

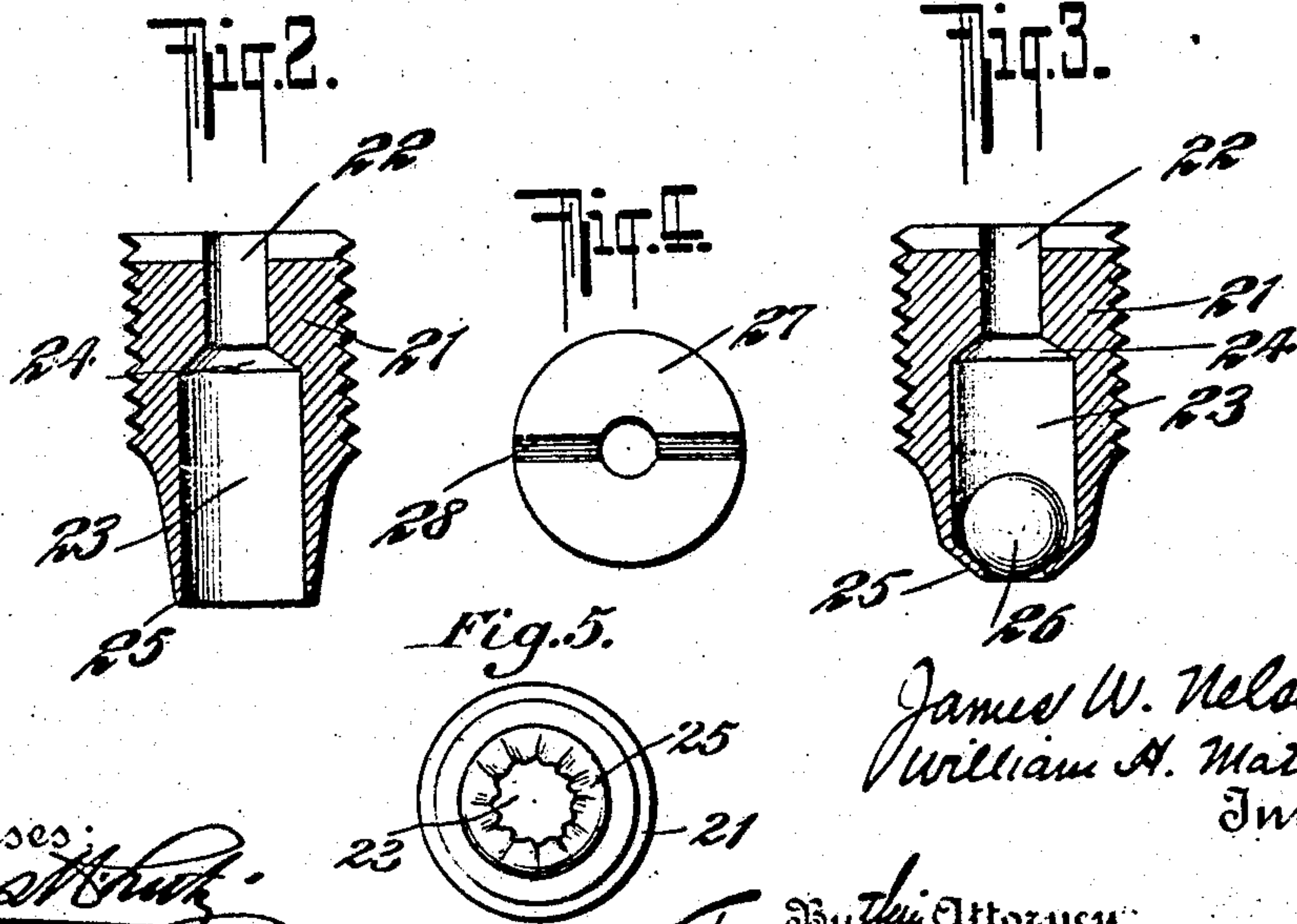
