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AUTOMATIC MACHINE FEED MECHANISM

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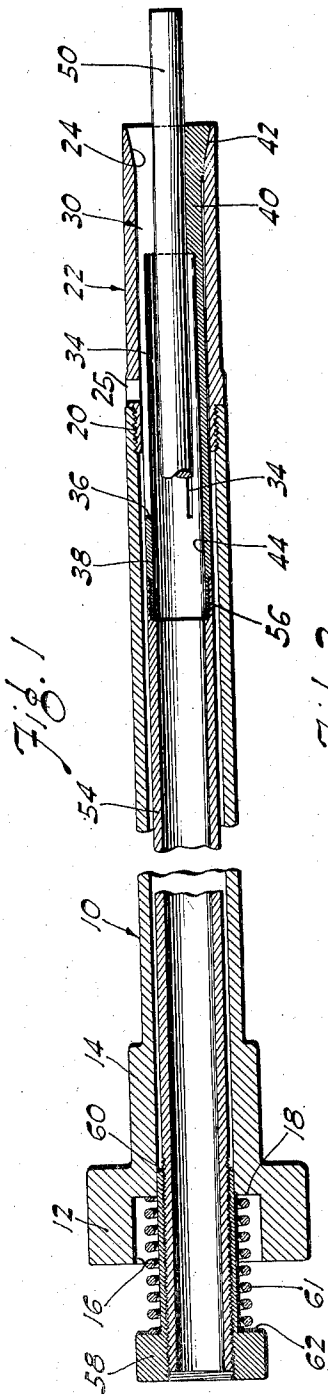


Fig. 1

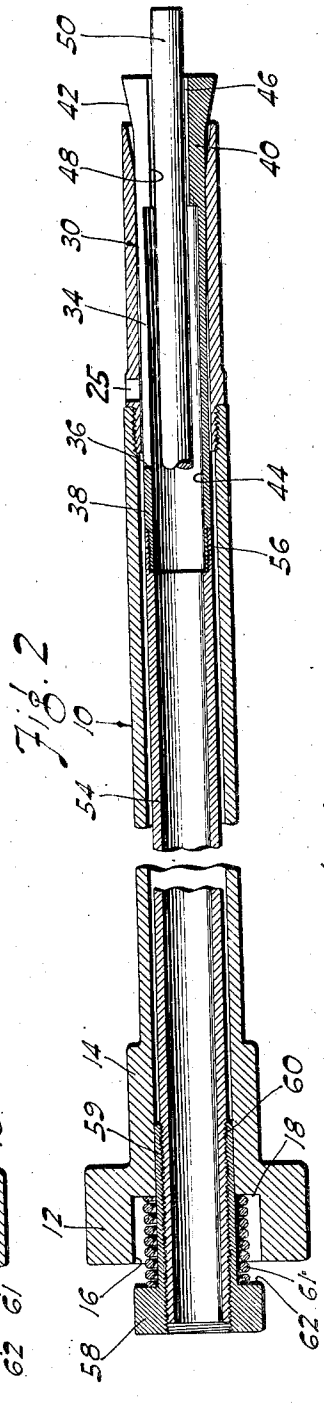


Fig. 2

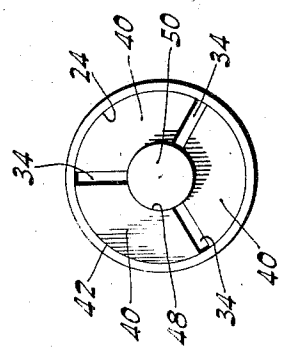


Fig. 3

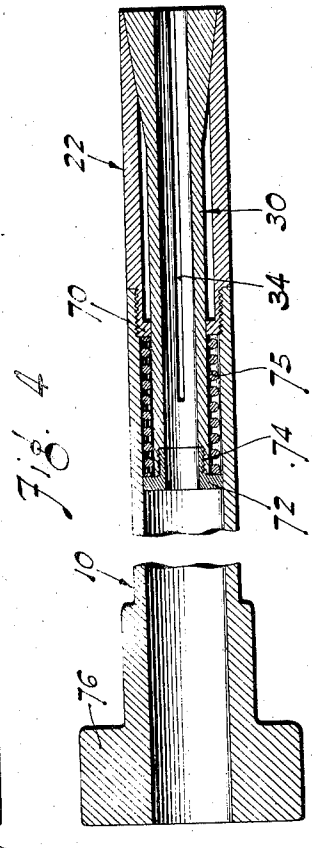


Fig. 4

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AUTOMATIC MACHINE FEED MECHANISM

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5 Claims. (Cl. 29—62)

This invention relates to automatic stock feeding mechanism for use in conjunction with revolving or stationary spindles as are used in multiple and single spindle type automatic machines such as screw machines and lathes.

