899,463.

J. W. NELSON.

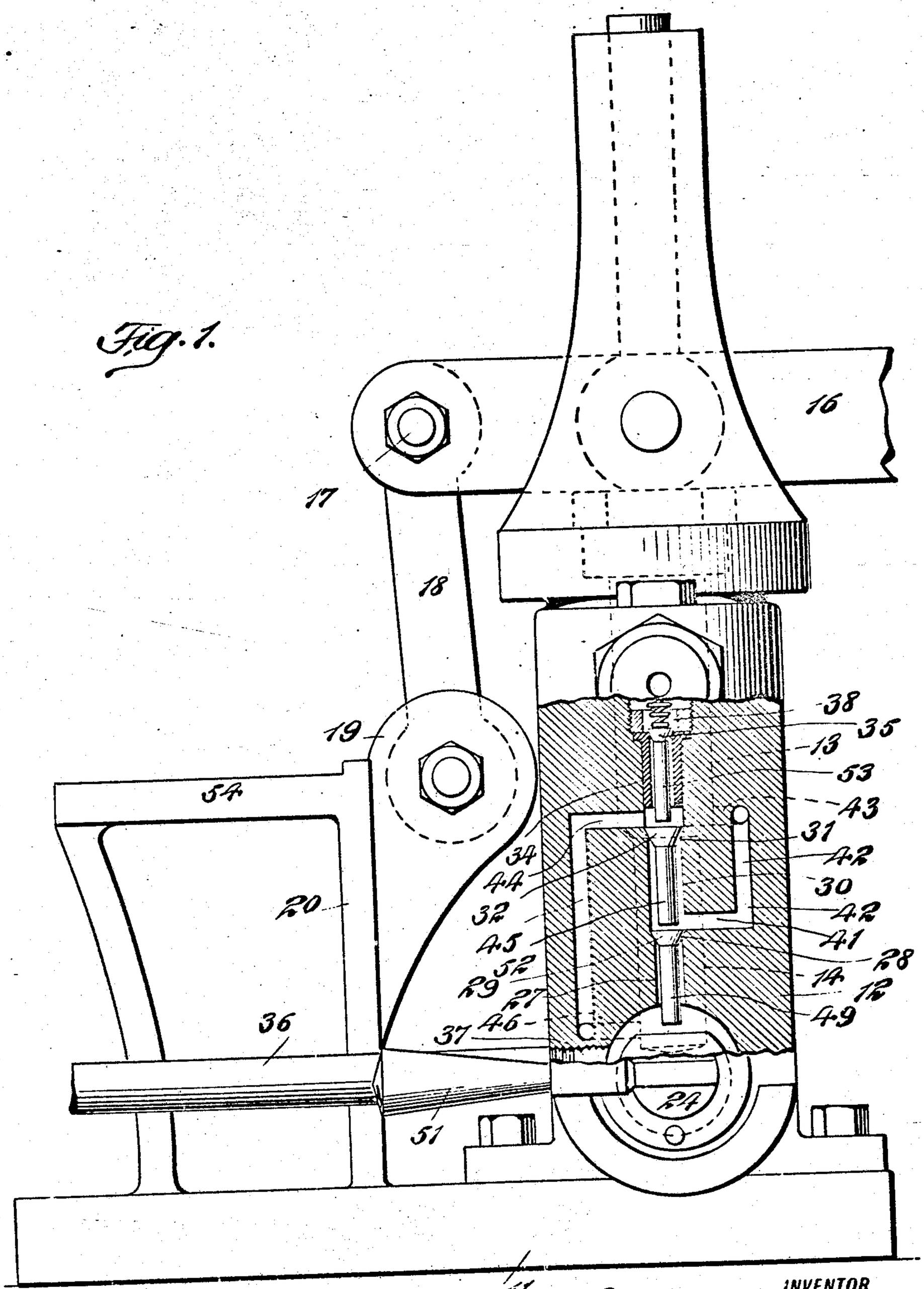
HYDRAULIC PUMP.

APPLICATION FILED FEB. 7, 1908.

