Aug. 27, 1946. R. A. PAPSDORF 2,406,508

SELF-ACTING STOCK FEED

Filed March 2, 1945 5 Sheets-Sheet 1

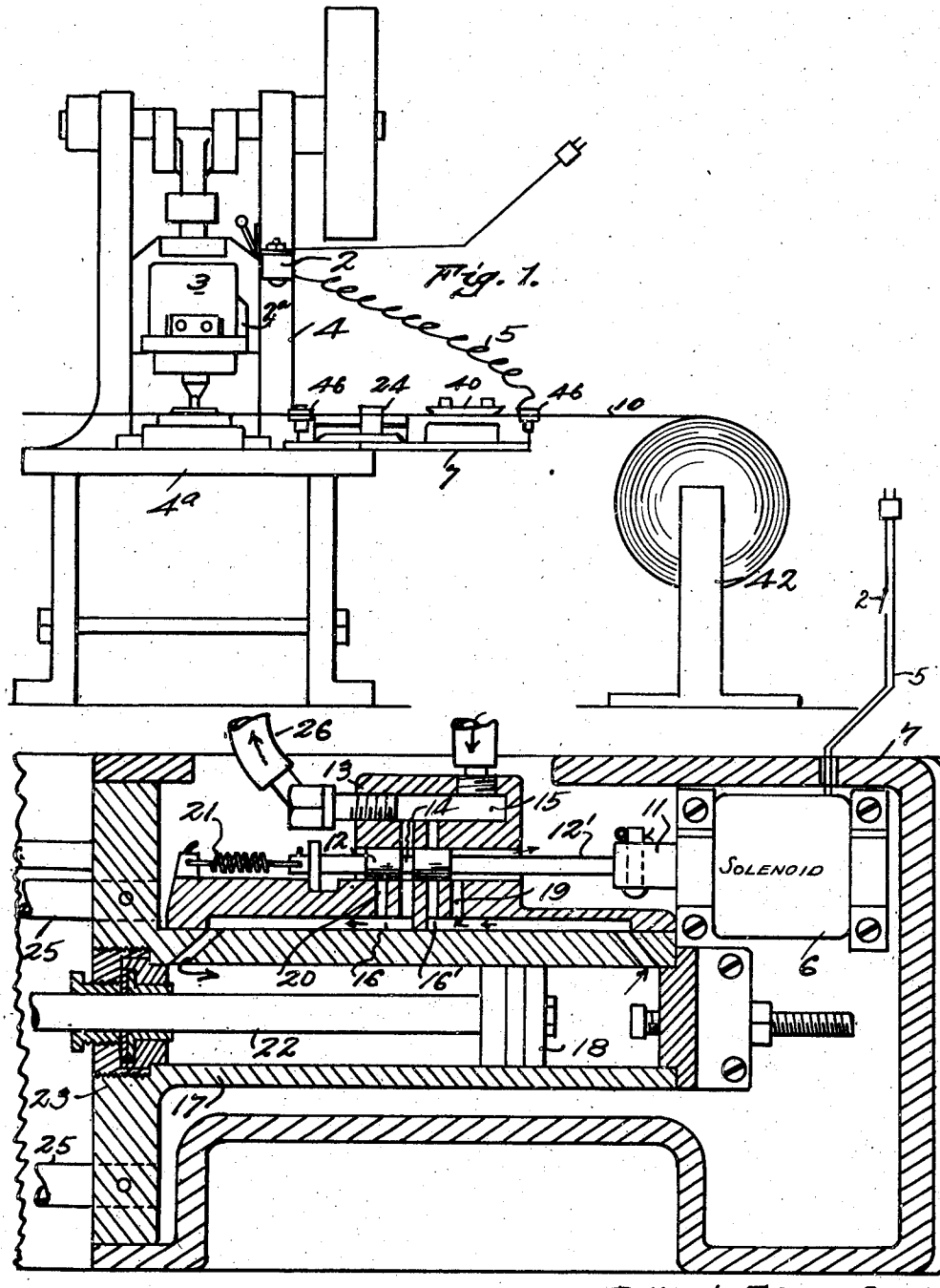

Fig. 1.

Fig. 2.

Robert A. Papsdorf,
INVENTOR;
By
Frederick E. Maynard,
Atty.

