March 1, 1960 E. H. SCHULTZ 2,926,888

HYDRAULIC SERVICE JACK

Filed Oct. 14, 1955 3 Sheets-Sheet 1

Fig. 1.

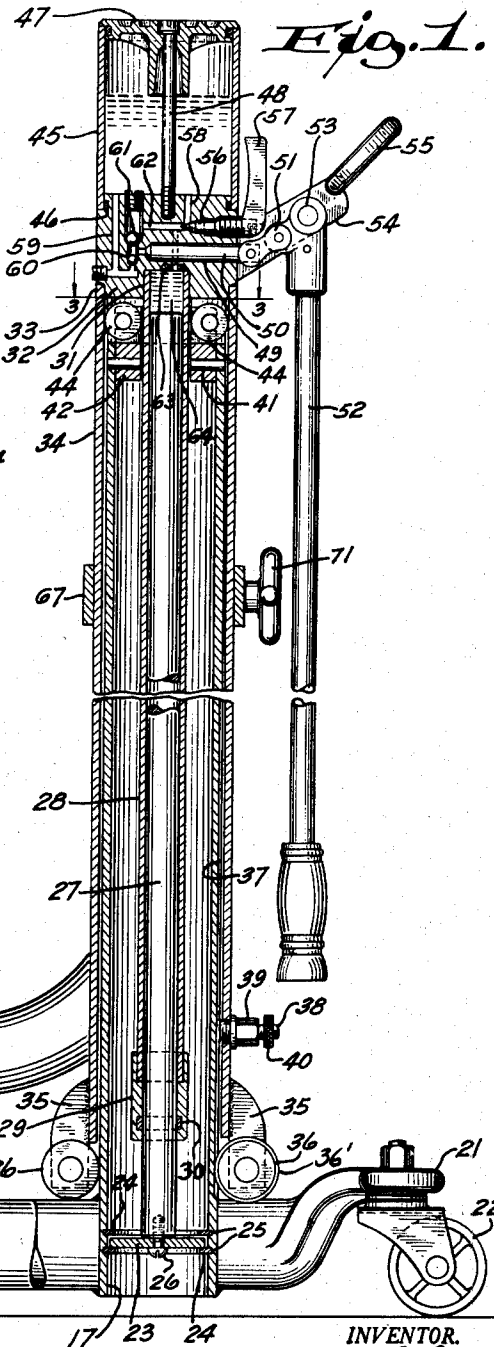


Fig. 2.

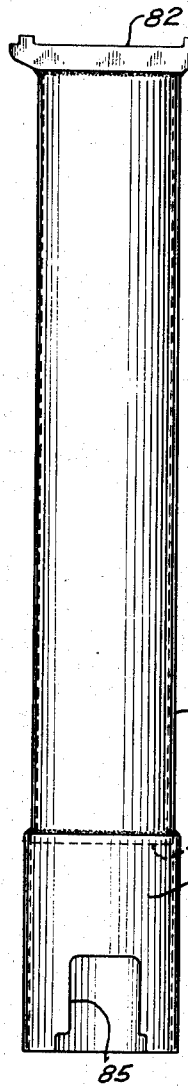
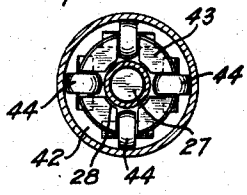


Fig. 3.



