United States Patent

[11] **3,568,559**

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[45] Patented **Mar. 9, 1971**

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[54] **PRESS UNIT**
6 Claims, 4 Drawing Figs.

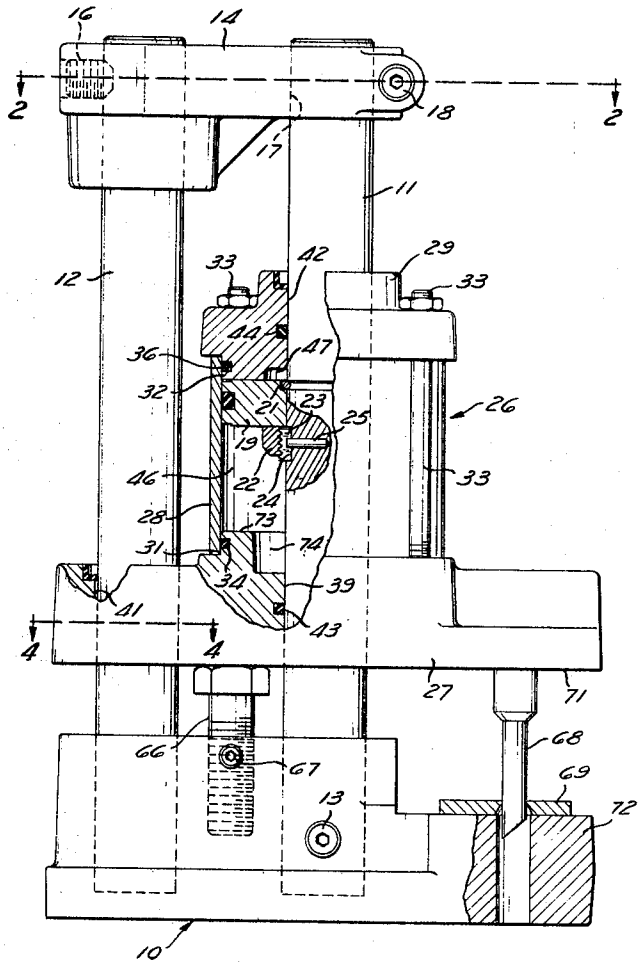
[52] **U.S. Cl.** **83/639,**
92/117, 100/269
[51] **Int. Cl.** **B26d 5/12**
[50] **Field of Search** 83/639;
92/117, 111; 100/269

[56] **References Cited**
UNITED STATES PATENTS

2,816,608	/1957	Farmwald et al.	83/639
3,134,231	/1964	McCreery	92/117X
3,181,436	/1965	McCreery	92/111X

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ABSTRACT: A fluid operated press is disclosed providing two parallel support columns mounted at one end on a base and connected at their other ends by a tie element. A piston is mounted on one support column and a cooperating cylinder assembly is guided by the column for reciprocating movement. Fluid passage means extend through the tie member and axially along one support column to provide separate flow passages communicating with each of the cylinder chambers.



