

April 19, 1927.

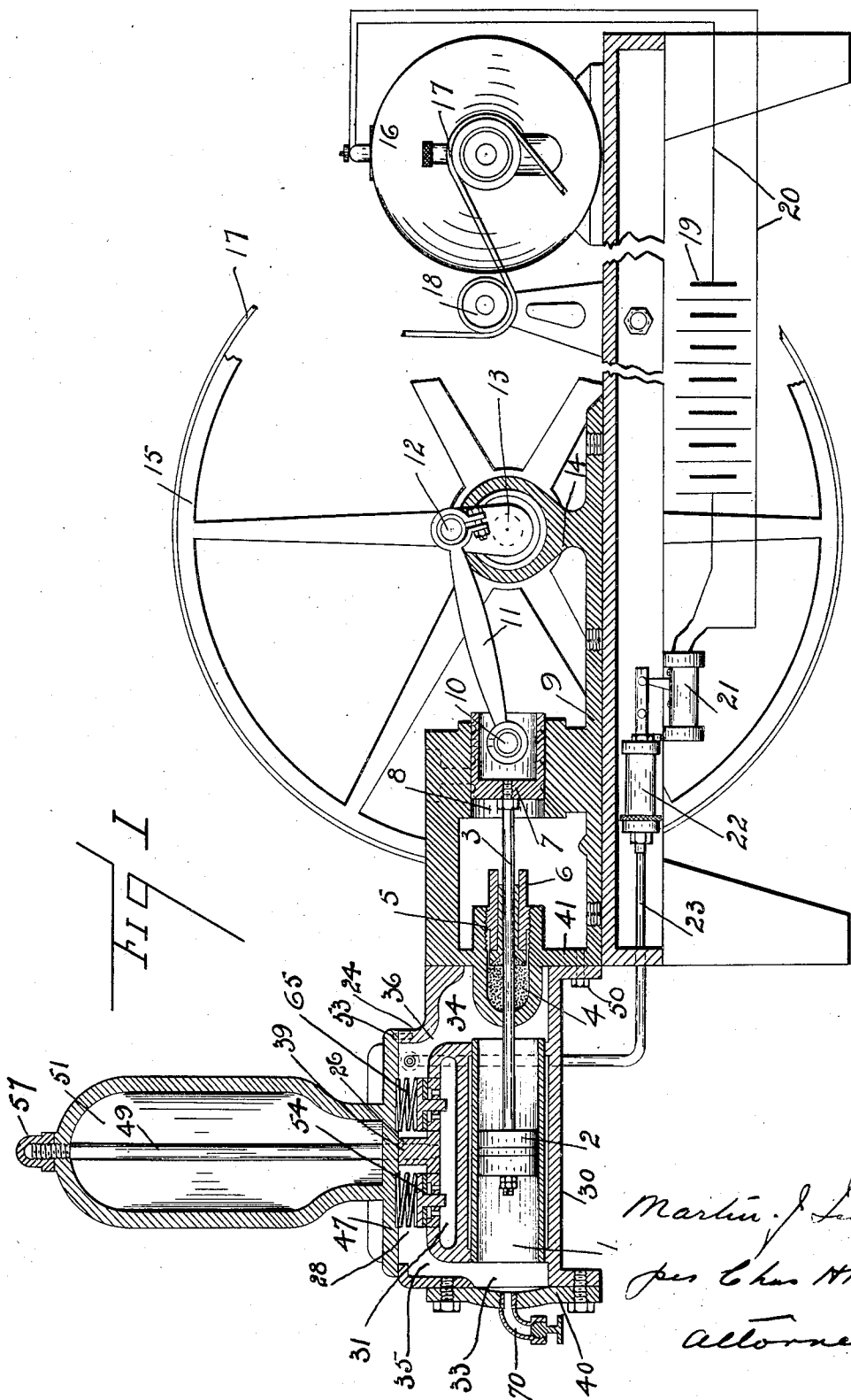
1,625,500

M. J. QUINN

PUMP

Filed Nov. 21, 1923

4 Sheets-Sheet 1



April 19, 1927.

