(No Model.) 2 Sheets—Sheet 1.

O. H. MECHEM.

HYDRAULIC JACK.

No. 369,992. Patented Sept. 13, 1887.

Fig. 1.

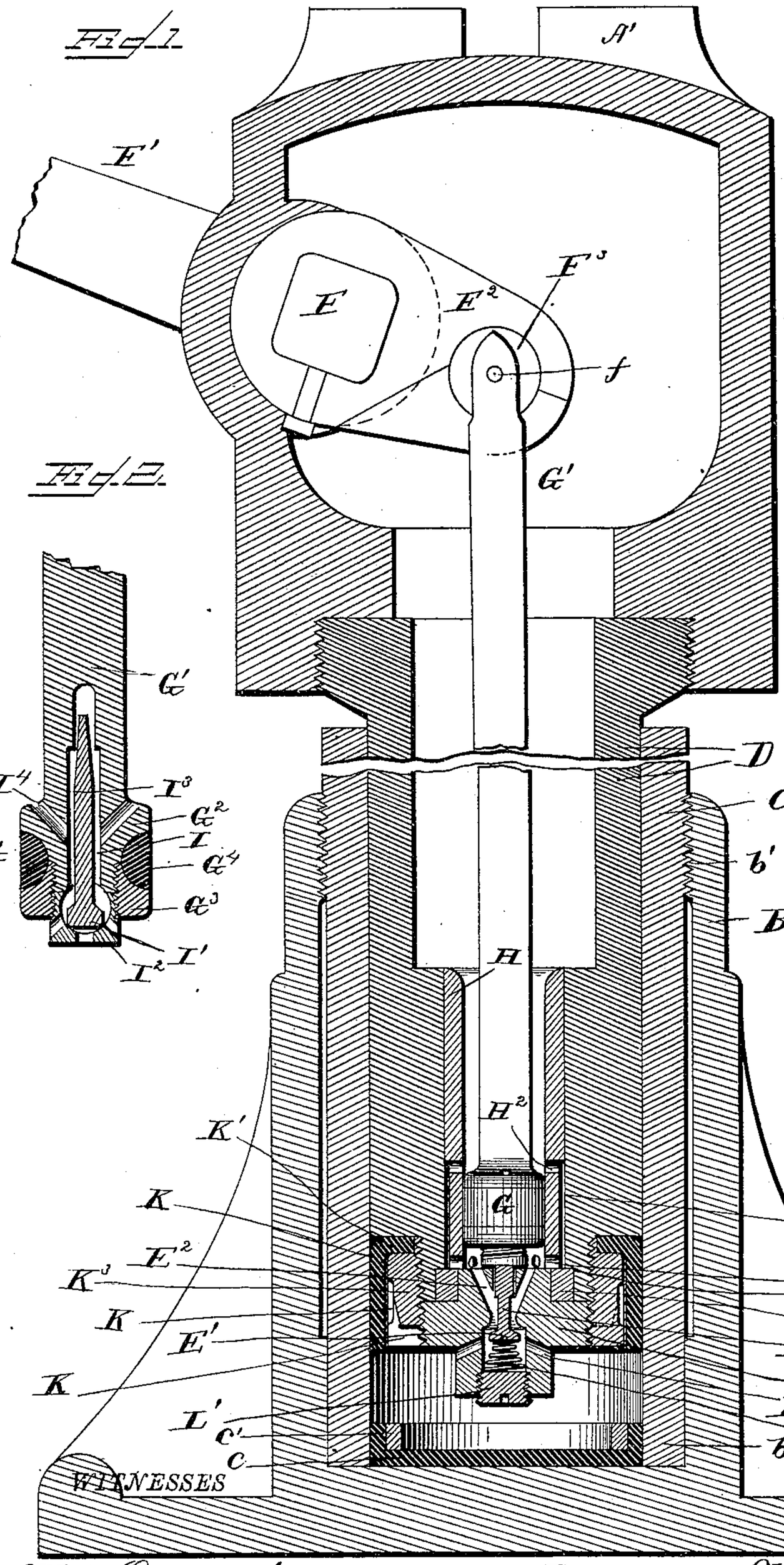
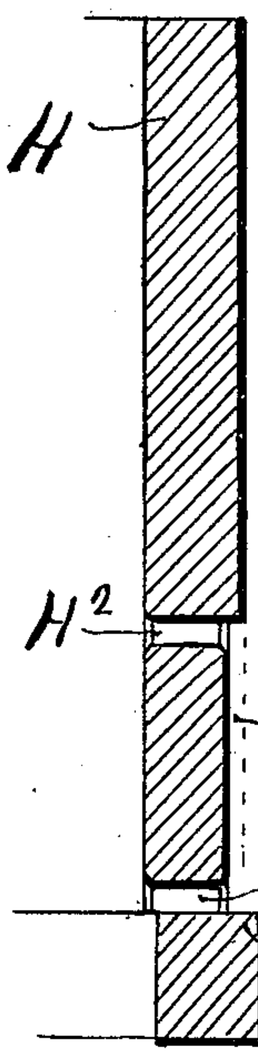