Patented Sept. 22, 1908.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

INVENTOR

James W. Nelson

BY

ATTORNEYS

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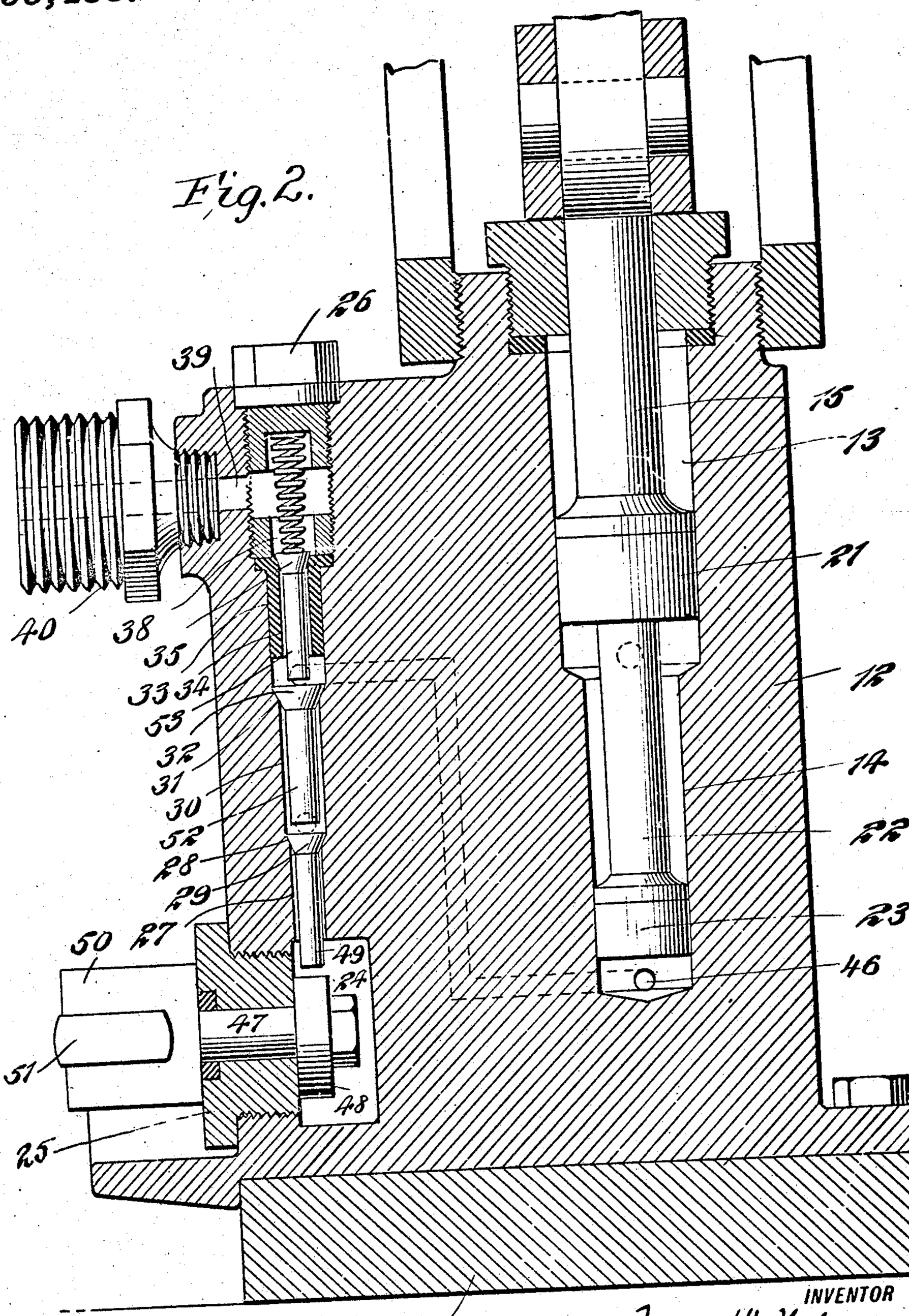
2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:

INVENTOR

James W. Nelson

BY

ATTORNEY

UNITED STATES PATENT OFFICE.

JAMES W. NELSON, OF NEW YORK, N. Y.

HYDRAULIC PUMP.

No. 899,463. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed February 7, 1908. Serial No. 414,668.

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 Pumps, of which the following is a specification.

This invention relates to hydraulic pumps of the multiple-piston type, wherein two or more pistons are jointly operated for the purpose of forcing a greater volume of liquid to the point of final application of the pressure, all but one of said pistons being rendered inoperative, when desired, for the purpose of increasing the power at a sacrifice of speed under the well-known principles of hydrostatics.

