

June 29, 1926.

1,590,848

L. NILSON

LIFTING JACK

Filed Nov. 27, 1922

2 Sheets-Sheet 1

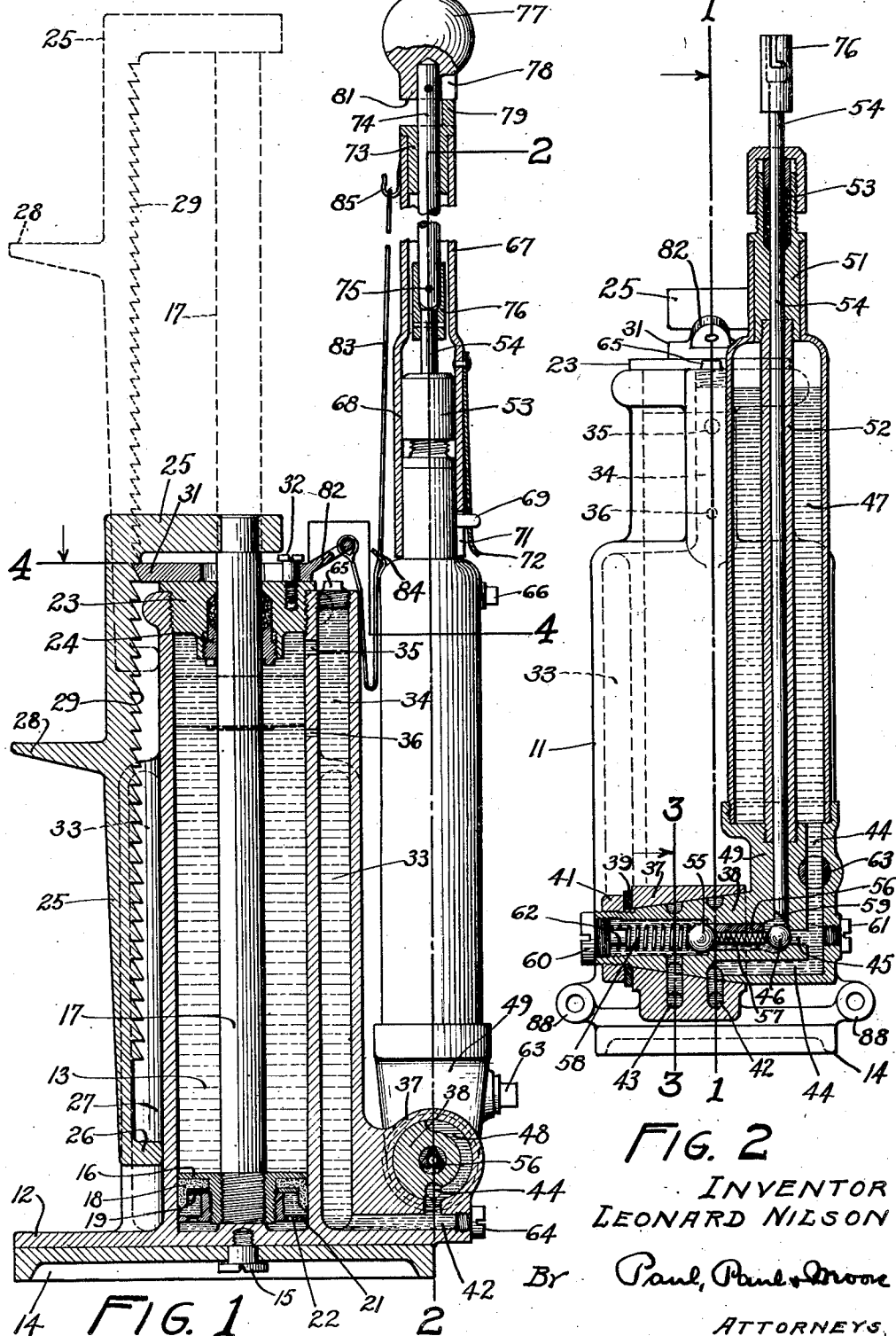


FIG. 2

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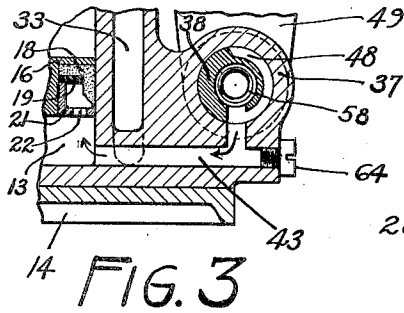


