

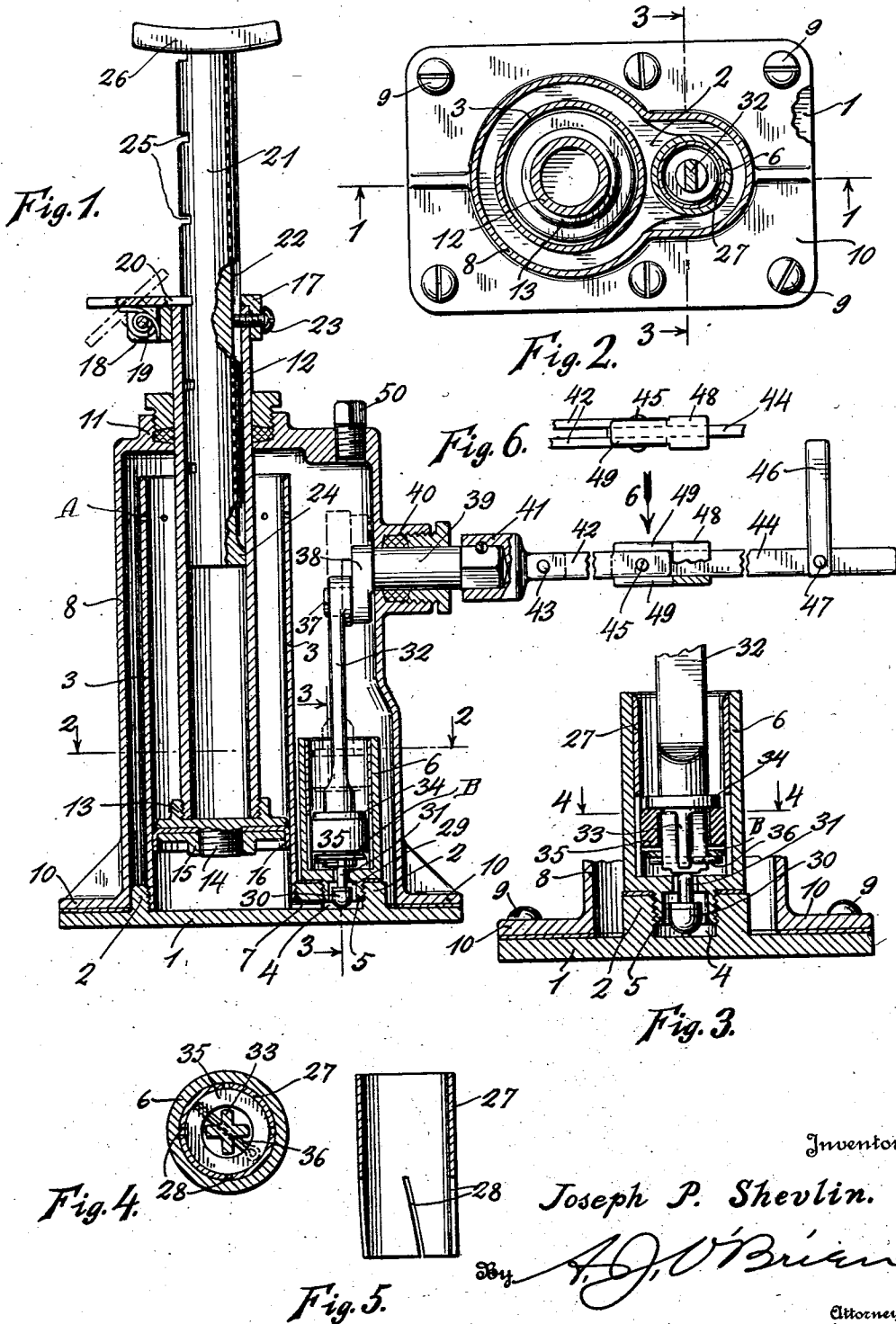
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HYDRAULIC JACK

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HYDRAULIC JACK.

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This invention relates to improvements in jacks for automobiles and has reference more particularly to improvements in hydraulic jacks.