One object of the invention is to provide an improved stock holding mechanism which will efficiently operate to intermittently feed stock through a machine of this type and to intermittently release and grip the stock without scoring or deforming the latter.

Another object of the invention is to provide a stock feeding mechanism of an improved type that is adapted for use in conjunction with machines of conventional design in common use today, and which may be conveniently adjusted by the operator of the machine to various degrees of stock gripping tension, such as may be required in operating at various spindle speeds, and on various sizes of stock and in connection with different lengths of feed out.

Another object of the invention is to provide an improved stock holding device adapted for use as a feeding mechanism for automatic machines of the type described, which is conveniently releasable at will by the operator of the machine for adjustment of the stock in the feed device.

Another object of the invention is to provide a stock feed mechanism adapted to permit proper relative movement of the stock to assume proper adjusted feed out positions, but to prevent relative movement therebetween as a result of recoil forces.

Another object of the invention is to provide in a stock feeding mechanism stock gripping fingers adapted to automatically compensate for wear therein, whereby the device maintains its operating effectiveness throughout extended periods of time.

The invention is exemplified in a construction comprising a conventional style of feeder tube provided at its forward end with a tapered feed finger actuating portion and a tubular thrust member telescopically disposed within the feeder tube. The thrust member is provided at its forward end with resilient stock gripping fingers adapted to clamp the stock therebetween when moved rearwardly relative to the feeder tube and between the inclined surfaces thereon. A resilient member mounted between the feeder tube and the feed finger thrust tube normally maintains them in stock gripping relation, but allows for momentary release of the stock at the start of the withdrawal stroke of the feeder tube, thus permitting momentary release and retreat of the feeder tube relative to the stock to a new position of gripping, without scoring the stock.

Adjustment means to vary the tension of the resilient member are provided in a conveniently disposed form so that the gripping tension of the feed fingers on the stock may be adjusted to suit different sizes of stock and different operating conditions without disassembling the device. Means for quickly disengaging the feed fingers from the stock are also provided in a conveniently disposed position whereby the operator may release the stock from the device to make adjustments of its position therein.

In the drawing:

Fig. 1 is a fragmentary longitudinal sectional view of a device incorporating the invention, showing the parts in stock gripping position;

Fig. 2 is a fragmentary longitudinal sectional view through the device illustrated in Fig. 1, showing the parts in released position;

Fig. 3 is a view of the forward end of the device as shown in Fig. 1;

Fig. 4 is a view similar to Fig. 1 of another form of construction incorporating the invention.

Referring to Figs. 1, 2 and 3, a feeder tube 10 is provided at its rear end with an annular shoulder member 12 and a reinforcing portion 14. The shoulder end of the feeder tube 10 is counterbored as at 16 to a diameter larger than the tube bore, thus providing an internal shoulder 18. The forward end of the feeder tube 10 is internally threaded for threaded connection as at 20 with one end of an annular nose piece 22, which is made of special hardened steel or other wear resisting metal. The nose piece 22 is counterbored at its outer end 24 to provide therein an accurately machined conical shaped camming surface 24.

A tubular feed chuck 30 is arranged in telescopic relation within the forward end of the feeder tube 10 and the nose piece 22, and comprises a generally tubular shaped body portion provided with a series of longitudinal slots 34 spaced radially of the chuck and extending from the forward end thereof to intermediate points 36. There is thus provided a chuck member comprising an uninterrupted body portion 38 and a plurality of forwardly extending feed fingers 40. The feed fingers 40 are formed adjacent their outer ends with tapered outer surfaces 42, which are complementary to the shape of the working surface 24 of the nose piece. The feed chuck 30 is formed with an internal central bore 44 extending from the rearward end through an intermediate portion thereof and a similar bore

46 through the forward end, but of a smaller diameter. There is thus provided, interiorly of each of the feed fingers 40, an arcuate stock gripping surface 48, and the feed chuck member 30 is adapted to grip a section of stock 50 between the opposed arcuate surfaces 48 whenever the feed fingers 40 are pressed inwardly toward the longitudinal axis of the chuck. The elements of the chuck 30 are so made that the natural resiliency of the material forming the feed fingers 40 tends to urge their forward ends outwardly away from the chuck axis to a position as shown in Figure 2. Movement of the chuck 30 toward a completely enclosed position within tube 10 will, by reason of the co-action of the working surface 24 and the flared end portions 42 of the feed fingers, force the feed fingers inwardly and into a stock gripping position, as shown in Figure 1.

