

July 4, 1967

A. W. SCRIBNER

3,329,327

STOCK ADVANCING DEVICE FOR PUNCH PRESSES AND THE LIKE

Filed March 25, 1966

2 Sheets-Sheet 1

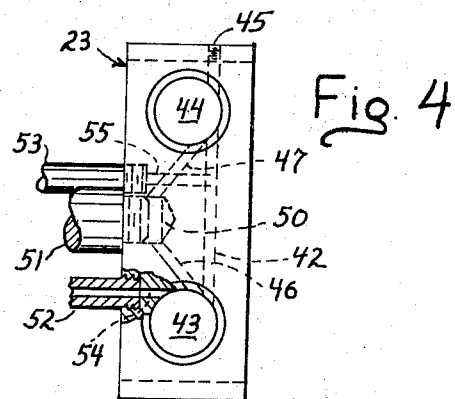
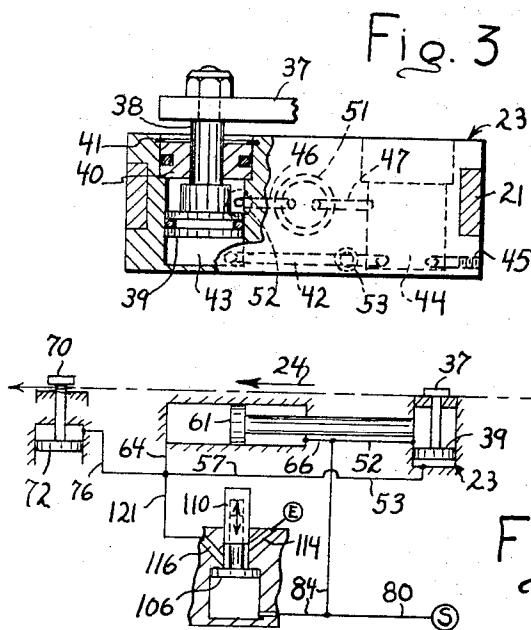
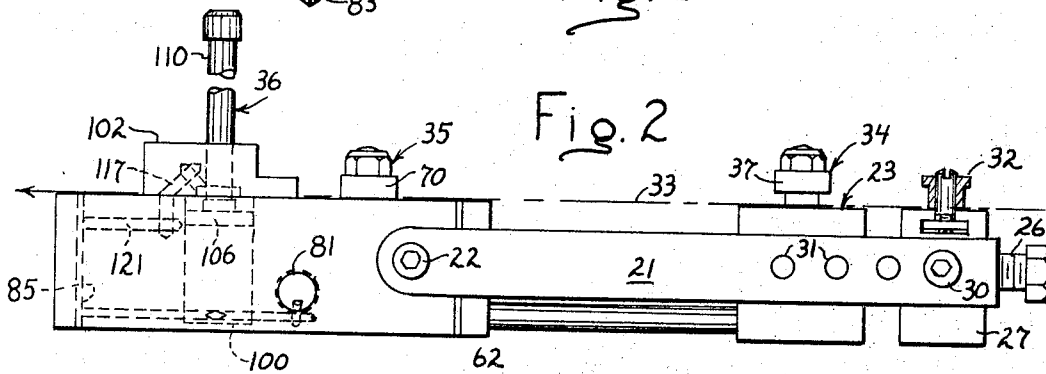
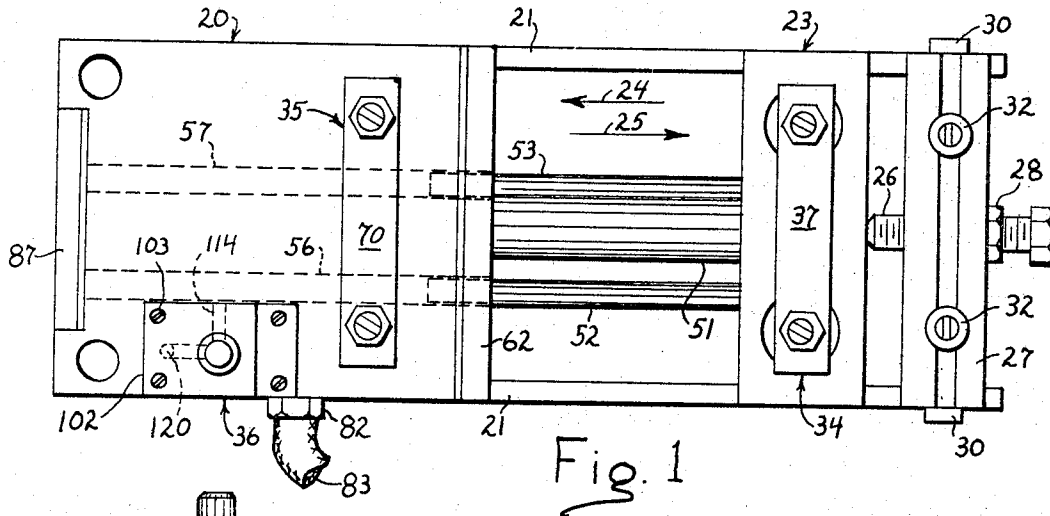


