June 29, 1926. 1,590,849

L. NILSON

LIFTING JACK

Filed Dec. 22, 1924 2 Sheets-Sheet 1

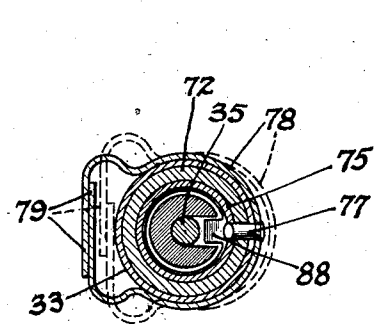


FIG. 4

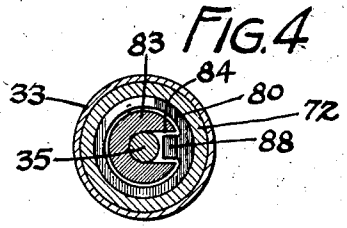


FIG. 5

FIG. 1

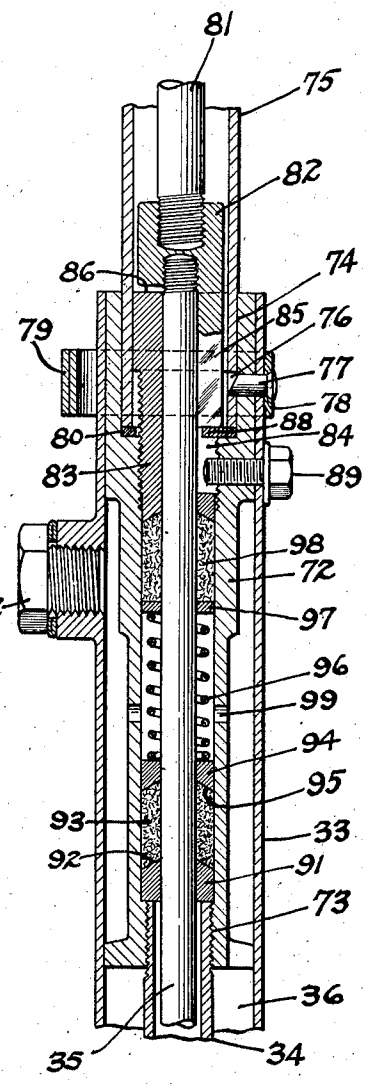


FIG. 6

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L. NILSON

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Filed Dec. 22, 1924 2 Sheets-Sheet 2

