Jan. 27, 1953 G. O. GRIDLEY 2,626,452

STOCK FEED MECHANISM

Filed Dec. 20, 1947 3 Sheets-Sheet 1

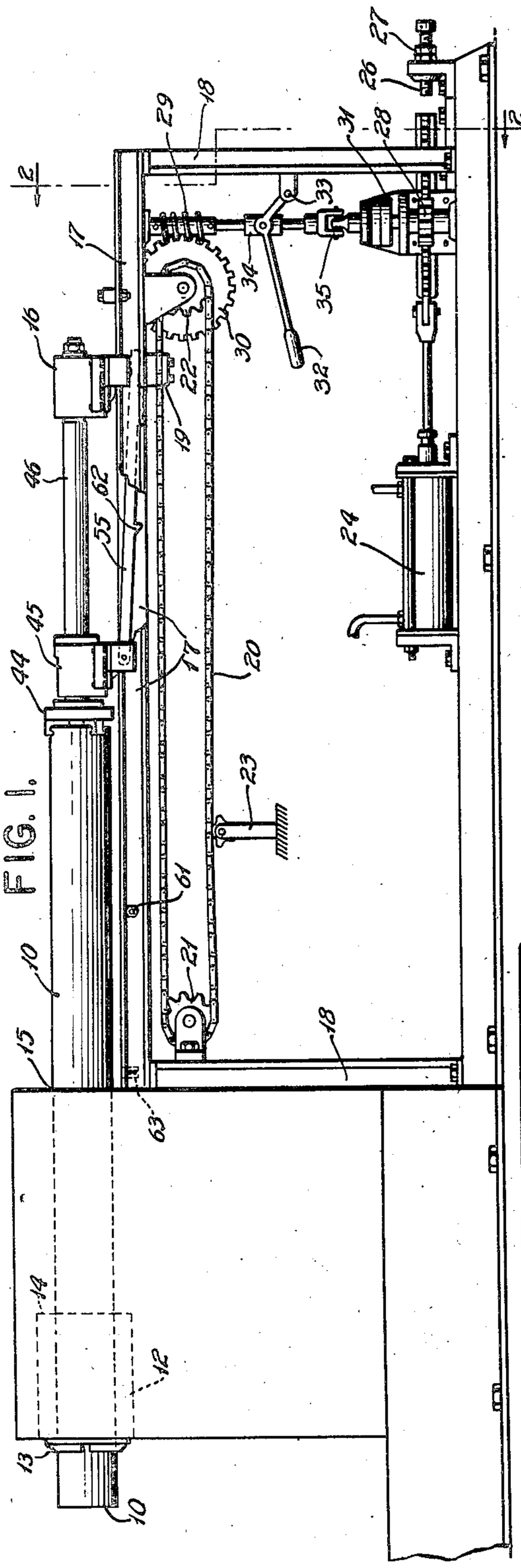


FIG. 1.

