

May 19, 1925.

1,538,638

G. J. KALBERER

ROD FEEDING CHUCK FOR AUTOMATIC SCREW MACHINES

Filed Aug. 8, 1923

Fig. 1.

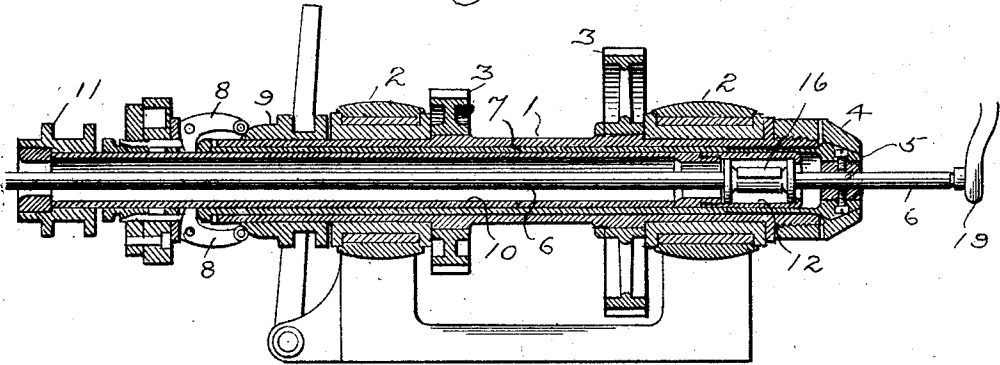


Fig. 2.

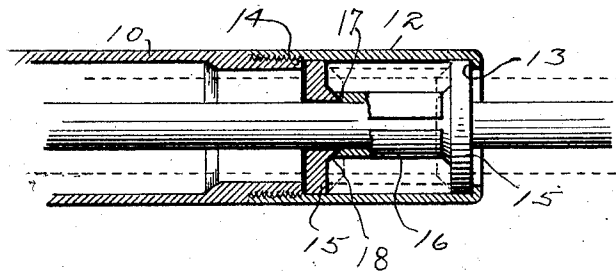


Fig. 3.

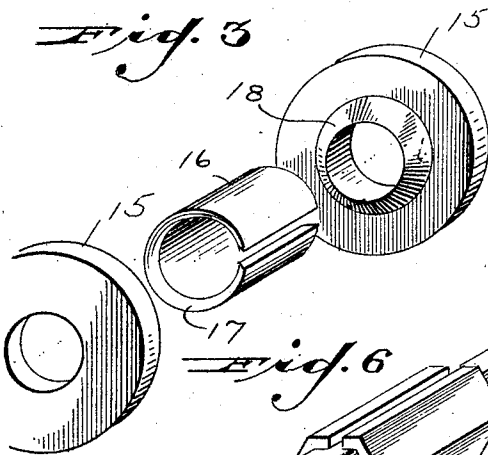


Fig. 4.

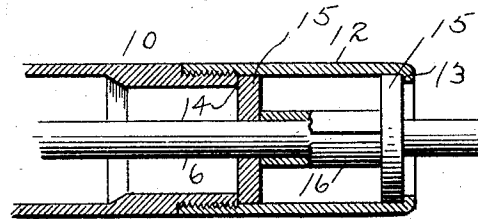


Fig. 5.

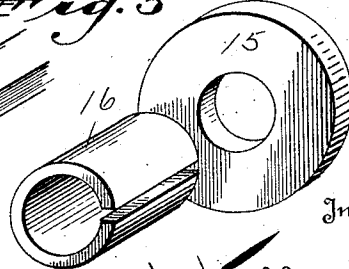
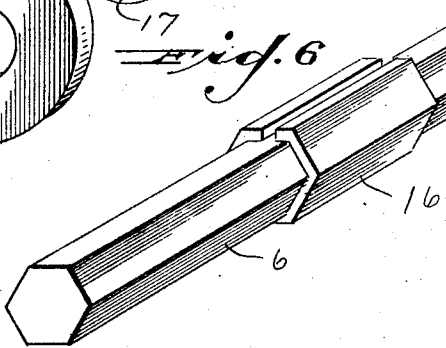


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE J. KALBERER, OF HAMILTON, OHIO.

ROD-FEEDING CHUCK FOR AUTOMATIC SCREW MACHINES.

Application filed August 8, 1923. Serial No. 656,357.

