

June 21, 1949.

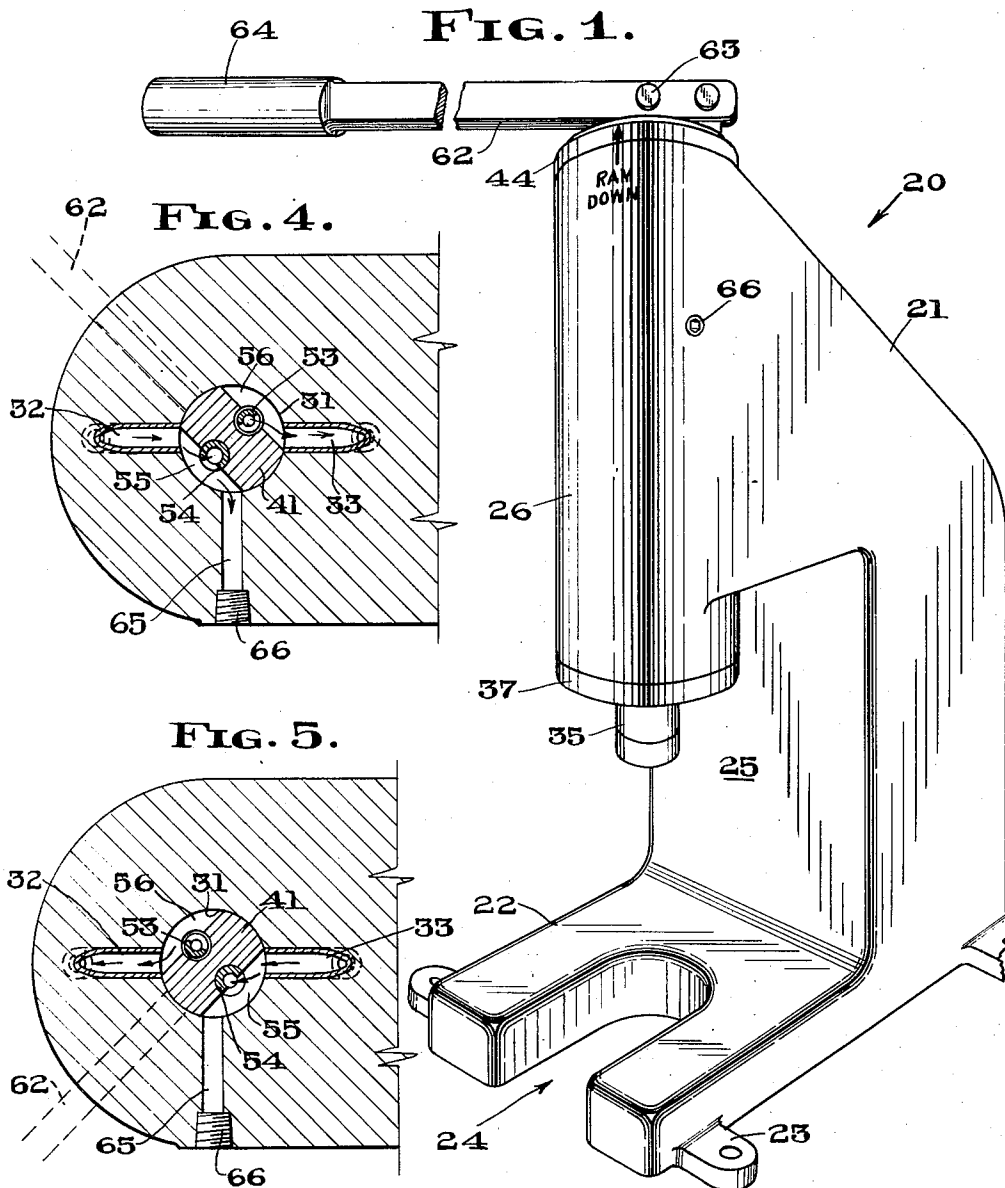
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MANUALLY OPERATED HYDRAULIC PRESS