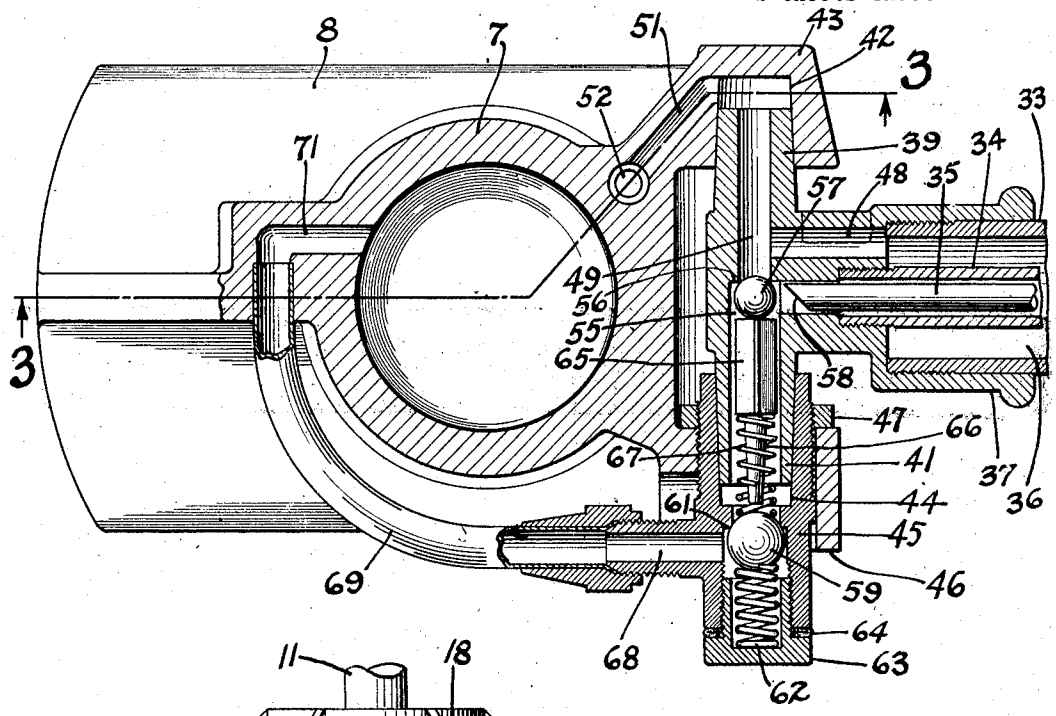


FIG. 2

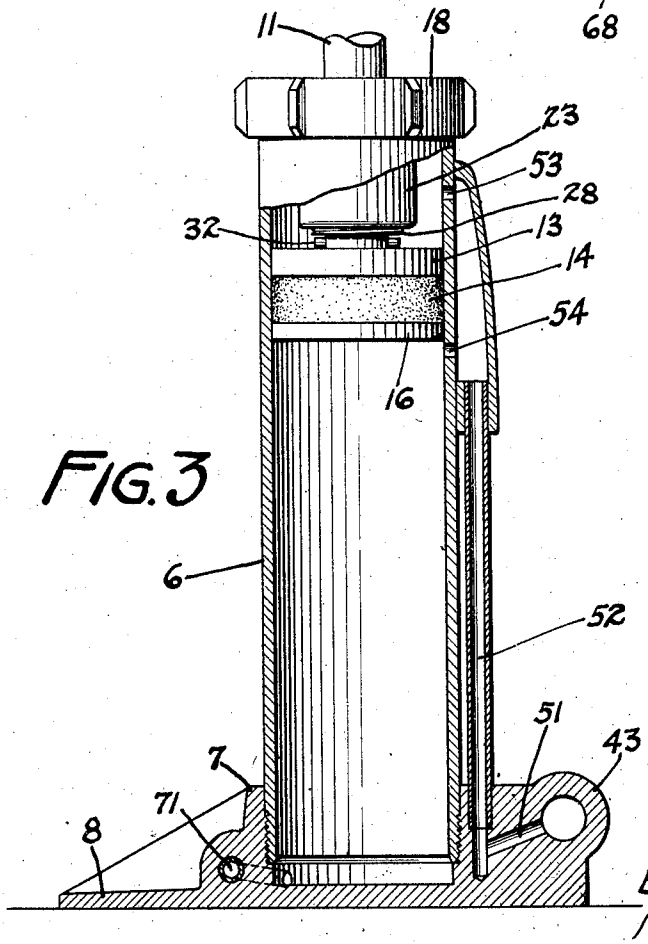


FIG. 3

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Patented June 29, 1926. 1,590,849

UNITED STATES PATENT OFFICE.

LEONARD NILSON, OF WAYZATA, MINNESOTA.

LIFTING JACK.

Application filed December 22, 1924. Serial No. 757,513.

This invention relates to improvements in lifting jacks of the hydraulic type such as are commonly employed for lifting the wheels of an automobile and the like, and more particularly is an improvement on the form of jack shown in my prior pending application, filed November 27, 1922, Serial #603,667.

The object of this invention is to provide a hydraulic lifting jack having an operating handle pivotally connected to the lower portion or base thereof so that the displacement pump mounted in the handle may be operated at any angle with reference to the jack.

A further object is to provide a jack having a jointed handle pivotally connected thereto, said handle comprising an auxiliary chamber or reservoir wherein the displacement pump is reciprocally mounted, and the pump being provided with a yieldably movable take-up means adjacent its upper end portion which functions to automatically compress the packing against the pump rod to prevent leakage therethrough.

A further object is to provide a jack of the above character having an inverted packing box provided in the cylinder head, and having means provided on the piston rod thereof adapted to engage the packing nut when the piston is raised to the limit of its upward movement, so that when the piston rod is rotated within the cylinder of the jack the relative position of the packing nut may be adjusted in the cylinder head, thereby to compress the packing against the piston rod to prevent leakage.

A further object of the invention is to provide such a jack having all of its valves and associated parts removably mounted in the lower pivotal connection between the handle and pump so that the valves may readily be removed from the jack for cleaning or replacement without having to remove the handle from the jack.

