April 4, 1961 G. R. BUNNELL 2,978,160

PRESS FEED MECHANISM

Filed Sept. 21, 1956 2 Sheets-Sheet 1

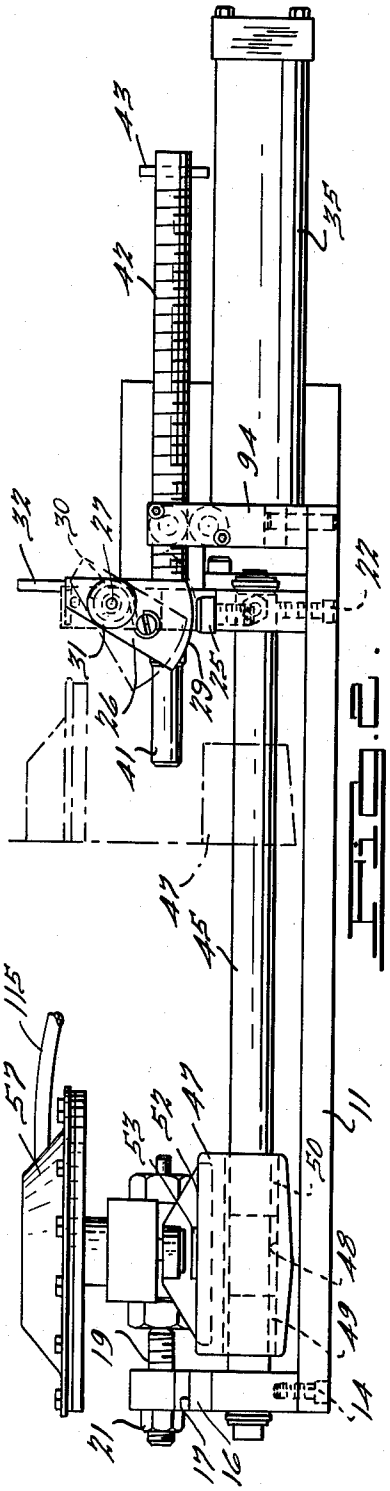


Fig. 2.

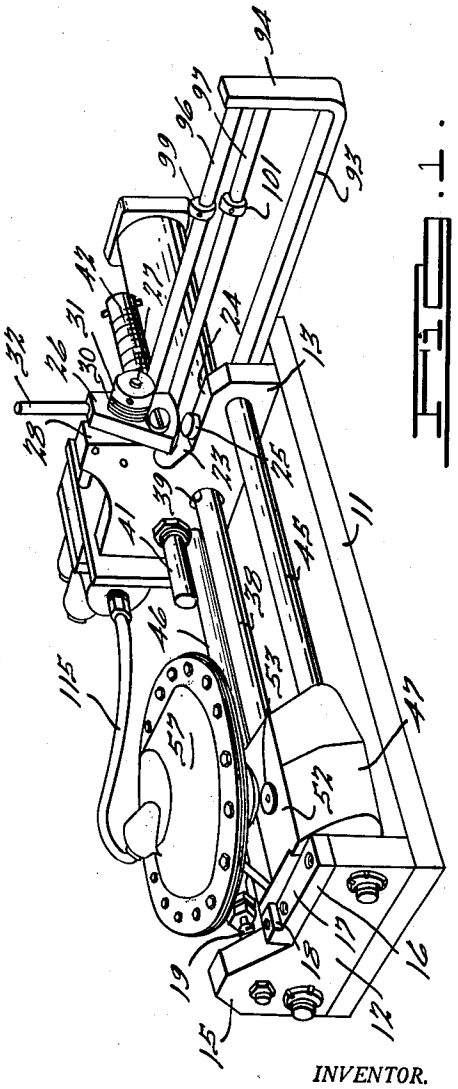


Fig. 1.