Filed May 25, 1945

2 Sheets-Sheet 1



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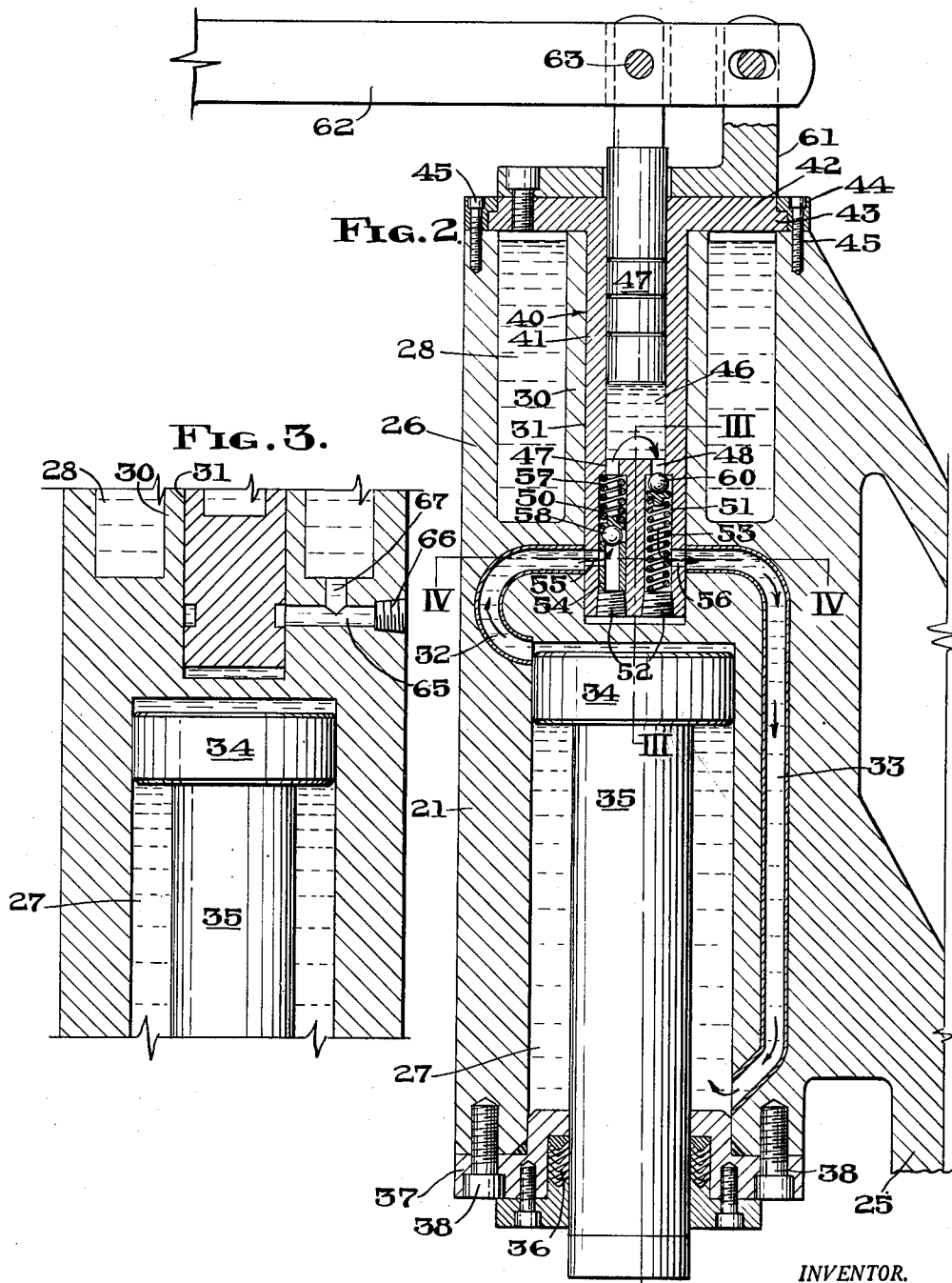
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UNITED STATES PATENT OFFICE

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MANUALLY OPERATED HYDRAULIC PRESS

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Application May 25, 1945, Serial No. 595,751

4 Claims. (Cl. 60—52)

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This invention relates to hydraulics and is particularly directed to a manually operated device in which the power is hydraulically transmitted. The invention is still more particularly directed to a bench press having a single operating member by means of which the ram of the press may be raised or lowered.