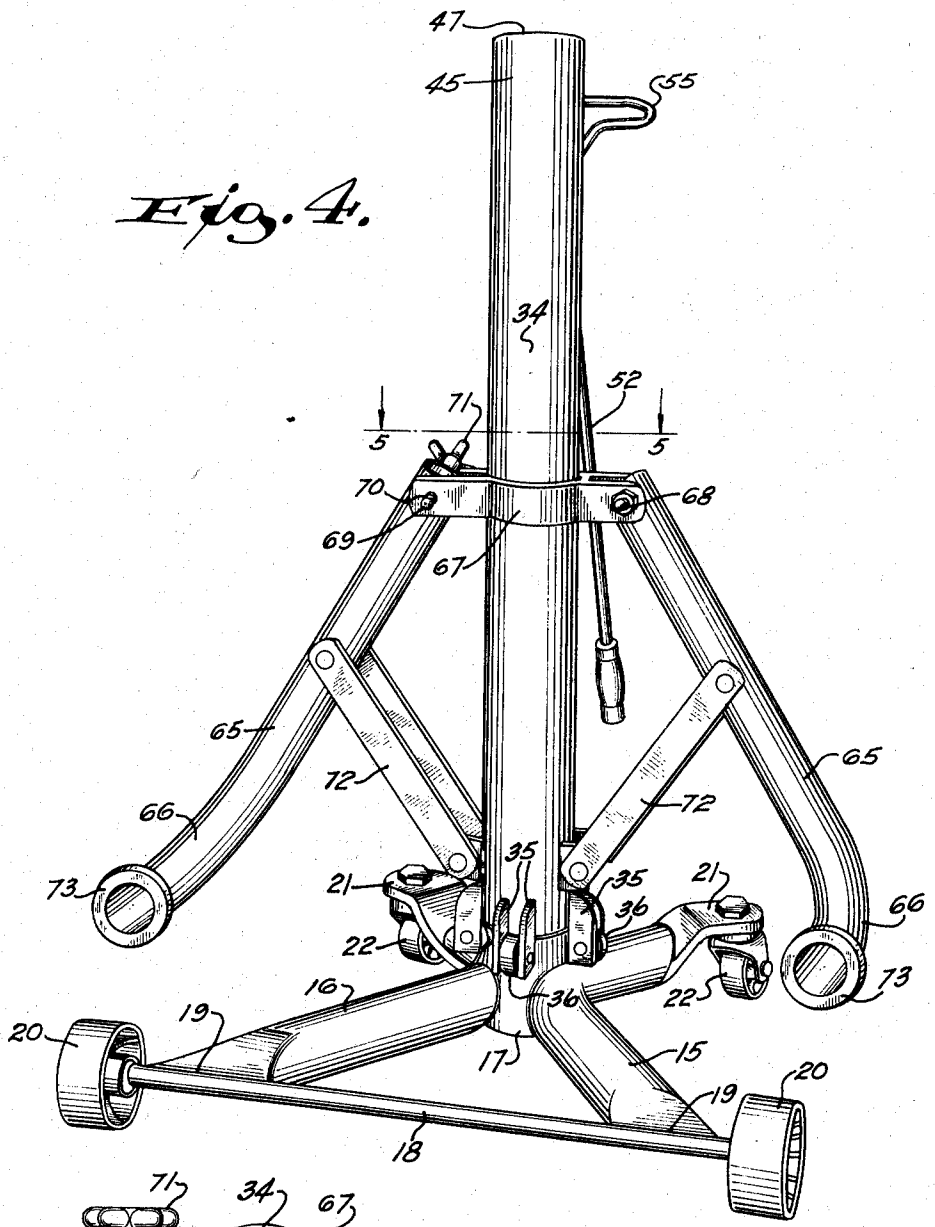
INVENTOR.
Edward H. Schultz
BY
Mosell & Mosell
ATTORNEYS.

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Filed Oct. 14, 1955 3 Sheets-Sheet 2

Fig. 4.



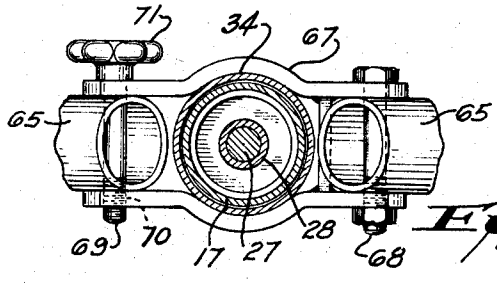


Fig. 5.

INVENTOR.
Edward H. Schultz
BY
Mosull & Mosull.
ATTORNEYS.

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Filed Oct. 14, 1955 3 Sheets-Sheet 3

Fig. 6.

