engaged by a spring 50. A gear 51 fast on the clutch driver is driven through a gear 52 through the medium of a friction clutch 53 on a shaft 54 belt driven from the main drive motor 55. The clutches 49 and 53 may be engaged and disengaged by manipulation of handles 56 and 57.

Each time the one-revolution clutch 44 is released in the manner to be described later, the cam 41 makes one revolution and the lever 34 is actuated to retract the block 28 and therefore the feed finger and then after a short dwell advances the finger through a distance determined by the adjusted position of the bolt 31 along the slot 30. Usually this distance will be slightly greater than the overall length of the workpiece.

The main collet 12 (Fig. 5) is of ordinary construction comprising spring jaws 58 disposed within a sleeve 61 and adapted to be squeezed together to grip the bar by axial shifting of the sleeve during which a tapered surface 60 thereon acts on an inclined surface 59. The sleeve 61 is slidable in a power driven sleeve 81 which is supported by bearing 117 in the main frame. It is connected through a pin 62 to a ring 63 inclined on one side as shown at 64 and cooperating with a similarly inclined end 65 on a sleeve 67 to form a groove 66 in which balls 66 are located. The sleeve 67 is enclosed by a sleeve 71 which carries a ball bearing 72 and is shifted to the right as viewed in Fig. 5 by a yoke 73 (Figs. 8 and 9) acting on the outer bearing race. In this movement, a surface 76 cams the balls inwardly separating the parts 63 and 67 and the resulting axial movement of the sleeve 61 closes the collet, as shown in Fig. 5, to grip the bar. In the reverse movement of the yoke, that is, to the left as viewed in Fig. 5, the surface 76 permits the balls to expand and the spring stress in the jaws opens the latter. The yoke 73 is carried by an arm 74 pivoted on a rockshaft 75 in the main machine frame 22 and arranged to be actuated by a hand lever 80 or by cam actuation of an arm 76. The latter carries a follower 77 which engages a groove 78 in the barrel cam 41. The cam surfaces of the grooves 40 and 78 are correlated to permit the feed finger 11 to be retracted while the collet is closed. This is followed by opening of the collet while the feed finger is being advanced and finally to again close the collet.

The parts of the machine thus far described are typical of those commonly used in automatic screw machines for advancing a stock bar step-by-step. In addition, the auxiliary collet 13, rotated in synchronism with the main collet, is operated to grip and support the advanced end of the stock while it is being cut off and then to carry the finished workpiece axially and forwardly past the stop 10.

As shown, the collet 13 is of the same general construction as the main collet 12 and like parts are indicated by corresponding primed numbers. Since this collet is to be shifted axially, the bearings 117' (Fig. 6) of the main spindle sleeve 81' are supported in a housing 85 which is mounted to slide on the main frame of the machine parallel to the work and collet axes. Herein, the housing has flanges 118 (Fig. 7) which slide in

ways 119 formed on the main frame and spaced from the end of the headstock.

To open and close the collet 13, the outer race of the bearing 72' is engaged by a yoke 83 (Figs. 6 and 8) on a U-shaped member 84 pivoted at 84a on the housing 85. An arm 86 on the member 84 is connected by a link 87 having a slidable connection 89 with a rod 88 which is supported by arms 91 fast on a rockshaft 92 on the main frame. The lower end of the link 87 projects through a depending boss 90 on the bottom of the head 85. The opposite end of the rockshaft 92 carries a second pair of arms 93 (Fig. 9) having rollers 94 and 95 that follow cams 96 and 97 which are fast on a shaft 98 and circumferentially adjustable relative to one another to provide a dwell between the opening and the closing of the collet 13. As the camshaft 98 turns clockwise from the position shown in Fig. 9, the cam 96 opens the collet 13 and after a dwell, the cam 97 rocks the shaft 92 reversely to close the collet.