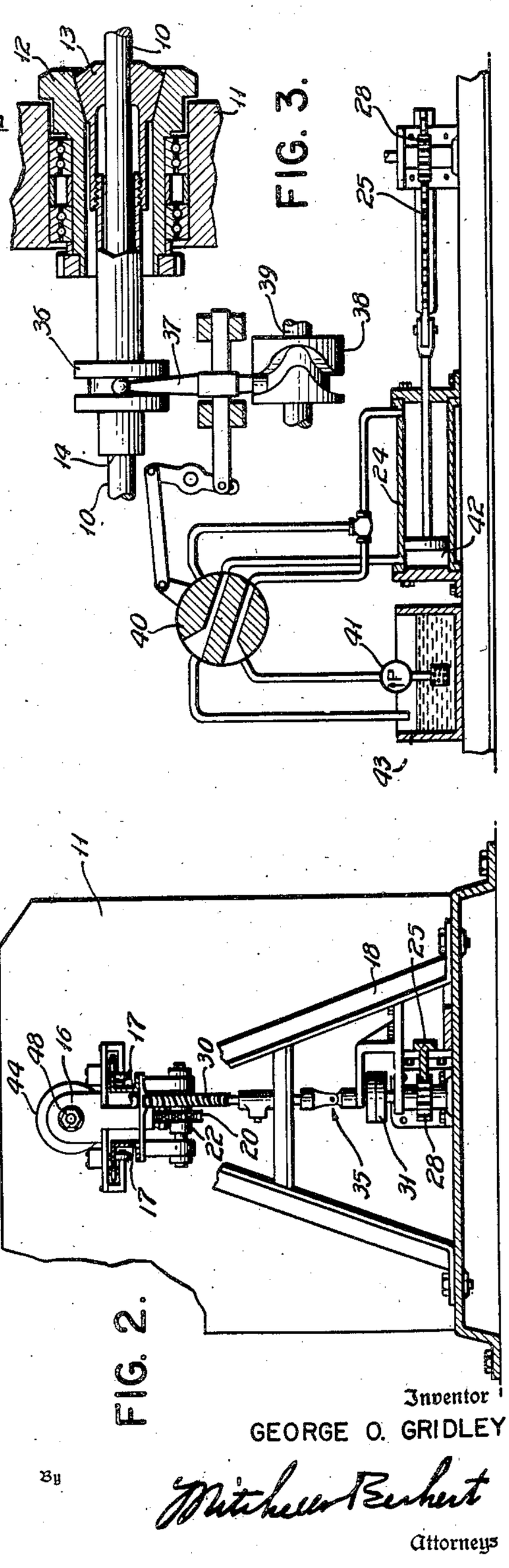


FIG. 3.

FIG. 2.

Inventor
GEORGE O. GRIDLEY

By Mitchell Berkert

Attorneys

Jan. 27, 1953 G. O. GRIDLEY 2,626,452

STOCK FEED MECHANISM

Filed Dec. 20, 1947 3 Sheets-Sheet 2

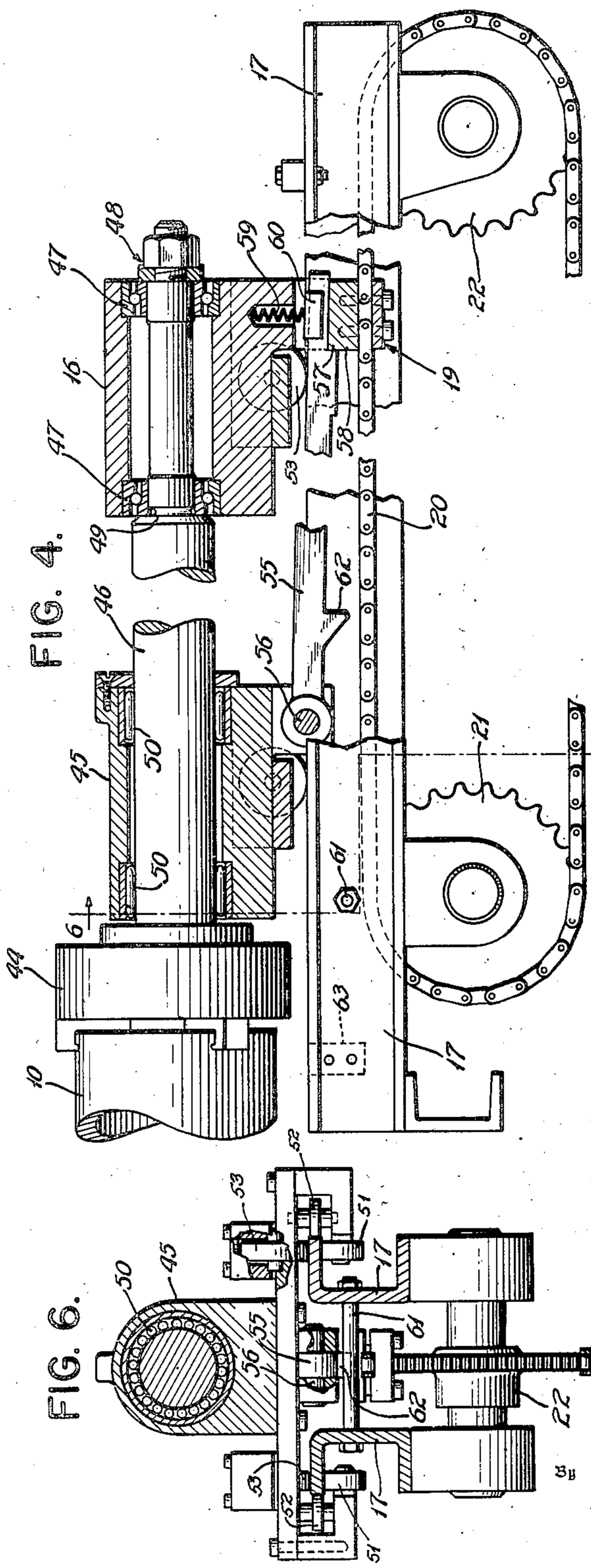


FIG. 4.