5 The ordinary lifting jacks which are operated by means of a handle that must be moved up and down like a pump handle are open to several serious objections which I will not enumerate in detail. I will, how-
10 ever, call attention to the fact that the ordinary pleasure car as now constructed has a gas tank, spare tire holder, bumper and sometimes a trunk secured to the rear end. This makes it almost impossible to put the
15 ordinary lifting jack in place and to operate the same unless the operator lies full length on the ground. To overcome this difficulty various improved constructions have been proposed which, however, have not been
20 very extensively adopted. Since the balloon tire has come into use another element has entered into the problem of proper lifting jack construction, namely, the fact that when a balloon tire is used the diameters of
25 the wheel rim are greatly reduced with the result that when the tires are deflated the axles are so near the ground that the ordinary jacks cannot be used.

It is the object of this invention to produce a lifting jack that is short enough to permit it to be put into place beneath the
30 axles of cars having balloon tires as well as with those having ordinary tires and which may be operated by means of a foldable handle of such length that the operator can remain in a comfortable position while using
35 the jack.

The above and other objects that will become apparent as the description proceeds are attained by means of a construction that I will now describe in detail, reference for
40 this purpose being had to the accompanying drawing in which the preferred embodiment of my invention is shown and in which:

45 Fig. 1 is a vertical section taken on line 1—1, Fig. 2;

Fig. 2 is a transverse section taken on line 2—2, Fig. 1;

50 Fig. 3 is a vertical transverse section of the pump taken on line 3—3, Figs. 1 and 2;

Fig. 4 is a section taken on line 4—4, Fig. 3;

Fig. 5 is a longitudinal section of the pump lining, and

55 Fig. 6 is a fragmentary plan view of the

handle looking in the direction of the arrow 6 in Fig. 1.

My improved jack consists of a base member 1 having a raised central portion 2 on its upper surface. The raised portion has a
60 cylindrical recess whose inner surface is threaded for the reception of the threaded lower end of the lifting cylinder 3. The raised portion 2 is also provided with a
65 threaded opening 4 for the reception of the threaded projection 5 on the bottom of the pump cylinder 6. An opening 7 connects the opening 4 with the cylindrical recess in the manner shown in Fig. 1. A casing 8
70 is secured to the upper surface of the base 1 by means of screws 9 that pass through the flange 10 into the base. The casing 8 is of such shape that its inner surface fits
75 against the outer edge of the raised portion 2. The top of the casing 8 has a stuffing box 11 through which the tubular piston rod 12 passes. To the lower end of the piston
80 rod, I have secured a metal head 13 of slightly smaller diameter than the interior of the cylinder 3. A threaded lug 14 projects downwardly from the lower side of the head 13 and has operatively connected therewith
85 a flanged nut 15 by means of which the leather cup 16 is held in place. Secured to the upper end of the piston rod 12 is a collar 17 that has two outwardly projecting
90 ears 18 which are perforated for the reception of the pin 19 about which the stop plate 20 pivots. A rod 21 which is of the proper diameter to fit the interior of the tubular
95 piston rod 12 is inserted therein from above. This rod has a longitudinal groove 22 that is engaged by the screw 23 and which prevents it from rotating with respect to the piston rod. The lower end of the groove
100 22 terminates a short distance above the end of the rod 21 so as to provide a stop 24 which prevents its withdrawal from the piston rod. On the side opposite from the groove 22 the rod 21 has several spaced
105 notches 25 into which the stop plate may project in the manner shown in full lines in Fig. 1. The upper end of the bar 21 is provided with an upwardly curved plate 26
110 whose upper surface is adapted to engage the lower surface of the axle. The upper portion of the cylinder 3 is provided with perforations A of sufficient size and number to allow the liquid pumped into said cylinder to escape into the chamber of the casing

8, to prevent accident, since in the absence of these openings the top of the casing might be broken if the piston of the lifting cylinder 3 should continue its upward movement due to the careless operation of the pump.

