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2,379,949

HYDRAULIC DEVICE

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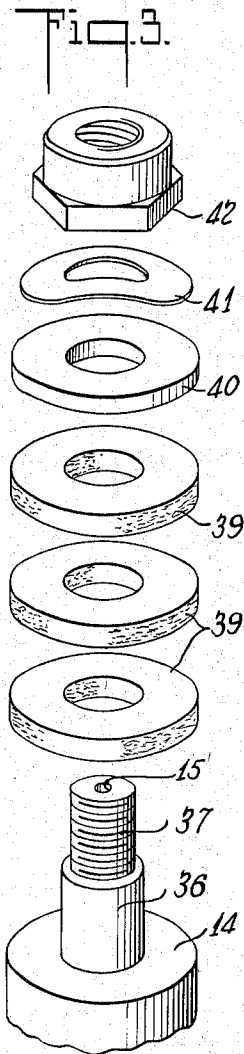
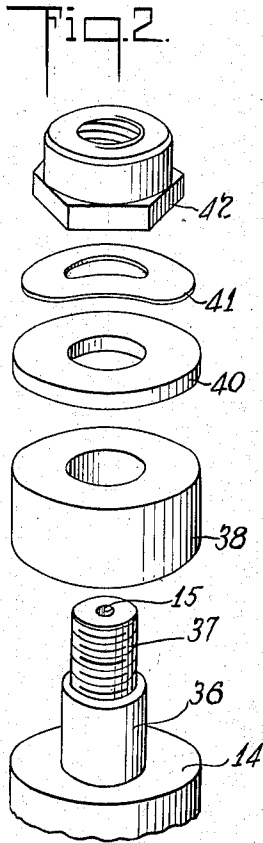
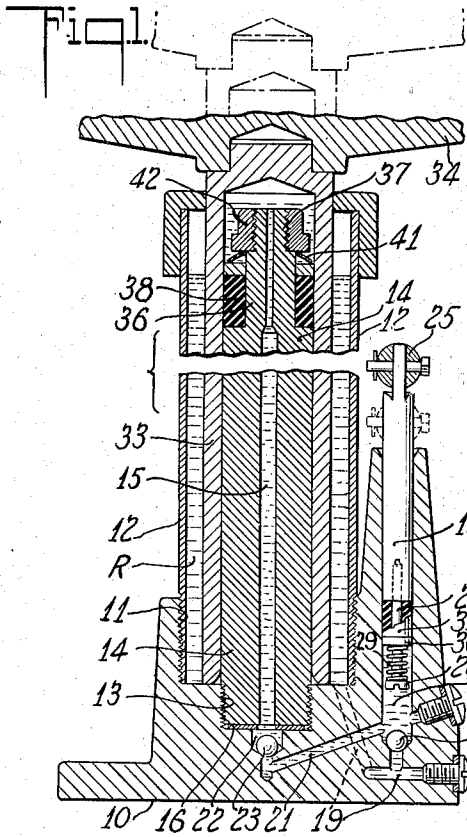


Fig. 5.

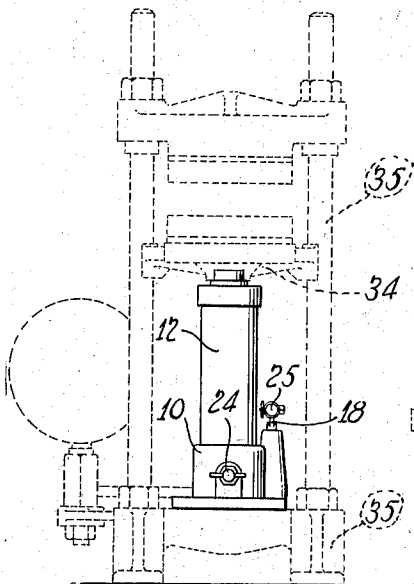
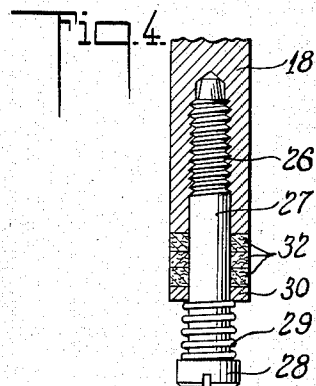
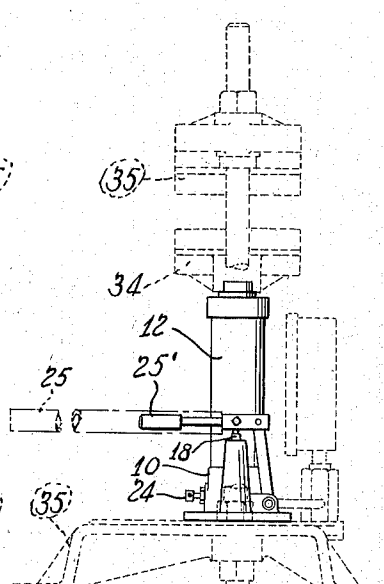