Aug. 27, 1946. R. A. PAPSDORF 2,406,508

SELF-ACTING STOCK FEED

Filed March 2, 1945 5 Sheets-Sheet 2

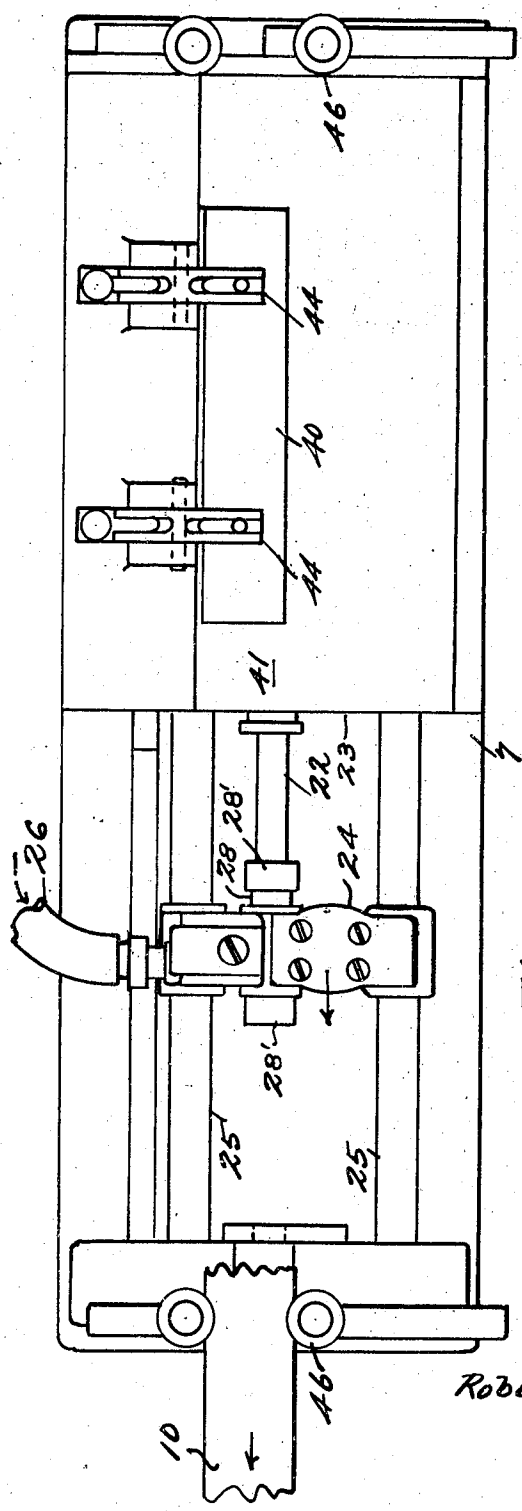

Fig. 3.

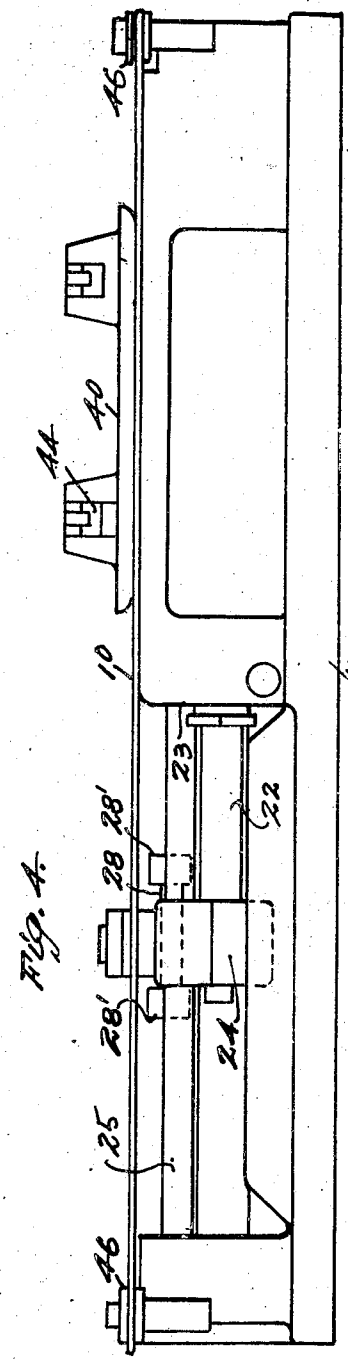

Fig. 4.