Patented March 9, 1971 3,568,559

2 Sheets-Sheet 1

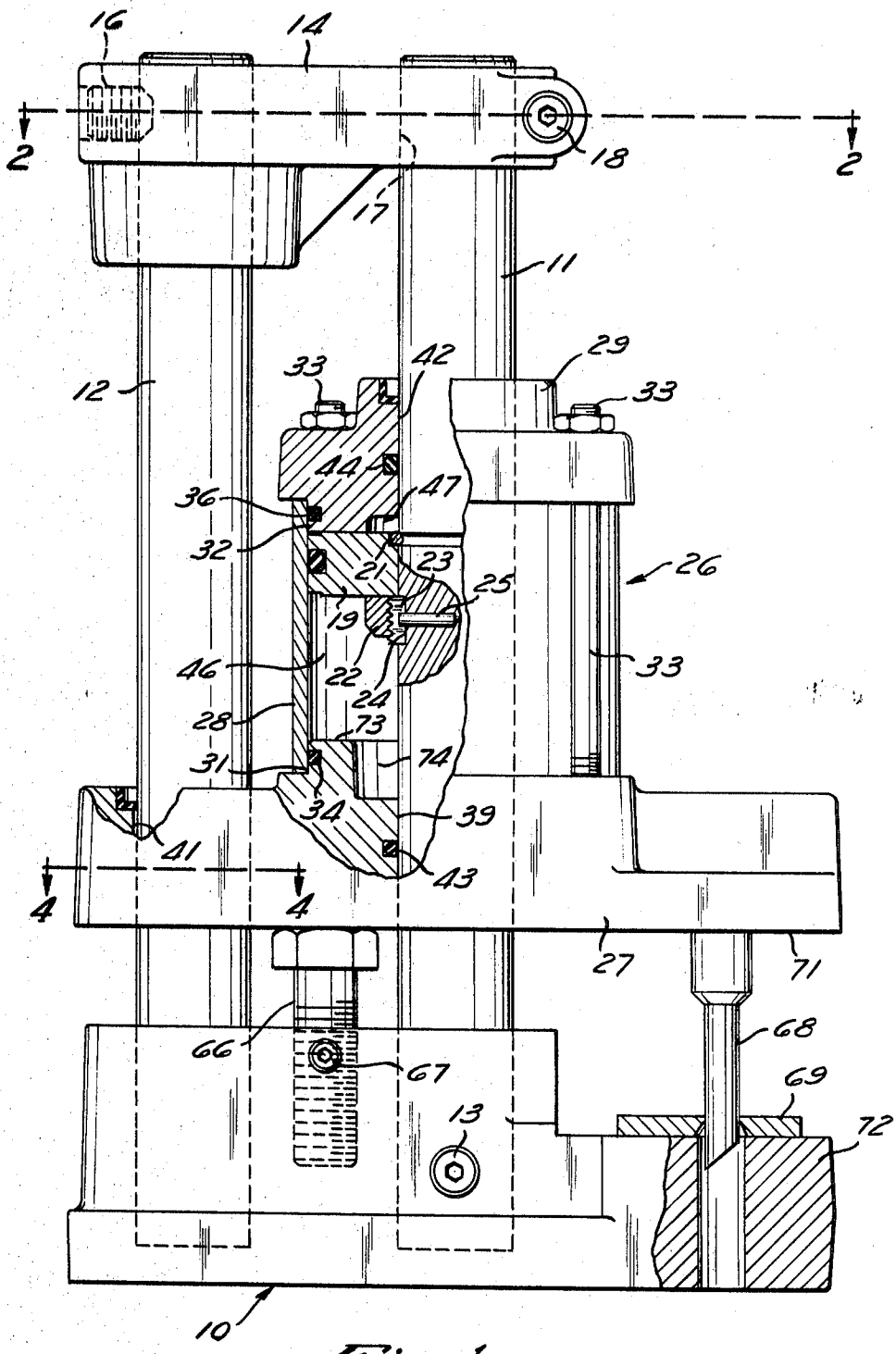


Fig. 1

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Patented March 9, 1971 3,568,559