INVENTOR.
Glenn R. Bunnell
BY
Harness, Dickey & Pierce
ATTORNEYS

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PRESS FEED MECHANISM

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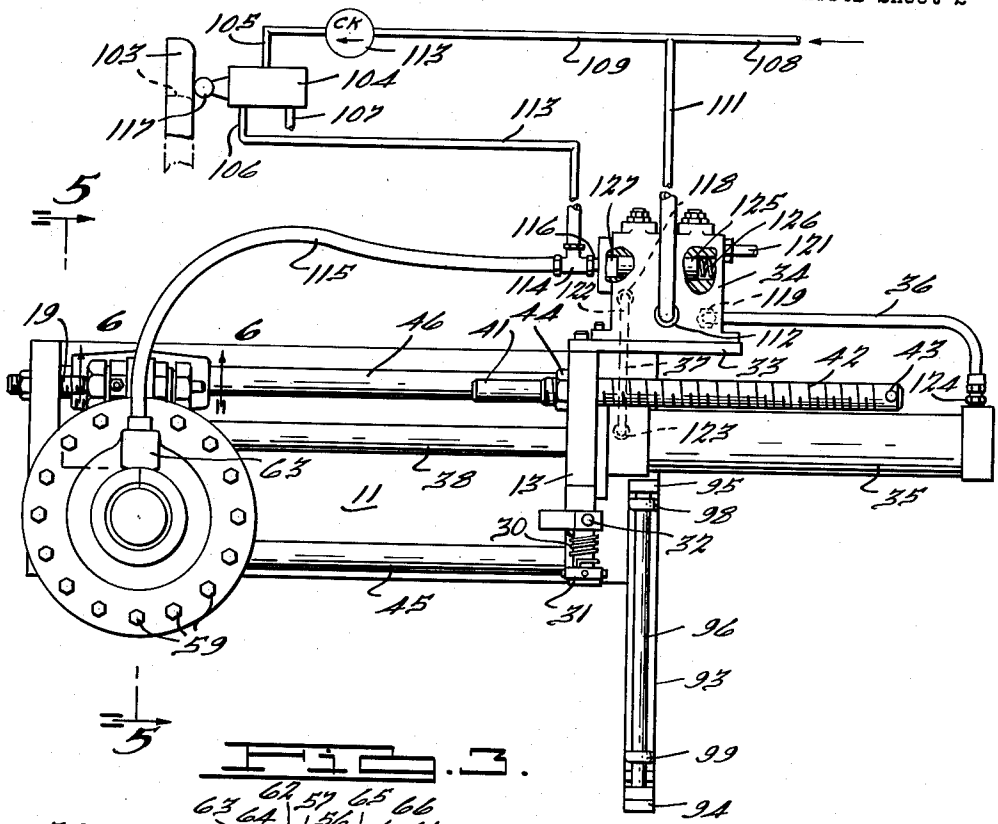


FIG. 3.

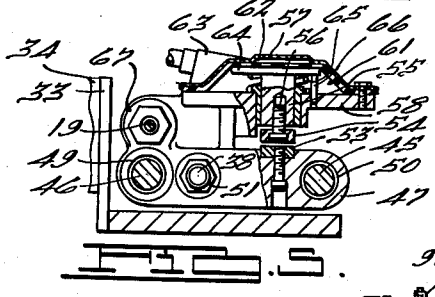


FIG. 5.

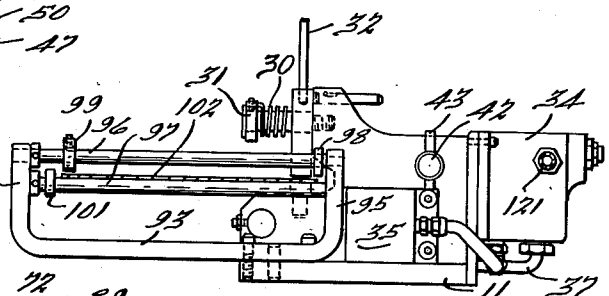


FIG. 4.

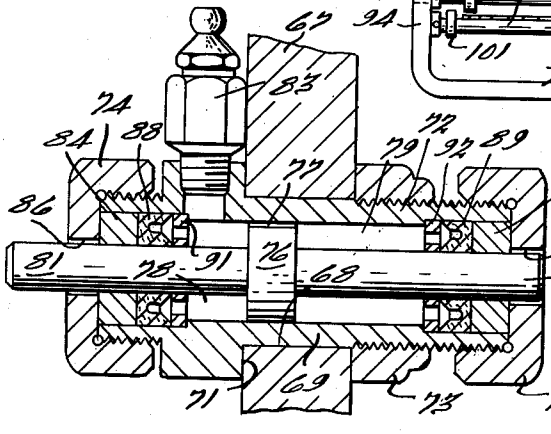


FIG. 6.

INVENTOR.
Glenn R. Bunnell.
BY
Harness, Dickey & Pierce
ATTORNEYS.

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PRESS FEED MECHANISM

Glenn R. Bunnell, Detroit, Mich., assignor to Special Engineering Service, Inc., Detroit, Mich., a corporation of Michigan

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13 Claims. (Cl. 226—151)

This invention relates to stock feeding machines, and more particularly to a mechanism for intermittently feeding equal lengths of strip sheet metal stock into a press or other punching or stamping machine.

It is an object of the invention to provide a novel and improved press feeding device which is simple and foolproof in use, and will automatically hold the stock in position after it has been fed to the machine so that inadvertent reverse movement will be prevented.

It is another object to provide an improved feeding device of the above character, which is adjustable to accommodate various widths of stock and in which the length of stock fed during each stroke of the device may be selectively adjusted.

It is a further object to provide an improved stock feeding device of this nature, which is adapted to be operated automatically in conjunction with the movements of the press or stamping machine with which it is associated.

It is also an object to provide an improved feeding mechanism as described above, in which means are provided for insuring that the stock will be firmly gripped before the feeding stroke begins, thereby preventing slippage or uneven use of the strip being fed.

It is another object to provide, in a device of the above character, a dashpot arrangement for cushioning the moving parts at each end of the stroke, including an improved construction which eliminates the necessity of machining threaded parts to close tolerances in order to provide proper bearing means for the slidable dashpot element.

Other objects, features and advantages of the present invention will become apparent from the subsequent description, taken in conjunction with the accompanying drawings.

