Jan. 1, 1957 J. H. FRIEDMAN 2,776,048

STOCK FEEDING APPARATUS

Filed July 19, 1952 4 Sheets-Sheet 1

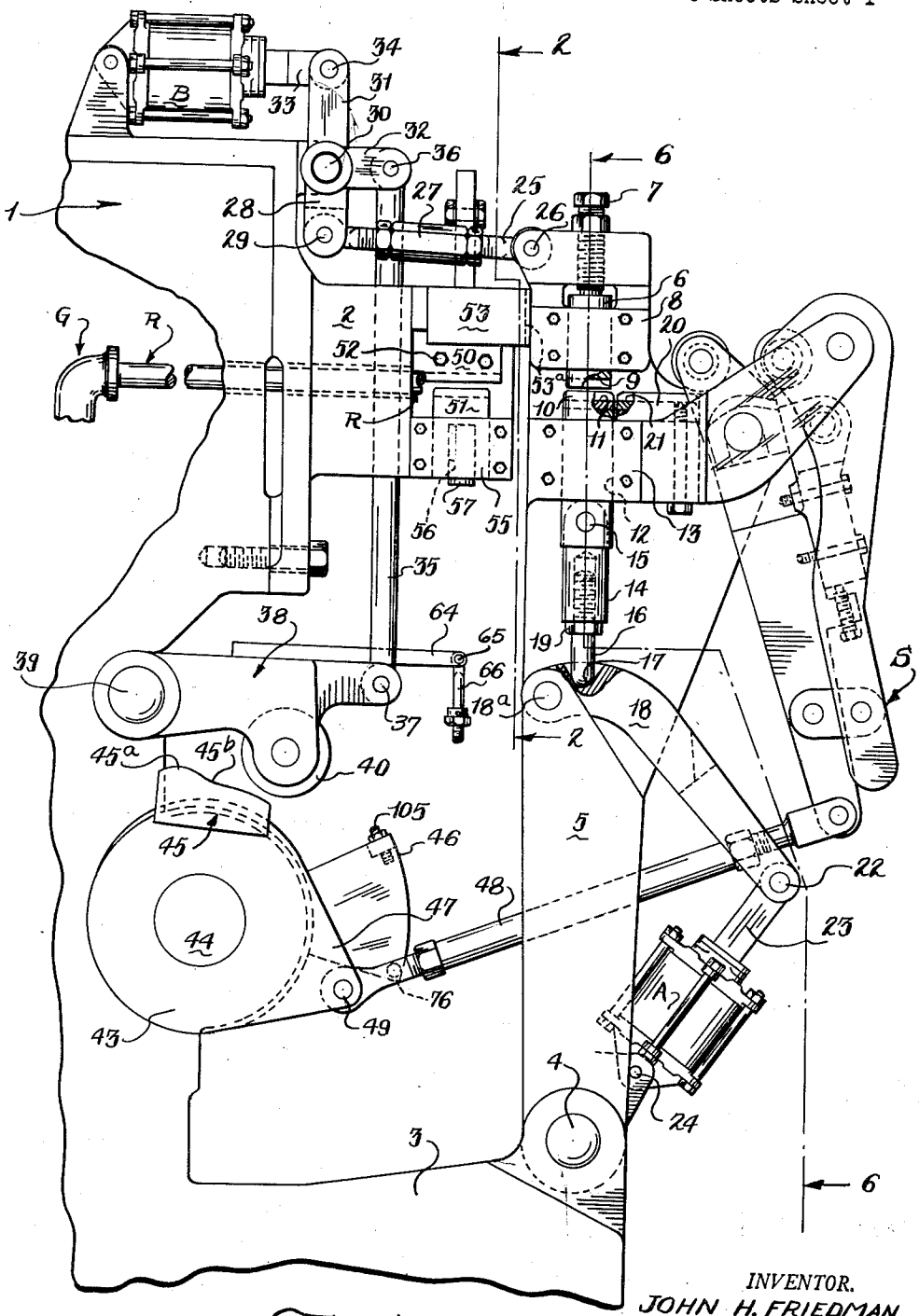

Fig. 1

