Oct. 27, 1953 W. B. RETZ 2,656,859

STOCK FEED MECHANISM

Filed Oct. 12, 1950

3 Sheets-Sheet 1

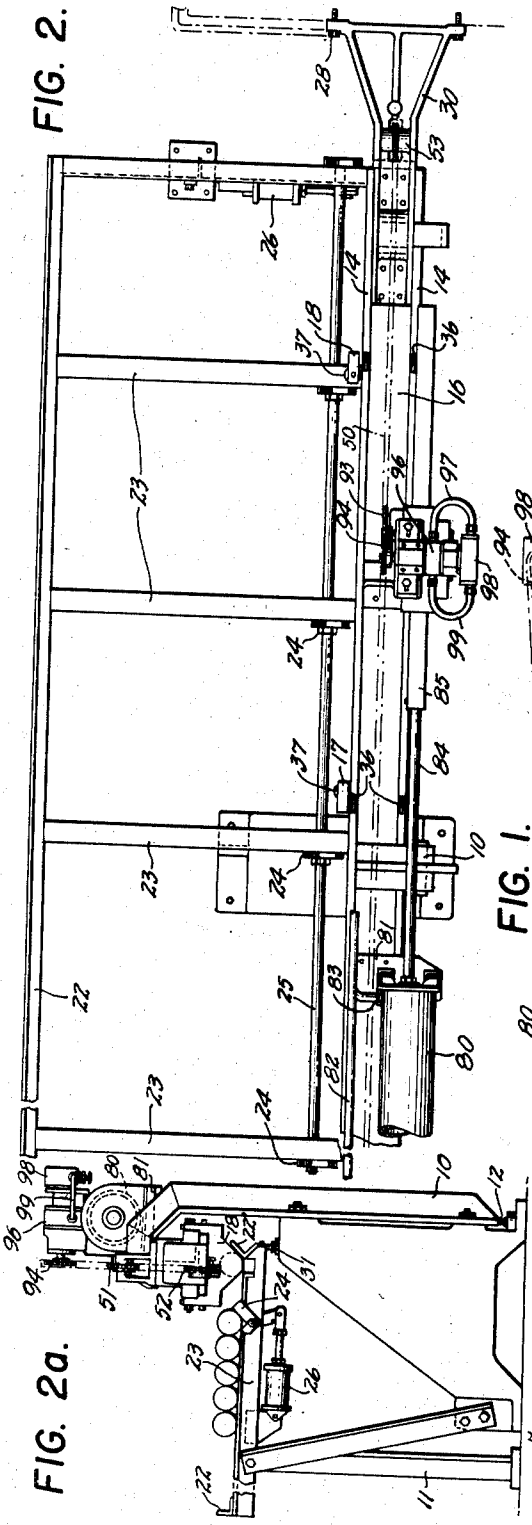


FIG. 2.

FIG. 2a.

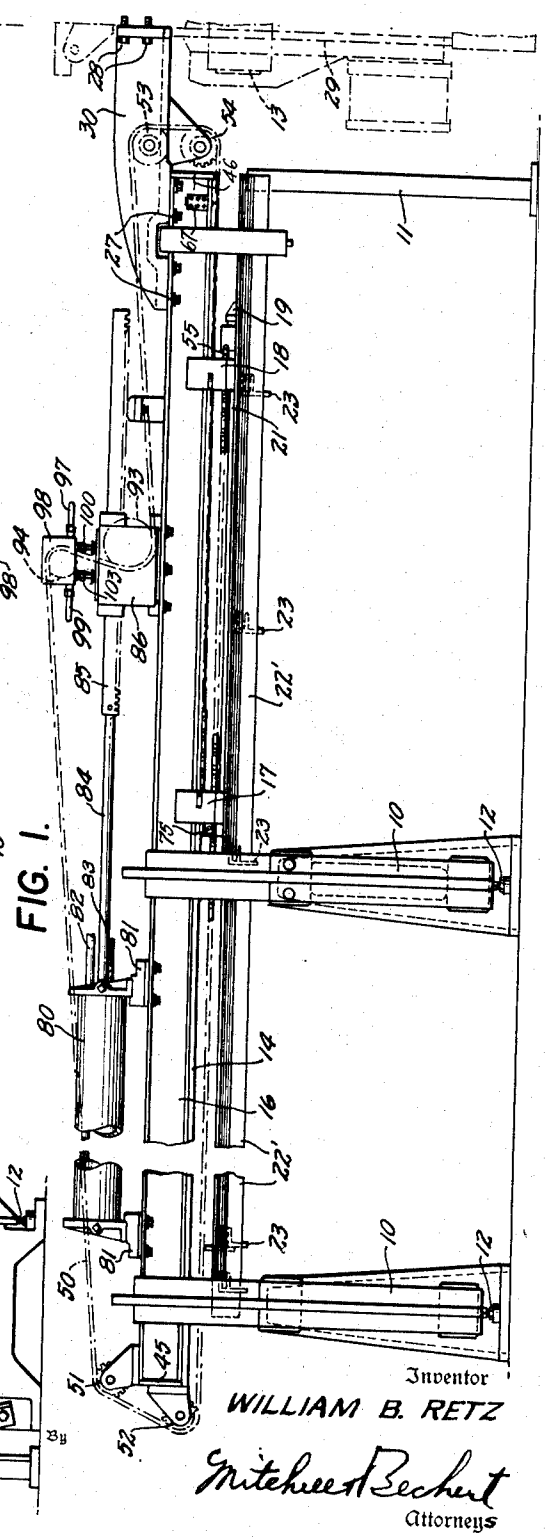


FIG. 1.

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FIG. 3.

