Oct. 4, 1927. 1,644,101

E. W. ANDERSON

HYDRAULIC JACK

Filed March 8, 1926

FIG. 1

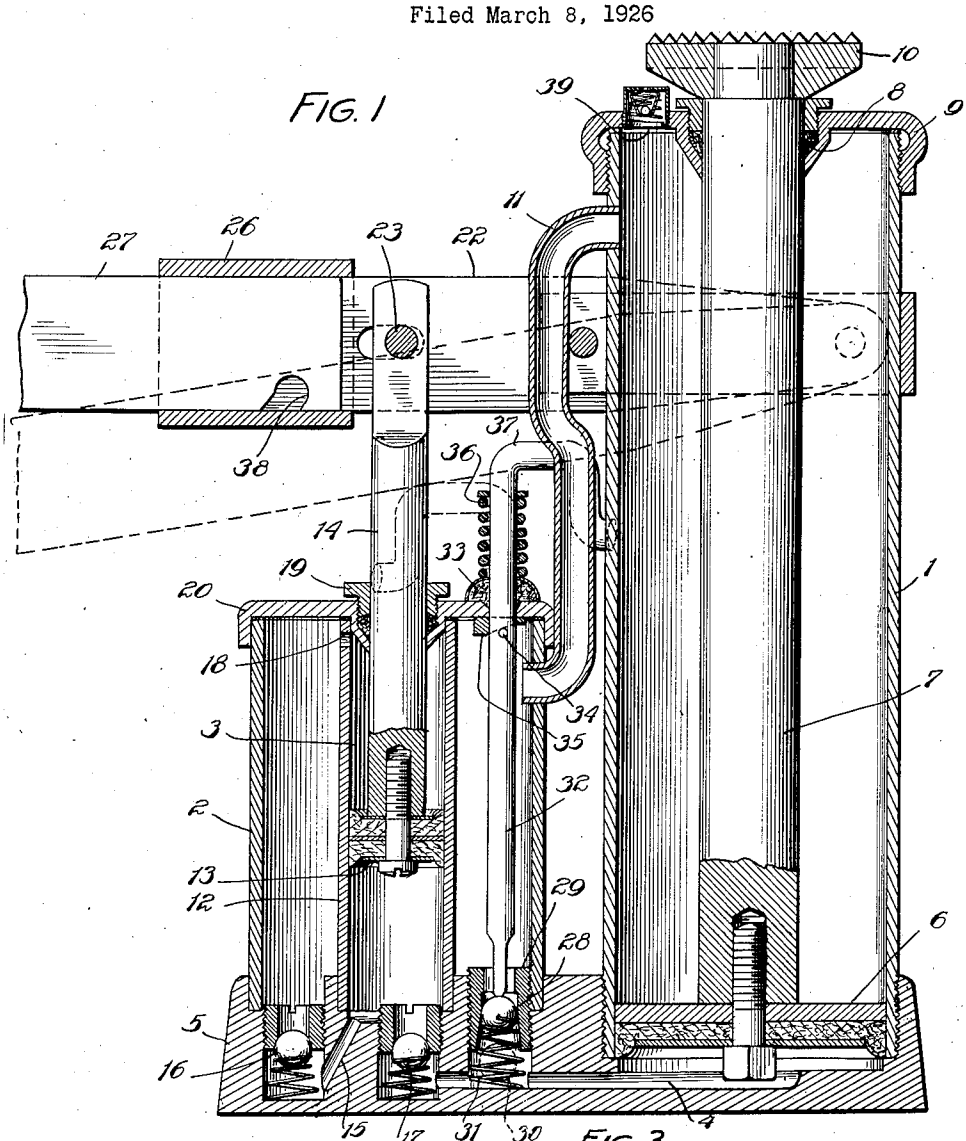


FIG. 2

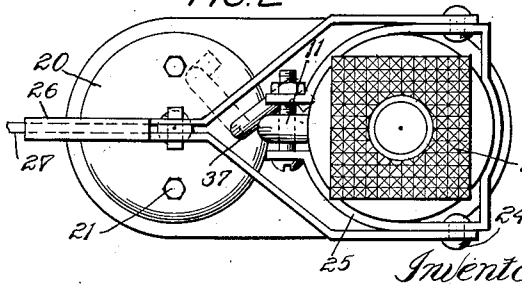


FIG. 3

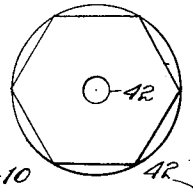


FIG. 4

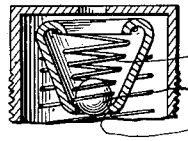
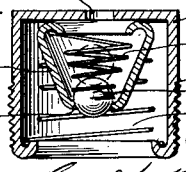


FIG. 5



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HYDRAULIC JACK.