To all whom it may concern:

Be it known that I, GEORGE J. KALBERER, a citizen of the United States, residing at Hamilton, in the county of Butler and State of Ohio, have invented certain new and useful Improvements in Rod-Feeding Chucks for Automatic Screw Machines, of which the following is a specification.

My invention relates to automatic screw machines and more particularly to the stock feeding means by which the stock is intermittently advanced for successive machining operations.

As ordinarily constructed there is provided within the feed spindle of the usual type of automatic screw machine a reciprocatory feed tube carrying at its forward end a spring chuck or feed shell which consists of a tubular nozzle longitudinally slotted to form a series of spring fingers which frictionally engage the stock rod extending through the feed tube and spindle. While such automatic screw machines are adapted to work upon stock of different diameters it is necessary to substitute a different feed tube or frictional chuck for each size of stock. These feed tubes or frictional chucks are rather expensive to manufacture and are moreover subject to excessive wear and undue slippage.

The present invention contemplates the employment of a single feed shell for all sizes of stock within the capacity of the machine and the employment within such feed shell of interchangeable stock clutching means which is not only simple in construction but may be very cheaply and inexpensively manufactured preferably upon the screw machine itself, and which will afford increased grasping power upon the stock to minimize slippage and by providing an extended uniform bearing surface the wear upon such stock engaging means is minimized. In a simple form this stock feeding means consists of a split spring sleeve having a tendency to contract tightly upon the rod of stock in association with two abutment collars which surround the stock rod at opposite ends of the gripping sleeve and engage limiting stops within the feed shell to transmit the movement of the feed shell in either direction to such rod gripping sleeve. The gripping sleeve is preferably though not necessarily interiorly beveled at its ends and the abutment collars are provided with corresponding tapered bearing surfaces

which afford a wedging action within the beveled ends of the sleeve to expand the sleeve and relieve the tension thereof upon the stock whenever the stock meets with resistance to its longitudinal movement.

The object of the invention is to simplify the structure as well as the means and mode of operation of rod feeding mechanism for intermittently advancing a rod through step by step movement which will not only be cheapened in construction but will be more efficient in use, positive in operation, uniform in action, easily controlled and unlikely to get out of repair.

A further object of the invention is to provide a rod feeding device which will be subject to minimum slippage and also to minimum wear.

A further object of the invention is to provide rod engaging means which may be economically manufactured for interchangeable use within a standard feed shell, to accommodate rod stock of different diameter.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation, or their equivalents as hereinafter described and set forth in the claims.

In the accompanying drawings wherein is shown the preferred but obviously not necessarily the only form of the embodiment of the invention, Fig. 1 is a longitudinal sectional view through the feeding spindle of an automatic screw machine illustrating the relation of the stock engaging means forming the subject matter hereof with the other operative parts of the machine. Fig. 2 is a longitudinal sectional view of the feeding shell and work engaging parts therein. Fig. 3 is a detail perspective view of the interchangeable stock engaging parts removed from the feeding shell. Fig. 4 is a longitudinal sectional view similar to Fig. 2 of a modification of the stock engaging members. Fig. 5 is a perspective view of the members illustrated in Fig. 4 removed from the feeding shell. Fig. 6 illustrates the application of the invention to polygonal stock.

Like parts are indicated by similar characters of reference throughout the several views.

While the present invention is equally applicable to any of the various screw machines

made by different manufacturers at the present time, for convenience of illustration it has been shown embodied in the feeding spindle of a Cleveland screw machine. In Fig. 1 of the drawings 1 is a hollow or tubular spindle mounted for rotation in bearings 2—2 and rotated by the driving gears 3 which intermesh with corresponding gears upon a countershaft. At its forward end the feeding spindle 1 is provided with an internally tapered nose or collet 4 within which engages the spring chuck 5 which grips and holds the rod stock 6 during the machining operation. The chuck 5 is longitudinally slotted to afford a contractible series of segments which is contracted into engagement with the rod 6 by forward pressure within the tapered collet 4. The chuck 5 is pressed forward to effect its contraction upon the stock rod 6 by the reciprocation of the chuck sleeve 7 mounted concentrically within the hollow spindle 1 and actuated forwardly by the pressure dogs 8. These pressure dogs are actuated by the sliding cone 9 controlled by a suitable cam upon the machine.