Fig. 2.

Fig. 9.



WITNESSES

F. L. Durand.
C. H. Durand.

INVENTOR.

Oliver H. Mechem,
Saml. J. Wallace,
Attorney.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

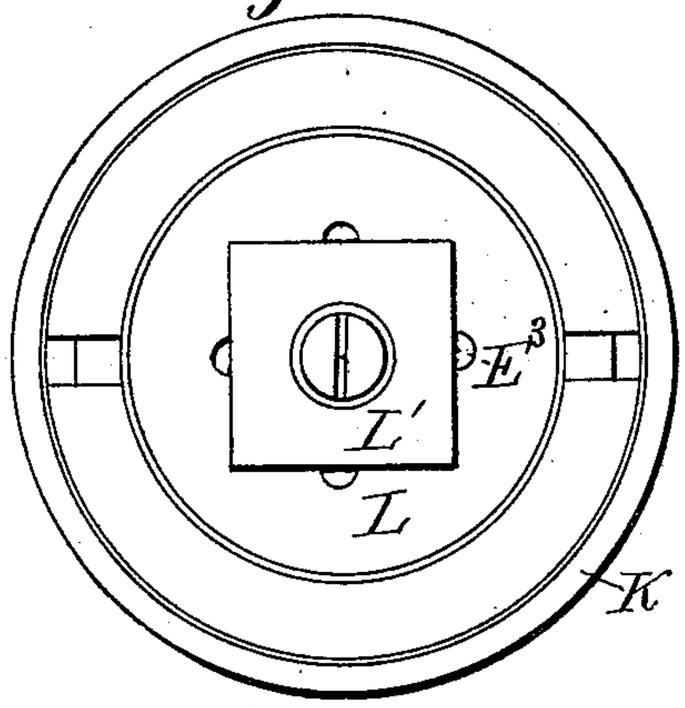


Fig. 4.

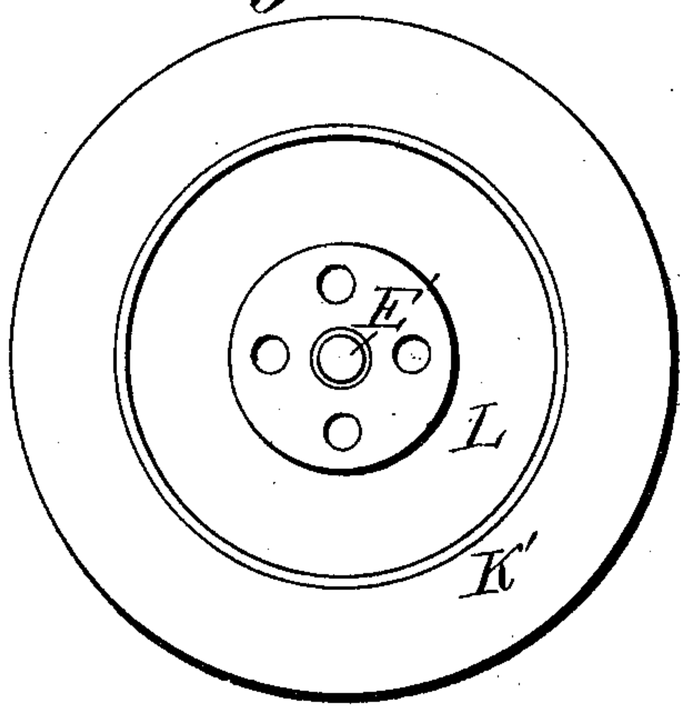


Fig. 5.