Fig. 13

Albert W. Scribner

July 4, 1967

A. W. SCRIBNER

3,329,327

STOCK ADVANCING DEVICE FOR PUNCH PRESSES AND THE LIKE

Filed March 25, 1966

2 Sheets-Sheet 2

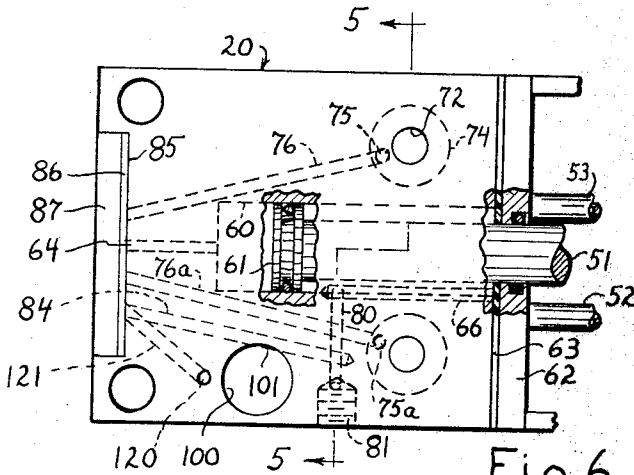


Fig. 6

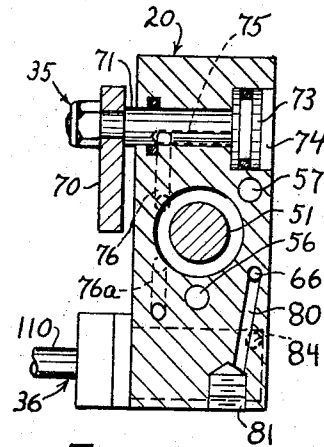


Fig. 5

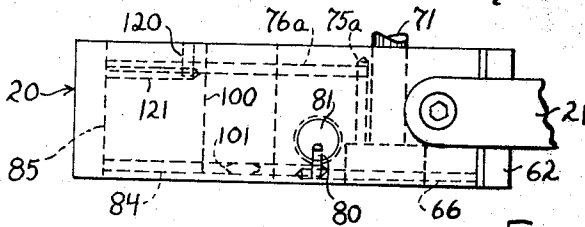


Fig. 7

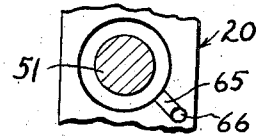


Fig. 8

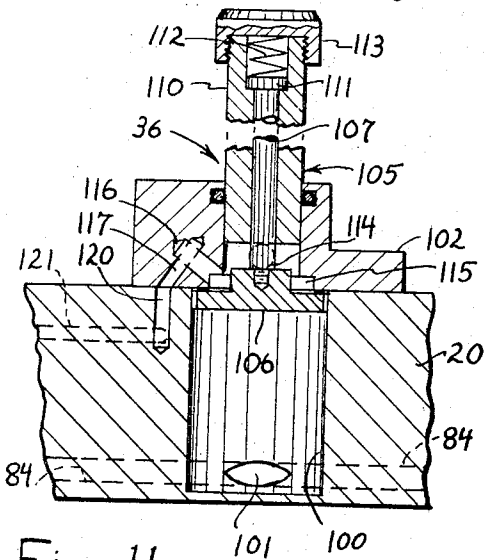


Fig. 11

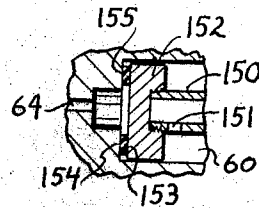


Fig. 14

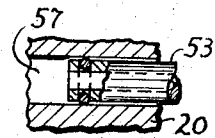


Fig. 9

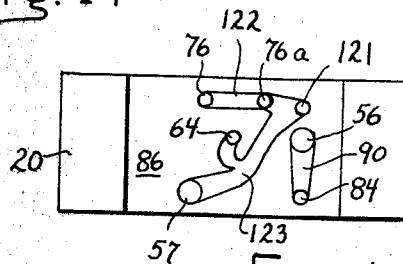


Fig. 10

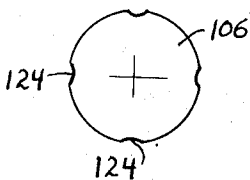


Fig. 12

Albert W. Scribner

1

3,329,327 STOCK ADVANCING DEVICE FOR PUNCH PRESSES AND THE LIKE

Albert W. Scribner, 6 Country Club Road,
Darien, Conn. 06820

Filed Mar. 25, 1966, Ser. No. 543,762

10 Claims. (Cl. 226—150)

This invention relates to an improved intermittently operating stock advancing means for metal working machines and the like. More particularly the invention relates to a novel fluid operated device for intermittently advancing metal stock into the work station of a punch press.

Many proposals have been made for devices which advance metal strip into various types of metal working machines such as saws, screw machines, punch presses, etc., however most of these devices have not proved to be entirely satisfactory because they have been either insufficiently accurate in operation, too expensive, incapable of rapid operation, or too cumbersome for easy set-up. The instant invention contemplates overcoming these difficulties by using a novel interrelated arrangement of actuating means and an improved means for directly controlling all of the actuating means of a fluid operated stock advancing device.

The primary object of the instant invention is to provide a relatively simple inexpensive stock advancing means which is capable of accurately and rapidly advancing stock step by step into a work station.

Another object of the invention is to provide a novel interrelated arrangement and control for a group of fluid actuating motors of a stock feeder whereby producing an operative indexing stroke and then a stock advancing stroke of the feeder in sequence is accomplished by supplying fluid pressure to all of said fluid motors simultaneously and then exhausting fluid pressure from all of said fluid motors simultaneously.

Another object of the invention is to provide an improved stock advancing device for a metal working machine or the like wherein a reciprocating fluid actuated feed head and an associated fluid operated stock gripping means thereon are both continuously biased to their respective first operative positions, and are simultaneously actuated to their respective second operative positions by the application of fluid pressure to a plurality of fluid motors that actuate said feed head and stock gripping means.