Located within the chuck sleeve 7 and concentric therewith is the reciprocating feeding tube 10 carrying at its rear end the grooved collar 11 engaged by a cam controlled yoke by which the feed tube is reciprocated. The feed tube 10 is provided at its forward end with a stock engaging means which grasps the stock rod 6 and upon the forward movement of the feed tube during the period of relaxation or disengagement of the chuck 5 carries the stock rod 6 forward in unison with the feed tube to present the end of the rod beyond the chuck jaws 5 preparatory to the next machining operation. Such is the usual and customary operation of automatic screw machine feeding mechanism which per se forms no part of the present invention.

In lieu of the spring gripper fingers ordinarily provided at the forward end of the feed tube 10 there is provided in the present instance a tubular shell or nozzle 12 having at its extremity an inclined flange forming an internal shoulder 13. This shell 12 is not slotted as is usual but is continuous throughout its periphery. The shell 12 is screw threaded onto the end of the feed tube 10 which projects within the shell 12 with the end of the feed tube forming a second internal shoulder 14 in spaced relation with the terminal shoulder 13. Located within the shell 12 in proximate relation with the shoulders 13 and 14 are two abutment collars 15 which surround the stock rod 6. Also surrounding the rod 6 intermediate the abutment collars 15 is a split sleeve 16 of spring steel which tends to tightly contract upon and grip the rod 6. The sleeve 16 may be flush at its ends

and abut upon the lateral faces of the collars 15 as shown in Figs. 4 and 5 but the sleeve 16 is preferably flared or beveled at its ends as shown at 17 in Figs. 2 and 3. The abutment collars 15 are preferably provided with corresponding conical faces 18 in proximity to the rod 6 which engages within the flared or beveled ends 17 of the sleeve 16. While the split sleeve 16 firmly grasps the rod 6 upon which it contracts by its inherent elasticity with sufficient tension to carry the rod with the feed tube so long as the rod is free to move axially, the sleeve 16 will nevertheless slide or slip upon the rod when the rod is otherwise held against movement by the chuck jaws 5 or by the limiting stop 19 by which the protruding end of the stock necessary for each successive machine operation is measured and the advance of the stock rod arrested. It will be understood that the stock rod 6, the feed tube 10, the chuck 5, and chuck sleeve 7 all rotate in unison with each other and with the spindle 1.

In Fig. 1 the stock rod 6 is shown at the limit of its forward or feeding movement and in engagement with the stop 19. The stop rod 19 is then withdrawn and the protruding portion of the rod is operated upon by the various tools to form it to the desired shape and the formed portion is finally severed. The chuck jaws 5 however continue to hold the rod tightly within their grasp. During the machining operation the feed tube 10 is retracted. Since the rod 6 is tightly held by the chuck jaws it cannot move rearward with the feed tube consequently the feed tube and gripping sleeve 16 move relative to the rod 6. During this rearward movement the internal shoulder 13 bearing upon the forward collar 15 draws such collar forcibly against the forward end of the gripping sleeve 16, overcoming its frictional engagement with the rod and sliding the sleeve rearwardly thereon. During such differential movement of the gripping sleeve 16 and the stock rod 6 the sleeve is slightly relaxed by the wedging effect of the conical face 18 of the forward collar 15 within the beveled extremity 17 of the sleeve. The sleeve is thus expanded by the conical face 18, under influence of the strain induced by the resistance of the rod and the relative movement of the tube. During such retrograde movement of the parts the rearward collar 15 moves idly with the feed tube and sleeve. As the parts reach the rearward limit of their range of movement the chuck jaws 5 release the rod 6. There being no resistance to the advance of the rod the latter is carried forward with the feed tube under the pushing influence of the rearward collar 15 upon which the gripping sleeve abuts and which in turn is engaged

and urged forward by the internal shoulder 14. So long as the resistance to the forward movement of the stock rod 6 is insufficient to overcome the gripping tension of the sleeve 16 the rod will continue to advance in unison with the feed tube. However, when the end of the rod 6 engages the stop arm 19 and is arrested thereby, the resistance offered by the stop arm being greater than the gripping tension of the split sleeve 16 the latter will be pushed forward upon the rod 6 to accommodate any further movement of the feed tube if such occurs. However, ordinarily the regulating cam will be adjusted to arrest the feed tube in proper time with the arrest of the rod by the stop 19. In any event the sliding or slipping movement of the gripper sleeve in relation with the rod in either direction is facilitated and the gripping tension slightly relieved by the wedging or camming action of the cone face 18 within the beveled end 17 of the sleeve. However, such camming action may be entirely omitted by forming the abutting faces of the collars 15 and the ends of the sleeve 16 perfectly flat or in planes perpendicular to the axis of the main feed tube. While the invention has been shown and described as applied to round stock it is to be understood that it is to be equally applicable to polygonal rods or bars in which case the split sleeve 16 will likewise be of polygonal form to agree with the contour of the rod.