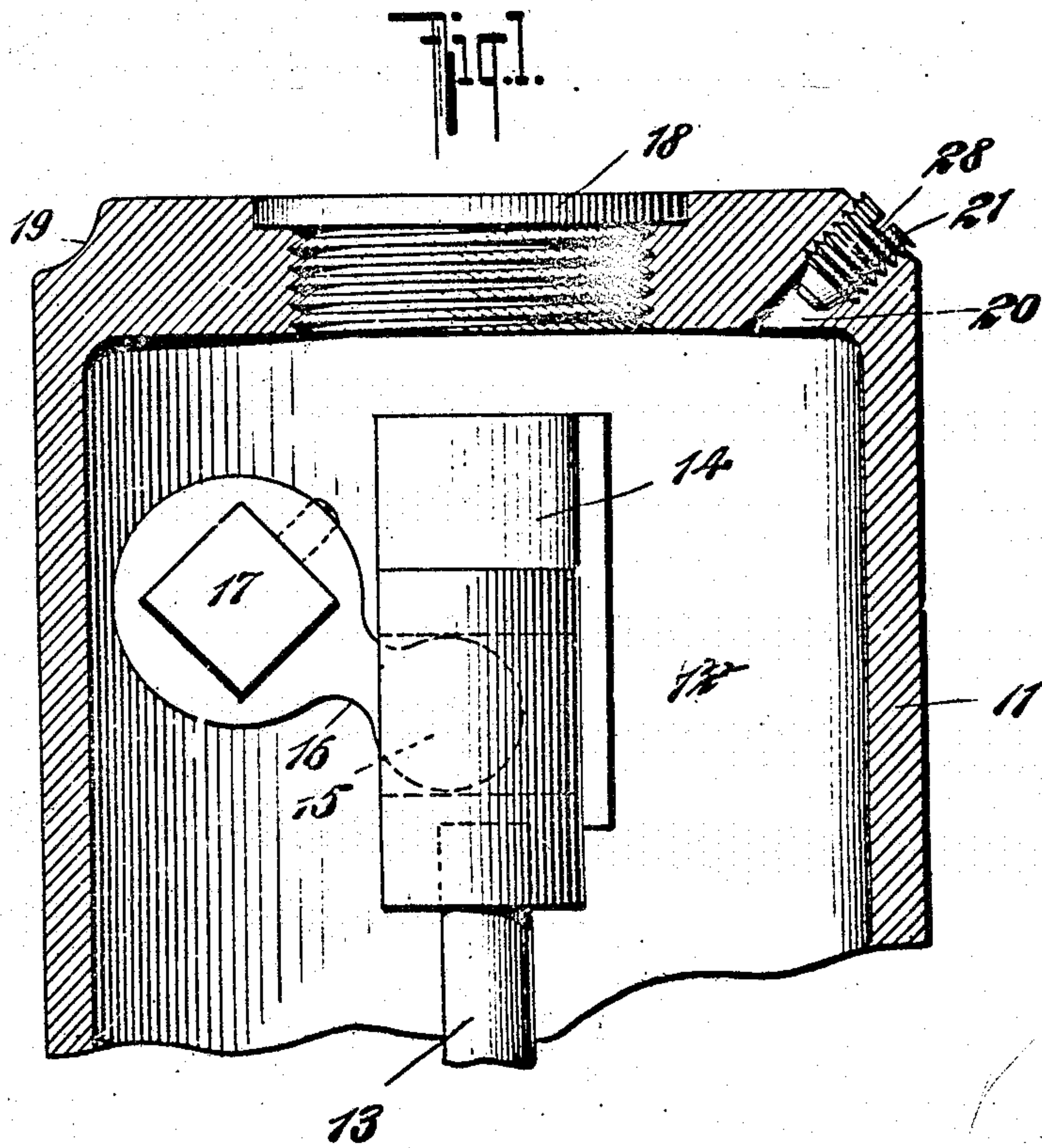
J. W. NELSON & W. H. MATHERS.