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STOCK FEEDING APPARATUS

Filed July 19, 1952 4 Sheets-Sheet 2

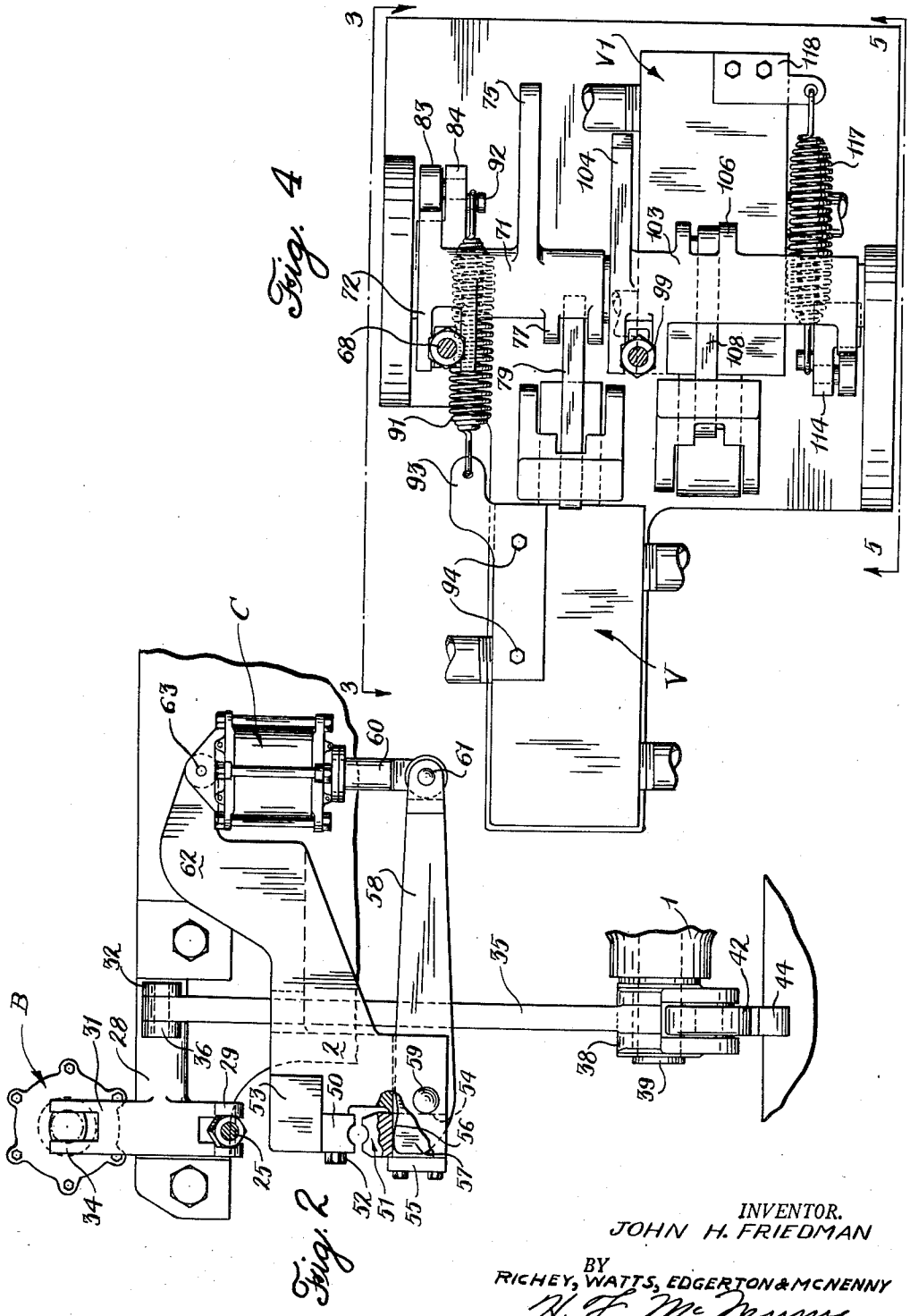

