Oct. 7, 1924.

1,510,462

J. B. DELL

HYDRAULIC JACK

Filed April 22, 1920

FIG. 1.

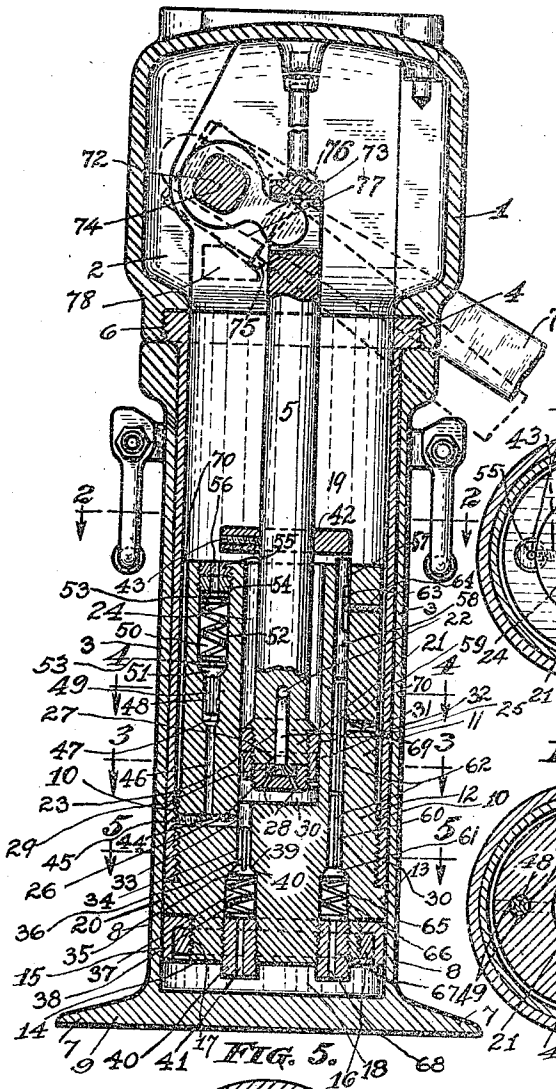


FIG. 2.

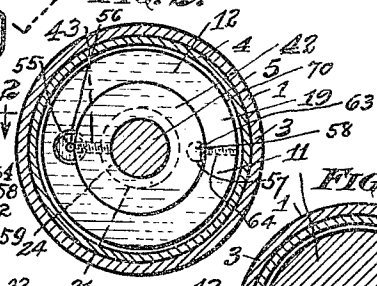


FIG. 3.

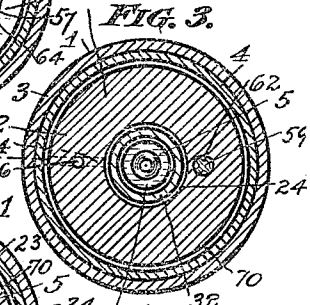


FIG. 4.

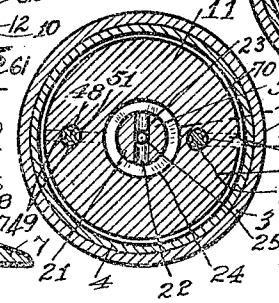
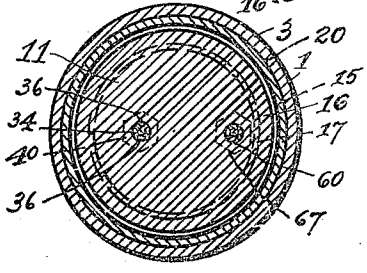


FIG. 5.



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UNITED STATES PATENT OFFICE.

JACOB B. DELL, OF ALTOONA, PENNSYLVANIA.

HYDRAULIC JACK.

Application filed April 22, 1920. Serial No. 375,859.

To all whom it may concern:

Be it known that I, JACOB B. DELL, a citizen of the United States of America, residing at Altoona, in the county of Blair and State of Pennsylvania, have invented certain new and useful Improvements in Hydraulic Jacks, of which the following is a specification.