The present invention contemplates a multiple-piston pump in which all valves are vertically acting and downwardly seating, as and for the purposes described by me in a copending application filed October 29, 1907, Serial No. 399,739. In the copending application aforesaid, I have shown and described the application of a similar inventive idea to a single-piston pump. In providing the pump-block of a single-piston pump with a separate valve-bore having, to facilitate manual control, all valves in superposed arrangement in said bore, no other passages in said pump-block are necessary except one for supplying liquid to said bore below the lower valve, one for delivering the liquid under pressure from said bore above the upper valve, and one connecting the pump-chamber with said bore at a point between the two valves—all of these passages, including the valve-bore, being straight throughout their entire length and therefore easily provided.

Following out the same general system of valve control as shown and described by me in my Patent No. 874,698, dated December 24, 1907, it will be apparent that the addition of another piston to the pump shown and described in my copending application, aforesaid, will necessitate the addition of another valve in the valve-bore and an entirely different arrangement of the passages in the pump-block to supply liquid to and deliver liquid under pressure from the pump chambers in a manner to enable the joint or several use of the pumps. Furthermore, with the employment of downwardly-seating valves in a substantially vertical valve-bore it will be apparent that the initial inlet valve must be the lowest valve and the largest pump, to which said valve checks back-flow, is—with a tandem arrangement of pistons, which I prefer to employ—the upper pump. Similarly, the final outlet valve must be at the top, with the pump to which it ultimately checks back-flow at the bottom. Such a construction obviously renders necessary a very different arrangement of ducts connecting the pump chambers with the valve-bore, and the object of the present invention is the provision of means whereby the advantages of downwardly-seating valves may be secured in a multiple-piston pump.

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 sectional elevation of a double-piston pump embodying my invention, and Fig. 2 is a transverse central section through the pump-block.

Referring now to the drawings in detail, numeral 11 refers to a suitable base, to one end of which is secured the preferably cylindrical pump-block 12. This pump-block is provided with a central bore comprising an upper portion 13 of relatively larger diameter and a lower portion 14 of relatively smaller diameter. The lower end of this bore is closed, and into the upper end thereof projects the piston-rod 15 which is vertically reciprocated by means of the pump-lever 16, to which it is pivoted, said pump-lever being fulcrumed at 17 to the link 18, pivoted in turn to the bracket 19 on the standard 20.

The reciprocating piston-rod 15 is provided with the piston-head 21, fitting the portion 13 of the pump-bore, from which head projects the supplemental piston-rod 22 carrying at its end the piston-head 23 fitting the portion 14 of the pump-bore. These pistons are preferably provided with suitable packings, but as this is a common and well-known expedient, and forms no part of the present invention, it is not shown in the drawings. The pump-block 12 is further provided with a lateral bore 24, the exterior end of which is sealed by means of a screw-plug 25 to form an interior chamber near the base of said pump-block. This pump-block is further provided with a vertical bore extending from the chamber 24 to the top of said block, preferably paralleling the pump-bore, to one side of which it is located, the upper end thereof being sealed by means of the screw-plug 26.

This bore comprises a lower portion 27, the diameter of which is increased at 28 to provide a seat for the valve 29. The widened portion 30 of said bore above the valve 29 terminates in a valve-seat 31 for the valve 32, above which the diameter of said bore is again increased throughout the portion 33, although, for the purpose of again decreasing the effective area of said bore, I prefer to mount therein the removable valve-plug 34, the top of which provides a seat for the valve 35, which is preferably downwardly spring-pressed, as shown.

Liquid is continuously supplied to the chamber 24, during operation of the pump from any suitable source of supply, such as a barrel or tank, from which leads the preferably flexible pipe 36, which communicates, through a suitable coupling by means of which it is secured to the pump-block 12, with a duct 37 in said pump-block which leads to the chamber 24. From the upper end of the valve-bore, which is preferably again enlarged to provide the small chamber 38, leads a lateral duct 39 to the coupling or connection 40, to which may be secured any desired kind of pipe or hose suitable for the transmission of liquid under pressure to the point of final application.

When the pistons of a double-piston type of pump or jack are located in tandem arrangement—that is, when they are mounted upon a common piston-rod and operated in alinement—it will be apparent that the piston of smaller diameter, and therefore the one for the generation of the greatest pressure, must be located below the larger piston. Under ordinary conditions, the liquid is drawn into the pump-chamber from above the piston and forced out through suitable passages below said pistons. In the present case, in order to avail myself of downwardly-seating valves, it is obvious that the liquid must be drawn into the pump-chamber from points below the valves and discharged from points above the same.