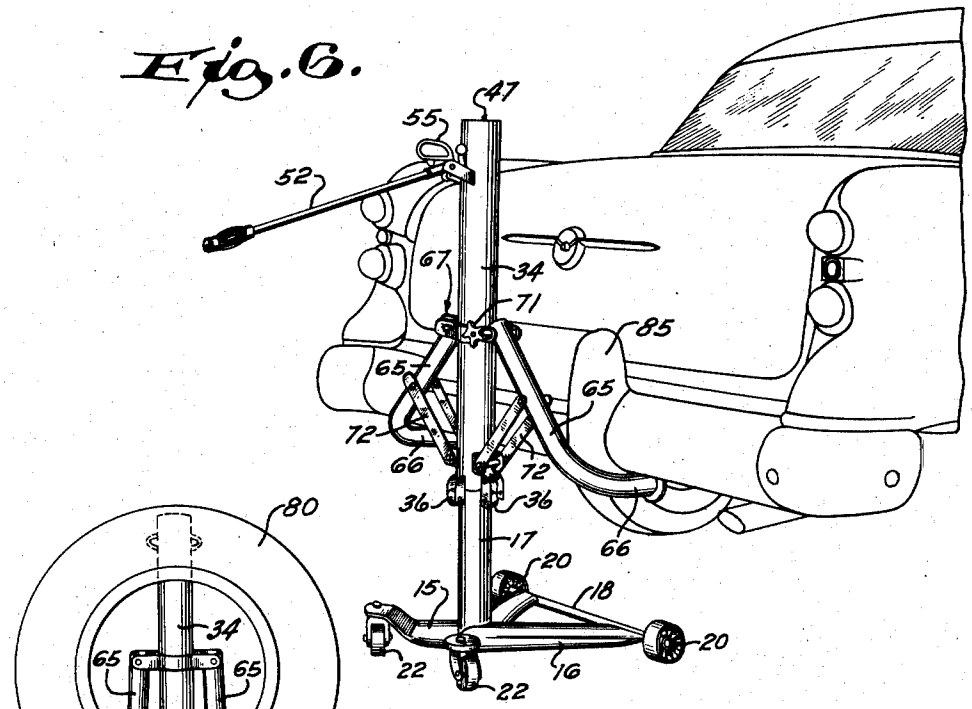


Fig. 7.

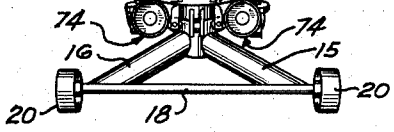
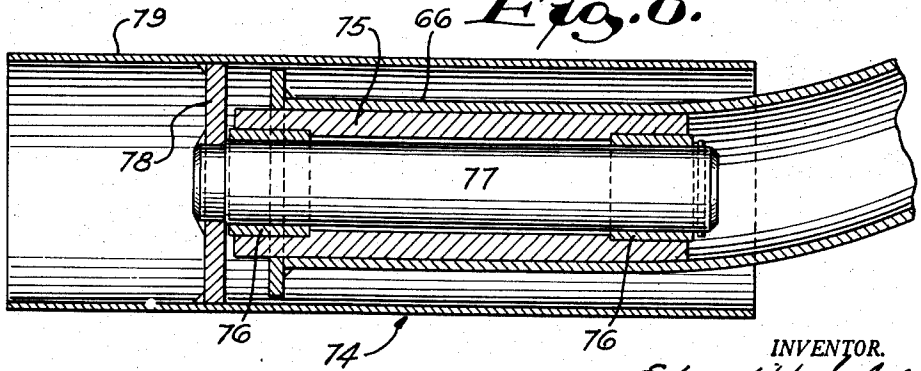


Fig. 8.



INVENTOR.
Edward H. Schultz
BY
Morsell & Morsell
ATTORNEYS.

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HYDRAULIC SERVICE JACK

Edward H. Schultz, Milwaukee, Wis.

Application October 14, 1955, Serial No. 540,556

10 Claims. (Cl. 254—2)

This invention relates to improvements in hydraulic service jacks.

It is a general object of the present invention to provide an improved hydraulic service jack for use in garages, filling stations, and similar establishments, said jack being principally adapted to lift by engagement with the bumper of an automobile, but being constructed for engagement in other ways where required.

A further object of the invention is to provide a jack as above described which is relatively light in weight, readily portable, and easily adapted to different automobiles or conditions.

A more specific object of the invention is to provide a service jack as above described wherein there are pivoted lifting arms having end portions which are adapted to engage beneath a bumper, and wherein there is means for adjustably varying the horizontal distance between the arms so that bumper guards or other projections may be cleared.

A still further object of the invention is to provide an hydraulic service jack wherein there is an outer vertically disposed cylinder which is adapted to be elevated by the action of fluid pressure, said cylinder having a top portion which may be used as a lifting element when it is desired to engage portions of a car other than the bumper.

A still further object of the invention is to provide an hydraulic service jack as above described wherein the upper end of the elevating cylinder is constructed to detachably receive an upright extension. This makes it possible to raise the body of a car while the car is being supported on a lift and to do other work requiring a jack of extra height. This is often advantageous as an aid in spreading springs on a car or in facilitating the installation of shock absorbers, mufflers, or tail pipes.