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This invention relates to hydraulic lifting jacks.

The jack to which this invention may be applied comprises a lifting piston arranged in an upright cylinder having a by-pass around the piston so as to permit both ends of the cylinder on opposite sides of the piston to contain liquid. The space above the piston thus serves as a reservoir from which the liquid may be forced through the by-pass to a comparatively small auxiliary reservoir which contains a pump for forcing the liquid to the lower end of the cylinder.

The main objects of this invention are to provide an improved form of valve mechanism for controlling the return flow of liquid from the lower part of the cylinder to the auxiliary reservoir to permit lowering of the piston; to provide a valve mechanism of this kind which is adapted to open the return passage in various degrees so as to control the speed at which the piston drops; and to provide an improved form of valve for controlling the air vent of the main cylinder.

An illustrative embodiment of this invention is shown in the accompanying drawing, wherein:—

Figure 1 is a central vertical section of a hydraulic jack to which this invention is applied, part of the handle being broken away, the dotted outline representing the positions of the operating handle and valve mechanism when the return passage is completely open.

Fig. 2 is a top plan of the same on a reduced scale.

Fig. 3 is an enlarged detail in elevation of the air vent valve.

Fig. 4 is a central vertical section of the same, showing the valve in position for admitting air to the cylinder.

Fig. 5 is a view similar to Fig. 4, but showing the valve closed, the dotted outline representing the position of the ball where air is being expelled from the cylinder.

In the specific construction herein shown, the improved jack comprises an upright cylinder 1 adapted to serve as the main liquid reservoir which communicates with a comparatively small auxiliary reservoir 2, in which is located a liquid pump 3 for forcing liquid from the auxiliary reservoir to the lower end of the cylinder 1 through a valve controlled liquid passage 4 formed in a base 5 on which the cylinder and reservoir are mounted.

Arranged within the cylinder 1, is a lifting piston 6 having a stem or plunger 7 extending through a stuffing box 8 in a cap 9 which is threaded to the upper end of the cylinder. Swiveled on the upper end of the plunger 7, is a head 10 adapted to engage the load to be lifted. The cylinder 1 serves as the main supply reservoir and may be completely filled, below and above the piston 6, with the oil or other liquid used in raising the load. Extending between the upper ends of the reservoirs 1 and 2, is a conduit 11, through which the liquid flows from one reservoir into the other.

In the form shown, the pump 3 comprises a cylinder 12, having arranged therein, a piston 13 secured to the lower end of a plunger 14. The lower end of the cylinder 12 is seated in a recess in the base 5 and communicates with the reservoir 2 through a liquid passage 15 controlled by a check valve 16. Communication between the cylinder 12 and the passage 4 is controlled by a check valve 17. Formed in the upper end of the cylinder 12 is an air vent 18. The upper end of the plunger 14 extends through a stuffing box 19 in a cap 20 which is mounted on the upper end of the reservoir 2. Extending through the reservoir 2, is a pair of bolts 21 which clamp the cap 20 to the reservoir 2 and which also serve to clamp the latter to the base 5. The upper end of the plunger 14 is connected to a yoke 22 by a pin and slot connection 23. The yoke 22 is pivotally secured, by pins 24, to a clip 25 which firmly embraces the upper part of the cylinder 1. Formed on the yoke 22, is a socket 26 for receiving a removable operating handle 27 by which the pump is manually operated.

The auxiliary reservoir 2 also communicates with the passage 4 through a check valve 28, which is normally closed, but which is adapted to be manually opened to permit the liquid below the piston 6 to return to the reservoir 2 when it is desired to lower the plunger 7. The valve 28 comprises a seat 29 coacting with a ball 30, which is normally seated by a spring 31. The ball 30 is urged away from its seat by an upright stem 32 which extends upwardly through a stuffing box 33 on the cap 20. The lower end of the stem 32 projects within the seat 29 in position to coact with the ball 30. The stem 32 is partially rotatable in the cap 20 and is provided with a pin 34 which rides on a cam

35 mounted on the cap 20 so as to move the stem 32 axially downwardly when it is partially rotated. Embracing the upper part of the stem 32, is a spring 36 arranged to normally urge the stem upwardly to hold the pin 34 in engagement with the cam 35.