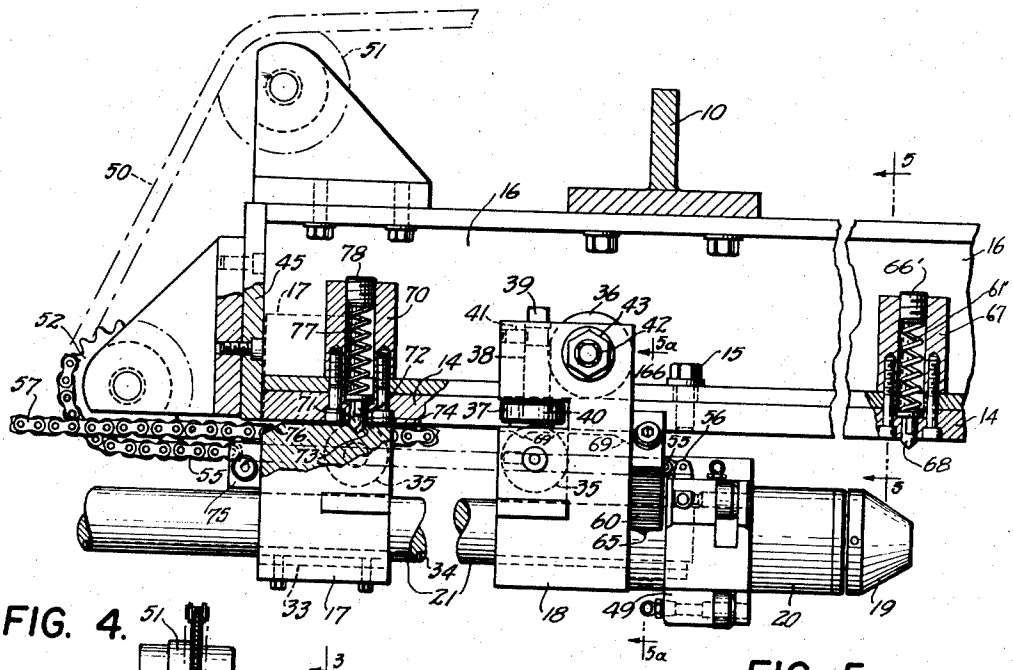


FIG. 4.

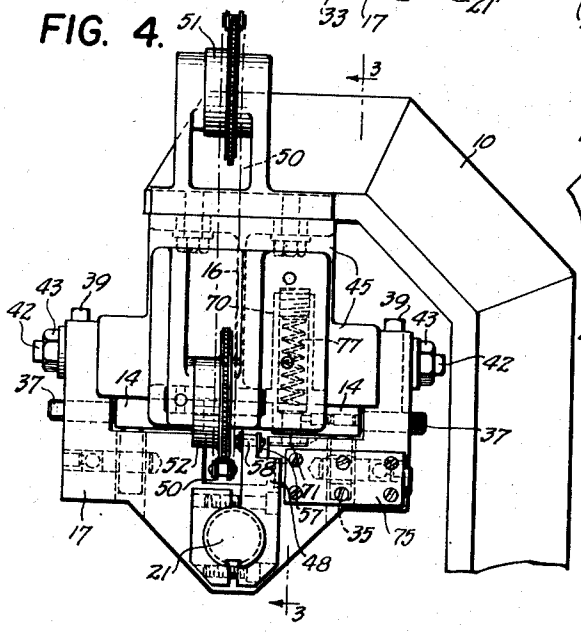
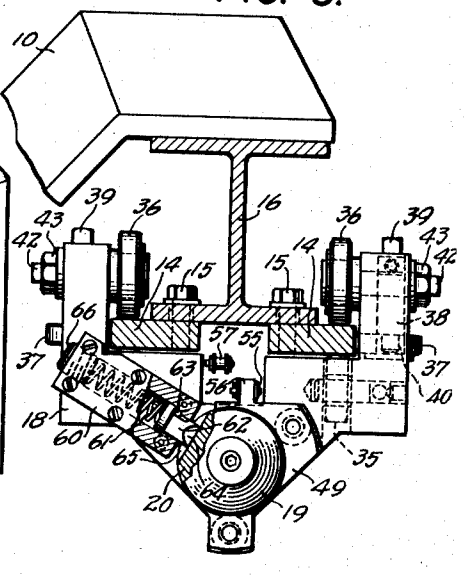


FIG. 5.



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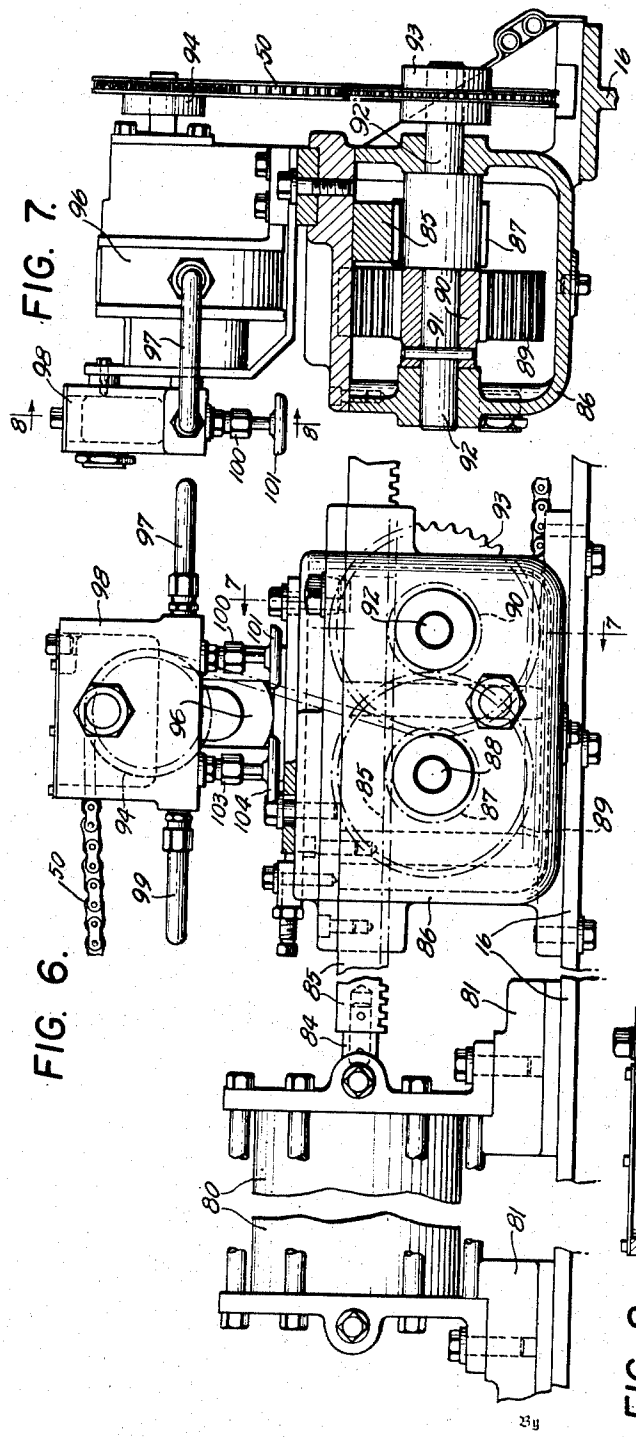


FIG. 7.