A further object of the invention is to provide an hydraulic service jack having a fixed vertical cylinder and having an outer vertical cylinder telescopically associated with said fixed cylinder, there being a novel arrangement of rollers to prevent binding between the two cylinders which normally results when an automobile is off-center on the jack.

Other objects of the invention are to provide an hydraulic service jack which is relatively simple and inexpensive in construction, versatile in use, neat in appearance, compact, and otherwise well adapted for the purpose described.

With the above and other objects in view, the invention consists of the improved hydraulic service jack, and all of its parts and combinations, as set forth in the claims, and all equivalents thereof.

In the accompanying drawings, illustrating one complete embodiment of the preferred form of the invention, in which the same reference numerals designate the same parts in all of the views;

Fig. 1 is a side elevational view of the improved jack in lowered condition, parts being broken away and shown in vertical section;

Fig. 2 is a front elevational view of the detachable extension for the upper end of the cylinder;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a perspective view showing the jack in lowered condition and showing the lifting arms in partly spread condition;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is a perspective view showing a portion of an automobile and showing the jack in operative position with respect to the bumper;

Fig. 7 is a front elevational view of the jack showing how it may be used to support and carry heavy tires or wheels, a tire being shown in supported position, and the jack being equipped with special tire supporting rollers; and

Fig. 8 is a longitudinal sectional view through the end of one of the supporting arms with a tire supporting roller of the type used in Fig. 7 connected thereto.

Referring more particularly to the drawing first to Figs. 1 and 4, the base comprises a pair of V-shaped members 15 and 16, preferably tubular, which members are welded to the lower end of an upright cylinder 17 in the manner shown in Fig. 4. An axle 18 is welded as at 19 to ends of the base members 15 and 16. Wheels 20 are rotatably mounted on the ends of the axle 18. The opposite ends of the base members 15 and 16 are shaped to form horizontally disposed supports 21 for caster assemblies 22.

Suitably supported within the fixed cylinder 17 a short distance above the lower end thereof is a ram disc 23. The latter is detachably supported between snap rings 24 which rings snap into grooves 25 in the interior of the cylinder 17.

Bolted by bolt 26 to the ram disc 23 to project upwardly therefrom is an elongated ram piston 27. The latter is telescopically associated within an inner ram cylinder 28 which moves with the cylinder 34, there being just enough clearance between the elongated piston 27 and its cylinder 28 to provide for relative telescopic movement. The lower end of the inner ram cylinder 28 is screwed into the upper end of a packing nut 29. Also within the packing nut 29 is a suitable seal 30 which engages around the elongated piston 27 to allow relative movement while preventing escape of oil.

The upper end of the inner ram cylinder 28 is threaded into a threaded opening 31 in the bottom of a cylindrical pump body 32. The lower end of the pump body 32 is of reduced diameter as at 33 to fit into the upper end of an outer cylinder 34, the upper end of the outer cylinder being preferably welded to the pump body as shown.

The lower end of the outer cylinder 34 has outwardly and downwardly projecting brackets 35 which rotatably carry rollers 36 on their lower ends. The rollers are of a size to engage the exterior of the fixed cylinder 17. It is preferred to employ four brackets and rollers 90° apart so that if the load is off-center the jack will, nevertheless, operate without binding between the lower end of the cylinder 34 and the lower exterior portion of the cylinder 17.

It is preferred to form the exterior of the cylinder 17 with a vertical groove 37 which extends upwardly for about three-fourths of the height of the cylinder. One of the rollers 36 (the right-hand roller of Fig. 1) is formed with an annular rib 36′ midway of the width of the roller which rides in the groove 37 to prevent relative rotation between the cylinders 34 and 17.

A locking pin 38 slidably mounted in a tubular body 39 which projects at a right angle from the outer cylinder

34 may be moved into engageemnt with a suitable aperture in the cylinder 17 when the outer cylinder is in fully extended position so as to mechanically lock the jack in fully extending position as a safety measure during certain types of use. The pin may be readily released from its locking hole by pulling out on the knob 40.

Fitted in the upper end of the cylinder 17 and secured thereto by pins 41 and surrounding the upper end of the ram cylinder 28 is a ring 42 which supports a cage 43 for rollers 44. The latter rotatably engage the interior of the cylinder 34 as shown in Fig. 1 to prevent any binding between the upper end of the cylinder 17 and the interior of the cylinder 34 should the load be off-center.

