Feb. 2, 1926. 1,571,602

J. ROBERTS

HYDRAULIC JACK

Original Filed March 20, 1924

Fig. 1.

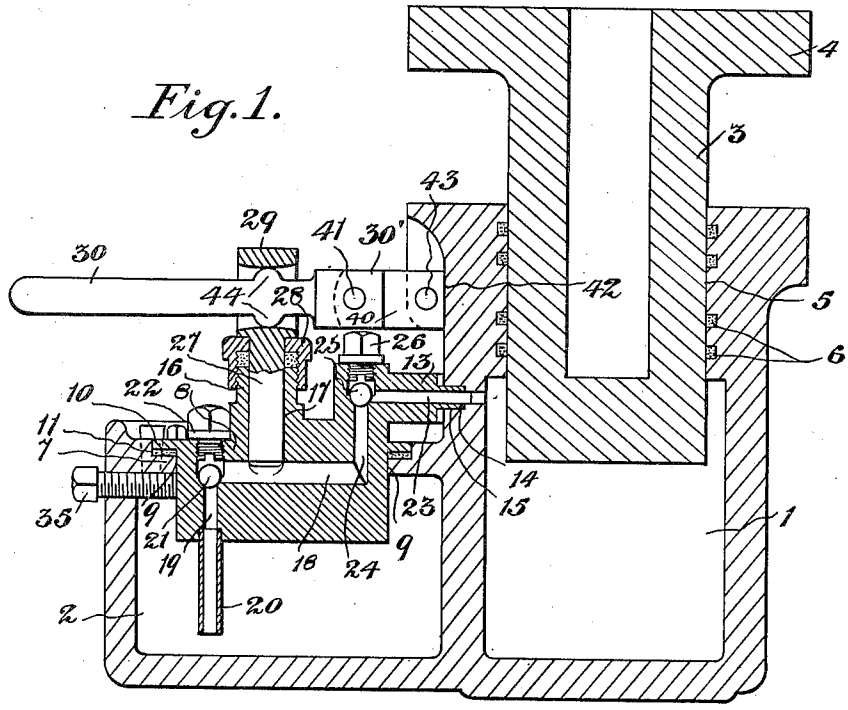
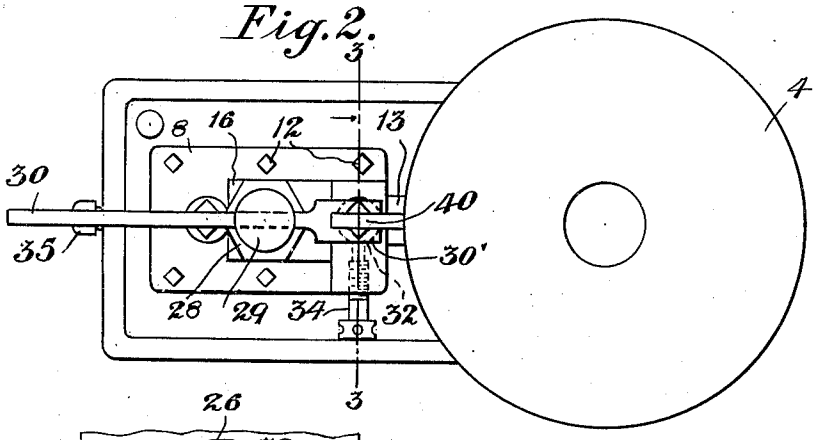


Fig. 2.



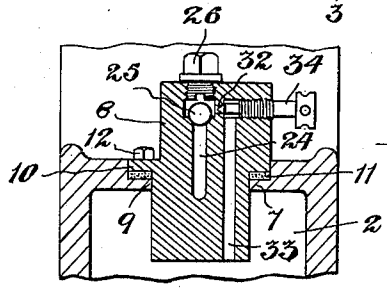


Fig. 3.

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Patented Feb. 2, 1926. 1,571,602

UNITED STATES PATENT OFFICE.

JAMES ROBERTS, OF TORONTO, ONTARIO, CANADA.

HYDRAULIC JACK.

Application filed March 20, 1924, Serial No. 700,488. Renewed December 11, 1925.

