

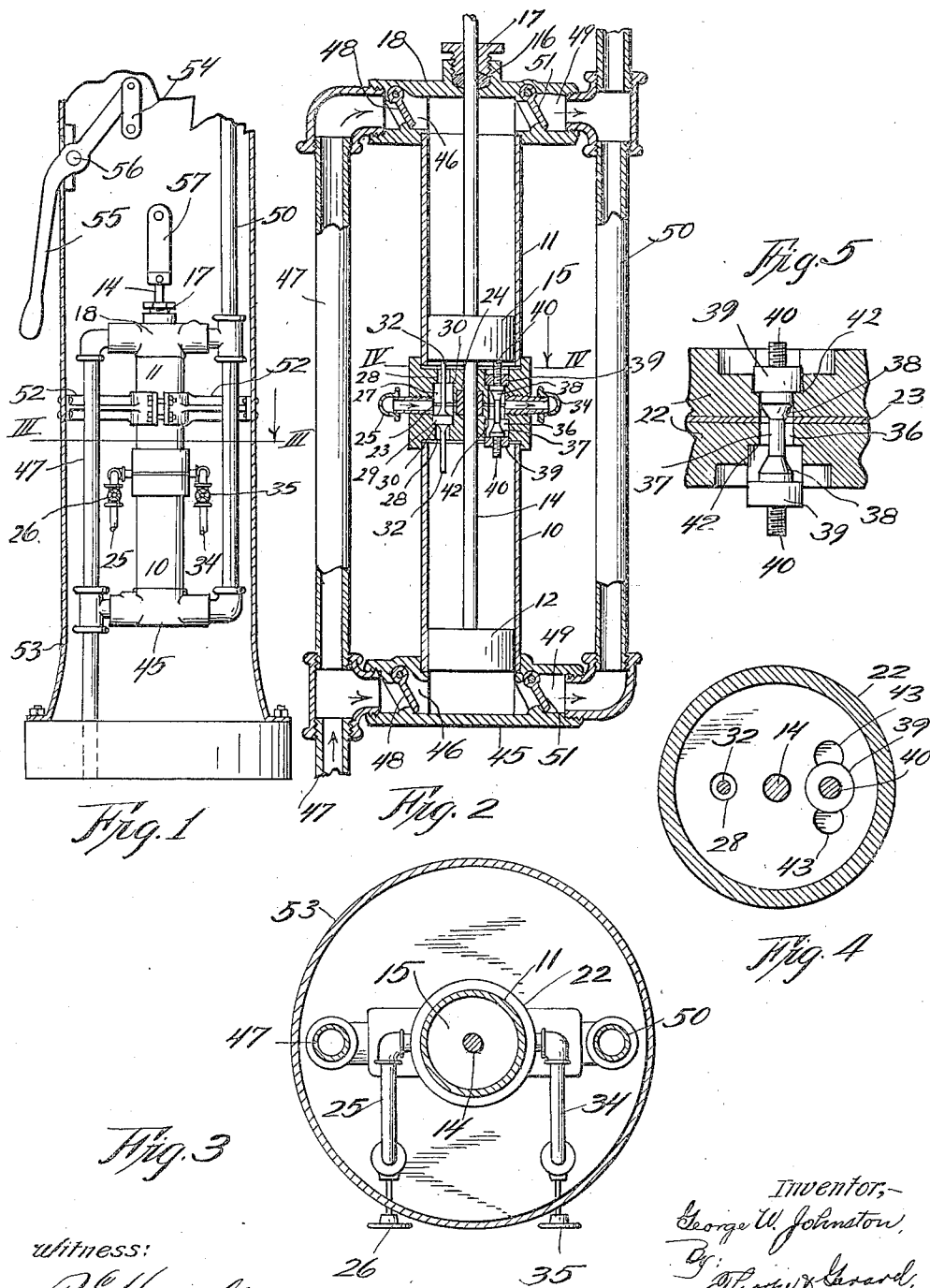
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COMBINED FLUID PRESSURE MOTOR AND PUMP

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Witness:

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UNITED STATES PATENT OFFICE.

GEORGE W. JOHNSTON, OF ST. JOSEPH, MISSOURI.

