June 19, 1923. 1,459,432

H. W. ARMSTRONG

HYDRAULIC JACK

Filed July 9, 1920

Fig. 1.

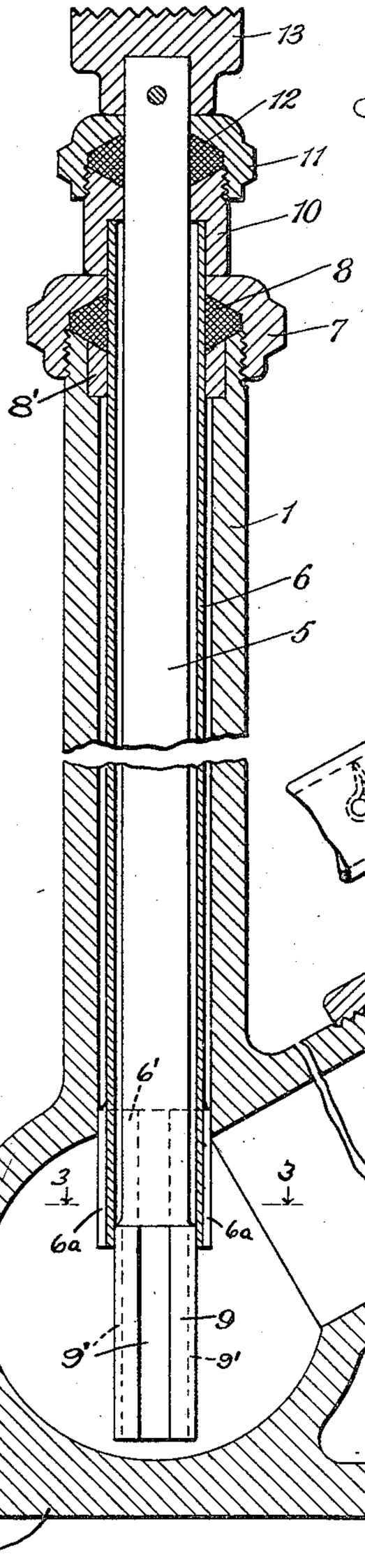

Fig. 3.

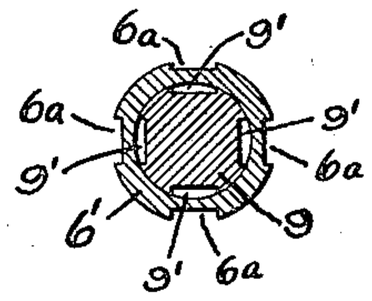

Fig. 2.

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By his Attorney
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UNITED STATES PATENT OFFICE.

HENRY W. ARMSTRONG, OF NEW HAVEN, CONNECTICUT, ASSIGNOR OF ONE-HALF TO HAROLD WYMAN, OF PLANTSVILLE, CONNECTICUT.

HYDRAULIC JACK.

Application filed July 9, 1920. Serial No. 394,887.

To all whom it may concern:

Be it known that I, HENRY W. ARMSTRONG, citizen of the United States, and resident of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Hydraulic Jacks, of which the following is a specification.

This invention relates to hydraulic jacks, being intended more particularly for embodiment in portable hand-operated jacks.

The invention has for a general object to provide a device in which a relatively quick operation and great length of lift, in comparison with the height when collapsed, is provided.

More specifically speaking, the invention has for an object to provide a fast operating telescoping jack, the various elements of which are successively raised and lowered.

For further comprehension of the invention and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

Figure 1 of the drawings is an axial vertical sectional view of a jack constructed according to the invention.

Figure 2 is a fragmentary side view of a novel collapsible handle designed for employment in operating the jack.

Figure 3 is a detail horizontal section on the line 3—3 of Figure 1.

As here shown, my improved jack comprises a cylinder 1 having a globular enlargement 2 at its lower end and a widened base 3. From the globular enlargement an integral cylindrical offset 4 projects laterally at a slight upward inclination. The cylindrical offset 4 opens into the globular enlargement 2 for its full diameter at one end. That is, one end of the cylinder is entirely open into the enlargement and both together form one chamber which is filled with the lifting fluid at all times. The base 3 preferably has the side thereof opposite the offset 4 curved upwardly, as at 3′, this construction facilitating the sliding of the jack into place under the part to be lifted.

Within the cylinder 1 are slidably mounted a pair of ram or plunger elements, consisting of a solid inner element 5 and a sleeve 6 surrounding the latter, the part 5 being hereinafter referred to as the plunger and the part 6 as the sleeve. The sleeve extends at its lower end for a short distance into the globular enlargement 2, while its upper end extends through a suitable central opening in a cap 7 screwed on the upper end of the cylinder 1, a stuffing box 8 surrounding the sleeve. The main length of the plunger 5 is preferably of somewhat less diameter than the interior of the sleeve 6 so as to reduce frictional engagement, the lower end of the plunger being enlarged, as at 9, to fit snugly in the sleeve.

This enlarged lower end is formed with vertical slots 9′ to provide a free passage for the oil upwardly past the said enlarged end and prevent the formation of an air cushion above the latter. This lower end 9 normally extends downward below the lower end of the sleeve when the jack is collapsed. The sleeve 6 is similarly formed with its main length of less diameter than the interior of the cylinder 1 and having a thickened lower end 6′ formed with slots 6ª. In the upper end of the cylinder a collar 8′ is located under the stuffing box 8 and snugly encircles the sleeve 6, the interior diameter of this collar being less than that of the lower end 6′ of the sleeve 6.

The upper end of the sleeve 6 is fixed in a barrel 10 upon which is screwed a cap 11, the plunger 5 extending upwardly through this barrel and cap through a stuffing box 12 therein. This upper end of the plunger 5 has the lifting head 13 of the jack fixed thereon, which head may be provided with a corrugated or serrated top as shown.