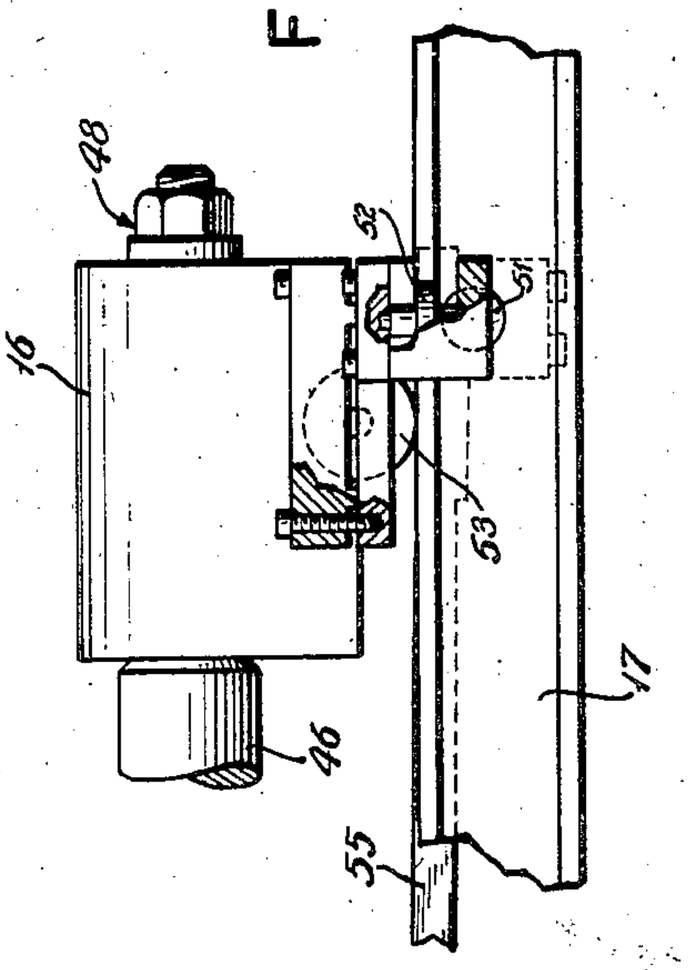


FIG. 5.

FIG. 6.

Inventor
GEORGE O. GRIDLEY

By Mitchell Berkut

Attorneys

Jan. 27, 1953 G. O. GRIDLEY 2,626,452

STOCK FEED MECHANISM

Filed Dec. 20, 1947 3 Sheets-Sheet 3

FIG. 7.