The present invention relates to hydraulic jacks and has as a special feature automatic means for releasing the internal fluid pressure, and lifting power of the jack when the load reaches a predetermined amount, set as the allowable lifting capacity of the particular jack, and thus prevent the bursting of the jack parts by making them perform an overload duty.

Specially devised means is also provided in my invention for releasing the lifting jack from its load after its full extension point has been reached, by merely continuously operating the ordinary hand lever used in extending the jack under a load. The release of the jack in this instance is accomplished in a gradual manner, and is under the control of the operator, all of which is explained more fully hereinafter in this specification.

In the accompanying drawings forming part of this specification I have shown one complete embodiment of my invention, constructed according to the best mode I have so far devised for the practical application of the principles of my invention.

In the drawings Figure 1 is a vertical central section of my improved hydraulic jack.

Figure 2 is a horizontal section on line 2—2 of Figure 1.

Figure 3 is a horizontal section on line 3—3 of Fig. 1.

Figure 4 is a horizontal section on line 4—4 of Fig. 1.

Figure 5 is a horizontal section on line 5—5 of Fig. 1.

The numeral 1 indicates a hydraulic or fluid pressure actuated jack, having the usual hollow cast metal head 2, an outer cylinder or shell 3, a ram 4, and a piston 5. The head 2 is of the ordinary type and is screw-threaded at 6 on the upper end of the ram 4, and the latter slidably operates within the cylinder 3 in the usual manner. The outer cylinder 3 in the jack shown is formed at its base into outwardly projecting flanges 7, and said cylinder is shown with the walls 8 formed integral with the bottom 9, but any of the usual types of cylinders or bases may be used. The ram 4 is cylindrical in shape, and the lower end of same is provided with a screw-thread 10 in which the pump 11 is screwed into engagement therewith. The pump 11 comprises the following parts. 12 indicates a preferably steel casting of circular cross-section and having an outstanding annular flange 13 formed thereon. Seated in the lower or recessed end 14 of casting 12 is the annular leather packing 15 of section shown in Figure 1, and secured in place by the packing ring 16, which last is screw-threaded at 17 on the end of the casting 12.

The ram 4 reciprocates in the cylinder 3 when properly actuated, and it is evident that no fluid can pass from expansion chamber 18 beneath the pump 11 to the fluid reservoir 19 by means of any space between the periphery of the flange 13, and the inner wall of the cylinder 3 at 20 on account of the tight non-leaking fit of the leather packing ring 15 against said inner wall. The casting 12 is formed into a chamber 24, into which the piston 5, and its head 21 projects, and reciprocates within same. The piston head 21 has a passage 22 connecting the passage 23 in a transverse horizontal direction with the chamber 24. A valve stem 25 reciprocates in the chamber or passage 23, and said stem terminates in a valve head 26, which coacts with the valve seat 27. Suitable small lead passages 28, 28 lead from the small chamber 29 to the portion of the chamber 24 indicated by numeral 30 below the piston head.

It is seen that when piston 5 is raised that the valve head 26 remains in the position shown resting on the bottom of the small chamber 29, and that when the piston is operated in a downward direction that the valve head 26 engages the seat 27 and closes the valve. 31 indicates leather packing, which is secured in place by the nut 32 screw-threaded on the end of the piston 5. From point 30 a passage 33 leads downward enclosing the valve stem 34, the latter terminating in a valve head 35. The valve stem is fluted or grooved at 36, 36 to enable fluid to reach the valve head 35, and chamber 37 when the valve head is in an open position. 89 is a spring which tends to hold the valve head 35 on its seat 39 and keeps the valve closed. Beneath the spring 38 is a nut