1,625,500

M. J. QUINN

PUMP

Filed Nov. 21, 1923

4 Sheets-Sheet 2

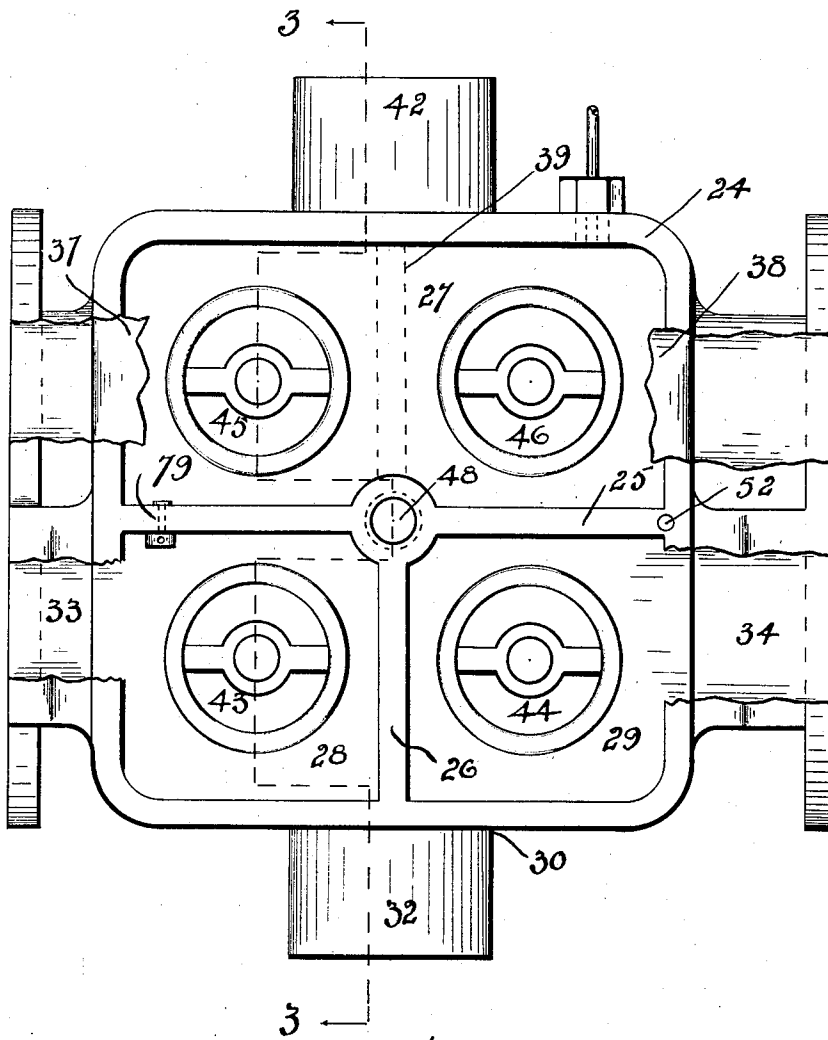


Fig 1

Martin J. Quinn
for Charles A. Miller
Attorney

April 19, 1927.