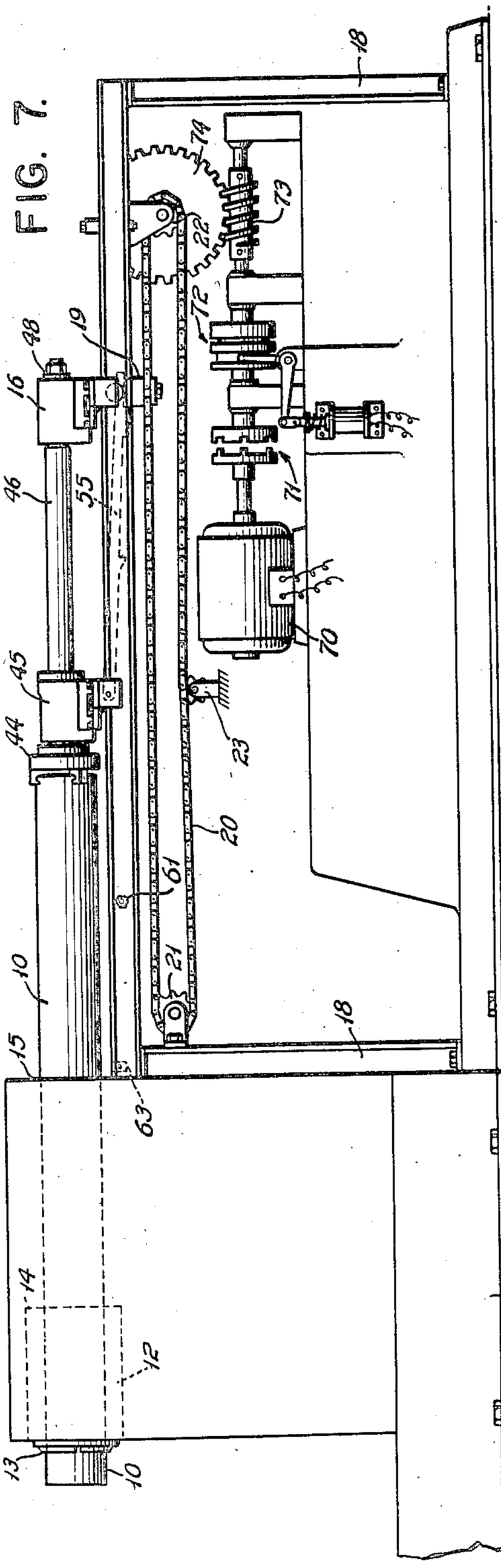
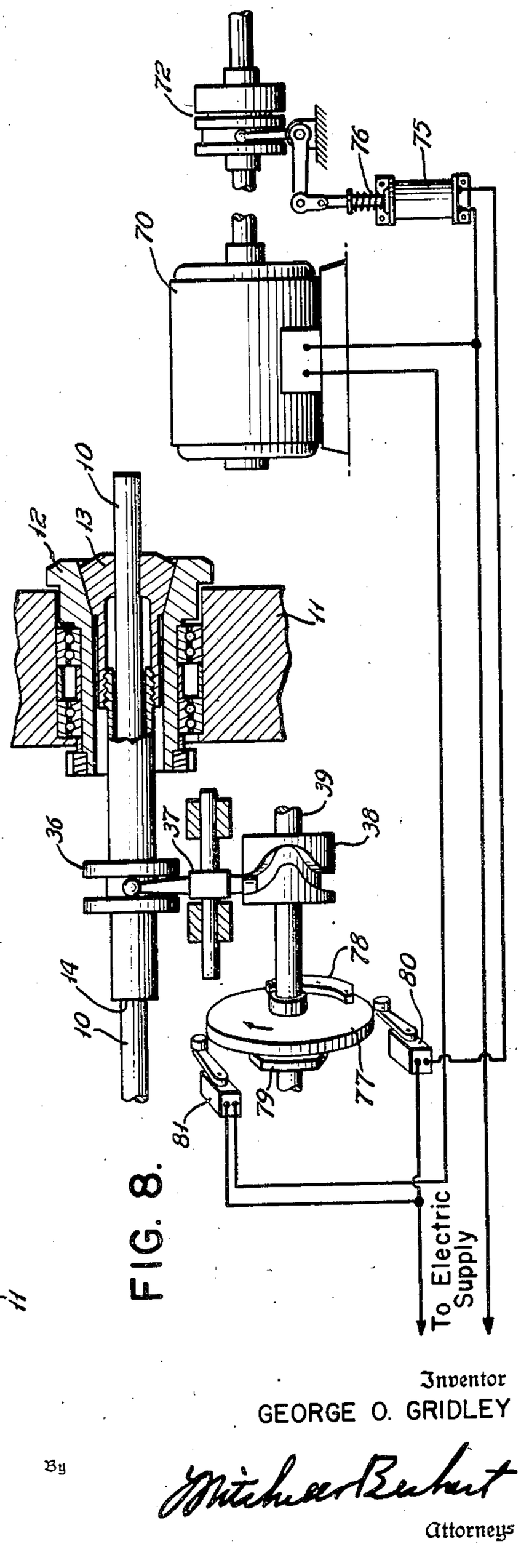


FIG. 8.



Inventor
GEORGE O. GRIDLEY

By Mitchell Bechet

Attorneys

Patented Jan. 27, 1953 2,626,452

UNITED STATES PATENT OFFICE

2,626,452

STOCK FEED MECHANISM

George O. Gridley, Berlin, Conn., assignor to The New Britain Machine Company, New Britain, Conn., a corporation of Connecticut

Application December 20, 1947, Serial No. 793,016

7 Claims. (Cl. 29—59)

1

My invention relates to stock-feeding mechanisms for machines such as automatic lathes.