40 screwed into the end of the casting 12 to form an abutment for the spring 38, and a passage 41 leads through the nut to the chamber 18 as shown. From the above description it is seen that when the piston 5 reciprocates fluid in chamber 19 is pumped by pump 11 into the chamber 18, and ordinarily the casting 12 will rise in the cylinder 3, and lift any load placed on the top of the head of the jack 2, as is at once understood. On the piston stem is an adjustable collar 42 which is fixed in position on said stem or piston 5 by means of a set-screw 43, the use of which collar 42 will be explained hereinafter in this specification. The above features are of ordinary construction, and the feature of my invention involving the safety release mechanism will now be described. Same consists in a passage 44, leading from the passage 33, the latter being plugged by a screw 45 as shown. From passage 44 leads a passage 46 which widens into passage 47, in which last the valve stem 48 reciprocates. The valve stem 48 is fluted or grooved at 49 so that fluid can pass from chamber 47 to chamber 50 when the valve 51 is open, as is readily understood. 52 indicates a spring which tends to keep the valve 51 in a closed position, and two washers having apertures therethrough and numbered 53, 53 are used as abutting elements at the ends of the spring 52. A nut 54, and a lock nut 55 retain the spring and adjacent parts in position in the casting 12. A passage 56 connects chamber 19 with chamber 50. From this description of the safety release mechanism it is seen that as soon as the pressure in the chamber 33 reaches a certain predetermined point equivalent to the strength of spring 52 used in the particular jack under consideration, that such pressure will overcome the spring 52 and open the valve 51 and release the fluid in the passages 33, 44, 46 etc. and the fluid pumped thereafter by the pump 11 into chamber 33 will merely travel back through the safety release mechanism passages into chamber 19, and the jack casting cannot be overstrained by an overload.

The load releasing mechanism will now be described, and consists of the following parts. Leading from the reservoir 19 is a passage 57, in which are located the slidable parts 58, 59, and 60 the latter being the stem of the valve 61. The valve stem 60 and the part 59 both have fluted stems at 62 for the passage of fluid therealong when the valve 61 is open. The part 58 has a cut-away portion at 63, into which a screw-threaded plug 64 engages forming a securing means to hold part 58 in the casting 12. It is seen further that the part 58 can reciprocate within the limits of the cut-away portion 63 for a purpose below described. The valve 61 operates against spring 65 in the chamber 66, and said spring in turn bears against the nut 67, which last is screwed into engagement with the base of the casting 12.

A passage 68 is formed in the nut 67 to provide a means of communication between chamber 18, through the valve 61 when same is open, through the fluted part 60, and passage 69, and by means of the peripheral recess 70 into the reservoir 19. The piston 5 is reciprocated by means of the lever 71 in the usual manner by means of the axle 72, and short lever 73, working about point 74 as a fulcrum. After the ram 4 carrying the head 2 has been extended by pumping fluid from chamber 19 into expansion chamber 18 by means of the pump 11, as high as it is desired to elevate the load on the head 2, it is evident that by reversing the position of the lever 71 in its socket 77, so that the projection 75 on same is reversed to position 76, it is seen that in this case the downward travel of the piston will continue until the bottom edge of the lever 71 or its socket 77 engages against the rigid lug 78, formed on the exterior of the head 2. In this last case the collar 42 will depress the parts 58, and 59, unseat the valve 61 thereby admitting fluid from the expansion chamber 18, by means of the passages 69 and 70 into the reservoir 19. This action if persisted in by further operation of the lever 71, will lower the ram 4 to its lowest position as shown in the drawings in Figure 1. The purpose of plug 64, and the cut-away portion or slot 63 formed in the part 58, is to prevent the latter from falling into fluid reservoir 19 under certain conditions in service. It is evident that when the jack is "handled" in use, it may be placed in an inverted position, while the piston 5 is in an extended position, in which case the collar 42 being no longer in proximate position with respect to the part 58, the latter would leave passage 57, and be deposited in reservoir 19, if it were not for the action of the plug 64 against the end of the slot 63. The load releasing mechanism, is very useful in that the same lever which raises the load, need simply be reversed in position in its socket 77, in order to start the load releasing mechanism, and lower the ram in the cylinder 3. Moreover the load releasing mechanism is positive in operation in my invention, and not subject to the uncertainties of small screw devices often used on hydraulic jacks for the purpose of releasing the jack from the load.