One object of this invention is to provide a hand press having a hand lever which may be oscillated in one plane to impart movement to the press ram and swung in another plane to regulate the direction of movement of the press ram thereby adapting the press for operation with one hand.

Another object of the invention is to provide a press having a hand operated pump and a valve for controlling the direction of movement of the press ram—both the pump and the valve being operated by the same control element.

Another object of the invention is to provide a power unit for a hydraulically operated device which power unit includes a pump having an inlet and an outlet port and means for adjusting such ports so that each may be made to communicate with either of a pair of lines extending to the hydraulically operated device.

A further object of the invention is to provide a tool having a power cylinder with fluid passages leading to either end thereof and providing a power unit with a bore for the reception of a plug, the passages above mentioned extending to spaced points in the bore to be alternately registered with inlet and outlet ports provided in the plug, the ports communicating with a chamber in the plug which in turn receives a reciprocating piston. Thus, through the reciprocation of the piston, fluid may be withdrawn from one end of the power cylinder and injected into the other end thereof, the particular ends connected with the inlet and outlet ports being determined by rotating the plug in the bore.

It is also an object of the invention to provide a tool having a frame with a piston chamber and a reservoir together with a bore and passages leading from the ends of the piston chamber and the reservoir to spaced points in the bore, a plug being rotatably positioned in the bore, the plug constituting a housing for a pump unit and having inlet and outlet ports which, through the rotation of the plug, may be alternately registered with the passages extending to the end of the piston chamber, the degree of rotation of the plug being so fixed that the inlet port will always be in communication with the passage extending to the reservoir.

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Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of embodiment of the invention is clearly shown.

In the drawings:

Fig. 1 is a perspective view of hand press formed in accordance with the present invention;

Fig. 2 is a vertical longitudinal section view taken through the head portion of the press shown in Fig. 1;

Fig. 3 is a detailed vertical sectional view taken on the plane indicated by the line III—III of Fig. 2;

Fig. 4 is a detailed horizontal sectional view taken through the valve portion of the press on the plane indicated by the line IV—IV of Fig. 2 and shows the valve in position to cause the ram of the press to be raised; and

Fig. 5 is a similar view showing the valve in position to effect the lowering of the ram.

Referring more particularly to the drawings, the numeral 20 designates the press in its entirety. The press in this instance includes a frame 21 of generally C shape when viewed from either side, having a foot portion 22 which may be provided with perforated ears 23 to receive bolts, screws or other securing devices employed in fastening the press to a bench or other support. The forward portion of the foot section 22 is bifurcated as at 24 to permit the discharge of punchings or other waste when the press is in use. The frame 21 also includes an upright back section 25 which carries a forwardly disposed head portion 26 at its upper end. The frame 21 may be suitably braced between the head and back portions to prevent distortion or breakage in use.

As shown in Fig. 2, the head portion 26 is formed with a piston chamber 27 at its lower end and a reservoir 28 at the upper end in substantial registration with the piston chamber. A boss 30 projects upwardly from the bottom wall of the reservoir 28, this boss being provided with a central bore 31 extending thereinto from the upper end. The frame 21 is provided with a pair of passages 32 and 33 which extend from opposite ends of the piston chamber 27 to diametrically opposed points in the bore 31. In the present instance, the passages 32 and 33 have been formed by molding previously bent tubing in the casting which forms the head of the frame 21. If desired, the tubing which forms these passages could be so bent from a single piece of material as to extend from the upper end of the piston chamber over the top thereof and downwardly along the

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back to the lower end of such chamber. When a frame bearing such tubing is machined, the formation of the bore 31 will cut the tubing into two passages 32 and 33, as shown, one leading to the upper end of the piston chamber and the other leading to the lower end thereof. It should be obvious that the passages could be formed by conventional cores, if so desired.