The cylindrical offset 4 before mentioned provides an actuating piston cylinder entirely open at one end and which forms a part of the fluid chamber in the body member 2. This piston cylinder is preferably of larger diameter than the plunger cylinder 1 and carries the means for raising the ram elements 5 and 6 of the jack. This means comprises a piston 15 in the offset 4, to which is connected a screw 16 threaded through a cupshaped cap 17 screwed on the end of the offset, a packing ring 18 being provided to prevent leakage of the lifting medium past the piston. As here shown the screw 16 has a swivel connection with the piston 15 which is effected by inserting a diminished projec-

tion 19 on the inner end of the screw into a suitable axial socket in the piston, this projection having a circumferential groove 20 formed therein, while a pin 21 fixed in the piston engages freely in said groove. The outer end of the screw may be squared as at 27 to receive a suitable handle for turning.

I preferably employ for this purpose the sectional handle shown in Figure 2, the construction of which provides a handle of considerable length so that the screw may be rotated conveniently at a distance from the jack. This handle comprises a series of tubular sections 22 of successively diminishing sizes to fit one within the other, the largest section having one end formed to engage the square end of the screw 16, while the smallest may have a solid handle element 23 inserted therein, this element being formed with a crank or a T-head or in any other well known way for purposes of rotation.

The handle element 23 and the different tubular sections 22 are detachably secured together by means of pins 24 carried thereby and projecting into slots 25 in the adjacent sections into which they project, these slots leading first inwardly in a longitudinal direction from the ends of the sections, then transversely, and finally outwardly a short distance toward the ends of the sections, the pins 24 being held in engagement with these outturned parts of the slots by coiled expansion springs 26 carried in the tubular sections.

When in use, the chamber formed by the globular enlargement 2 and offset 4 are filled with oil, grease or other suitable material. By rotating screw 16 the piston 15 is advanced and the oil forces the plunger elements 5 and 6 upwardly in the cylinder, raising the object engaged by the head. As will be apparent, both plunger elements will move upwardly together until the enlarged end 6′ of the sleeve 6 engages the collar 8′, when the sleeve comes to rest, the plunger 5 continuing to rise until the part has been lifted to the desired height. The barrel 10, as will be apparent, will operate as a stop to prevent the plunger 5 from disengaging from the sleeve 6 by reason of the enlarged end 9 of the plunger engaging said barrel and so limiting the upward movement of the plunger.

The advantage of constructing the piston 15 of relatively large size or diameter with relation to the plunger elements 5—6 will be apparent in embodiments of the invention in devices where speed and long range of movement of the plunger or lifting element is desired with a relatively small movement of the actuating piston. The cylinder 4 in which this actuating piston 15 is operated may project from the main or body portion 1—2 at an angle, as shown, or in any other position with relation thereto as may be desired for convenience of construction or operation.

As many changes could be made in the above construction and many apparently widely different embodiments of my invention designed without departing from the scope of the appended claims, I intend that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative merely of an operative embodiment of my invention and not in a limiting sense.

What I claim is as follows:—

1. In a hydraulic jack, a body member in which a fluid chamber is formed, a portion of which chamber forms an actuating piston cylinder entirely open at one end in said chamber, an actuating piston in said cylinder, means for actuating said piston from the exterior of the jack, a second cylinder of less cross-sectional area than said first named actuating piston cylinder opening into and extending from said fluid chamber, and a plunger in said second cylinder adapted to be operated fast and quick by the fluid in said chamber at a greater speed than that of said actuating piston when the latter is operated.

2. In a hydraulic jack, a cylinder, a ram comprising a sleeve slidable in said cylinder and a plunger slidable in said sleeve, said sleeve and plunger having spaced enlargements at their lower ends fitting snugly in the cylinder and sleeve, respectively, and forming slots between the cylinder and sleeve and between the sleeve and plunger, respectively.

3. In a hydraulic jack, a fluid chamber, a cylinder entirely open at one end into and forming a part of said chamber, an actuating piston in said cylinder, a second cylinder of less cross-sectional area than said first named cylinder opening into and extending from said fluid chamber, and a pair of telescoping ram elements in said second cylinder consisting of a sleeve and a plunger positioned therein normally projecting from both ends of said sleeve, the lower end projecting into said fluid chamber and the upper end extending to the exterior of the jack and having a lifting head mounted thereon.

4. In a hydraulic jack, a fluid chamber, a cylinder entirely open at one end into and forming a part of said chamber, an actuating piston in said cylinder, a second cylinder of less cross-sectional area than said first named cylinder opening into and extending from said fluid chamber, and a pair of telescoping ram elements in said second cylinder consisting of a sleeve and a plunger positioned therein normally projecting from both ends of said sleeve, said plunger being of a less diameter than the

interior diameter of said sleeve except at its lower end where it is provided with an enlarged portion which fits snugly in said sleeve and normally extends below the lower end thereof into said fluid chamber.

5. In a hydraulic jack, a fluid chamber, a cylinder entirely open at one end into and forming a part of said chamber, an actuating piston in said cylinder, a second cylinder of less cross-sectional area than said first named cylinder opening into and extending from said fluid chamber, and a pair of telescoping ram elements in said second cylinder consisting of a sleeve and a plunger positioned therein normally projecting from both ends of said sleeve, both said plunger and sleeve being of less diameter than the interior diameter of said sleeve and second cylinder, respectively, and each being provided at their lower ends with an enlarged portion fitting snugly in said sleeve and second cylinder, respectively, and normally extending into said fluid chamber.

Signed at Southington, in the State of Connecticut, this 12th day of June, A. D., 1920.

HENRY W. ARMSTRONG.