Fig. 4

Fig. 2

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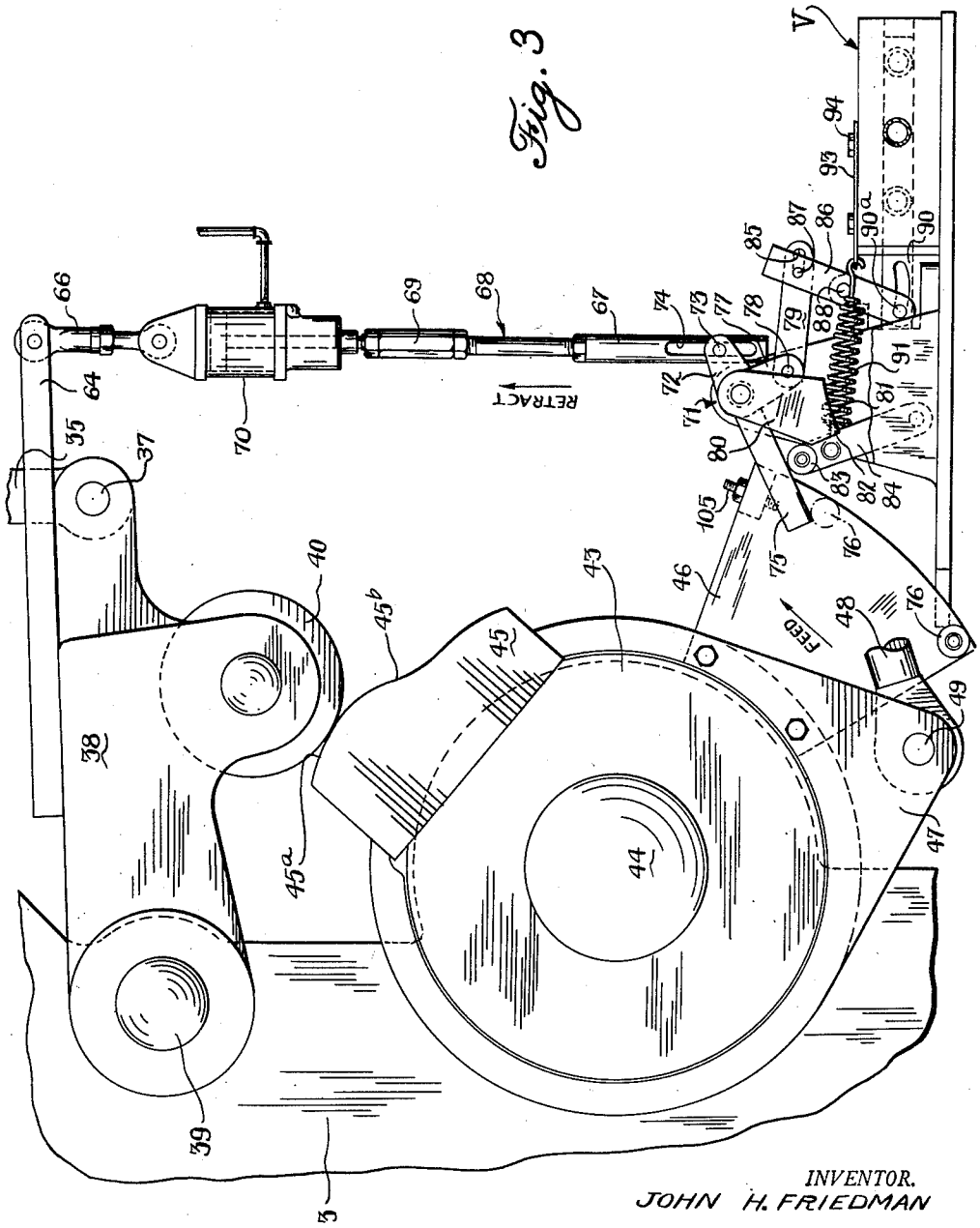
STOCK FEEDING APPARATUS

