March 19, 1929. H. C. MILLER ET AL 1,706,309

HYDRAULIC AND OTHER FLUID PRESSURE LIFTING JACK

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FIG. 2.

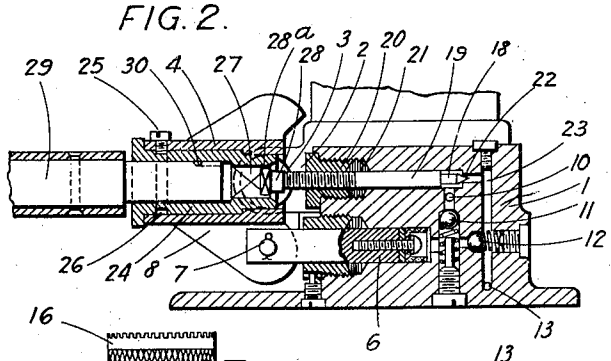
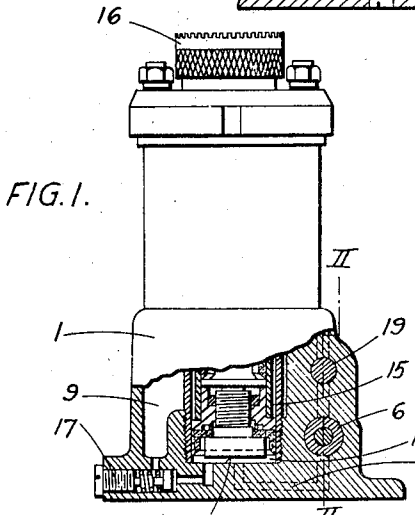


FIG. 1.



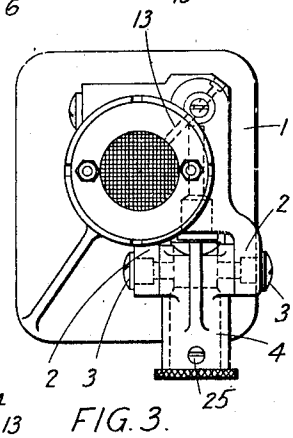
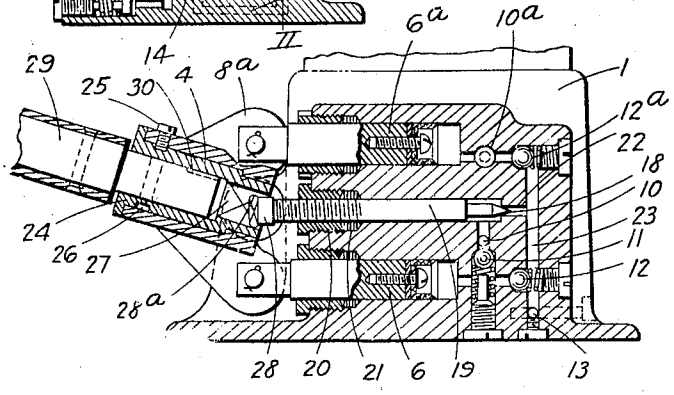


FIG. 3.



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FIG. 5.

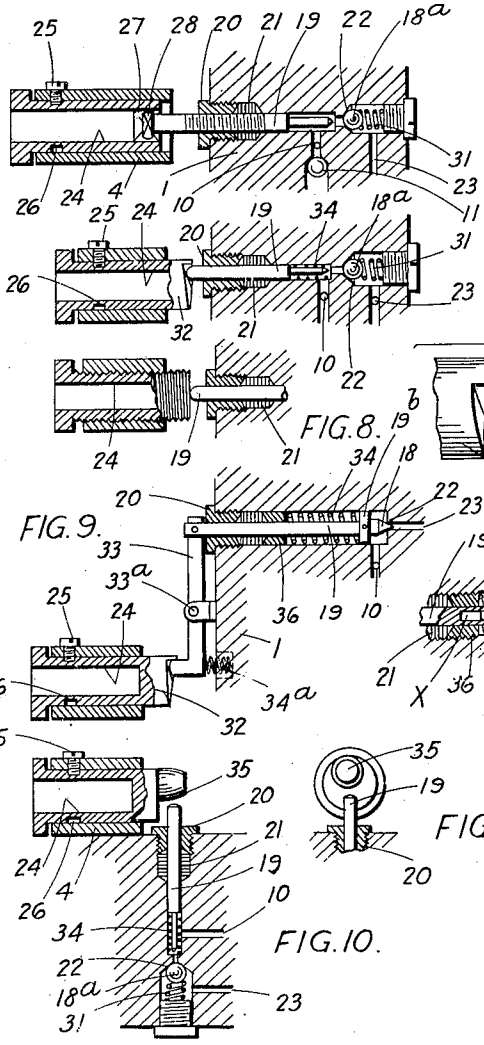


FIG. 6.