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 drawing, 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 accompanying drawings forming a part of this specification,

Figure 1 is a cross-sectional view of the improved jack showing the piston rod and piston in lowermost or normal position;

Figure 2 is a cross-sectional view on the line 2—2 of Figure 1 showing the simple construction of the valves mounted in the pivotal connection between the handle and base of the jack;

Figure 3 is a vertical sectional view on the line 3—3 of Figure 2, the upper portion of the jack being shown in elevation;

Figure 4 is a cross-sectional view through the upper portion of the operating handle showing the preferred means provided for demountably connecting the upper section of the pump handle to the relatively larger lower handle section;

Figure 5 is a cross-sectional view on the line 5—5 of Figure 1 showing the means provided for limiting the downward movement of the pump rod.

Figure 6 is an enlarged detail sectional view of the upper end of the pump section of the handle.

The jack shown in the accompanying drawings comprises a hollow tube or cylinder 6 suitably mounted in a raised boss 7 integrally formed on a suitable base 8 as shown in Figure 1. The cylinder 6 may be secured to the boss 7 by such means as the threads 9. A piston rod 11, having a lifting head 12 secured to the upper end thereof, is reciprocally mounted within the cylinder 6. A piston head is secured to the lower end of the piston rod. This piston head preferably comprises a disk-like member 13 whereon the usual leather cup or packing 14 is mounted as shown. A washer 15 is seated on the lower central portion of the packing adapted to be engaged by a flanged nut 16 received in threaded engagement on the lower end of the piston rod. The flanged nut 16 is provided with a series of apertures 17 through which the pressure fluid may enter the inside of the piston and outwardly force the vertical wall of the packing against the wall of the cylinder 6, thereby positively preventing any of the fluid from escaping around the packing when the piston is being raised to lift a load. The peripheral flange of the nut 16 is also arranged to overhang

the lower edge of the packing cup thereby providing a longer bearing for the piston rod when being raised and also preventing the lower edge of the cup from becoming damaged in use. It also functions to prevent the fluid from inwardly forcing the flange of the packing, and escaping thereby to the upper portion of the jack.

A feature of this invention resides in the novel means provided at the upper portion of the cylinder 6 to prevent leakage of the fluid therethrough when the jack is in operation. As shown in Figure 1, a cylinder head or cap 18 having a tapered seat 19 is mounted upon the upper end of the cylinder 6 by means of suitable threads 21. The upper inner corner of the cylinder wall 6 is correspondingly tapered to provide a seat for a suitable packing washer or gasket 22. When the cap 18 is rotated on the threads 21, the gasket 22 will be tightly compressed between the tapered seat 19 of the head and the upper end of the cylinder wall thereby positively preventing any leakage of fluid therethrough. The cap 18 is also provided with an inverted stuffing-box depending within the upper end of the cylinder 6. As shown in Figure 1, this stuffing-box preferably comprises a hub 23 having a conical seat 24 at the upper end thereof against which the usual packing 25 is compressed by means of an annular ring 26 engaged by a suitable compression spring 27. The other end of the spring 27 is seated against a packing nut 28 which is adjustably mounted in threads 29 provided in the lower end of the hub 23.

The means provided for adjusting the position of the packing nut 28 to tighten or compress the packing 25 preferably consists in providing suitable slots or grooves 31 in the lower face of the nut adapted to receive the oppositely projecting end portions of a pin 32 mounted in the lower end of the piston rod adjacent the disk-like member 13. When it is desired to change the relative position of the packing nut 28 the operator will raise the piston rod until the ends of the pin 32 engage the slots 31 in the nut after which the nut may readily and conveniently be rotated and adjusted by simply rotating the upper end of the piston rod. When the packing has been tightened to the desired degree to prevent leakage around the piston rod, the packing nut will be frictionally retained in adjusted position by means of the spring 27 which tends to downwardly force it against the threads 29. It will be noted that when the piston rod is in lowermost position, as shown in Figure 1, and the head 12, is bearing against the cylinder head or cap 18, that a space will be provided between the piston and the bottom wall of the cylinder, formed by the base. This space is to provide clearance for the fluid so that it may be forced under the piston when it is desired to raise it.

