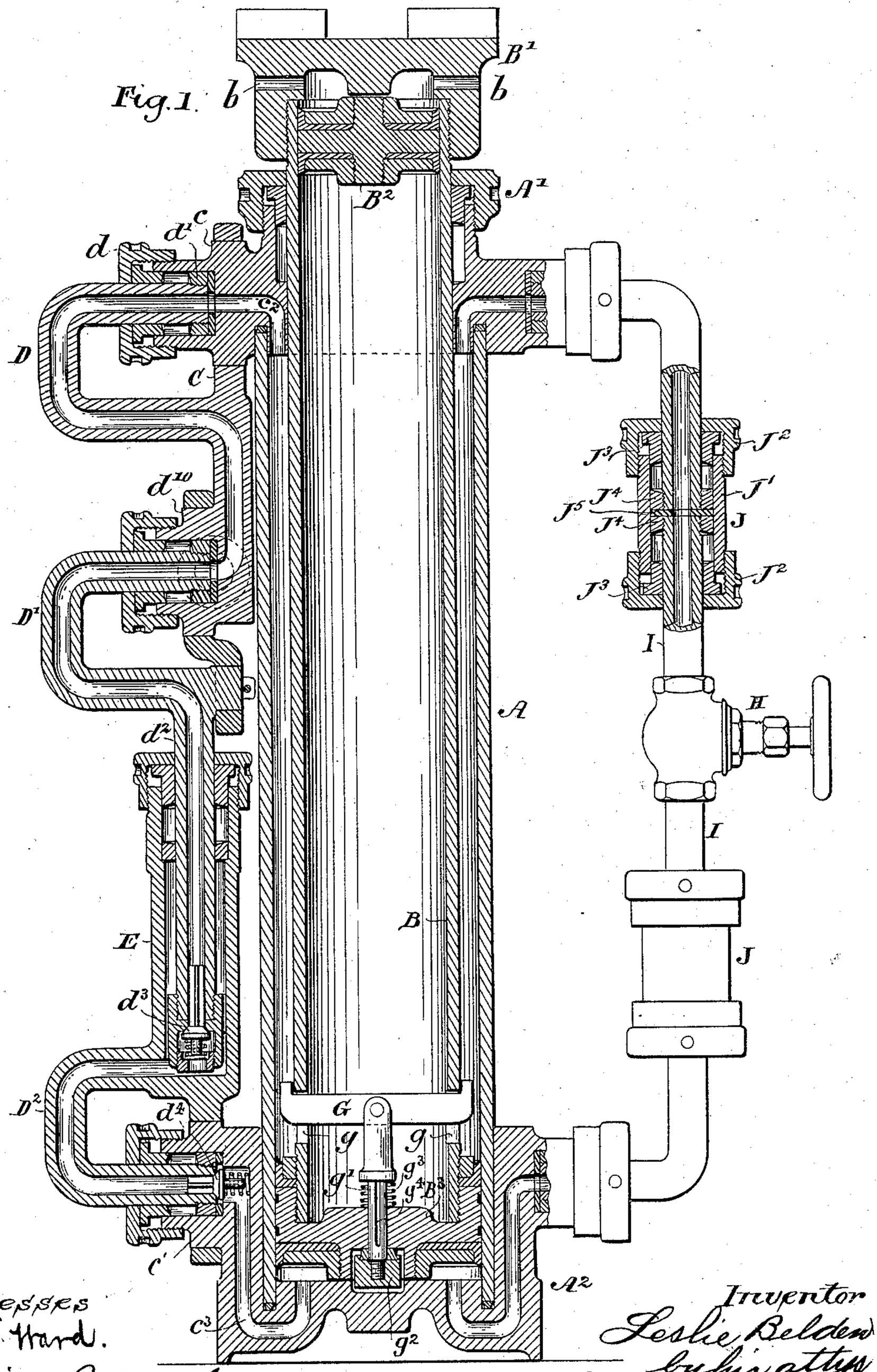
(No Model.) 2 Sheets—Sheet 1.

L. BELDEN.

HYDRAULIC JACK.