FIG. 6.

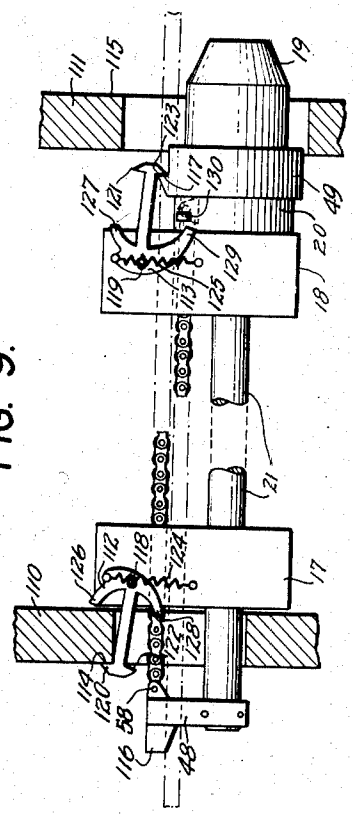


FIG. 9.

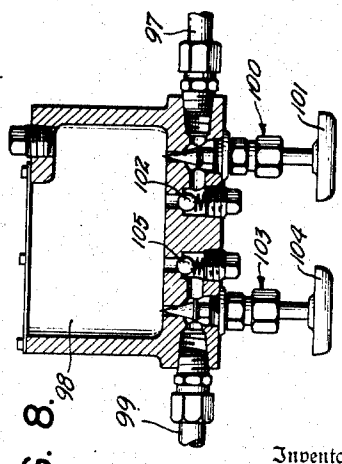


FIG. 8.

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Patented Oct. 27, 1953

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UNITED STATES PATENT OFFICE

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STOCK FEED MECHANISM

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Application October 12, 1950, Serial No. 189,727

21 Claims. (Cl. 140—128.2)

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My invention relates to automatic stock-feeding mechanisms for bar machines or the like.

It is an object of the invention to provide an improved device of the character indicated.

It is another object to provide an improved stock-feeding mechanism of limited longitudinal length and yet providing for accommodation of maximum-length bar stock.

It is also an object to provide automatic means for limiting the rate of feed in a mechanism of the character indicated so that, regardless of the size and weight of the unconsumed length of stock to be fed, the rate of feed may be held substantially constant.

It is a further object of the invention to provide an improved stock-feeding mechanism wherein the pusher member which directly feeds the stock is longitudinally extendable out both ends of the frame of the mechanism, so that stock may be fed well into the spindle, and so that stock lengths approaching the length of the framework of the mechanism may be accommodated.

It is a further object to meet the above objects with a mechanism wherein the widest longitudinally based support of the pusher member is provided at all times.

Other objects and various further features of novelty and invention will become apparent to those skilled in the art from a reading of the following specification in conjunction with the accompanying drawings. In said drawings, which show, for illustrative purposes only, preferred forms of the invention:

Fig. 1 is a view in side elevation of a stock feeding mechanism embodying features of the invention;

Fig. 2 is a partly broken-away, simplified, plan view of a stock-feeding mechanism shown in Fig. 1;

Fig. 2*a* is a rear or left-end view of the arrangement of Fig. 1;

Fig. 3 is an enlarged, fragmentary, partly sectionalized view of the rear end of the feeding mechanism of Fig. 1, with the pusher means located near the rear end, the sectionalized parts being shown more or less in the plane 3—3 of Fig. 4;

Fig. 4 is a rear or left-end view of the parts of Fig. 3;

Fig. 5 is a partly sectionalized, front or right-end view of the parts of Fig. 3, as viewed from the plane 5—5 of Fig. 3 and with certain parts broken-away and in section in the plane 5*a*—5*a* of Fig. 3;

Fig. 6 is an enlarged, fragmentary, side elevation of other parts of the mechanism of Fig. 1;

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Fig. 7 is a right-end view of the parts of Fig. 6, with certain parts shown in section along the line 7—7 of Fig. 6;

Fig. 8 is an enlarged sectional view in the plane 8—8 of Fig. 7; and

Fig. 9 is a schematic representation of an alternative arrangement of certain parts of Fig. 3.

Briefly stated, my invention contemplates an improved stock-feeding mechanism for feeding bar or the like stock to a machine such as a lathe. Necessarily, the stock-feeding mechanism accommodates the bars to be fed at the rear end of the machine, and in order that the last usable piece of stock may be automatically fed, my feeding mechanism includes an extendable pusher of the general type disclosed in U. S. Patent No. 2,555,753, granted June 5, 1951, to Donald H. Montgomery. In order that bars of maximum length may be accommodated by the feeding mechanism, this pusher is also extendable out the rear end of the feeding mechanism, and in accordance with the invention such extension out both ends of the feed mechanism is accomplished automatically. My mechanism provides improved automatic means for assuring that support for the pusher shall be of the greatest possible longitudinal base, whatever the longitudinal position of the pusher; in one form, this automatic means contemplates use of appropriate selectively operating detent means and, in another form, positive or dog latches are employed.

As a further feature, my invention also contemplates an improved means for transmitting feeding or driving forces from a motor to the pusher. This feed means is applied in such a way that, regardless of whether the pusher is extended out the rear end of the feed mechanism (and thus has a maximum length piece of stock to push) or whether the pusher is extended into the spindle (and thus has a minimum length piece of stock to advance), the feeding movement will be at substantially constant speed. Simple means are provided for adjustably regulating this desired constant speed, as for minimum bounce upon striking a stock stop. The mechanism may further include means for adjustably selecting a desired retraction speed for the feed mechanism, so as automatically to return the pusher, and this retracting or return feed may project the pusher beyond the rear end of the mechanism, in readiness for accommodation of a maximum length new piece of stock, with a minimum consumption of time.