1,625,500

M. J. QUINN

PUMP

Filed Nov. 21, 1923

4 Sheets-Sheet 3

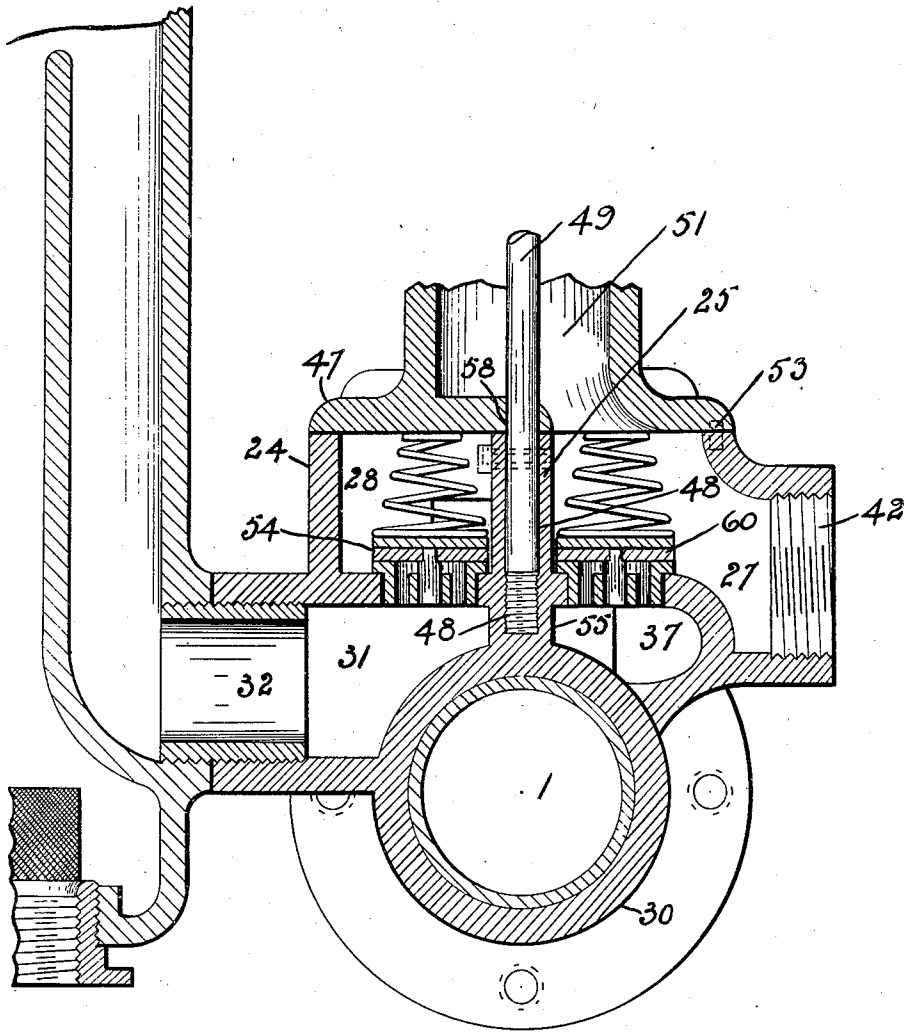


FIG 3

Martin J. Quinn
per Charles H. Kitchin
attorney

April 19, 1927.

1,625,500

M. J. QUINN

PUMP

Filed Nov. 21, 1923

4 Sheets-Sheet 4

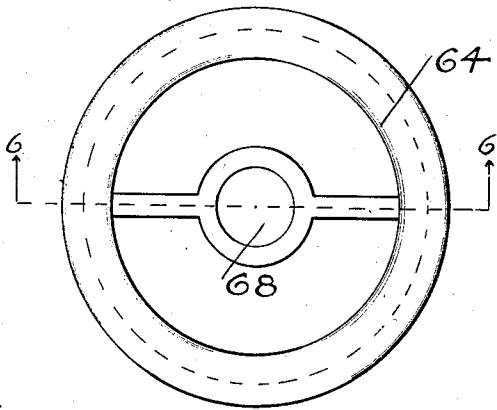


FIG 5

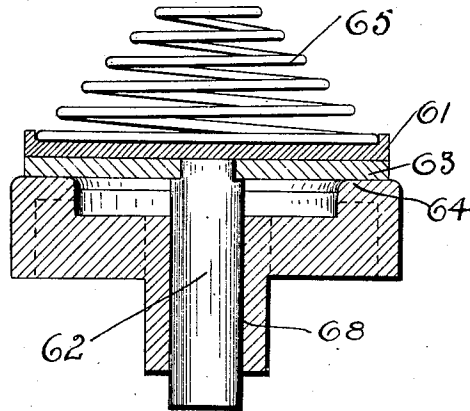


FIG 4

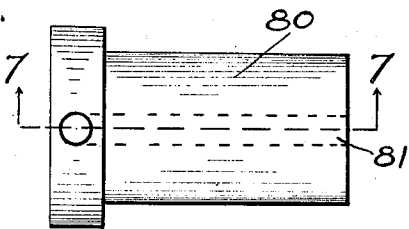


FIG 6

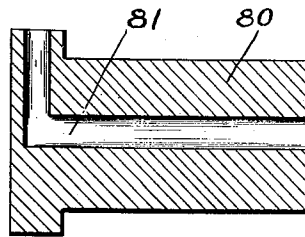


FIG 7

*Martin J. Quinn
per to his 10 miles
attorney*

UNITED STATES PATENT OFFICE.

