A. W. MARR.

HYDRAULIC JACK.

APPLICATION FILED MAY 5, 1919.

1,344,919.

Patented June 29, 1920.

2 SHEETS—SHEET 1.

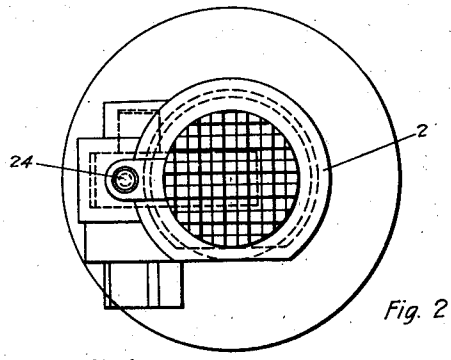


Fig. 2

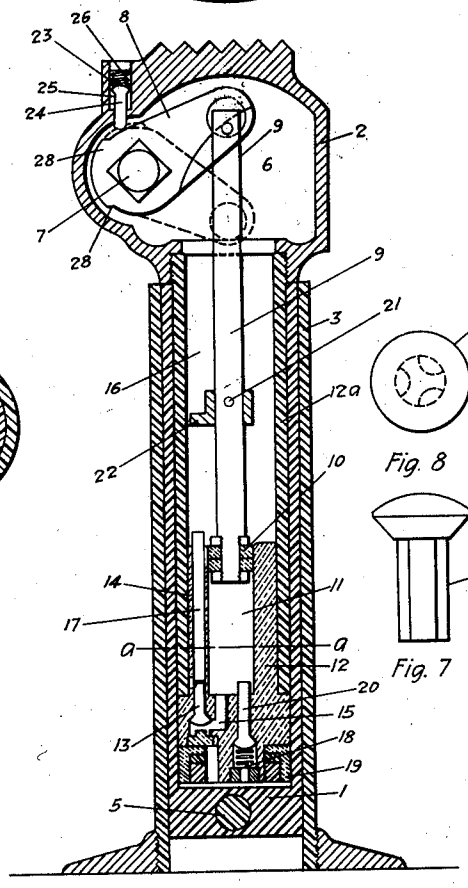


Fig. 1

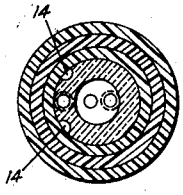


Fig. 3

Fig. 8

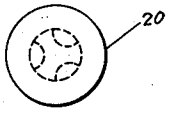


Fig. 10

Fig. 7

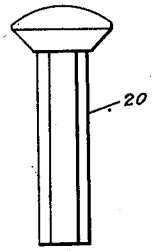


Fig. 9

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2 SHEETS—SHEET 2.

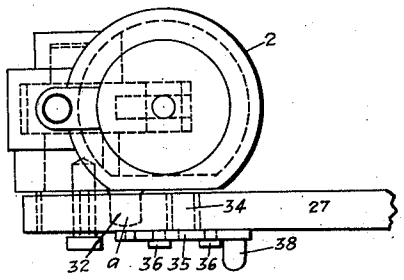


Fig. 6

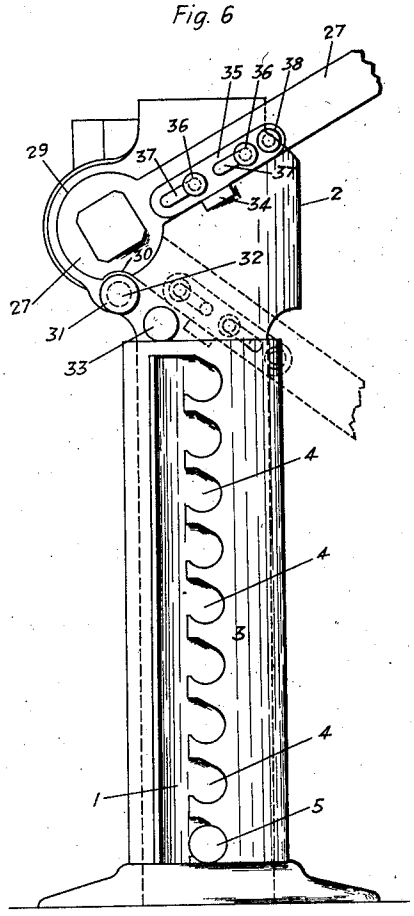


Fig. 4

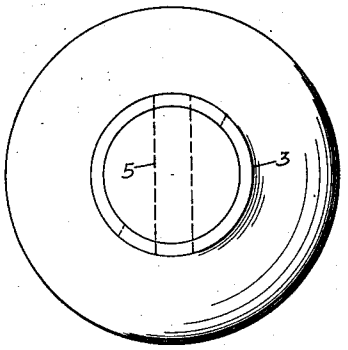


Fig. 5

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UNITED STATES PATENT OFFICE.