Referring to the drawings (Figs. 1–8), my invention is shown in application to a feeding mechanism including a longitudinally extending

frame, comprising a table resting upon longitudinally spaced supports or pedestals 10—11. The supports may include adjustable means 12 for adjustably leveling elongated guide means with respect to the axis of the spindle 13 of the machine to be fed. The guide means may comprise transversely spaced rails 14 (Fig. 5) secured, as by bolts 15, to the lower flanges of a suitable rigid frame member or I-beam 16. The I-beam 16 is shown suspended from the pedestals 10. The rails 14 may serve to support and to guide two spaced carriages 17—18 providing longitudinally spaced support for the pusher means.

The pusher means may include a nose 19 revolubly supported in a head 20 at the forward end of the pusher bar 21 and in axial alignment with the spindle 13. The bar 21 is preferably elongated, and the pusher nose and head 19—20 may be of a diameter to clear the bore of the spindle 13. The length of bar 21 may be such as to permit a fully extended projection of the nose 19 into the collet or chucking means (not shown) of the machine being fed so that there may be utmost consumption of the stock, and such projection may be accomplished with no loss of locating support by means of carriages 17—18.

The table for supporting the bars of stock awaiting feeding may comprise a framework of longitudinal and transverse members 22—22'—23, which may be set slightly inclined from the horizontal so as to permit bars to roll, one by one, down into a stock-feeding position. The bars may be retained from rolling by means of a plurality of spaced retaining fingers 24 (Fig. 2a), all of which may be connected to a longitudinally extending actuating rod 25. Each of the fingers 24 may be in the nature of a bellcrank with both arms generally upwardly extending so that, upon a limited rotary reciprocating cycle thereof, one bar may be released at a time from the magazine and allowed to roll into a stock-feeding position, at which position one of the longitudinal frame members 22' may properly stop and locate the newly loaded bar. A simple double-acting fluid-pressure cylinder 26 may provide the necessary rocking action for the bar 25 and trip fingers 24, as will be understood. Once the framework has been elevated (by means of jacks 12) into correct alignment with the spindle 13, bolts or other means 27—28 may be secured so as to hold the I-beam 16 of the guide means rigidly to the back frame 29 of the machine, as by means of a bracket 30; minor elevation adjustments, as when necessary to align a new and different stock size with the spindle, may be made by jacking adjustments of the table 22—22'—23, as at 31 (Fig. 2a).

As indicated, each of the carriages 17—18 may carry aligned guide means for accurately locating the pusher bar 21 on the spindle axis. In the form shown, the pusher bar 21 is cylindrical, and the guide means in each of the carriages 17—18 is a plain cylindrical bore. For purposes which will later be clear, the pusher bar 21 is non-rotatably supported in the carriages 17—18; a spline 33 in the rear carriage is shown engaging a longitudinal key slot or groove 34 in the pusher bar 21 to prevent any possible rotation of the bar 21.

To promote relative ease of movement of carriages 17—18 on the rails 14, a roller suspension may be provided in each case. This roller suspension contemplates positive location of the

thrust or pusher axis in both the horizontal and vertical transverse planes. Thus, the forward carriage may have two lower rollers 35 for separate engagement with the underside of the rails 14, and two upper rollers 36 for separate engagement with the upper side of rails 14. Two side rollers 37 may engage the outer exposed edges of the rails 14. In order to eliminate transverse play in the positioning of the thrust axis with respect to the rails 14 provision may be made for the adjustable reduction of such play; in the form shown, I employ a pin 38 having an exposed adjustment head 39 and an eccentric-shaft portion 40 (Figs. 3 and 5) for the roller 37. Set-screw means 41 may retain a given lateral adjustment for the roller 37. In the same way a head 42 in conjunction with lock-nut means 43 may serve to adjustably secure an eccentric placement of the roller 36, as will be understood.

In order to limit travel of the carriages 17—18 with respect to the guide means 16 and with respect to the pusher bar 21, limiting abutments may be provided; an end plate 45 (Fig. 3) may be welded or otherwise secured over the rear end of the I-beam 16 and rails 14, and a similar end plate 46 at the forward end may limit travel of the forward carriage 18. To limit movement of the carriages 17—18 with respect to the pusher bar, I show an abutment member 48 (Fig. 9) at the rear end of the pusher bar 21 and an enlargement 49 (Figs. 3 and 5) adjacent to head 20 at the forward end.

In accordance with a feature of the invention, means are provided for a positive direct application of feeding thrust to the pusher means regardless of the longitudinal position of the pusher means and regardless of the direction of travel of the pusher means. Such feed means may utilize a flexible cable looped over the ends of the framework of the mechanism and rigidly fastened to both ends of the pusher. In the form shown, I employ a sprocket chain 50, but it will be understood that metal tape, cable, or other flexible means may also serve the purpose.

The sprocket chain 50 is shown as a single loop supported at the rear end by pulleys or idler sprockets 51—52, and at the forward end by pulleys or idler sprockets 53—54. The free end 55 of the chain 50 which is adjacent the rear sprocket 52 (Fig. 3) is preferably attached to the pusher means at a forward location, as at 56 on the enlarged head 49. The other free end 57 of the sprocket chain 50, that is, the end which is adjacent the forward sprocket wheel 54, is preferably attached to the pusher means toward the rear end thereof, as at 58 on the abutment 48 (Fig. 9). As shown clearly in Figs. 2 and 3, the orientation of sprockets 52—54 with respect to the points of attachment 56—58 of the chain ends 55—57 to the pusher is preferably such that a tautened chain-length will always be parallel or substantially parallel to the thrust axis of the pusher. In Fig. 3, it will be seen, for the case of the chain end 55, that the sprocket 52 is slightly lower with respect to the sprocket 54 but that in each case, whether it be the sprocket 52 or the sprocket 54, the chain end is attached to the pusher means in a plane tangent to the sprocket and parallel to the thrust axis. It will be appreciated that, with the arrangement discussed, the two chain ends 57—55 will overlap longitudinally for the substantial or feed length of the pusher, so that feeding thrust imparted to the chain 50 may be directly applied to the pusher whether

the pusher is in a position intermediate the ends of the mechanism or is extended beyond either the forward or rear ends of the mechanism.