Robert A. Papsdorf, INVENTOR,
By
Frederick E. Maynard, Atty

Aug. 27, 1946. R. A. PAPSDORF 2,406,508

SELF-ACTING STOCK FEED

Filed March 2, 1945 5 Sheets-Sheet 3

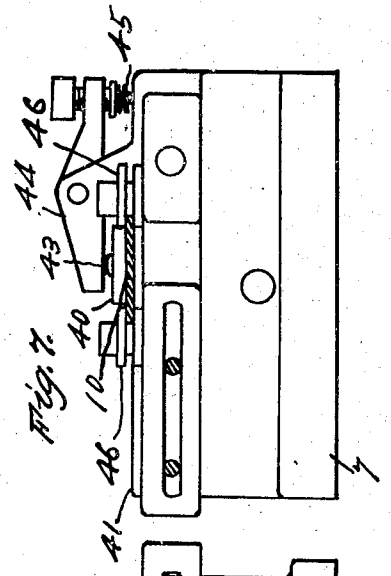

Fig. 7.

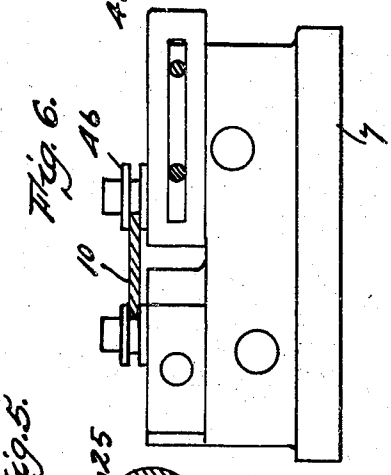

Fig. 6.

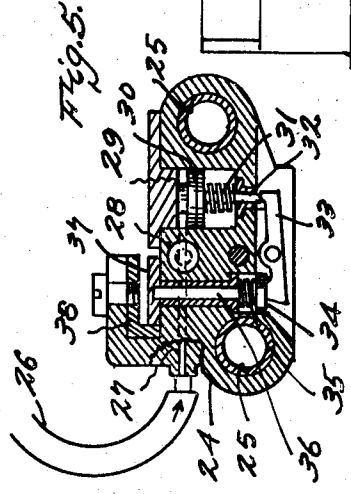

Fig. 5.

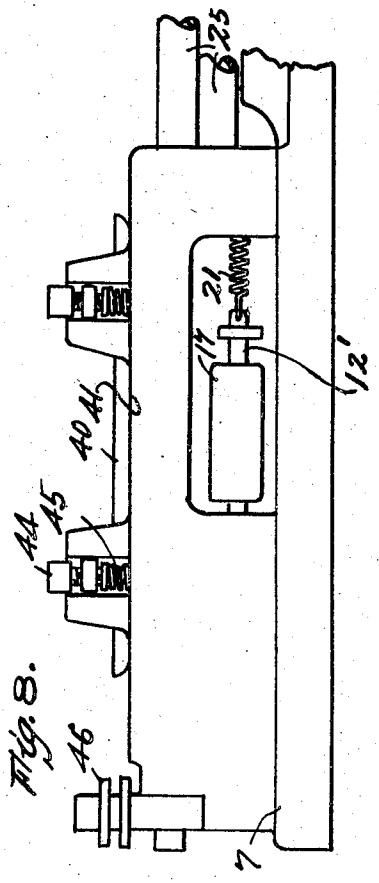

Fig. 8.

Robert A. Papsdorf,
INVENTOR;
By
Frederick E. Maynard,
Atty.

