March 20, 1928. 1,662,922

M. J. HELMER

HYDRAULIC JACK

Filed Dec. 21, 1925 2 Sheets-Sheet 1

Fig. 2.

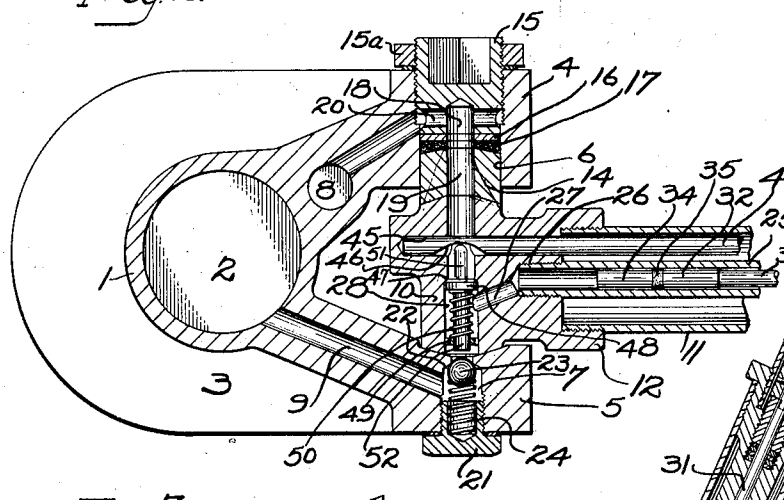


Fig. 7.

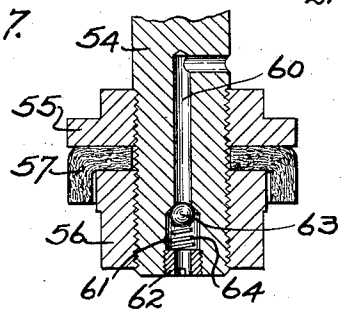
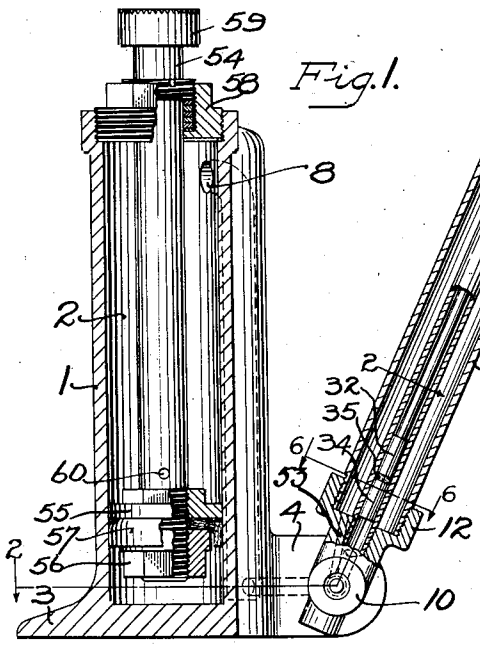


Fig. 1.



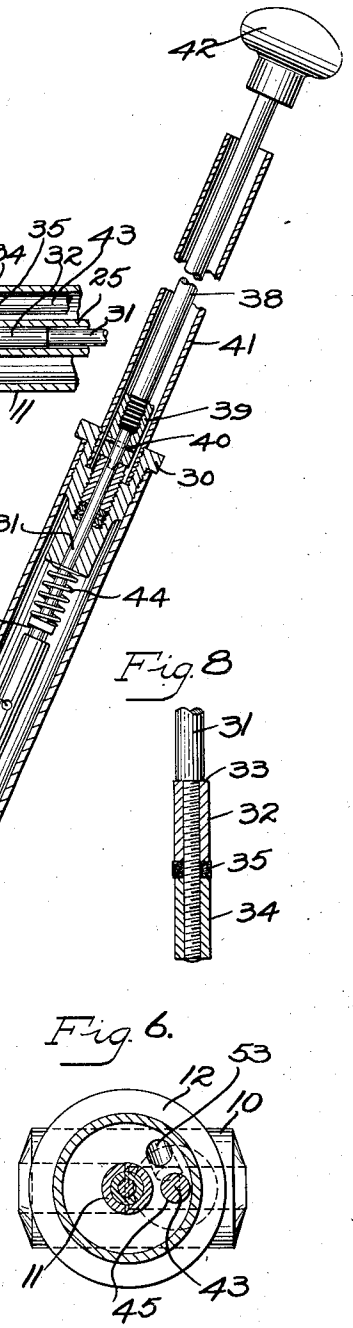


Fig. 8

Fig. 6.