FIG. 3

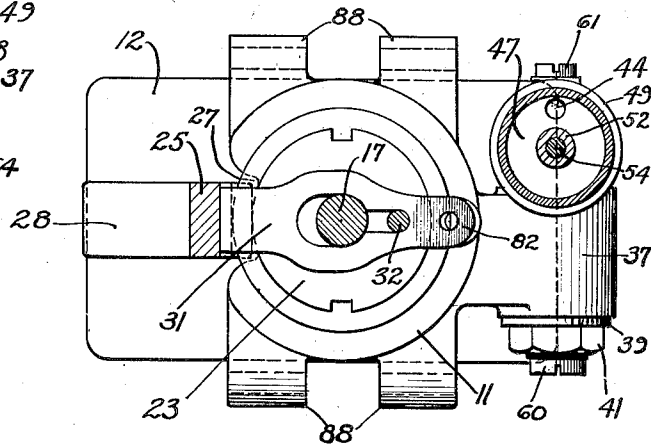


FIG. 4

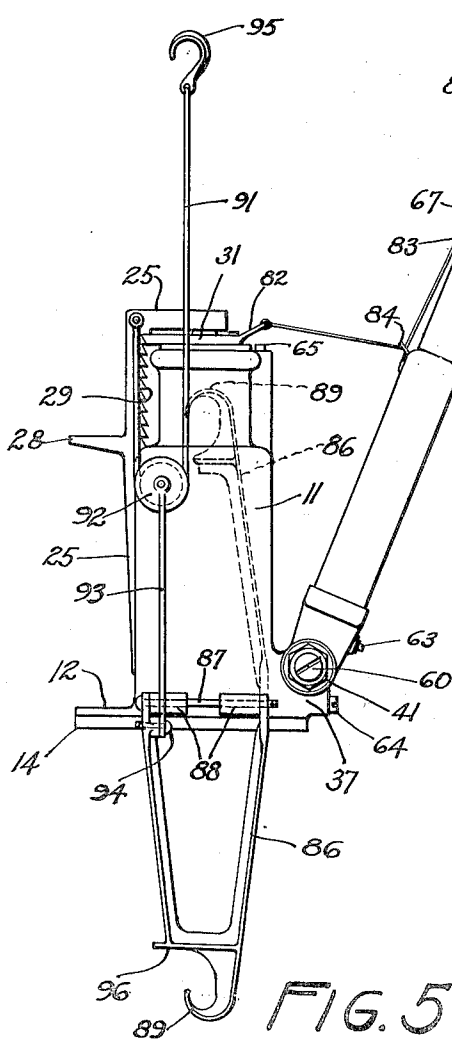


FIG. 5

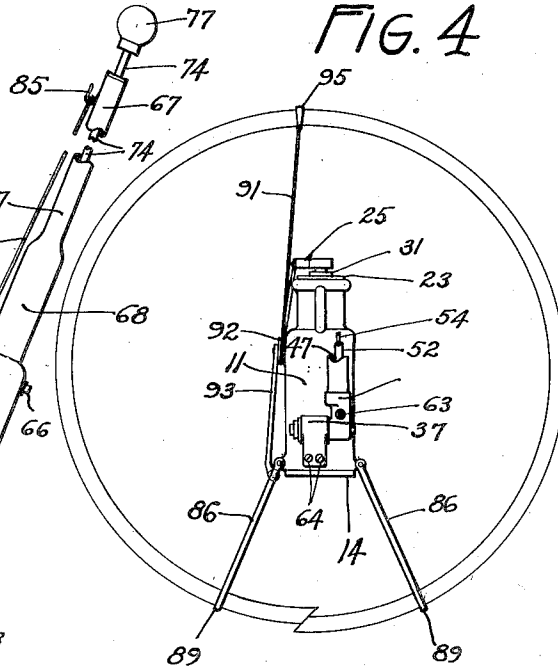


FIG. 6

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LIFTING JACK.

Application filed November 27, 1922. Serial No. 603,667.

This invention relates to new and useful improvements in lifting jacks, such as are commonly employed for lifting the wheels of an automobile, etc., and is more particularly directed to hydraulic jacks using an inelastic fluid, such fluid usually being controlled by means of a hand-operated plunger and valve mechanism.