In the drawings:

Figure 1 is a perspective view of the improved feeding device of this invention, showing the carriage in its forward position;

Figure 2 is a side elevational view of the device showing the location of the stops and the configuration of the one-way holding cam;

Figure 3 is a plan view of the feeding device combined with a fluid control diagram shown in schematic fashion;

Figure 4 is an end elevational view of the stock feeding device showing the construction of the sheet metal guide rods;

Figure 5 is a detailed cross-sectional view in elevation taken along the line 5—5 of Figure 3 and showing the internal construction of the gripper operating means on the carriage; and

Figure 6 is a fragmentary elevational view in cross section taken along the line 6—6 of Figure 3 and showing the construction of the buffer mechanism.

In general terms, the invention comprises a device adapted to be placed alongside or attached to a press or similar machine tool having a vertically movable head and adapted to perform work on a sheet metal strip stock fed into the machine intermittently and in predetermined

lengths of equal size. The device comprises an elongated base having a pair of guide rails on which is slidably mounted a carriage for feeding the stock toward the machine. This carriage is actuated between a retracted and a forward position by a double-acting cylinder, and carries means for gripping the sheet metal stock when the carriage is moved forwardly, and automatically releasing the stock when the carriage is retracted. One-way frictional holding means comprising a cam and cooperating button are mounted on the base at the rear end thereof, and this holder serves the function of firmly holding the stock after the carriage has reached the forward extremity of its movement, thus insuring immobility of the stock during retraction of the carriage even though the carriage gripping means may not have been fully released.

The device is equipped with a pair of guide rods for positioning the stock as it enters the main portion of the feed mechanism, and a buffer mechanism for cushioning the carriage at both ends of its stroke. The buffer mechanism includes a hydraulic dashpot arrangement mounted on the carriage, the dashpot comprising a loosely fitting piston with buffer rods extending in opposite directions and engageable with stationary stops at both ends of the base. A novel bearing arrangement for the buffer rods eliminates the necessity for close tolerances on the threaded end caps for the cylinder which encloses the buffer piston.

In an illustrated embodiment of the invention, movement of the carriage is coordinated with actuation of the carriage gripper, and both motions are controlled by movement of the press ram. In particular, the carriage gripper is diaphragm-actuated and is so arranged that it will assume its gripping position when a predetermined pressure has been attained in the diaphragm chamber. Pressure will be initially applied to the diaphragm chamber as the ram begins its upstroke. When the predetermined pressure is exceeded, the control valve for the carriage shifting cylinder will be automatically actuated to cause forward motion of the carriage together with the stock, the portion of the stock in front of the carriage being fed into position beneath the press ram. The carriage and stock will remain in this position until the press ram reaches the bottom of its next stroke, at which juncture pressure will be released in the diaphragm chamber, causing release of the carriage gripper. This pressure release will also cause actuation of the carriage shifting cylinder control valve back to its original position, resulting in retraction of the carriage. The one-way cam holder will hold the stock stationary while the carriage retracts, so that the next length of stock will be in front of the carriage, to be advanced as soon as the press ram begins its next upstroke.

Referring now more particularly to the drawings, the device comprises a flat base 11 having a pair of upright plates 12 and 13 secured thereto. Plate 12 is secured at the end of base 11 which will be adjacent the press when the device is in operative position, and is generally rectangular in shape with an upward extension 15 in one corner thereof. The upper edge of plate 12 carries a guide member 16 thereon, this member having a flat upper surface 17 and a smaller edge guide surface 18 at right angles to surface 17. Extension 15 of plate 12 carries a forward stop 19 which projects rearwardly from the end plate and is adapted to be engaged by a buffer on the carriage, described below. Stop 19 is preferably adjustable in a longitudinal direction and is held by means of a nut 21.

Plate 13 is secured to base 11 by bolts 22 a short distance forwardly of the rear edge of the base. This plate is of irregular shape and serves to support a major portion of the elements of the press feeder. In particular, one side of plate 13 is notched, as indicated at

23 in Figure 1, to receive the sheet metal strip stock being fed to the forward end of the device. Notch 23 is approximately in alignment with the guide surfaces of guide 16. The lower surface 24 of notch 23 is relatively long and carries a button 25 on which the stock slides during its movement. A one-way holding cam 26 is pivoted at 27 to a vertical edge surface 28 of plate 13 above button 25, and serves to prevent rearward movement of the strip stock while the carriage is being returned to its rear position. For this purpose, cam 26 is provided with a curved surface 29 of gradually increasing radius with respect to the axis of pivot 27 in the direction in which the stock is fed, as seen in Figure 2. A torsion spring 30 is secured at one end to a stationary collar 31 on pivot 27 and at its other end to cam 26. Spring 30 urges cam 26 in a counterclockwise direction as seen in Figure 2. With this arrangement, it will be observed that strip stock disposed between button 25 and cam 26 may be moved from right to left in Figure 2, but that attempted movement from left to right of the stock will result in frictional engagement of the stock between button 25 and cam 26, thus preventing rearward stock movement. A handle 32 may be provided for manually releasing cam 26 from the stock.