Another feature of this invention resides in the novel construction of the pivotal connection between the pump handle and the base of the jack. As shown in Figure 1, the lower portion of the operating handle is preferably constructed of a relatively larger tubular member 33 having a smaller tube 34 mounted therein adapted to receive the pump rod 35 reciprocally mounted therein. As a result of the tubular member 33 being relatively larger in diameter than the tube 34, a space or chamber 36 will be provided within the lower portion of the pump handle which functions as an auxiliary fluid reservoir or chamber which is in communication with the interior of the jack cylinder through a valved passageway provided in the lower pivotal connection of the handle. and which will be subsequently described. The tubular member 33 has its lower end fixedly mounted in a hub 37 of a T-shaped head 38 having oppositely extending tapered end portions 39 and 41, as particularly shown in Figure 2. The end portion 39 is mounted in a correspondingly tapered bearing 42 provided in a hub 43 integrally formed on the base plate 8 as shown. The opposite end portion 41 is mounted in a tapered bearing 44 provided in a sleeve 45 which is adjustably mounted in a hub 46. The inner end of the sleeve 45 is threaded to receive a locknut 47 whereby the sleeve 45 may be axially adjusted within the hub 46 so as to provide leak-tight joints between the tapered extensions 39 and 41 and their correspondingly tapered seats 42 and 44, respectively. By means of the nut 47, the pivots may also be adjusted so as to provide the proper friction to suit the operator. A port 48 is provided in the T-shaped head 38 and leads from the chamber 36 of the pump handle, to a duct 49 provided in the end portion 39 of the T-shaped head. A port 51 is provided in the boss 43 of the base 8 and leads from the duct 49 to a passageway 52 provided adjacent the outer wall of the cylinder and having its upper end in communication with the upper end of the cylinder by means of apertures 53 and 54. Thus it will be seen that the upper portion of the cylinder will always be in direct communication with the auxiliary reservoir or chamber 36.

The valve mechanism provided for controlling the return flow of the fluid from beneath the piston to the upper portion of the cylinder and the auxiliary reservoir, preferably consists of a pair of ball check valves which are operatively mounted in the T-shaped head 38 and the sleeve 45, as is clearly shown in Figure 2. As here shown, the tapered end portion 41 of the T-shaped head is provided with a relatively larger

bore 55, having a seat 56 centrally provided at the inner end thereof adapted to receive a ball valve 57. This valve is preferably arranged so as to have its center substantially in axial alignment with the pump rod 35 so that when the pump rod is downwardly moved to the limit of its downward movement, in the lowering operation of the jack, the lower tapered end portion 58 thereof will engage the ball and unseat it to allow the fluid to return from beneath the piston to the upper portion of the cylinder, and to the auxiliary reservoir or chamber 36. A similar valve 59 is mounted in the sleeve 45 and is yieldably held against a seat 61 by means of a compression spring 62, preferably mounted in a hollow cap 63 received in threaded engagement in the end of the sleeve 45. A suitable gasket 64, preferably of asbestos, is interposed between the flanged head of the cap 63 and the end of the sleeve to provide a tight joint therebetween. The means provided for opening or unseating the outer valve 59 when the inner valve 57 is opened by downward movement of the pump rod 35 preferably consists of a triangular member 65 which is interposed between the two valves in the bore 55 of the end portion 41 of the T-shaped head. This triangular member has a reduced end portion 66 provided on one end thereof upon which a coiled compression spring 67 is mounted having one end bearing against the adjacent end of the triangular member 65 and the other end bearing against the ball check valve 59. It is to be understood that the spring 62 is comparatively stronger than the inner spring 67 so that the ball valve 59 will normally be held against the seat 61 against the tension of the spring 67. When in normal closed position, as above described, the spring 67 will yieldably retain the inner check valve 57 in closed position against the seat 56 as shown in Figure 2. It is also to be understood that the overall length of the triangular member 65 and its reduced end portion 66 is less than the shortest distance between the two valves 57 and 59 to be opened against the tension of the spring 67 and without unseating the valve 59 each time the pump rod 35 is upwardly drawn to fill the inner tube 34 with fluid, which action of the pump rod will necessarily cause the valve 57 to open. When the pump rod is downwardly moved to force the fluid under the piston, the valve 57 will retain its closed position and the fluid will pass thereby and around the openings between the triangular member 65 and the bore 55 and against the outer check valve 59. The pressure of the fluid against the check valve 59 will cause it to open and allow the fluid to be forced into a port 68 which is in communication with the bottom of the cylinder through a tube 69 and duct 71. When the downward stroke of the pump rod 35 has been completed and it is again outwardly drawn in the operation of the next stroke, the valve 59 will be closed by the spring 62 and the valve 57 will again be opened by the suction of the pump rod against the tension of the spring 67. When it is desired to lower the jack, the pump rod 35 will be moved to the limit of its downward stroke, thereby causing the beveled face 58 thereof to engage the valve 57 and unseat it against the tension of the spring 67. Such unseating of the valve 57 will cause the triangular member 65 to be axially moved within the bore 55 until the terminal of the reduced end portion 66 will engage the valve 59 and open it against the tension of the spring 62. When the two valves have thus been opened the fluid will return from beneath the piston through the tube 69, port 68, by the open valve 59, through the bore 55 and by the open valve 57; thence through the duct 49, port 51, passageway 52 and into the upper portion of the cylinder. A portion of the fluid will also be returned to the auxiliary reservoir or chamber 36 through the port 48. As soon as the pump rod is upwardly drawn out of engagement with the check valve 57, the two valves will again automatically be moved into closing position. Referring to Figure 2, it will be seen that should the valves become inoperative as a result of dirt and grit or from wear, they may readily and quickly be removed from their seats for cleaning or renewal, by simply unscrewing the cap 63 and slightly tilting the jack until they drop out of their seats. It will also be seen that when the valves are opened, the valve 57 will be opened first against the tension of the spring 67, there being substantially no back pressure in the bore 55. Such movement of the valve 57 will cause the triangular member 65 to be moved towards the valve 59 until the reduced end portion 66 contacts with the valve and forces it off its seat. Thus, as soon as the valve 59 is opened the fluid may freely return to the upper portion of the cylinder and the auxiliary reservoir. In actual operation of the jack, it has been found that should the valves become stuck from dirt and grit, they may sometimes be operative by simply tapping the valve 57 with the end 58 of the plunger rod, thereby eliminating the necessity of having to remove the valves for cleaning.