As another feature of the invention, I provide automatically releasable means for so locating the carriages with respect to the pusher and with respect to the guide means or rails 15 that there will always be a maximum longitudinal base or spread between the points of support provided by the carriages 17—18. In the forms shown in Figs. 1 to 5, such means contemplates resilient detent-type engagements at both front and rear ends of the mechanism.

At the front end, this detent action is effective between the front carriage 18 and the pusher means, and between the front carriage and the front of the frame. Separate detent mechanisms may be employed for these two front-end functions, and in the former a block 60 on the front face of the front carriage 18 encases spring means 61 constantly urging a detent member 62 against the outer surface of the pusher head 20. A transverse pin 63 may key the detent against rotation, so that a suitably sloped cam flat 64 may be positioned to ride up on the head 20 when the front carriage 18 approaches the front position. When the front carriage 18 reaches the full forward position with respect to the pusher head 20, the detent 62 may drop into and thus engage a detent abutment 65, which may be merely a milled transverse slot or groove in the head 20. For the second front-end detent function, a housing 67 may be secured to a rail 14 and to the frame so as to poise a detent 68 for interception of a cam 69 on the front carriage; the arrangement may be such that, as the front carriage approaches the front end of the frame, the detent 68 will ride up on cam 69 so as to home in a detent recess 69', preferably as the front carriage strikes the front abutment 46.

It will be understood that with sufficiently strong action by springs 61—61', as adjusted by means of screws 66—66', the holding power of the detents 62—68 may be enough to overcome all friction in the various guide means. Thus, once the pusher head 20 and the front carriage 18 have been latched together by the detent 62, a feed of the pusher will necessarily mean a feed of the front carriage until the front frame abutment 46 intercepts and thus limits further travel of the front carriage 18, at which time detent 68 will be engaged. Thereafter, the detent action will be forced to release, and the pusher will be projected ahead of the front carriage 18 and into the spindle 13 of the machine being fed.

In a similar manner, spring-detent means may serve to hold the rear carriage 17 as far rearwardly as possible at all times. I have shown one rear detent 70 to involve a resilient engagement between the rear carriage 17 and the frame, and a second rear detent 75 between the rear carriage 17 and the rear end 48 of the pusher. The detent housing 70 (Fig. 3) may be mounted upon the I-beam 16, and a detent member 71 (keyed at a flat 72 in order to prevent rotation) may be suitably formed with cam flats 73 for cooperation with a detent recess or groove 74 in the rear carriage 17. As shown at 76, the rear edge of the rear carriage 17 may be beveled off in the path of the detent 71 in order to assist in an automatic location of the detent 71. As in the case of the front detent mechanism, the detent 72 may be adjustably loaded by means of spring 77 and screw 78. The other rear detent 75 may be similarly formed; its housing is shown mounted on the rear carriage 17 and projecting for latching engagement with pusher member 48 (see Fig. 4).

Once the rear carriage has been latched in the rear position shown in Fig. 3, the strength of rear-detent action is preferably such as to hold against sliding friction occasioned by relative movements of the various guide means. When the pusher bar 21 has been fed forward to the point where the rear abutment 48 strikes the carriage 17, the detent 71 may be forced to give way (as the detent 75 takes hold), and the abutment 48 may thereafter carry and therefore position the rear carriage. It will be understood that in a retracting stroke the detent 75 may hold the carriage 17 at the rear of the pusher until such time as the rear carriage 17 strikes the frame abutment 45 to dislodge detent 75 and at the same time to latch the carriage 17 in that position.

In accordance with a further feature of the invention, I provide that feed rates for both the driving and retracting strokes of the stock pusher may be selectably regulated, with provision for independent control of the speed for each of the strokes. The regulating means may be so devised that substantial constancy of feed rate may be maintained, more or less regardless of the load on the pusher, that is, regardless of whether a full length of stock or an almost completely consumed length of stock is to be fed. My feed rate regulating means may form part of the driving means for the sprocket chain 50, or it may be a separate unit connected in series with the driving means and the load.

In the form shown, the driving means is a double-acting cylinder 80 fixed, as at brackets 81, at longitudinally spaced points at the rear end of the guide means 16. The cylinder 80 may be hydraulically actuated by means (not shown) providing selective application of hydraulic pressure at head and tail connections 82—83. The piston in cylinder 80 may be fastened to a rod 84, and the latter may be connected to a longitudinally extending rack 85.

In order that the combined extended length of the rack 85, rod 84, and cylinder 80 shall not exceed the length of the frame member 16, and in order that at the same time a full stroke of the rack shall be effective to produce a full stroke of the pusher from the fully extended rear position to the fully extended front position, I provide gear means having a step-up ratio between the rack 85 and the sprocket chain 50.

The gear means may be housed in a box 86 mounted upon the frame 16 of the mechanism and serving as a guide and support for the rack 85. The rack 85 may drive the pinion 87 on a pivot shaft 88, to which a gear 89 may also be keyed. The gear 89 may mesh with the second pinion 90, suitably keyed, as by pin 91, to a second shaft 92 carrying a drive-sprocket 93 for driving engagement with the chain 50. In order that the sprocket 93 shall have a substantial arcuate engagement with the chain 50, an idler sprocket 94 may be mounted generally above the box 86. It will be understood that for a full stroke of the relatively short rack 85, the step-up ratio afforded by gears 87—89—90—93 may translate this relatively short stroke into a full stroke of the chain and, therefore, of the pusher means.

As indicated above, governor means may be applied to the drive means for limiting the stock-feeding speed to a desired rate and for separately limiting the pusher-retraction speed to another desired rate. Such governor means may employ

hydraulic-control means and, as desired, the hydraulic control may be built into the motor or driving means 80; in such event, a restrictive orifice by-passed by a one-way check valve could be included in the head connection 82, and a similar restrictive orifice by-passed by a suitably connected check valve could also be provided in the tail connection 83. However, in the form shown, the governor means is separate and apart from the motor or driving means 80. For convenience, the governor means is mounted directly above the gear box 86, and the idler-sprocket wheel 94 is utilized for driving the governor.

