J. W. NELSON.

HYDRAULIC PRESSURE GENERATING, CONTROLLING, AND APPLYING DEVICE.

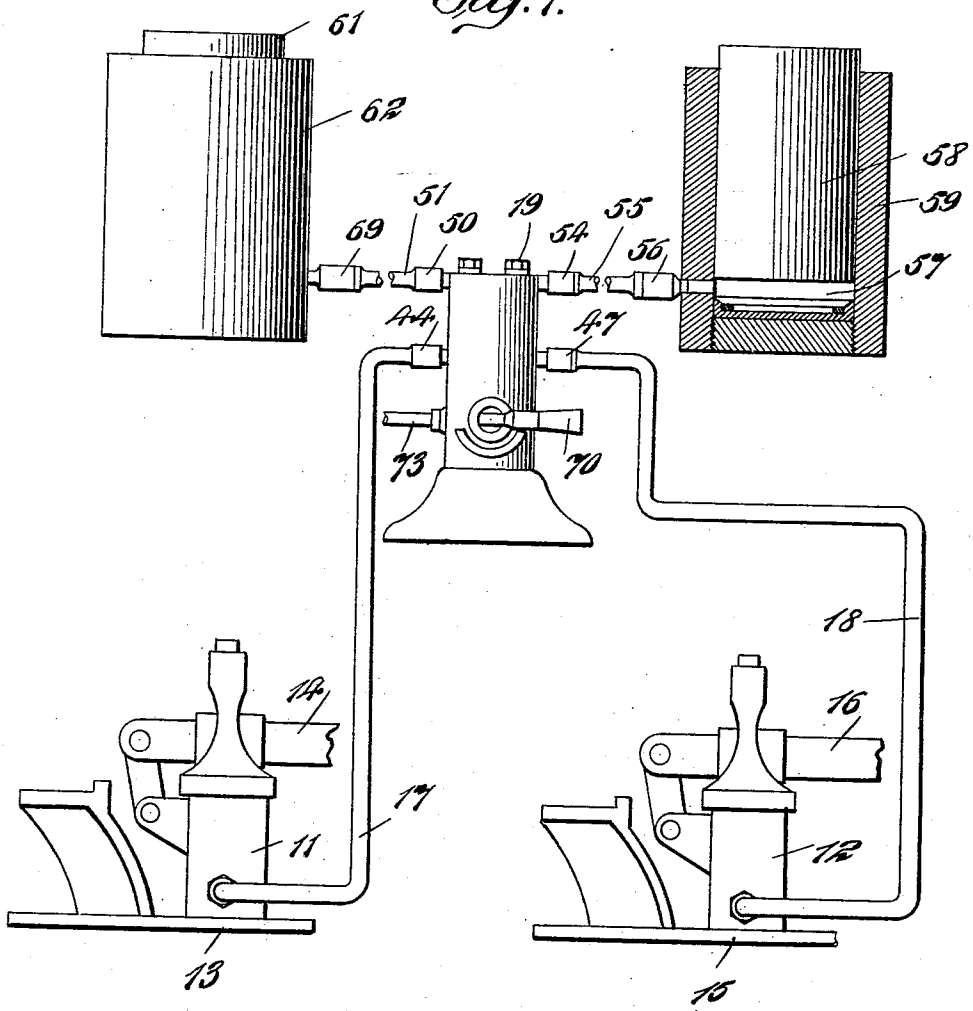
APPLICATION FILED DEC. 19, 1908.

941,167.

Patented Nov. 23, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



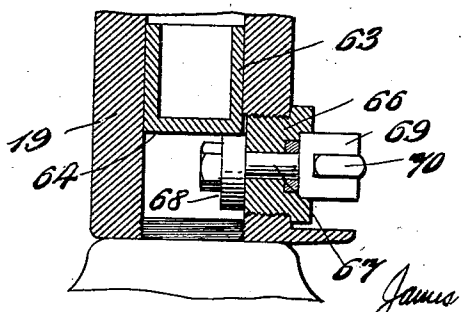


Fig. 3.