Fig. 6.



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HYDRAULIC DEVICE

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7 Claims. (Cl. 309—4)

The present invention relates to hydraulic devices, and is more particularly directed toward providing improved means for packing such devices to insure the maximum holding power for retaining the fluid under pressure as well as minimizing leakage when pressure is released.

The present invention contemplates arrangements whereby the packing is at all times held under low initial pressure so that the seal between the parts is maintained even though the fluid pressure is released. This minimizes leakage while the pressure is off and avoids it when the pressure is being built up. At the same time it provides a solid packing which is always held tight by pressure always slightly in excess of the hydraulic pressure, eliminating adjustments and excessive leakage, and reducing friction and wear.

The invention is particularly suitable for jacks, pumps, or the like, working to pressure of several thousand pounds per square inch. Apparatus for such purposes has heretofore typically employed cup-shaped or U-shaped leather or other washers carried by the piston and held against the cylinder walls only by the pressure of the fluid in the chamber of the device.

Other and further objects will hereinafter appear as the description proceeds.

The accompanying drawing shows, for purposes of illustrating the present invention, two of the many embodiments in which the invention may take form, together with modified forms of packing material, it being understood that the drawing is illustrative of the invention rather than limiting the same.

In the drawing:

Figure 1 is a vertical section view through the jack and pump of a hydraulic press;

Figures 2 and 3 are enlarged views, showing packing for the larger or lifting piston of the press jack, the parts being separated;

Figure 4 is an enlarged view of the pump piston, illustrating a modified form of packing; and

Figures 5 and 6 are front and side elevational view of the press jack showing it in a press.

The base or body member of the jack is illustrated at 10. It has a large diameter threaded bore 11 at the top to receive a thin walled cylinder casing 12 to form an oil reservoir R, and a concentric threaded bore 13 to receive a fixed piston 14 having a central oil passage 15. The piston is threaded against a gasket 16. To the side of the reservoir cylinder, the body has a vertical drilled hole 17 for a plunger 18. The lower end of the drilling 17 is in communication with the reservoir R by means of drillings 19 and a

ball valve 20 and with the oil passage 15 by means of drillings 21, 22 and ball valve 23. The reservoir and drilling 22 are connected by the usual release valve under the control of a screw indicated at 24.

5 The plunger 18 is operated by an extension 25 on lever 25'. The lower end of the plunger is drilled to a predetermined depth and tapped, as indicated at 26 (Figure 4), and a bolt 27 is threaded all the way into this hole. This bolt has an enlargement or head 28 spaced some distance below the lower end of the plunger. The exposed portion of the bolt receives a coiled spring 29, a metal washer 30 and a packing ring which may be a cylinder 31 of artificial rubber resistant to oil, as shown in Figure 1, or a plurality of leather or other washers 32, as shown in Figure 4.

15 The piston 14 is surrounded by a cylinder 33 which supports the ram 34 of the press 35. The upper end of the piston 14 is turned down, as indicated at 36, and it is threaded at 37. The portion 36 receives a similar artificial rubber ring 38 (or a plurality of leather or other washers 39, Figure 3), a metal washer 40, and a deformed spring washer 41. A nut 42 is threaded down against a shoulder on the piston and flattens the spring.