COMBINED FLUID-PRESSURE MOTOR AND PUMP.

Application filed April 3, 1922. Serial No. 543,999.

To all whom it may concern:

Be it known that I, GEORGE W. JOHNSTON, a citizen of the United States, and resident of St. Joseph, county of Buchanan, State of Missouri, have invented a certain new and useful Improvement in Combined Fluid-Pressure Motors and Pumps, of which the following is a complete specification.

The present invention relates to pumps and more particularly to pumps of the fluid pressure type, and aims to provide an improved apparatus of this class in which a pair of cylinders are so arranged and connected as to enable a common valve mechanism to be employed between adjacent ends of the cylinders for controlling the supply of motive fluid.

As one form of embodiment of the invention, I provide an improved pump of this type especially adapted for a tandem arrangement of the cylinders, together with an improved valve structure especially adapted for the control of the intake and exhaust from the cylinders by the operation of the cylinder plungers, and with a view to providing a construction which will be adapted for use in connection with any form of motive fluid, such as compressed air, steam, or any equivalent source of power.

With the foregoing general object in view, the invention will now be described by reference to the accompanying drawing illustrating one form of construction which I have devised for embodying the proposed improvements, after which the novel features therein will be particularly set forth and claimed.

In the drawing—

Figure 1 is a sectional elevation (partly broken away) illustrating a pumping apparatus constructed in accordance with the present invention;

Figure 2 is an enlarged sectional elevation, showing the pump cylinders with their connections;

Figure 3 is an enlarged transverse section, taken on the line III—III of Figure 1;

Figure 4 is an enlarged horizontal section, taken on the line IV—IV of Figure 2; and

Figure 5 is an enlarged detail sectional view showing one of the fluid pressure valves.

Referring now to the drawing in detail, this illustrates the improved construction

comprising a cylinder 10 arranged in alignment with a second cylinder 11, the cylinder 10 being fitted with a piston 12 provided with a piston rod 14 which is connected also with a second piston 15 operating in the cylinder 11. The piston rod 14 may, if desired, be extended through packing 16 and a packing gland 17 in the upper cylinder head 18 of the cylinder 11, as shown in Figure 2, for making operative connection to other mechanism as explained in my copending application Serial No. 494,804, filed August 24, 1921.

The inner adjoining cylinder head members 22 of the cylinders 10 and 11 are provided with an intervening packing disk 23 and are so constructed and arranged as conjointly to form a stuffing box having suitable packing 24 for the portion of the piston rod 14 intermediate the pistons 12 and 15, as illustrated in Figure 2. The cylinder head members 22 are also so formed as conjointly to provide a valve head including a valve structure designed to control the intake and exhaust from the cylinders and having intake and exhaust valves adapted to be actuated by the movement of the pistons. For this purpose, an intake pipe 25 having a regulating valve 26 and leading from any suitable source of fluid pressure, is connected with the cylinder head members 22, in communication with a valve chamber or passage 27 formed by mating recesses within said head members, and also communicating by way of ports or openings 28 with the respective cylinders 10 and 11. Within the valve chamber 27 is slidably mounted a valve 29 of substantially cylindrical form and adapted for alternate engagement with the valve seats 30 at the opposite ends of the chamber 27 and surrounding the margins of the ports or openings 28. From the opposite faces of the valve 29 project suitable valve operating stems 32, which are of appropriate length to permit the engagement and operation of the valve by the respective pistons 12 and 15, for alternate opening and closing of said cylinders to communication with the intake pipe 25.

At the opposite side of the members 22 is fitted an exhaust pipe 34 provided with a regulating valve 35 and communicating with a valve passage or chamber 36 conjointly formed by mating recesses within

said head members 22, and accommodating a valve stem 37 having tapered end portions 38 to which are fitted the valve plugs 39 carried by the threaded extensions 40 from the valve stem 37. At the opposite ends of the valve chamber 36 are provided valve seats 42 adapted for engagement by the valves 39, and at the exterior of these valve seats the valve passage is enlarged as indicated at 43, for facilitating the free exhaust action on opening movement of the valves 39.