ALEXANDER W. MARR, OF CANTON, OHIO.

HYDRAULIC JACK.

1,344,919. Specification of Letters Patent. Patented June 29, 1920.

Application filed May 5, 1919. Serial No. 294,650.

To all whom it may concern:

Be it known that I, ALEXANDER W. MARR, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Hydraulic Jacks, of which the following is a specification.

This invention relates to new and useful improvements in hydraulic jacks.

The principal object of my invention is to provide in a hydraulic jack, an air-valve that is automatically opened when the jack lever is forced downwardly, for the purpose of admitting air to fill the space left by the liquid which is forced from the inner tube or well to the outer cylinder of the jack. Furthermore, when the suction valve and discharge valve are opened, allowing the liquid to flow from the cylinder back to the inner tube, the means I have provided will hold the air valve open to permit the air to pass freely from the inner tube or well of the jack. After this occurs, the air valve will be automatically closed to prevent the entrance of dirt, dust, oil or other foreign matter to the interior of the jack, as well as to enable the jack to be laid in a horizontal position without fear of leakage.

Another object of the invention is to provide means for preventing the jack lever from being removed until the air valve is closed, thus insuring the closing of the latter to seal the jack so that it can be laid in a horizontal position without risk of the liquid leaking out. This feature makes the jack particularly useful for automobile service.

Another object of the invention is the provision of means whereby, by turning the jack cylinder in one direction while holding the outer casing, said cylinder may be quickly raised through the casing to the load, resulting in the saving of time devoted to pumping the jack up to the load. With equal facility the cylinder may be lowered in the casing after the load has been released.

A further object of the invention is to provide means for preventing the jack from being tripped while raising the load, said means being simple in construction and efficient in operation.

The preferred form of embodiment of my invention is illustrated in the accompanying drawings, of which Figure 1 is a sectional, elevational view of my improved hydraulic jack. Fig. 2 is a top plan view thereof. Fig. 3 is a horizontal sectional view through the lower portion of the jack, taken on the line *a—a* of Fig. 1. Fig. 4 is a side elevational view of the jack, showing the ratchet telescoping-casing for the jack cylinder. Fig. 5 is a bottom plan view thereof. Fig. 6 is a top plan view of the same. Fig. 7 is a vertical elevational view, and Fig. 8 a plan view, of the suction valve. Fig. 9 is a vertical elevational view, and Fig. 10 a plan view, of the discharge valve.

Throughout the specification and drawings, similar reference characters denote corresponding parts.

Referring to the accompanying drawings, the numeral 1 designates the cylinder and 2 the head of a hydraulic jack. The cylinder 1 is vertically movable in a quick-action sleeve or outer casing 3 constructed as follows: Referring to Figs. 4 and 5, the outer casing 3 is vertically slotted on opposite sides to provide a series of vertically-disposed notches 4, in each of which one end of a transverse holding pin 5 that passes through the lower end of the cylinder 1, is adapted to fit. By turning the cylinder 1 to the left, and at the same time holding the casing 3 in a stationary position, the ends of the pin 5 may be drawn out of the lower notches 4, to permit the head 2 to be raised easily to the load, after which the ends of said pin may be moved into the nearest upper notches of the casing 3, to firmly hold said cylinder in the desired position. After the load has been lowered, the cylinder may again be turned to the left to permit the ends of the pin 5 to clear the notches 4 for the purpose of quickly lowering the cylinder 1 in the outer casing. It is thus seen that my improved quick-action means obviates the labor and time necessary to pump the head of the jack up to the load each time it is to be used.