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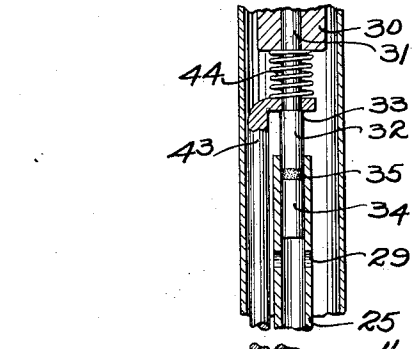


Fig. 5.

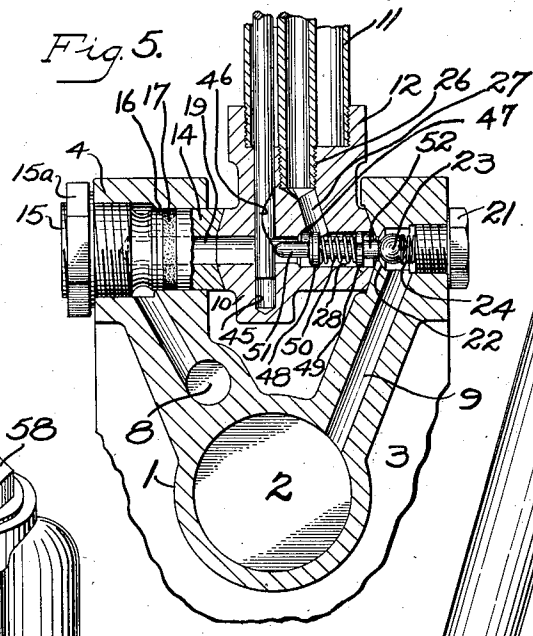


Fig. 3.

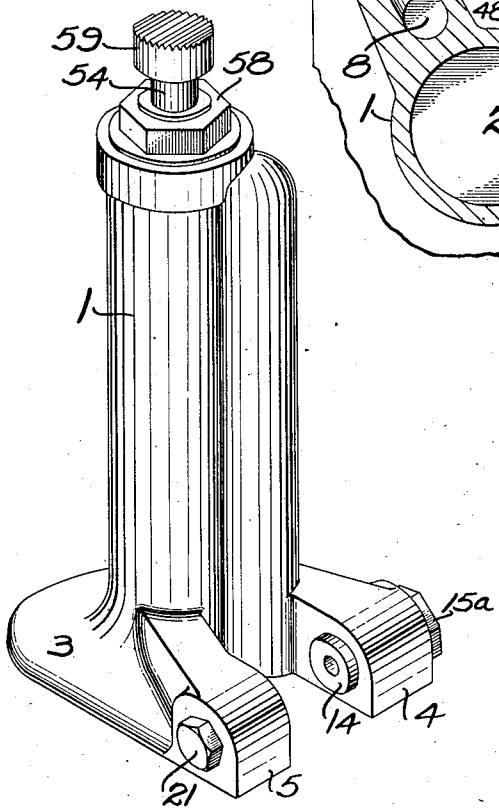
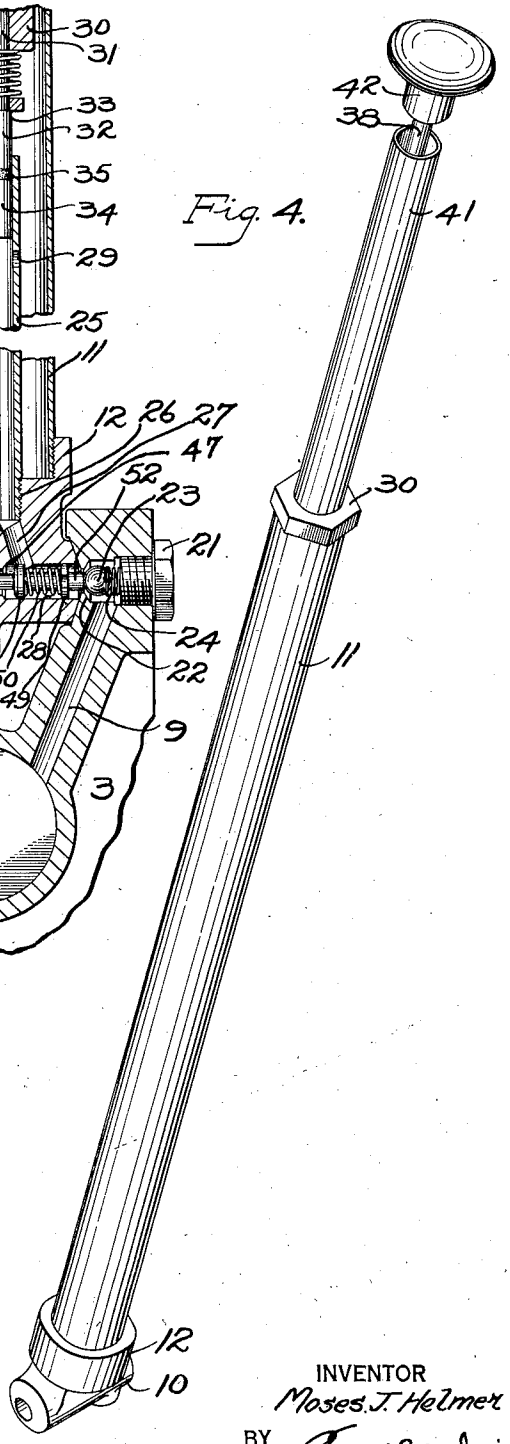