MARTIN JOSEPH QUINN, OF TORONTO, ONTARIO, CANADA.

PUMP.

Application filed November 21, 1923. Serial No. 676,168.

This invention relates to the construction of single stage compressor pumps, particularly of the type adapted for domestic uses, in which the fluid is drawn through suction valves, and forced under pressure through discharge valves, and one of the objects of this invention is to simplify the construction of the valve mechanism by using a single valve chest, in which the valve boxes for the suction and discharge valves are arranged side by side, closed by a single plate which when removed simultaneously exposes and renders accessible both the suction, and the discharge, valves.

To this end the cylinder and the valve chest with the intercommunicating fluid-ways are complete in a single casting and in the preferred construction the valve chest is located above the cylinder. This valve chest is divided by a longitudinal partition into suction and discharge valve boxes connected by ports with the intercommunicating fluid-ways through which, during the operation of the piston, a circulation is maintained from the intake to the discharge.

A further object of the invention is to eliminate the air binding of the suction valves and this is accomplished by connecting the suction and discharge sides of the valve chest by a vent through which a diminutive stream of water can be pumped from the discharge side to the suction side, at each operation of the piston, to displace the confined air on the suction side of the pump and force it through to the discharge side.

In the drawings:

Fig. 1 is a longitudinal sectional elevation of the pumping apparatus,

Fig. 2 is a top plan view of the valve box,

Fig. 3 is a section taken on the line 3—3 of Fig. 2,

Fig. 4 is a sectional view through one of the valves and its valve seat,

Fig. 5 is a plan view of the vent connecting the valve box of the discharge valves with the valve box of one of the suction valves, and

Fig. 6 is a sectional view on the line 6—6 of Fig. 5.

Figure 7 is a section on line 7—7 of Fig. 6. Like characters of reference refer to like parts throughout the specification and drawings.

The general construction of the pump in-

volves a cylinder 1 in which is longitudinally movable a reciprocating piston 2, fitted with cup leathers, for drawing the fluid through the intake or suction valves and forcing it through the discharge valves. The piston 2 is provided with a piston-rod 3 operating through a stuffing box 4 and a gland 5 secured within the stuffing box by a cap 6. The piston-rod 3 is connected with a cross-head 7 reciprocating in slideways 8 integral with the base 9. The stuffing box, slideways and base are formed by a single casting and the axes of the stuffing box and cross-head, together with the axes of the gland and stuffing box cap, are in fixed alignment with each other and when the parts are assembled, are in alignment with the axis of the cylinder. The cross-head 7 is provided with a wrist pin 10 to which is knuckled one end of a connecting rod 11. The other end of the connecting rod 11 is knuckled to a crank 12 keyed on a shaft 13. The shaft 13 is journalled in bearings 14 extending upwardly from, and forming part of, the base 9, and mounted on the shaft 13 is a flywheel 15 to which motion is transmitted from the motor 16 by a belt 17; the belt being tensioned by a belt-tightener 18. Leading from the poles of the battery 19 to the motor 16 are conductors 20 through which the circuit is closed by a switch 21. The switch is controlled from the fluid pressure governor 22 connected with the high pressure side of the pump by a fluid pressure pipe 23.

All of the foregoing parts may be of any usual or approved construction and are referred to only so far as is necessary to explain the construction and operation of the novel features of the apparatus.