Thus, actuation of the feed chuck member 30 in reverse directions longitudinally of the feeder tube 10 will cause the feed fingers 40 to alternately grip and release the bar of feed stock 50 disposed within the device. The mechanism for actuating the feed chuck relatively to the feeder tube is shown as comprising a tubular thrust member 54, engaging at its forward end by means of screwthreads 56 the rearward end of the feed chuck 30. At its rearward end, the thrust tube 54 supports a sleeve 59 which is threaded thereon as at 60 for relative longitudinal adjustment. A finger piece 58 in the form of an annularly extending flange is formed on the sleeve 59, thus providing a shoulder 62. A coil spring 61 is arranged between the shoulder 18 and the shoulder 62 and is so dimensioned as to normally urge the shoulder 12 and the finger piece 58 apart. Thus, means are provided for constantly and automatically urging the thrust member 54 toward the rear end of the feed tube 10, and to maintain the feed fingers 40 in clamping relation upon the bar of feed stock 50. The tension of the spring 61 may be conveniently varied by the operator of the device by turning the finger piece 58 to increase or decrease the tension, as the case may require. An opening as at 25 is provided through a wall portion of the feed tube to permit access therethrough to the slot 34 of the feed chuck 30, by some suitable tool such as a screw driver or the like. Thus, when it is desired to vary the tension adjustment of the spring 61, a screw driver may be inserted through the opening 25 and into engagement with one of the slots 34 as a means of holding the feed chuck 30 against axial rotation when the finger piece 58 is being turned by the operator. Also, springs of different characteristics may be substituted in the place provided for spring 61 if it is necessary to do so to obtain the desired results.

In operation, the device in assembled form is adapted to be fitted into any conventional type of automatic machine spindle, and to receive therethrough a bar of feed stock for presenting the extending end thereof to the tool of the machine. The shoulder member 12 of the device provides means for cooperation with the cam member (not shown) of the machine for transmitting alternating feed out and retreating movements to the feed tube 10 whereby intermittent feed out movements are imparted to the stock bar 50. Fig. 1 illustrates the device when in stock gripping position. When the machine cam bears against the shoulder 12 to move the feed tube 10 rearwardly or to the left as viewed in the drawing, a momentary inherent adhesion between the stock bar 50 and the finger contacting surfaces 48 retards a corresponding rearward movement of the feed chuck 30, the relative movement between the feeder tube 10 and the thrust tube 54 being taken up by the spring 61. Thus, the device is moved toward a position as illustrated in Figure 2 wherein the feed fingers 40 release the stock bar 50 by reason of their resiliency. The tension of the spring 61, however, causes the thrust tube 54 and the feed chuck 30 to follow the feed tube 10 in lagging relation to a new stock gripping position, from whence it will be moved forwardly again by the cam of the machine to feed out a new section of stock to the tool of the machine.

Thus, means are provided for an automatic, clean-cut release of the stock by the feed fingers simultaneously with the beginning of the withdrawal stroke of the feeder tube, whereby the feed stock is not marred by relative longitudinal movement between the feed fingers and the stock while the feed fingers are held in clamping relation thereon.

The extending finger piece 58 provides means for conveniently releasing the stock from the feed fingers 40, whereby the operator of the machine may merely press the piece 58 forwardly against the action of the spring 61 to a position as shown in Figure 2, thus releasing the stock from the fingers 40. Thus, adjustments of the relation of the bar of stock in the device may be readily made without subjecting the stock to forces which might otherwise mar or otherwise deform the bar and necessitate interruption of the operation of the machine. Obviously, the piece 58 is adapted with equal facility to be actuated in response to movements of a mechanically operated element of the machine upon which the device may be installed, in lieu of the manual manipulation described hereinbefore, to provide for an automatic total release of the stock at the beginning of each withdrawal stroke of the feed fingers 40.

Fig. 4 illustrates another form of construction of the feed chuck member, wherein the nose member 22 is provided with an internally extending annular shoulder 70 adjacent its rear end, and the feed chuck member 30 is provided adjacent its rear end with an outwardly extending flange member 72 threaded thereon as at 74. A coil spring 75 is thus adapted to be received between the shoulders 70 and 72 and about the chuck 30 and within the feeder tube 10. This form of the device functions in a manner identical to that of the form shown in Figs. 1 and 2 with the exception that no tension adjustment means for the spring 75 is provided. However, this construction has the advantage of being completely enclosed, and may be preferred by some operators.