Aug. 27, 1946. R. A. PAPSDORF 2,406,508

SELF-ACTING STOCK FEED

Filed March 2, 1945 5 Sheets-Sheet 4

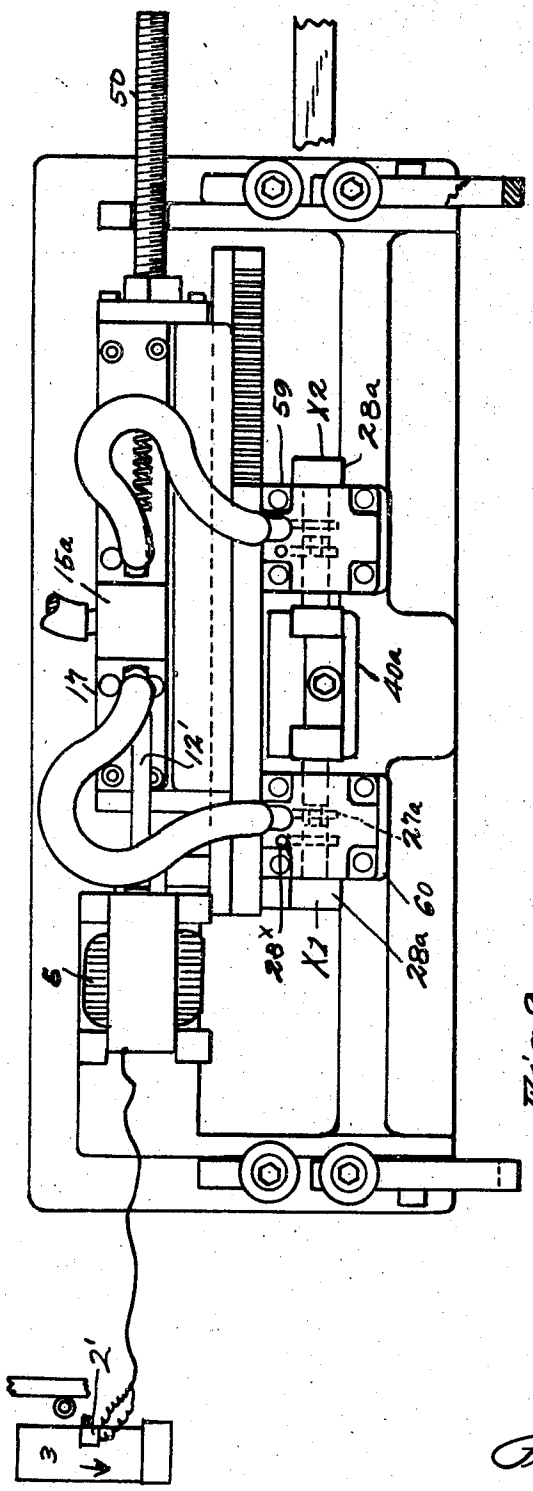

Fig. 9.

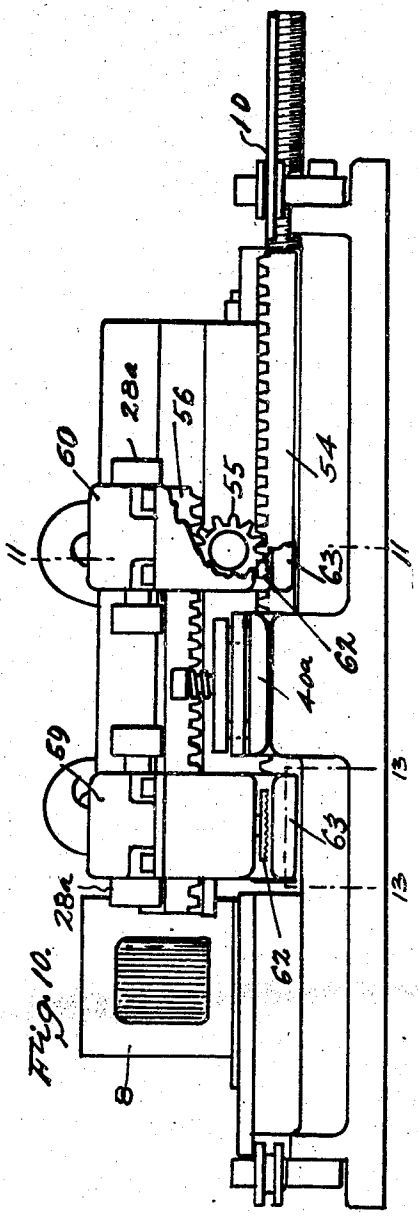

Fig. 10.

Robert A. Papsdorf,
INVENTOR;
By
Frederick E. Maynard,
Atty.