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

It is another object to provide an improved stock-feeding mechanism that may of itself accurately govern successive feeding advances of the stock without requiring that the machine to be fed be equipped with a stock stop.

It is also an object to provide improved supporting means in a stock-feeding mechanism of the character indicated, whereby the rear end of the stock may be more accurately positioned and held in alignment during the feeding process.

It is a more specific object to provide an improved extensible stock-feeding mechanism, extensible beyond the back end of the machine to be fed and within the collet mechanism of the machine, whereby the stock may be fully consumed, insofar as it is usable.

It is a further object to provide an improved hydraulically actuated stock-feeding mechanism.

It is still another object to provide an improved electrically operated stock-feeding mechanism.

It is in general an object to provide a relatively simple stock-feeding mechanism that may be readily adapted to a machine of the character indicated, that is not likely to get out of order, and that may be easy to maintain.

Other objects and various further features of the invention will be pointed out or will occur 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 simplified side view in elevation of a stock-feeding mechanism according to the invention, as applied to feeding an automatic lathe;

Fig. 2 is a right-end view of the assembly of Fig. 1, partly sectionalized in the plane 2—2 of Fig. 1;

Fig. 3 is a schematic diagram of control circuits for the system of Fig. 1;

Fig. 4 is an enlarged partly sectionalized view of feeding elements of the mechanism of Fig. 1;

Fig. 5 is a fragmentary detail of part of the Fig. 4 assembly;

Fig. 6 is a sectional view taken in the plane 6—6 of Fig. 4;

Fig. 7 is a side view in elevation illustrating an alternative construction according to the invention; and

Fig. 8 is a schematic view of control means for the arrangement of Fig. 7.

2

Briefly stated, my invention contemplates the utilization of chain or belt means to drive the pusher of a stock-feeding mechanism in such a way that the stock feed-out distance (in the machine to which the feed mechanism is adapted) may be the same for successive operations, regardless of the usable length of stock remaining unconsumed. The feed-out operation may be positive, so as to avoid the need of a stock stop on the machine which is being fed. The pusher means may include a longitudinally extending portion longitudinally movably supported in a guided carriage, which is preferably detachably latched in a forward position (relative to the pusher means), for best support of the butt end of the stock; when unlatched, the pusher means may be extended through the machine, even to the collet jaws thereof.

In both forms to be described, the stock-feed mechanism includes pusher means guided by longitudinally extending ways. The pusher means is attached to an endless belt in the form of a sprocket chain which is spread between sprocket wheels at both ends of the feed mechanism. Drive may be applied to the pusher means through one of the sprocket wheels, by way of a worm-and-worm-wheel reduction system. In one form, a reciprocable hydraulic motor and suitable clutch means drive the worm, and in the other form, an electric motor and suitable clutch means drive the worm. In both cases, means are disclosed for appropriately synchronizing stock-feeding operations with the functioning of the collet or chuck of the machine which is being fed.

Referring to Figs. 1 to 6 of the drawings, my invention is shown in application to a stock-feeding mechanism for supplying bar or tubular stock 10 to an automatic lathe 11. The lathe 11 includes a spindle 12 for revolubly supporting the stock 10, and chuck means in the form of a so-called draw-back collet 13 serve to clamp the stock 10 for turning operations. In the automatic lathe 11 it so happens that the rear end 14 of the collet-and-spindle assembly 12—13 is considerably forward of the rear end 15 of the lathe 11.

The stock-feeding mechanism may include pusher means in the form of a pusher carriage 16 to be guided by guides or rails 17 on the frame 18 of the stock-feeding mechanism. Rollers 51—52—53 may assure smooth travel of carriage 16 along rails 17 as well as alignment (vertical and lateral) and resistance against jumping. The pusher carriage 16 may be secured, as at 19, to endless-belt means in the form of a sprocket

chain 20. The chain 20 is trained over supporting sprocket wheels 21—22 at opposite ends of the frame 18, and drive means may be applied to the rear sprocket wheel 22. If desired, chain-tightener means 23 may be employed to assure positive positioning of the pusher means 16 at all times.