In the hydraulic governor shown, I connect the sprocket 94 to drive a positive displacement or gear pump 96 and, depending upon the direction of rotation of the sprocket 94, that is, depending upon whether a feed or a retracting stroke is being imparted to the pusher, hydraulic fluid will be circulated from the pump 96 through a first line 97 to a sump 98, with return flow from the sump 98 through a second line 99 to the pump 96; alternatively, in the case of reversed direction of rotation of sprocket 94, fluid will be driven through the second line 99 to the sump 98, with return flow from the sump 98 through the first line 97 to the pump.

In accordance with the invention, I provide means for selectively limiting one direction of flow in each of the lines 97—99, and thus I selectively regulate the forward and return-stroke feed speeds. Referring to Fig. 8, it will be seen that a first needle valve or restrictive orifice 100 may be interposed between the first line 97 and the sump 98, and that operation of the hand wheel 101 will govern the flow-limiting effect of the valve 100. In order that the limiting effect may be effective for but one direction of flow, I provide a check valve 102 by-passing the orifice valve 101. Thus, for flow in line 97 from the pump 96 to the sump 98, the orifice valve 100 may apply a braking effect upon rotation of the sprocket 94 in accordance with the setting of the hand wheel 101; but in the reversed direction, the valve 100 may offer negligible resistance to flow in view of the by-passing action of check valve 102. In like manner, a second orifice valve 103 with a hand wheel 104 may be interposed in the second line 99 before connection to the sump 98, and a second check valve 105 may by-pass the orifice valve 103. Thus, for a reversed movement of sprocket (94) rotation, the orifice valve 103 will provide the limiting or braking effect.

In other words, in one direction of feed, say, when driving the stock pusher into the spindle 13, the setting of one of the hand wheels, say the hand wheel 101, may provide a means of limiting the speed of travel to a relatively slow speed, if so desired, and during such feed the second check valve 105 will effectively by-pass any limiting action of the orifice valve 103. On the other hand, during a retracting stroke, the setting of orifice valve 103 may determine the rate of retraction of the pusher, and if desired this rate may be relatively fast in order to reduce the time necessary to load and advance a new piece of stock into the machine. During the retracting stroke, it will be understood that check valve 102 will necessarily by-pass any limiting action of the first orifice valve 100.

In accordance with another feature of the invention I provide means as an alternative to the arrangement discussed in Figs. 3, 4, and 5 for the automatic, selective, and yet positive, engagement of the carriages 17—18 to the pusher

21 and to end-frame members 110—111, in order to assure the sequence of operation discussed in connection with the detent-operated scheme of Figs. 3 to 5. The arrangement of Fig. 9 may utilize dogging means at each end of the mechanism for this purpose, and in the form shown a dogging member 112 is carried by the rear carriage 17 and a generally similar dogging member 113 is carried by the front carriage 18. Dog-abutment means 114—115 may be provided at both ends of the frame members 110—111, and further dog-abutment means 116—117 may be provided at both ends of the pusher means, all for automatic selective cooperation with the dogging means 112—113.

In the form schematically shown, each dogging member is pivotally suspended, at 118—119, on one of the rear and front carriages 17—18, respectively. Each dogging member may include an abutment, as at 120—121, to engage the frame and an abutment 122—123 to engage the pusher means. Spring means 124—125 may bias the dogging means 112—113 to one side or the other of a dead-center position, so as to hold which ever dogging engagement has been selected. The dogging members may include further means, such as a projection 126—127, to engage the frame for purposes of automatically reversing the setting of the dogging members. Also, similar projections 128—129 may be poised to intercept parts of the pusher means for resetting the dogging means 112—113.

The functioning of the described arrangement may be better understood from a description of a cycle of operation. For the position shown in Fig. 9, stock may be in the process of being advanced into the machine, but there may not have been such an advance of stock as to bring the tail end 48 of the pusher means as far as the frame end 110 of the mechanism. The dogging means 112 will be in a position engaging the rear carriage 17 to the frame member 110 at 114—120. At the same time, the front carriage 18 will be held adjacent the head member 20 of the pusher means by engagement of dogging means 113 at 117—123. When the stock has been fed far enough so that the rear 48 of the pusher means begins to enter the rear end of the framework of the stock-feeding mechanism, the means 48 will intercept the dogging-member projection 128 so that the dogging member may be shifted from the position shown to a position of engagement at 116—122 with the pusher means rather than with the frame member 110.

Upon still further feeding advance of the pusher means, the nose 20 will begin to project beyond the forward end 111 of the mechanism, and at the same time the projection 127 will be intercepted by the frame 111, so as to reverse the position of the dogging means 113 and thus to establish a dogging engagement to the frame at 115—121 while releasing the head 20 from engagement with the forward carriage 18. The head may then be projected beyond frame member 111 and into the spindle 13 of the machine being fed. Feeding may continue until the rear carriage 17 abuts the forward carriage 18, and this may occur when a substantial length of the pusher bar 21 has been projected forwardly into the chuck or collet of spindle 13, as will be understood.

At commencement of a retracting stroke, the dogging means 112 will be engaged at 116—122 to the pusher means, so that the rear carriage

17 will be carried adjacent the end member 48 of the pusher means. At the same time, the forward carriage 18 will be latched or dogged, at 115—121, to the forward frame member 111 until such time as the pusher head 20 approaches the forward carriage 18. Abutment means 130 on the head 20 may then intercept the projection 129, so as to shift the dogging means 113 out of engagement with the frame member 111 and into dogging engagement, at 117—123, with the head 20, as shown. Upon further retraction, the rear end of the pusher will approach the rear frame member 110, at which time the projection 126 of dogging means 112 will engage the rear frame 110 so as to shift the rear carriage 17 out of engagement with the pusher means and into dogging engagement with the frame member 110, thus releasing the pusher for extension a maximum length rearwardly of the frame of the mechanism.

It will be seen that the described mechanism is positive in operation and yet is fully automatic and permits the fullest extension of the pusher beyond both ends of the mechanism. Also, it will be seen that I have described an improved stock-feeding mechanism featuring automatic magazine-loading and feeding of maximum-length stock into a lathe or the like machine to be fed. My mechanism can be adapted to handling a wide variety of stock sizes and a wide variety of loads to be pushed; yet it is possible with my mechanism to maintain at all times a desired accurate control of the feed rate and a different desired accurate control of the retraction speed.