Overlying the cylinder 1 is a valve chest 24 divided lengthwise by a partition 25. On one side of the partition 25 is the valve box 27 for the discharge valves and on the other side of the partition are two valve boxes 28 and 29 for the suction valves. The valve boxes 28 and 29 are separated by a transverse partition 26 extending from the suction side of the valve chest to the partition 25. Below the valve boxes 28 and 29 is an intake header 31 having an intake port 32, and beneath the valve box 27 are two corresponding compartments 37 and 38 separated from the header 31 by a partition 55, and from each other by a transverse partition 39.

At opposite ends of the cylinder 1 and communicating therewith are compartments 33 and 34 separated from the header 31 but communicating with the compartments 37 and 38 respectively. A port 35 connects the valve box 28 with the compartment 33 and a port 36 connects the valve box 29 with the compartment 34. In the preferred construction the cylinder 1, valve chest 24, header 31 and compartments 33, 34, 37 and 38 and the partition 39 are complete in a single casting 30.

The compartments 33 and 34 are closed as by heads or plates 40 and 41. The head 40 is removably bolted to the casting 30 for access to the cylinder and piston but the head 41 is part of the casting forming the stuffing box and its related parts and when assembled with the casting 30 rigidly holds the latter in its fixed position and maintains the alignment of the cylinder, stuffing box and slideways. The header 31 is connected with the valve boxes 28 and 29 by valve closed ports 43 and 44, and the compartments 37 and 38 are connected with the valve box 27 by valve closed ports 45 and 46. During the operation of the piston 2 a circulation is maintained from the intake port 32 through the header 31, valve closed ports 43 and 44, ports 35 and 36, compartments 33 and 34, and 37 and 38, and valve closed ports 45 and 46 to the discharge port 42.

This construction, while maintaining the circulation of the fluid-ways from the intake port to the discharge port, locates the valve boxes 28 and 29 for the suction valves in the same horizontal plane as the valve box 27 for the discharge valves, and permits of all these valve boxes being covered by a single plate or cap 47 secured to the casting 30 by a single bolt 49. As shown in Fig. 2 the partition 26 is connected with the partition 25 interjacent the ends of the latter; and at the junction of the partitions 25 and 26 is a screw-threaded bore 48 into which is entered the inner end of the bolt 49. In the construction shown in the drawings a pressure chamber 51 is integral with the plate or cap 47 and the lower end of the pressure chamber 51 opens into the valve box 27 through a port 56. It is not essential, however, that the pressure chamber 51 and the plate or cap 47 should be integral but this arrangement contributes to the simplicity of the construction as a single bolt 49 can be used for securing the plate 47 and the pressure chamber 51 to the valve chest. For the correct assembly of the plate or cap 47 on the valve chest the top edge of the latter, at some convenient part of its surface, is formed with a hole 52 into which is entered a corresponding stud 53 projecting from the adjacent surface of the cap or plate 47 and formed

through the cap or plate 47 in alignment with the bore 48 is a hole 58 through which is entered the bolt 49.

A convenient method for assembling the parts is to enter the inner end of the bolt 49 in the screw-threaded hole 48 and place the cap or plate 47 in position on the top of the valve chest by entering the upper end of the bolt through the hole 58 and a corresponding hole 59 in the top of the pressure chamber, and lock them together by a nut 57 fitted on the outer end of the bolt 49 and tightened until the plate 47 seals the top of the valve chest. This assembly of the cap or plate 47 with the valve chest is of considerable importance inasmuch as access to, and the enclosing of, the discharge and suction valves is obtained by means of a single plate and a single bolt.

Sealing the ports 43 and 44 are spring pressed poppet valves 54 and sealing the ports 45 and 46 are spring pressed poppet valves 60. These valves are similar in construction and, as shown in Fig. 4, each consists of a cup-shaped metal disc 61, a valve stem 62 and a fiber or non-metallic disc 63 interposed between the metallic disc 61 and the valve seat 64. The lower end of the spring 65 is entered in the cup-shaped cavity in the disc 61 and its upper end bears against the under side of the cap or plate 47. As the general construction of these valves is old the foregoing features are mentioned only to indicate the retention of the lower end of the spring in axial alignment with the valves.