FIG. 7.

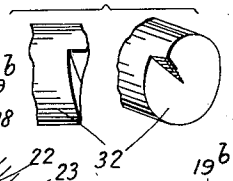


FIG. 8.

FIG. 9.

FIG. 10.

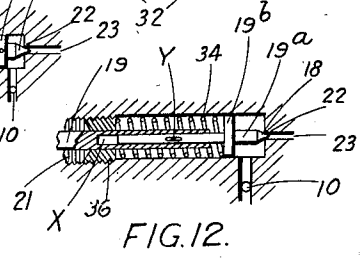


FIG. 12.

FIG. 11.

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UNITED STATES PATENT OFFICE.

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HYDRAULIC AND OTHER FLUID PRESSURE LIFTING JACK.

Application filed May 15, 1928, Serial No. 277,912, and in Great Britain February 4, 1927.

This invention relates to hydraulic and other fluid pressure jacks of the type in which a pumping handle is utilized for lowering the ram through the operation of a release valve, through which latter the motive fluid returns from the ram cylinder into a reservoir or sump.

Objects of the present invention are to provide an improved construction and arrangement of such fluid pressure jacks whereby the ram can be lowered by the operation of a release valve through the pumping handle in any position in the oscillatory path of the latter; and likewise to improve the construction and arrangement of the release valve and the means for controlling the operation thereof.

According to the present invention in a fluid pressure jack of the kind referred to the release valve is operatively connected to the pumping handle of the jack in such manner that a rotary or screw-like movement of the handle at any position in its oscillatory path operates the release valve, and thus enables the lowering of the ram to be effected irrespective of the position of the pumping handle.

In a convenient construction the release valve is operatively connected to the pumping handle through a rotatable sleeve that is mounted in the pivoted socket with which the pumping handle engages, so that a rotary or screw-like movement of the pumping handle in any position on its oscillatory path operates the release valve through the corresponding rotation of the said sleeve in the pivoted socket.

The sleeve may be secured against axial movement within the pumping handle socket or be threaded therein, and may be connected to the release valve so as to rotate the latter, or be associated with the release valve so as to effect axial displacement thereof without rotation of the release valve.

The release valve may also, as hereafter fully explained, be constructed to act as a combined release and safety valve.

In the accompanying drawings is illustrated by way of example embodiments of the invention in oil operated jacks.

Figure 1 is an elevation partly in section of a single pump type of jack, Figure 2 is a transverse section on the line II—II of Figure 1, and Figure 3 is a plan.

Figure 4 is a view similar to Figure 2 of a double pump type of jack, and Figures 5 to 12 show diagrammatically more arrangements, hereafter particularly referred to, for operating the release in accordance with the invention.

Referring first to Figures 1 to 3:—

The base casting 1 is provided with lugs 2 within which are secured pivot pins 3 for a socket 4 which when oscillated by means of a suitable handle about the pivot pins 3 produces working strokes for the pump 6 pivotally connected at 7 to a wing 8 on the socket.

On each outstroke of the pump 6 oil is drawn from the ram reservoir 9 through a conduit 10 past a valve 11, and at each instroke the oil previously drawn past the valve 11 is forced past a vale 12 to a conduit 13 communicating with the ram chamber 14, thereby raising the ram 15, the top of which is shown at 16.

As shown at 17 a safety valve may be provided for returning oil from the ram chamber 14 to the reservoir 9 when excessive pressure on the oil is obtained.

In order to permit the ram to fall after a lifting operation, the release valve, according to this invention, is disposed contiguous to the pump. The valve is of needle form, as indicated at 18, and is integral with an operating rod 19 threaded in a gland 20 maintaining packing 21 about the rod. The valve 18 normally seats on a port 22 between the conduit 10 and a conduit 23 connecting with the conduit 13, and when the valve is withdrawn the oil under pressure in the ram chamber 14 returns quickly through the conduit 13 and port 22 to the conduit 10, and thence back to the reservoir 9.

