

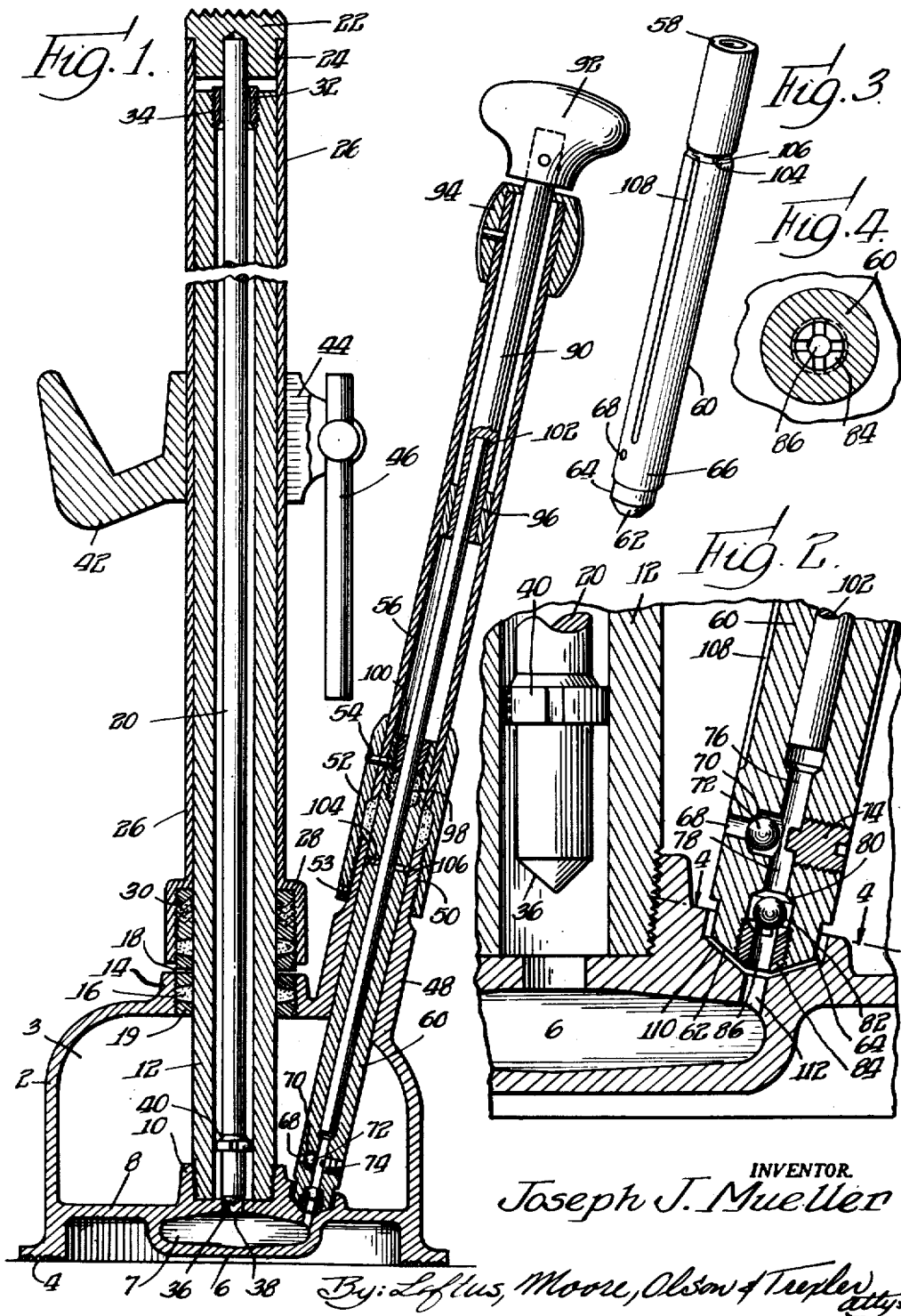
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J. J. MUELLER

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HYDRAULIC JACK

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2,434,949

HYDRAULIC JACK

Joseph J. Mueller, St. Joseph, Mich., assignor to
Auto Specialties Manufacturing Company, St.
Joseph, Mich., a corporation of Michigan

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2 Claims. (Cl. 60—52)

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This invention relates to pushing and pulling devices and particularly of the automobile jack type wherein the lifting mechanism is hydraulically actuated.