After the collet 13 has been advanced to the position shown in Fig. 2, the stop 10 is yieldably moved into the path of the stock bar. As shown (Figs. 9 and 10), the stop 10 comprises an arm 19 provided with a hardened side surface 18 on one end. The opposite end is fast on a shaft 69 mounted on the main frame 22 in bearings 82 and 102. The former is a thrust bearing which permits rotation but prevents axial shifting of the shaft. Also fast on the shaft 69 is an arm 106 which is urged by a torsion spring 117 in a direction to move the arm 19 into active position in the path of the stock 14 (see Fig. 9), this position being determined by a set screw 106'.

Positively acting means is provided for retracting the stop bar 19 to inactive position. This means includes a link 128 connected at one end to the arm 106 and at the other end to a lever 142 pivoted at 142' and carrying a follower roller which rides against the cam 41. A lobe 144 on the follower has a leading surface which times the retraction of the stop arm and a trailing surface which permits the arm to move to active position under the action of the spring 117.

In order that the opening and closing of the collets 12 and 13, the swinging of the stop 10, and the actuation of the feed finger 11 may be synchronized, the camshaft 98 is driven from the feed camshaft 46. This drive includes a pair of spiral gears 99, a shaft 100, worm gearing 101, a shaft 103, and pickoff gears 104. The camshaft 98 also times the operation of the one-revolution clutch 44. For this purpose, a cam 107 mounted on the shaft 105 is coupled to the shaft 98 by one tooth jaw clutch 108. A lobe 109 on the cam is arranged to engage a projection 110 on a follower arm 111 pivoted on a stationary pin 112 and rigid with an arm 113 which will be depressed each time the lobe 109 passes the projection 110. Such movement of the arm 113 retracts a pin 114 which allows the clutch 44 to engage under the action of a spring 116. The pin 114 rides in a cam groove 106 and after nearly one revolution, one cam surface 115 engages the pin whereupon the driven clutch member 43 is shifted axially to disengage the clutch jaws as the revolution is completed.

To shift the head 85 along the ways 119 and move the auxiliary collet 13 axially back and forth, a cored-out extension 122 (Fig. 6) projects from the outer end of the head and a nut 124 thereon threads onto one end of a tube 121 which is supported at its other end in a lug 120 depending from the head. Within the tube is a compression spring 127 which acts between a plug

126 and a wall of the main frame 22 and thus tends to shift the head to the right, as viewed in Fig. 6. This movement is limited by engagement of a flange 125 on the tube with collar 128 which bears against pins 129 of a yoke 130 fast on a rockshaft 131. At its other end, this shaft carries a follower arm 132 (Fig. 9) bearing against the periphery of a cam 133 which is fast on the shaft 100 and therefore rotates counter-clockwise. The cam is contoured to advance the head 86 against the action of the spring 127 and to the right as viewed in Fig. 6 before the collet 13 has been opened to release the cut-off piece of stock. The extent of this motion is determined by the adjustment of the tube 121 relative to the nut 124.

Each workpiece is ejected from the jaws of the auxiliary collet in the retraction of the latter to the left as viewed in Fig. 6. The piece is thus delivered into the coned end 166 of a tubular magazine 164 sized according to the diameter of the workpieces and supported at one end by the sleeve 61' and at the other end by the spindle 81' to which the magazine is connected by a nut 165 threading onto the outer ends of the magazine and the spindle. The pieces are discharged from the remote end of the tube as illustrated in Fig. 6.

The two collet spindles 81 and 81' are driven in unison and continuously. For this purpose, pick-off gears 134 (Fig. 8) connect the shaft 54 to the shaft 135 connected in turn through gears 136 to a shaft 137 which drives the spindle 81 through gears 138. The shaft 137 is extended beneath the tool 15 and within the head 85 has a spline connection 139 with a tubular shaft 140 journaled in the head and connected to the spindle 81' through gears 141 having the same ratio as the gears 138. The connection 139 permits the head to shift axially while the spindle 81' continues to rotate.