WITNESSES

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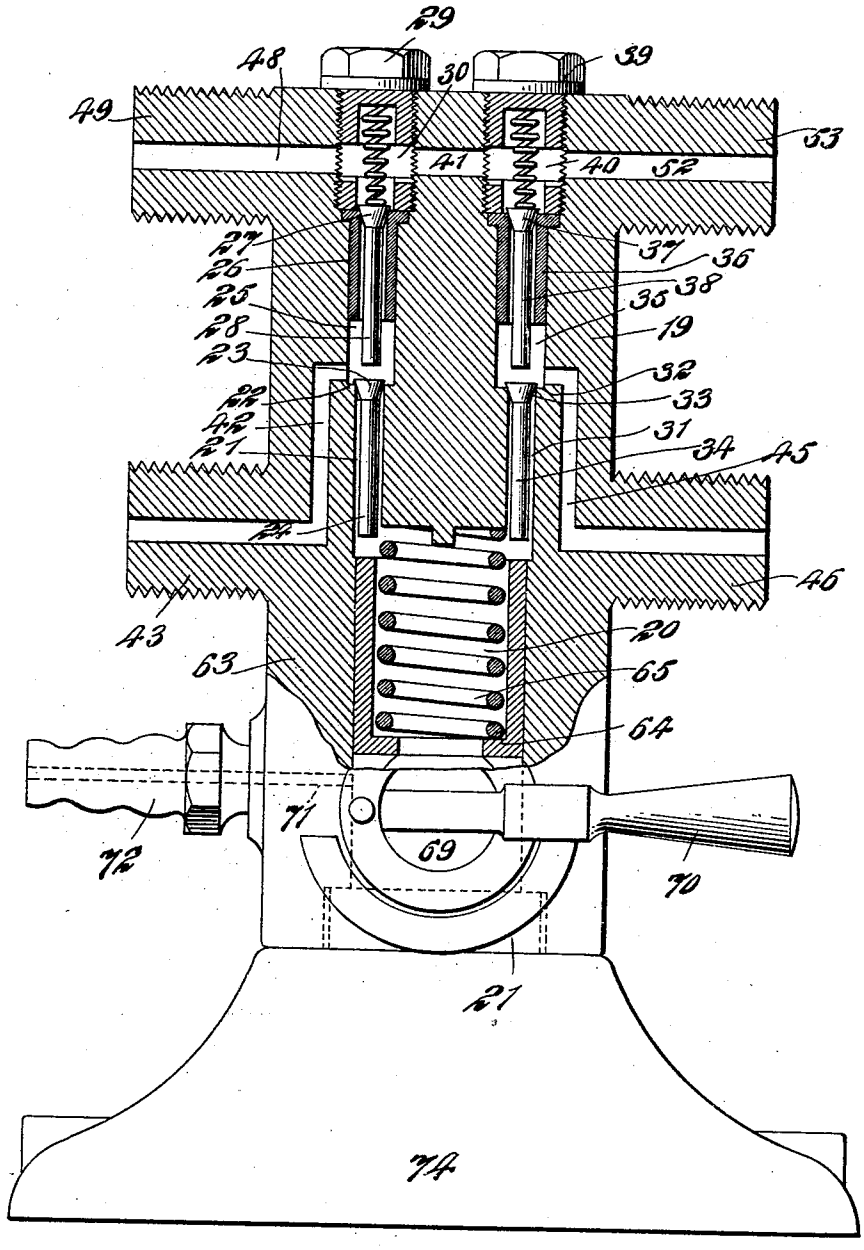

Fig. 2.

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HYDRAULIC PRESSURE GENERATING, CONTROLLING, AND APPLYING DEVICE.

941,167. Specification of Letters Patent. Patented Nov. 23, 1909.

Application filed December 19, 1908. Serial No. 468,344.