The pump cylinder 6 has a lining consisting of a tube 27 whose outer diameters is such that it fits the cylinder with a driving fit. Before this lining tube is inserted into the cylinder, its lower end is provided with several saw cuts or slots 28 which extend upwardly a little more than one-third of its length. The threaded projection 5 has an axial opening 29 for the reception of the head 30 of the check valve whose stem 31 extends through an opening in the bottom of the pump cylinder. Operatively associated with the pump cylinder is a piston or plunger formed on the lower end of the connecting rod 32. The lower end of this rod has a transverse section resembling a cross (Fig. 4) having four arms 33 that terminate a short distance below the flange 34. A cylindrical leather member 35 surrounds the cross-like portion and is held in place by a pin or cotter key 36. A metal washer separates the lower end of the leather member 35 from the cotter key. The leather ring 35 is of such length that it may reciprocate slightly between the flange and the washer. The leather ring by virtue of the fact that it fits closely within the pump cylinder 6, will assume its lowermost position during the upward movement of the rod 32, leaving a space below the flange 34 and around the cruciform part of the rod, to permit the liquid to pass from the space above to that below the plunger during the upward movement of the latter. Again for the same reason, during the downward movement of the plunger, the leather ring will move to its uppermost position or into contact with the flange 34, thus preventing any liquid from passing from the space below the plunger to that above the plunger during the downward movement of the latter.

The upper end of the rod 32 is connected to the crank pin 37 on the end of the crank arm 38 which is integral with the shaft 39. It will be noticed that the crank shaft extends through the wall of the casing and is rotatable in the stuffing box 40. The outer end of the crank shaft is square and adapted to enter the socket 41 on the end of the handle. This handle comprises two bars 42 that are connected to the end of the socket 41 by means of a pin 43. Another similar bar 44 is pivoted between the other ends of the bars 42 by a pin 45. A short bar 46 is pivoted at 47 to the bar 44 and serves as a lever by means of which the shaft 39 may be given a rotary movement. For the purpose of preventing the bars 42 and 44 from bending about the pivot 45 when they are in use, I have provided the bar 44 with a slide 48

that has two projecting side members 49 which engage the edges of the bars 42 and prevent the parts from bending.

When the crank pin 37 is in its uppermost position, shown dotted in Fig. 1, the plunger with its leather ring 35 is in the position with respect to the pump cylinder shown by dotted lines in Fig. 1, but when the crank pin is in its lowermost position the parts are in the full line position, in which position the check valve in opening 29 is held open in the manner shown. In this position the upper edge of the ring 35 is below the upper ends of the slots 28 so that liquid may pass from the interior of the cylinder 3 through the passage 7 by the valve head 30 and through the cuts or slots 28 to the upper side of the plunger in the pump cylinder. During the normal operation of the jack for raising the load, the leather member 35 should never pass entirely below the upper extremities of the slots or cuts 28. It is easy to control the movement of the plunger in this regard, since the normal travel of the handle for the purpose of reciprocating the pump plunger, will ordinarily not move through more than an arc of 90 degrees. Hence, when it is desired to release the load, it will only be necessary to move the handle through a somewhat greater arc or sufficiently to cause the plunger to travel to its lowermost position. The casing 8 is provided with an opening in its top that is closed by a plug 50. This opening is employed for filling the casing with liquid. The liquid used may be water, oil or a mixture of glycerine and alcohol or any other liquid that is suitable for this purpose. The casing can be filled with liquid to a point slightly above the top of the cylinder 3 as the liquid space is constant at all positions of the piston and plunger. The liquid within the casing is not under pressure at any time as the pressure is confined to the space below the piston and pump plunger.

The operation of my device is as follows. Let us assume that the parts are in the position shown in Fig. 1. The operator grasps the bar 46 and rotates the shaft 39 one-half a turn thereby bringing the crank arm to dotted line position. When the plunger in the pump cylinder moves upwardly liquid will pass from the top to the lower side thereof, traveling through the space below the flange 34 and around the cruciform part of the rod 32 as heretofore explained. When the plunger is again moved downwardly it will force liquid past the check valve through the passage 7 and into the cylinder 3 thereby moving the piston rod 12 upwardly. The check valve will prevent the liquid from returning into the pump as the plunger is again moved upwardly. In this manner the piston rod 12 is gradually extended. When the load is to be lowered the

crank is moved into full line position (Fig. 1) which causes the lower end of the plunger to force the check valve into open position and brings the leather ring 35 down below the upper ends of the cuts 28, thereby permitting the liquid to flow back into the casing. I desire to call particular attention to the fact that the by-pass is opened by a slight extra rotation of the shaft 39 which makes it possible to release the jack without removing the handle from the end of the shaft, as heretofore explained.