In the present instance, the tool 15 effects the final cutting off of the advanced end of the stock to form the workpiece and the major portion of the metal is removed by a form tool 145. These tools are clamped in holders 146 and 147 slidable on ways 148 on a bracket fastened to the end of the headstock housing 22 beneath the collet 12. The tool holders are thus adapted to slide transversely of the stock 14 and perform their cutting functions by entering the stock from opposite sides. The tool holders 146 and 147 are adjustably connected by screws 150 to circular racks 151 and 152 meshing with gear teeth on the upper ends of arms 154 only one of which is shown. These arms are actuated by cams 155 and 156 fast on the shaft 105 and shaped to rapid approach, feed, and rapid return the tools 15 and 145. The arm 154 is fulcrumed at 160 and a roller 162 on its lower end bears against the periphery of the cam 156. The cam 155 acts on the roller 161 on the lever 159 which is also pivoted at 160 and is connected by a link 158 to the other arm.

Operation

The cams 133, 78, 96, 97, 40, 156, and 155 are shaped to time the advance and retraction of the head 85, the opening and closing of the collets 12 and 13, the advance and retraction of the feed finger 11, the form tool 145 and the cut-off tool 15 in the proper sequence. It will be noted that the tools 15 and 145 and the head 85 are actuated by cams which rotate continuously whereas the opening and closing of the collets 12 and 13, the positioning of the stop 10, and the advance

and retraction of the feed finger 11 are controlled by cams which are driven through the medium of the clutch 44 so that the cams make one revolution during the cycle. At the time when the clutch 44 becomes engaged by withdrawal of the pin 114, the parts will be positioned as shown in Fig. 1, the cut-off tool 15 having just completed its operation. At this time, the collet 12 will clamp the stock bar and the collet 13 will clamp the last cut-off workpiece, both collets rotating in synchronism. In the first part of the cycle, the feed finger 11 and the cut-off tool 15 are retracted, and at the same time, the head 85 advanced, after which the stop 10 is moved into active position by the spring 117 as shown in Fig. 2. In the latter part of the head motion, the cam 78 operates to open the collet 12 thereby releasing the stock bar. The feed finger then advances, moving the leading end 16 of the stock until the same engages the surface 18 of the stop 10. The frictional character of the gripping engagement between the stock and the feed finger permits the latter to overtravel slightly during which time the collet 12 is closed clamping the stock in the position shown in Fig. 3. Simultaneously the collet 13 is opened and the stop 10 is retracted, and then the cam 133 operates to return the head 85. The advanced end 16 of the stock constitutes a stop for pushing the line of workpieces through the magazine 164 as shown in Figs. 4 and 6. In the final portion of the revolution of the clutch 44, the collet 13 is closed by the cam 97 thereby gripping the advanced end of the bar which is thus held in readiness for advance of the tools. The form tool 145 first advances to shape the trailing end of the workpiece next to be formed as well as the leading end of the succeeding workpiece.

For different kinds of workpieces such, for example, as the piece 170 shown in Fig. 12 having end portions of different diameters, it becomes necessary to provide for ejection of the finished piece from the auxiliary collet 13 in a different manner and preferably during the advance of this collet which, as described above, follows the cutting off of the piece. Such a modification of the apparatus and method above described is disclosed in Figs. 12, 13, and 14, the parts in common with the apparatus first described bearing corresponding reference numbers. The collet 13 is, of course, shaped according to the contour of the advance end of the workpiece 170 so as to grip and hold this end as shown in Fig. 12 when the collet is closed.

To eject the workpiece, a rod 171 is disposed within the spindle sleeve 81' and is axially slidable in bearings 172 supported thereby. One end of the rod projects beyond the spindle sleeve and is threaded to receive nuts 174 which act as an abutment for a spring 175, the other end of which engages a cap 176 screwed on to the sleeve. The rod is thus urged to the right as viewed in Fig. 12 to a position determined by engagement of its pointed end 173 with an axially adjustable stop 178 screw threaded into the machine frame. Thus, the other rod end 177 which is disposed within the collet jaws is disposed in an accurately defined position in which it acts as a stop for engaging the end of the stock bar 14 to limit the advance of the latter for the succeeding operation.