The upper end of the pump body 32 is of decreased diameter to fit within the lower end of a reservoir casing 45, said casing being suitably secured in position, and there being a sealing ring as at 46. The upper end of the reservoir casing is closed by a cap 47 which is ribbed on top to provide a lifting head. The cover is removably held in position by means of a bolt 48 which extends downwardly through the cover and which threads into the upper end of the pump body 32.

Mounted for reciprocal movement in a horizontal bore 49 of the pump body is a pump piston 50. A link 51 has one end pivotally connected to the outer end of the pump piston and has its other end connected to the inner end of a handle 52. The latter is pivotally connected as at 53 with a bracket 54 which is rigidly attached to the pump body, there being a handle loop 55 rigidly connected to the bracket 54.

A needle valve 56 is threaded into the pump body and has an external operating handle 57. The valve 56 controls the return flow of oil to the reservoir through a duct 58.

When the operating handle 52 is raised and operated to pull the plunger 50 in an outward direction, liquid from within the reservoir 45 is sucked through the duct 59 past a non-return ball 60. On the return stroke of the plunger the ball 60 closes and the fluid is forced past ball 61 into ducts 62 and 63 into the chamber 64 above the elongated piston 27 to force the cylinders 34 and 28 and attached parts upwardly. This, of course, includes the pump body and reservoir 45. To lower the jack the handle 57 is turned to open the needle valve 56 and allow fluid to by-pass through the duct 58 back into the reservoir 45.

A pair of L-shaped lifting arms 65 having horizontal bumper engaging portions 66 have their upper ends pivotally connected to the projecting ends of a clamping assembly 67, the latter embracing the cylinder 34 intermediate its height. One of the lifting members 65 is pivotally connected to the clamping assembly by the bolt 68. The other lifting arm is pivotally connected by a bolt 69 having a threaded end which is threaded into a threaded hole 70 on one side of the clamping assembly. The other end of the bolt has a handle 71. When the bolt 70 is loosened the clamping assembly 67 may be slid up or down on the cylinder 34, and the assembly may be clamped in any selected position by tightening of the bolt 70, so as to vary the horizontal distance between the bumper engaging portions 66 to best suit conditions. The arms 65 are connected by pivoted links 72 with the lower portion of the cylinder 34 as is clear from Fig. 4.

In order to prevent the car from slipping off the jack, the ends of the portions 66 may be formed with integral shoulders 73.

If it is desired to use the jack for lifting and moving heavy truck tires or wheels, the arm portions 66 may be fitted with tire supporting roller assemblies 74 (see Figs. 7 and 8). Each roller assembly includes a cylinder 75 which fits within one of the tubular ends 66. Journalled within the cylinder 75 in bearings 76 is a shaft 77. The outer end of the shaft is rigidly secured to the center of a disc 78 and the latter has its periphery welded within a cylindrical roller 79. Thus, the wheel 80 of Fig. 7 may be rotated on the rollers 79 to change the position of the bolts or for other purposes.

Referring now to Fig. 2, the numeral 81 designates an extension member having an auxiliary lifting head 82. The lower end of the extension 81 is connected to a cylinder 83 of increased diameter which is of a size to fit over the reservoir casing 45. Between the main portion of the extension 81 and the portion 83 is an internal shoulder 84 which is adapted to seat on the cap 47 of Fig. 1. The part 83 has a cut-out 85 to clear the operating members on the pump body. This extension is used when parts other than a bumper are to be engaged, and is particularly useful when extra height is required as, for example, when a car is on a garage lift. In such a situation it is frequently desirable to raise the body of the car so as to spread springs or facilitate the installation of shock absorbers, mufflers or tail pipes. The extension 83 makes it possible to do this type of job efficiently.

Operation

In use of the improved service jack the handle 71 of the adjustment bolt 70 is first turned to free the clamp 67. The clamp is then raised or lowered to obtain a desired horizontal distance between the two bumper engaging portions 66 of the lifting arms. On a car such as that shown in Fig. 6, it is desirable to spread the arm portions 66 sufficiently far so as to clear the bumper guards 85. When the desired adjustment has been obtained, the bolt 70 is tightened so as to tightly clamp the clamping assembly 67 to the cylinder 34. The operating handle 52 is then raised and operated in a pumping manner to pump fluid into the chamber 64*a* above the piston 27 as heretofore described. This causes the jack to raise as shown in Fig. 6. To lower the jack it is merely necessary to open the valve 56 through the handle 57 so as to allow fluid from the chamber 64 to escape back into the reservoir 45.