Among the objects of the present invention is to provide an hydraulically actuated jack wherein the base portion of the jack is formed as an integral casting having but two openings therein, the central axes of which are disposed to form an acute angle, and wherein the ram cylinder and ram are operatively mounted in one, and the high pressure pump cylinder and piston and relief or by-pass valve are mounted in the other opening, the arrangement being such that any oil tending to leak out of the openings will flow back into the liquid reservoir, and whereby all other openings are avoided so that there is minimum oil leakage in connection with the operation of the jack.

Yet another object of the invention resides in providing an hydraulically operated jack wherein the base of the jack is formed as a single casting having but two bores or openings formed therein, the central axes of which are disposed to form an acute angle therebetween, and arranged in connection with the ram cylinder chamber and the reservoir so that a projection of the central axis of the boring for the high pressure pump cylinder intersects the ram cylinder chamber and connects therewith, thereby eliminating the necessity of forming any other borings in the basal casting which communicate with the exterior of the casting, thus eliminating the possibility of any leakage except at the bore for the ram cylinder and the high pressure pump cylinder.

Other and further objects of the invention will be apparent from a perusal of the following specification, when taken in connection with the accompanying drawing, wherein:

Figure 1 is an elevational view in section of one form of my invention, preferably formed as an hydraulically operated bumper jack;

Figure 2 is an enlarged section of the basal portion of the jack;

Figure 3 is a perspective view of the combined high pressure pump cylinder and relief valve; and

Figure 4 is a section taken on the line 4—4 of Figure 2.

Referring now to the drawings in detail, the jack comprises, in general, an integral casting 2 having a base 4 upon which it is adapted to rest, the base being provided with a central well 6 and web portion 8, the well providing a chamber beneath the ram cylinder, as at 7. The walls of the

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well 6 are upstanding as at 10 and internally threaded to provide a threaded seat for the bottom of a relatively long tube 12 forming the ram cylinder. This ram cylinder projects outwardly through a circular boss 14 on the upper portion of the base 2, a suitable packing 16 being retained by packing rings 18 and 19 threadedly connecting with an interior thread on the boss 14. A ram 20 is mounted within the ram cylinder 12 and this ram 20 carries at its upper end a load support 22 which has welded to it as at 24 a relatively long sleeve 26 the lower end of which is provided with an integral enlarged collar or bell 28 which houses packing 30, which packing in turn takes against the outer smooth wall of the ram cylinder 12. Guide ring 32 is threadedly interposed between the inner wall of the upper end of the ram cylinder 12 and the ram piston 20, passages 34 being formed in this guide ring to permit the passage of lubricant or other liquid therethrough to act upon the undersurface of the work head 22 to raise the ram. If desired, the lower end of the ram piston is provided with a conical valve 36 taking against a seat 38 in the well 6 and the lower portion of the piston 20 is provided with a guide ring 40 thereon which is likewise provided with passages to permit liquid to flow thereabout or therearound. In addition to the load support 22 the sleeve 26 may be provided with a second saddle 42 shaped to receive and hold the bumper of the automobile. This sleeve is provided with a clamping member 44 operated by an actuator 46 for slidably clamping the saddle 42 in any desired position vertically of the sleeve 26. It will be noted that the central axis of the ram 20 coincides with the central vertical axis of the opening in the collar 14.

In addition the basal casting 2 is provided with but one other bore or opening, the central axis of which is the center of the integral sleeve 48. This sleeve is externally threaded as at 50 to receive an actuating sleeve 52 which is internally threaded, and the outer end of this sleeve is provided with an inwardly projecting pin 54 which passes through a relatively long tube 56 and likewise through an internally threaded sleeve portion 58 of the high pressure pump cylinder 60.

The lower end of the sleeve 52 may be provided with a threaded pin 53 limiting the outward unscrewing movement of the sleeve relatively to the sleeve 48, the same being provided with any desired ancillary stop.

This high pressure pump cylinder 60 is shown in perspective in Figure 3. It is provided with a fluid inlet conduit 62 forming a valve seat 70

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controlled by a ball valve 72. There is a plug 74 having on its inner end a short stud 76 which hold the valve relatively close to its seat. The high pressure pump cylinder 60 is bored longitudinally from end to end. The lower end of this bore, as shown in Figure 2, provides a piston chamber 70 which communicates with the inlet conduit 68 and also with an extension conduit 78 having a valve seat 80 controlled by a second ball valve 82. In addition there is a plug 84 having a central conduit 86 therethrough for holding the valve relatively close to its seat while permitting liquid to pass through the plug 84. The ball 82 closes on the seat 80. The lower end of the high pressure pump cylinder 60 is formed, as heretofore stated, with the conical portion 62, and in addition the plug 84 forms a continuation of this conical surface. If desired the lower end of the wall 62 may be cut away, as shown at 84, to facilitate the passage of the liquid from the valve seat into the lubricant reservoir 3.