Aug. 27, 1946. R. A. PAPSDORF 2,406,508

SELF-ACTING STOCK FEED

Filed March 2, 1945 5 Sheets-Sheet 5

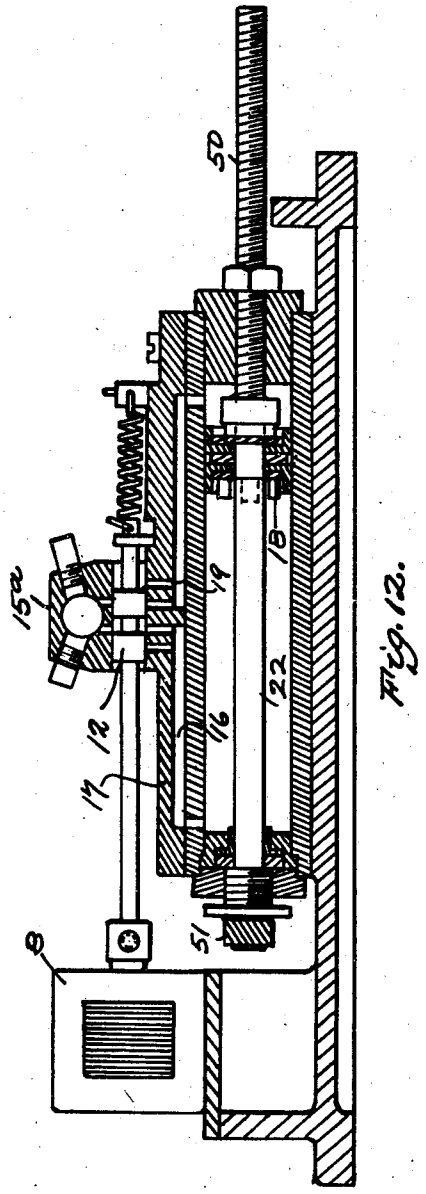

Fig. 12.

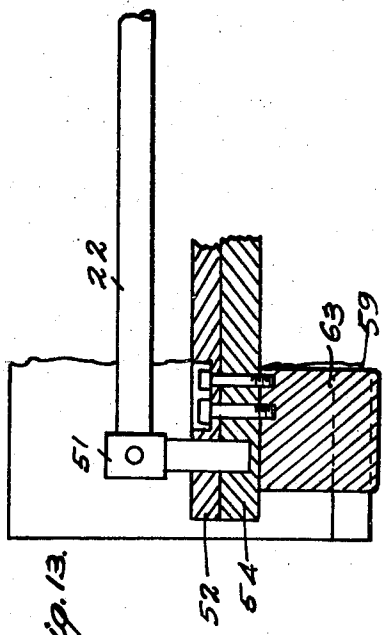

Fig. 13.

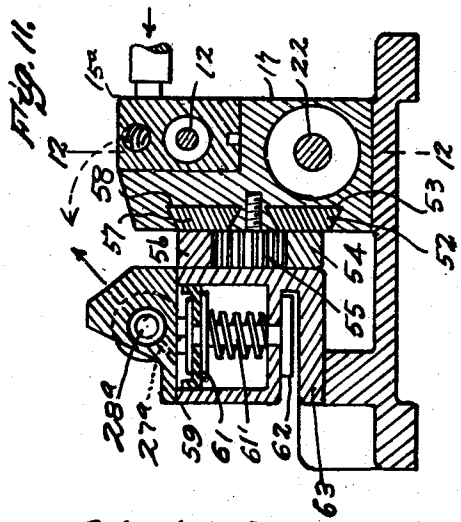

Fig. 11.

Robert A. Papsdorf,
INVENTOR;
By
Frederick E. Maynard,
Atty

Patented Aug. 27, 1946 2,406,508

UNITED STATES PATENT OFFICE

2,406,508

SELF-ACTING STOCK FEED

Robert A. Papsdorf, Los Angeles, Calif.

Application March 2, 1945, Serial No. 580,577

22 Claims. (Cl. 164—117)

1

This invention is in the art of punch press equipment for machine shops and its concept is in improvements in means for feeding strip stock to the press dies, or other given working parts.

It is an object of this invention to provide a simple, highly efficient, practical, substantial and reliable mechanism for alternately holding the work strip and for alternately automatically feeding the strip in predetermined amounts lengthwise) to the work performing tool parts in a given press. It is to be understood, however, that the use of the feeding mechanism is not limited to punch presses.

A further object of the invention is to provide a press controlled, independently powered stock feeder including a separately powered stock vise and vise reciprocating assembly; it being an object, in this connection, to provide for fluid pressure activation of the vise and its reciprocating device.

An additional object of the invention is to provide a self-acting control for the pressure activated vise.

Also, an object of the invention is to provide a unitarily organized holding and feeding mechanism readily bodily attachable to a given type of punch press with but little or no tooling or machining, or alteration of the original machine or press.

The invention resides in certain novel conceptions improving the art of stock feed to given apparatus, such as punch presses, as set forth in the ensuing text and having, with the above, additional objects and advantages as hereinafter developed, and whose constructions, combinations, and sub-combinations, and details of means and the manner of operation will be made manifest in the following description of the herewith illustrative embodiments; it being understood that modifications, variations and adaptations may be resorted to within the scope, spirit and principle of the presently claimed invention.