The specific object of this invention is to provide a hydraulic jack having an operating handle or plunger for raising or lowering the piston or lifting member of the jack, which may be operated at any angle.

A further object is to provide a jack having an auxiliary chamber wherein an additional supply of fluid may be stored for the purpose of supplying fluid to the main reservoir in case of leakage, etc.

A further object is to provide a jack having means for securely holding the lifting member in any desired position and also means for releasing said lifting member when a quick descent of the piston is desired.

A still further object is to provide a jack of simple and inexpensive construction, and one so designed that it may be conveniently carried in the usual tool box of an automobile.

Other objects of the invention will more fully appear from the following detailed description and the accompanying drawings and will be pointed out in the annexed claims.

In the drawings, there has been disclosed a structure designed to carry out the objects of the invention but it is to be understood that the invention is not confined to the exact features shown as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a vertical sectional view on the line 1—1 of Figure 2, showing a jack embodying my invention and also showing the means provided for retaining the lifting member in any desired position;

Figure 2 is a vertical sectional view on the line 2—2 of Figure 1, showing the auxiliary fluid chamber and also the valve mechanism;

Figure 3 is a detail sectional view on the line 3—3 of Figure 2, showing the passage or port connecting the piston chamber with the valve mechanism;

Figure 4 is a cross-sectional view on the line 4—4 of Figure 1;

Figure 5 is a side elevation of a jack showing the operating handle in an inclined position and also showing the means provided for contracting an automobile tire rim 60 when it is desired to remove or mount a tire;

Figure 6 is a view showing the jack positioned upon a rim.

In the selected embodiment of the invention here shown, for purposes of disclosure, there is illustrated a lifting jack comprising a body 11, having a suitable base plate 12 and piston chamber 13, preferably integrally formed therewith. A supporting plate 14 70 is preferably provided, upon which the base plate 12 is pivotally mounted by any suitable means, such as a shoulder stud 15, shown in Figure 1. The supporting plate 14 functions as a turntable upon which the jack 75 may be turned when in use.

A suitable piston is provided within the chamber 13. This piston preferably comprises a flanged member 16, secured to the lower terminal end of a piston rod 17. A 80 suitable packing cup 18 is seated upon the flanged member 16 and is secured thereto by means of a circular washer 19 and lock-nut 21, received in threaded engagement upon the flanged member 16. A plurality of 85 apertures 22 are preferably provided in the annular horizontal flange of the lock-nut 21 to permit the fluid to pass therethrough to force the packing outwardly against the walls of the chamber 13 thus forming a 90 tight joint. It will be noted that the horizontal flanges of the member 16 and nut 21 are substantially of the same diameter as the bore of the chamber 13, thus providing a suitable bearing to support the lower end of 95 the piston rod 17.

A piston chamber head or cap 23 is secured to the upper end of the jack body to form a closure for the chamber 13. This cap is provided with a suitable stuffing-box 100 24 of ordinary construction, to provide a non-leakable bearing to support the upper end of the piston rod. The stuffing-box 24 is preferably inverted to provide as long a bearing as possible for the piston rod 17 105 without increasing the height of the jack body.

An object-lifting member 25 is secured to the upper terminal end of the piston rod 17 and extends outwardly therefrom and downwardly terminating slightly above the base plate 12, when in its lowermost or normal po- 110

sition. A suitable supporting lug 26, preferably integral therewith, is provided at the lower terminal end of the lifting member 25 and adapted to bear against the bottom of a longitudinal groove or recess 27 provided in the jack body. The purpose of this lug is to support the lower end of the lifting member when lifting a load. A horizontal lug 28 is provided upon the member 25 and outwardly projects therefrom to provide means for engaging and lifting a load too low to permit the upper end of the lifting member 25 to be placed thereunder.

Means are provided for positively locking the lifting member 25 against downward movement, should it be desired to leave the load upon the jack for any length of time. Suitable ratchet teeth 29 are provided upon the inner face of the downwardly extending portion of the lifting member adapted to be engaged by a suitable latch 31, slidably mounted upon the cap 23 by means of the piston rod 17 and a shouldered screw 32, secured to the cap. Thus, when the piston reaches the desired height the latch may manually be moved into engagement with the ratchet teeth 29 on the lifting member 25 and thereby securely hold or lock said member in any desired position, and at the same time relieve the piston of its load. This, however, is necessary only when the jack is to support a load for an indefinite length of time. In ordinary use, such as lifting the wheel of an automobile when changing a tire, it would not be necessary to use the latch. If desired, a spring may be provided to move the latch into engagement with the ratchet teeth 29, in which case the latch would engage each tooth as it passed during the upward movement of the lifting member 25.