Filed July 19, 1952 4 Sheets-Sheet 3

Fig. 3



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STOCK FEEDING APPARATUS

Filed July 19, 1952 4 Sheets-Sheet 4

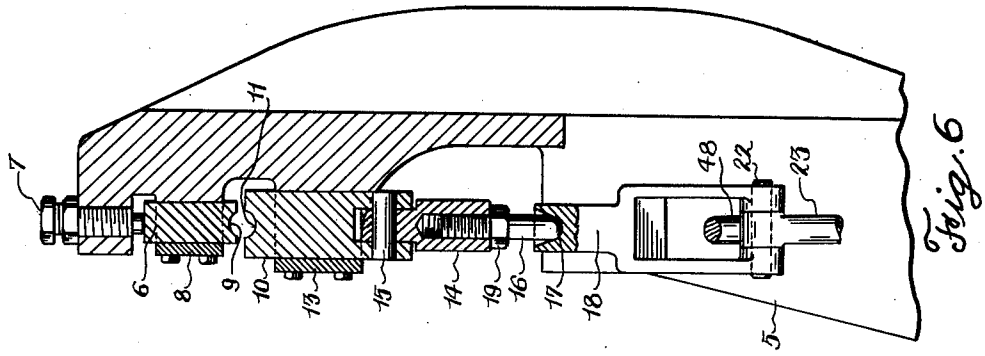

Fig. 6

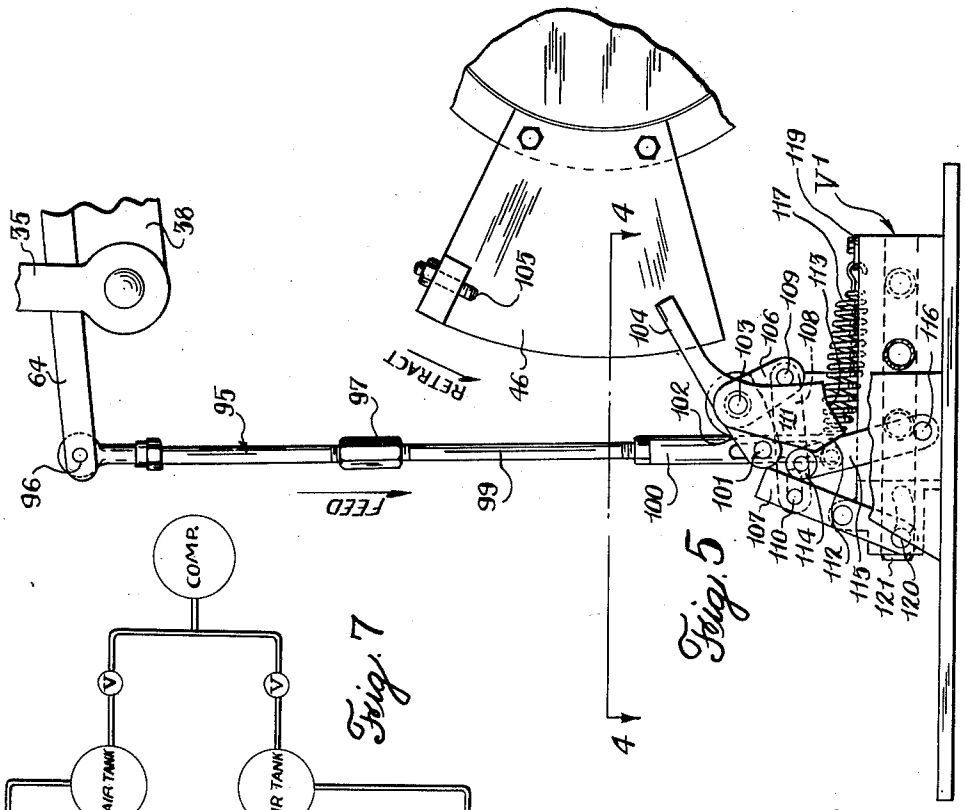

Fig. 5

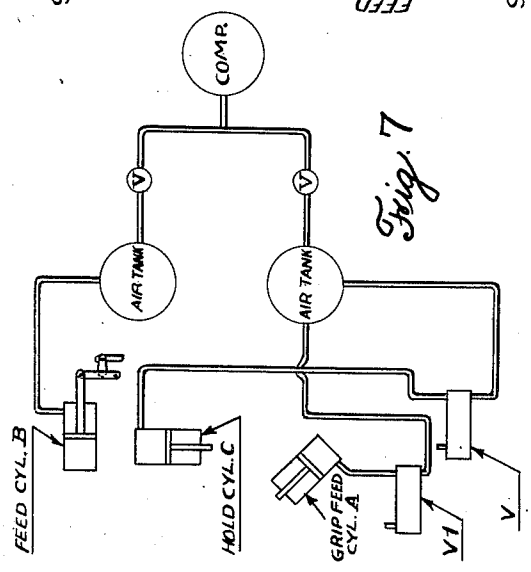

Fig. 7

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Patented Jan. 1, 1957

2,776,048

STOCK FEEDING APPARATUS

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Application July 19, 1952, Serial No. 299,883

8 Claims. (Cl. 203—127)

This invention relates to stock feeding apparatus and more particularly to apparatus for feeding elongated rod or wire stock into metal working machinery. In the machinery of the type mentioned, stock is fed to a shear and blanks are sheared from the stock and operated on by tool and die sets in the machine. It is necessary that all sheared blanks be of the same length. In order to insure uniformity in the length of the sheared blanks, it has been proposed to intermittently drive a pair of feed rollers that advance the stock against a fixed stock gauge, the motion of the rollers exceeding slightly the desired length of the blank to be sheared from the stock, whereby slippage occurs between the rollers and the stock after the latter engages the fixed stock gauge.

If the rollers are made to grip the stock firmly enough to insure positive feeding, then the necessary slipping action imparts high loads on the over-running clutch and other mechanism associated with the feed rollers. On the other hand, if the rollers do not grip the stock positively enough, short feeding will result.

An object of the present invention is to insure uniformity of stock feeding without requiring slippage between the feeding device and the stock. This is accomplished by replacing the feed rollers with a pivoted lever mounting stock grippers that are not intended to and do not slip on the stock. The feed lever is retracted mechanically and advanced on its feed stroke by yieldable means such as a pneumatic cylinder. Thus, it is only necessary that the retraction stroke be made slightly greater than that necessary to feed the desired length of blank whereupon during the feeding stroke, the yieldable means will bring the stock against the stock gauge and hold it there without requiring slipping of the feeding member relative to the stock.

It is a feature of this invention that a control means for the stock holding and stock feeding grippers are operated after the feed lever has reached each of its extreme positions thereby insuring that the length of stroke of the feeder will be consistently uniform. This is accomplished by incorporating in the mechanism what amounts to lost motion means between the main driving shaft of the device and the control mechanism for the grippers.

The manner in which these and other objects and advantages may be accomplished will be apparent in the following detailed description of a preferred embodiment of my invention.

