

S. E. FOLK.
PUMP.

APPLICATION FILED JUNE 19, 1911.

Patented Jan. 9, 1912.

3 SHEETS—SHEET 1.

1,014,289.

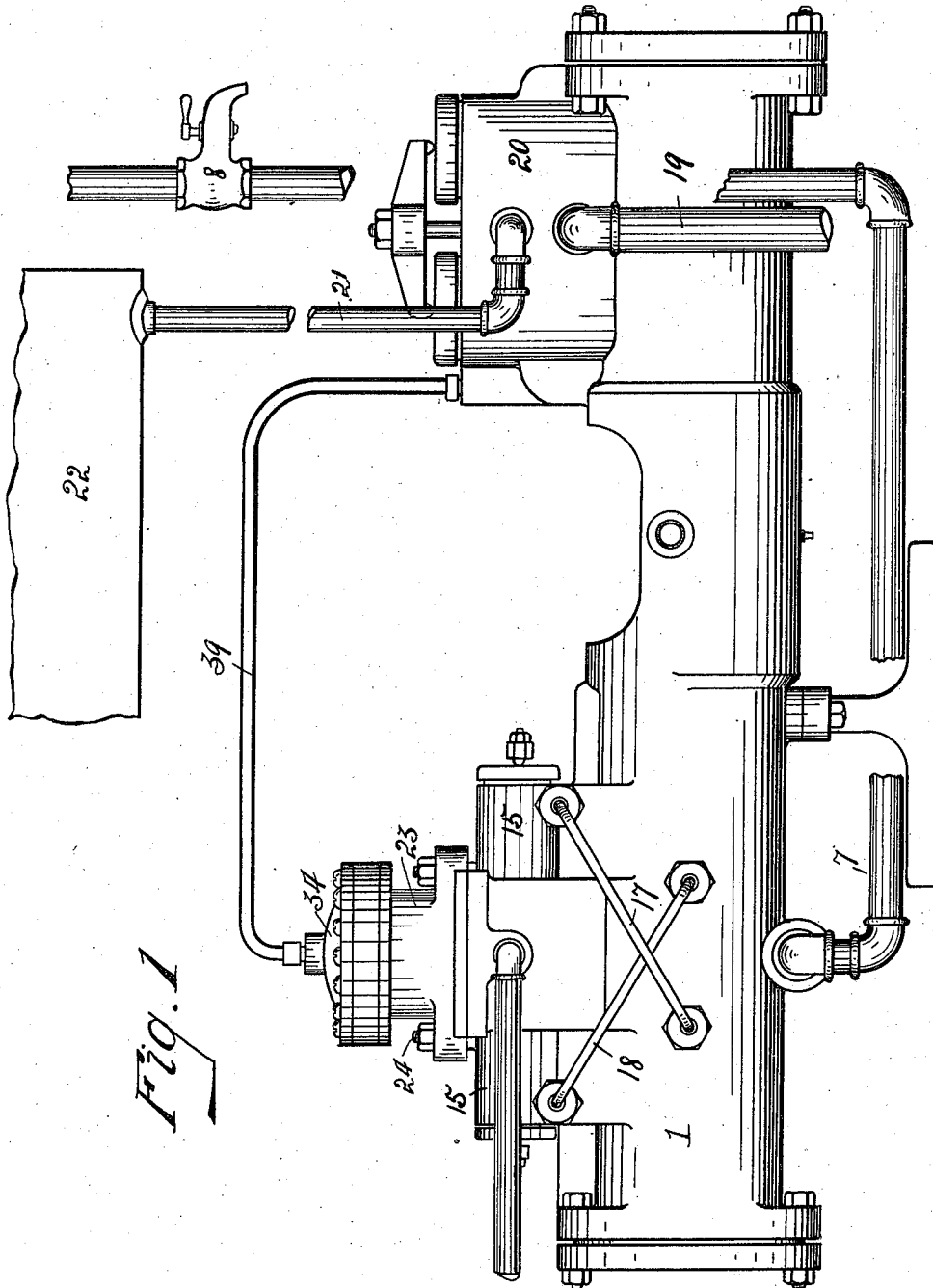


Fig. 1

WITNESSES.
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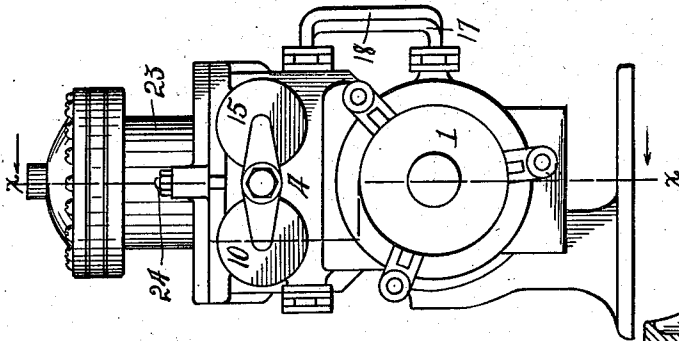