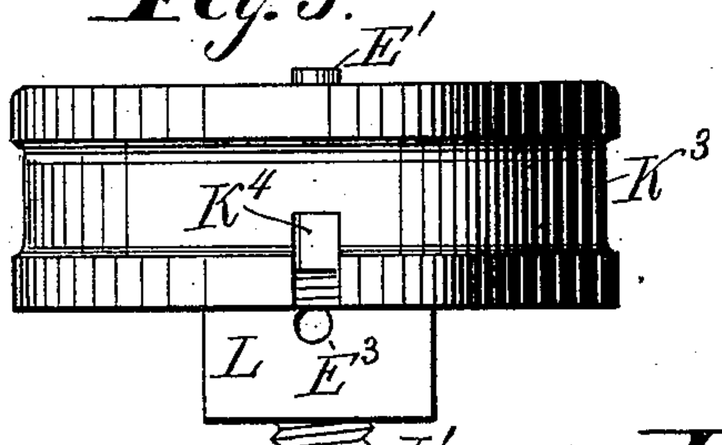


Fig. 6

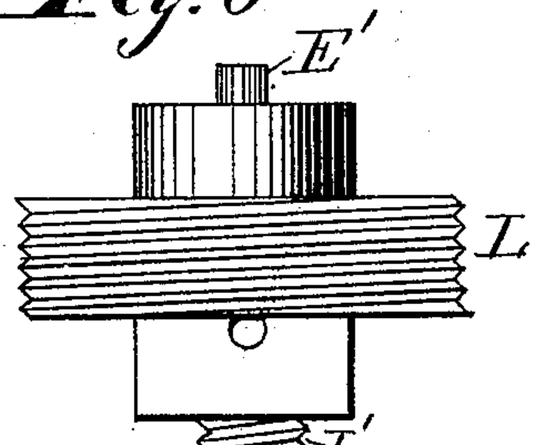


Fig. 7.

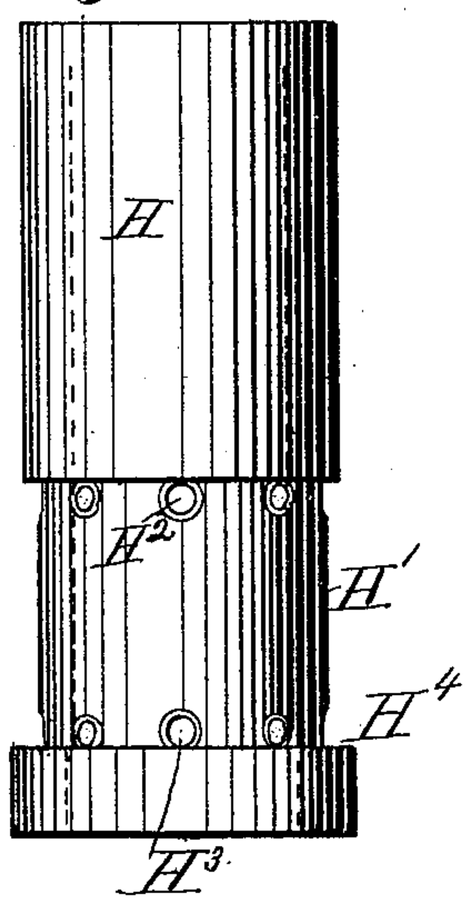
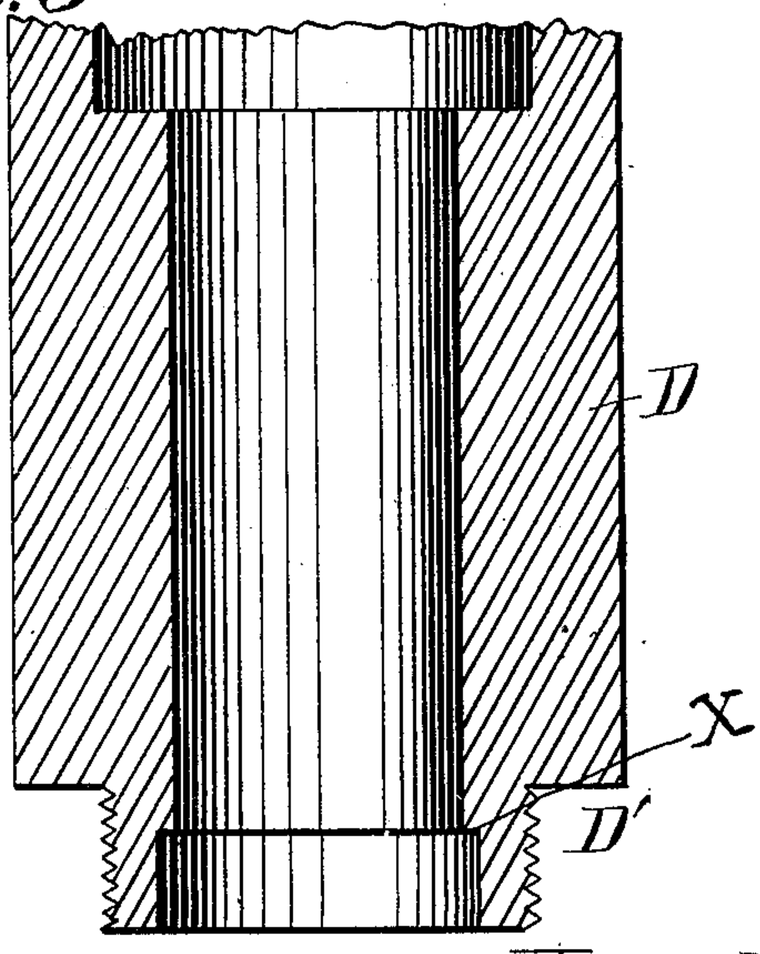