Referring to Figures 1, 2 and 3, it will be noted that the piston chamber 13 is partially surrounded by an outer fluid chamber 35, communicating with the upper end of the piston chamber 13 by means of a vertical circulating passage 34 and upper and lower horizontal ports 35 and 36, (Figure 1). An integral hub or bearing 37 is preferably provided at the lower portion of the jack body 11 to provide a suitable hinge or pivot for the operating handle, hereinafter described.

This hub is provided with a tapered aperture adapted to receive a correspondingly tapered plug 38, held therein by means of a suitable washer 39 and lock-nut 41, thus providing a leak proof joint or hinge. Ports 42 and 43 are provided in the lower portion of the hub 37 through which the fluid must flow in passing from one chamber to the other when the jack is operated. The chamber 33 communicates with the valve mechanism by means of the port 42 and a similar port 44 in the tapered plug 38, thence through a short duct 45 to the intake valve

46. The port 44 also extends upwardly and connects the chamber 33 with an auxiliary chamber or reservoir 47, hereinafter described. The piston chamber 13 communicates with the valve mechanism by means of the port 43, entering said chamber beneath the piston. (Figure 3). Suitable grooves or recesses 48 extend partially around the periphery of the plug 38, in alinement with the ports 42 and 43 to permit the fluid to flow freely through the valve mechanism at any angle of the operating handle.

In Figure 2, it will be noted that the tapered plug 38 has an integral portion 49 extending upwardly therefrom to provide a support for the auxiliary reservoir 47, secured thereto. The upper end of this reservoir is preferably smaller in diameter and adapted to receive a suitable plug 51 therein. A hollow tube or pipe 52 is secured to the lower portion of the plug 51 and extends downwardly through the reservoir 47 and has its lower end secured to the portion 49 of the plug 38, thus providing a very rigid and substantial construction. The upper end of the plug 51 is provided with a suitable stuffing-box 53 to provide a nonleakable bearing for the plunger rod 54, reciprocally mounted therein. This plunger extends downwardly through the tube 52 and the portion 49 of the plug 38 to the intake valve 46.

Thus, when the plunger rod 54 is moved upwardly the fluid will be drawn through the intake valve 46 from the chamber 33 and follow the plunger upwardly within the tube 52 until the plunger reaches the top or end of its stroke. As soon as the plunger starts its down stroke the intake valve 46 will automatically close and the outlet valve 55 will open permitting the fluid to pass there-through to the port 43 and piston chamber 13. As the fluid is pumped into the piston chamber the piston will commence to ascend, carrying with it the lifting member 25.

An important feature of the novel valve mechanism employed in this jack resides in the means provided for unseating or opening both the intake and outlet valves at the same time, to permit the fluid to return from the piston chamber 13 back to the outer chamber 33, necessary when it is desired to lower the piston to its normal position.

A triangular sleeve 56 is loosely mounted between the two valves 46 and 55 and has a small coiled compression spring 57 mounted therein. This spring functions in seating the intake valve 46 when the plunger 54 starts its downward stroke. A coiled spring 58 is provided to seat the outlet valve 55. This spring is preferably considerably stronger than the smaller spring 57, thereby holding the valve on its seat against the pressure of the spring 57 when the intake valve is opened.

In Figure 2, it will be noted that if the plunger 54 is moved downwardly beyond the position shown in the above figure, its lower terminal end will contact with the valve 46 and unseat it, moving it outwardly until it engages the triangular sleeve 56. The lower end of the plunger is preferably provided with a beveled face 59, as shown, to facilitate the action of unseating the valve. As the plunger continues downwardly the sleeve 56 will unseat the valve 55, thereby permitting the fluid to return from the chamber 13 through the open valves and the sleeve 56 to the outer chamber 33, the weight of the load upon the piston forcing the fluid back until the load has been released. As soon as the plunger is turned to its normal position the valves will be closed by the springs 57 and 58.