Secured to one end of plate 13 is a valve mounting plate 33 extending at right angles to plate 13, as seen in Figure 3. A four-way valve 34 is mounted on plate 33 for controlling the feeding and gripping portions of the device. Secured to the rear surface of plate 13 is a double-acting cylinder 35, this cylinder having connections 36 and 37 from the opposite ends thereof to valve 34. A piston 38 extends from cylinder 35 through an aperture 39 in plate 13, as seen in Figure 1, and is connected to the carriage in a manner described below. Plate 13 also has mounted thereon a rear stop 41 for arresting the rearward movement of the carriage. In order to adjust the carriage stroke, stop 41 is made integral with a lead screw 42 mounted in plate 13 and longitudinally adjustable by a handle 43 at the rear end thereof. A lock nut 44 is also mounted on screw 42 to hold it in any selected position.

Extending between and secured to plates 12 and 13 are a pair of carriage rails 45 and 46. These rails comprise parallel rods in a common horizontal plane a short distance above the upper surface of base 11. A carriage 47 is slidably mounted on rails 45 and 46, the carriage having a pair of rail-receiving apertures 48, as seen in Figure 2, with bushings 49 and 50 disposed within each aperture. The outer end of piston 38 is secured to carriage 47 by means of a nut 51. Preferably, carriage 47 is substantially constructed, and has a flat upper surface 52 carrying an anvil 53. The upper surface of anvil 53 is in a common plane with surface 17 of guide member 16 and with the upper surface of button 25, as seen best in Figure 2, and carriage surface 52 is sufficiently wide to accommodate the strip stock being fed.

Disposed above anvil 53 is a gripping member 54, the opposing surfaces of the anvil and gripping member being such that a flat strip of stock may be firmly gripped therebetween when the gripping member is forced downwardly toward the anvil. Member 54 is secured to a piston rod 55 by means of a bolt 56 suspending the gripping member below the rod, so that limited upward movement of the gripping member is permitted until it engages the lower surface of piston rod 55. The upper end of piston rod 55 is disposed below a circular cover plate 57 secured to a corresponding circular portion 58 of carriage 47 by bolts 59. A diaphragm 61 is disposed between cover plate 57 and circular portion 58 of the carriage, the periphery of the diaphragm being secured between these two parts in sealed relation. The chamber 62 formed between diaphragm 61 and cover plate 57 is connected to a port 63, so that fluid supplied under pressure to this port will cause downward movement of the central portion of diaphragm 61. An actuating plate 64 is disposed between the lower surface of diaphragm 61 and is secured to the upper end of piston rod 55, so that downward movement of the central portion of the diaphragm will result in gripping member 54 being forced downwardly against anvil 53.

A compression spring 65 is disposed between the undersurface of actuating plate 64 and the upper surface of circular carriage portion 58, this spring tending to urge member 64 upwardly, so that release of pressure from chamber 62 will result in upward withdrawal of gripping member 54 from anvil 53. A guide pin 66 may also be provided between actuating member 64 and circular carriage portion 58 to insure proper movement of the parts.

Carriage 47 is provided with a buffer holding portion 67 above that portion of the carriage which rides on rail 46, as seen in Figure 5. An aperture 68, best shown in Figure 6, is provided in carriage portion 67, and a buffer cylinder 69 is disposed within aperture 68. The forward end of cylinder 69 has a shouldered portion 71 which engages carriage portion 67 when the parts are assembled. The rear portion of cylinder 69 is threaded, as indicated at 72, and a nut 73 is mounted on threaded portion 72 and engages carriage portion 67 to hold cylinder 69 in position. The opposite extremities of cylinder 69 are threaded to carry a pair of end caps 74 and 75 respectively.

A buffer piston 76 is slidably supported within cylinder 69, the outer surface of the piston being spaced from the cylinder bore at one or more points 77 so that fluid may flow slowly between chambers 78 and 79 on opposite sides of piston 76 when the piston is forced in either direction. A pair of buffer rods 81 and 82 extend from piston 76 in opposite directions, the ends of these rods being engageable with stops 19 and 41 respectively. A filling valve 83 is also provided for maintaining the proper amount of fluid in chambers 78 and 79.

Novel means are provided for slidably supporting buffer rods 81 and 82 in such a manner as to eliminate the necessity for maintaining close center tolerances on the threads by means of which end caps 74 and 75 are mounted on cylinder 69. As is well known, the problems involved in maintaining true concentricity between a bearing surface and a threaded portion machined on the same part or element are much greater than those which arise when, for example, a smooth bore and a smooth outer surface are to be made concentric on a single part. In the illustrated embodiment of the invention, bearing elements 84 and 85 are provided for buffer rods 81 and 82 respectively, these elements having smooth concentric inner and outer surfaces and being disposed within the enlarged ends of the bore within buffer cylinder 69. Clearance apertures 86 and 87 are provided in end caps 74 and 75 respectively, these apertures having a considerably larger diameter than that of buffer rods 81 and 82. A pair of packing seals 88 and 89 are positioned inwardly of bearings 84 and 85 respectively, these packing seals being held in position by a pair of spacers 91 and 92. With this construction, it will be seen that proper bearing support of buffer rods 81 and 82 will be attained without the necessity of machining the threads for end caps 74 and 75 to close center tolerances, since the concentricity between these threads and clearance apertures 86 and 87 will be immaterial.