Having now described my invention what I claim as new is:

1. A hydraulic jack comprising lifting and pump cylinders having associated pistons and piston rods, and an operative connection between the cylinders for the transfer of liquid in the operation of the jack, and a tight casing enclosing both cylinders and forming a chamber for the liquid, the cylinders being in open communication above their pistons with the chamber of the casing.

2. A hydraulic jack comprising lifting and pump cylinders having associated pistons and piston rods, and an operative connection between the cylinders for the transfer of liquid in the operation of the jack, and a tight casing enclosing the cylinders and forming a chamber for the liquid, the cylinders being open at the top for the free circulation of liquid.

3. A hydraulic jack comprising lifting and pump cylinders having associated pistons and piston rods, and an operative connection between the cylinders for the transfer of liquid in the operation of the jack, the cross-sectional area of the pump cylinder being less than that of the lifting cylinder, and a tight casing enclosing the said cylinders and forming a chamber for the liquid, the cylinders being open at the top for the free circulation of liquid by displacement during the operation of the jack.

4. A hydraulic jack comprising lifting and pump cylinders having associated pistons and piston rods, and an operative connection between the cylinders for the transfer of liquid in the operation of the jack, and a tight casing enclosing the cylinders and forming a chamber for the liquid, the cylinders being in open communication above their pistons with the chamber of the casing, the upper portion of the lifting cylinder having openings to allow the liquid of the cylinder below its piston to pass into the chamber of the casing to prevent the piston from engaging the top of the casing during its upward travel.

5. A structure of the class described comprising lifting and pump cylinders and associated pistons and piston rods, the said cylinders being operatively connected at the bottom for the passage of liquid for load

lifting and releasing purposes, and a casing enclosing said cylinders and forming a chamber for the liquid, the said cylinders having constant free communication at the top with the liquid in said chamber, the rod of the lifting cylinder piston passing through an opening in the casing and the rod of the pump piston being operatively connected through an opening in the casing for manipulating purposes.

6. A hydraulic jack comprising a base, lifting and pump cylinders mounted thereon and provided with associated pistons and piston rods, the two cylinders being connected by a check-valve-controlled duct for the passage of liquid from the pump cylinder to the lifting cylinder below the piston of the latter, the pump piston including a ring fitting closely within its cylinder and having a limited reciprocable movement between upper and lower stops on the rod which is open within the ring for the passage of liquid, the lower part of the wall of the pump cylinder having shallow grooves whose vertical length is somewhat greater than the vertical length of the piston ring to permit the passage of liquid from a position below to a position above the piston for load releasing purposes whenever the piston is in its lowermost position, the check valve being arranged to be held open by the pump piston to cooperate with the said grooves for the return of the liquid from the lifting cylinder to the pump cylinder.

7. A hydraulic jack comprising, in combination, a base member, a casing member open at one end and adapted to be secured to the base in such a manner that the base forms a closure for the open end whereby a closed reservoir is formed for the reception of a liquid, a plunger cylinder secured at its lower end to said base, a pump cylinder secured at its lower end to said base, said plunger and pump cylinders being entirely enclosed within said casing and having their upper ends spaced from the casing, a communicating passage between said cylinders, a pump piston in the pump cylinder, a plunger in the plunger cylinder and means extending through the casing for operating the pump piston.

8. A hydraulic jack comprising, in combination, a base member, a casing member open at one end and adapted to be secured to the base in such a manner that the base forms a closure for the open end whereby a closed reservoir is formed for the reception of a liquid, a plunger cylinder secured at its lower end to said base, a pump cylinder secured at its lower end to said base, said plunger and pump cylinders being entirely enclosed within said casing and having their upper ends spaced from the casing, a communicating passage between said cylinders, a pump piston in the pump cylinder, a

plunger in the plunger cylinder, a plunger rod connected with the plunger piston and extending outwardly through the casing, said rod being of a smaller diameter than the interior of the plunger cylinder so as to provide a space for the reception of a liquid between the rod and the cylinder when the plunger is below the upper end of the cylinder, and an operative connection between the outside of the casing and the pump piston whereby the latter may be reciprocated for the purpose of transferring liquid to the plunger cylinder.

In testimony whereof I affix my signature.

JOSEPH P. SHEVLIN.