To all whom it may concern:

Be it known that I, JAMES W. NELSON, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Hydraulic Pressure Generating, Controlling, and Applying Devices, of which the following is a specification.

This invention relates to hydraulic jacks in connection with which the means for generating the hydraulic pressure are located at some distance from the device or devices for applying the pressure, and which are provided with means apart from both the generating and applying means for controlling the generated pressures.

In a copending application, filed January 27, 1908, Ser. No. 412,855, I have shown and described apparatus for generating and applying hydraulic pressure which comprises two separate pumps, two separate rams, suitable flexible connecting conduits therebetween, and a device located in proximity to said rams for equalizing and distributing the pressure of the two pumps and operable to control and finally relieve the applied pressures.

The present invention contemplates improvements in this device for equalizing, distributing and controlling the pressures. It is well known that hydraulic apparatus of this character is frequently used in localities and under conditions which render it exceedingly difficult to provide pure water for the pumps. The sediment or foreign matter in impure water is likely to soon become lodged to a greater or lesser extent in the valve seats and ultimately prevents satisfactory operation of the valves. Inasmuch as all pump and pressure valves in the present type of apparatus are located in what I may term the valve block or controlling member, interposed between the pumps and the rams, I have found that where the valves seat downwardly in channels through which the water is forced in an upward direction under pressure, sediment does not become so easily lodged in the valve seats, and if lodged is more easily dislodged by the flow of water in a downward direction through the channels when the pressure is relieved. The present invention, therefore, contemplates a valve block in which the valves are downwardly seated and means for retaining said block in a substantially vertical position during operation of the device.

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

Figure 1 is a diagrammatic view, parts thereof being in section, of a complete apparatus embodying my invention; Fig. 2 is an enlarged central vertical section of the valve block or pressure controlling device, and Fig. 3 is a transverse central section through the lower part of said valve block.

Referring now to the drawings in detail, numerals 11 and 12 refer to two pumps, each of the single piston or plunger type. The pump 11 is preferably mounted on a suitable base plate 13 and I have shown the plunger therein adapted to be reciprocated by means of the ordinary pump lever 14. The pump 12 is shown mounted upon a suitable plate 15 and is operated by means of the lever 16. From the pump chamber underneath the piston in the pump 11, leads a suitable duct to the pipe 17, and similarly, from the pump chamber underneath the piston in the pump 12, leads a duct to the pipe 18. These pipes 17 and 18 lead to the valve block or pressure controlling device 19. This valve block preferably comprises a cylindrical-shaped body having a larger longitudinal bore 20 at the lower end thereof, the bottom of which is preferably closed and sealed by means of the screw-cap 21. At the upper end of the block 19 are provided two smaller longitudinal bores which extend from the top of the device to an open into the bore 20, each of these smaller bores being of varying diameters and of smaller diameter adjacent to the bore 20.

Referring first to the bore, I have shown the same at 22 increased in diameter to provide a seat for the valve 23 which has a stem 24 extending downwardly and projecting slightly into the bore 20. Within the widened portion 25 of this bore, I insert a removable cylindrical plug 26, the top of which provides a seat for the valve 27 which has a stem 28 extending downwardly nearly but not quite to the top of the valve 23. Above the valve 27, the bore is again increased in diameter, the top thereof being closed and sealed by means of the screw-cap 29 to provide a chamber 30 above the valve

27. Similarly, the smaller portion 31 of the other bore is at 32 increased in diameter to provide a seat for the valve 33, which has a stem 34 extending downwardly and projecting slightly into the bore 20. The enlarged portion 35 of said bore is similarly provided with the cylindrical plug 36, the top of which provides a seat for the valve 37 which has a stem 38 projecting downwardly nearly but not quite to the top of the valve 33. This bore is similarly closed and sealed at its upper end by means of the screw-plug 39 which similarly provides a chamber 40 above the valve 37. The chambers 30 and 40 are connected by the open duct 41. From the portion 25 of one of these valve bores, between the valves 23 and 27, leads a duct 42 to and through the arm or lug 43, which is screw-threaded for the reception of the coupling or connection 44 at the end of the pipe 17. Similarly, from the portion 35 of the other bore, between the valves 33 and 37, leads a duct 45 to and through arm or lug 46, which is screw-threaded for the reception of the coupling 47 at the end of the pipe 18.