A hollow sleeve 72 is suitably secured to the upper end of the tubular member 34 of the pump handle by such means as brazing or welding. Referring to Figure 6, it will be noted that the upper end of the relatively smaller tube 34 which forms the barrel or cylinder for the pump rod 35 is secured to the lower end thereof by means of threads 73. The upper end of the sleeve 72 is provided with a relatively larger bore 74 adapt-

ed to receive one end of the handle section 75 as shown in Figure 1. An aperture 76 is provided in the wall of the handle section 75 adjacent its lower end and this aperture is adapted to receive a locking pin 77 mounted in a flexible metallic band 78 arranged to encircle the upper end of the lower tubular member 33 of the pump handle. The pin 77 passes through an aperture provided in the wall of the sleeve 72 as shown in Figures 1 and 6. The ends of the band 78 are preferably formed to overlap each other as shown in Figure 4 so that when it is desired to remove the upper handle section 75 from the lower handle section 33, the operator will press the overlapping ends 79 of the band towards and against the wall of the tubular member 33, thereby causing the pin 77 to be outwardly moved to the position shown in dotted lines in Figure 4, out of engagement with the aperture 76 provided in the handle section 75. The handle section 75 may then readily be disconnected from the lower handle section after the upper end 81 of the pump rod has been unscrewed from the head 82 secured to the upper end of the pump rod 35. A threaded bushing 83 is mounted in the sleeve 72 and upwardly projects into the enlarged bore 74 provided at the upper end of the sleeve. An open ended slot or opening 84 is provided in one side of the bushing 83 adapted to receive an elongated lug or extension 85 provided on one side of the head 82 of the pump rod and depending therefrom in axial alignment with the pump rod. In the operation of the pump rod 35, the lower end of the lug 85 will engage the face 86 of the bushing 83, thereby preventing the lower end of the pump rod from contacting with the ball check valve 57. When it is desired to unseat the valves to release the fluid from beneath the piston, the pump rod 81 will be rotated by means of the hand grip 87 until the depending lug 85 is brought into registration with the open ended slot 84 in the bushing 83, after which the pump rod may be moved to the limit of its downward movement into engagement with the valve 57 which will be opened thereby. It is to be understood that when the lug 85 is in alignment with the slot 84 the lower beveled face 58 of the pump rod will be in the position shown in Figure 2, in which position it will cause the valve to be unseated when downwardly moved to the limit of its movement. In order to prevent the lower pointed end of the pump rod 35 from becoming damaged from contact with the opposite side of the bore 55 a stop washer 80 is preferably mounted in the bottom of the enlarged bore 74 of the hollow sleeve 72. This stop washer is preferably provided with an inwardly projecting lug 88 which is fitted into the elongated opening or slot 84 as clearly shown in Figures 4 and 5. When the pump rod is downwardly moved to unseat the valves, the lower face of the lug 85 will engage the lug 88 of the washer 80, thereby preventing the rod from further downward movement. The bushing 83 is preferably locked in adjusted position by means of the lockscrew 89 shown in Figure 1. The end of this screw is preferably inserted into the slot 84 of the bushing 83 when the latter is in locked adjusted position. Thus, it will be seen that when the bushing has been adjusted to tighten or compress the packing 98, and the screw 89 is inserted in the slot 84, the beveled face 58 of the pump rod will always be positioned as shown in Figure 2, when the lug 85 is inserted into the open end of the slot 84, in which position it may be downwardly moved to unseat the two valves.