In the system of valves in the arrangement shown and described by me in my earlier patent aforesaid, a superposed arrangement of three valves normally render effective the operations of both pumps, but which may be successively unseated, in order, for the purpose of, first, rendering the larger pump inoperative; second, rendering both pumps inoperative; and, third, relieving the pressure in the ram or pressure chamber. These valves having common controlling means with connecting means therebetween for interdependency in manual control, it will be apparent that the valve nearest to said controlling means will be the first affected by operation of said means and, therefore, the first to be unseated. In the patent aforesaid, the valve nearest the source of supply is the upper valve in the valve-bore and checks back-flow from the upper pump-chamber. In the present construction, the valve nearest the source of supply, and which should check back-flow from the upper pump-chamber, is the lowest valve in the bore. It will therefore be apparent, as hereinbefore suggested, that for the present purposes a very different arrangement of passages must be provided from that shown in the earlier patent aforesaid. To effect the desired result, I provide a lateral duct 41 leading from the portion 30 of the valve-bore between the valves 29 and 32, which duct comprises a vertical portion 42 and terminates in another lateral portion 43 which leads into the bottom of the pump chamber 13.

From the portion 33 of the valve-bore above the valve 32 and below the valve 35, leads a lateral duct 44, having the vertical portion 45 and terminating in the lateral portion 46 which leads into the chamber 14 below the lower and smaller piston. To provide for the manual control of these valves, I have shown the screw-plug 25 provided with the short shaft 47 centrally journaled therein, carrying at its inner end the cam 48, in cooperative positional relation to the end of the downwardly-projecting stem 49 of the valve 29. The outer end of the shaft 47 is provided with a head 50 which is turned by means of an operating lever 51 secured in said head. Said cam 48 is normally non-interferent with the automatic action of the valve 29. The valve 32 is similarly provided with a downwardly-projecting stem 52 which extends nearly but under normal conditions not quite to the valve 29. The valve 35 is similarly provided with a downwardly-projecting stem 53, extending nearly but under normal conditions not quite to the valve 32.

It will now be apparent that with the lever 51 in such position that the cam 48 is non-interferent with automatic action of the valve 29, upon the up-stroke of the pump-lever 16, and therewith the pistons 21 and 23, partial vacuums will be formed in both pump chambers underneath said pistons. The inequality of pressure thus created will first unseat the valve 29, the liquid from the source of supply then branching, part flowing through the ducts 41, 42 and 43 to the chamber 13 below the larger and upper pump, and part flowing through the portion 30 of the valve-bore, unseating the valve 32, and flowing through the ducts 44, 45 and 46, to the chamber 14 below the lower and smaller piston. Upon the downstroke of said lever 16 and the pistons 21 and 23, the pressure of the liquid in the upper and larger pump-chamber 13, in connection with the force of gravity, will seat the valve 28, this liquid being then forced past the valve 32, where it joins with the liquid from the smaller and lower pump-chamber 14, and passes the

valve 35 on its way to the point of application.

When it is desired to render the larger pump inoperative, for purposes hereinbefore briefly referred to, the lever 51 is turned through an arc which causes the cam 48 to impinge against the stem 49 to raise the valve 29 and hold the same off its seat, without, however, interfering with automatic action of the valve 32. Under these conditions, upon the upstroke of the pistons, liquid will in the manner described be drawn into both pump-chambers, but upon the down-stroke of said pistons, the valve 29 being held off its seat, liquid under pressure of the larger piston 21 will follow the path of least resistance and flow back past said valve and through the portion 27 of the valve-bore to the source of supply. The liquid under pressure of the smaller piston 23, however is forced into the valve-bore at a point above the valve 32, which retains all of its normal functions and which is, therefore, seated under excessive pressure from above the same in connection with the force of gravity. The liquid from the smaller pump-chamber 14, therefore, will be forced through the upper portion 33 of the valve-bore and past the valve 35 to the point of application of the pressure. It is at times desirable, furthermore, to render both pumps inoperative without, however, relieving the pressure which is being applied. For this purpose, the lever 51 is turned through a slightly greater arc, operating through the cam 48 to still further raise the stem 49 of the valve 29 until the latter impinges against the end of the stem 52 of the valve 32 and unseat said valve 32, without, however, unseating the valve 35. It will now be apparent that operation of both pumps merely cause the liquid to flow idly back and forth, through the now open passages, to and from the source of supply.