2 Sheets-Sheet 2

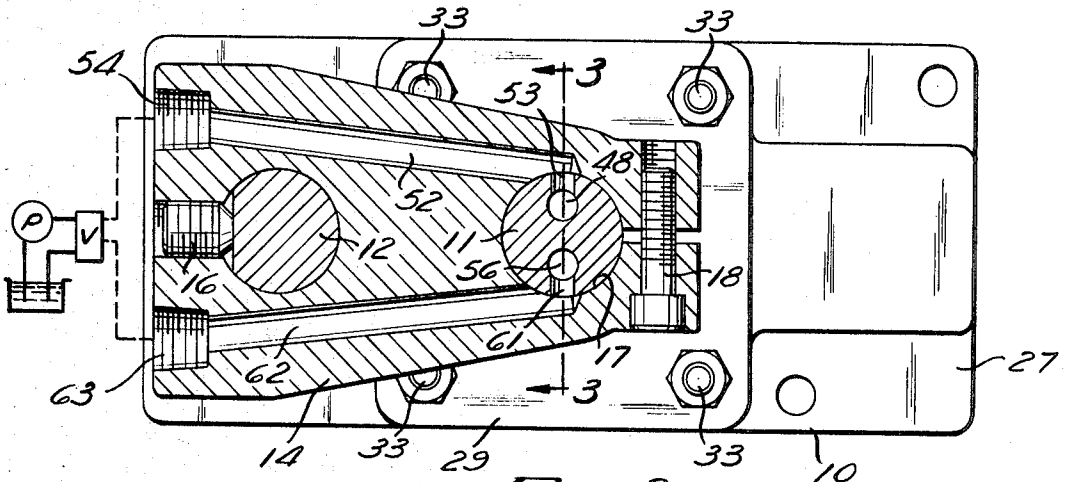


Fig. 2

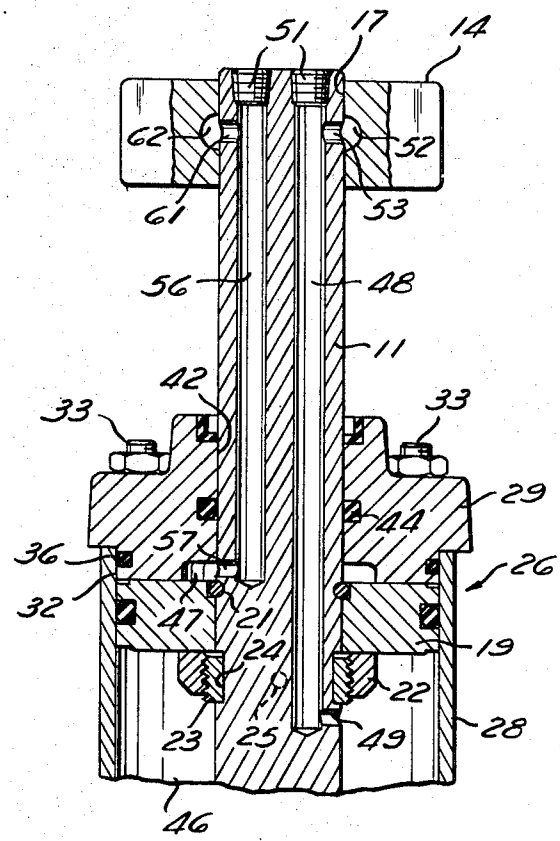


Fig. 3

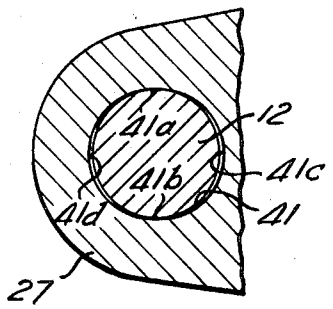


Fig. 4

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PRESS UNIT

BACKGROUND OF INVENTION

This invention relates generally to fluid operated presses and more particularly to a novel and improved double-acting fluid operated press which is constructed and arranged to minimize costs and to improve reliability of operation.

PRIOR ART

The Farmwald U.S. Pat. No. 2,816,608 discloses a press unit for cutting, punching tools, and the like. This unit is simple in structure and low in cost. However, the unit is susceptible to wear after repeated cycling. Such wear tends to prevent the use of this unit with close-fitting tools or the like.

SUMMARY OF INVENTION

A tool press in accordance with the present invention is constructed and arranged so that it can be manufactured a low cost without sacrificing durability. The illustrated press is manufactured primarily by simple boring and drilling operations so the manufacturing costs are minimized.

The illustrated tool press unit includes a pair of parallel supports which are anchored at one end in a base and at the other end in a tie member. Therefore, the two supports are connected at both ends for rigidity and alignment.