Fig. 8



Attest:
H. D. Harrington.
L. Mechem

Inventor,
O. H. Mechem.
By Sam'l. F. Wallace,
Attorney.

UNITED STATES PATENT OFFICE.

OLIVER H. MECHEM, OF CONNELLSVILLE, PENNSYLVANIA, ASSIGNOR TO RICHARD DUDGEON, OF GLEN COVE, NEW YORK.

HYDRAULIC JACK.

SPECIFICATION forming part of Letters Patent No. 369,992, dated September 13, 1887.

Application filed January 16, 1885. Serial No. 153,103. (No model.)

To all whom it may concern:

Be it known that I, OLIVER H. MECHEM, a citizen of the United States, residing at Connellsville, in the county of Fayette and State of Pennsylvania, have invented certain new and useful Improvements in Hydraulic Jacks, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention consists in an improved hydraulic jack having certain peculiar features, which I make and use substantially as set forth hereinafter, and as shown in the accompanying drawings, in which—

Figure 1 is a sectional elevation of the hydraulic jack. Figs. 2 to 9 are details of parts of the same.

The apparatus is made with two main parts—the top A and the base B—which fit together telescopically, and are provided with internal cavities to contain a working-fluid, and with a pump, valves, and other parts arranged so that by means of the pump the fluid can be forced from the upper part through a valved passage into the lower part, to force the upper part upward slowly and with great power to lift or otherwise move buildings or heavy bodies under or to which the apparatus is applied in use.

The base or lower part, B, of the apparatus is fitted in form to rest firmly upon a support, and has a projecting rim, B′, and an outer tube, B^2, and buttress-braces B^3, formed in one part by casting or otherwise. It has also a main cylinder or barrel, C, of material strong to resist internal pressure, which is set vertically into the base, with a tight fit around its lower end at *b*, and a tight fit within the collar *b′* at the top of the tube B^2, where screw-threads are cut into both parts, and screwed up tightly to hold the parts together strongly against the great pressure used. A packing, *c*, is used to close the joint at the bottom of cylinder C, which is made of leather or other suitable material, held in place by the ring *c′*, which binds it to the cylinder C. The fluid pressing against the part *c* forces it tightly into the joint to close it. The internal face of cylinder C is finished true and smooth, to receive the piston D of the upper part, and to enable it to be closely packed and to move freely up and down therein at work.