In the drawings:

Fig. 1 is a side elevation of the apparatus;

Fig. 2 is a partial section taken on 2—2 of Fig. 1 with some parts removed for purposes of simplification;

Fig. 3 is an enlarged view of one of the control valves;

Fig. 4 is a plan view of the control valves;

Fig. 5 is an elevation corresponding to Fig. 3 but looking in the other direction;

Fig. 6 is a section taken on 6—6 of Fig. 1; and,

Fig. 7 is a piping diagram of the installation.

As best seen in Fig. 1, the machine incorporates a

frame member 1 apertured to receive rod or wire stock R which is fed against the stock gauge G. This machine may be a cold header or the like of the type shown in the patent to Clouse 2,026,823 or in my co-pending application Serial No. 663,569, filed April 19, 1946, and now Patent No. 2,542,864. Bracket 2 is bolted to the machine bed for supporting the stock grippers and on a lower part of the bed is formed an extending arm 3 which mounts by means of pin 4 the stock feed lever 5. In order to grip stock, an upper block 6 is mounted on the lever and is backed up by an adjustable set screw 7. Plate 8 clamps block 6 in its adjusted position and the block is notched as at 9 for receiving the stock. This construction also appears clearly in Fig. 6.

The movable gripper block 10 is grooved as at 11 for receiving the stock and rides in a slot 12 formed in lever 5 with the block retained by cover plate 13. In order to open and close the grippers, link 14 is pivoted to block 10 as at 15 and carries a threaded stud 16 which rests in a pocket 17 formed in the operating lever 18. Lock nut 19 holds the stud 16 in its adjusted position against lever 18. Lever 18 is pivoted to arm 5 as at 18a. A stock straightening mechanism S is likewise mounted on the apparatus as described in my co-pending application Serial No. 81,514, filed March 15, 1949 and now Patent No. 2,646,102, such straightening apparatus including block 20 grooved as at 21 for receiving the stock as described in my aforesaid application. Operating arm 18 connects as at 22 to the piston rod 23 of the grip cylinder A which, in turn, is pivoted on the arm 5 as at 24.

The feed lever is mechanically retracted and elastically or resiliently advanced for feeding by the following apparatus. An eye bolt 25 is pivoted to the upper end of arm 5 as at 26 and is screwed to a turnbuckle nut 27, the other end of which receives an I-bolt pivoted to a bellcrank lever 28 as at 29. A right and left hand thread construction is employed for the eye bolts whereby adjustment of nut 27 controls the position of the feed lever 5. The bellcrank lever 28 is pivoted to the bed frame as at 30 and has an upward extension 31 and a horizontal extension 32. The upward extension connects to a piston rod 33 by means of pivot 34, the piston rod extending into a feed cylinder B, pivotally mounted on the frame and serving to resiliently advance the lever 5 on its feeding stroke. The feed lever or arm 5 is retracted or withdrawn from the frame against the force of air in cylinder B which cylinder is always supplied with air under pressure tending to move piston rod 33 to the left, as seen in Fig. 1, during operation of the device. In order to retract the feed lever 5, a vertical rod 35 connects as at 36 to the horizontal extension 32 of the bellcrank 28 and the rod 35 is also pivoted at 37 to a cam follower arm 38 which, in turn, is pivoted to the frame as at 39. A cam follower roller 40 is mounted on the follower. A cam support plate 43 is fastened to a shaft 44 forming part of the metal working machine. This shaft is an oscillating one, oscillation of which is timed relative to header slide motion by any means known in the art such as shown in the patent to Clouse 2,139,936.

In order to retract the feed lever, a cam is mounted on plate 43 having a lift portion 45 and a uniform radius portion 45a for permitting over-ride of the cam after the feed lever 5 reaches its retracted position. Also, carried by the shaft 44 is a bracket 46 that mounts means for operating control valves for stock holding and feed gripping air cylinders. The hub or plate 43 has an extension 47 connected to an adjustable link 48 for operating a stock straightening mechanism S as described in my aforesaid copending application.

To hold the stock during shearing and retraction of the feed lever, a pair of grip blocks 50 and 51 are mounted on the frame of the machine. Block 50 is bolted to

bracket 8 by bolts 52 and is backed up by a lug 53 (as best seen in Fig. 2). Block 51 is slidably retained in a slot 54 in bracket 2 by a cover plate 55. The block is slotted as at 56 to receive the end of an operating lever 57 having an extension 58 and being pivotally mounted in the bracket 2 as at 59. The lever 58 connects to the piston rod 60 by pin 61 which rod extends into stock holding cylinder C pivotally mounted on an extension 62 of bracket 2 by a pin 63.