The cycle of operation of this form of the invention is as follows, it being assumed that the tools 15 and 145 have completed their operation and are retracted. The cam 96 then operates to

release the collet 13 whereupon the head 85 and the collet 13 are shifted to the right from the position shown in Fig. 13. In this movement, the end of the rod 174 acts on the workpiece to eject it from the collet 13 and to the left whereupon the finished piece drops down between the two collets, the collet 13 dwelling in the position shown in Fig. 13 in which the stop surface 177 is exposed. At this time, the collet 12 is released and the feed finger 11 is moved forwardly to advance the stock bar 14 until the leading end 16 engages the stop 177 as shown in Fig. 14. Thereupon the collet 12 clamps the bar and the released collet 13 is retracted to a position overlapping the bar end. Closing of the collet 13 and cutting off of the workpiece then proceed as described above.

I claim as my invention:

1. In a machine of the character described, the combination of mechanism for advancing a stock bar step by step and cutting off the advanced end successively, a rotary collet adapted to clamp and release the leading end of the stock bar and to rotate therewith, said collet having an axial recess for supporting a succession of finished workpieces in end to end relation, means supporting said collet for movement axially of the bar between a first position overlapping said leading end and a second position spaced from this end, mechanism operable to shift said collet to said second position after a piece of said bar has been cut off, to release the collet while the finished workpiece remains supported therein, and then to retract the collet and the supported workpiece to said first position after the next advance of the bar, a stop movable laterally into and out of the path of said stock bar and operable, when disposed in said path, to limit the advance of the stock, and means operable automatically to move said stop into active position after advance of said collet to said second position and then retract the stop after advance of said bar.

2. In a machine of the character described, the combination of mechanism for advancing a stock bar step by step and cutting off the advanced end successively, a rotary collet adapted to clamp and release the leading end of the stock bar and to rotate therewith, means supporting said collet for movement axially of the bar between a first position overlapping said leading end and a second position spaced from the bar end in the direction of advance of the bar, mechanism operable to shift said collet to said second position after a piece of said bar has been cut off, to release the collet with said piece supported therein, and then return the collet and the supported piece to said first position after the next advance of the bar, a stop member movable transversely of the path of the stock bar and collet, and means for moving said member into said path while the shiftable collet is in said second position and out of the path after the advance of said stock bar and before the return of said collet to said first mentioned position.

3. In a machine of the character described, the combination of mechanism for advancing a stock bar step by step and cutting off the advanced end successively, a rotary collet adapted to clamp and release the leading end of the stock bar and to rotate therewith, means supporting said collet for axial movement away from and back toward the advanced end of said stock bar, mechanism for opening said collet in the advanced position of the latter while leaving the previously fin-

ished piece supported therein, a movable stop for limiting the advance of the stock bar, mechanism operable while said collet is moved away from the end of said bar to project said stop into active position to limit the next advance of said bar and then to withdraw the stop, and mechanism to retract the open collet and the workpiece supported therein past the advanced end of the bar whereby to cause the latter to push the piece through the collet.

4. In a machine of the character described, the combination of mechanism for advancing a stock bar step by step and cutting off the advanced end successively, a rotary collet adapted to clamp and release the leading end of the stock bar and to rotate therewith, means supporting said collet for axial movement away from and back toward the advanced end of said stock bar, mechanism for releasing the collet as an incident to its advance while retaining the cut-off piece supported in the collet, and a stop operable while said collet is moved away from the end of said bar to limit the next advance of the bar, the end of the stock bar after such advance operating during retraction of said collet to eject the piece therefrom.

5. In a machine of the character described, the combination of mechanism for advancing a stock bar step by step and cutting off the advanced end successively, a rotary collet adapted to clamp and release the leading end of the stock bar and to rotate therewith, means supporting said collet for movement forwardly to carry the cut-off piece away from the bar and then backwardly to a position overlapping the advanced end portion of the bar, means operable automatically after cutting off of the end portion of the bar to release said collet, and stop means engageable with one end of said cut-off piece during one of said axial movements of said collet while released and operating to utilize such movement to shift the piece axially relative to the collet and thereby eject the same from the collet.