Means are also provided in this novel jack to positively prevent any leakage of fluid from the upper end of the handle section 33 and the pump mounted therein. Such means preferably consists in mounting a packing washer 91 within the bore of the hollow sleeve 72 and in abutting relation to the upper end of the tube 34. This packing washer is provided with a projecting inclined face 92 which is adapted to engage the usual packing 93 and outwardly force it against the wall of the sleeve 72. A packing washer 94 is also mounted in the sleeve 72 to provide a backing for the packing 93 as shown in Figure 1. This washer is provided with a recessed face 95 which is preferably correspondingly inclined and functions to force the packing inwardly against the pump rod 35. A compression spring 96 is interposed between the packing washer 94 and a flat washer 97 which functions to compress the upper packing 98 against the lower inclined face of the threaded bushing 83. By means of this novel construction, it will be seen that any pressure built up within the hollow tube 34 around the pump rod 35 will act directly against the lower packing washer 91 which will tend to upwardly move it against the packing 93. Such action of the packing washer 91 will cause the lower portion of the packing to be outwardly forced against the walls of the sleeve 72. Conversely, the upper end of the packing 93 will be forced inwardly against the pump rod by the action of the inclined face 95 of the washer 94, thereby preventing any leakage of fluid around the pump rod or between the packing and bore of the sleeve 72. Upward movement of the packing washer 94 will be prevented by the action of the spring 96 which also functions to retain the upper packing 98 under constant pressure. Should any fluid, however, escape by the lower packing 93, then it will enter into the chamber wherein the spring 96 is mounted

and from which chamber it will be returned to the auxiliary reservoir 36 through suitable ports 99 provided in the wall of the sleeve 72. A notch 101 is provided in the lower flange of the sleeve 72 through which any fluid being returned to the chamber 36 through the apertures 99 may return to the reservoir 36. A filler plug 102 is provided in the tubular handle member 33 adjacent its upper end by means of which the jack may be supplied or filled with a suitable operating fluid.

Means are also provided to prevent an excessive pressure from being built up within the lower portion of the jack in the lifting operation thereof. Such means preferably consists in the provision of the port 54 which is located as shown in Figure 3 and functions to allow the fluid pumped under the piston to be returned to the auxiliary reservoir or chamber 36 when the piston has reached a predetermined height.

I claim as my invention:

1. A lifting jack comprising a base, a pump barrel and plunger, a handle having a head journaled in said base and provided with a duct leading to said barrel, valves in said duct controlling the delivery of inelastic fluid to said barrel, and means permitting the removal of said valves from said duct without removing said head from its bearings in said base.

2. A lifting jack comprising a base, a pump barrel and plunger, a handle having a head journaled in said base and provided with a duct leading to said barrel, valves in said duct controlling the delivery of inelastic fluid to said barrel, and means permitting the removal of said valves from said duct without removing said head from its bearings in said base, said means comprising a coupling sleeve having a removable cap.

3. A lifting jack comprising a base, a pump barrel and plunger therefor, a handle having a T-shaped head, a pump handle therein, a sleeve adjustably mounted in said base and having a tapered seat therein to receive a correspondingly shaped end of said head, and permit said handle to be tilted, said head and sleeve having an inelastic fluid duct communicating with said barrel and valves for controlling the flow of inelastic fluid through said duct, the adjustment of said sleeve increasing or decreasing its frictional contact with said head to obtain the desired resistance to the movement of said handle.

4. A lifting jack comprising a base, a pump barrel and plunger therefor, a handle having a T-shaped head journaled in said base, a coupling sleeve provided at one end of said head and seated thereon and having a suitable take-up device, said head and sleeve having an inelastic fluid duct therein, and valves for said duct, a tube and coupling therefor connecting said sleeve with said barrel, and permitting adjustment of said sleeve by said take-up device, and a cap removably mounted in said sleeve and permitting access to said duct and valves.