For the purpose of relieving the pressure at the point of application, it is only necessary to turn the lever 51 through a still greater arc, the cam 48 operating through the valve-stem to raise the valve 32 until it impinges against the stem 53 of the valve 35 and raises the latter off its seat, thus opening a passage through said bore from the pipe leading to the points where the pressure is applied to the source of liquid supply. Obviously, the lever 51 may be returned to any one of the various positions described in this manner restoring the functions of the device as described in connection with each one of these positions.

The platform 54 carried by the support 20 is designed to provide a seat for a brace by means of which tipping of the device is prevented during operation of the pumps.

Many modifications of minor detail of my improved hydraulic pump 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 herein shown and described.

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

1. A hydraulic pressure generator comprising a plurality of pumps, a single passage valved to normally effect the flow from all pumps in an upward direction therethrough, and valve-controlling means for rendering one of said pumps inoperative.

2. A hydraulic pressure generator comprising a plurality of pumps, a single passage valved to normally effect the flow from all pumps in an upward direction therethrough, and valve-controlling means for rendering one or more of said pumps inoperative.

3. A hydraulic pressure generator comprising a plurality of pumps, a single passage valved to normally effect the flow from all pumps in an upward direction therethrough, and valve-controlling means for rendering one or all of said pumps inoperative.

4. A hydraulic pressure generator comprising a plurality of pumps, a single passage valved to normally effect the flow from all pumps in an upward direction therethrough, and valve-controlling means for rendering said pumps successively inoperative.

5. A hydraulic pressure generator comprising a plurality of pumps, a single passage valved to normally effect the flow from all pumps in an upward direction therethrough, and valve-controlling means for rendering one of said pumps inoperative, said means being further operable to render more than one of said pumps inoperative.

6. A hydraulic pressure generator comprising a plurality of pumps, a single passage valved to normally effect flow from all pumps in an upward direction therethrough, and valve-controlling means for rendering one of said pumps inoperative, said means being further operable to render all of said pumps inoperative.

7. A hydraulic pressure generator comprising a plurality of pumps, a single passage valved to normally effect the flow from all pumps in an upward direction therethrough, and valve-controlling means for rendering one of said pumps inoperative and for relieving the pressure at the point of application.

8. A hydraulic pressure generator comprising a plurality of pumps, a single passage valved to normally effect the flow from all pumps in an upward direction therethrough, and valve-controlling means for rendering one or all of said pumps inoperative and for relieving the pressure at the point of application.

9. A hydraulic pressure generator comprising a plurality of pumps, a single passage valved to normally effect the flow from all pumps in an upward direction therethrough,

and valve-controlling means for rendering one of said pumps inoperative, said means being further operable to relieve the pressure at the point of application.

10. A hydraulic pressure generator comprising a plurality of pumps, a single passage valved to normally effect the flow from all pumps in an upward direction therethrough and valve-controlling means for rendering one of said pumps inoperative, said means being further operable to render all of said pumps inoperative and to relieve the pressure at the point of application.

11. A hydraulic pressure generator comprising a plurality of pumps coöperating with a series of downwardly-seating valves, and means for rendering one of said valves inoperative.

12. A hydraulic pressure generator comprising a plurality of pumps coöperating with a series of downwardly-seating valves, and means for rendering one or more of said valves inoperative.

13. A hydraulic pressure generator comprising a plurality of pumps coöperating with a series of downwardly-seating valves, and means for rendering one or all of said valves inoperative.

14. A hydraulic pressure generator comprising a plurality of pumps coöperating with a series of downwardly-seating valves, and means for rendering one of said valves inoperative, said means being further operable to render all valves inoperative.

15. A hydraulic pressure generator comprising a plurality of pumps coöperating with a series of downwardly-seating valves, and means for unseating one of said valves, said means being further operable to successively unseat all of said valves.

16. A multiple-pump hydraulic pressure generator provided with a series of downwardly-seating valves and means for unseating all valves by one operation.

17. A double-pump hydraulic pressure generator provided with a series of downwardly-seating valves and means for unseating all valves by one operation.

18. A double-pump hydraulic pressure generator provided with a series of downwardly-seating valves and means acting upon one of said valves to unseat all thereof.