During the suction stroke of the piston a vacuum or partial vacuum is created in the valve chest and the fluid flowing into the intake chamber 31 through the intake port 32 lifts the suction valves 54 from their seats and enters the valve boxes 28 and 29 and from these valve boxes it passes through the ports 35 and 36 into the compartments 33 and 34. During the pressure stroke of the piston the fluid is forced from the compartment 33 into the compartment 37 and through the port 45 into the valve box 27, and from the compartment 34 through the compartment 38 and port 46 into the valve box 27; and from the valve box 27 through the discharge port 42 to the pressure chamber 51.

In hydropneumatic systems it is necessary to suck air into the system through the pump and for this purpose an air cock 70 is fitted to the compartment 33. When the air cock is open the air enters the compartment 33 and is forced through the port 45 into the valve box 27. It is also forced by the action of the piston through the port 35 into the valve box 28. The accumulated air in the valve box 28 develops pressure which prevents the operation of the suction valve in that particular box or in other words causes

the pump to become air bound. To overcome this a vent connects the valve box 28 with the valve box 27 at or near the top of the partition 25. This vent may consist of a minute hole bored through the partition but in the preferred construction a hole 79 of corresponding diameter to the plug 80 is bored through the partition and the plug is inserted through this hole. Formed through the plug is a vent hole 81 of a relatively small diameter to minimize the quantity of fluid passing from the valve box 27 into the valve box 28 but of sufficient diameter to permit of a small quantity being forced from the valve box 27 into the valve box 28 at each pressure stroke of the piston. When the cock 10 is open the piston pumps air instead of water into the cock end of the pump and the pumping of air continues until the cock is again closed. During the pumping of air the pump, without the vent 81, has a tendency to become air bound in the valve box 28 but with the vent 81 the action of the piston sucks the fluid from the intake header 31 through the port 44 into the valve box 29 and through the port 36 and compartments 34 and 38 into the valve box 27. The pressure within the latter forces a small quantity of water through the vent 81 at each pressure stroke of the piston. Synchronizing with the suction of the piston on the air end of the pump this water, entering through the vent into the valve box 28, displaces a corresponding amount of air which it forces as a result of such displacement through the vent 81 on the return stroke of the piston into the valve box 27 and then through the discharge 42. In the course of time the repeated operation of the piston will have forced sufficient water through the vent to completely displace the air within the valve box 28 and thus eliminate the trouble resulting from air binding.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A pump comprising a cylinder, a piston within the cylinder, a single valve chest overlying the cylinder, valved suction ports and valved discharge ports, arranged side by side

in said chest, a partition separating the valved suction ports from the valved discharge ports and shutting off communication between them through said chest, an intake header below and communicating through the valved suction ports with the suction side of said partition, fluid-ways communicating with the suction side of said partition and through the valved discharge ports with the discharge side of the valve chest, the discharge side of said chest having an outlet above the level of the discharge valves, in combination with a single cover for the valve chest enclosing the valved suction and discharge ports, and rendering both sets of ports and their valves simultaneously accessible when the cover is removed.

2. A pump comprising a cylinder, a piston within the cylinder, a single valve chest overlying the cylinder, valved suction ports and valved discharge ports, arranged side by side in said chest, a partition separating the valved suction ports from the valved discharge ports and shutting off communication between them through said chest, an intake header below and communicating through the valved suction ports with the suction side of said partition, fluid-ways communicating with the suction side of said partition and through the valved discharge ports with the discharge side of the valve chest, and an air vent through said partition connecting the discharge side of the valve chest with the suction side, whereby the valved suction ports may be prevented from becoming air bound by a portion of the fluid on the discharge side of the partition being forced through the air vent to the suction side of the partition to displace a corresponding quantity of air which escapes through the air vent from the suction side to the discharge side of the partition, in combination with a single cover for the valve chest enclosing the valved suction and discharge ports, whereby the removal of the cover renders both sets of ports and their valves simultaneously accessible.

Dated at the said city of Toronto, this 30th day of October, A. D. 1923.

MARTIN JOSEPH QUINN.