No. 371,919. Patented Oct. 25, 1887.

Fig. 1.



Witnesses
Chas. J. Hardt.
Maurice J Roach

Inventor
Leslie Belden
by his attys
Gifford & Brown.

(No Model.) 2 Sheets—Sheet 2.

L. BELDEN.

HYDRAULIC JACK.

No. 371,919. Patented Oct. 25, 1887.

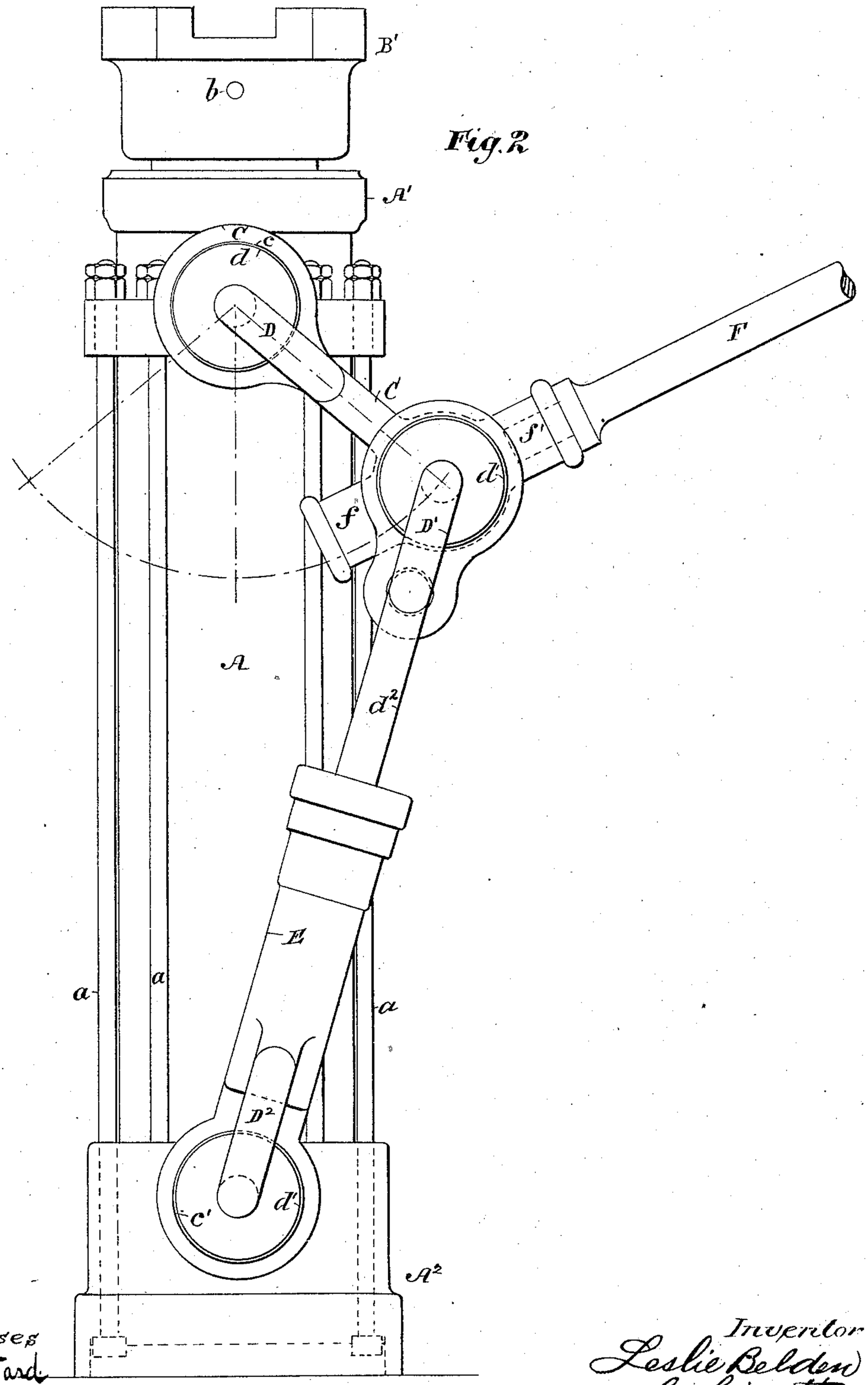


Fig. 2

Witnesses
Chas. T. Ward
Maurice J. Roach

Inventor
Leslie Belden
by his attys
Gifford & Brown

UNITED STATES PATENT OFFICE.