Means are provided for supporting and guiding the strip stock being fed between button 25 and cam 26. This means comprises a U-shaped bracket 93 secured to base 11 adjacent plate 13, as shown in Figures 1 and 6, and immediately rearwardly of slot 23. Upstanding legs 94 and 95 of bracket 93 support the opposite ends of a pair of guide rods 96 and 97 respectively. The spacing between upper guide rod 96 and lower guide rod 97 is such that the strip stock may be fed freely therethrough and in alignment with slot 23, the right hand edge portion of the stock, as seen in Figure 4, passing between

button 25 and gripping cam 26. In order to maintain the proper position of strip stock of different widths and thicknesses, a pair of collars 98 and 99 are mounted on upper guide rod 96, and another collar 101 is mounted on lower guide rod 97. These collars are adjustable along their respective guide rods and serve to maintain the strip stock in position. In particular, the strip stock is engaged on its upper surface by collars 98 and 99 and on its left hand edge, as seen in Figure 4, by collar 101. In order to illustrate this arrangement, the strip stock is shown in cross section at 102 in Figure 4. It will be seen that sheet strip 102 will normally be quite thin in comparison with the spacing between guide rod 97 and collars 98 and 99, and will be somewhat narrower than the spacing between collar 101 and arm 95. The sheet strip will therefore move loosely through the guide means, but will be prevented from excessive movement which might cause it to become disengaged from the feeding device.

The means for controlling actuation of carriage cylinder 35 and gripper piston 55 is, in the illustrated embodiment, operated in conjunction with a moving portion 103 of the press. Part 103 may be, for example, a cam attached to the press ram (not shown) which moves vertically from an upper position shown in solid lines in Figure 3 to a lower position shown in dot-dash lines, and then back to its upper position during an operative cycle. Cam 103 controls the operation of a three-way cycling valve 104 having a supply connection 105, a working connection 106 and an exhaust connection 107. Supply connection 105 is connected to a supply conduit 108 by means of a branch 109, another branch 111 from supply conduit 108 leading to supply port 112 of carriage cylinder control valve 34. A check valve 113 is provided in branch 109 to prevent flow of fluid from connection 105 of valve 104 to branch 111. Working connection 106 of valve 104 is connected by a conduit 113 to a T-connection 114. One side of T-connection 114 is connected to diaphragm chamber port 63 by a flexible hose 115, while the other side of the T-connection is connected to spool chamber port 116 of valve 34. The disposition of cam 103 with respect to actuating member 117 of valve 104 is such that when cam 103 is in its upper position or in any intermediate position it will engage member 117, thus connecting supply port 105 to working port 106. When cam 103 is in its extreme lower position, as shown in dot-dash lines in Figure 3, actuating member 117 will be disengaged and working port 106 will be connected to exhaust port 107.

Four-way valve 34 is provided with supply port 112, a pair of working ports 118 and 119, and an exhaust port 121. Working port 118 is connected to the forward end of cylinder 35 by means of conduit 37 connected with cylinder port 123, while working port 119 is connected to cylinder port 124 by conduit 36. When valve spool 125 is in its leftward position, supply port 112 of valve 34 will be connected with working port 118 so that the piston within cylinder 35 will move to the right as shown in Figure 3, and working port 119 will be connected to exhaust port 121. When spool 125 is shifted to the right, supply port 112 will be connected with working port 119 to advance the piston within cylinder 35 to the left as seen in Figure 3, while working port 118 will be connected with exhaust port 121. The construction of valve 34 is such that spool 125 thereof will normally be urged to the left as seen in Figure 3 by a compression spring 126 disposed within the valve body. When the pressure in spool chamber 127 of valve 34 reaches a predetermined level, for example 50 p.s.i., valve spool 125 will shift from left to right, thus causing advancement of strip stock 102 as described in detail below.

Operation

Assume an initial condition in which the press ram, together with cam 103, is in its upper position in readiness for an operating cycle, fluid pressure has not yet been applied to supply conduit 108, and carriage 47 is in its retracted position as shown in dot-dash lines in Figure 2. A sheet of strip stock 102 will be fed between guide rods 96 and 97, collars 99 and 101 being adjusted along their respective guide rods to properly maintain the position of the stock. The strip will be threaded between button 25 and one-way holding cam 26 and then between anvil 53 and retracted gripping member 54. The outer end of the stock will rest on guide member 16 which will be disposed adjacent the stationary die (not shown) of the press.

Prior to application of fluid pressure to supply line 108, gripping member 54 will be in its raised position due to the action of spring 65, thus facilitating the threading of the strip stock into the stock feeder. When pressure is applied to supply line 108, fluid will flow through supply branch 109, port 105 of pilot valve 104, and working port 106 of this valve to conduit 113 and T-connection 114. Fluid pressure will build up in diaphragm chamber 62, thus driving gripper actuating rod 55 downwardly until gripping member 54 firmly presses against the strip stock, thus seizing the stock between member 54 and anvil 53. During this time, carriage 47 will remain in its retracted position. Pressure will also build up in spool chamber 127 of valve 34, tending to shift spool 125 from left to right. However, spring 126 will resist this movement until a predetermined pressure has been built up in chamber 127, and thus simultaneously in diaphragm chamber 62.