The control mechanism for the feed grip cylinder A and the stock holding cylinder C will now be described. The stock holding cylinder C is opened to exhaust by a lever system on arm 38 and is actuated to close the grippers 50 and 51 by means of hub 43. An arm 64 extends from the cam follower 38 and is pinned as at 65 to an adjustable link 66. The link terminates in a member 67 for operating a valve control linkage which is adjustably connected by means of rod 68 to a turnbuckle 69, the other end of which connects to a piston disposed in cylinder 70. Cylinder 70 acts as a yieldable relief should the parts be jammed when the cam 45 lifts arm 38 and connected parts.

A valve V is provided for controlling the stock holding cylinder C (the cylinder appears in Fig. 2) such valve being operated by a combined snap action, lost motion linkage. As seen in Fig. 3, the operating mechanism for the valve V comprises a lever 71 having an extension 72 carrying a pin 73 riding in slot 74 formed in rod 67. The valve is also controlled by an extension 75 which may be engaged by a roller 76 mounted on cam plate 46. Another extension 77 of the lever 71 is pivoted as at 78 to a link 79. The lever 71 also has a cam-like extension 80 having cam surfaces 81 and 82 thereon for engagement with a roller 83 mounted on a pivoted link 84. The link 79 is slotted as at 85 and actuates the lever 86 by means of a pin 87 riding in the slot, lever 86 being pivoted to the valve body as at 88 and having an extension that operates the valve plunger 90 by means of pin 90*a*. Spring 91 urges roller 83 against cam extension 80.

As seen in Fig. 3, the cam part 45*a* is under the roller 40 which raises the cam follower 38 and by means of the bellcrank lever 28 retracts the feed lever 5. When the parts reach this position the snap action linkage for the valve V, under action of rod 67, will be such as to position the valve as seen in Fig. 3 which is the position wherein the valve V is internally ported so that air pressure is released from the stock holding cylinder C to ready the apparatus for the feed stroke. When the shaft 43 moves in the other or feed direction, valve V is unaffected and the holding grippers are released until roller 76 strikes lever 75 after completion of the feed stroke whereupon the valve snaps to a position directing air to the stock holding cylinder C for holding the stock during subsequent retraction of the feed lever.

In order to operate the feed gripper control valve V_1 to open the feed grippers, a rod 95 is pivoted to follower 38 as at 96 and connects to a turnbuckle 97 which mounts rod 99 connected to a slotted member 100 that receives a pin 101 carried by one extension 102 of a multi-arm lever. This lever is pivoted to the support bracket at 103 and has another extension 104 for engagement by an adjustable set screw 105 carried by the cam plate 46, which acts to close the feed grippers. Another lever extension 106 connects to valve operating lever 107 by means of a link 108 pinned to extension 106 at one end as at 109 and is slotted at the other end to receive a pin 110 in lever 107. A cam extension 111 is also part of lever 102 and has cam surfaces 112 and 113 for engaging a roller 114 on a lever 115 pivoted to the valve support as at 116. The roller 114 is urged against the cam 111 by a coil spring 117 connected to the valve body as at 119. Lever 107 carries a pin 120 connected to the valve plunger 121. Thus, it can be seen that this part of the apparatus is similar to the other valve control linkage in that a lost motion snap action is provided. For example, when lever 104 is depressed by screw 105 on hub 43, due to the clearance provided by slot in link 108, the valve is not operated until about the time that roller 114 passes over the hump between cam surfaces 112 and 113 whereupon the spring 117 and lever 115 snaps the remainder of the linkage so as to move the valve plunger to the right in the drawings to close the feed grippers. The reverse action occurs when member 100 drops after the end of the feed stroke whereupon the end wall of the slot in member 100 on rod 95 strikes pin 101 and snaps the valve in the other direction, that is, to the position shown in Fig. 5 which is the position that disconnects the air pressure line from the feed grip cylinder A and opens the cylinder by means of an exhaust port in the valve to atmosphere, thereby opening the feed grippers.