6. In a machine of the character described, the combination of mechanism for advancing a stock bar step by step and cutting off the advanced end successively, a rotary collet adapted to clamp and release the leading end of the stock bar and to rotate therewith, means supporting said collet for movement forwardly to carry the cut-off piece away from the bar and then backwardly to a position overlapping the advanced end portion of the bar, and stop means engageable with one end of the cut-off piece during one of said axial movements of the collet and utilizing such movement to shift the piece axially relative to the collet and out of gripping engagement therewith.

7. In a machine of the character described, the combination of mechanism for advancing a stock bar step by step and cutting off the advanced end successively, a rotary collet adapted to clamp and release the leading end of the stock bar and to rotate therewith, means supporting said collet for movement axially of the bar between a first position overlapping said leading end and a second position spaced from this end, mechanism operable to shift said collet to said second position after a piece of said bar has been cut off and to said first position after the next advance of the bar, and a stop disposed within said collet in position to be engaged by the leading end of the stock bar in the next advance thereof, said stop acting during the advance of said collet to said second position to eject the cut-off piece reversely from the collet and thereby expose the stop for engagement by the end of said bar.

8. In a machine of the character described, the combination of mechanism for advancing a stock bar step by step and cutting off the advanced end successively, a rotary collet adapted to clamp and release the leading end of the stock bar and to rotate therewith, means supporting said collet for movement axially of the bar between a first position overlapping said leading end and a second position spaced from the bar in the direction of advance thereof, mechanism operable to shift said collet to said second position after a piece of said bar has been cut off and to said first position after the next advance of the bar, and a stationary stop member disposed within said shiftable collet along the axis thereof and operable to eject the cut-off piece reversely from the collet as the latter is moved to said second position, the end of said member being exposed as an incident to such ejection of the cut-off piece and thereafter acting as a stop for limiting the advance of the stock bar.

9. The method of controlling the advance of a bar of stock which comprises applying a gripping means to the end portion of said bar, cutting off the bar adjacent said gripping means, advancing the gripping means to separate the cut-off piece from said bar, inserting a stop between said cut-off piece and the end of the bar, advancing the bar against said stop, withdrawing the stop, releasing the gripping means, and retracting the gripping means past the advanced end of the bar to carry the cut-off piece against the bar end and thereby eject the piece through the gripping means.

10. In a machine of the character described, the combination of mechanism for advancing a stock bar step by step and cutting off the advanced end successively, a rotary collet adapted to clamp and release the leading end of the stock bar and to rotate therewith, means supporting

said collet for axial movement away from and back toward the advanced end of said stock bar, and a stationary stop for limiting the advance of the stock bar, said stop being disposed on the axis of said collet and operable during the advance of the latter to eject a cut-off piece out of the collet.

11. The method of controlling the advance of a bar of stock which comprises applying a gripping means to the end portion of said bar, cutting off the bar adjacent said gripping means, releasing the gripping means, advancing the gripping means to carry the cut-off piece against a positive stop and then cause ejection of the piece reversely as the advance is continued, advancing the bar against said stop, and retracting the gripping means over the advanced end portion of the bar.

12. In a machine of the character described, the combination of mechanism for advancing a stock bar step by step and cutting off the advanced end successively, a rotary collet adapted to clamp and release the leading end of the stock bar and to rotate therewith, means supporting said collet for movement axially of the bar between a first position overlapping said leading end and a second position spaced from the bar in the direction of advance thereof, mechanism operable to shift said collet to said second position after a piece of said bar has been cut off and to said first position after the next advance of the bar, and a member positioned to engage the cut-off piece during the advance of said collet whereby to eject the piece reversely out of the collet and then to provide an abutment engageable with the leading end of the bar in the succeeding advance thereof whereby to limit such advance.

ANDREW SLOVAK.