When the pressure in pilot chamber 127 has been built up to this predetermined level, spool 125 will shift to the right, thus connecting supply port 112 of valve 34 with working port 119. The piston within cylinder 35 will be driven from right to left as seen in Figures 2 and 3, thus advancing carriage 47 to its forward position. During this movement strip stock 102 will be pulled along with carriage 47 and the outer end of the strip will thus be fed into its working position beneath the press ram. No resistance will be offered to this advancing movement of strip stock 102 by cam 26, since the latter will be free to swing clockwise as seen in Figure 2 because of the curvature of outer cam surface 29. Check valve 113 will prevent any reduction in gripping pressure while the stock is advanced, since no escape of fluid from diaphragm chamber 62 will be permitted.

As carriage 47 approaches its forward position, buffer rod 81 will engage stop 19, thus forcing buffer piston 76 to the right within cylinder 69, as seen in Figure 6. Hydraulic fluid will flow slowly through restricted area 77 from chamber 79 to chamber 78, thus cushioning the shock as carriage 47 reaches its forward position. It will be understood that the time required for the entire sequence of operation of the stock feeder described above may be relatively short in accordance with the production requirements of the press.

The press ram, together with cam 103, may now be driven to its lower position, and the pressing operation will take place with strip stock 102 in its proper position beneath the press ram. As cam 103 reaches its lowermost position, it will become disengaged from actuating member 117 of cycling valve 104. Working port 106 of valve 104 will thus be connected with exhaust port 107, exhausting the fluid pressure within diaphragm chamber 62 as well as pilot chamber 127 of valve 34. Gripping member 54 will thus be drawn upwardly from its gripping position, and supply port 112 of valve 34 will be connected with working port 118. This will cause retraction of the piston within cylinder 35, drawing carriage 47 to the right as seen in Figures 2 and 3. Should gripping member 54 not be fully released from strip stock 102, any tendency of the strip stock to be retracted will be prevented by frictional engagement of cam 26 with the strip.

When carriage 47 reaches its retracted position, buffer rod 82 will engage stop 41, and the carriage will be

brought to a halt in a cushioned manner as described previously. When the press ram, together with cam 103, moves upwardly from its lower position, valve 104 will again be shifted to connect supply port 105 with working port 106. This will again cause gripping member 54 to be forced downwardly against the strip stock, and when the fluid pressure has reached a predetermined level, valve spool 125 will again be shifted to drive carriage 47 forwardly to repeat the cycle. Should it be desired to alter the length of strip stock fed during each cycle of operation of the feed mechanism, this may be done by rotating screw 42 connected with stop 41, without affecting the operation of the remaining portions of the device.

While it will be apparent that the preferred embodiment of the invention disclosed is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. In a device for intermittently advancing strip stock in equal lengths, a base, a carriage slidably mounted on said base, fluid-actuated means for moving said carriage between forward and retracted positions, a gripper on said carriage, fluid-actuated means for moving said gripper from a retracted position to a gripping position, fluid control means responsive to the attainment of a predetermined gripping pressure by said gripper to cause movement of said carriage from its retracted to its forward position, a direct fluid connection between said gripper fluid-actuated means and said fluid control means, and means included in said fluid control means and responsive to release of pressure by said gripper to cause movement of said carriage to its retracted position.

2. In a feeding mechanism for intermittently advancing flat strip stock in equal lengths, a base, guide means mounted on said base for guiding the strip stock into the feeding mechanism, one-way holding means mounted on said base adjacent said guide means and actuatable to permit movement of the strip stock only in the advancing direction, a carriage slidably mounted on said base forwardly of said one-way holding means, a gripper on said carriage movable between a released position and a gripping position firmly grasping said strip stock, second guide means mounted at the forward end of said base, first fluid-actuated means for moving said carriage between a forward and a retracted position, second fluid-actuated means for moving said gripper to its gripping position, a control valve for said first fluid-actuated means, and a direct fluid connection between said second fluid-actuated means and said control valve, said control valve being responsive to the attainment of a predetermined pressure by said gripper to cause movement of said carriage to its forward position, said control valve being further responsive to reduction in pressure of said gripper to cause movement of said carriage to its retracted position.

3. The combination according to claim 2, said gripper comprising an anvil on said carriage and a gripping member disposed above said anvil, said second fluid-actuated means comprising a diaphragm carried by said carriage and connected on one side to said gripping member, a pressure chamber formed on the other side of said diaphragm, and a spring urging said gripping member toward its retracted position.

4. In a device for intermittently advancing strip stock in predetermined lengths, a base, front and rear plates at opposite ends of said base in upright position, a pair of rails supported between said plates in parallel relation, a carriage slidably mounted on said rails and movable between forward and retracted positions, a bracket secured to said base adjacent said rear plate, a pair of guide rods carried by said bracket and adapted to receive said strip stock therebetween, one-way holding means mounted on said rear plate adjacent said guide rods and adapted to permit only forward movement of said strip stock, a gripper carried by said carriage and movable between gripping and released positions, a pair of stops carried by said plates, at least one of said stops being adjustable in the direction of movement of said carriage, a buffer mechanism carried by said carriage between said stops, and means for sequentially moving said gripper to its gripping position, said carriage to its forward position, said gripper to its released position, and said carriage to its retracted position.