LESLIE BELDEN, OF NEW YORK, N. Y.

HYDRAULIC JACK.

SPECIFICATION forming part of Letters Patent No. 371,919, dated October 25, 1887.

Application filed January 13, 1887. Serial No. 224,287. (No model.)

To all whom it may concern:

Be it known that I, LESLIE BELDEN, of New York, in the county and State of New York, have invented a certain new and useful Improvement in Hydraulic Jacks, of which the following is a specification.

I will describe in detail a hydraulic jack embodying my improvement, and then point out the novel features in claims.

In the accompanying drawings, Figure 1 is a longitudinal section of a jack embodying my improvement. Fig. 2 is a side view thereof.

Similar letters of reference designate corresponding parts in both figures.

A designates a cylindrical metal shell, secured near its ends to cylindrical metallic heads A′ A². These heads are secured firmly on the shell A by bolts *a*, extending between them outside said shell.

B designates a piston within the shell A. It is of less diameter than the shell, so that an annular space is formed between it and the shell when it is within the shell. The piston has a movement longitudinally of the shell imparted to it. It is also hollow, and its interior is filled with liquid. Upon one end of the piston is a block, B′, adapted to be placed against the object to be lifted or moved. This block is hollow, and, as shown, is internally screw-threaded to facilitate its attachment to the piston. Its interior communicates with the interior of the piston. Passages *b* extend from its interior to the external atmosphere. Within the piston is a suitably-packed disk, B², fitting snugly. When a partial vacuum is created in the hollow piston, as hereinafter to be described, atmospheric pressure holds the disk B² against the liquid within the piston, thus offering a resistance to the liquid. The cylinder A and the piston B constitute a reservoir for the liquid. The piston is propelled in one direction by hydraulic pressure exerted against a piston-head, B³, secured to the piston near one end, and suitably packed to prevent water passing around its circumference.

In the position shown in Fig. 1 the piston occupies its farthest position within the shell A, and the piston and the annular space between it and the shell are filled with liquid. When it is desired to move the piston outwardly, liquid is withdrawn from the piston and shell and forced in behind the piston-head B³. This is effected by means of a pump located outside the shell A and secured thereto.

Upon one side of the heads A′ A² are projecting portions *c c′*. The portion *c* has extending through it an inlet-passage, *c*², communicating with the annular space between the shell A and the piston B. The portion *c′* has extending through it an outlet-passage, *c*³, communicating with the space behind the piston-head B³.

Mounted upon the projecting portion *c* is one lever, C, of a toggle by which the pump is operated. A portion of the lever C surrounds loosely the projecting portion *c* of the head A′ in such manner that the lever may swing upon said portion *c*. This lever comprises a pipe, D, formed in such manner that one of its ends will, when in place, extend into a recess within said portion *c*, and the passage within the pipe will communicate with the passage *c*². This end of the pipe D extends through a stuffing-box, *d*, secured to the portion *c* of the head A′, and is provided within the recess with a packing-ring, *d′*, which tends to keep the passage within the pipe in alignment with the passage *c*². The other end of the pipe D communicates with a passage in a cylindric portion, *d*¹⁰, of the lever C, constituting part of the joint of the toggle. This portion *d*¹⁰ is provided with a projecting portion having a recess and stuffing-box similar to the portion *c* of the head A, and in like manner receives one end of a pipe, D′, comprised in a lever constituting the other portion of the toggle. This lever is provided with a portion loosely surrounding the projecting portion on the portion *d*¹⁰, and may therefore swing on said portion *d*¹⁰. The pipe D′ has a straight portion, *d*², extending into a pump-cylinder, E, and constituting the piston for said pump. A suitable stuffing-box is arranged about the piston *d*², upon that end of the pump-cylinder through which the piston extends. Upon the inner end of the piston *d*² is arranged a reflow check-valve, *d*³. The pump-cylinder E has a ring-like portion extending loosely about the projecting portion *c′* of the head A², and may swing on said projecting portion. A pipe, D², communicates with the pump-cylinder E near one end thereof, and at the other