In the form shown, the drive means for the drive-sprocket wheel 22 is hydraulically operated from a cylinder 24, the piston of which is connected to reciprocate a rack 25. Limiting advances for the rack 25 may be adjustably selected by means of a screw abutment 26 having lock-nut means 27 to secure a given abutment position. The rack 25 may drive a pinion 28 on a generally vertical shaft so as to impart rotation to a worm 29 for a worm wheel 30, in driving relation with the sprocket wheel 22. So that the motion of the drive chain 20 may always be in the same direction, I provide one-way engaging or ratchet clutch means 31 between the pinion 28 and the worm 29. It will be clear that, upon a feeding stroke of the rack 25 (left to right in the sense of Fig. 1), as limited by adjustment of the abutment means 26, there may be a given feeding advance of the pusher means 16. While the rack 25 is being retracted and positioned for the next feeding stock, the ratchet clutch 31 does not engage and no motion is imparted to the drive chain 30. This simple reciprocating cycle may repeat itself until there is no further usable unconsumed stock, as will be pointed out below.

After the feed means 16 has been fully advanced and it is desired to retract the same for accommodation of a new piece of stock 10, it may be desired to disengage the worm 29 from the worm wheel 30, as by lifting the handle of a bellcrank 32 pivoted at 33. The bellcrank 32 will be understood then to displace the sleeve 34 backward, as permitted by a universal joint 35, and to provide the desired disengagement of the worm 29 from the worm wheel 30.

As indicated generally above, the described feeding of the pusher means may be coordinated with operation of the collet 13 in the lathe 11. The collet 13 is shown in the schematic arrangement of Fig. 3 to be actuated by a spool 36 in which a cam-follower fork 37 rides. The cam follower 37 may follow the track or groove of a drum cam 38, which may be on the main camshaft 39 of the lathe 11. A shift of the fork 37 to the right pushes the collet 13 to disengage it from the stock 10, and a shift to the left draws the collet 13 back to a chucking position. The hydraulic cylinder 24 may be reversibly actuated by a reversing valve 40, which in turn is connected to reverse its functions upon a shift of collet-actuating means 37. In the position shown, the valve 40 connects a source 41 of pressurized fluid to the tail end of cylinder 24, so as to retract the rack 25 and to position the same for a feeding stroke. Upon disengagement of collet 13, as when the fork 37 is shifted to the right, the valve 40 will be reversed so as then to apply pressurized fluid to the head end 42 of cylinder 24. A working stroke, and, hence, a feed of pusher means 16, is then quickly accomplished, as limited by the adjustment of the abutment screw 26. During the working stroke, fluid in the tail end of cylinder 24 may be connected by valve 40 for exhaust to the sump 43. When the collet 13 has been clamped on the newly fed-out stock, the valve 40 will be shifted back to the position shown so that the rack 25 may be repositioned for a feed stroke. It will be understood that,

during the repositioning of the rack 25, the overrunning clutch may effectively disengage the rack-and-pinion means from the pusher means 16.

In order that the feed-out operation may be accomplished without requiring a stock stop in the working area of the lathe 11, I employ a chuck 44 carried by the pusher assembly for secure attachment to the tail end of the stock 10, so that the stock will not continue to feed after the feed thrust stops. The chuck 44 may be and preferably is accurately positioned in alignment with the axis of spindle 12, and for this purpose I provide a supporting carriage 45, which will be referred to as the forward carriage. The forward carriage is preferably longitudinally movable with respect to the pusher means, and it may be guided by the rails 17; for a purpose which will be clear, the forward carriage is detachably latched against longitudinal movement with respect to the pusher means. In the form shown, the pusher means includes a longitudinally extending cylindrical portion or bar 46 to support the chuck 44, and the bar 46 may derive support from both carriages 16—45, as by being journalled therein. Antifriction bearing means 47 are shown to provide revoluble support of the pusher bar 46 in the rear carriage 16, and the bearings 47 are preferably of a thrust-sustaining type, so that they may be preloaded to assure an axially locked relation between the bar 46 and the pusher carriage 16. In the form shown, adjustable take-up means 48 and a shoulder 49 provide the means for preloading the bearings 47.

As indicated above, the pusher bar 46 is preferably slidable with respect to the forward carriage 45. Since the bar 46 rotates with the stock 10, I prefer to employ antifriction bearing means 50 which may be of the so-called needle type to assure the desired antifriction revoluble and longitudinally slidable support. As also indicated, the forward carriage is preferably detachably latched against longitudinal movement with respect to the pusher means. In the form shown, the detachable latch means utilizes a spacer bar 55, which may be carried, as by a pivot pin 56, on one of the carriages (45) and latched to the other carriage (16) as by engagement of a notch 57 on bar 55 with a ledge 58 on the other carriage (16). Resilient means 59 may act upon a shoe 60, to retain the spacer bar 55 in the latched position shown.