Figure 1 is a front elevation of the combined punch press, the stock feeding unit, and the feeder control. Figure 2 is a longitudinal plan and sectional view of the fluid powered, vise reciprocator. Figure 3 is a plan of the assembled, unitary feed mechanism; with the stock holding clamp and the travelling vise, and end sets of stock guide rollers. Figure 4 is a front elevation of the holding clamp and the vise, and the guide rollers, and the assembly bed frame. Figure 5 is a cross-section of the vise and the stationary supporting rails. Figure 6 is a left end elevation, and Figure 7 is a right end elevation; as to Fig. 4.

2

Figure 8 is an elevation showing the rear side of the clamp and a portion of the bed frame.

Figure 9 is a plan of a double action feeder involving the same principles as set out as to Fig. 1, and Figure 10 is front elevation thereof. Figure 11 is a cross-section (vertically) on line 11—11 of Fig. 10. Figure 12 is a vertical section on line 12—12 of Fig. 11. Figure 13 is a horizontal plane, section on line 13—13 of Fig. 10 of a rod and vise assembly.

In the present disclosure the primary controller of the feeding means is an electric switch 2, though other devices may be used instead as the ram 3 of the press rises an abutment 2a thereon will engage the normally open lever of the switch and close the switch whereby to effect closure of circuit in a two-wire cable 5 serving a solenoid 6, Fig. 2.

A feature of this invention resides in a more or less unitary frame or bed 7 which carries all of the mechanical means used here to hold or to step-by-step feed the given stock strip 10. Therefore the organized assembly can be readily bolted in suitable position on the table 4a of the press.

The solenoid 6 is fixed on the outer end of the bed 7 and has a reciprocating, axial core 11 suitably affixed to the stem 12' of a cylindrical valve 12 closely fitting in a valve chest 13 and having a cross-port 14, which in the position shown in Fig. 2 delivers fluid pressure (air preferred) from a constant pressure chamber 15 to a power duct 16 feeding one end of a pressure cylinder 17 to force a piston 18, therein, far to the right. Meanwhile operating fluid is exhausting by way of one of two exhaust ports 19 and 20 which are alternately opened by passage of relative ends of the valve 12 to clearance position from these ports.

The valve 12 is normally pulled to the position in Fig. 2 by a light spring 21 to effect movement of the piston 18 to an idle or right end location in readiness to be driven to the left instantly the ram 3 closes the solenoid circuit. When this circuit is closed the valve snaps to the right and its port 14 registers with a power port 16' feeding pressure to the right end of the piston 18 with the consequence that this is rapidly driven on its functioning stroke to the left; this stroke being used to effect left feed of the stock strip 10. Exhaust of fluid from the left end of the cylinder 17 is by way of the port or duct 16 and exhaust port 20 when this latter is uncovered by the valve 12. As soon as the solenoid is de-energized the spring 21 again retracts the valve 12 and fluid pressure returns the piston to the right end of the cylinder.

The travelling vise

Means are provided whereby to intermittently grip and release the strip 10 and this means is automatically reciprocated by the aforesaid piston 18; in one direction whilst the vise is gripping and in the opposite when the stock is free in the vise.

The piston 18 has a rod 22 passing from the cylinder head 23 and rigidly affixed to a block 24 forming the body of a vise device which is slidably mounted on a pair of fixed parallel tubular or other rails 25—25; clearly shown in Figs. 3 and 4.

Extending from the constant pressure chamber 15 is a flexible hose 26 constantly supplying fluid pressure to a feed port 27 in the vise body block 24 and which is alternately opened and closed by a spool valve 28 more or less freely sliding endwise in the block to supply pressure to or stop it from a chamber 29 in the block and in which a piston 30 is constantly resisted by an upthrusting spring 31. When the valve 28 opens flow to the chamber 29 the piston 30 moves down and by its rod 32 rocks a lever 33 pivoted in the block and having one end engaging a button 34 pressed down by its spring 35. The button is fixed to a push rod 36 having fixed on its upper end a vise jaw 37. Close above the moving jaw 37 is a fixed upper jaw 38 which cooperates with the lower jaw to grip an interposed portion of the stock strip 10 which is to be fed into the press. The normal position of the jaw 37 is as it is when it is under pressure by way of the fluid activated piston 30 and that is while the main piston 18 is to the right limit, Fig. 2, as then also is the vise 24.