Fig. 4.



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UNITED STATES PATENT OFFICE.

MOSES J. HELMER, OF ST. PAUL, MINNESOTA.

HYDRAULIC JACK.

Application filed December 21, 1925. Serial No. 76,608.

It is an object of this invention to provide a hydraulic jack having a handle pivotally attached to the body portion in such a way that the latter can be placed under the part to be lifted by pushing it ahead of the handle, thus obviating the necessity of stooping or crawling under dirty mechanisms in order to set the jack in position.

Another object of the invention is to provide a hydraulic jack having a socket joint which will remain tight between the body portion and the handle, and to provide operating means at the outer end of the handle for raising and lowering the jack.

A further object of the invention is to provide a hydraulic jack wherein the handle forms a fluid storage in which the fluid is never under pressure, and wherein the fluid passages from both ends of the cylinder to the socket joint are formed within the body portion in which the cylinder is located.

With these and numerous other objects in view which will be mentioned as the specification proceeds, the invention is hereinafter more fully described with the aid of the accompanying drawings and claimed.

Figure 1 illustrates a sectional elevation of the invention.

Figure 2 is a section on the line 2—2 of Figure 1, but showing the full width of the invention.

Figures 3 and 4 are perspective views of the body portion and handle respectively.

Figure 5 is a cross section of the body and portions of the handle showing the releasing mechanism when in operation.

Figure 6 is a section on the line 6—6 of Figure 1, but showing the whole width of the invention.

Figure 7 is a cross section of the plunger, and

Figure 8 is a detail.

Referring now more particularly to the drawings, 1 designates a body portion within which is a cylinder 2. 3 indicates a base at its lower end. Integral with the body 1 are lugs 4 and 5 having holes 6 and 7 therethrough in axial alignment with one another. Within the body portion 1 is a passage 8 leading from the upper end of the cylinder to the hole 6 through the lug 4; and a second passage 9 connects the lower end of the cylinder with the hole 7 through the lug 5.

10 indicates a substantially T-shaped coupling member or other connecting means pivotally mounted between the inner surfaces of the lugs 4 and 5, and having a tubular handle 11 secured to its branch 12. The opposite ends of the member are usually bevelled or convex; one of them bears against the inner surface of the lug 5, and the other against a sleeve 14 mounted in the hole 6 of the lug 4. There must be good bearing surfaces at these joints to insure their remaining tight and at the same time permitting pivotal movement of the T-shaped coupling member. The outer end of the hole 6 is threaded to receive a screw 15 by which the sleeve 14 is held against one end of the member 10, and 16 and 17 indicate a steel and a felt washer respectively which I prefer to insert between the screw 15 and the sleeve 14. 15ª is a lock nut to prevent accidental movement of the screw 15. The inner end of the screw is provided with a substantially concentric hole 18 which registers with the bore 19 of the sleeve, and 20 indicates a radial opening through the screw 15 connecting the hole 18 with the passage 8.