To detach the latch means, the spacer bar 55 and the frame 18 may include cooperating elements to cause unlatching of the bar 55, as by an unseating of the notch 57 from ledge 58 when the forward carriage 45 arrives at the front end of ways 17. In the form shown, this unlatching mechanism utilizes a transversely extending bolt or rod 61 between the rails 17 and a projection or lugs 62 on the spacer bar 55. The projection 62 preferably engages the rod 61 so as to detach the latch means 55 just before the end of possible travel of the forward carriage 45 on the rails 17. In the form shown, this unlatching occurs just prior to a positive arresting of the forward carriage 45 by means of an abutment 63 spanning the rails 17. It will be understood that, after unlatching, the forward carriage 45 may continue to provide aligning support for the stock 10 while the pusher bar 46 is extended; if the chuck 44 is designed to fit within the spindle 12, then the stock 10 may be fully consumed, insofar as it is

usable, by feeding the butt of stock 10 within the spindle up to the jaws of collet 13.

In Figs. 7 and 8, I show a modified form of the invention in which an electric motor 70 is employed to drive a stock-feeding mechanism for an automatic lathe 11, which may be of the same type as described above. In the form shown, clutch means 71—72 couple the motor 70 to a worm 73 for a worm wheel 74, to drive the drive sprocket wheel 22. From this point, that is, from the drive-sprocket wheel 22, the stock-feeding system may be generally similar to that which has been already described. Thus, pusher means employing a forward detachably latched sliding carriage 45 may carry a chuck 44 to grip the stock 10; the pusher means may also be driven by the sprocket chain 20, as through the rear or drive carriage 16.

In the form shown, the clutch 71 is a dog clutch which may be manually operated (by means not shown) whenever it may be desirable to uncouple the motor 70 from the rest of the drive system, as in manually controlling the stoppage of a feeding operation. For automatic control of the feed-out of stock 10, the clutch 72 may be electrically operated, as by a solenoid 75, which is shown normally urged by the spring 76 to cause engagement of the clutch 72. When the solenoid 75 is energized, the spring 76 is compressed and the clutch 72 disengages.

In order to coordinate the electrically driven stock-feeding mechanism with normal automatic operation of the collet 13 in the lathe 11, an additional cam disc 77 may be mounted upon the main camshaft 39 of the lathe 11, and in the form shown cam elements 78—79 are adjustably positionable about the cam disc 77 to provide a desired operating sequence of cam-follower operated switches 80—81, respectively. The switch 81 is normally open and shown to be in the control circuit for the motor 70, while the switch 80 is normally closed and connected to operate the solenoid 75. The cam 79 is preferably so positioned with respect to the collet-disengaging rise of cam 38 that the motor 70 will be energized (to produce a feed of the pusher means) as soon as the collet jaws are released enough to permit such feed; the high or actuating surface of cam 79 preferably drops to shut off the motor 70 at about the time when the collet jaws are set to clamp the newly fed-out stock 10. The cam 78 may be of greater arcuate extent than the cam 79; and its trailing edge, that is the edge controlling energizing of solenoid 75 and hence declutching, is preferably set in accordance with the desired feed-out distance for the stock 10. Since the cam 78 may be of longer effective duration than the cam 79, it will be clear that regardless of the feed-out distance to be controlled by cam 78, the clutch 72 may always be positively engaged when the motor 70 is turned on. There may thus be assurance that whatever the selected feed-out distance, such feed-out distance may be uniformly duplicated for each feed-out operation.

It will be seen that I have described relatively simple stock-feeding mechanisms for positively assuring equal successive feed-out distances while eliminating the need for a stock stop in the working area of the machine to be fed. Either of the forms described is comprised of essentially simple elements, and the arrangements are such that maintenance is not difficult. In either form, it is a relatively simple matter to select the feed-out distance which is required; and, regardless of the size of the feed-out distance, it may be reliably duplicated no matter how much usable stock remains unconsumed. Although, for clarity, no means have been shown in either of the described arrangements for shutting of the feed when there is no usable stock left, it will be understood that simple disabling or shut-off means may be employed to cooperate between the pusher means and some fixed part or position.