The chamber 27 receives a piston 34 having a ram 35 depending from the lower surface thereof. This ram projects through a packing gland 36 which is carried by a cap 37 secured to the frame 21 with screws 38 to close the open end of the bore 27. The reciprocation of piston 34 in the chamber 27 will cause movements of the ram 35 toward and away from foot section 22 of the frame 21. To effect the movement of the piston 34 the bore 31 is provided with a pump device generally designated by the numeral 40. This pump device includes a plug 41 projecting from the under side of a disc 42 which forms a cover for the reservoir 28. The plug 41 has its outer surface ground to closely fit the inner surface of the bore 31 to thereby prevent the seepage of fluid between the elements. This fit is also such as to permit the plug 41 to be revolved in the bore 31 and to further facilitate this motion, the disc 42 is provided with a flange 43 which cooperates with a retaining ring 44 secured to the upper end of the frame 21 by screws 45.

As illustrated in Fig. 2, the plug 41 has a centrally located opening extending thereinto from the upper end, the opening 46 being ground to receive a pump plunger 47. At its lower end, the chamber 46 communicates with a pair of eccentrically located openings 47 and 48 which in turn communicate with chambers 50 and 51 extending into the plug 41 from the lower end. Threaded plugs 52 close the lower end of the chambers 50 and 51 and also serve as abutments for a spring 53 in one chamber and a tubular valve seat 54 in the other chamber. The latter chamber, designated by numeral 50, constitutes the inlet for the pump while the former identified by reference numeral 51 serves as the outlet therefor. As will be observed in Figs. 4 and 5 the plug 41 has diametrically opposed slots 55 and 56 cut in the sides thereof, these slots being parallel and intersecting the chambers 50 and 51. As also illustrated in Figs. 4 and 5, the slot 55 intersects the insert or tubular valve seat insert 54 and chamber 50 contains a spring 57 which serves to resiliently hold a ball valve 58 in engagement with the upper or seat end of the insert 54. Thus, when the plunger 47 is moved upwardly, fluid will be drawn from the passage then in registration with the slot 55 into the chamber 46, this fluid raising and passing the ball valve 58. When the direction of movement of the plunger 47 is reversed, the spring 57 will cause the ball valve 58 to again engage its seat and prevent the escape of fluid to the passage from which it has just been drawn. Such fluid will thereby be forced through the opening 48 into the chamber 51. In so moving, this fluid will pass ball valve 60 which is yieldably held in engagement with the lower edge of the opening 48 by the spring 51. The ball valve 60 prevents such fluid from moving back into the chamber 46 when the plunger 47 is again moved in an upward direction. Continued reciprocation of the plunger 47 will cause fluid to be withdrawn from one end of the piston chamber 27 and forced into the other end thus causing piston 34 to move toward the end of the chamber connected with the inlet port of the pump.

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To effect the operation of the plunger 47, the disc 42 has a fulcrum stand 61 secured thereto which stand pivotally receives a lever 62, the latter also being pivotally connected as at 63 with the upper end of the plunger 47. Thus, by raising and lowering the outer end 64 of the lever 62 the plunger 47 may be reciprocated in the chamber 46 to effect the pumping of the fluid and the operation of the piston 34 and ram 35. Since the operating lever 62 is supported solely by the disc 42, the end 64 of such lever may be swung to the right or left to effect partial rotation of the plug 41 in the bore 31. By this movement communication between the slots 55 and 56 and the passages 32 and 33 may be selectively established and reversed. In Fig. 4 the slot 55 is in communication with the passage 32 while slot 56 communicates with passage 33. The relative position of the operating handle 62 at this time is shown in dotted lines. When the parts are in the position shown in Fig. 4 and the handle 64 is oscillated in a vertical plane, fluid will be withdrawn from the upper end of the piston chamber and supplied to the lower end to cause the ram to be elevated. In Fig. 5 the parts are positioned to cause the reversal of communication, the slot 55 there being in communication with the passage 33 and the slot 56 communicating with passage 32. When the parts are thus positioned and handle 64 is raised and lowered, fluid will be supplied under pressure to the upper end of the piston chamber to cause the piston and ram to descend.