To all whom it may concern:

Be it known that I, JAMES ROBERTS, a subject of the King of Great Britain, and residing in the city of Toronto, county of York, Province of Ontario, Canada, have invented certain new and useful Improvements in Hydraulic Jacks, of which the following is a specification.

The principal objects of this invention are, to devise a portable hydraulic jack of very compact form which will lift and sustain extremely heavy loads and may be placed in very closely restricted positions.

The principal feature of the present invention consists in the novel construction of the pump-operating means which enables me to increase the power developed by the jack without in any manner changing the proportions of the other parts, and consequently without impairment of the compact form of the jack, and in the following specification I shall describe my invention, and what I claim as new will be set forth in the claims forming part of this specification.

Fig. 1 is a vertical mid-central view through my jack, showing in side elevation the operating means for the pump. Fig. 2 is a plan view, and Fig. 3 is a cross sectional view on the line 3—3, Fig. 2.

In the drawings, like characters of reference, refer to the same parts.

The base of the jack comprises a ram chamber 1 which is of cylindrical form and a fluid receptacle 2 which extends to one side of the ram chamber, the top of said receptacle being arranged about midway of the height of the base.

The ram 3, which is here shown formed with a circular flange 4 at the top, slides within the cylindrical orifice 5 at the top of the ram chamber and suitable packing rings 6 are arranged in the wall of said orifice. The top of the fluid receptacle 2 is formed with an inwardly extending flange 7 and upon this flange is supported a pump block 8.

The block 8 fits within the rectangular orifice 9 encircled by the flange 7 and is provided with a lateral flange 10 extending over the flange 7. A suitable packing 11 is placed between these flanges and the block is fastened securely by the cap screws 12. The block 8 is formed with a projecting lug 13 having a reduced end 14 which fits into a hole 15 arranged in the side of the ram chamber and when secured in place forms a fluid tight joint. Upon the top of the block 8 is arranged a boss 16 having a vertical orifice 17 bored therein and communicating at the bottom with a passage 18 which extends longitudinally of the block and to each side of said orifice.

A hole 19 extends downwardly from the outward end of the passage 18 and a length of pipe 20 extends from the bottom of the block close to the bottom of the receptacle 2. A valve seat is formed at the upper end of the hole 19 and a ball valve 21 rests in said seat.

A screw plug 22 is arranged above the ball valve to allow access thereto and to enable the placing of the valve.

The opposite end of the passage 18 extends upwardly in the block and communicates with a horizontal passage 23 leading through the lug 13 to the hole 15 and ram chamber 1 and at the top of the vertical portion 24 of the passage 18 is arranged a ball valve 25 and a screw plug 26 is arranged above said valve. A cylindrical plunger 27 is arranged in the orifice 17.

A packing nut 28 is secured at the upper end of the boss 16 around the plunger. The upper end of this plunger is in the form of a slotted head 29, and a lever 30 extends through said slotted head. The inner end 30′ of this lever is preferably bifurcated as shown in Fig. 2, and straddles the outer end of a connection 40, to which it is pivoted by means of the pin 41. This connection 40 is fixedly associated with the base of the jack, after the following preferred manner: the inner end of this connection is substantially vertically disposed as shown at 42 and fits up against a portion of said base.

A pin 43 in substantially the same plane as the pin 41 and substantially parallel thereto passes through portion of said base and through the inner end of said connection, thus firmly supporting said connection.

The lever 30 is provided with aligned upper and lower bosses 44 which rest in contact with the downward curved upper and upward curved lower ends of the slot formed in the head 29. This construction permits of the maximum range of move-

ment of the lever 30, and the placing of the fulcrum 41 for said lever as close as practicable to the plunger 27 permits me to develop greater power with this jack than I can develop where the fulcrum of the lever is further away from said plunger.

The wider range of movement for the lever 30 is had through the use of the bosses 44, because since the lever is shallower measured at a point beyond each end, so to speak, of the said bosses, no portion of the said lever adjacent the said bosses will contact with the upper or lower curved ends of the said slot in the head 29 during operation.