5. In a device for intermittently feeding predetermined lengths of strip stock, an elongated base, a first upstanding plate at the forward end of said base, a second upstanding plate adjacent the rear end of said base, a U-shaped bracket secured to said base rearwardly of said rear plate and extending to one side thereof, a pair of parallel guide rods mounted between the legs of said U-shaped bracket and spaced apart a sufficient distance to guide said strip stock therebetween, a slotted portion on one side of said rear plate in alignment with said spaced rods, a button on the lower surface of said slot, a holding cam pivoted to said rear plate and having a lower surface disposed above said button, said lower surface being of increasing radius in the direction of advancing movement of said strip stock, a spring urging said holding cam in a direction to frictionally engage strip stock thereby preventing retraction thereof, parallel rails supported between said plates above said base, a cylinder extending rearwardly from the rear end of said rear plate, an apertured portion in said rear plate, a piston extending forwardly from said cylinder through said apertured portion, a carriage connected to said piston and slidably mounted on said rails, an upwardly facing anvil carried by said carriage, a gripping member disposed above said anvil and movable between a retracted position and a gripping position against strip stock carried on said anvil, a guide member mounted on said forward plate in alignment with said anvil, button and guide rods, a diaphragm and diaphragm chamber on said carriage above said gripping member, said diaphragm being connected to said gripping member whereby fluid pressure in said diaphragm chamber will force said gripping member downwardly into its gripping position, a spring urging said gripping member into its retracted position, a pair of stops carried by said forward and rear plates, a buffer mechanism carried by said carriage and engageable with said forward and rear stops to absorb shocks, a valve carried by said rear plate and connected to the forward and rear ends of said cylinder, said valve being movable between a first position in which it is adapted to supply fluid pressure to the rear end of said cylinder and a second position in which it is adapted to supply pressure to the forward end of said cylinder, means responsive to the attainment of a predetermined pressure in said diaphragm chamber to move said valve to its first position, whereby forward movement of said carriage will be effected, and means responsive to reduction of the fluid pressure in said diaphragm chamber to move said valve to its second position, thereby effecting retracting movement of said carriage.

6. The combination according to claim 5, said valve comprising a spool valve, said means for moving said valve to its first position comprising a chamber at one end of said spool valve connected to said diaphragm chamber, said means for moving the valve to its second position comprising a compression spring at the opposite end of said spool valve, said spring being of such strength that said spool valve will move to its first position only when a predetermined pressure has been attained in said spool chamber.

7. In a system for feeding equal lengths of strip stock intermittently to a vertical press, a feeder comprising a base, a carriage slidably mounted on said base and movable between a retracted and a forward position, fluid-

operated gripping means on said carriage movable from a retracted position to a gripping position in response to the attainment of the predetermined fluid pressure, a double-acting cylinder on said base and connected to said carriage for moving the carriage between its retracted and forward positions, a control valve connected to said cylinder, said control valve being movable between a first position to cause forward movement of said carriage and a second position to cause rearward movement of said carriage, a direct fluid connection between said fluid-operated gripping means and said control valve, means responsive to attainment of said predetermined pressure for moving said control valve to its first position, means responsive to reduction of said pressure for moving said valve to its second position, and a cycling valve for controlling the supply of fluid pressure to said fluid-operated gripping means, said cycling valve being adapted to be shifted in response to vertical movement of said press between a first position supplying fluid pressure to said fluid-operated gripping means, and a second position connecting said fluid-operated gripping means to exhaust.

8. In a feeding mechanism for intermittently advancing flat strip stock in equal lengths, a base, a pair of parallel guide rods mounted on said base for guiding the strip stock into the feeding mechanism, said guide rods being spaced apart a sufficient distance to accommodate the stock therebetween, one-way holding means mounted on said base adjacent said guide rods and actuatable to permit movement of the strip stock only in the advancing direction, the position of said guide rods relative to said one-way holding means being such that one edge portion of said strip stock fed through said guide rods will pass through said one-way holding means, a plurality of guide collars adjustably mounted on said guide rods and movable laterally with respect to the direction of movement of said strip stock, whereby strip stock of different widths and thicknesses may be guided between said guide rods, a carriage slidably mounted on said base forwardly of said one-way holding means, a gripper on said carriage movable between a released position and a gripping position firmly grasping said strip stock, second guide means mounted at the forward end of said base, first fluid-actuated means for moving said carriage between a forward and a retracted position, second fluid-actuated means for moving said gripper to its gripping position, and a control valve for said first fluid-actuated means, said control valve being responsive to the attainment of a predetermined pressure by said gripper to cause movement of said carriage to its forward position, said control valve being further responsive to reduction in pressure of said gripper to cause movement of said carriage to its retracted position.