Mounted on one of the supports is a piston which cooperates with a cylinder assembly to provide a double-acting fluid actuator in which the cylinder assembly is reciprocable toward and away from the base. The guiding support of the cylinder assembly is provided by seal and bearing portions located at opposite end of the cylinder. This substantial spacing between the two guiding or bearing portions provides a structure wherein proper positioning of the cylinder assembly is maintained and excessive loads are not encountered. Orientation of the cylinder assembly is provided by the second cylindrical support without providing lateral support.

The main cylindrical support element is provided with axial passages which connect to the cylinder chambers at one end and which connect to associated passages at the tie member at their other end. Therefore, the unit can be easily connected to a valved source of pressure.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation partially in longitudinal section illustrating the general structural arrangement of a press unit incorporating this invention;

FIG. 2 is a plan view of the unit taken along 2–2 of FIG. 1, showing the tie member in section;

FIG. 3 is a fragmentary section taken along 3–3 of FIG. 2; and

FIG. 4 is a fragmentary section taken generally along 4–4 of FIG. 1.

Referring now to the drawings, the press is provided with a base 10 adapted to be secured to any suitable mounting surface. Projecting up from the base 10 are a pair of parallel cylindrical support members 11 and 12. The two support members 11 and 12 are press-fitted into the base 10 and the support member 11 is provided with a setscrew 13 to prevent movement of the support member 11 with respect to the base.

Mounted on the upper ends of the support members 11 and 12 is a tie member 14. The support member 12 is locked in the tie member 14 by a setscrew 16. The locking of the upper end of the support member 11 within the tie member 14 is accomplished by a clamping structure best illustrated in FIG. 2. The forward end of the tie member 14 is slotted to the bore 17 which receives the upper end of the support member 11 and a clamping screw 18 causes the tie member to tightly grip the upper end of the support member 11.

Mounted on the support member 11, which is the main support member of the press, is a piston 19. The piston 19 is axially positioned on the support member 11 by a retaining ring 21 at its upper side and a nut 22 at its lower side. The nut 22 is

threaded onto a split screw 23 which is positioned in an annular recess 24 formed in the support member 11. A pin 25 locks the screw 24 against rotation. The assembly of the piston 19 on the support member 11 is accomplished by sliding the piston over one or the other ends of the support member, positioning the retaining ring on one side and the split screw on the other side of the piston and threading the nut 22 along the split screw 23 until it presses the piston into locking engagement with the retainer ring 21.

A cylinder assembly 26 includes a lower cylinder head element 27, a tubular cylinder portion 28, and an upper cylinder head portion 29. The The two head portions 27 and 29 are provided with axially extending flanges 31 and 32 respectively which extend into the opposite ends of the tubular member 28. Tie bolts 33 are provided to clamp the cylinder heads onto the cylinder portion. O-ring seals 34 and 36 provide a fluidtight joint between the cylinder heads and the tubular member 28.

The cylinder head 27 is provided with a first bore 39 which closely fits the support member 11 to provide a bearing engagement therebetween. A second bore 41 is formed in the cylinder head 27 to receive the second support member 12. In this instance the bore 41 is formed to closely fit the support member 12 only at its sides at 41*a* and 41*b* and to provide a clearance of about .005 inch at the front 41*c* and back 41*d* mating portions. This clearance prevents binding in the event that slight deflection occurs in the support 11 during the operation of the press and the only guiding function of the second support member 12 with respect to the cylinder assembly 26 is to orient the cylinder assembly and keep it from turning about the axis of the first support member 11. Of course, the second support member 12 does provide additional strength and stiffness to assist in maintaining the first support member 11 in the proper position.

The upper cylinder head 29 is formed with a bore 42 which closely fits the first support member 11 and cooperates with the bore 39 to provide a second bearing for guiding and locating the cylinder assembly 26. The two spaced bearing surfaces provided by the two bores 39 and 42 provide accurate positioning of the cylinder assembly with respect to the support rod 11.