From the chamber 30 leads the lateral duct 48 to and through the arm or lug 49, which is screw-threaded for the reception of the coupling 50 at one end of the pipe 51 which leads to one of the rams, and from the chamber 40 leads a similar duct 52 to and through the lug or arm 53, which is screw-threaded for the reception of the coupling 54 at the end of the pipe 55 which leads through the coupling 56 to the chamber 57 below the ram 58 in the cylinder 59. In a similar manner, the pipe 51 leads through the coupling 60 to the chamber below the ram 61 in the cylinder 62.

Fitting within the bore 20, is the cylinder or push tube 63, the upper end of which is positioned to impinge, when raised, against the stems 24 and 34 of the valves 23 and 33. This cylinder is provided at its lower end with the in-turned flange 64, providing a seat for the spring 65 which acts against the top of the bore 20 to tend to keep said cylinder in its lowermost position.

The cylinder 19 is provided with a lateral aperture which is closed and sealed by the screw-plug 66, which is centrally bored to provide bearings for the short shaft 67, on the inner end of which is mounted the cam 68 in coöperative positional relation to the bottom of the cylinder 63. The outer end of the shaft 67 is provided with a head 69, in which is mounted the end of the lever 70 by means of which said shaft 67 is rotated and said cam 68 operated to raise and lower the cylinder 63.

It will be apparent that through the rotation of the shaft 67, the cam may be operated to raise the cylinder 63, the first effect of which will be to engage the stem 24 of the valve 23 and hold the latter off its seat. Continued rotation of the cam 68 will continue upward movement of said cylinder 63 to engage the stem 34 of the valve 33 and raise and hold the latter off its seat, without, however, unseating either of the two valves 27 and 37. Further rotation of the shaft 67 will cause a valve 23 to impinge against the stem 28 of the valve 27 and raise and hold the latter off its seat, thereby opening a passage from the chamber 30 to the bore 20. Still further raising of the cylinder 63 will cause the valve 33 to impinge against the stem 38 of the valve 37 and raise and hold the latter off its seat, thereby opening a passage from the chamber 40 to the bore 20.

From the lower part of the bore 20 leads a lateral duct 71 to and through the nipple 72, by means of which the rubber or other flexible tube or hose 73 may be secured to said block and be open to the bore 20. This pipe 63 leads to any suitable source of liquid supply, such as a barrel or tank.

In order that the valves may operate in a constantly vertical position, I mount the block 19 upon a suitable heavy standard 74, which is of sufficient size and weight to prevent accidental overturning of the block.

It will now be apparent that upon the up-stroke of the piston within the pump 11, a partial vacuum will be formed in the pump chamber, and this relief of pressure will result in the unseating of the valve 23 and a flow of liquid from the source of supply through the pipe 73 to the bore 20, thence upwardly through the portion 21 of the valve bore, past the valve 23 and through the duct 42 and the pipe 17 to the pump chamber. Upon the down-stroke of the piston in the pump 11, the excess of pressure against the upper side of the valve 23 will, assisted by gravity, seat said valve, and the flow of water is directed upwardly through the portion 25 of said bore, past the valve 27 and into the chamber 30, where, on account of the duct 41, the generated pressure is equally distributed between the chambers underneath the rams 58 and 61. Similarly, upon the up-stroke of the piston in the pump 12, a partial vacuum is formed in the pump chamber which results in the flow of liquid from the source of supply to the bore 20, upwardly past the valve 33 to the duct 45 and thence to said pump chamber. Upon the down-stroke of said piston, said valve 33 is seated, and the liquid is directed upwardly through the portion 35 of the valve bore, past the valve 37, which it unseats, and into the chamber 40, where it is similarly distributed between the two ram chambers. It will therefore be seen that either one or both pumps may be operated, each having its own valve checking back flow to the source of supply, and that the effective