AIR VALVE FOR HYDRAULIC JACKS.

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899,462.

Patented Sept. 22, 1908.



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UNITED STATES PATENT OFFICE.

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AIR-VALVE FOR HYDRAULIC JACKS.

No. 899,462.

Specification of Letters Patent.

Patented Sept. 22, 1908.

Application filed May 23, 1907. Serial No. 375,245.

To all whom it may concern:

Be it known that we, JAMES W. NELSON and WILLIAM H. MATHERS, citizens of the United States, and residents of New York city, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Air-Valves for Hydraulic Jacks, of which the following is a specification.

10 This invention relates to hydraulic jacks, and particularly to self-contained jacks of this class which include a reservoir from which the motive fluid is pumped into the ram or pressure chamber, to do the required work, and back to which said fluid is returned when released from said chamber, after the work has been done and it is desired to "lower" the jack, or, in other words, to contract the expanded tool for removal and subsequent operations. It is well known that the liquid most generally employed in such a self-contained hydraulic jack, in order that the device may be successfully operated in severely cold weather, is one of various compounds which are non-freezing at any ordinary temperatures. As such compounds are more or less expensive, it is of course desirable, so far as possible, to eliminate waste of the fluid, and, therefore, the reservoir should be so closed or sealed that the liquid cannot escape therefrom, and this irrespective of the position in which the device is used or placed. While it is desirable to thus prevent escape of the fluid, it will be apparent that it is essential to permit of the free ingress of air—this more particularly in view of the fact that as the fluid is withdrawn from said reservoir a vacuum or partial vacuum would otherwise be created within said reservoir which might seriously interfere with the proper operation of the pump valves. Furthermore, it will be similarly apparent that as the fluid is returned from the ram or pressure chamber to said reservoir, during the operation of "lowering", provision must be made for the escape of air from said reservoir, otherwise a pressure would be generated therein which would ultimately become sufficient to check or seriously impede the lowering or contracting operation.

This invention particularly relates to means for permitting the free ingress and

egress of air to and from the reservoir of a self-contained hydraulic jack and at the same time prevent the escape of liquid matter therefrom, and the principal objects of the invention are simplicity of construction, dependability in operation and economy in manufacture.

Our invention will be more readily understood by reference to the accompanying drawings, forming a part of this specification, in which

Figure 1 is a central sectional elevation of the upper portion of a hydraulic jack, we having selected for the purposes of this description a well-known type of hydraulic jack in which the reservoir—within which is also located the pump-operating means—is mounted upon the upper end of the ram; Fig. 2 is an enlarged central section of the valve-plug in its uncompleted state, before the insertion of the ball-valve; Fig. 3 is a similar view of the completed plug with the ball therein and the lower edge thereof turned inwardly to retain the ball in the valve chamber; Fig. 4 is a top plan view of said plug, and Fig. 5 is a bottom plan view of said plug, showing the crimped or corrugated end thereof.

Referring now to the drawings in detail, numeral 11 refers to the upper end of the ram of a type of hydraulic jack which we have selected for the purposes of description and to which form we do not desire to limit our invention. This upper end of the ram is hollow, providing an interior chamber 12 adapted to contain, in addition to the pump-operating mechanism, a suitable supply of the liquid which is to be forced by the pumps or pump into the ram or pressure chamber.

In the type of jack shown, the pump-operating mechanism comprises a plunger-rod 13, provided with a head 14 into which projects the knuckle 15 at the end of the arm 16 on the rock-shaft 17. This shaft 17 is rocked by means of a lever (not shown) secured to an end of said shaft which projects beyond the casing or wall of the jack.

The top or upper wall of the shell or casing 11 is provided with a screw-threaded aperture, adapted to be closed and sealed by the similarly screw-threaded cap or plug 18, to permit of access to the interior of the ram for the purposes of filling the reservoir and the

removal for repair or replacement of parts of the pump mechanism which have become worn or broken.

It will be noted that, partly for the purposes of safety and convenience in handling and partly for a purpose hereinafter set forth, the upper corner or edge of the head 11 of the ram has been cut away to form the tapering or beveled and preferably concave face 19, and extending from that portion of this face 19 opposite the rock-shaft 17 to the interior of the reservoir, we provide the bore 20.

It will be apparent that were the jack always to be used in an upright or vertical position, the location of a valved vent in the wall of the reservoir would be immaterial, so long as it was above the highest level of the surface of the liquid in said reservoir. When the jack is to be used in a horizontal position as well, however, this vent should obviously be located so that it will be invariably above the normal level of the liquid when the jack is in either of the two positions mentioned or any position intermediate thereof. The pump-operating lever, which is reciprocated to rock the shaft 17, preferably projects towards the side of the jack opposite that within which said shaft is mounted, and when used in a horizontal position, therefore, the device should be placed with said lever projecting upwardly, for the purpose of accessibility, and when in this position the side of the ram within which the rock-shaft 17 is mounted will be underneath. It follows, therefore, that if the bore 20, which is intended to provide the vent to which we have referred, (and referring now to the position of the jack as shown in Fig. 1), is located in the upper, right-hand corner of the head 11 of the ram, the interior mouth thereof will invariably be above the normal level of the liquid in the reservoir whether the jack is used in a vertical or horizontal position.

Within the bore 20 we mount the valve-plug 21. This plug 21 may obviously be secured in said bore in any one of many well-known ways, but we prefer, as best insuring a tight joint without interfering with ready insertion, adjustment and removal, that bore and plug be provided with corresponding interior and exterior screw-threads, respectively. This plug 21 is first made in the form illustrated in Fig. 2, having a longitudinal bore or passage 22 therethrough which is reduced in diameter near its upper end to form the valve-chamber 23 and the valve-seat 24. The lower end of the plug tapers to the thin circular edge 25.