The upper part, A, has a head, A′, with its upper surface fitted to receive and hold against the weight or object to be operated on in use, and is provided with a large cavity to hold the working-fluid and parts for operating the pump. It has a cylinder or tube, D, which fits within and extends to the bottom of cylinder C before lifting, and is provided with a large internal cavity to hold the fluid and the pump. The cylinder D is made true and smooth on the outside, to fit the cylinder C closely, and to move up and down in it freely while held firm and true in position by it, and by full-length bearings all around. It has a packing-ring, K, around its lower end, to prevent the working-fluid from escaping upward between the parts. The lower end of cylinder D is closed to serve as a ram-head, and is provided with a central passage, E, fitted with a valve, which is arranged to open downward by pressure in the pump above, and to be closed by pressure from below.

The pump is provided with a lever-handle, F′, removably attached to the head A, which may be moved up and down to operate the pump. This handle connects with the pump-rod G′ by means of a rock-shaft, F, which passes into the head A by a suitable packed bearing, and bears a crank, F^2, inside, by which it connects with the pump-rod, so as to move it as the handle is moved. The end of the crank F^2 is slotted below and has a pivot-pin, F^3, which holds the end of the pump-rod by a hole through the pin F^3, and a central pin, *f*, through the pin and pump-rod together, so that the pump-rod will be moved up and down with an endwise motion as the crank moves, and will play in the slot in the crank.

The pump-rod is provided with a plunger-head, G, on its lower end, with suitable packing around it, which fits and works in the pump-barrel H in the lower part of the cylinder D, so as to pump the working-fluid from above through the passage E to lift the upper portion of the jack.

The pump plunger-head G is formed by an enlargement, G^2, on the rod G′, with a screw-

nut, G³, below, which holds the packing G⁴, of leather or other suitable material, between them. The opposed sides of these two parts are tapered under the packing, so that when they are forced together by screwing up the nut they will force the packing out to enlarge it in the pump-tube.

The rod G′ is perforated by a passage, I, through the plunger-head, with branches out sidewise above and below the head for the passage of the fluid downward in pumping. This passage has a valve, I′, with an enlarged part below, which fits against shoulders of the passage, so as to close it when pushed upward by the pressure of the fluid below, and with a long valve-stem extending upward loosely in the passage I. This valve rests upon a screw-plug, I², set into the enlarged passage below, so as to leave a passage open for the fluid to descend, but so as to be forced up to close the passage by pressure from below in pumping.

The pump-barrel H is a strong cylinder or tube of small diameter, which is held firmly in place by a solid re-enforce extended inward from the walls of cylinder D. This pump-barrel is of such length as to suit the regular length of stroke of the plunger-head G in pumping, and of such added length downward that the head G may be forced down below its regular point of travel in pumping whenever it is desired to permit the fluid to return to the upper part and let the head A descend. A recess is cut in the exterior wall of tube H along this added space, to leave an annular cavity, H′, around this part, which is connected with the interior by a series of holes, H² H³, at the upper and lower parts, to form a by-passage for the fluid upward around the plunger-head when forced down into this portion of the pump-tube. When the plunger is forced down this way, it strikes the end of valve E′ below and forces it down so as to open that passage and let the fluid escape. The holes H² H³, which form the by-passage for the fluid at the upper and lower ends of the annular space H′, are made small, and are suitably beveled or countersunk on their edges at each end, so as to permit the fluid to flow easily, and so as not to cut or abrade the packing on the plunger-head where it passes over them. The outer ends are prepared before inserting the pump-tube in its seat by countersinking. The inner ends are countersunk also before inserting, to a less degree. This may be done with a countersink-tool formed with a head, and a separate stem, which is inserted through an opposite hole and fitted to the head within the pump-tube, or by other means.

The lower end of the pump-tube H has a shoulder, H⁴, enlarged to rest upward against a shoulder cut into the surrounding part to hold it firmly in place, while under pressure from below, by the plug-block L, which is screwed up against it.