Attention is directed to the utility of having the collar 42 adjustably mounted on the stem of the piston 5, so that the operation of the parts 58, 59, and 60 can be adjustably controlled according to the physical conditions which obtain without the jack, to wit: the relation of the bottom edge

of the lever 71 and the rigid lug 78, before described. It is also seen that the length of the groove 63 and the relative position of the adjustable collar 42 on the stem of piston 5, determine the limit of movement of the parts 58, 59 and 60, as well as the valve 61 as is at once understood.

I claim:

1. In a hydraulic jack provided with a fluid reservoir, a pump and expansion chamber, a pump piston having a stem, means for expeditiously lowering the jack comprising a pump casting having a peripheral recess, a valve passage connecting the expansion chamber with the latter, a normally closed valve having a stem in the valve passage, adjustable means on the pump piston stem for depressing said valve, means carried in the pump casting for transmitting motion from the depressing means to the valve stem, and means for preventing dislodgment from, and limiting the travel of said transmitting means within the pump casting.

2. In a hydraulic jack provided with a fluid reservoir, a pump and expansion chamber, a pump piston having a stem, means for expeditiously lowering the jack comprising a pump casting having a peripheral recess formed thereon, a valve passage connecting the expansion chamber and the fluid reservoir, a passage connecting the valve passage and the peripheral recess, an upper slidable member, an intermediate slidable member and a normally closed valve having a stem located in said valve passage, a slot formed in the side of the upper slidable member, a plug carried by the pump casting in engagement with the said slot for preventing dislodgment, and limiting the travel of said slidable members, and adjustable means on the piston stem adapted to engage the upper slidable member for operating the aforesaid valve.

3. In a hydraulic jack, a safety pressure means comprising a fluid reservoir, a pump having a piston and a piston chamber, a jack expansion chamber, a passage connecting the two last named chambers, a normally closed valve in said passage, a second passage connecting the first passage with the fluid reservoir, a normally closed valve in the second passage adapted to automatically open when the pressure in the expansion chamber reaches a predetermined point; in combination with means for expeditiously lowering the jack consisting of a pump casting having a peripheral recess formed thereon, a valve passage connecting the expansion chamber and the pump casting peripheral recess, a normally closed valve in the valve passage, a fluted stem on the valve head, adjustable means mounted on the pump piston stem for depressing said last named valve, and means for transmitting motion from said depressing means to the fluted valve stem.

4. In a hydraulic jack, a safety pressure means comprising a fluid reservoir, a pump having a piston and a piston chamber, a jack expansion chamber, a passage connecting the two last named chambers, a normally closed valve in said passage, a second passage connecting the first passage with the fluid reservoir, a normally closed valve in the second passage adapted to automatically open when the pressure in the expansion chamber reaches a predetermined point; in combination with means for expeditiously lowering the jack consisting of an adjustable collar on the stem of the above-named piston, a pump casting having a peripheral recess formed thereon, a valve passage connecting the expansion chamber and the pump casting peripheral recess, a normally closed valve in the valve passage, a fluted stem on the valve head, and means for transmitting motion from the piston collar to the fluted valve stem for the purpose of permitting fluid to pass from the expansion chamber to the fluid reservoir.

5. In a hydraulic jack, a safety pressure means comprising a fluid reservoir, a pump having a piston and piston chamber, a jack expansion chamber, a passage connecting the two last named chambers, a normally closed valve in said passage, and means for relieving the pressure in the expansion chamber when same reaches a predetermined point; in combination with means for expeditiously lowering the jack consisting of an adjustable collar on the piston stem, a pump casting having a peripheral recess formed thereon, a valve passage connecting the expansion chamber and the pump casting peripheral recess, a normally closed valve in the valve passage, a fluted stem on the valve head, means for transmitting motion from the piston collar to the fluted valve stem, and means for limiting the movement of the said transmitting means.

In testimony whereof I affix my signature.

JACOB B. DELL.

Witnesses:

WILLIAM A. HIRTLE,

MARY A. JUNKIN.