Although in each of the described forms of the invention a sprocket chain has been employed as the drive medium for the stock pusher, other equivalent belt-like elements, such as metal tape, belts or the like may be used. For this reason, the term "belt" has been adopted as a generically descriptive term for sprocket and equivalent means.

While I have described my invention in detail for the preferred form 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, a frame including longitudinally extending guide means, two carriages to be guided by said guide means, a pusher bar supported in each of said carriages, the forward of said carriages being longitudinally movable with respect to said bar and the rearward of said carriages being locked against axial displacement with respect to said bar, feed means for feeding said rear carriage, detachable spacer means positively and directly abutting axially fixed parts of said carriages for spacing said carriages, said spacer means placing said carriages in direct thrusting and driving abutment relation in one position thereof, and unlatching means on said frame and positioned to intercept and to displace said spacer means from said one position and to a position disengaging said carriages, whereby after said disengagement continued feeding of said rear carriage may extend said bar through said forward carriage and into the rear of a machine into which stock is being fed.

2. In a stock-feeding mechanism of the character indicated, a frame including fixed elongated guide means, forward and rear carriages independently slidably guided by said guide means, feed means for said rear carriage, pusher means including a substantial elongated cylindrical guide portion and with means at one end to engage a piece of stock to be fed, bearing means axially fixedly carried by each of said carriages and rotatably supporting said pusher means with said cylindrical guide portion axially slidably supported in the bearing means in said forward carriage, releasable spacer means positively and directly spacing axially fixed parts of said carriages, and means coacting between said frame and a part of said spacer means for releasing said spacer means upon movement of said carriages to a given point along said fixed elongated guide means.

3. A stock-feeding mechanism according to claim 2, in which said feed means includes endless-belt means, and reciprocable hydraulic means including a rack and pinion mechanism positively connected to said belt means for driving said belt means in positive increments in accordance with the stroke of said hydraulic means.

4. A stock-feeding mechanism according to claim 3, in which said feed means includes adjustable stop means for said hydraulic means,

whereby the positive feed increments may be adjustably selected.

5. A stock-feeding mechanism according to claim 2, in which said feed means includes endless-belt means, and motor driven worm-and-wheel mechanism positively connected to said belt means for positively driving said belt means.

6. In a stock-feeding mechanism of the character indicated, a frame including fixed elongated guide means, a carriage slidably guided by said guide means, pusher means including a substantial elongated pusher bar directly slidably received in and supported by said carriage and including stock-engaging means at one end to engage a piece of stock to be fed and feed-thrust means at the other end, whereby the fed-thrust end and the stock-engaging end of said pusher means extend on opposite sides of said carriage, releasable spacer means positively and directly abutting axially fixed parts of said feed-thrust means and of said carriage, said spacer means positively holding said feed-thrust means at a maximum extended position rearwardly of said carriage, and means coacting between said frame and a part of said spacer means for releasing said spacer means upon movement of said carriage to a given point along said fixed elongated guide means.

7. In combination, a lathe-type machine including an internally fed collet and collet-actuating means; and a stock-feeding mechanism comprising a frame including fixed elongated guide means, forward and rear carriages independently slidably guided by said guide means, feed means for said rear carriage, pusher means including a substantial elongated cylindrical

guide portion and with means at one end to engage a piece of stock to be fed, bearing means axially fixedly carried by each of said carriages and rotatably supporting said pusher means with said cylindrical guide portion axially slidably supported in the bearing means in said forward carriage, releasable spacer means positively and directly spacing axially fixed parts of said carriages, and means coacting between said frame and a part of said spacer means for releasing said spacer means upon movement of said carriages to a given point along said fixed elongated guide means; said feed means including endless-belt means, reciprocable double-acting hydraulic means including a rack-and-pinion mechanism positively connected to said belt means for driving said belt means in positive increments in accordance with the stroke of said hydraulic means, and reversing-valve means for said cylinder and connected for actuation in timed relation with said collet-actuating means.

GEORGE O. GRIDLEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
324,409	Nutting	Aug. 18, 1885
497,631	Conradson	May 16, 1893
1,101,716	Seaman	June 30, 1914
1,663,599	Hornberger	Mar. 27, 1928
1,855,515	Dingell	Apr. 26, 1932
2,249,561	Jelinek et al.	July 15, 1941
2,369,466	Kylin et al.	Feb. 13, 1945