Another object of the invention is to provide an improved stock feeder having a plurality of fluid motors including two fluid motor means which respectively actuate a reciprocable feed head and a stock gripping means mounted on the latter, and a fluid control means associated with said motors whereby fluid pressure is supplied to the control sides of all of said plurality of fluid motors during one operative stroke of the feeder.

Another object of the invention is to provide a novel fluid control valving and conduit means in combination with the actuating means of a fluid operated stock feeder.

Other objects of the invention will become apparent as the disclosure progresses.

In the drawings:

FIGURE 1 is a plan view of the instant stock feeder.

FIGURE 2 is a front elevational view of the apparatus of FIGURE 1.

FIGURE 3 is a right hand end elevational view in partial section with some elements omitted and illustrates the construction of the movable feed head.

FIGURE 4 is a plan view with some parts omitted of the structure shown in FIGURE 3.

FIGURE 5 is a sectional view taken along section line 5—5 of FIGURE 6.

2

FIGURE 6 is a plan view in partial section showing some of the fluid conduit lines in the main body of the instant device.

FIGURE 7 is a front elevational view of the apparatus of FIGURE 6.

FIGURE 8 is a fragmentary view of a portion of the inner or right hand end of the main body.

FIGURE 9 is a fragmentary view in partial section and illustrates the sliding engagement between the fluid supply tubes and the associated bores in the main body.

FIGURE 10 is an end view of the outer or left end of the main body and shows the apertures and channels cut in the gasket for interconnecting the various fluid lines.

FIGURE 11 is an enlarged axial sectional view of the control valve means for the instant device.

FIGURE 12 is a bottom view of the lower head portion of the valve member.

FIGURE 13 is a fluid circuit diagram for the instant device.

FIGURE 14 is an axial sectional view showing a modified embodiment of the instant main fluid motor.

Referring primarily to FIGURES 1 and 2 there is shown a main frame comprising a main body 20 and a pair of parallel side rails 21 which are fixedly secured to said main body by any suitable means such as screws 22. A reciprocable feed head 23 is slidably mounted on said side rails and is power actuated by a main double acting fluid motor for movement in a forward work feeding direction 24 and a rearward indexing direction 25. The forward limit of feed head movement is determined by engagement of the feed head 23 with the main body 20 or parts secured thereto while the rearward limit of feed head movement is determined by engagement of the feed head with the inner end of an adjustable abutment screw 26 which is threadedly mounted in an end block 27. A lock nut 28 secures screw 26 in adjusted position. Block 27 is fixedly secured to the outer ends of the side rails by any suitable means such as screws 30. Several holes 31 are provided in the side rails whereby major adjustments may be made in the operative stroke of the feed head by varying the position of the end block relative to the main body 20, minor variations in said stroke being made possible by rotatably adjusting said abutment screw 26 and locking the latter in selected position. Any suitable means such as the laterally adjustable guide rollers 32 may be provided on the top of the end block 27 for guiding the movement of the strip stock into and through the instant feeder, this stock feed path being indicated by arrow 33, FIGURE 2. Fluid actuated stock gripping means 34 are provided on the feed head 23 while fluid actuated stock clamping means 35 are provided on the main body 20. The said main fluid motor, the gripping means 34 and the clamping means 35 are actuated in a coordinated manner such that during the forward or stock feeding stroke of feed head 23 clamping means 35 is in a released condition and gripping means 34 is in a gripping condition so that the metal stock or strip is advanced by a predetermined amount corresponding to the selected length of the operative stroke of the feed head. During the subsequent rearward indexing stroke of the feed head clamping means 35 is actuated while gripping means 34 is released whereby the metal strip remains clamped against the main body while the feed head moves to the position shown in FIGURE 1. The forward feed stroke and the rearward indexing strokes of the feed head 23 are initiated in response to the operation of a control valve means 36 by the movable platen of the punch press.

The means for actuating the said main fluid motor and the fluid actuated gripping and clamping means 34 and 35 will now be described. Considering first the feed head 23 the gripping mean 34 comprises a transverse movable bar 37 having ends that are respectively connected so as

to be actuated by a pair of double acting fluid motors. These two double acting motors, their connections and controls are similar so that a detailed description of one thereof will suffice here. A piston rod 38, FIGURE 3, is connected between bar 37 and a piston 39, the latter being slidably disposed in a cylindrical bore formed in the feed head 23. This cylinder bore is sealingly closed at its upper shouldered end by any suitable means such as an annular plug 40 that is secured in place by a conventional type E-ring 41. The feed head is formed with a transverse bore 42 that interconnects that portion of fluid cylinder 43 located below piston 39 with the corresponding portion of the other fluid cylinder 44. Any suitable plug 45 is provided in the outer end of bore 42. Two holes 46, 47 are drilled in the feed head 23 so as to interconnect that portion of cylinder 43 above piston 39 with the corresponding portion of the other cylinder 44. The holes or bores 46, 47 both communicate with the unfilled inner end of a threaded bore 50 that is adapted to threadedly receive the outer end of piston rod 51 of the said main fluid motor.

The rearward ends of a pair of tubular fluid conduit tubes 52 and 53 are threadedly attached to the feed head so as to respectively communicate with bores 54 and 55 formed in the feed head; bore 55 communicating in turn with bore 42 and the said lower portions of cylinders 43 and 44, and bore 54 communicating with the said upper portions of said cylinders 43 and 44. With these connections fluid pressure applied through tube 53 will tend to elevate both of the double acting pistons such as 39 and thus move the bar 37 of the stock gripping means 34 to release position. Applying fluid pressure through tube 52 will tend to lower both said pistons and the bar 37 to stock gripping condition. The forward ends of said tubes 52, 53 are respectively slidably received in two elongated parallel bores 56 and 57, FIGURE 1, that extend completely through the main body 20, the sliding engagement of this telescopic type fluid conduit arrangement being illustrated in FIGURE 9.