The hole 7 is threaded at its outer end for the screw 21, and between the point where the passage 9 enters the hole 7 and the inner end of the hole is a shoulder 22 inwardly beyond which the diameter of the hole is reduced. A ball valve 23 is normally held against the seat formed by the shoulder 22 by a helical spring 24, the opposite end of which latter seats within the screw 21.

In the tubular handle 11 is a pump casing 25 open at both ends, and having its inner end in threaded engagement with an opening 26 in the T-shaped coupling member. From the bottom of the opening 26 a passage 27 communicates with the transverse passage 28. Towards the outer end of the pump casing a bleeder hole 29 is provided. The upper end of the handle 11 is threaded internally to receive a gland 30 which acts as a bearing for the pump rod 31, the lower end of which is provided with a plunger usually consisting of an upper sleeve 32 tightened against the shoulder 33, a lower sleeve 34, and a leather washer 35 between the sleeves. The upper end of the pump rod is connected to an extension rod 38 by a coupling 39 into which the rod 38 is threaded. 40 indicates a pin for holding the rod 31 in the coupling. This coupling provides a positive stop for the pump rod towards the bottom of its stroke. The extension rod 38 terminates in a knob 42, and in larger jacks I utilize an ex-

tension grip 41 in threaded engagement with the upper end of the gland.

The release rod 43 is offset at its upper end substantially at right angles to its length, and is provided with a hole through which the pump rod 31 passes. Around the pump rod a helical spring 44 is arranged which extends from the underside of the gland 30 to the offset portion of the release rod to tend to force the latter downwards. The lower end of the rod 43 is slidably arranged in an opening 45 in the T-shaped member 10, this opening is of smaller diameter than the transverse passage 28 on both sides of which it extends. Towards the lower end of the release rod the latter is formed in a more or less concave shape at 46. In the transverse passage 28 is a shoulder 47 which forms a seat for the valve 48, the stem 52 of which is supported by a guide 49 fixed to the wall of the passage 28. A coil spring 50 tends to hold the valve 48 against its seat, and integral with the valve is a projection 51 which normally terminates in the concavity 46 of the release rod. 53 is a passage between the inside of the tubular handle 11 and the transverse passage 28.

In the cylinder 2 is a piston rod 54 having a head at its lower end which generally consists of two annular members 55 and 56 between which the leather 57 is arranged. The upper end of the piston rod extends through a gland 58 and terminates in a lifting member 59. In larger jacks, primarily to facilitate the removal of the piston head from the cylinder, I provide a bypass from the upper to the lower side of the lead consisting of a passage 60 through the piston rod. This passage is enlarged at 61 and has a screw thread at its lower end for the hollow screw 62. A ball valve 63 is normally held against the seat formed at the junction of the passage 60 with the enlarged portion 61 by a spring 64.

Referring now to the operation of the jack; the cylinder is first filled with fluid both above and below the piston head, as also are the passages 8 and 9 and the tubular handle 11.

To force the lifting member upwards the pump rod 31 is first pulled outwards in the pump casing care being taken that the lower end of the bottom sleeve 34 of the plunger is not raised above the bleeder hole 29 or the upper end of the top sleeve 32 brought into contact with the offset portion of the release rod 43. On this, the upstroke, fluid is drawn through the passage 8, radial opening 20, hole 18, bore 19, past the valve 48, since the suction caused by the upward movement of the plunger overcomes the tension of the spring 50, and into the transverse passage 28; or from the tubular casing 11 through the passage 53 into the said transverse passage, and thus into the lower end of the pump casing. On the downstroke the fluid is discharged from the pump casing through the transverse passage 28 past the ball valve 23, into the hole 7 and passage 9 and thus to the cylinder 2 on the underside of the piston head.