As shown in Figs. 3, 4, and 5 a short drilled passage 65 extends into the side of the head and communicates with the bore 31 between the passages 32 and 33. The outer end of the passage 65 is closed by a pipe plug 66 while the intermediate portion of this passage is intersected by a second short passage 67 extending from the reservoir 28. The passage 65 is so located relative to the passages 32 and 33 and the slot 55 in the plug 41, that when the plug is disposed to effect either a raising or a lowering movement of the ram, the passage 65 and the reservoir 28 will always be in communication with the inlet port of the pump. Inasmuch as there is a differential in area between the top and bottom surfaces of the piston 34, more fluid will be required to lower the ram than to raise it. When the ram is being depressed this additional fluid will be drawn from the reservoir 28 and when the ram is being raised the excess fluid will flow through the passages 65 and 67 to the reservoir. The capacity of the press may be determined by the relative sizes of the plunger 47 and the piston 34.

It should be obvious from the foregoing that the entire operation of the press illustrated in the drawings is controlled by a single element, thus freeing one hand of the operator and making the press suitable for use by a one armed operator.

It should be further apparent that, if desired, additional passages could be provided leading to power cylinders for performing other useful work, and the pump 40 indexed in the same manner as described to disconnect the ram piston chamber and supply fluid pressure to the additional power cylinder or cylinders.

While the form of embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

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I claim:

1. A hand operated press comprising a body having a reservoir, a piston chamber, a bore disposed in axial relation to said piston chamber, and passages extending from the ends of said piston chamber and from said reservoir to spaced points in said bore; a piston slidably mounted in said piston chamber; a plug rotatably disposed in said bore, said plug having an axially extending chamber and spaced inlet and outlet ports formed therein; check valve means in said inlet and outlet ports; a second piston mounted for reciprocation in the chamber in said plug; and a hand lever for reciprocating said second piston, said lever being pivotally connected with said plug and second piston and movable with said plug about the axis thereof to selectively connect said inlet and outlet ports with the passages leading to the ends of the first mentioned chamber, said inlet port being in continuous communication with said reservoir.

2. A manually operated hydraulic press comprising a body having a piston chamber, a bore in axial alignment with said chamber, an annular reservoir concentric with said bore, and passages connecting the ends of said chamber and said reservoir with circumferentially spaced points in said bore; a piston slidably received by said piston chamber; a plug disposed for oscillatory movement in said bore, said plug having a piston chamber and valve-containing inlet and outlet ports; a second piston disposed for reciprocatory movement in the chamber in said plug; and a hand lever pivoted for swinging movement on said plug to impart reciprocatory movement to said second piston, said lever and plug being movable about the axis of the latter to alternately connect the inlet and outlet ports with the passages leading to the opposite ends of the first-mentioned piston chamber, the passage leading from said reservoir being in constant communication with said inlet port.

3. A manually operated hydraulic press comprising a frame with a table section and a head section with the longitudinal axis normal to said table section said head section having a piston chamber, a bore in axial alignment therewith, and passages connecting the ends of said chamber with circumferentially spaced points in said bore; a piston slidably arranged in said piston chamber; a ram projecting from said piston toward said table section; a plug disposed for oscillatory movement in said bore; said plug hav-

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ing a second piston chamber and valve-containing inlet and outlet ports; a second piston disposed for reciprocatory movement in the second piston chamber; and a hand lever connected to said plug for swinging movement in planes extending axially of said head and angular thereto, movement of said handle in the axial plane serving to reciprocate said second piston, swinging movement of said handle in the other plane serving to alternately connect said inlet and outlet ports with the passages extending to the ends of the first piston chamber.

4. A manually operated hydraulic press comprising an integral body having a piston chamber at one end portion and a reservoir chamber at the opposite end; a boss projecting into the reservoir chamber, said boss having a cylindrical bore formed therein; passages in said body connecting the ends of said piston chamber and circumferentially spaced points in said bore; a piston disposed for reciprocation in said piston chamber; a plug disposed in said bore, said plug being secured to said body for rotation in said bore, said plug having a piston chamber and inlet and outlet ports, rotary movement of said plug serving to alternately connect said inlet and outlet ports with said passages; a second piston disposed for reciprocation in the chamber in said plug; and an operating hand lever pivotally supported on said plug and connected to said second piston, said lever being rockable in a plane parallel to the axis of said second piston to effect movement thereof and in a plane at right angles to said axis to effect rotation of said plug.

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