On the upstroke of the piston 6, the liquid in the upper end of the cylinder 1 is forced through the passage 11 into the reservoir 2. When the valve 28 is open, the lifting piston 6 drops by gravity, or by the weight of the load, and the liquid in the lower end of the cylinder 1 is forced back into the reservoir 2, and from the reservoir 2 the liquid is forced through the passage 11 into the cylinder 1 above the piston 6. The speed at which the lifting piston is lowered is controlled by the position of operating stem 32. To lower the lifting piston slowly, the stem 32 is turned only slightly so as to move the ball 30 only a short distance from its seat.

The upper end of the stem 32 is formed to provide a handle 37 which is adapted to be manually turned for axially shifting the stem 32. The handle 37 may be actuated by the handle 27 and for this purpose the latter is provided with a notch 38 which is adapted to engage the handle 37 for turning the stem 32. To actuate the handle 37 by means of the handle 27, the latter is withdrawn from the socket 26 and held in one hand of the operator. As shown in dotted outline in Figures 1 and 2, the handle 37 is adapted to be shifted into the path of one arm of the yoke 22 so that, by moving the yoke downwardly, the stem 32 may be shifted downwardly for opening the valve 28 to its fullest extent, thereby permitting a comparatively quick lowering of the lifting piston.

In order to permit the ingress of air to the reservoir 2 through the passage 11 during the operation of the pump 3, the cap 9 of the cylinder 1 has a vent 39 controlled by an automatic valve 40. The valve 40 comprises a casing 41 having a vent 42. Arranged within the casing 41, is a vertically movable valve 43, normally urged into position for closing the vent 42, by means of a spring 44. The valve 43 is opened, to permit the ingress of air, upon each upstroke of the pump piston 13. Formed in the lower end of the valve 43, is an opening 45 normally closed by a ball 46 which is urged into engagement with its seat by a spring 47. When the lifting piston 6 drops, the air in the upper part of the reservoir 2 unseats the ball 46, during its egress through the vent.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. A hydraulic jack comprising a cylinder for the lifting piston, a liquid supply reservoir communicating with said cylinder, a valve controlling the return flow of liquid from said cylinder to said reservoir, means for opening said valve, and mechanism for pumping liquid from said reservoir to said cylinder, said valve opening means being shiftable into position to be actuated by said pumping mechanism.

2. A hydraulic jack comprising a cylinder for the lifting piston, a liquid supply reservoir communicating with said cylinder, a valve controlling the return flow of liquid from said cylinder to said reservoir, an axially movable stem adapted to open said valve, and mechanism for pumping liquid from said reservoir to said cylinder, said valve opening stem having a handle part shiftable into position to be actuated by said pumping mechanism.

3. A hydraulic jack comprising a cylinder for the lifting piston, a liquid supply reservoir communicating with said cylinder, a valve controlling the return flow of liquid from said cylinder to said reservoir, a stem movable axially to open said valve, said stem also being partially rotatable, means for moving said stem axially during its rotation, and mechanism for pumping liquid from said reservoir to said cylinder, said mechanism being also adapted to axially move said valve opening stem.

4. A hydraulic jack comprising a cylinder for the lifting piston, a liquid supply reservoir, a liquid passage providing communication between said cylinder and reservoir, a valve in said passage, means for normally closing said valve, a stem axially shiftable and partially rotatable in said reservoir for opening said valve, and means for moving said stem axially through its partial rotation, said stem being also movable axially independently of its rotary movement.

5. A hydraulic jack comprising a cylinder for the lifting piston, a liquid supply reservoir, a liquid passage providing communication between said cylinder and reservoir, a valve in said passage, means for normally closing said valve, a stem axially shiftable and partially rotatable in said reservoir for opening said valve, a cam for moving said stem axially during its rotation, a handle on said stem, and mechanism for pumping liquid from said reservoir to said cylinder, said handle being adapted to be turned into position to be actuated by said pumping mechanism.

Signed at Chicago this 19th day of February 1926.

E. WILLIAM ANDERSON.