end extends into a recess in the portion c' and through a stuffing-box in manner similar to the portion c of the head A'. This end of the pipe D^2 communicates with the passage c^3, opening into the space behind the piston-head B^3, and is provided with a reflow check-valve, d^4.

It will be observed that liquid may flow freely from the inlet-passage c^2, through the pipe D, the pipe D', the pump, and the pipe D^2, and out at the outlet-passage c^3.

The pump is operated by a lever, F, which may be fitted into either a socket, f or f', at the toggle-joint. When the lever F is rocked, the toggle-joint is caused to pursue the path indicated in the arc-shaped dotted line in Fig. 2, and it is obvious that at each forward and backward movement of the lever F the piston d^2 is caused to make two complete excursions within the pump-cylinder. Furthermore, by the use of a toggle great power can be brought to bear upon the piston-head B^3.

As previously stated, liquid entering the cylinder A behind the piston B^3 forces it and the piston B outwardly, and of course the distance which the piston B will be so forced is proportional to the quantity of liquid withdrawn from in front of the piston-head and forced in behind it. Secured to the piston-head B^3 is a dog, G, here shown as double-ended. This dog is arranged in front of the piston-head and extends transversely to the axis of the piston B, its ends protruding through longitudinal slots g in said position. It is mounted upon a spindle provided with a hollow portion, g', extending centrally through the piston-head, and provided upon its end to the rear of the piston-head with a valve, g^2. A spring, g^3, bearing at one end against the piston-head and at the other against a shoulder on the dog spindle, tends to keep the dog in the position shown in Fig. 1, or in such position that no fluid can flow through the hollow portion g of the spindle, and so behind the piston-head. When the piston B has been moved sufficiently far forward, the protruding ends of the dog G will come in contact with the head A', thereby forcing the dog backwardly, together with the hollow portion g' of the spindle and the valve g^2. Liquid may then flow from one side of the piston-head to the other through an opening, g^4, in the portion g' of the spindle, and pressure will thus be equalized. When it is desired to return the piston to the position shown in Fig. 1, communication is opened between the spaces in front and to the rear of the piston-head by turning a cock, H, in a pipe, I, communicating by means of passages in the heads $A' A^2$ of the cylinder A with such spaces. When the jack is in operation, this cock is of course closed. I prefer to construct the pipe I in sections and join the sections by unions J.

Each of the unions J is composed of a shell or cylinder, J', having screw-threaded ends which receive internally screw-threaded caps J^2. Within the caps J^2 are stuffing-boxes J^3, through which extend the adjacent ends of the sections of the pipe I. These ends of the sections of the pipe I are screw-threaded externally, and are provided with flanges J^4, shown as consisting of nuts. Between these flanges is a washer, J^5. By this arrangement the unions may be lengthened or shortened, as desired, and a tight joint still be preserved.

It will be seen that the liquid in this jack may be used repeatedly, and also that the jack may be held in any position when in use.

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

1. The combination, with a reservoir for liquid, of a pump, a toggle for operating said pump, comprising swinging levers and pipes, and stuffing-boxes into which certain ends of the pipes extend and within which they may rotate, substantially as specified.

2. In a hydraulic jack, the combination, with a cylinder, of a hollow piston within the cylinder, provided with a piston-head, passages communicating with the cylinder upon each side of the piston-head, a pump, a toggle for operating said pump, comprising swinging levers and pipes communicating with said passages, and stuffing-boxes into which certain ends of the pipes extend and within which they may rotate, substantially as specified.

LESLIE BELDEN.

Witnesses:
J. R. BOWEN,
MAURICE J. ROACH.