25 In each case the packing here shown is kept under low initial pressure by the corresponding spring so that the packing is at all times pressed lightly against the cylinder walls. This pressure keeps the joint tight, and when higher pressures are developed in the apparatus, these added pressures increase the lateral packing pressure proportionally. Pressure on the packing is thus always slightly in excess of the hydraulic pressure, but no more, giving ideal conditions for minimum leakage, friction and wear. At the same time the packing is properly set at all times without adjustment.

35 While the invention is here shown in connection with pumps and jacks, it is susceptible of employment in other high pressure hydraulic apparatus.

45 Since it is obvious that the invention may be embodied in other forms and constructions within the scope of the claims, I wish it to be understood that the particular forms shown are but a few of these forms, and various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

What is claimed is:

55 1. Apparatus for holding fluids under a wide range of pressures from substantially little pres-

sure to a very high pressure, comprising a body having a cylindrical bore, a relatively movable member in the cylinder and having a portion of smaller diameter, a normally submerged annular packing ring of rectangular cross section carried by the smaller diameter portion of the member and fitting the cylindrical walls, a pressure distributing washer bearing on the packing ring, a spring bearing on the washer, means for putting the spring under compression so as to compress the packing ring and squeeze it against the cylinder walls at all times so that leakage is avoided, and a fluid admission passage whereby fluid under high pressure is applied on the packing in addition to the spring pressure and the packing ring is further compressed.

2. Apparatus for holding fluids under a wide range of pressures from substantially little pressure to a very high pressure, comprising a body having a cylindrical bore and an inlet passage for admitting fluid under pressure, a relatively movable member in the bore and having a portion of smaller diameter, a normally submerged, annular packing ring of rectangular cross section carried by the smaller diameter portion of the member and fitting the cylindrical walls, a pressure distributing washer bearing on the packing ring, a spring bearing on the washer, and means for putting the spring under compression so as to compress the packing ring and squeeze it against the cylinder walls at all times so that leakage is avoided.

3. In a hydraulic device such as a jack, pump, or the like, a piston having an axial tapped hole of predetermined depth, a stud of predetermined length threaded into the hole and having a head at the outer end spaced a predetermined distance from the end of the piston, a packing ring and a spring on the stud, the ring and spring having a predetermined uncompressed length in excess of the spacing of the head of the stud from the end of the piston, the ring and the spring being held under compression by the head of the stud when threaded all the way into the hole.

4. In a hydraulic device such as a jack, pump, or the like, comprising a cylinder providing a pressure chamber for fluid and a piston fitted in

the chamber, the piston and cylinder being relatively movable in an axial direction, the improvement comprising an element normally submerged in the fluid and carried by the piston and of smaller diameter than the piston thereby providing a shoulder facing toward the chamber, an annular packing ring of rectangular cross section about the smaller diameter element whereby hydraulic pressure forces the packing ring toward the shoulder, a pressure distributing washer bearing on the packing ring, compression spring means carried by the small diameter element beyond the pressure distributing washer, and means to place said spring means under tension to create an initial pressure of the packing ring against the shoulder and maintain this pressure so that the packing ring is squeezed outwardly against the cylinder walls in the absence of substantial hydraulic pressure in the chamber.

5. The improvement claimed in claim 4 wherein the small diameter element is integral with the piston and threaded at its end to receive a nut, and the spring means is a deformed resilient washer between the packing and the nut.

6. The improvement claimed in claim 4 wherein the small diameter element is in the form of a stud threaded into the piston against a stop and having an enlargement at the end against which the spring means bears.

7. In an apparatus for holding fluids under a wide range of pressures from substantially little pressure to a very high pressure, comprising a body having a cylindrical bore, a piston received in the bore the body and piston being relatively movable, the piston having a small diameter end, a packing ring carried by said end and fitting the cylindrical walls, a pressure distributing washer bearing on the packing ring, a spring on said end for exerting pressure against the packing ring, and a nut threaded on said end for putting the spring under compression so as to compress the packing ring and squeeze it against the cylinder walls in the absence of substantial fluid pressure in the bore whereby leakage is prevented at all times.

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