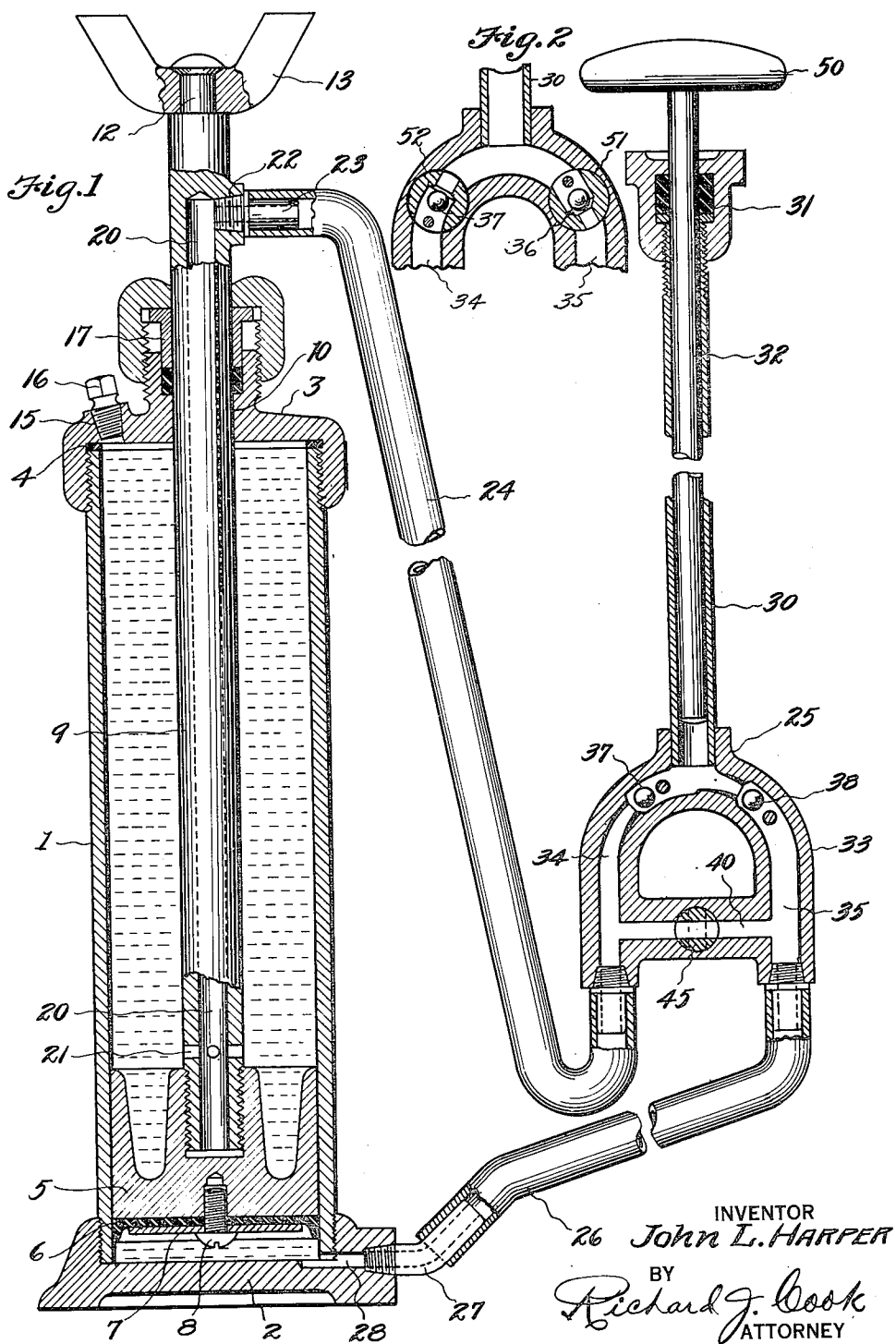


J. L. HARPER.
HYDROSTATIC JACK.
APPLICATION FILED MAR. 1, 1920.

1,409,441.

Patented Mar. 14, 1922.



UNITED STATES PATENT OFFICE.

JOHN L. HARPER, OF SEATTLE, WASHINGTON.

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Specification of Letters Patent. Patented Mar. 14, 1922.

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To all whom it may concern:

Be it known that I, JOHN L. HARPER, a citizen of the United States, and resident of the city of Seattle, county of King, and State of Washington, have invented certain new and useful Improvements in Hydrostatic Jacks, of which the following is a specification.

This invention relates to jacks, or similar power devices, and more particularly to a hydrostatic jack wherein a plunger moves with great force under the influence of a liquid medium, that is forced into the cylinder wherein the plunger moves, by means of a pump of relatively small diameter, to which the power is applied.

The principal object of the invention is to provide a hydrostatic jack of the above character, comprising improved details of construction whereby the fluid medium is forced, in raising the jack, from the upper to the lower side of its plunger and in lowering the jack is permitted to flow, by weight applied to the plunger or otherwise mechanically arranged, in the opposite direction.

It is a further object of the invention to provide in connection with the jack, a pump of novel character, equipped with a by-pass and check valves which will act accordingly, as is required for operation of the device.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Figure 1 shows a jack and pump in longitudinal section, with the conduits leading from the cylinder of the jack, from upper and lower sides of the plunger to the pump.