The outer end of the piston extends outwardly through the sleeve 56 where it is welded or press fitted to a handle member 90 which has affixed to its end a handle knob 92. The outer end of the sleeve 56 has likewise pinned thereto another handle 94 for rotating the tube 56. Guide ring 96 spaces the handle 90 from the inner wall of the tube 56. A packing member 98 is sealed by the sealing ring 100 which engages the inner threaded walls of the outer end of the high pressure pump cylinder, whereby to force the packing tightly against the reciprocating piston rod 102. If desired, the high pressure pump cylinder is provided with passages 104 connected by an annular channel 106 which in turn communicates with a relatively long longitudinal lubricant slot 108, whereby lubricant escaping as far back as the passages 104 is carried outwardly to the slot 108 and returned to the oil reservoir.

It will be noted that the central axis of the bore for the high pressure pump cylinder forms an acute angle with the central axis of the bore formed for the ram cylinder and the projections of these axes are so related that the central axis of the high pressure pump cylinder intersects the edge of the wall 6 formed in the base casting and which wall forms a part of the ram cylinder chamber. In addition, the basal casting just opposite the bore formed by the sleeve 48 is provided with a valve seat 110, the central axis of which corresponds with the central axis of the high pressure pump cylinder, so that a passageway 112 may be drilled through to connect with the chamber 7 forming the ram cylinder chamber. Thus the passageway 36 and the passageway 112 may be drilled directly from the borings formed in the basal casting, and hence since the lower portion of the high pressure pump cylinder is formed in connection with the valve seat 110 as a by-pass valve, there is no need for any additional borings in the basal casting, and particularly is there no need for any borings which reach the exterior surface of the basal casting, other than the bores for the ram cylinder and high pressure pump cylinder.

It must be obvious that reciprocation of the handle 92 will actuate the piston so that on its upstroke liquid will be sucked from the reservoir 3, past the conduit 68, the ball 70 being pulled from its seat, and liquid will thus be drawn into the pump cylinder. In this action the ball 82 seats upon the valve seat 80. Upon the return or downward movement of the pump piston this liquid will be transferred through the passageway

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86, the passageway 112, into the ram cylinder chamber 6. At this time the ball 70 will be forced onto its seat and the ball 82 will be forced from its seat. A repetition of this reciprocation of the piston will raise the ram cylinder to the desired height.

When it is desired to lower the ram, the handle 94 is turned, whereby the threaded connection between the sleeve 52 and the threads 50 on the outer wall of the stationary sleeve 48 of the basal casting causes the retraction of the lower end of the high pressure pump cylinder away from the valve seat 110, whereby to permit liquid to flow from the well 6 through the passage 112 into the liquid reservoir 3. As the ram descends, the lower end thereof 36 will seat upon the valve seat 38 so as to hold any liquid thereabout, within the ram cylinder.

From an inspection of the drawing and the foregoing description it will be apparent that by disposing the two bores of the basal casting at a proper acute angle, such as shown, their central axes will intersect in such a manner that the passageway 112 may be drilled through the bore of the sleeve 48 whereby to effect oil communication between the well 6 forming the ram cylinder chamber and the liquid reservoir, and whereby by utilizing the lower portion of the high pressure pump cylinder as a valve, and forming the wall of the casting about the passageway 112 as a seat, I provide a relief or by-pass valve which may be opened or closed by shifting the high pressure pump cylinder relatively to the base, and this is preferably accomplished by a rotary movement of the pump cylinder. To this end it will be seen that by providing the pump cylinder with a relatively long extension and a turnable handle located adjacent the reciprocable knob or handle of the high pressure pump piston, I am enabled to control both the raising and lowering of the ram from a point relatively close to the load support of the ram cylinder, that is at a relatively high elevation, whereby facility and ease of operation is assured, so that the automobile chassis may be lifted by means of a load support engaging the bumper at a point substantially at the elevation of the bumper and whereby the load support may be lowered when desired, from this same elevation.

It will also be seen that by removing the pins 53 and 54 and unscrewing the sleeve 52, the entire high pressure pump cylinder and by-pass valve may be removed as a unit from the base for inspection and repair. It will also be noted that the high pressure pump cylinder is drilled laterally before it is inserted in the base.

Obviously the invention is not limited to the specific details of construction disclosed herein but is capable of other modifications and changes without departing from the spirit and scope of the appended claims.