strokes, if both pumps are employed, may be either alternate or in unison. If both pumps are used, irrespective of the force employed, the pressures are equalized between the chambers 30 and 40. These pumps are sometimes coupled to a common source of power, and under such circumstances it might be at times inconvenient to check operation of one of said pumps alone. Under such circumstances, it is only necessary for the operator, stationed near the rams, where the work is being done and where the progress thereof can readily be noted, to turn the lever 70 to an arc sufficient to raise the push-tube 63 and unseat the valve 23. Under such conditions, the operation of the pump 11 will be ineffective, the liquid drawn into the pump chamber upon the up-stroke of the piston, returning past the now open valve 23 to the source of supply. Should it become desirable to terminate altogether the application of increased pressure, the lever 70 may be turned through a slightly greater arc, operating to unseat the valve 33 as well as the valve 23, under which conditions the operations of the pumps will be wholly ineffective although the valves 27 and 37 would prevent relief of the generated pressures in the ram chambers.

When it is desired to relieve the pressure in the ram chambers, for the purpose of removing or replacing the jacks or for any other purpose, the lever 70 is turned through a still greater arc, elevating the valve 23 to the point where it impinges against the stem 28 of the valve 37 and unseats the latter, operating in the manner described to provide an open passage from the chambers underneath both rams to the source of supply.

Many modifications of minor details of my improved hydraulic pressure generating, controlling and applying devices will doubtless readily suggest themselves to those skilled in the art to which it appertains, and I therefore do not desire to limit my invention to the specific construction, location and arrangement of parts as herein shown and described:

I claim as new and desire to secure by Letters Patent:

1. In combination, a plurality of separate pressure generating means, means apart therefrom for applying the generated pressures, and requisite valves all located in an individually-movable member and downwardly seating therein.

2. In combination, a plurality of separate pressure generating means, means apart therefrom for applying the generating pressures, and requisite valves all located in an individually-movable member and downwardly seating therein, and means for retaining said member in a proper vertical position during operation.

3. In combination, a plurality of separate pressure generating means, means apart therefrom for applying the generated pressures, and requisite valves all located in an individually-movable member and downwardly seating therein, and means for rendering one or more of said valves inoperative.

4. In combination, a plurality of separate pressure generating means, means apart therefrom for applying the generated pressures, and requisite valves all located in an individually-movable member and downwardly seating therein, means for rendering one or more of said valves inoperative, and means for retaining said member in a proper vertical position during operation.

5. In combination, a plurality of separate pressure generating means, means apart therefrom for applying the generated pressures, and requisite valves all located in an individually-movable member and downwardly seating therein, said member being provided with means for unseating one or more of said valves and with means for insuring vertical operation of said valves during use of the device.

6. In combination, a plurality of separate pressure generating means, means apart therefrom for applying the generated pressures, and requisite valves all located in an individually-movable member and downwardly seating therein, means for supplying liquid through said member from a point below said valves, and means for insuring vertical operation of said valves during use of the device.

7. In combination, a plurality of pumps. suitable conduits from said pumps which unite in a common pressure-distributing chamber, suitable downwardly-seating valves in each of said conduits, and means common to all of said valves for positively unseating the same, said valves and said means being constructed and arranged to cause one or more thereof to be unseated as desired.

8. In combination, a plurality of pumps, suitable conduits from said pumps which unite in a common pressure-distributing chamber, downwardly-seating valves in each of said conduits, means common to all of said valves to positively unseat the same, said valves and said means being constructed and arranged to cause one or more thereof to be unseated as desired, and means for applying the resultant pressure in said distributing chamber.