5. A lifting jack comprising a barrel, a plunger and rod therefor, a supporting base for said barrel having hubs thereon, one of said hubs having a bore and the other a tapered seat, a sleeve fitting within said bore and having a tapered seat, a handle having a T head with tapered ends to fit said tapered seats, said sleeve having a take-up nut for adjusting it to draw said head to its seats, said sleeve and head having ducts therein and valves for said ducts.

6. A lifting jack comprising a barrel having a base, a plunger and rod therefor in said barrel, a handle mounted on said base and having an inelastic fluid reservoir and supply and return ducts leading to said barrel, and valves for said ducts controlling the feed and return of inelastic fluid, a reciprocating pump rod mounted in said handle adapted to control the opening and closing of said feed and return valves, and means for positively unseating said feed valve when said return valve is actuated by the engagement of said pump rod therewith.

7. A lifting jack comprising a barrel having a suitable base and plunger and rod therefor, a handle mounted on said base and having an inelastic fluid reservoir therein, and supply and return ducts communicating with said reservoir and with said barrel above and below said plunger respectively, said ducts having seats and valves therefor, a thrust member interposed between said valves and normally out of contact with said supply valve and having means for yieldingly holding said return valve normally to its seat, a pump rod operating in said handle, the downward stroke of said rod opening said supply valve and the upward stroke thereof opening said return valve, said rod having means, when moved into engagement with said return valve, for forcing it off its seat and moving said thrust member lengthwise to positively unseat said supply valve and thereby relieve the pressure on said plunger and allow it to drop in said barrel.

8. A lifting jack comprising a pump barrel having a plunger and rod therefor, a head for said barrel having a stuffing-box depending within said barrel and wherein said rod is slidable, said box having a tapered seat and packing therefor, an adjusting nut for said packing and said rod having means for engaging and adjusting said nut with the rotation of said rod.

9. A lifting jack comprising a pump barrel having a plunger and rod, a head for said barrel having a stuffing-box depending

therein and in which said rod is slidable, a packing for said box, an adjusting nut therefor having a transverse slot and a pin mounted in said rod to enter said slot for turning said nut when said rod is rotated.

10. A lifting jack comprising a barrel, a plunger and rod therefor, a handle connected with the base of said barrel and having an inelastic fluid duct therein communicating with said barrel, a return valve in said duct, a pump rod mounted in said handle to normally reciprocate therein and force the inelastic fluid pressure into said barrel under said plunger, and also having a movement to unseat said valve, means normally preventing sufficient downward stroke of said pump rod to unseat said valve but permitting such downward movement when said rod is rotated to a predetermined position.

11. A lifting jack comprising a barrel, a plunger and rod therefor, a handle connected with the base of said barrel and having an inelastic fluid duct therein communicating with said barrel, a return valve in said duct, a pump rod mounted in said handle to reciprocate therein and force the inelastic fluid pressure into said barrel under said plunger, continued movement of said rod unseating said valve, means normally limiting the downward stroke of said pump rod to prevent unseating of said valve but permitting such downward movement when said rod is rotated to a predetermined position, said means comprising a bushing mounted in said handle and having a longitudinal slot therein, and a lug on said pump rod normally contacting with the end of said bushing but adapted to enter said slot when said rod is rotated.

12. A lifting jack comprising a pump barrel, plunger and rod therefor, a handle connected with said barrel and having an inelastic fluid duct communicating with said barrel beneath said plunger, and a valve in said duct for controlling the flow of inelastic fluid from said barrel to said handle, a pump rod mounted in said handle and having a beveled lower end adapted to engage and unseat said valve, and means for limiting the downward stroke of said pump rod and preventing damage to the beveled end thereof.

13. A lifting jack comprising a pump barrel, plunger and rod therefor, a handle connected with said barrel and having an inelastic fluid duct communicating with said barrel beneath said plunger, and a valve in said duct for controlling the flow of inelastic fluid from said barrel to said handle, a pump rod mounted in said handle and having a tapered lower end adapted to engage and unseat said valve, and means for limiting the downward stroke of said pump rod and preventing damage to the tapered end thereof, said means including a stop washer having an inwardly projecting lug in the path of a depending lug on said pump rod.

14. A lifting jack comprising a barrel having a suitable base, a plunger and rod therefor, a handle mounted on said base and comprising outer and inner tubular members with a space between them forming an inelastic fluid reservoir, said base and handle having ducts therein communicating with said barrel and with said inner and outer tubular members, and valves for controlling the flow of fluid through said ducts, a sleeve forming a continuation of said inner tubular member, a pump rod mounted to slide in said sleeve and inner tubular member, a packing box for said pump rod provided in said sleeve and ports in said sleeve for conducting leakage in said stuffing-box to said fluid reservoir.