The feed head 23 is adapted to be reciprocally actuated by a double acting main fluid motor comprising a main cylinder or bore 60, FIGURE 6, formed in the main body 20 and in which a piston 61 is adapted to move, piston 61 being connected to the other end of said piston rod 51. The rearward or right end (as seen in FIGURE 1) of said main cylindrical bore 60 is closed by a cover plate 62 and an appropriate gasket 63, said gasket and cover plate being formed with appropriate apertures to accommodate the said side rails 21 and the presence and sliding movement of said main piston rod 51 and the two fluid conduit tubes 52 and 53. The main body 20 is formed with a bore 64 which communicates with the left end of the main cylinder 60 (as seen in FIGURE 6) while a groove 65, FIGURE 8, formed in the inner end face of the main body 20 communicates the adjacent right end of said main cylinder 60 with a bore 66 extending parallel to and adjacent to the lower side of said main cylinder. As will be apparent the introduction of fluid pressure into opposite ends of the main cylinder 60 through said bores 64 and 66 will tend to move the piston 60 in opposite directions respectively so as to reciprocate said feed head 23 as will be discussed below.

The stock clamping means 35 comprises a second movable transverse bar 70 having outer ends that are respectively connected so as to be actuated by a pair of single acting fluid motors located in said main body 20. In that these single acting fluid motors and their connections are similar a detailed description of one thereof will suffice here. Referring to FIGURES 5 and 6 a piston rod 71 extends through a suitable bore 72 formed in the main body 20 and is connected at one end to the bar 70 and at the other end to a piston 73. Piston 73 is slidably mounted in an enlarged cylinder bore 74 formed in the lower portion of the main body 20, the portion of this cylindrical bore located above piston 73 defining a fluid cylinder. A ver-

tical bore 75 communicates between the top shoulder of said cylindrical bore 74 and an angularly disposed horizontal bore 76. Similar conduit bores 75a and 76a are provided for the other single acting stock clamping fluid motor. As will be apparent application of fluid pressure to the outer or forward ends of conduit bores 76 and 76a will cause the single acting pistons such as 73, and the bar 70 to be lowered thus clamping the metal stock in fixed position against the main body 20. If desired any suitable spring means may be provided for lightly biasing said bar 70 upwardly towards a normal elevated stock release position.

A description will now be made of the fluid control means and related conduits for supplying fluid pressure to the main double acting feed head reciprocating motor, to the two double acting stock gripping motors on the feed head and to the two single acting stock clamping fluid motors on the main body 20. As mentioned above the right hand end (as seen in FIGURE 6) of the main cylinder 60 is arranged to constantly communicate with a source of fluid pressure. To this end a bore 80, FIGURES 5 and 6, is provided in the main body which communicates between the said bore 66 and a threaded bore 81 formed in the side of the main body. Bore 81 is adapted to threadedly receive a fitting 82, FIGURE 1, of a flexible fluid conducting line or hose 83 that is connected to a fluid pressure source. As will be apparent fluid pressure will always flow from line 83 through bores 80, 66 and groove 65 into the said right end of the main cylinder 60 and this will cause the piston 61 to be normally actuated so as to move the feed head 23 in a stock feed direction 24, FIGURE 1, until said feed head engages and is arrested by the said main body cover plate 62. As was previously mentioned a continuous supply of fluid pressure is also directed to the respective upper portions of the double acting fluid motors on the feed head 23. To this end a bore 84, FIGURE 6, formed in the main body 20 communicates between said bore 80 and the recessed forward end face 85, FIGURES 5 and 6, of the main body 20. The said end face 85 is covered with a formed gasket 86 and a cover plate 87, the latter being secured to the main body by any suitable means such as screws. FIGURE 10 is a left end view of the main body with the cover plate 87 removed and the formed gasket 86 shown in place over the ends of the various bores terminating at said end face 85. As may be seen the gasket is channelled as at 90 so as to communicate the end of said bore 84 with the adjacent end of the said air tube bore 56, FIGURES 1 and 5. With these connections it will be apparent that a continuous supply of fluid pressure from the air supply line 83 is directed through bores 81, 80, 84, channel 90, bore 56, tube 52 and bore 54, FIGURE 4, to the upper end of cylinder 43 and through bores 46 and 47 to the corresponding upper end of cylinder 44. Thus continuous fluid pressure acting on the upper sides of both double acting fluid motors on the feed head tends to continuously bias the clamp bar 37 to a stock gripping position. From the above description it will be seen that the normal condition of the instant stock feeder is such that the feed head 23 is in a position abutting the main body plate 62 while the metal strip or stock to be advanced is simultaneously gripped by the said stock gripping means 34, the stock clamping means 35 at this time being in its stock release condition. This normal condition of the parts exists after the completion of a stock feeding stroke of the instant feeder. When the punch press or other device is actuated so as to partake of a cycle of operation a member attached to the movable press platen in moving downwardly engages the valve control means 36, FIGURE 1, so as to initiate an indexing stroke of the instant feeder whereby the stock clamping means 35 is operated to clamp and retain the stock stationary on the main body 20 while the stock gripping means 34 is released and the feed head 23 is simultaneously moved in an indexing direction 25, FIGURE 1. After the press