To make such release at will whatever the position of the pumping handle, the socket 4 is provided with a sleeve 24 secured to the socket, e. g. by means of a screw 25 taking into an annular groove 26 on the sleeve, so that the sleeve is rotatable without being axially displaceable, and the end of the sleeve contiguous to the release valve is squared as shown at 27 to receive a square head 28 formed on the rod 19. Thus, as the sleeve 24 is rotated, a corresponding axial displace-

ment of the valve 18 is obtained by virtue of the rod 19 being in threaded engagement with the gland 20.

Conveniently the pump handle 29 may be received by the sleeve in detachable manner, as for instance by pin and slot engagement indicated at 30, so that at any moment during pumping the handle without being removed has merely to be suitably rotated to procure the required unseating of the valve 18 if release is desired.

By suitable variations in the conduit within the casting 1, a double pump jack may be provided with a release valve disposed and operated according to the invention.

As shown in Figure 4, the second pump 6^a may be actuated from an upper wing 8^a on the socket and a conduit 10^a and non-return valve are provided corresponding to the conduit 10 and valve 11 of the pump 6 in Figure 2, together with a valve 12^a corresponding to the valve 12, whilst the socket 4 is constructed as before to carry the sleeve 24 having a squared end 27 taking over a square head 28 of the valve rod 19.

To permit unobstructed oscillation of the socket 4 the edges of the square head 28 are radiused as indicated at 28^a to afford clearance for the sleeve 24, while the polygonal section of the two parts 24, 28 assures transmission of rotatory motion when imparted to the sleeve irrespective of its position in its oscillatory path.

Although the release valve has been described as of needle form, other forms of valve may be used, and may be separated from the operating rod. Further, instead of direct transmission of movement from the sleeve to the valve rod, indirect transmission, i. e. through intermediate agents, e. g. cams, levers, may be employed.

In the construction shown in Figure 5, the rod 19 is separate from its valve, which is indicated at 18^a and is of ball type pressed to the seating at port 22 by a spring 31. In such arrangement rotation of the spindle 19 through the agency of the sleeve 24 is utilized to force the valve 18^a back against compression of the spring 31.

A modified form of such arrangement is shown in Figures 6 and 7, in which construction the sleeve is given a solid cam end 32 conveniently of helix form, as clearly seen in the side and pictorial views given in Figure 7 to a larger scale. As the sleeve 24 is rotated its cam 32 forces back the rod 19 which in this construction slides through the gland 20 and packing 21 against the resistance of a coiled spring 34 thereby unseating the valve 18^a, and when the sleeve 24 is reversed the valve rod 19 is returned by the reaction of the spring 34.

A further modification of such arrangement consists in forming the sleeve 24 as a threaded member within the socket 4, as indicated in Figure 8, thereby eliminating special cam 32, as rotation of the sleeve causes its required axial advance to actuate the rod 19 and displace the valve 18^a.

Although in the constructions heretofore described the release valve rod is shown disposed in a vertical plane containing the axes of the pump, it may be laterally removed therefrom or set at an angle thereto as illustrated for example at Figures 9 to 11, while the valve rod may be operated so as to open and close the release valve either by means of cams and springs, or by suitably arranged toothed wheels, worm gear and the like.

As indicated in plan at Figure 9, the release valve rod 19 is disposed laterally of the pump and is connected with the sleeve 24 of the socket 4 by a lever 33 mounted on a centre 33^a arranged on the base 1 in any convenient manner.

The sleeve 24 may be provided with a cam 32 or be threaded within the socket, as illustrated at Figure 8, so that on rotation of the sleeve the same is displaced axially and rocks the lever 33, thus actuating the valve rod 19 against the resistance of the spring 34 through the consequent operation of the connecting lever 33.

As shown, the release valve 18 is integral with the rod, which latter is furnished with a collar 19^b to form an abutment for one end of the coiled spring 34, the opposite end of which bears against a plug 36 forming the end of the stuffing box through which the rod 19 slides.

When the sleeve 24 is rotated so as to cause its cam end 32 to rock the lever 33, the latter withdraws the valve rod 19 against the resistance of the spring 34, thus opening the release valve 18, and when the sleeve 24 is reversed so as to release the connecting lever 33, the reaction of the spring 34 retracts the valve rod, thus closing the release valve 18.