Threaded plugs or screws 60 and 61 are provided at each end of the tapered plug 38, preferably in alinement with the valves 46 and 55, by means of which access may be had to the valves. The screw 60 is preferably provided with a reduced end portion 62 upon which one end of the spring 58 is mounted. By the removal of this screw the entire valve mechanism may be removed from the tapered plug 38, including the springs 58 and 46, valves 55 and 46, and the triangular sleeve 56. If necessary, the screw 61 may be removed and a small instrument, such as a nail or wire may be inserted in the plug to eject the parts therefrom. A tapered valve plug 63, of ordinary construction, is also preferably provided in the port 44, between the duct 45 and the auxiliary reservoir 47 to provide means for disconnecting said reservoir from the chamber 33.

This valve may be either open or closed during the operating of the plunger 54. When open, as shown in Figure 2, the plunger will draw its supply of fluid from both the chamber 33 and reservoir 47, while if closed it will receive its supply from the chamber 33 only. The primary purpose of this valve is to enable the user to disconnect the auxiliary reservoir from the valve mechanism and the chamber 33 and thus have in reserve, an additional supply of fluid to be used in supplying fluid to the chamber 33 from time to time as needed due to leakage and absorption of the fluid in constant use. Clean-out plugs 64 are also provided for the ports 42 and 43.

Referring to Figure 1, it will be noted that the upper end of the circulating passage 34 is provided with a filler plug 65 and also a similar plug 66 is provided in the upper portion of the auxiliary reservoir 47.

The operating handle of this jack is preferably made in two sections to facilitate packing and storing. The upper section comprises a hollow shaft or tube 67 slightly enlarged at its lower end to form a bayonet socket 68, of usual construction. A pin 69 is preferably secured to the wall of the upper reduced portion of the reservoir 47 and the plug 51 and is adapted to be engaged by an open end slot 71 provided in the enlarged portion of the tube 67 and a flat spring 72, preferably secured to the wall of the tube 67. The above described mechanism functions in securely locking the two handle sections together. The upper end of the tube 67 is provided with a bushing or sleeve 73 to provide a suitable bearing for an operating rod or shaft 74, reciprocally mounted therein. The lower terminal end of this rod is provided with a pin 75, secured thereto and adapted to be received within a bayonet socket 76, secured to the upper terminal end of the plunger 54. A hand grip 77 is secured to the upper end of the rod 74. This grip has a recess 78 formed in its lower portion adapted to receive a suitable lug 79, preferably integral with the sleeve 73. When the hand grip 77 is positioned to receive the lug 79, as shown in Figure 1, the bevel face 59 at the lower end of the plunger 54, will be in the position shown in Figure 2, and the rod 74 and plunger 54 may then be moved downwardly to unseat or open the valves 46 and 55 to permit the fluid to flow from the piston chamber 13 back to the outer chamber 33, as hereinbefore described. When it is desired to operate the plunger 54 the hand grip will be rotated to bring the recess 78 out of alinement with the lug 79, thus preventing the lower end of the plunger from striking or jamming the valve when the plunger is being operated, the lower face 81 of the grip contacting with the top of the lug 79 and thereby limiting its further downward movement.

Means are also provided for conveniently releasing or disengaging the latch 31, when it is desired to lower the jack. A suitable lug 82 is preferably provided upon the latch 31 to which a flexible cable or cord 83, of any suitable material, is secured. This cable passes through a loop 84 secured to the body of the auxiliary reservoir 47, thence upwardly to a hook 85, secured to the operating handle or tube 67, adjacent its upper end. By the use of this cable, the latch may be disengaged from the ratchet teeth 29, either by exerting a pull thereon by hand or by swinging the operating handle outwardly away from the jack body until the cable is taut, (Figure 5).

This novel jack may also be used as a means for contracting an automobile tire rim (split type) when it is desired to remove a tire therefrom. Opposed brackets 86 are pivotally connected to the base of the jack, on each side thereof, by means of suitable pins or bolts 87 and lugs or bosses 88. Suitable hooks 89 are provided at the terminal ends of these brackets adapted to engage the flange of the rim, as shown in Fig-

ure 6. A flexible chain or cable 91 is preferably secured to the upper end of the lifting member 25 and passes downwardly over a sheave or sprocket 92, rotatably mounted in an arm 93, pivotally connected to one of the brackets 86, by means of a suitable pin 94. A hook 95 is secured to the free end of the chain 91.