The gripper sleeves 16 may be made of any suitable length according to conditions of use, the size and weight of the stock operated upon, and other governing factors. Such form of stock gripping device affords a frictional engagement of much greater extent than the usual spring fingers. The gripping effect is thus materially increased and at the same time by the extended uniform bearing the wear upon the feeding parts is materially reduced.

The subject matter herein described is further shown and described in modified form in a companion application for Letters Patent Serial No. 669715, filed October 20, 1923.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is

not limited to the specific details shown, but that the means and construction herein disclosed comprises the preferred form of several modes of putting the invention into effect and the invention is, therefore, claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. In a construction of the character described, a reciprocatory feed tube through which a rod of stock to be intermittently advanced extends, a split spring sleeve surrounding the stock within the tube and grasping the stock by the inherent tension of the sleeve said sleeve being operatively engaged upon longitudinal movement of the tube to advance the stock therewith and pressure operated means for expanding the sleeve against its inherent tension to release its grasp upon the stock upon resistance of the stock to advance movement.

2. In a construction of the character described, a reciprocatory feed tube through which a rod of stock to be intermittently advanced extends, a pair of spaced collars loosely surrounding the rod of stock within the tube, a pair of abutment shoulders carried by the tube and engaging the extreme faces of the collars, and a split spring sleeve grasping the rod of stock by the inherent spring tension of the sleeve, said split sleeve being interposed between the collars and abutted by the mean faces thereof as the tube is moved to and fro.

3. In a construction of the character described, a reciprocatory feed tube, through which a rod of stock to be intermittently advanced extends, a spring sleeve independent of the tube located interiorly thereof, and of less external diameter than the interior diameter of the tube grasping the rod of stock within the tube by the inherent tension of the sleeve and an operative connection between the sleeve and tube by which the sleeve and rod are advanced in unison so long as the rod is free to move and thereafter the sleeve is slidingly adjusted upon the rod against the frictional engagement of the sleeve with the rod by the movement of the tube in relation with the rod.

4. In a construction of the character described, a reciprocatory feed tube, through which a rod of stock to be intermittently advanced extends, a contractile member independent of said tube surrounding the rod of stock, and engaged therewith by its contractile tendency said rod and contractile member being capable of rotation independent of the feed tube and a pushing member carried by the tube and abutting the contractile member to shift said contractile member axially and with it the rod so long as the resistance to the movement of the rod

is insufficient to overcome the frictional engagement of the contractile member upon the rod, said contractile member being slid-
 5 ingly adjustable upon the rod under influence of the moving tube whenever resistance to movement of the rod is greater than the frictional engagement of the contractile member thereon.

5. In a construction of the character described, a reciprocatory feed tube, through
 10 which a rod of stock to be intermittently advanced extends, a split spring sleeve independent of the tube surrounding the rod and grasping it by the inherent tension of
 15 the sleeve, a pushing member carried by the tube and engaging the sleeve to shift the sleeve and with it the rod, and means for automatically relaxing the engagement of the sleeve upon the rod upon resistance to
 20 the movement of the rod being encountered.

6. In a construction of the character described, a reciprocatory feed tube, through
 25 which a rod of stock to be intermittently advanced extends, spring tension means carried by the tube frictionally engaging the rod to advance the rod when the tube is moved in one direction, and means for auto-
 30 matically relaxing the tension of said engaging means upon retrograde movement of the tube.

7. In a construction of the character described, a reciprocatory feed tube, through
 35 which a rod of stock to be intermittently advanced extends, a split spring sleeve surrounding the rod and grasping it by the inherent tension of the sleeve, an operative connection between the sleeve and tube by
 40 which the sleeve and engaged rod are advanced in unison with the movement of the tube, and means for effecting expansion of the sleeve to release its engagement upon the
 45 rod upon retrograde movement of the tube.