The invention is hereby claimed as follows:

1. In an hydraulically actuated jack, the combination of a basal casting having a substantially horizontal bottom wall, said wall having a centrally disposed annular upstanding wall providing a well and beneath which is a centrally disposed, cup-shaped wall providing a centrally disposed ram chamber adapted to receive liquid, the upper portion of said base above said well being provided with a central bore the central axis of which corresponds with the central axis of said well, a ram cylinder mounted in said bore and seated in the internal walls of said well, a ram in said cylinder and a load member for said arm,

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the upper surface of the bottom wall, to one side of said well being provided with a substantially conical valve seat, the central axis of which is provided with an opening communicating with said ram chamber, the upper portion of said basal casting adjoining said first mentioned bore being provided with a second bore, the central axis of which coincides with the central axis of said valve seat, a high pressure pump cylinder mounted in said second bore, said pump cylinder being formed on its lower end as a valve adapted to seat upon said valve seat, said pump cylinder being internally and longitudinally bored, and a piston therein, the lower portion of said pump cylinder below the lowermost seating position of said piston being formed with a liquid inlet and a liquid discharge conduit, and valve means controlling said conduits, the interior of said basal casting forming a liquid-containing reservoir surrounding said ram cylinder and said high pressure pump cylinder whereby the liquid inlet formed in said pump cylinder communicates with said reservoir, means for reciprocating the piston, and means for shifting the valve relatively to and from its seat.

2. An hydraulically actuated jack comprising an integral basal casting having walls forming a central well, the walls of said casting extending above said central well to provide a ram cylinder well, a port formed in one of said walls connecting said upper ram cylinder well with said lower central well, said casting having additional upper integral walls spaced from the first mentioned walls to form a liquid-containing reservoir, said upper well wall being formed with a conical valve seat on one portion of its outer surface in said

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reservoir and a central port connecting the valve seat with said lower well, said port being in line with said second bore, said upper walls having two bores at their top, a ram cylinder passing through one of said bores, through said reservoir, and connecting with the upper well of the basal casting and making liquid connection with the lower well, a ram in said ram cylinder and having a load support, a high pressure pump cylinder mounted in the second bore, a piston in said cylinder, there being means for operating said piston, the lower end of said pump cylinder being formed as a relief valve adapted to close on said valve seat, said high pressure pump cylinder having its central axis registering with said central opening, and means formed with internal valve passages adapted on reciprocation of said piston to pass liquid from said reservoir to said pump cylinder and through said opening in said valve seat to the lower central well, and means for shifting the relief valve toward and from the valve seat whereby to control the passage of liquid from the ram cylinder chamber through the passage in the valve seat to the reservoir.

JOSEPH J. MUELLER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,038,974	Werner	Apr. 28, 1936
2,049,335	Stephens	July 28, 1936
2,052,781	Lindsay	Sept. 1, 1936
2,238,968	Brumder	Apr. 22, 1941

Certificate of Correction

Patent No. 2,434,949.

January 27, 1948.

JOSEPH J. MUELLER

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Column 3, line 3, for the word "hold" read *holds*; column 4, line 75, for the word "arm" read *ram*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of April, A. D. 1948.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.

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the upper surface of the bottom wall, to one side of said well being provided with a substantially conical valve seat, the central axis of which is provided with an opening communicating with said ram chamber, the upper portion of said basal casting adjoining said first mentioned bore being provided with a second bore, the central axis of which coincides with the central axis of said valve seat, a high pressure pump cylinder mounted in said second bore, said pump cylinder being formed on its lower end as a valve adapted to seat upon said valve seat, said pump cylinder being internally and longitudinally bored, and a piston therein, the lower portion of said pump cylinder below the lowermost seating position of said piston being formed with a liquid inlet and a liquid discharge conduit, and valve means controlling said conduits, the interior of said basal casting forming a liquid-containing reservoir surrounding said ram cylinder and said high pressure pump cylinder whereby the liquid inlet formed in said pump cylinder communicates with said reservoir, means for reciprocating the piston, and means for shifting the valve relatively to and from its seat.

2. An hydraulically actuated jack comprising an integral basal casting having walls forming a central well, the walls of said casting extending above said central well to provide a ram cylinder well, a port formed in one of said walls connecting said upper ram cylinder well with said lower central well, said casting having additional upper integral walls spaced from the first mentioned walls to form a liquid-containing reservoir, said upper well wall being formed with a conical valve seat on one portion of its outer surface in said

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