If it is desired to engage portions of a car other than the bumper, the lifting head 47 of the reservoir cap may be employed, or the lifting head 82 of the extension member as heretofore described, depending upon height requirements.

If it is desired to use the jack for handling heavy tires or wheels, the roller assemblies 74 are inserted within the ends of the lifting members as shown in Fig. 8 and the jack may be adjusted so that the rollers are closer together as shown in Fig. 7. It is to be noted that the inner end of a member 75 engages the curve of the wall of the tube 66 to frictionally hold itself in position.

During use of the jack, the engagement of the pin 38 within the groove 37 of the cylinder 17 prevents undesirable rotation between the cylinders 34 and 17.

When the jack is being operated it is unnecessary to obtain a perfect balance of the car on the jack because no binding of the jack is possible. Even if the car is substantially off-center on the jack, the rollers 44 which engage the inside of the cylinder 34, and the rollers 36 which engage the outside of the fixed cylinder 17 prevents any binding between the relatively movable cylinder portions.

To move the jack from one place to another it may be quickly pushed or pulled by means of the handle 52 or 55.

The particular construction makes it possible to use tubular members for most of the parts. Thus, the jack may be relatively light in weight and relatively inexpensive in construction. The operating mechanism is extremely simple, rendering the jack relatively foolproof.

Due to the fact that the piston 27 is anchored to the base, and that the cylinders 28 and 34, and lifting members are movable together, it is possible, by opening the relief valve 56, to speed up a lifting operation by manually lifting the jack until the lifting members 66 engage the bumper. This makes the actual operation much

quicker as it is unnecessary to do a slow pumping in order to get an initial engagement. As soon as the bumper is engaged, the relief valve must be closed to prevent the oil from returning to the reservoir.

Various changes and modifications may be made without departing from the spirit of the invention, and all of such changes are contemplated, as may come within the scope of the claims.

What I claim is:

1. In a hydraulic service jack of the type having a base, having an upright supporting member, having an outer cylinder telescopically supported on said upright supporting member, and having fluid pressure operated means for causing elevating extensible movement of said outer cylinder, a pair of lifting arms each having a lower and object-engaging portion, a link for each lifting arm pivotally connected at its upper end to its lifting arm a substantial distance below the upper end thereof and at its lower end in longitudinally fixed position on said outer cylinder, a clamping assembly to which the upper ends of said lifting arms are pivotally connected, and means for clamping said clamping assembly in a selected position on said cylinder to thereby vary the distance between said object engaging portions of the lifting arms to suit conditions.

2. In a hydraulic service jack of the type having a base, having an upright supporting member, having an outer cylinder telescopically supported on said upright supporting member, and having fluid pressure operated means for causing elevating extensible movement of said outer cylinder, a pair of lifting arms each having a main portion disposed in a vertical plane and having a horizontal object engaging portion, a link for each lifting arm pivotally connected at its upper end to the main portion of its lifting arm intermediate its length and at its lower end in longitudinally fixed position on a lower portion of said outer cylinder, a clamping assembly to which the upper ends of said lifting arms are pivotally connected, and means for clamping said clamping assembly in a selected position on said cylinder to thereby vary the distance between said object engaging portions of the lifting arms to suit conditions.

3. In a hydraulic service jack of the type having a base, having an upright supporting member, having an outer cylinder telescopically supported on said upright supporting member, and having fluid pressure operated means for causing elevating extensible movement of said outer cylinder, a pair of lifting arms each having a main portion disposed in a vertical plane and having a horizontal object engaging portion, a clamping assembly embracing said outer cylinder and having ends projecting in opposite directions therefrom, means pivotally connecting the upper ends of said lifting arms to said projecting ends of said clamping assembly, means for clamping said clamping assembly in a selected position on said cylinder, and means between said arms and cylinder for varying the spacing between the object engaging portions thereof.