To release the fluid from the underside of the piston head the pump rod 31 is drawn outwards until the upper end of the sleeve 32 lifts the offset portion of the release rod 43 thereby raising the lower end of the release rod. When this occurs the valve 48 is forced off its seat by contact first of the side of the concavity 46, and later the lower end of the rod 43, with the projection 51 integral with the valve. This movement of the valve 48 brings the end of the stem 52 in contact with the ball valve 23 and forces the latter off its seat. The fluid then flows back from the underside of the piston head through the passage 9 and either enters the tubular handle 11, or passes through the passage 8 into the upper end of the cylinder. The fluid also flows upwards in the pump casing 25 and escapes into the tubular handle through the bleeder hole 29.

It will be observed that the construction of the socket joint is such that only the joint between the T-shaped member 10 and the lug 5 is under pressure, and this joint is so constructed as to remain tight for a prolonged period once the screw 15 has been correctly adjusted.

Again the tubular handle 11 functions as a reservoir within which the fluid is never under pressure. The only places where pressure is carried are on the underside of the piston and back as far as the ball valve 23, or, during the downstroke of the pump rod, in the pump casing under the plunger and back to the valve 48. The possibility therefore of leakage round the lug 4 or between the sleeve 14 and the T-shaped member is negligible.

While in the foregoing the preferred embodiment of the invention has been described and shown, it is understood that the construction herein specified is susceptible to such modifications as fall within the scope of the appended claims.

What I claim as my invention and desire to secure by Letters Patent is:

1. A jack of the class described comprising a cylinder, a piston therein, a lifting rod connected with the piston and passing through the top of the cylinder, a pump swiveled to the lower part of the cylinder and means for permitting liquid to pass from the pump when the same is actuated into the lower part of the cylinder to raise the piston therein and to permit liquid in the cylinder above the piston to return to the pump, valve means for normally preventing the liquid in the lower part of the cylinder from returning to the pump, a sliding mem-

ber in the pump for moving such means to inoperative position and means for actuating the sliding member when the pump plunger is moved to its highest position.

2. A jack of the class described comprising a cylinder having a base formed therewith, with a pair of oppositely arranged extensions on the base, passages in the extensions and base, and a passage connecting the top of the cylinder with a passage in one of the extensions, a pump having its base swiveled between the extensions, said base having a passage in communication with the passages in the extensions, a valve in the passage in one of the extensions, a valve in the passage of the base of the pump having its stem arranged to engage the first valve when the stem is moved a certain distance, a pump cylinder connected with the pump base, a plunger tube therein having its lower end in communication with the passage in the base, a sliding member in the base for forcing the stem against the first valve to force the same off its seat, a plunger in the tube, a plunger rod passing through the pump cylinder, a handle on the outer end of the rod, the tube having holes therein communicating with the pump cylinder and means whereby the cylinder, when moved to its highest position, will operate the sliding member to cause it to move the valve off its seat.

3. A jack of the class described comprising a cylinder having a base formed therewith, with a pair of oppositely arranged extensions on the base, passages in the extensions and base and a passage connecting the top of the cylinder with the passage in one of the extensions, a pump having its base swiveled between the extensions, said pump base having a passage in communication with the passages in the extensions, valves for controlling the passages, a pump cylinder connected with the pump base, a plunger in the pump for forcing liquid in the cylinder through some of the passages into the jack cylinder, a member carried by the pump plunger and operated by an upward movement of the plunger for moving said valves off their seats to permit the liquid in the jack cylinder to return to the pump cylinder and a spring for normally preventing action of said member.

4. A jack of the class described comprising a cylinder, a piston therein, a lifting rod connected with the piston and passing through the top of the cylinder, a pair of extensions formed on the base of the cylinder, said extensions being spaced apart and the inner end of one extension having an inner concaved face and the other extension having a threaded bore, a threaded plug fitting in the bore and having an inner concaved face, a pump base fitting between the extensions and having convex lateral faces conjugating with the faces on the extension and plug whereby the plug is swivelly connected to the extensions, a pump connected with the base and the parts including the extensions having passages therein for permitting liquid to pass from the pump into the cylinder and from the cylinder back into the pump and valve means for controlling the flow of liquid.

MOSES J. HELMER.