While I have described my invention in detail for the preferred forms shown, it will be understood that modifications may be made within the scope of the invention as defined in the appended claims.

I claim:

1. In a stock-feeding mechanism of the character indicated, an elongated guide member, stock-pusher means including an elongated longitudinally extending pusher member, two supporting carriages independently slidable in longitudinally spaced relation on said guide member, pusher member guide means on both said carriages, said pusher member being slidably guided and supported by both said carriages for the substantial length thereof, whereby the substantial length of said pusher member may be extended beyond both ends of said guide member, drive means for said pusher member including a taut flexible connection between a rear part of said guide member and a forward part of said pusher member and a taut flexible connection between a forward part of said guide member and a rear part of said pusher member, first automatically releasable latch means between one of said carriages and one of said members, and second automatically releasable latch means between the other of said carriages and one of said members.

2. A mechanism according to claim 1, in which said latch means includes a detent latch.

3. A mechanism according to claim 1, in which said latch means includes a dogging member.

4. In a stock-feeding mechanism of the character indicated, elongated guide means, stock-pusher means including a longitudinally extending pusher bar of substantially constant cross-section for the substantial length thereof, two supporting carriages independently slidable in longitudinally spaced relation on said guide means bar-guide means on both said carriages and

of a size to guide and support the said constant-cross-section length of said pusher bar, whereby said pusher bar may be slidably supported in both said carriages for the substantial length thereof, so that said pusher bar may be extended beyond both ends of said guide means, first spring-detent means including cooperating parts on the rear carriage and at the rear of said guide means, and second spring-detent means including cooperating parts on the forward carriage and at the forward end of said pusher bar, abutment means at the forward and rear ends of said guide means for determining limiting movement of said carriages thereon, and abutment means on the forward and rear ends of said pusher bar for determining limiting movement of said carriages with respect to said pusher bar.

5. In a stock-feeding mechanism of the character indicated, longitudinally extending guide means, stock-pusher means including a longitudinally extending pusher bar, two supporting carriages independently slidable in longitudinally spaced relation on said guide means, dogging means carried by each of said carriages, first dog-abutment means longitudinally fixedly related to said guide means, second dog-abutment means longitudinally fixedly related to said pusher bar, said dogging means being longitudinally engageable with one of said dog-abutment means in a first relative longitudinal position and longitudinally engageable with the other of said dog-abutment means in a second relative longitudinal position.

6. A mechanism according to claim 5, and including means responsive to a relative longitudinal movement of said pusher bar and of said guide means while said dogging means is in one position for moving said dogging means to a second position.

7. A mechanism according to claim 6, and including means responsive to a relative longitudinal movement of said pusher bar and of said carriage while in said second position for moving said dogging means to said first position.

8. A mechanism according to claim 5, in which said dogging means includes means resiliently retaining whichever one of said positions said dogging means may have been shifted to.

9. In a stock-feeding mechanism of the character indicated, elongated guide means, stock-pusher means including a longitudinally extending pusher bar, two supporting carriages independently slidable in longitudinally spaced relation on said guide means, bar-guide means on both said carriages, said pusher bar being slidably guided and supported in both said carriages for the substantial length thereof, whereby the substantial length of said pusher bar may be extended beyond both ends of said guide member, front dogging means carried by the front carriage, rear dogging means carried by the rear carriage, first forward dog-abutment means longitudinally fixedly related to said guide means at the front end thereof, second front dog-abutment means longitudinally fixedly related to said pusher bar at the front end thereof, said front dogging means being longitudinally engageable with said first front dog-abutment means in a first position and longitudinally engageable with said second front dog-abutment means in a second position, first rear dog-abutment means longitudinally fixedly related to said guide means at the rear end thereof, second rear dog-abutment means longitudinally fixedly related to said pusher bar at the rear end thereof, said rear

dogging means being longitudinally engageable with said first rear dog-abutment means in a first position and longitudinally engageable with said second rear dog-abutment means in a second position, means responsive to limiting movements of said carriages on said pusher bar for shifting said dogging means from one position to the other, and means responsive to limiting movements of said carriages on said guide means for shifting said dogging means from said other position to said one.

10. In a stock-feeding mechanism of the character indicated, elongated guide means, elongated stock-pusher means slidably supported on said guide means, reversible drive means for said stock-pusher means and positively connected to said stock-pusher means for both directions of drive, first governor means for said drive means and connected to limit speed in a first direction of travel, and second governor means adjustable independently of said first governor means and connected to limit the speed of said drive means in the opposite direction of travel.

11. In a stock-feeding mechanism of the character indicated, elongated guide means, stock-pusher means slidably supported on said guide means, hydraulic-motor means connected to said pusher means, governor means for said motor means, said governor means including a first fluid line comprising a first restrictive orifice and a by-passing check valve, whereby a first unidirectionally restricted flow in said first line may be determined by said first orifice while essentially unimpeded flow in the opposite direction is permitted, and a second fluid line comprising a second restrictive orifice and a by-pass check valve, whereby a second unidirectionally restricted flow in said second line may be determined by said second orifice while essentially unimpeded flow in the opposite direction is permitted, one of said orifices being connected to restrict flow during a drive stroke of said pusher, the other of said orifices being connected to restrict flow during a retracting stroke of said pusher.

12. A mechanism according to claim 11, in which one of said restrictive orifices is adjustable independently of the other, whereby forward and retracting feed speeds of said pusher may be independently selected.

13. In a stock-feeding mechanism of the character indicated, elongated guide means, stock-pusher means slidably supported on said guide means, feed means for said pusher means and including a sprocket chain connected to said pusher means and supported at both ends of said guide means, and governor means including reversible positive-displacement pump means responsive to a feeding movement of said pusher means and connected to drive said pump, a sump, a first fluid connection from one side of said pump to said sump, and a second fluid connection from the other side of said pump to said sump, each of said connections separately including an adjustable restrictive orifice and a check valve by-passing said orifice.

14. In a stock-feeding mechanism of the character indicated, a frame, elongated guide means on said frame, stock-pusher means slidably supported on said guide means, a double-acting hydraulic cylinder mounted on said frame at one end thereof and including a longitudinally extending piston rod, a longitudinally extending rack carried with said piston rod, said cylinder and said rod and said rack having a combined length less than that of said guide means when said rod is extended, step-up gear means carried by said frame and including a pinion driven by said rack, a drive sprocket connected to the output or high-speed end of said gear means, a chain on said sprocket and connected at both ends to said pusher means, supporting means for said chain at both ends of said frame, and hydraulic governor means fixed to said frame and including a sprocket driven by said chain.