5

6

punching or other working operation is completed the upward return stroke of the press platen will permit the valve means 36 to be restored to its normal condition and such will initiate a stock feeding stroke in direction 24, FIGURE 1, as above described. The control valve means 36 comprises a single three way valve arrangement the construction and operation of which will now be described in detail. Referring particularly to FIGURES 1, 6 and 11 the main body 20 is formed with a relatively large vertical valve bore 100 which extends almost to the lower surface of said main body. Bore 100 intersects and thus communicates with the said bore 84, as illustrated at 101 of FIGURE 11, so that a supply of fluid pressure always exists in the lower portion of said valve bore 100. A valve block 102 is secured to the upper surface of main body 20 by any suitable means such as screws 103, FIGURE 1. A valve member 105 is mounted for vertical control movement in the block 102 and the main body, member 105 comprising a valve head 106 to which is secured a coaxial valve stem 107. A valve sleeve 110 is axially slidably mounted on stem 107, this sleeve being recessed at its upper end to receive the headed end 111 of said stem 107 and a compression spring 112. A cap 113 is threadedly secured to the upper end of sleeve 110. The lower end of sleeve 110 is normally spaced a short axial distance from the upper face of the valve head 106 so as to leave uncovered the inner end of an exhaust bore or port 114, FIGURES 1 and 11, that is formed in said valve block 102. The valve block 102 is formed with a circular recess 115 in the region just above the valve head 106 and is also formed with an angular bore 116 which communicates between said recess 115 and another bore 117 formed in the valve block. The lower end of bore 117 communicates with the upper end of a vertical bore 120 formed in the main body 20, bore 120 in turn communicating with a horizontal bore 121 that is formed in said main body and terminates at said recessed main body end face 85 as is best seen in FIGURE 6. The said gasket 86, FIGURE 10, is channelled as at 122 and 123 so as to communicate the outer end of said bore 121 with the adjacent ends of the two stock clamping conduit bores 76 and 76a, the said main cylinder conduit bore 64 and the stock gripping motor release conduit bore 57.

The upper face or surface of valve head 106 is provided with any suitable annular gasket that is capable of sealingly cooperating with the adjacent lower annular surface of the valve block 102 surrounding said recess 115. The valve 106 is also formed with several shallow peripheral fluid conducting recesses 124 as illustrated in FIGURE 12.

The normal condition of the three way valve means 36 is shown in FIGURE 11 and thus it will be apparent that the said four bores 76, 76a, 64 and 57 are all normally connected to the valve exhaust port 114 through conduit bores 121, 120, 117, 116 and recess 115. The continuous fluid supply existing in the main valve bore 100 is sealed off from said valve recess 115 by the valve head 106, which head is biased upwardly by the continuous fluid pressure in bore 100 into sealing engagement with the said adjacent annular surface of the valve block 102 that borders said recess 115. Under these normal valve conditions the feed head 23 is thus normally biased to its forward or left hand position while the stock gripping means 34 on the feed head is simultaneously biased to a stock gripping condition by the previously described continuous fluid pressure action on the associated double acting fluid motors. When the press platen moves downwardly a distance corresponding roughly to $\frac{2}{3}$ of the press stroke the said member attached to said platen will engage and depress the valve stem cap 113 and the sleeve 110 will initially move downwardly relative to stem 107 which remains stationary due to the upward biasing fluid pressure in valve bore 100. The spring 112 is thus compressed and the lower end of sleeve 110 covers the exhaust port 114. Upon further downward movement the

lower end of sleeve 110 engages the adjacent upper surface of the valve head 106 so that continued downward movement of said sleeve will overcome the upward fluid biasing action on valve head 106 so that the valve head moves downwardly out of sealing engagement with the said lower surface of said block 102. Thus the continuous fluid pressure supply in the bore 100 can and does flow upwardly through said shallow peripheral recesses 124 in the valve head and into said recess 115. From recess 115 the fluid pressure flows through the serial fluid conduit bores 116, 117, 120, 121 to the said end face 85 of the main body 20. From the end of bore 121 the fluid pressure flows through the gasket channels, 122 and 123, FIGURE 10, and into the two stock clamping fluid conduit bores 76 and 76a, the main cylinder conduit bore 64 and the stock gripping release conduit bore 57. When this fluid pressure is received by the main body clamping means 35 through bores 76, 75 and 76a, 75a the pistons such as 73 will immediately move the clamp bar 70 to a stock clamping position against the main body 20. When this fluid pressure is also received through bore 57, air tube 53 and bore 55, FIGURE 4, at the larger area lower stock releasing sides of the double acting pistons such as 39, FIGURE 3, in the feed head 23 the clamp bar 37 will be elevated to a release position against the said continuous fluid biasing action on the top of said two double acting pistons such as 39. When this fluid pressure is received through bore 64 at the left side, as seen in FIGURE 1, of the main cylinder 60 the feed head 23 will be thereby displaced in an indexing direction 25, FIGURE 1; the differential areas on opposite sides of the main piston 61 causing the said continuous fluid biasing action on the right side thereof, as seen in FIGURE 1, to be overcome. Thus depressing of the valve stem 110 will cause the feed head 23 to move from its said normal condition through an indexing stroke during which stroke the stock clamping means 35 holds the stock in a fixed position on the main body 20 while the stock gripping means 34 is in a release condition. At the end of the indexing stroke the feed head 23 abuts the inner end of the adjustable screw 26 as shown in FIGURE 1.