With the objective of simplicity, the vise valve 28 is self-acting and of utmost simplicity in construction and is motivated by its own kinetic energy; preferably. Therefore valve 28 is here shown in Fig. 3 as extending entirely through the block or body 24 and having enlarged heads 28' which not only give it desired weight but further serve as valve stops at the ends of its reciprocations in the vise body 24; the valve having sufficient stroke to open and close the port 27. In Fig. 3 the valve 28 is in effective vise jaw closing position and the vise is considered as moving to the left and the stock 10 is being shifted in the direction of the arrow. When the vise reaches the end of its feeding stroke the energy stored in the spool valve 28 will cause it to automatically shift to the left and to stop flow of fluid pressure to the vise piston 30 and the compounding lever 33 will release the jaw 37 of clamping effort on the stock strip. Therefore, when the main valve 12 is released by the solenoid the spring 21 retracts the valve 12, and the piston and its connected vise rod 22 and the vise 24 all shift to the right free from the stock 10.

Means are provided whereby to exert, constantly, a firm pressure on the strip 10 so that it will not be moved to the right in the interim of right hand stroke of the vise 24, and yet which will not interfere with left hand feed of the stock by like motion of the effective vise. This means as disclosed here includes an elongate clamp bar 40 disposed above and along a box or cover plate 41 which houses the above set forth pressure chest and cylinder relative to the main piston 18; this cover plate forming a platform for the incoming strip; as from reel 42. The bar has pins 43 interengaged with the near ends of overhanging levers 44; Figs. 7 and 8, and whose outer ends are up-thrust by jack springs 45 which

therefore act to press the bar firmly onto the interposed strip 10.

End pairs of control and guide rollers 46 are mounted on the ends of the box 41 and the bearing frame 7, Figs. 3 and 4, to vertically and laterally guide the stock through the feeding assembly.

Double action feed means

In Figs. 9 to 13, inclusive, the mechanism shown is designed to positively feed the stock 10 at each stroke of the punch 3 of a press which is provided with a switch 2' of such type that current will excite the solenoid 6, Fig. 9, on each stroke of the punch. Fig. 12 shows the solenoid rod pulling the valve 12 to the left to serve air to the port 16 of the cylinder 17, and open exhaust port 19; the piston 18 being driven to the right. In this device there is an adjustable bumber screw 50 whereby to stop the piston at any desired right end position and thus regulate the amount of stock feed at each piston stroke in either direction.

For the purpose of advancing stock to the left at each reciprocation of the piston the rod 22 is attached by a block 51, Fig. 13, to the near end of a carrier or slide bar 52 mounted in ways 53, parallel to the cylinder 17, and to the bar 52 is fixed a parallel rack 54 constantly meshing with a pinion 55 whose upper rim portion meshes with a rack bar fixed to and carrying a slide 57 running in ways 58.

In Fig. 13 the rack 54 is shown rigidly attached to the lower part of a stock feeding vise 59; a like vise 60 being rigidly affixed to the upper bar 56. These vises have spring raised pistons 61 whose rods 61' have presser jaws 62 driven down when air pressure from a relative momentum, control valve 28*a* (of the same principle as set out above as to the valve 28) opens air port 27*a*, when in position X1, Fig. 9. When the valve 28*a* shifts to position like X2 a relative exhaust port 28*x* is opened to vent the trapped air and let the piston rise and lift the effective jaw 62 from the stock. So long as air pressure is applied to the jaw of either vise 59 or 60 the stock is clamped on the stock rest 63 of the vise and then as either rack 54 or 56 is shifted toward the left the gripped stock is fed to the press.

Sudden stop of the piston 18 and thereby the related vises, in either direction of their movements, causes the momentum valves 28*a* to be instantly shifted from an open to a closed position, or vice versa: one or the other of these vises feeds stock at every stroke of the driving piston 18, but only the vise that is moving toward the left is effective on the stock. The vise valves are fed air constantly from a common supply head 15*a*, which also feeds the motor valve 12.

A presser foot 40*a*, Fig. 10, acts to hold the stock still while not feedingly gripped by a vise.

What is claimed is:

1. In an automatic stock feeding mechanism: the combination of a double-action. fluid pressure operated, reciprocating motor, a vise reciprocative by said motor and including a self-acting clamping and self-releasing device, and a master control for the motor adapted for operation by a coacting part of apparatus to which the stock is to be fed.

2. In a stock feeding mechanism: the combination of a reciprocating motor, and a reciprocable, self-acting stock gripping and self-acting releasing vise, and a drive connection between the vise and the motor, and a motor controller

adapted for actuation by a coacting part of apparatus to which the stock is to be fed.

3. The combination, in a stock feeder, with a motor having a reciprocable part: of an automatic, power activated vise reciprocative by said part and including a self-acting device to both set and to open the vise, and a master controller for the motor adapted for operation by apparatus to which the stock is fed.