Although only one form of the invention has been shown and described in detail, it will be apparent to those skilled in the art that the invention is not so limited but that various changes can be made therein without departing from the spirit of the invention or from the scope of the appended claims.

What is claimed is:

1. In a stock feeding mechanism for an automatic machine, a tubular retaining member responsive to motions of an element of said machine toward withdrawn and feed out positions, a tubular stock carrying member slidable within said retaining member and provided at one of its ends

with extending resilient stock gripping finger portions disposed concentrically within said retaining member, a coil spring disposed between axially opposed shoulder portions of said retaining member and said carrying member and normally maintaining said fingers and said retaining member in predetermined axial relation and providing a lagging motion connection between said retaining member and said fingers, and adjustment means associated with the shoulder portion of said carrying member for varying the tension within said coil spring.

2. In a stock feeding mechanism for an automatic machine, a tubular retaining member responsive to motions of an element of said machine toward withdrawn and feed out positions and having a cam portion thereon, stock gripping fingers connected to a tubular stock carrying member slidably mounted within said retaining member and adapted to be urged inwardly toward stock gripping positions by said cam portion upon relative longitudinal movement of said retaining member and said stock carrying member and arranged concentrically within said retaining member, resilient means disposed between opposed shoulder portions formed on said retaining member and said carrying member for urging the aforesaid members longitudinally relative to one another to normally maintain said fingers in stock gripping positions, said resilient means providing a lagging motion connection between said retaining member and said fingers, and adjustment means associated with one of said shoulder portions for varying the tension within said resilient connecting means, and a manually operable control element for said adjustment means extending beyond said retaining member for convenient manipulation by the operator of the machine for adjusting the tension within said resilient connecting means.

3. In a stock feeding mechanism for an automatic machine, a tubular retaining member responsive to motions of an element of said machine toward withdrawn and feed out positions, stock gripping fingers mounted upon a second tubular member arranged concentrically within said retaining member in such manner that said stock gripping fingers bear against an inner portion of said retaining member and said second tubular member being of lesser diameter and spaced from the inner wall of said retaining member, an adjustment nut arranged upon said second tubular member in screwthreaded relation thereon and comprising a tubular body portion partially disposed within the space between said retaining member and said second tubular member and comprising a positioning or bearing element therebetween and an outwardly extending flange providing a shoulder opposed to an end wall of said retaining member, a coil spring disposed between an end wall of said retaining member and said shoulder of said adjustment nut.

4. A feed mechanism for an automatic machine comprising an outer tubular body member having an internal conical surface, a gripping element disposed within said outer body member and comprising a general annular shaped body portion having separated gripping fingers extending axially at one end thereof, said gripping fingers having enlarged end portions for contacting said internal conical surfaces of said outer body, an internal flange extending inwardly from the inner wall of said outer body member to provide a shoulder and a concentric bearing for mounting and guiding said gripping element in spaced relation with respect to said outer body member, a second flange extending radially outwardly from said gripping element in spaced relation with respect to said first mentioned flange and providing a shoulder and a bearing element for positioning and guiding said gripping element concentrically within said outer body member, a coil spring disposed about said gripping element and within said outer body member and having its opposite ends abutting the shoulders of said first and said second mentioned flanges for normally urging said outer body member and said gripping element in one direction of relative axial movement for resiliently maintaining said gripping finger in stock gripping position.

5. In a stock feeding mechanism for an automatic machine, a tubular retaining member responsive to motions of an element of said machine toward withdrawn and feed out positions and being provided with a camming portion, a second tubular member slidably mounted within the first mentioned tubular retaining member and provided at one of its ends with axially extending stock gripping fingers arranged concentrically within said retaining member and adapted to bear against said cam portion and to be actuated inwardly thereby toward stock gripping positions, a manual adjustment nut mounted in screwthreaded relation thereon adjacent the other end of said second mentioned tubular member, a coil spring having one of its ends bearing against said adjustment nut and the other of its ends bearing against an end wall of said retaining member, said retaining member being preformed with an opening through a wall portion thereof to permit access to the interior of the mechanism by means of a tool for holding said second mentioned tubular member against axial rotation when said adjustment nut is rotated thereon during adjustments of the tension of said spring.

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