To remove or mount a tire the operator will position the apparatus upon the rim, as shown in Figure 6, the hooks 89 engaging the rim preferably on each side of the joint and the hook 95, secured to the end of the chain 91, will engage the rim substantially diametrically opposite the hooks 89. The operator will then reciprocate the plunger 54 and as the piston and lifting member 25 move upwardly, the hook 95 will be drawn downwardly or towards the jack body, resulting in the contraction of the rim. Means are also provided for expanding the rim after the tire has been mounted thereon. A flat surface or face 96 is provided on each one of the brackets 86, as shown in Figure 5. As soon as the tire has been placed upon the rim and the hooks 89 and 95 have been released, the operator will disengage the hooks from the flange of the rim and the face 96 will be moved into engagement with the inside of the rim. The upper end of the lifting member 25 will also be moved into engagement with the rim upon the opposite side and as the piston is forced outwardly by the manipulation of the plunger 54, the rim will be expanded to its normal diameter and the apparatus may then be removed therefrom.

When the jack is to be used for lifting, the brackets 86 may be folded against the body of the jack, as shown by dotted lines in Figure 5, or they may be removed therefrom by the withdrawal of the pins 87 from the lugs 88.

Operation.

The operation of this jack may be explained in the following manner:

The filler plug 65 will first be removed and the piston chamber and outer chamber 33 filled with any suitable inelastic fluid, such as oil. No particular care need be exercised in filling the apparatus, provided sufficient fluid is introduced to fill the piston chamber to overflowing when the piston is at the top of the stroke.

When the plunger 54 is pulled upwardly by means of the hand grip 77, the fluid will be drawn from the outer chamber 33, through the ports 42 and 44, the intake valve 46 and into the tube 52 within the auxiliary reservoir 47. When the plunger descends the intake valve 46 will close, causing the fluid to flow through the triangular sleeve 56, the outlet valve 55 and the port 43

to the piston chamber 13. As the fluid enters the piston chamber beneath the piston, it will flow through the apertures 22 provided in the lock nut 21, thereby forcing the packing outwardly against the walls of the piston chamber as the piston slowly ascends. As soon as the piston has reached the top or limit of its stroke, shown by dotted lines in Figure 1, the fluid will flow through the horizontal relief port 36, into the vertical communicating passage 34 and back to the chamber 33 and will thus continue to circulate until the operator arrests the reciprocating movement of the plunger 54. The port 36 is therefore a safety means to prevent the piston from being forced against the cap 23. The upper port 35 permits the fluid above the piston to flow there-through into the outer chamber 33 as the piston rises.

In the accompanying drawings, I have shown the outer chamber 33 as nearly encircling the piston chamber 13. It will also be noted that the capacity of this chamber is considerably greater than the capacity of the piston chamber 13. This, however, is not essential to the successful operation of the jack as the quantity of fluid required to successfully operate the apparatus need not be any greater than the capacity of the piston chamber, when the piston is at the top of its stroke. The purpose of providing a surplus of fluid is to prevent the jack from becoming inoperative, due to lack of sufficient fluid caused by leakage, absorption, etc., from continued use and long service. An additional supply of fluid may also be kept in reserve in the auxiliary reservoir 47 and admitted to the chamber 33 should the supply of fluid become too low to successfully operate the apparatus.

I claim as my invention:

1. A lifting jack comprising a support, a base on the support and provided with a piston chamber, a piston therein, a lifting member connected with said piston to engage the object to be lifted, a handle having a hinged connection with said base, a barrel and plunger therein operative in said handle, circulating channels extending partially around and then partially longitudinally through the hinge pintle, one communicating with the lower portion of the piston chamber and with the lower end of the handle, and another with the upper portion of said chamber and the lower end of the handle, and valves at the lower end of the handle for controlling the circulation.

2. A lifting jack comprising a support, a base on the support, a piston chamber on the base and a piston therein, a lifting member connected with said piston to engage the object to be lifted, a handle having a hinged connection with said base and provided with a fluid chamber, a barrel and plunger op-

erative in said handle, fluid circulating passages communicating with said piston chamber both below and above said piston and with said handle fluid chamber and plunger barrel at their lower portions, valves in the passages actuated by the movement of said plunger for permitting the fluid to enter and leave said piston chamber beneath and above said piston and into and out of the bottom of said handle.