An ordinary steel ball 26, slightly less in diameter than the diameter of the valve-chamber 23, is then placed in said chamber, and the thin end-edge 25 of said plug pinched or crimped inwardly, as shown in Fig. 3, to provide a gate which retains said ball within said chamber. This in-turned edge, how-

ever, being crimped or slightly corrugated, does not provide a valve-seat, there being always small openings for the flow of air between ball and gate.

It will be noted that the bore 20 is diagonally disposed with reference to both top and side walls of the reservoir, and, therefore, whether the jack is in a vertical or a horizontal position (or any oblique position intermediate thereof), the exterior end or mouth of said bore will be above the interior end or mouth thereof. Consequently, the ball 26, when under equal atmospheric pressures, will normally, under action of gravity, seek the lowermost part of the chamber 23 and, therefore, rest against the gate formed by the in-turned edge 25—this gate being, as shown, at the bottom of the chamber 23 in whatever position the jack may be used. As explained, the ball does not in this position check the free passage of air into and out of the reservoir, and the air-pressure in said reservoir, therefore, during use of the jack, is maintained at all times atmospheric. The normal level of the liquid, in any position of the jack when in use, being below the interior mouth of the bore 20, no liquid can escape from the reservoir. When the jack is thrown or placed to one side, however, when not in use, it is practically impossible to invariably so position the vent that it will be above the level of the liquid in the reservoir. If the interior mouth of the bore 20, under such conditions, becomes submerged in the liquid, one of two things will happen; either the disposition of the bore 20 will be so changed that the action of the force of gravity will be reversed and, augmented by the pressure of the liquid, operate to seat the ball and close the valve, or the action of gravity will be so nearly reversed that the interior pressure of the liquid will be sufficient to easily overcome the remaining resultant force in opposition thereto and drive the ball into its seat 24 and effectually seal the opening. It will be seen that in this manner we provide a single and exceedingly simple valved vent, self-acting without springs, which is automatically operable for the purposes intended irrespective of the position of the tool when in or out of use.

We prefer to provide the top face 27 of the plug 21 with the usual groove or channel 28 for the reception of the ordinary screw-key or screw-driver, which is employed for the purpose of inserting and properly adjusting said plug in and removing the same from the bore 20.

Having thus described a device embodying our invention, we claim as new and desire to secure by Letters Patent:

1. A vent-passage for the reservoir of a hydraulic jack or the like, the relative direction of which is inclined to both the top and side walls of said reservoir.

2. A vent-passage for the reservoir of a hydraulic jack or the like which includes a valve chamber which inclines downwardly from its outer to its inner end both when the device is in a vertical and when in an operably horizontal position.

3. A vent-passage for the reservoir of a hydraulic jack or the like, the relative direction of which is inclined to both the top and the side walls of said reservoir, said passage providing a valve-chamber with a seat at the outer end thereof only, and a ball in said chamber.

4. A vent-passage for the reservoir of a hydraulic jack or the like which includes a valve chamber inclining downwardly from its outer to its inner end both when the device is in a vertical and when in an operably horizontal position, said valve-chamber being provided with a seat at the outer end thereof only, and a ball in said chamber.

5. A reservoir for self-contained hydraulic jacks and the like having a bore through the wall thereof which is inclined in direction to the planes of both top and side walls of said reservoir, and a removable valve-plug in said bore.

6. A reservoir for self-contained hydraulic jacks and the like having a bore through the wall thereof so relatively inclined that the exterior mouth of said bore is above its interior mouth both when the device is in a vertical and when in an operably horizontal position, and a removable valve-plug in said bore.

7. A valve plug for the reservoir of a hydraulic jack comprising a substantially cylindrical body with the longitudinal bore reduced in size at each end to provide a valve chamber having a valve seat at its outer end only, a ball-valve in said chamber, and means for removably securing said plug in the wall of said reservoir in such position of inclination that the inner end of said chamber is below the outer end thereof when the device is in a vertical and when in an operably horizontal position.

8. The combination, with the reservoir of a self-contained hydraulic jack or the like, said reservoir being provided with a passage through the wall thereof which inclines downwardly from its outer to its inner end both when the device is in a vertical and when in an operably horizontal position, of a plug having a longitudinal bore therethrough, said bore being interiorly enlarged to form a valve-chamber with a seat at the outer end thereof only, a ball in said chamber, and means for removably securing and adjusting said plug in said passage.

In testimony of the foregoing, we have hereunto set our hands in the presence of two witnesses.

JAMES W. NELSON.
WILLIAM H. MATHERS.

Witnesses:
M. B. GLEN,
JAS. MOORE.