The outer cylinder head 18 of the cylinder 11 and outer head 45 of the cylinder 10 are provided with intake passages 46 communicating with a pump supply pipe 47 leading from any suitable supply tank or reservoir (not shown) such as the gasoline reservoirs of filling stations, the flow through the passages 46 being controlled by suitable inwardly opening check valves 48. Similarly, cylinder heads 18 and 45 are also provided with outlet passages 49 communicating with a pump discharge pipe 50 leading to the point of delivery of the fluid or liquid being pumped, the flow through said passages 49 being also controlled by means of suitable outwardly opening check valves 51.

The pump structure is preferably maintained in position by means of bracket arms 52 embracing one of the cylinders and securing the same in upright position within a tower or pump standard 53, such as ordinarily used at filling stations.

In the operation of the pump, and assuming that the valves 26 and 35 are opened to the proper extent and that the cylinder 11 has been closed to the exhaust connection 34 and opened to the intake connection 25 (in which event the cylinder 10 will be opened to the exhaust and closed to the intake), the pistons 12 and 15 will accordingly move upward in unison in Figure 2, the piston 12 traveling on its exhaust stroke while the piston 15 accomplishes its working stroke as regards the supply of motive fluid. This will obviously effect the discharge of any fluid or liquid in the cylinder 11 out past the upper valve 51 and also draw in a charge of the liquid past the lower valve 48 into the cylinder 10. When the pistons have reached the limit of their upward travel, the piston 12 will have engaged and actuated the valves for both the fluid pressure connections 25 and 34, thus closing the valve 29 with relation to the cylinder 11 and opening it with relation to the cylinder 10, while, vice versa, the cylinder 10 will be closed to the exhaust 34 and the cylinder 11 open to said exhaust. This will, of course, produce a reverse movement of the pistons, the piston 15 now traveling on its exhaust stroke, while the piston 12 will simultaneously accomplish its working

stroke as regards the supply of motive fluid. By this operation, the charge of liquid in the cylinder 10 will be expelled past the lower valve 51 into the discharge pipe 50, and the piston 15 will operate to draw a charge of liquid past the upper valve 48 into the cylinder 11, the upper valve 51 and lower valve 48 of course remaining closed. At the end of the stroke on the pistons just described, the valves controlling the supply and exhaust of the motive fluid are again actuated automatically by the piston 15, thereby completing one full cycle of operation.

It will thus be apparent that I have devised a simple and practical double-acting pump construction for utilizing the fluid pressure motor principle set forth in the co-pending application above referred to, and that the construction may be readily adapted for operation by means of any type of motive fluid under pressure. The apparatus described is further adapted for operation, upon occasion, for the purpose of compressing air, using the pipe 47 as an air intake and the pipe 50 as an outlet for the compressed air for delivery to any suitable reservoir.

In the event that the source of fluid pressure supply should be temporarily cut off, or the working parts should stick or for any reason require an initial manual operation for the starting of the same, I have provided a hand-operated lever 55 fulcrumed at 56 in the standard 53, with a strap link 54 on the inner end of said lever adapted to make detachable connection with a connecting member 57 which may be provided on the upper end of the piston rod 14, as illustrated in Figure 1.

What I claim is:

A fluid pressure pump construction comprising a pair of cylinders arranged in tandem and provided with pistons connected to the same piston rod, each piston traveling through its working stroke while the other piston travels through its exhaust stroke, the adjacent heads of said cylinders conjointly forming a stuffing box for said piston rod, a single valve operating in said cylinder heads for controlling the fluid-pressure intake to both of said cylinders, a pair of connected valves controlling the fluid-pressure exhaust from both of said cylinders, said valves being all freely movable within their valve passages, and said intake valve being unconnected with and movable entirely independently of said exhaust valves, said intake and exhaust valves having stem portions projecting into both of said cylinders for alternate engagement by said pistons for automatically actuating said valves in response to the movements of said pistons, the outer ends of said cylinders being provided with inwardly opening check

valves communicating with a common fluid intake connection and also with outwardly opening check valves communicating with a common discharge connection, whereby said
5 cylinders are alternately filled with charges of fluid from said intake connection and said charges are alternately expelled from said cylinders into said common discharge connection in response to the movements of said pistons.

In witness whereof I hereunto affix my signature.

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GEORGE W. JOHNSTON.