The automatic air-valve construction that I employ for sealing the jack when the lever is in its uppermost position, will now be described. Referring to Fig. 1, the head 2 of the jack contains the usual liquid well or reservoir 6. Journaled in the head 2 is a lever shaft 7 to which is fixedly secured one end of a rocker arm 8, to the other end of which is pivotally secured the upper end of a pump rod 9. To the lower end of the latter is secured a plunger 10 that works in a central recess or bore 11 of a pump barrel 12 provided in the lower end of a ram 12^a to which the head 2 is screwed.

The numeral 13 designates the usual suction valve that passes liquid from the channels 14 14 to a suction passage 15 that communicates with the lower end of the pump bore 11, said channels being in communication with the elongated ram chamber 16 that is a continuation of the reservoir 6, and communicating at their lower ends with an annular space into which the top of the suction valve 13 projects. The numeral 17 designates the usual rod for tripping the suction valve 13 to permit the liquid to flow back into the reservoir 6 when the load is being lowered. (See Figs. 1, 3, 7 and 8.)

Referring to Figs. 1, 9 and 10, the numeral 18 designates a discharge passage from the pump bore 11 to a force chamber 19, said pump chamber being provided with the usual discharge valve 20. Secured to the pump rod 9, preferably by means of a pin 21, is a trip block 22 to engage and force downwardly the trip rod 17 to open the suction valve 13, the pump rod at the same time being adapted to strike the discharge valve 20 to open it, whereby with both valves simultaneously open, liquid may flow from the force chamber 19 back to the reservoir 6 when the load is lowered.

In the upper left portion of the head 2 there is provided a vertical air passage 23 to admit air to the space above the level of the liquid in the reservoir 6 when the jack is operated to raise a load. Provided in the passage 23 is an air valve 24 of the puppet type that is normally held against its seat 25 by a spring 26 above it. While said valve is thus held closed, no dirt, dust, oil or other foreign matter can get into the reservoir 6 when the jack is not being operated. Furthermore, said jack may be laid in a horizontal position without fear of leakage, since the air valve thoroughly seals it, thus making the jack one which is particularly adapted for automobile service.

When the lever 27 that is provided to operate the rocker arm 8, is lowered, the air valve 24 will be raised to admit air, by the following mechanism: Formed on the periphery of the rocker arm 8, at a place to engage and raise the air valve 24 on the downward movement of the lever 27, is a cam portion 28. (See Fig. 1.) In the upper position of the rocker arm, as shown by the heavy lines in Fig. 1, the air-valve 24 is held closed by the spring 26. However, when the pump rod 9 is lowered, the cam portion 28 of the rocker arm 8 will engage and raise the lower end of the air-valve 24, to permit air to rush in and fill the space above the liquid in the reservoir 6. The position of the cam 28 when the pump rod is in its lower position, is shown by the dotted lines in Fig. 1. So long as the lever 27 is in a position below its normal upper one, the lower end of the air-valve 24 will rest upon the cam 28, to admit air to the reservoir 6. But as soon as the lever reaches the position shown in Fig. 4, the cam 28 will have been moved to a point where it has cleared the lower end of the air-valve 24, permitting the spring 26 to force the latter tightly against its seat 25 to seal the opening or passage 23 against the admission of more air and against the discharge of any liquid when the jack is laid in a horizontal position.

The following means are provided to prevent the lever 27 being removed from the jack except when it has reached a position wherein the cam 28 has cleared the lower end of the air-valve 24, or, in other words, a position in which said air-valve has closed the air passage 23: The front end of the lever 27 has a circular periphery 29 in which a notch 30 is provided. When it is desired to remove the lever after it has reached the position shown in Fig. 4, this notch 30, which is curved, will clear the flange 31 of a pin 32 secured to the head 2. However, when the lever 27 is moved downwardly, that portion of its periphery at the right of the notch 30 will pass into the space between the flange 31 and the head 2 of the jack, to be held by said flange on the locking pin 32, against removal until it has again reached the position wherein the air-valve 24 will be closed.

The means which I provide for preventing the jack from being tripped while raising a load, will now be described. Fixedly secured to the lower left portion of the head 2 is a pin 33 adapted to be engaged by a stop block 34 on a slide 35 that is movably secured to the operating lever 27 by means of flanged pins 36 that project from said lever through slots 37 provided in said slide. By means of a handle 38 the slide 35 may be moved to bring the block 34 in a position to strike, or avoid, the pin 33 on the downward movement of the lever 27. In the full lines in Fig. 4, the block 34 is set in a position to engage the pin 33 on the downward movement of said lever, in which instance said pin will stop the lever at a point wherein the trip block 22 on the pump rod 9 will not engage the trip rod 17 to open the suction valve 13, nor will the lower end of said pump rod strike the discharge valve 20 to open it, thus preventing the jack from being tripped while raising the load.