9. In combination, a plurality of pumps, suitable conduits from said pumps which unite in a common pressure-distributing chamber, downwardly-seating valves in each of said conduits, and means below and common to all of said valves for unseating the same in consecutive order.

10. In combination, a plurality of pumps,

suitable conduits from said pumps which unite in a common pressure distributing chamber, downwardly-seating valves in each of said conduits the lower checking back flow to the source of supply and the upper checking back flow from said distributing chamber, and means having common actuating means for successively unseating the valves in each conduit.

11. In combination, a plurality of pumps, a source of liquid supply common to all of said pumps, suitable conduits, from said pumps which unite in a common pressure distributing chamber, two downwardly-seating valves in each of said conduits, the lower checking back flow to said source supply and the upper checking back flow from said distributing chamber, and means having common actuating means for unseating one or both of the valves in each conduit and corresponding valves in all conduits successively.

12. In combination, a plurality of means for generating hydraulic pressures, means for applying the generated pressures, suitable connecting conduits therebetween, two downwardly-seating valves in each conduit, and common means for successively unseating the lower valves in said conduits and subsequently similarly consecutively unseating the upper valves in said conduits.

13. In combination, a plurality of means for generating hydraulic pressures, means for applying the generated pressures, suitable connecting conduits therebetween, a source of liquid supply common to all of said conduits, a downwardly-seating check valve in each conduit checking back flow from said source of supply, downwardly-seating final pressure valves, and means common to all of said valves for first unseating said check valves successively and then similarly successively unseating said pressure valves.

14. In combination, a plurality of means for generating hydraulic pressures, means for applying the generated pressures, suitable connecting conduits therebetween, two downwardly-seating valves in each conduit, and common means for successively unseating the lower valves in said conduits, said means being further operable to similarly successively unseat the upper valves in said conduits.

15. In combination, a plurality of means for generating hydraulic pressures, means for applying the generated pressures, suitable connecting conduits therebetween, and an individually-movable member intermediate the ends of said conduits through which said conduits are directed, said member containing an independent series of downwardly-seating valves for each conduit and common means for their manual control.

16. In combination, a plurality of means for generating hydraulic pressures, means for applying the generated pressures, suitable connecting conduits therebetween, an individually-movable member intermediate the ends of said conduits through which said conduits are directed, said conduits in said member each containing an independent series of downwardly-seating pump and pressure valves, and common means for first successively unseating the lower valves in the several series and subsequently similarly successively unseating the upper valves in said series.

17. In combination, a plurality of means for generating hydraulic pressures, means for applying the generated pressures, suitable connecting conduits therebetween, an individually-movable member intermediate the ends of said conduits through which said conduits are directed, each of said conduits in said member being provided with downwardly-seating valves, and means for successively unseating the lower valves in said conduits, said means being further operable to similarly successively unseat the upper valves in said conduits.

18. In combination, a plurality of means for generating hydraulic pressures, means for applying the generated pressures, suitable connecting conduits therebetween, an individually-movable member intermediate the ends of said conduits through which said conduits are directed, said conduits in said member each containing an independent series of downwardly-seating pump and pressure valves, and common means for first successively unseating the lower valves in the several series and subsequently similarly successively unseating the remaining valves in said series, and means for retaining said individually-movable member in a substantially vertical position during operation of the device.

19. In combination, a plurality of means for generating hydraulic pressures, means for applying the generated pressures, suitable connecting conduits therebetween, an individually-movable member intermediate the ends of said conduits through which said conduits are directed, each of said conduits in said member being provided with downwardly seating check and pressure valves, means for successively unseating the lower valves in said conduits, said means being further operable to similarly successively unseat the remaining valves in said conduits, and means for retaining said individually-movable member in a substantially vertical position during operation of the device.

In testimony of the foregoing, I have hereunto set my hand in the presence of two witnesses.

JAMES W. NELSON.

Witnesses:
HELEN CROCKER,
JAS. MOORE.