The plug-block L is fitted to close the cylinder D and the pump-tube below. It is held by screwing into the collar K³ from below, and for about half the width of the collar, so as to abut firmly against the ends of part D′ and of the pump-tube H. The central passage, E, is bored vertically through the plug-block L, and has branch passages E² E³ above and below, as shown, for the passage of the fluid. Between these two sets of branch passages the passage E is single, and has bearing-shoulders as a seat for an enlarged part of the valve E′.

The valve E′ rests on a coiled spring, E⁴, below, which acts to hold it closed. This spring rests in an enlarged space on a plug, L′, which is screwed into block L. The valve E′ has a long stem, which passes up the passage E, with a bearing around it above, but with a reduced part above the valve-seat, so as to open a passage for the fluid when forced down. The upper end of the valve-stem projects above, so that the pump-plunger can strike and force it down to let the fluid pass.

The packing-ring K is formed of a band of leather or other suitable material, with its upper edge, K′, bent at an angle inward, and abutted upward against a shoulder on part D. A ring-band, K², of sheet metal, is fitted inside the band K, to keep the packing out in place against the walls of cylinder C. The band K is left of substantial or full thickness to its lower edge, and is not feathered or beveled off to a thin edge, liable to turn under or bend back to let the fluid get started between it and the walls and escape by it so as to leak. This packing is held in place by a collar, K³, which holds firmly by a screw-thread upon a sub-caliber part, D′, of part D. This collar is recessed around its outer surface, and the recess is kept open by band K², and connects by passages K⁴ with the fluid below, so as to let the fluid enter and bear outward on the packing-ring the full force of the weight resting on the jack. This construction lets the packing move freely in the cylinder when not loaded, while it prevents leakage when loaded.

When the jack is to be used, it is placed in position with bearings for its two ends, so that the desired effect will be produced by the piston-like motion of ram D in cylinder, and with the fluid in the cavities of part A D. The pump-handle F′ is then moved as a lever up and down, to move the plunger, so as to pump the fluid down through the perforated plunger-head and the pump-tube and the passage E to the chamber below ram D and force the ram upward with a slow and powerful force. This is continued to the extent desired or possible. When it is desired to release the pressure or to lower head A, the plunger-head is forced down below its regular working-point, so as to pass below holes H² and strike the end of the stem of valve E′ and push that open and let the fluid under pressure below pass up by passages E, E², H³, H′, H², and H into the cavity of parts A D, so that they can descend. This action can be stopped at any time by raising the plunger.

Oil or any suitable fluid is used as the working-fluid.

A like construction can be used in hydraulic presses, and in various other pumping apparatus, in whole or part. Various modifications of the parts may be made and used.

I am aware that I am not the first to invent the combination of passages for the backflow of the liquid placed within the walls of the pump-chamber and connecting therewith above and below the pump-piston when in its most depressed position, and a piston having a passage-way through it provided with a valve, whether the pump be removable or not, nor of the above in combination with a valve having a stem adapted to be engaged by the piston to open the valve, and I do not claim the same broadly.

I claim—

1. In a hydraulic jack, a pump-tube having an annular by-passage in its walls connected with the pump-tube way, combined with a perforated pump-plunger having its travel way in the pump-tube extended below such passage-connection.

2. In a hydraulic jack, a pump-tube having a by-passage opening into it from the side with countersunk or rounded edges, combined with a pump-plunger having its travel way across such opening.

3. In a hydraulic jack, the combination of a ram having a removable pump-tube provided with a shoulder, H^4, for holding it in the ram-tube, with a screw-plug block abutting against both the pump and ram tubes to hold the pump-tube in place.

4. In a hydraulic jack, the combination of a ram having a removable pump-tube provided with a shoulder, H^4, for engagement with the ram-tube, with a screw-plug block, L, bearing a valved passage and abutting against the pump-tube to hold it in place.

5. The combination of the head A and base B, having telescoping cylinders, with a pump therein, having a passage through its plunger-head and a covered by-passage in its walls, and with a plug-block to close the end of the pump-tube, provided with a valved passage, having a stem to its valve adapted to be engaged by the plunger to open the valve and permit fluids to flow back and around the plunger-head.

In testimony whereof I affix my signature in the presence of two witnesses.

OLIVER H. MECHEM.

Witnesses:

B. F. MORSELL,

SAML. J. WALLACE.