By drawing the slide 35 away from the cam shaft 7, as shown by the dotted lines in Fig. 4, the block 34 will clear the pin 33 on the downward movement of the latter, permitting the pump rod 9 to be forced thereby approximately $\frac{1}{8}''$ farther down in the pump bore 11, to strike and open the discharge valve 20, the suction valve being simultaneously engaged and opened by the trip rod 17 that is struck by the descending trip block 22 on said pump rod. Therefore, the liquid will be permitted to flow back into

the reservoir 6 when the load is lowered. It will thus be seen that by means of my sliding stop and pin construction, the operator may easily and efficiently control the tripping of the jack.

Having described my invention, I claim:

1. In a hydraulic jack, the combination with a cylinder, a ram movable therein, a head secured to said ram, a pump in the latter, a device in said head for operating said pump, of an air valve in said head, and automatic means controlled by the pump-operating device, to open said air valve to admit air to the interior of said head, and to hold said valve open until the pump-operating device has been returned to its starting position.

2. In a hydraulic jack, the combination with a cylinder, a ram movable therein, a head secured to said ram, a pump in the latter, a lever pivotally secured to said head for operating said pump, of an air valve, normally closed, in said head to admit air to the interior thereof, and cam means controlled by said lever to open said valve on the downward movement of the lever, and hold it open until said lever has been returned to its upper starting position.

3. In a hydraulic jack, the combination with a cylinder, a ram movable therein, a head secured to said ram, a pump in the latter, a rod for operating said pump, a rocker arm pivotally secured in said head, one end of which is secured to the pump rod, means for reciprocating said rocker arm to operate the pump, of an air-inlet passage in said ram head, a puppet valve in said passage, a seat for said valve also provided in said passage, resilient means for normally holding said valve against its seat to seal the jack, and a cam operated by said rocker arm, adapted to engage and open said valve on the downward movement of said pump rod, and to hold said valve open until the pump rod has been drawn by the rocker arm to its upper starting position.

4. In a hydraulic jack, the combination with a cylinder, a ram movable therein, a head secured to said ram, a pump in the latter, a rod for operating said pump, a shaft journaled in the ram head, a rocker arm one end of which is fixedly secured to said shaft and the other end pivotally attached to the upper end of said pump rod, a lever for operating said rocker arm, of an air-inlet passage provided in said ram head, a puppet valve in said passage, a seat for said valve in the passage, a spring normally holding said valve against its seat, and a cam formed on the rocker arm, adapted to engage the lower end of said air valve to open it on the downward movement of said lever, and hold it open until said lever has been returned to its upper starting position.

5. In a hydraulic jack, the combination with a cylinder, a ram movable therein, a head secured to said ram, a pump in the latter, a device in said head for operating said pump, a lever removably secured to said device, of an air valve, normally closed, in said head to admit air to the interior thereof, cam means controlled by said lever to open said valve on the downward movement of the lever, and to hold it open until said lever has been returned to its upper starting position, and means preventing the removal of said lever until it has been returned to said last named position, to insure the closing of said air valve against the admission of air to said jack and the leakage of liquid from it.

6. In a hydraulic jack, the combination with a cylinder, a ram movable therein, a head secured to said ram, a pump in the latter, a device in said head for operating said pump, a lever removably secured to said device, having a circular head, of an air valve, normally closed, in said head to admit air to the interior thereof, cam means controlled by said lever to open said valve on the downward movement of the lever, and to hold it open until said lever has been returned to its upper starting position, a pin secured to said ram head near the circular head of said lever, and a flange on said pin in the space between which and the ram head the outer circular portion of said head of the lever is adapted to pass during its downward movement, for the purpose of preventing the removal of said lever until it has been returned to its upper starting position, said lever having a notch in its circular head, which is adapted to clear the flange on said pin when said lever has reached its last named position, whereby it may be removed only after said air valve has been closed.

In testimony whereof I have hereunto set my hand this 23rd day of April, 1919.

ALEXANDER W. MARR.

Witness:

HOWARD S. SMITH.