A cycle of operation will now be briefly described. Assume that the parts are positioned as at Fig. 1, which is the end of the feed stroke with the stock R resting against the stock gauge G. The hub 43 has completed its counter-clockwise (feed) motion and is ready to begin the clockwise or retraction motion. Cam follower arm 38 is down because cam 45 has moved out from under roller 40 and roller 76 on hub 43 will have moved valve V to the position wherein the stock holding grippers 50 and 51 are closed. Likewise, rod 95 (Fig. 5) will be down so that the feed gripper controlling valve V has been shifted so as to open the stock feed grippers on arm 5 by exhausting cylinder A. As the hub 43 moves clockwise, cam 45 is brought under roller 40 and the ramp 45*b* lifts the arm 38 thereby positively retracting the feed lever against the force of air pressure in feed cylinder B. During this motion, the stock is held between jaws 50 and 51 of the holding gripper and feed gripper jaws 10 and 11 are open to permit them to pass over the stock. Towards the end of the retraction stroke, a constant radius portion 45*a* of the cam 45 is brought under roller 40 and further rotation of the hub 43 in the clockwise direction as seen in Fig. 1 continues without affecting the feed lever, which remains at its retracted position. However, this continued motion of hub 43 brings set screw 105 against lever 104 operating valve V_1 (Fig. 5) to close the stock feed grippers while the arm 5 is fully retracted and before the feed stroke begins. Also, the rod 68 controlling valve V (Fig. 3) for the stock holding grippers 50 and 51, is adjusted so that the final motion of the hub 43 in the retract direction (clockwise in Fig. 1) snaps over the valve V to exhaust position wherein the hold cylinder C is exhausted to the atmosphere and hold grippers 50 and 51 release the stock. Now, the stock is gripped in arm 5 and is freed from the stock holding grippers 50 and 51, all before the feed stroke is initiated. When hub 43 reverses (counter-clockwise as seen in Fig. 1), roller 40 on arm 38, which is held against part 45*a* of cam 45 by pressure in feed cylinder B, rides down ramp 45*b* on the cam thereby lowering arm 38 and permitting feed cylinder B, through the levers connected thereto, to advance the feed lever and the stock on the feed stroke.

When the stock R engages the stock gauge G, further rotation of the hub 43 has no affect on the feeding, and in order that the stock be firmly pressed against the gauge, there is a clearance indicated in dotted lines at 53*a* between arm 5 and stop 53. However, such further rotation of shaft 44 does bring roller 76 (Fig. 3) against lever 75 snapping the valve V to a position wherein air pressure is applied to the stock grip cylinder C thereby gripping and holding the stock in its extended position. This action occurs before the cam 45 moves entirely off of roller 42. When the latter happens, near the end of the feed stroke, the final dropping of lever 38 causes rod 95 to move down and snap valve V_1 to exhaust position wherein the feed grip cylinder A exhausts to atmosphere thereby opening feed jaws 10 and 11 while the stock is held against the gauge in preparation for the retraction stroke. Any clearance at 53*a* will now be taken up under

force of air pressure in cylinder B but this has no affect on the stock nor on the length of stock fed by the apparatus. The stroke of the lever **5** is determined by the height of cam **45** and adjustment of turnbuckle **27**. Thus, it can be seen that a positively operated feeding device is provided which includes a yieldable means such as the air cylinder B for operating the feed lever on the feed stroke thereby permitting a positive gripping of the stock and at the same time insuring that the stock will be firmly urged against the feed gauge to provide uniformly sheared blanks. The cylinder **70** (Fig. 3) is a safety over-load release to prevent damage to the parts should the valve V become jammed, it being noted that the lever **68** is positively lifted by cam **45** for operation of valve V. Such a mechanism is not required for operation of valve V_1 (Fig. 5) because here the lever **38** is moved by the feed cylinder B which acts as a resilient over-load release should the valve jam. By adjusting the cam **45** and the turnbuckle **27**, the desired stroke and position of the feed lever **5** can be provided. Due to the resilient nature of the feeding action, blocks **9** and **10** can be adjusted to provide any desired firmness of grip during the feeding stroke, this being possible because no slipping between the feed grippers and the stock is required.

Having completed a detailed description of a preferred embodiment of the present invention so that others skilled in the art may be able to understand and practice the same, I state that what I desire to secure by Letters Patents is not limited by said preferred embodiment but rather is defined in what is claimed.

What is claimed is:

1. Apparatus for feeding elongated stock comprising a frame having stock receiving means therein, a stock feeding member, a first stock gripper on said member, means mounting said member for advancing toward and retracting from said frame, a second stock gripper on said frame, an oscillating shaft in said frame, a cam driven by said shaft, cam follower means connected to said feeding member for retracting said feeding member under action of said cam, an air cylinder connected to said feed member opposing the action of said cam for advancing said feeding member for feeding, first means driven by said shaft operably connected to said grippers for closing said first gripper and opening said second gripper after said feeding member reaches its retracted position, and second means driven by said shaft operably connected to said grippers for opening said first gripper and closing said second gripper after said feeding member reaches its advanced position.

2. In a header, a frame having a stock receiving bore therein a stock gauge mounted on said frame, a stock feeding lever pivoted on said frame, a first stock gripper on said lever, a second stock gripper on said frame, an oscillating shaft in said frame, a cam driven by said shaft, cam follower means connected to said lever for retracting said lever from the frame under action of said cam, a pneumatic cylinder and piston assembly connected between said frame and lever for advancing said lever when said cam permits, first means driven by said shaft operably connected to said grippers for closing said first gripper and opening said second gripper after said lever reaches its retracted position, and second means driven by said shaft operably connected to said grippers for opening said first gripper and closing said second gripper after said lever reaches its advanced position.