Seals 43 and 44 are provided in the cylinder heads 27 and 29 respectively to provide a fluidtight joint between each respective cylinder head and the support member 11. The cylinder assembly 26, therefore, cooperates with the support member 11 and the piston 19 to define first and second expansible chambers 46 and 47. When fluid under pressure is admitted to the first expansible chamber 46 while the second chamber is connected to exhaust, the cylinder assembly is urged in a downward direction to the position illustrated. Conversely when fluid under pressure is admitted to the second expansible chamber 47 while the first chamber 46 is connected to exhaust, the cylinder assembly moves upwardly along the two support members 11 and 12.

Passage means are provided in the support member 11 and the tie member 14 to connect to each of the expansible chambers 46 and 47. The passage means within the support member 11 includes an axial passage 48 which extends past the piston 19 and is open to the first chamber 46 through a lateral passage 49 immediately below the split screw 23. The upper end of the passage 48 is closed by a plug 51 and is open to a passage 52 in the tie member 14 by a lateral opening 53. The passage 52 opens at its rearward end to a threaded opening 54 which is adapted to receive a conventional fitting. The communication with the upper expansible chamber 47 is provided by an axial passage 56 in the support member 11 which is open to the chamber 47 by a lateral bore 57 immediately above the piston 19. Here again the upper end of the passage 56 is closed by a plug 51 and a lateral passage 61 provides communication with a passage 62 and a threaded fitting opening 63 in the tie member 14. The ports 54 and 63 are adapted to be connected to a source of pressure such as a pump P through a control valve V. When the fluid is air an open ex-

haust may be provided but when hydraulic fluid is used, a reservoir return system is provided as illustrated.

A capscrew 66 is threaded into the base 10 and is provided with a setscrew 67. This capscrew adjustably limits the lower extent of movement of the cylinder assembly 26. Any suitable tools such as the punching tool 68 and die 69 can be mounted on the opposed tool supporting portions 71 and 72 of the cylinder head 27 and base 10 respectively.

In operation when a cutting or punching operation is required, the valve is operated to supply fluid under pressure to the lower expansible chamber 46. This produces a force urging the cylinder assembly in a downward direction to the position illustrated in FIG. 1. Since the reaction force is transmitted by the piston 19 to the support member 11, the setscrew 13 and press fit is provided to resist upward movement of the support member 11 with respect to the base. After the downward stroke is completed, the valve is reversed to pressurize the upper expansible chamber 47. This causes the cylinder assembly to move upwardly until the end face 73 on the flange 31 engages the lower side of the piston 19. Preferably the cylinder head 27 is recessed at 74 so that contact is not provided between the cylinder head and either the nut 22 or the screw 23. Further this structure ensures that the cylinder head does not close off the lateral port 49 when the cylinder is at its upper extreme of movement.

In order to minimize the cost of the device and to make the device a light as possible, the base 10, tie member 14, and the two cylinder heads 26 and 29 are preferably formed of aluminum castings. The support members 11 and 12 are preferably formed of steel. Since the support members are connected at both ends, the support 12 adds stiffness to the support 11 and improved accuracy of operation of the device is insured. Further the substantial spacing between the two guiding portions on the support member 11 provided in the two cylinder heads 27 and 29 provide substantial support to resist any bending of eccentric loads applied between the base and cylinder assembly by the tools. Further the cylinder heads are relatively thick so tat a substantial length of bearing is provided in each of them. This minimizes the pressure of bearing contact and consequently minimizes wear even when the cylinder heads are formed of aluminum or the like. Further the use of the elongated opening 41 prevents the binding of the mechanism when slight deflections do occur.

Because the parts may be manufactured by simple boring and lathe operations, the cost of the entire unit is low and it can economically used in special setups which are not in continuous use.

It should be understood that although a preferred embodiment of this invention is illustrated, various modifications and rearrangements may be resorted to without departing from the scope of the invention disclosed.