Figure 2 is a detail, sectional view of an alternate valve construction in the pump.

Referring in detail to the drawings: 1 designates a cylinder wherein a liquid medium such as oil, water or glycerine, may be contained; the cylinder being threaded at its lower end into a base or shoe, 2, and at its upper end is closed by means of a cap 3, which is also threaded thereon and equipped with a gasket 4, to effect a non-leaking connection.

Mounted slidably within the cylinder, is a plunger or piston, 5, having the usual packing washer 6 fixed to its lower end by means of an overlying plate 7, and a screw 8 that threads through the plate and into the base

of the plunger, and has a plunger rod 9 attached thereto by a threaded connection, which extends upwardly through a central opening 10 in the cap and at its upper end is equipped with a shank 12 whereon a shoe 13 is adapted to pivot.

The cap 3 is provided with an opening 15, normally closed by a plug 16, through which liquid may be removed or poured within the cylinder, and is provided about the opening 10 with a stuffing box of the usual type, indicated at 17, which will prevent leakage about the rod 9.

The rod 9 is provided with a longitudinal channel 20, which communicates through a plurality of openings 21 near the lower end of the rod, with the interior of the cylinder 1 just above the plunger, and at its upper end has a laterally directed opening 22, wherein a stem 23 is threaded. A flexible conduit 24, such as a rubber hose, leads from this stem to a pump 25, presently described, and a similar conduit 26 leads from the pump to a stem 27 that is threaded into a laterally opening channel 28 in the base 2, which communicates with the interior of the cylinder below the plunger.

The pump 25 consists of cylinder 30, equipped at its outer end with a packing box 31 through which a pump rod 32, that fits closely and is slidable within the cylinder, is extended, and at its inner end the cylinder is open and is threaded into a head 33. The head has two outlets, 34 and 35, which communicate, respectively, with the conduits, 24 and 26.

Ball check valves 37 and 38 are placed in the channels 34 and 35, respectively, operable to prevent flow outward through the channel 34, or inward through the channel 35, but which will permit the passing of the liquid in the opposite directions in these channels.

A by-pass 40 connects the two channels, 34 and 35, between the check valves and the outlets of the channels which the valves control, and this by-pass is provided with a valve 45 which may be turned so as to prevent or permit flow therethrough.

The pump rod 32 is provided at its outer end with a handle 50 whereby the same may be actuated.

In Figure 2 I have shown an alternate valve construction which provides for the pressure medium being pumped in the op-

posite direction, to force the piston downward. This is accomplished by mounting the ball check valves, 37 and 38, in cocks 51 and 52, which may be revolved to reverse the operation of the valves, as shown in Figure 1; and thus on operation of the pump would cause the fluid to be forced in the reverse direction.

Assuming the parts of the device are so constructed and assembled, and the cylinder filled with a liquid pressure medium, in using the jack, the plunger is lowered within the cylinder to the position in which it is here shown, and the jack placed on a substantial foundation, and the rod and shoe 13 in position to act against the object to be lifted.

With the valve 45 in position to close the channel 40, the pump rod 32 is actuated to draw the liquid from the cylinder 1, above the plunger through the rod ports 21, the channel 20, conduit 24, pump channel 34, past the ball check 37, and to force it through the channel 38, conduit 26 and channel 28, into the cylinder below the plunger.

Since the effective diameter of the pump rod 32 may be made very small, as compared to the diameter of the plunger 5, it is apparent that little pressure applied on the pump will exert a relatively great pressure on the plunger and great lifting force may be exerted through the rod 9.

If it is desired to lower an object supported by the jack, the valve 45 is turned to permit flow through the channel 40 and under pressure applied to the plunger through the rod 9, the liquid will be dispelled from the lower end of the cylinder through the conduit 26, channel 40, and conduit 24, and into the upper end of the cylinder through the rod channel 20.

It is apparent that jacks of this character may be used in various places and for all purposes where jacks or such power devices

are required, and may be made in sizes according to their needs or requirements.

What I claim as my invention, is:

1. The combination with a pressure medium pump having valved inlet and outlet channels and means for controlling and reversing the direction of flow through said channels, of a jack comprising a closed cylinder having a base opening therein, a piston operable within the cylinder, a lifting rod fixed to the piston and extending from the cylinder, at its upper end, said rod having a channel longitudinally therethrough opening to the interior of the cylinder adjacent the piston and from the rod exteriorly of the cylinder, and conduits connecting said base opening and said rod channel at its outer end with the channels of the pump, for the purpose set forth.

2. The combination with a pressure medium pump having valved inlet and outlet channels and means for controlling and reversing the direction of flow through said channels, of a jack comprising a closed cylinder having a base opening therein, a piston operable within the jack cylinder, a lifting rod extending upwardly from the piston to the exterior of the cylinder, having a channel longitudinally therein opening interiorly of the cylinder adjacent the upper side of the piston and to the exterior of the cylinder adjacent the outer end of the rod, a shoe mounted on the outer end of said lifting rod, and flexible conduits extending from the inlet and outlet channels of the pump respectively to the exterior opening of the rod channel and the base opening of said pump cylinder, whereby operation of the pump will effect the transferring of a fluid pressure medium from one side of the piston to the other, for the purpose set forth.

Signed at Seattle, Washington, this 15th day of February, 1920.

JOHN L. HARPER.