15. A lifting jack comprising a barrel and base therefor, a plunger and rod in said barrel, a handle mounted on said base, a tubular member carried by said handle and having an inelastic fluid reservoir and a duct connection with said barrel, a pump rod mounted to slide in said tubular member, a sleeve mounted in said handle and encircling said pump rod and forming a continuation of said tubular member, stuffing-boxes comprising packing and washers therefor encircling said pump rod within said sleeve and having a space between them and a compression spring in said space separating said washers, the wall of said sleeve having ports between said washers leading from said space to said reservoir through which leakage around said packing is returned to said reservoir.

16. A lifting jack comprising a barrel having a suitable base, a plunger and rod for said barrel, a handle mounted on said base, a tube in said handle communicating with said barrel, a sleeve connected with said tube, a pump rod slidable in said tube and sleeve, packing washers on said rod in said sleeve and having opposing convex and concave surfaces, a packing between said washers adapted to slide on said rod, one of said washers being exposed to pressure in said tube when said rod is pressed down, and yielding means for normally holding the other washer against movement on said rod.

17. A lifting jack comprising a barrel and base therefor, a plunger and rod in said barrel, a handle mounted on said base, a tubular member carried by said handle and having an inelastic fluid reservoir and a duct connection with said barrel, a tube within said member, a sleeve within said member forming a continuation of said tube, a pump rod mounted to slide in said sleeve and tube, a packing within said sleeve exposed to the pressure in said tube when said rod is thrust downwardly, said packing being adapted to

slide up and grip said rod, and a spring on said rod within said sleeve for yieldingly resisting such upward movement of said packing.

18. A lifting jack comprising a barrel and base therefor, a plunger and rod in said barrel, a handle mounted on said base, a tubular member carried by said handle and having an inelastic fluid reservoir and a duct connection with said barrel, a tube within said member, a sleeve within said member forming a continuation of said tube, a pump rod mounted to slide in said sleeve and tube, two sets of packing washers and packing within said sleeve, a washer of one set being exposed to the pressure in said tube when said rod is operated, and adapted to slide under such pressure on said rod, a spring on said rod between said sets of packing and normally resisting such sliding movement, and said second packing serving to prevent the inelastic fluid from leaking out around said pump rod when said handle is in horizontal position.

19. A lifting jack comprising a barrel and base therefor, a plunger and rod in said barrel, a handle mounted on said base, an inelastic fluid reservoir provided in said handle and having a duct connection with said barrel, a sleeve within said handle, a pump rod adapted to reciprocate in said sleeve, two sets of packing washers and packing therefor encircling said pump rod within said sleeve, a compression spring interposed between the sets of packing to resist movement thereof on said rod, and a bushing mounted in said sleeve for adjustment of said packing sets and said compression spring.

20. A lifting jack comprising a barrel and base therefor, a plunger and rod for said barrel, a handle mounted on said base and having an inelastic fluid reservoir and duct communicating with said barrel, a valve in said duct, a pump rod mounted to reciprocate in said handle and having an end to unseat said valve, a sleeve and packing therein for said rod in said handle, a slotted bushing having threaded engagement with said sleeve for adjusting said packing, said rod having means normally limiting its stroke but adapted when rotated to a predetermined position to enter the slot in said bushing and allow said rod to unseat said valve, and a locking bolt adapted to enter the slot in said bushing and hold it in position to allow the valve release stroke of said rod.

21. A lifting jack comprising a barrel and base therefor, a plunger and rod in said barrel, a handle mounted on said base and comprising a tubular member having an inelastic fluid reservoir therein and a duct connection with said barrel, a pump rod mounted in said handle, a telescoping handle extension for the outer end of said tubular member, a pump rod extension mounted in said handle extension and having means for connection with said rod, and a snap fastening device for removably mounting said handle extension on the outer end of said tubular member.

22. A lifting jack comprising a base, a piston cylinder and piston therein on the base, a plurality of bearings on the base, a pump including a reciprocating plunger with its base pivoted in said bearings and connections from the pump through the base to the upper and lower part of the piston chamber, having valves therein to properly control the flow of fluid from said pump to the upper and lower ends of said piston chamber.

In witness whereof, I have hereunto set my hand this 19th day of December, 1924.

LEONARD NILSON.