3. Apparatus for feeding elongated stock against a stock gauge comprising a frame having a stock receiving aperture therein, a stock feeding member movably mounted on said frame, a stock feeding gripper on said stock feeding member, a stock holding gripper supported on said frame, power means for retracting said feeding member away from said frame, an air piston and cylinder assembly connected between said frame and stock feeding member, means for continuously supplying air under pressure to said cylinder for advancing said feeding member toward said frame, first means operably connected to said grippers for closing said stock feeding gripper and opening said stock holding gripper after said feeding member reaches its retracted position, and second means operably connected to said grippers for opening said stock feeding gripper and closing said stock holding gripper after said feeding member reaches its advanced position.

4. Apparatus for feeding elongated stock against a stock gauge comprising a frame having a stock receiving aperture therein, a stock feeding member movably mounted on said frame, a stock feeding gripper on said stock feeding member, a stock holding gripper supported on said frame, a cam shaft in said frame carrying a cam, a cam follower and linkage for positively retracting said feeding member away from said frame, an air piston and cylinder assembly connected between said frame and stock feeding member, means for continuously supplying air under pressure to said cylinder for advancing said feeding member toward said frame, first means operably connected to said grippers for closing said stock feeding gripper and opening said stock holding gripper after said feeding member reaches its retracted position, and second means operably connected to said grippers for opening said stock feeding gripper and closing said stock holding gripper after said feeding member reaches its advanced position.

5. Metal working apparatus comprising a frame having a stock receiving aperture therein, a stock gauge mounted on said frame, a stock feeding member movably mounted on said frame, a stock feeding gripper on said stock feeding member, a stock holding gripper supported on said frame, means for retracting said feeding member away from said frame, an air piston and cylinder assembly connected between said frame and stock feeding member, means for continuously supplying air under pressure to said cylinder for advancing said feeding member toward said frame, first means operably connected to said grippers for closing said stock feeding gripper and opening said stock holding gripper as said feeding member advances the stock toward said gauge under action of said air piston, and second means operably connected to said grippers for opening said stock holding gripper after said piston and cylinder assembaly has pressed the stock carried by the gripper on said feeding member against the stock gauge.

6. Apparatus for intermittently feeding rod stock into a metal working machine comprising a frame, a stock receiving bore in said frame, a stock gauge mounted transversely of said bore to engage the end of the rod stock being fed, an oscillating feed lever pivotally mounted in the frame below said bore on a pivot axis extending transversely with respect to the axis of said bore, a pair of co-operating grip jaws operatively connected to the upper end of said feed lever in alignment with said bore and being adapted to grip the rod stock being fed into the bore, grip jaw actuating means operatively connected to said grip jaws and movable therewith toward and away from said bore to effect alternate grip and release of the grip jaws on the stock as the grip lever is oscillated, a cam shaft mounted on the frame on an axis parallel to said feed lever axis, a feed lever crank carried by the frame, a link connecting said crank and feed lever to oscillate the lever and move the grip jaws carried thereby toward and away from said bore, a pair of opposed stock holding jaws mounted on the frame between the feed lever and the bore, a cam on said cam shaft, grip jaw control means in the path of said cam, said control means being connected to said grip jaw actuating means whereby said grip jaws engage the stock when the lever is remote from the holding jaws and the stock is released by the grip jaws when adjacent the holding jaws with the end of the stock against said stock gauge.

7. Stock feeding apparatus according to claim 6 wherein the grip jaw actuating means includes an air cylinder.

8. Apparatus for intermittently feeding rod stock into a metal working machine comprising a frame, a stock re-

ceiving bore in the frame, a stock gauge mounted within the frame transversely of said bore to engage the end of the stock being fed therein, a stock feeding lever mounted for oscillation on a shaft beneath said bore, a lever actuating crank mounted on said frame, a link connecting said crank to said lever for moving the upper end of said lever toward and away from said bore, a pair of co-operating grip jaws carried by said lever in alignment with said bore, a pair of oposed holding jaws mounted on the frame between said bore and said lever to intermittently hold the stock being fed into the machine by said grip jaws, grip jaw actuating means operatively connected to said grip jaws to effect grip or release of the stock by said grip jaws, a cam shaft mounted in said frame for rotation about an axis parallel to the pivotal axis of said lever, grip jaw control means in the path of a cam member carried by said cam shaft, said control means being operatively connected to said grip jaw actu-

ating means, said cam shaft and said crank being operatively connected for movement in timed relation whereby said control means effects movement of the grip jaws to engage the stock when the grip jaws are remote from said holding jaws and said grip jaws are released with respect to the stock when the grip jaws are adjacent to the holding jaws.

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