If desired the release valve 18 may be made separate from the valve rod 19, as illustrated for example at Figure 6, in which case a second lever is arranged between the lever 33 and the valve rod 19 so as to give the requisite push to the valve rod for the purpose of opening the release valve, such as 18^a (Figure 6), the valve rod 19 being retracted by the reaction of its spring 34 or by means of a spring 34^a arranged between the base 1 and the lever 33, as indicated at Figure 9.

In the construction illustrated at Figure 9, the release valve 18 is utilized as a safety valve; that is to say, the valve 18 is held against the seat 22 by the spring 34 in opposition to the fluid pressure in the conduit 23 connected with the ram chamber. The plug 36 against which one end of the spring 34 bears, is threaded so that it can be adjusted for the purpose of regulating the pressure of the spring 34 upon the valve 18; thus, when the fluid pressure in the conduit 23 ex-

ceeds the predetermined resistance of the spring 34, the valve 18 is forced open and allows the fluid to escape and pass back to the reservoir 9 through the conduit 10, so that the employment of a separate safety valve as 17 (Figure 1) is unnecessary.

This construction may be modified by making the valve rod 19 telescopic, as indicated at Figure 12. In such modified construction the inner end of the valve rod 19 is bored out, as indicated at X, and provided with a telescopic extension 19^a, the end of which forms the release valve 18. The telescopic extension 19^a carries the abutment 19^b for one end of the spring 34, and is connected to the rod 19 by a pin and slot device indicated at Y, which device affords a slight lost motion between the valve rod 19 and its extension 19^a so that the latter can move sufficiently to allow the valve 18 to open under fluid pressure acting through the conduit 23 against the spring 34 without causing the valve rod 19 to move through its gland and stuffing box.

The lost motion of the pin and slot connection Y is taken up when the valve rod 19 is operated from the sleeve 24 so as to open the release valve, as previously described.

As indicated at Figures 10 and 11, the valve rod 19 is disposed substantially at right angles to the socket 4 and the pump, the sleeve 24 in the socket being provided with an eccentrically disposed cam 35; thus, when the sleeve 24 is rotated, the angular movement of the cam 35 operates the valve rod 19 against the resistance of its spring 34 so as to open the release valve 18^a, the valve rod being retracted and the release valve 18^a closed by the reaction of the springs 31 and 34, as previously described.

We claim:—

1. A fluid pressure lifting jack operated by means of a pump having an oscillatory pumping handle and furnished with a release valve wherein the release valve is operatively connected to the oscillatory pumping handle in such manner that a rotary or screw-like movement imparted to the pumping handle at any position in its oscillatory path controls the release valve.

2. A fluid pressure lifting jack furnished with a release valve and operated by means of a pump connected to a pivoted socket that is adapted to receive a pumping handle, wherein said socket is provided with an internal sleeve rotatable by the handle, said sleeve being operatively connected to the release valve so as to control the latter through a rotary or screw-like motion imparted to the pumping handle at any position in the stroke of the latter.

3. A fluid pressure lifting jack furnished with a release valve and operated by means of a pump connected to a pivoted socket that is adapted to receive a pumping handle, wherein said socket is provided with an internal sleeve rotatable by the handle, said sleeve being operatively connected to the release valve through an axially displaceable valve rod mounted in the base of the jack and connected at one end to said sleeve and at the other end to said release valve.

4. A fluid pressure lifting jack furnished with a release valve and operated by means of a pump connected to a pivoted socket that is adapted to receive a pumping handle, wherein said socket is provided with an internal sleeve secured against axial movement and rotatable in said socket by the handle, said sleeve being operatively connected to the release valve through an axially displaceable valve rod mounted in the base of the jack and connected at one end to said sleeve and at the other end to said release valve.

5. A fluid pressure lifting jack furnished with a release valve and operated by means of a pump connected to a pivoted socket that is adapted to receive a pumping handle, wherein said socket is provided with an internal sleeve rotatable in said socket by the handle, which sleeve is in threaded engagement with said socket so as to be axially displaceable therein, and is operatively connected to the release valve by an axially displaceable threaded valve rod that works through a gland in the base of the jack, said rod being connected to said sleeve by an angular head on one end of said rod which engages a counterpart bore in the adjacent end of said sleeve, said rod being connected at the other end to the release valve.

In testimony whereof we affix our signatures.

H. C. MILLER.
MAY SUMNER,
Executrix of George Percy Sumner, Deceased.