4. In combination: an independently activated master controller; a prime motor controlled thereby, and an independently motivated vise, to grip stock to be fed, which is bodily reciprocated by the motor, and a momentum device to alternately self-set and self-release the vise.

5. In combination: an independently activated master controller; a prime motor controlled thereby, and a self-setting and self-releasing vise bodily reciprocated by the motor.

6. A stock feeding device comprising a unitary assembly adapted to be bodily attached to or removed from a given work handling apparatus and which assembly includes a reciprocative, power actuated stock vise and means to reciprocate the vise, and a common bodily portable mounting for the vise and said means and which is adapted for aforesaid attachment, and a self-acting power control means for effecting automatic gripping and automatic releasing vise actions.

7. The device of claim 6; said vise control means being kinetically motivated.

8. The device of claim 6; said control including a self-motivated control member.

9. A stock feeding device comprising a unitary assembly adapted to be bodily installed in effective combination with a given work machine and including an independently motivated vise means having a self-setting and self-releasing gripper, and stroke making means which are interconnected so that the vise is shifted to and fro to feed interposed stock when clamped in the said vise.

10. A strip stock feeder for a work performing machine, having in combination: a power motor having a piston rod, a power actuated vise including self-setting and self-releasing grip means, said rod connected to said vise to bodily reciprocate it, and a master controller for the motor and including a part adapted to be actuated by an element of said machine.

11. In a stock feeder for a work performing machine: a double acting, pneumatic motor having a piston rod and a reciprocating valve, a solenoid whose core is connected to the valve to shift it in one direction, means to retract the valve, a controller for the solenoid which is operable by a cooperative part of said machine, a power-set vise connected to and bodily reciprocated by said rod, and an automatic control for set and release of the vise.

12. The feeder of claim 11; said vise control including a self-shifting valve controlling power flow to the vise.

13. In a stock feeder of the class described: a mounting structure for bodily attachment to a given machine, a system of guides on the structure for work stock control, a stock vise guidedly reciprocative on the structure, a self-acting means to alternately set the vise on and release it from interposed work and including a part controlled by vise motions, power means connected to and reciprocating the vise, an automatic control apparatus for said power means, and a clamp to hold the stock when the stock is freed by the vise.

14. The feeder of claim 13; said vise setting means including a pneumatic motor having a vise-motion motivated valve.

15. The combination with a punch press having a reciprocating ram, of a mechanism to intermittently feed stock to the press and including an organized, bodily installable assembly comprising a mounting having a solenoid whose circuit is controlled by said ram, a pressure fluid operated motor having a valve connected to the core of the solenoid for stroke in one direction thereby and an automatic retractor for the valve, and a self-setting and self-opening vise bodily reciprocated by the motor.

16. A pneumatic vise for feeding stock to a press, including a bodily movable structure having a stock rest, a cylinder and a piston therein having a jaw to grip stock on the rest, means to automatically retract the piston and the jaw from the rest, and a momentum activated valve for supplying air to the piston cylinder during shift of the vise bodily in one direction and to cut off air on reverse shift of the vise.

17. The combination with a punch press, of a plurality of self-acting gripping and releasing action vises, means for concurrently shifting the vises bodily in opposite directions, and a press actuated control for said means; said vises having control means whereby each is made effective to grip stock when the vises shift in one direction only and release it on reverse shift.

18. An electro-pneumatic feed apparatus for a stock working machine; having a pair of vises, a pair of carriers to which they are respectively fixed, means for concurrently shifting the carriers and their vises in opposite directions, and self-acting means for automatically setting the vises on and automatically releasing the vises from the stock at given reciprocations.

19. The apparatus of claim 18; said setting and releasing means including air driven pistons, and automatic momentum valves for control of the pistons.

20. The apparatus of claim 18; said shifting means including a pneumatic motor for actuating the carriers, and an automatic control for the motor.

21. Apparatus, for feeding stock to a stock working machine, including a pair of vises and a pair of carriers to which they are respectively fixed, means for concurrently shifting the carriers and their vises in opposite directions, and means for automatically setting the vises on the stock at given reciprocations; said shifting means including racks fixed to the carriers, a pinion engaging and reversely driving the racks, and a motor connected to and reciprocating one of the carriers.

22. The apparatus of claim 18; said setting and releasing means including a pneumatic motor having self-actuated, double-action air valve.

ROBERT A. PAPSDORF.