9. In a feeding mechanism for intermittently advancing flat strip stock in equal lengths, a base, guide means mounted on said base for guiding the strip stock into the feeding mechanism, one-way holding means mounted on said base and actuatable to permit movement of the strip stock only in the advancing direction, said one-way holding means comprising a stationary button on one side of said strip stock, a holding cam pivotally mounted on the other side of said strip stock adjacent said button, means urging said holding cam toward said button, said holding cam having an outer surface of increasing radius in the direction of advance of said strip stock, whereby said holding cam will frictionally engage strip stock to prevent retracting movement thereof, a carriage slidably mounted on said base forwardly of said one-way holding means, a gripper on said carriage movable between a released position and a gripping position firmly grasping said strip stock, second guide means mounted at the forward end of said base, first fluid-actuated means for moving said carriage between a forward and a retracted position, second fluid-actuated means for moving said gripper to its gripping position, and a control valve for said first fluid-actuated means, said control valve being responsive to the attainment of a predetermined pressure by said gripper to cause movement of said carriage to its forward position, said control valve being further responsive to reduction in pressure of said gripper to cause movement of said carriage to its retracted position.

10. In a feeding mechanism for intermittently advancing flat strip stock in equal lengths, a base, guide means mounted on said base for guiding the strip stock into the feeding mechanism, one-way holding means mounted on said base adjacent said guide means and actuatable to permit movement of the strip stock only in the advancing direction, a carriage slidably mounted on said base forwardly of said one-way holding means, a pair of stops for arresting the carriage in its forward and retracted positions, a buffer mechanism carried by said carriage and engageable with said stops, said buffer mechanism comprising a buffer piston and cylinder, buffer rods extending from said cylinder in opposite directions and attached to said piston, the relative dimensions of said buffer piston and cylinder being such that fluid within said cylinder will pass relatively slowly from one side to the other of said piston when one of said buffer rods engages its corresponding stop, a gripper on said carriage movable between a released position and a gripping position firmly grasping said strip stock, second guide means mounted at the forward end of said base, first fluid-actuated means for moving said carriage between a forward and a retracted position, second fluid-actauted means for moving said gripper to its gripping position, and a control valve for said first fluid-actuated means, said control valve being responsive to the attainment of a predetermined pressure by said gripper to cause movement of said carriage to its forward position, said control valve being further responsive to reduction in pressure of said gripper to cause movement of said carriage to its retracted position.

11. In a system for feeding equal lengths of strip stock intermittently to a vertical press, a feeder comprising a base, a carriage slidably mounted on said base and movable between a retracted and a forward position, fluid-operated gripping means on said carriage movable from a retracted position to a gripping position in response to the attainment of the predetermined fluid pressure, a double-acting cylinder on said base and connected to said carriage for moving the carriage between its retracted and forward positions, a control valve connected to said cylinder, said control valve being movable between a first position to cause forward movement of said carriage and a second position to cause rearward movement of said carriage, means responsive to attainment of said predetermined pressure for moving said control valve to its first position, means responsive to reduction of said pressure for moving said valve to its second position, a cycling valve for controlling the supply of fluid pressure to said fluid-operated gripping means, said cycling valve being adapted to be shifted in response to vertical movement of said press between a first position supplying fluid pressure to said fluid-operated gripping means, and a second position connecting said fluid-operated gripping means to exhaust, a fluid supply conduit for said control valve and said cycling valve, a pair of branches from said conduit leading to said valves, and a check valve in the branch leading to said cycling valve, whereby reverse fluid flow in said last-mentioned branch will be prevented.

12. In a feeding device for intermittently advancing stock to a machine or the like, in combination with a source of fluid under pressure, a reciprocable feed carriage, a gripper on the carriage, means for actuating the gripper to gripping and released positions, including a fluid-energizable gripper motor, means for actuating the carriage to advanced and retracted positions, said last-named means including a fluid-energizable feed motor, a valve, and biasing means normally urging the valve to

a position in which said feed motor urges the carriage to the retracted position and fluid conducting means operatively interconnecting the source and the gripper motor, said valve being shiftable in one direction in response to the attainment of a predetermined pressure in said fluid conducting means to overcome said biasing means, whereby the carriage is actuated to the advanced position, and shiftable in a different direction when said pressure in the fluid conducting means falls below a predetermined value, whereby the biasing means overcomes the valve to again cause the carriage to move to retracted position.

13. In a feeding device for intermittently advancing stock to a machine or the like, in combination with a source of fluid under pressure, a reciprocable feed carriage, a gripper on the carriage, means for actuating the gripper to gripping and released positions, including a fluid-energizable gripper motor, one-way holding means separate from said gripper and actuatable to permit movement of the stock only in an advancing direction, means for actuating the carriage to advanced and retracted positions, said last-named means including a fluid-energizable feed motor, a valve, and biasing means normally urging the valve to a position in which said feed motor urges the carriage to the retracted position, and fluid conducting

means operatively interconnecting the source and the gripper motor, said valve being shiftable in one direction in response to the attainment of a predetermined pressure in said fluid conducting means to overcome said biasing means, whereby the carriage is actuated to the advanced position, and shiftable in a different direction when said pressure in the fluid conducting means falls below a predetermined value, whereby the biasing means overcomes the valve to again cause the carriage to move to retracted position.

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