15. In a stock-feeding mechanism of the character indicated, a frame, elongated guide means on said frame, stock-pusher means including an elongated bar extending longitudinally of said guide means, carriage means longitudinally slidable on said guide means and including guide means for the longitudinally slidable guided support of said bar, whereby said pusher means may be slidable in said carriage means for extension beyond both ends of said frame, and drive means for said pusher means including cable means connected at both ends to said pusher means, forward and rear support means for said cable means at the front and rear end of said frame, the end of said cable means adjacent said front-support means being connected to the rear of said pusher means, and the end of said cable means adjacent said rear-support means being connected to the front end of said pusher means, whereby said cable means may remain taut for all longitudinal positions of said pusher means with respect to said frame.

16. A stock-feeding mechanism, comprising a frame including fixed elongated guide means, an elongated stock pusher including elongated guide means extending a feed length along said pusher, said pusher guide means having a uniform elongated length, front and rear carriages mounted for movement along and guided by said fixed elongated guide means, said carriages including guide means conforming to said pusher guide means, said carriage guide means being aligned and extending longitudinally with respect to said fixed elongated guide means, said several guide means being so constructed and arranged that said pusher may be longitudinally guided for said feed length in both said carriages and relatively to each of said carriages, detachable connecting means cooperating between one of said carriages and said pusher and between the other of said carriages and said frame for selectively connecting either or each of said carriages against longitudinal displacement with respect to said pusher and said frame respectively, whereby upon loading a piece of stock in said feed mechanism for feeding stock beyond the front end of said fixed elongated guide means, both of said carriages can be moved along said fixed elongated guide means into adjacency at the rear end thereof and said pusher may be moved rearwardly of said adjacent carriages so that the feed length extends rearwardly of said rear carriage for accommodating maximum length stock and so that during a feed movement said pusher may be first moved with respect to said rear carriage and then with respect to said front carriage.

17. A stock-feeding mechanism, comprising a frame member including fixed elongated guide means, an elongated stock-pusher member including elongated guide means extending a feed length along said pusher member, said pusher guide means having a uniform elongated length, front and rear carriages mounted for movement along and guided by said fixel elongated guide means, said carriages including guide means conforming to said pusher guide means, said carriage guide means being aligned and extending longitudinally with respect to said fixed elongated

guide means, said several guide means being so constructed and arranged that said pusher member may be longitudinally guided for said feed length in both said feed carriages and relatively to each of said carriages, detachable connecting means cooperating between one of said carriages and one of said members and between the other of said carriages and one of said members for selectively connecting either said one of said carriages against longitudinal displacement with respect to one of said members or the other of said carriages against longitudinal displacement with respect to one of said members, whereby upon loading a piece of stock in said feed mechanism for feeding stock beyond the front end of said fixed elongated guide means, both of said carriages can be moved along said fixed elongated guide means into adjacency at the rear end thereof and said pusher member may be moved rearwardly of said adjacent carriages, and reversible feed means for said pusher member and including a frame-based actuating connection to a forward part of said pusher member for retracting the same rearwardly of said adjacent carriages so that the feed length may be projected rearwardly of said rear carriage for accommodating maximum length stock and so that during a feed stroke said pusher member may be first moved with respect to said rear carriage and then with respect to said front carriage.

18. A mechanism according to claim 17, in which said detachable connecting means includes a detachable connection between said rear carriage and said frame member at the rear end of said fixed elongated guide means, and in which said detachable connecting means further includes a detachable connection between said front carriage and said pusher member at the forward end of said pusher guide means.

19. A mechanism according to claim 17, in which detachable connecting means includes a detachable connection between said rear carriage and the rear of said fixed elongated guide means, and a further detachable connection between said front carriage and the front of said fixed elongated guide means, whereby said carriages may be connected to said frame member when longitudinally free of said pusher member and may be connected to said pusher member when longitudinally free of said frame member.

20. In a stock-feeding mechanism of the character indicated, a frame member, elongated guide means on said frame member, stock-pusher means including an elongated bar member extending longitudinally of said guide means, carriage means longitudinally slidable on said guide means and including guide means for the longitudinally slidable guided support of said bar member, whereby said pusher means may be slidable in said carriage means for extension beyond both ends of said frame member, drive means for said pusher means including cable means connected at both ends of said pusher means, forward and rear support means for said cable means at the front and rear end of said frame member, the end of said cable means adjacent said front-support means being connected to the rear of said pusher means, the end of said cable means adjacent said rear-support means being connected to the front end of said pusher means, whereby said cable means may remain taut for all longitudinal positions of said pusher means with respect to said frame member, first automatically releasable latch means between said carriage means and one of said members, and second automatically releasable latch means between said carriage means and one of said members.

21. In a stock-feeding mechanism of the character indicated, a frame member, elongated guide means on said frame member, stock-pusher means including an elongated bar member extending longitudinally of said guide means, carriage means longitudinally slidable on said guide means and including guide means for the longitudinally slidable guided support of said bar member, whereby said pusher means may be slidable in said carriage means for extension beyond both ends of said frame member, drive means for said pusher means including cable means connected at both ends of said pusher means, forward and rear support means for said cable means at the front and rear end of said frame member, the end of said cable means adjacent said front-support means being connected to the rear of said pusher means, the end of said cable means adjacent said rear-support means being connected to the front end of said pusher means, whereby said cable means may remain taut for all longitudinal positions of said pusher means with respect to said frame member, first automatically releasable latch means between said carriage means and one of said members, second automatically releasable latch means between said carriage means and one of said members, and bi-directional speed control means for said drive means.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
324,409	Nutting	Aug. 18, 1885
1,663,599	Hornberger	Mar. 27, 1928
2,108,274	Tautz et al.	Feb. 15, 1938
2,327,916	Mariotte	Aug. 24, 1943
2,555,753	Montgomery	June 5, 1951

FOREIGN PATENTS

Number	Country	Date
534,429	Germany	Sept. 26, 1931