I claim:

1. A press comprising a base, a pair of parallel cylindrical supports anchored at one end in said base and extending in one direction therefrom, a tie element, the other ends of said supports being anchored in said tie element, a piston mounted on one of said supports between said base and tie element, a cylinder assembly reciprocably mounted on said supports, said cylinder assembly providing a cylindrical portion peripherally engaging said piston and a seal and guide portion engaging said one support on each side of said piston, said piston and cylinder assembly cooperating to define a first expansible chamber on one side of said piston and a second expansible chamber on the other side of said piston, said one support being provided with first and second axial passages open to said first and second chambers respectively, said passages being adapted to be selectively connected to a valved source of fluid under pressure, said base and cylinder assembly being formed with opposed tool mounting portions on the side of said one support opposite the other of said supports, said tie element being formed with a connecting passage in fluid communication with each of said axial passages.

2. A press as set forth in claim 1 wherein said tie element is formed with a bore enclosing the end of said one support, said connecting passages and axial passages connecting through the interface between said one end of said support and said bore, and clamp means are provided to tightly clamp said interface.

3. A press comprising a base, a pair of parallel cylindrical supports anchored at one end in said base and extending in one direction therefrom, a tie element, the other ends of said supports being anchored in said tie element a piston mounted on one of said supports between said base and tie element, a cylinder assembly reciprocably mounted on said supports, said cylinder assembly providing a cylindrical portion peripherally engaging said piston and a seal and guide portion engaging said one support on each side of said piston, said piston and cylinder assembly cooperating to define a first expansible chamber on one side of said piston and a second expansible chamber on the other side of said piston, said one support being provided with first and second axial passages open to said first and second chambers respectively, said passages being adapted to be selectively connected to a valved source of fluid under pressure, said base and cylinder assembly being formed with opposed tool mounting portions on the side of said one support opposite the other of said supports, said cylinder assembly being provided with a guide passage encircling said other support.

4. A press comprising a base, a pair of parallel cylindrical supports anchored at one end in said base and extending in one direction therefrom, a tie element, the other ends of said supports being anchored in said tie element, a piston mounted on one of said supports between said base and tie element, a cylinder assembly reciprocably mounted on said supports, said cylinder assembly providing a cylindrical portion peripherally engaging said piston and a seal and guide portion engaging said one support on each side of said piston, said piston and cylinder assembly cooperating to define a first expansible chamber on one side of said piston and a second expansible chamber on the other side of said piston, said one support being provided with first and second axial passages open to said first and second chambers respectively, said passages being adapted to be selectively connected to a valved source of fluid under pressure, said base and cylinder assembly being formed with opposed tool mounting portions on the side of said one support opposite the other of said supports, a first lock ring being positioned on one side of said piston, and clamping lock means are provided on the other side of said piston, said clamping lock means operating to press said piston towards said first lock ring to secure said piston in a predetermined position relative to said one support.

5. A press as set forth in claim 4 wherein said clamping lock means includes a split screw positioned in a groove in said one support, and a nut threaded onto said split screw engaging one side of said piston.

6. A press as set forth in claim 5 wherein a lock pin is provided to prevent rotation of said split screw.

PO-1050
(5/69)

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,568,559 Dated March 9, 1971

Inventor(s) Frank J. Fink

It is certified that error appears in the above-identified paten and that said Letters Patent are hereby corrected as shown below:

Column 1, line 19, before "a" insert -- at -- .

Column 1, line 32, change "end" to -- ends -- .

Column 3, line 38, change "tat" to -- that -- .

Claim 3, line 34, change the period, at the end of tl claim, to a comma (,) and add as the remainder of th claim:

-- said guide passage closely fitting said other sup only along lateral zones substantially parallel t plane containing the axes of said supports, said guide passage providing clearance with said other support along the remainder of the interface therebetween -- .

Signed and sealed this 6th day of July 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER
Commissioner of Pat