4. In a hydraulic service jack of the type having a base, having an upright supporting member, having an outer cylinder telescopically supported on said upright supporting member, and having fluid pressure operated means for causing elevating extensible movement of said outer cylinder, a pair of lifting arms each having a main portion disposed in a vertical plane and having a horizontal object engaging portion, a clamping assembly embracing said outer cylinder and having ends projecting in opposite directions therefrom, means pivotally connecting the upper ends of said lifting arms to said projecting ends of said clamping assembly, means for clamping said clamping assembly in a selected position on said cylinder, and means including pivoted links connected to said lifting arms and cylinder below said clamping assembly for spreading the lower ends of the latter in response to movement of the clamping assembly on the cylinder.

5. In a hydraulic service jack of the type having a base, having an upright supporting member, having an outer cylinder telescopically supported on said upright supporting member, and having fluid pressure operated means for causing elevating extensible movement of said outer cylinder, a pair of lifting arms each having a main portion disposed in a vertical plane and having a horizontal object-engaging portion, a link for each lifting arm pivotally connected at its upper end to the main portion of its lifting arm intermediate the length thereof and at its lower end in longitudinally fixed position on the outer cylinder, a pair of clamping members embracing said outer cylinder and having sets of ends projecting in opposite directions beyond said cylinder, means pivotally connecting the upper end of one of said lifting arms between one set of projecting ends of said clamping members, and means including a bolt for drawing the opposite set of projecting ends together to clamp said members in a selected position on said cylinder, the upper end of the other lifting arm being pivoted on said last mentioned bolt.

6. An hydraulic service jack comprising a base having an upright tubular supporting member, an outer cylinder telescopically supported on said upright supporting member, fluid pressure operated means including a cylinder and piston assembly within said tubular supporting member for causing elevating extensible movement of said outer cylinder, means for preventing binding between the outer cylinder and said upright supporting member including roller means carried near the upper end of said upright supporting member and embracing said cylinder and piston assembly and engaging the interior of said outer cylinder, said outer cylinder having means for engagement with an object to be lifted.

7. An hydraulic service jack comprising a base having an upright supporting member, an upright elongated piston projecting upwardly from the base within said supporting member and surrounded thereby, an outer cylinder telescopically supported on said upright supporting member and having a head, an inner cylinder projecting downwardly from said head within said outer cylinder and movable therewith, said inner cylinder being telescoped over said elongated piston and there being a chamber within said inner cylinder between the upper end of said elongated piston and said head, and means for introducing fluid under pressure into said chamber to cause elevating movement of the inner and outer cylinders and head with respect to said fixed supporting member and elongated piston.

8. An hydraulic service jack comprising a base having an upright supporting member, an upright elongated piston projecting upwardly from the base within said supporting member and surrounded thereby, an outer cylinder telescopically supported on said upright supporting member and having a head with a hollow upper portion to provide a fluid reservoir, an inner cylinder projecting downwardly from said head within said outer cylinder and movable therewith, said inner cylinder being telescoped over said elongated piston and there being a chamber within said inner cylinder between the upper end of said elongated piston and said head, and means for introducing fluid under pressure from said reservoir into said chamber to cause elevating movement of the inner and outer cylinders and head with respect to said fixed supporting member and elongated piston.

9. An hydraulic service jack comprising a base having an upright supporting member, an upright elongated piston projecting upwardly from the base within said supporting member and surrounded thereby, an outer cylinder telescopically supported on said upright supporting member and having a head, the lower portion of said head forming a pump body and the upper portion forming a fluid reservoir, an inner cylinder projecting downwardly from said head within said outer cylinder and movable therewith, said inner cylinder being telescoped

over said elongated piston, there being a chamber between the upper end of said elongated piston and said head, and means including a pump in said pump body for introducing fluid under pressure from said reservoir into said chamber to cause elevating movement of the inner and outer cylinders and head with respect to said fixed supporting member and elongated piston.

10. An hydraulic service jack comprising a base having an upright supporting member, an upright elongated piston projecting upwardly from the base within said supporting member and surrounded thereby, an outer cylinder telescopically supported on said upright supporting member and having a head, an inner cylinder projecting downwardly from said head within said outer cylinder and movable therewith, said inner cylinder being telescoped over said elongated piston and there being a chamber within said inner cylinder between the upper end of said elongated piston and said head, means for introducing fluid under pressure into said chamber to cause elevating movement of the inner and outer cylinders and head with respect to said fixed supporting member and elongated piston, and means for preventing binding between the outer cylinder and upright supporting member

including roller means carried near the upper end of said upright supporting member between said inner cylinder and the outer cylinder and engaging the interior of said outer cylinder.

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