8. In a construction of the character described, a reciprocatory feed tube, through
 50 which a rod of stock to be intermittently advanced extends, a split spring sleeve surrounding the rod and grasping it by the inherent tension of the sleeve, an operative
 55 connection between the sleeve and tube by which the sleeve and engaged rod are advanced in unison with the movement of the tube, and means for effecting expansion of the sleeve to release its engagement upon the
 60 rod upon encountering excessive resistance to the movement of the rod in either direction.

9. In a construction of the character described, a reciprocatory feed tube, through
 65 which a rod of stock to be intermittently advanced extends, a split sleeve surrounding the rod and grasping it by the inherent tension of the sleeve, said sleeve being internally beveled at its opposite ends, a pair of spaced collars loosely surrounding the
 70 rod at opposite ends of the sleeve, tapered

inturned faces upon said collars engaging
 75 with the internally beveled ends of the sleeve to shift said sleeve and with it the rod in longitudinal direction, said tapered faces
 80 being adapted upon resistance to longitudinal movement of the rod and sleeve to enter within the beveled ends of the sleeve and thereby expand the sleeve and relieve
 85 its tensioned engagement with the rod, and oppositely disposed abutment shoulders
 90 upon the tube engaged by the collars to transmit the movement of the tube to the sleeve.

10. In a construction of the character described, a reciprocatory feed tube, through
 95 which a rod of stock to be intermittently advanced extends, a split sleeve surrounding the rod and grasping it by its inherent tension, and a wedge member pressed into engagement with the sleeve by the movement
 100 of the tube by which the sleeve and rod are advanced so long as little resistance is offered to such movement, the said wedge member acting by its wedging action to expand the sleeve and relieve its tensioned
 105 grasp of the rod upon resistance to movement of the rod being encountered.

11. In a construction wherein a rod of stock is intermittently advanced through a
 110 reciprocatory feed tube in unison with the movement of said tube in one direction, characterized by an expansible and contractile gripping sleeve grasping the rod of stock by inherent tension of the sleeve, and
 115 means for forcibly expanding said sleeve against its inherent tension to release the rod upon retrograde movement of the tube.

12. In a construction wherein a rod of stock is intermittently advanced through a
 120 reciprocatory feed tube in unison with the movement of said tube in one direction characterized by an expansible and contractile gripping sleeve grasping the rod of stock by inherent tension of the sleeve, and pressure operated means for forcibly expanding
 125 the sleeve to disengage it from the rod when unison movement of the rod is resisted.

13. In a construction wherein a rod of stock is intermittently advanced through a
 130 feed tube in unison with the movement of the tube in one direction, characterized by an expansible and contractile feed chuck, clutching the rod of stock by its contraction thereon during advance movement of the
 135 tube, and strain operated means for automatically expanding such feed chuck to release its engagement upon the rod of stock during retrograde movement of the feed tube.

14. In a construction wherein a rod of stock is intermittently advanced through a
 140 feed tube in unison with the movement of the tube in one direction, characterized by an expansible and contractile feed chuck, 130

and means for controlling the expansion and contraction of the feed chuck by the resistance of the feed rod to unison movement, whereby the inability of the rod of stock to move with the chuck will effect a relative expansion of the chuck to release its engagement upon the rod.

15. In a construction of the character described, a reciprocatory feed tube thru which a rod of stock to be intermittently advanced extends, a split spring sleeve surrounding the stock within the tube and grasping the stock by the inherent tension of the sleeve, the sleeve and tube normally moving in unison, the tube being capable of limited axial movement, independent of the sleeve upon resistance to movement of the latter, and pressure operated means, controlled by such relative movement of the tube and sleeve for expanding the sleeve.

16. In a construction of the character described, a reciprocatory feed tube, thru

which a rod of stock to be intermittently advanced extends, a spring sleeve independent of the tube grasping the rod of stock within the tube by the inherent tension of the sleeve and an operative connection between the sleeve and tube by which the sleeve and rod are advanced in unison with the tube so long as the rod is free to move, the tube being capable of movement relative to the sleeve upon meeting resistance to the movement of the rod and pressure operated means to expand the sleeve to effect the relaxation of the grasp of the sleeve upon the rod, the further movement of the tube and sleeve being effected in unison and independent of the rod.

In testimony whereof, I have hereunto set my hand this 23rd day of July A. D. 1923.

GEORGE J. KALBERER.

Witnesses:

M. A. CONRAD,
E. J. WEIGEL.