In the normal position of the parts illustrated in Fig. 1 it is shown clearly that the bosses 44 are positioned so that as they are of the same size one will be above the other, and they will rest in contact with the apex of each curved end of the slot in the head 29, and in alignment with the longitudinal axis of the plunger 27. In order to provide for the upward and downward movement of the plunger 27 of equal distances, the pin 41 is located substantially in alignment with the longitudinal axis of the lever 30. Obviously there will be a combined sliding-and-rolling contact, during operation, between the said bosses and the curved ends of the said slot, thus allowing for freedom of movement for said lever without any necessity of having a loose connection between said lever and the base of the jack.

I have found that the construction herein-stated and illustrated in my drawings, relieves the plunger 27 of the action of any torque which naturally would bring lateral pressure against said plunger.

In the use of this jack the structure is such as to enable it being inserted into very restricted spaces and when the ram is inserted beneath the load the lever 30 is operated to operate the pump plunger. In the upward stroke the plunger draws a quantity of the fluid past the valve 21 into the passage 18 and on the downward stroke the valve 21 closes and the fluid is forced past the valve 25 into the ram chamber. The size of the plunger and the leverage are so proportioned as to enable the operation of the pump producing very high pressures within the ram chamber and the effect of pressure introduced into said chamber forces the ram upward to lift the load. The ball valve 25 being subject to the pressure within the ram chamber effectively holds the fluid so that the ram may be maintained positively in any desired position for any definite period.

In order to accomplish the lowering of the load a by-pass is arranged in the block 8 and consists of a transverse opening 32 leading from the passage 24 above the valve 25 and having a threaded outer end opening from the side of the block.

A hole 33 leads downwardly from the transverse passage through the block and communicates with the interior of the receptacle 2. A valve 34 having a threaded stem threaded into the threaded open end of the transverse opening 32 is adapted to engage the valve seat to close the opening. This valve is closed during the operation of raising the ram and when it is desired to lower it the valve is opened to allow the escape of fluid from the ram chamber. It will be seen that the lowering may be regulated very accurately by the manipulation of the valve 34.

A heavy set screw 35 is arranged in the outer end of the fluid receptacle to engage the pump block to force the end of the lug 13 securely into place to maintain the joint tight under the heavy pressure which is exerted.

What I claim is:

1. An hydraulic jack comprising a base having a ram chamber and a separate fluid receptacle; a ram operating in said ram chamber; a pump secured to said fluid receptacle and connected with the ram chamber, and embracing a plunger having a slotted head, the upper end of said slot being curved downwardly, and the lower end thereof being curved upwardly, and the apexes of said curved surfaces being substantially in alignment with the longitudinal axis of said plunger, a lever extending through said slotted head and provided at its upper and lower sides with aligned bosses projecting therebeyond which operate in contact with the curved upper and lower ends of said slot, and means fixedly carried by said base and projecting laterally therebeyond and to the outer end of which the inner end of said lever is pivoted so that the fulcrum for said lever will be substantially in alignment with the longitudinal axis thereof, said pump through the movement given to said plunger through the medium of said lever drawing fluid from said fluid receptacle and forcing it into said ram chamber.

2. An hydraulic jack comprising a base having a ram chamber and a separate fluid receptacle; a pump block removably secured in the top of said fluid receptacle and having a passage therethrough in communication with the ram chamber; a pump operatively arranged in said block and in communication with said fluid receptacle and embracing a plunger having a slotted head, the upper end of said slot being curved downwardly, and the lower end thereof being curved upwardly, and the apexes of said curved surfaces being substantially in alignment with the longitudinal axis of said plunger, a lever extending through said slotted head and provided at its upper and lower sides with aligned bosses projecting

therebeyond which operate in contact with the curved upper and lower ends of said slot, and means fixedly carried by said base and projecting laterally therebeyond and to the outer end of which the inner end of said lever is pivoted so that the fulcrum for said lever will be substantially in alignment with the longitudinal axis thereof, said pump through the movement given to said plunger through the medium of said lever drawing fluid from said fluid receptacles and forcing it into said ram chamber.

JAMES ROBERTS.