19. A double-pump hydraulic pressure generator provided with a series of downwardly-seating valves and means acting upon one of said valves to unseat said valve only or all thereof.

20. A multiple-pump hydraulic pressure generator provided with a series of downwardly seating valves and means acting upon one valve to unseat said valve, said means being further operable to successively unseat all of said valves in order.

21. A double-pump hydraulic pressure generator having all valves arranged in a vertical series and means acting upon the lowest valve only to positively unseat said valve only or all of said valves.

22. A double-pump hydraulic pressure generator having a passage for the flow of liquid communicating with but not including the pump-chambers, valves in said passage to normally effect the flow of liquid in an upward direction therethrough, and means for unseating one of said valves.

23. A double-pump hydraulic pressure generator having a passage for the flow of liquid communicating with but not including the pump-chambers, valves in said passage to normally effect the flow of liquid in an upward direction therethrough, and means for successively unseating said valves in order from the lowest to the highest.

24. A double-pump hydraulic pressure generator having a passage for the flow of liquid communicating with but not including the pump-chambers, valves in said passage to normally effect the flow of liquid in an upward direction therethrough, and means for unseating the lowest valve, said means being further operable to successively unseat all valves in order from the lowest to the highest.

25. A multiple pump hydraulic pressure generator having a fluid passage not including the pump-chambers and having all valves located in said passage and downwardly seating therein, and means for controlling said valves.

26. A double-pump hydraulic pressure generator having a fluid passage which does not include the pump-chambers and having all valves located in said passage, the inlet port to said valves being located below the outlet port therefrom when the device is in a vertical position, and means for controlling said valves.

27. A double-pump hydraulic pressure generator having a fluid passage which does not include the pump-chambers and having all valves located in said passage, the inlet port to said valves being located below the outlet port therefrom when the device is in a vertical position, and means for successively unseating said valves in order from the lowest to the highest.

28. A double-pump hydraulic pressure generator having a fluid passage which does not include the pump-chambers and having all valves located in said passage, the inlet port to said valves being located below the outlet port therefrom when the device is in a vertical position, and means for unseating the lowest valve, said means being further operative to successively unseat all of said valves in order.

29. A double-pump hydraulic pressure generator having a fluid passage which does not include the pump-chambers and having all valves located in said passage, the inlet

port to said valves being located below the outlet port therefrom when the device is in a vertical position, and means acting against the lowest valve to unseat said valve only or all of said valves.

30. A hydraulic pressure generator comprising two pumps of different capacities, a separate valve-bore and valves therein, the lowest checking back-flow from the larger pump, the highest controlling back-flow from the ultimate pressure chamber, and an intermediate valve checking back-flow from the smaller pump only, and means for unseating the lowest valve.

31. A hydraulic pressure generator comprising two pumps of different capacities, a separate valve-bore and valves therein, the lowest checking back-flow from the larger pump, the highest controlling back-flow from the ultimate pressure chamber, and an intermediate valve checking back-flow from the smaller pump only, and means for unseating said lowest and said intermediate valves by one operation.

32. A hydraulic pressure generator comprising two pumps of different capacities, a separate valve-bore and valves therein, the lowest checking back-flow from the larger pump, the highest controlling back-flow from the ultimate-pressure chamber, and an intermediate valve checking back-flow from the smaller pump only, and means for unseating all of said valves by one operation.

33. A hydraulic pressure generator comprising two pumps of different capacities, a separate valve-bore and valves therein, the lowest checking back-flow from the larger pump, the highest controlling back-flow from the ultimate pressure chamber, and an intermediate valve checking back-flow from the smaller pump only, and means for unseating said lowest valve, said means being further operable to unseat more than one of said valves.

34. A hydraulic pressure generator comprising two pumps of different capacities, a separate valve-bore and valves therein, the lowest checking back-flow from the larger pump, the highest controlling back-flow from the ultimate pressure chamber, and an intermediate valve checking back-flow from the smaller pump only, and means for unseating said lowest valve, said means being further operable to unseat all of said valves.

35. A hydraulic pressure generator comprising two pumps of different capacities, a separate valve-bore and valves therein, the lowest checking back-flow from the larger pump, the highest controlling back-flow from the ultimate pressure chamber, and an intermediate valve checking back-flow from the smaller pump only, and means for successively unseating said valves in order from the lowest to the highest.

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

JAMES W. NELSON.

Witnesses:
H. CROCKER,
JAS. MOORE.