When the press platen completes its working stroke and moves upwardly the valve member 105 will follow this upward movement due to the continuous upward valve biasing action of the fluid pressure in bore 100 until said valve head 106 again seats against the said lower annular surface of said valve block 102 as shown in FIGURE 11. At this time then the supply of fluid pressure to bores 116, 117, etc. from the continuous fluid pressure in bore 100 is cut off. Continued upward movement of the valve sleeve 110, as caused by spring 112, will uncover the exhaust port 114 and fluid pressure may thus be exhausted simultaneously from main body fluid clamping motors, the left side of the main double acting fluid motor and the lower sides of the double acting stock gripping fluid motors on the feed head 23. Under these conditions the continuous fluid biasing action on the right side of the main fluid motor and on the upper sides of the stock gripping motors on the feed head will cause the gripping means 34 to move to stock gripping position and said feed head to move in the stock feed direction 24, the stock clamping means 35 at this time being in a release condition. Thus the parts are restored to their said normal positions and another predetermined incremental length of stock is thus fed into the press. This cyclic action of the instant stock feeder is repeated in response to the repeated cyclic operation of the punch press. Due to the arrangement of the instant fluid motors, valving and fluid conduit lines the effective operation of the stock clamping and gripping means 35 and 34 occurs before the feed head 23 commences its movement in either direction 24 or 25. Only a single three way valve means 36 is required here to directly control the timed operation of all the fluid motors for the instant apparatus. Here supplying fluid pressure to the control sides of all the fluid motors

produces an indexing stroke of the feed head, while exhausting fluid pressure from the said control sides of all the said fluid motors produces a stock feeding stroke of the feed head. This simplified fluid motor and control arrangement makes the device much simpler, more reliable, and less expensive to produce.

A circuit diagram for the instant feeder is shown in FIGURE 13; the conduit lines of this schematic sketch being numbered so as to generally correspond with the conduit lines discussed above in connection with FIGURES 1-12. In FIGURE 13 the parts are illustrated as they would be during a stock feeding stroke. It will be noted that the relative movement between the valve stem 107 and sleeve 110 is such as to prevent there ever being a direct or open connection between the continuous fluid pressure supply in valve bore or chamber 100 and the exhaust port 114. As is illustrated in the drawings any suitable O-rings or the like are provided when and where desired so as to afford a sliding or other seal between the various cooperating parts of the device. Furthermore any conventional type means may be used to control the speed of operation of the main fluid motor such as that illustrated at 76 and/or 78 of U.S. Patent No. 2,939,355.

A modified embodiment of the instant stock feeding device is illustrated in FIGURE 14: here a continuous supply of fluid pressure may be supplied to the upper sides of the double acting motors on the feed head 23 through a tubular main piston rod 150, FIGURE 14, that is formed with a port or hole 151 located closely adjacent the rearward face of a main piston 152. Port 151 thus communicates the inside passage of the main piston rod 150 with the right hand end, as seen in FIGURES 1 and 6, of the main cylinder 60; this end of the main cylinder being continuously supplied with fluid pressure as above described. Accordingly fluid pressure is continuously supplied to the upper sides of the double acting pistons of the feed head through port 151, the inside of the tubular piston rod 150 and the bores 46, 47, FIGURE 4. With this type arrangement the fluid conducting tube 52, the bore 56, FIGURE 1, and bore 54, FIGURE 4, may be eliminated. As is also shown in FIGURE 14 the effective length of the main cylinder 60 may be shortened so that an annular face portion 153 of the main piston 152 engages the face of an annular shoulder 154 located at the forward end of the cylinder 60, which engagement determines the forward limit of the stock feeding movement of the feed head 23. Here a sealing means such as annular ring gasket 155 is secured to the said shoulder 154 so that when the cooperating face portion 153 of the main piston 152 engages said gasket at the end of each stock feeding stroke any fluid pressure leakage past the piston 152 is cut off from and cannot reach the forward or left end of the cylinder 60 and thus escape through bore 64 which is of course then connected to the valve exhaust port 114. The effective inside diameter of ring gasket 155 is made greater than the effective outside diameter of the piston rod 150 so that the effective area on the left side of the main piston is still greater than that on the right side thereof when the parts are in their said normal positions. As will be apparent the sealing gasket 155 may be carried by the piston 152.

It will be apparent to those skilled in the art that numerous variations and modifications may be made in the particular construction of the above described invention without departing from the underlying principles and arrangements disclosed. It is therefore desired by the following claims to include within the scope of the invention all such variations and modifications whereby substantially the results of the invention may be obtained by the use of substantially the same or equivalent means.

The invention claimed is:

1. A device for advancing stock: comprising a main frame;

- a feed head mounted on said frame for movement in stock feeding and indexing directions;
 - a first continuously acting biasing means normally operative to move said feed head in said stock feeding direction;
 - a first fluid motor means operable to move said feed head in said indexing direction against the action of said first biasing means;
 - a stock gripping means mounted on said feed head and movable to stock gripping and releasing positions;
 - a second continuously acting biasing means normally operative to move said stock gripping means to said stock gripping position;
 - a second fluid motor means on said feed head for moving said stock gripping means to said stock releasing position against the action of said second biasing means; and
 - fluid control means operable to direct fluid pressure simultaneously to said first and second fluid motor means, and to exhaust fluid pressure simultaneously from said first and second fluid motor means.
2. Apparatus as defined by claim 1: additionally comprising
 - a stock clamping means on said frame and movable to stock clamping and releasing positions;
 - a third fluid motor means for operating said stock clamping means; and
 - fluid conduit means coupled between said fluid control means and said third fluid motor means whereby fluid pressure may be supplied to said third fluid motor means at the same time that fluid pressure is supplied to said first and second fluid motor means.
 3. A device for advancing stock: comprising
 - a main frame;
 - a feed head mounted on said frame for reciprocating movement in a stock feeding direction and in an indexing direction;
 - a first double acting fluid motor carried by said frame for reciprocally actuating said feed head in said directions, said motor including a solid piston and a piston rod having a passageway formed therein;
 - stock gripping means mounted on said feed head for movement between stock gripping and stock releasing positions;
 - at least one double acting fluid motor carried by said feed head for moving said stock gripping means between its said stock gripping and release positions;
 - a first fluid conduit means for conducting fluid pressure to the stock feeding side of said first double acting fluid motor and to the stock gripping side of said double acting fluid motor on said feed head so as to thereby grip said stock and advance an incremental length thereof;
 - a second fluid conduit means for conducting fluid pressure to the other sides of both of said double acting fluid motors for moving said feed head in an indexing direction and for moving said stock gripping means to a stock releasing position;
 - one of said fluid conduit means including said passageway in said piston rod, and the other of said fluid conduit means including a tube that is operatively connected to said feed head and slidably received in a bore formed in said main frame; and
 - a fluid control valve operative in one condition thereof to supply fluid pressure simultaneously to both said other sides of said double acting fluid motors, and operative in the other condition thereof to exhaust fluid pressure simultaneously from said other sides of said double acting fluid motors.
 4. A device for advancing stock: comprising
 - a frame including a main body member;
 - a feed head reciprocally mounted on said frame for movement in forward and rearward directions;
 - a first fluid motor for actuating said feed head;

- stock gripping means on said feed head operable to grip and release said stock;
- at least one double acting fluid motor on said feed head for operating said stock gripping means;
- a first fluid conducting means having one end communicating with one side of said double acting fluid motor on said feed head, and having its other end adapted to be coupled to a continuous fluid pressure supply so that fluid pressure is continuously supplied to said one side of said double acting fluid motor;
- a second fluid conducting means having one end communicating with the other side of said double acting fluid motor on said feed head; and
- control valve means for controlling the simultaneous supply of fluid pressure to said first fluid motor for actuating said feed head and to the other end of said second fluid conducting means for operating said double acting fluid motor against the continuous fluid action at said one side of said double acting fluid motor on said feed head for operating said stock gripping means.
5. A device for advancing stock: comprising
- a frame including a main body;
- a feed head reciprocally mounted on said frame;
- a first fluid operated means on said main body for actuating said feed head;
- a stock gripping means mounted on said feed head;
- a second fluid operated means on said feed head for actuating said stock gripping means;
- a first fluid conduit means communicating with both said first and second fluid operated means;
- valve control means for controlling the flow of fluid pressure to said first fluid conduit means;
- said valve control means comprising means defining a valve bore in said main body;
- a closure member for closing an end of said bore, said closure member having a valve stem bore formed therethrough which communicates with said valve bore;
- valve stem means movably disposed in said valve stem bore;
- a valve head disposed in said valve bore and coupled to the inner end of said valve stem means;
- said valve head having an upper annular face portion that is adapted to sealingly engage a cooperating annular face portion formed on the lower side of said closure member;
- a second fluid conduit means formed in said closure member and communicating at one end thereof with the radial inner side of said sealingly engaged face portions and at the other end thereof with said first fluid conduit means;
- fluid exhaust conduit means formed in said closure member and cooperating with said valve stem means; and
- a third fluid conduit means in said main body adapted to continuously supply fluid pressure to said valve bore, which continuous fluid pressure normally maintains said face portions in sealing engagement whereby said first fluid conduit means communicates with said exhaust conduit means but not with the continuous fluid pressure in said valve bore and whereby when said valve head is moved so as to separate said previously sealingly engaged face portions said fluid conduit means is effectively blocked and said continuous fluid pressure supply in said valve bore can flow into said second fluid conduit means in said closure member and through said first fluid conduit means to said first and second fluid operated means on said main body and feed head respectively.
6. A device for feeding stock: comprising
- a frame;
- a feed head reciprocally mounted on said frame;

- stock gripping means operatively mounted on said feed head and adapted to grip said stock during a stock feeding stroke of said feed head;
- a main double acting fluid motor means on said frame for reciprocally actuating said feed head, said main fluid motor means comprising
- means defining a cylinder;
- a piston slidably mounted in said cylinder; and
- a piston rod operatively connected between said piston and said feed head;
- a first fluid conduit means communicating with one end of said cylinder and adapted to be coupled to a source of fluid pressure so that said piston may be power operated in one direction in said cylinder;
- a second fluid conduit means communicating with the other end of said cylinder;
- a fluid pressure control means for supply and exhausting fluid pressure to and from the said second fluid conduit means for actuation of said feed head; and
- fluid pressure cut-off means including an annular face portion formed at the said other end of said cylinder and a cooperating annular face portion formed on the adjacent face of said piston, said face portions when said piston completes its movement in said one direction being mutually and sealingly engaged so as to prevent fluid pressure leaking from said one end of said cylinder and past the outer walls of said piston from reaching said second fluid conduit means which is then coupled to exhaust fluid pressure from said other end of said cylinder.
7. A feeder for advancing stock: comprising
- a main frame including a body member;
- a feed head mounted on said frame for reciprocating movement in a forward stock feeding direction and in a rearward feed head indexing direction;
- a first double acting fluid motor in said body member for reciprocating said feed head;
- a first fluid conduit means arranged for continuously supplying fluid pressure to the stock advancing end of said first double acting fluid motor so that said fluid motor is normally operative to move said feed head in a forward stock feeding direction;
- a second fluid conduit means for conducting fluid pressure to feed head indexing end of said first fluid motor;
- stock gripping means mounted on said feed head and movable to stock gripping and releasing positions;
- at least one double acting fluid motor mounted on said feed head for operating said stock gripping means;
- a third fluid conduit means arranged for continuously supplying fluid pressure to the stock gripping side of said double acting fluid motor on said feed head so that this fluid motor is normally operative to move said stock gripping means to said stock gripping position;
- a fourth fluid conduit means communicating with the stock releasing side of said double acting fluid motor on said feed head;
- a stock retainer means mounted on said frame and operable to clamp and release said stock;
- a third fluid motor on said frame for operating said retainer means so as to grip said stock;
- a fifth fluid conduit means communicating with said third fluid motor; and
- a three way valve control means operative in a first condition thereof for exhausting fluid pressure from said second, fourth and fifth fluid conduit means so as to produce a stock advancing stroke of the feeder, and operative in a second condition thereof to supply fluid pressure to said second, fourth and fifth fluid conduit means so as to produce a feed head indexing stroke of the feeder.
8. In a device for advancing stock:
- a frame;