3. A lifting jack comprising a jack body having a suitable base and a piston chamber thereon with passages at different levels near its upper portion and a piston therein, a lifting member connected with said piston to engage the object to be lifted, a handle having a hinged connection with said base, a barrel and plunger operative in said handle, said jack having fluid circulating passages communicating with said piston chamber above and below said piston and with the lower portion of the handle, and valves in said circulating passages for controlling the fluid.

4. A lifting jack comprising a base, a piston chamber thereon and a piston in the chamber, an object lifting member connected with said piston, said jack also having a fluid chamber and a plug in its top for filling purposes with passages connecting the piston chamber and fluid chamber at different levels and a port leading from the upper portion of said piston chamber to said fluid chamber, said piston chamber containing a supply of fluid above the piston which is forced therefrom into said fluid chamber, by the upward movement of said piston, a handle hinged to the base and having a pump therein, fluid circulating passages communicating with said piston chamber below and above said piston and with the lower portion of said pump whereby fluid may be forced from the pump through one of the passages into said piston chamber below the piston and drawn through the other passage from above the piston.

5. A lifting jack comprising a base, a piston chamber thereon, a piston therein, a fluid chamber having a port leading from the upper portion of said piston chamber to said fluid chamber, said piston chamber containing a supply of fluid which may be forced therefrom into said fluid chamber by the upward movement of said piston, a pump hinged to the base and having a fluid circulating passage extending through the hinge and partially around the hinged pinle and communicating with the bottom of said fluid chamber and the bottom of said piston chamber, and valves in the hinge for controlling the flow of fluid through said passage from said fluid chamber into the piston chamber.

6. A lifting jack comprising a base, a piston chamber and piston therein on the base

at one side of said chamber, a bearing on the base, a pump having an offset plug in said bearing, a fluid circulating passage from said bearing and partially around said plug and through said plug and communicating with said piston chamber below said piston, and a fluid chamber communicating with said passage and with said piston chamber above said piston and with the bottom of the pump around said plug.

7. A lifting jack comprising a base, a piston chamber thereon and piston therein, and an object lifting member connected with said piston, a pump hinged to the base, a fluid circulating passage through the hinge communicating with said piston chamber below said piston, and a fluid chamber communicating with said passage and with said piston chamber through an upper and a lower passage above said piston.

8. A lifting jack comprising a jack body having a piston chamber therein, a piston therefor, and an object-lifting member connected with said piston, said body having an inelastic fluid circulating passage communicating with said piston chamber and a fluid chamber for said passage, also an auxiliary fluid reservoir communicating with said piston chamber, a plunger and mechanism actuated thereby for admitting inelastic fluid step by step into said piston chamber with each stroke of said plunger, and mechanism adapted for connection with said object-lifting member for exerting an inward pull toward said member and jack body with the outward movement of said object-lifting member.

9. A lifting jack comprising a jack body having a piston chamber therein and piston therefor, and an object-lifting member connected with said piston, an inelastic fluid chamber and a circulating passage connecting it with said piston chamber below said piston, an auxiliary fluid reservoir communicating with said fluid chamber and said piston chamber and means for disconnecting said auxiliary fluid reservoir from said fluid chamber and said piston chamber, a handle for said jack body, a plunger having a hand grip and a comparatively long stem fitting within said handle, valves in said circulating passage, the reciprocating movement of said plunger operating said valves to feed said inelastic fluid into said piston chamber, said plunger being also mounted to actuate said valves and release the fluid in said piston chamber when a quick descent of the piston is desired.

10. A lifting jack comprising a support, a base swiveled on said support for rotation on a vertical axis, said base having thereon a piston chamber and piston therein, a lifting member connected with said piston and having teeth thereon, a latch on the piston chamber cooperating with the teeth to hold

the lifting member in adjusted positions, a handle connected with said base, a plunger operating in said handle, said handle and chamber forming part of an inelastic fluid circulating passage communicating with said piston chamber below said piston, and a fluid reservoir connected with said passage and with said piston chamber above said piston, and means actuated by movement of said plunger for admitting the inelastic fluid into said piston chamber with each stroke of said plunger. 1c

In witness whereof, I have hereunto set my hand this 23rd day of November, 1922.

LEONARD NILSON.