11

- a feed head mounted on said frame for movement between forward and rearward positions;
 - a stock gripping means mounted on said feed head for movement between stock gripping and stock releasing positions;
 - a plurality of double acting fluid motors for actuating said feed head and said stock gripping means;
 - a first fluid conduit means for delivering a continuous supply of fluid pressure to one side of all of said double acting fluid motors respectively whereby said feed head and said stock gripping means are normally moved to their respective first operative positions;
 - a second fluid conduit means for conducting fluid pressure to and from the other sides of all of said double acting fluid motors whereby said feed head and said stock gripping means may be moved to and from their respective second operative positions; and
 - a single three way valve control means operable in one condition thereof to supply fluid pressure simultaneously to said second fluid conduit means so that said feed head and said stock gripping means are moved to their respective second operative positions against the biasing action of said continuous supply of fluid pressure to said one side of all said motors, and operable in another condition thereof to exhaust fluid pressure simultaneously from said second fluid conduit means so that said feed head and said stock gripping means are restored to their said respective first operative positions by the action of said continuous supply of fluid pressure to said one side of all said fluid motors.
9. In a stock feeding device:
- a frame including a main body;
 - stock clamping means mounted on said frame for movement between stock clamping and release positions;
 - a feed head mounted on said frame for reciprocation in stock feeding and indexing directions;
 - a main fluid motor for actuating said feed head;
 - stock gripping means mounted on said feed head and adapted to be moved to stock gripping and release positions;
 - at least one additional fluid motor mounted on said feed head for operating said stock gripping means;
 - a first fluid conduit means for conducting fluid to said main fluid motor;
 - a second fluid conduit means for conducting fluid to said additional fluid motor on said feed head;
 - valve control means for controlling the operation of said feed head and stock gripping means;
 - said second fluid conduit means including a tube having one end thereof operatively secured to said feed head so as to communicate with said additional fluid motor on said feed head and having the other end thereof slidably received in a bore formed in said main body whereby fluid pressure may be supplied to said additional fluid motor through said bore and tube;
 - said additional fluid motor on said feed head comprising a double acting fluid motor;
 - said tube communicating with one operative side of said double acting fluid motor; and
 - said second fluid conduit means also including a second tube having one end thereof operatively secured

12

to said feed head so as to communicate with the other operative side of said double acting fluid motor and having the other end thereof slidably received in a second bore formed in said main body, said second bore being connected to a fluid pressure source whereby fluid pressure may be continuously supplied to said other operative side of said double acting fluid motor through said second tube and said second bore so that said double acting fluid motor is continuously biased in one operative direction.

10. A stock feeding apparatus operable through alternate feed and indexing strokes for intermittently advancing stock material into a work station: comprising
- a main frame including a main body member;
 - a feed head mounted on said main frame for reciprocation in feed and indexing directions;
 - stock gripping means mounted on said feed head for movement between stock gripping and stock releasing positions;
 - stock clamping means mounted on said main frame for movement between stock clamping and stock releasing positions;
 - a first main fluid motor means mounted on said main frame for reciprocally actuating said feed head in said feed and indexing directions;
 - a second fluid motor means mounted on said feed head for actuating said stock gripping means between said stock gripping and stock releasing positions;
 - a third fluid motor means mounted on said main frame for actuating said stock clamping means between said stock clamping and stock releasing positions;
 - a first fluid conduit means communicating with said first fluid motor means;
 - a second fluid conduit means communicating with said second fluid motor means;
 - a third fluid conduit means communicating with said third fluid motor means; and
 - valve means operatively coupled between a source of fluid pressure and said first, second and third fluid conduit means and being operable to a first condition wherein fluid pressure is applied simultaneously to all three of said fluid motor means, said stock gripping means, said stock clamping means and said feed head thus being actuated so as to produce one of said strokes of the stock feeding apparatus, said valve means being operable to a second condition wherein fluid pressure is simultaneously exhausted from all three of said fluid motor means, said stock gripping means, said stock clamping means and said feed head thus being actuated so as to produce the other of said strokes of the stock feeding apparatus.

References Cited

UNITED STATES PATENTS

2,397,974	4/1946	Morrow et al.	
2,484,729	10/1949	Perdue.	
2,703,711	3/1955	Hilton	226—149
3,038,645	6/1962	Nordloff.	

M. HENSON WOOD, JR., *Primary Examiner.*

R. A. SCHACHER, *Assistant Examiner.*