Fig. 3

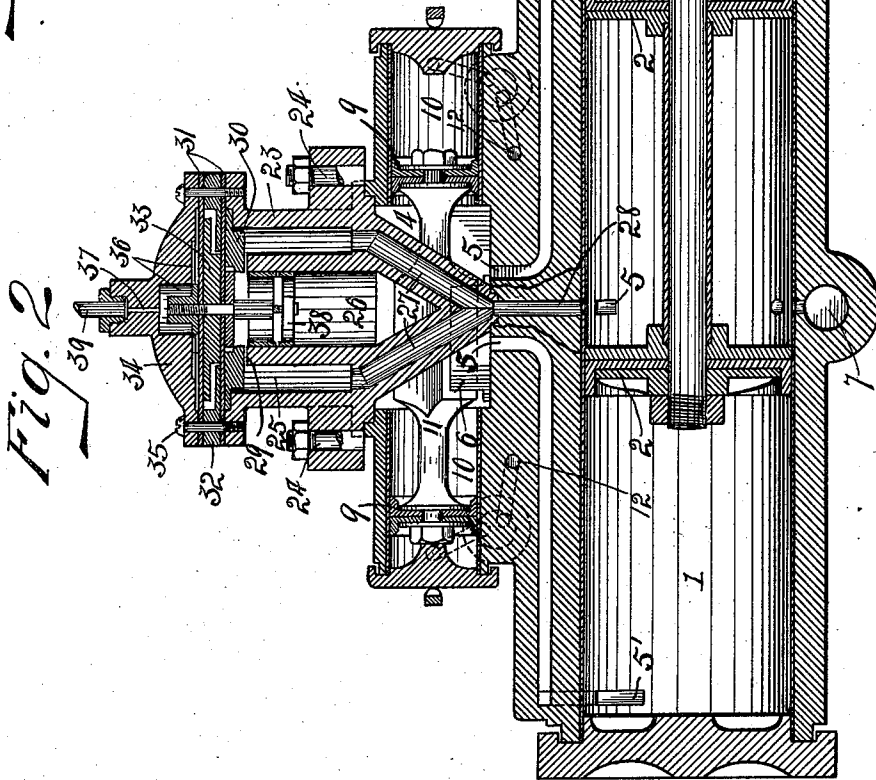


Fig. 2

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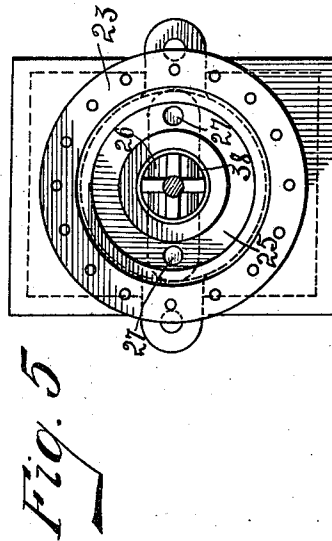
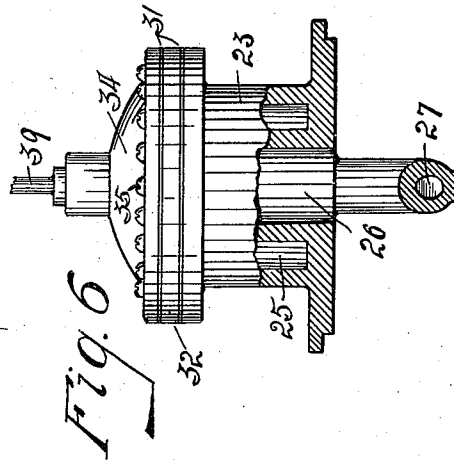
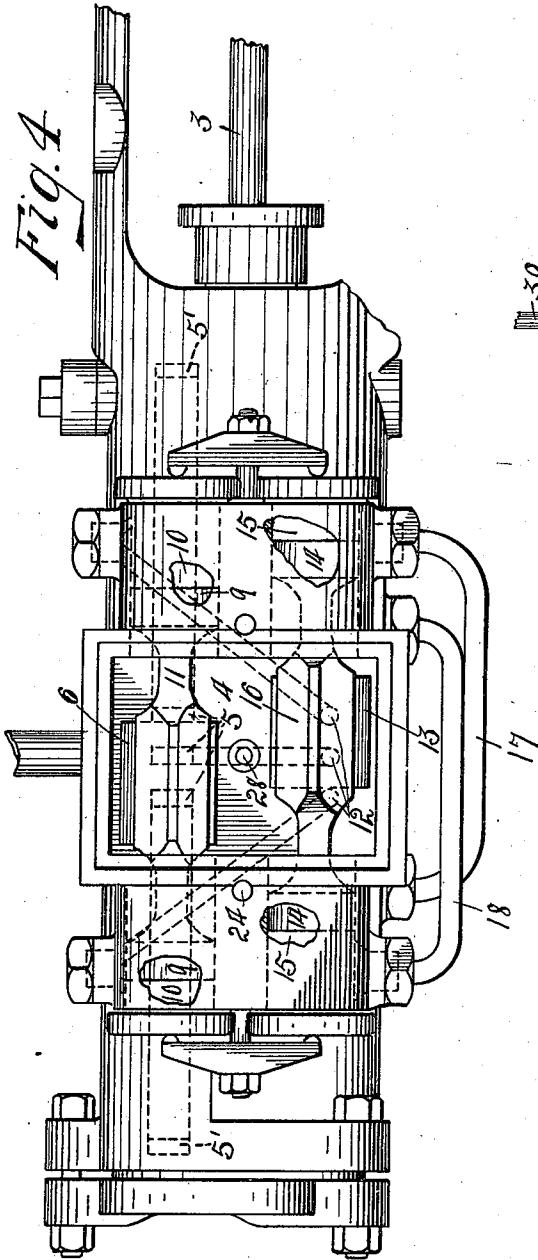
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3 SHEETS—SHEET 3.



WITNESSES.

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UNITED STATES PATENT OFFICE.

SAMUEL E. FOLK, OF BRYAN, OHIO.

PUMP.

1,014,289.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SAMUEL E. FOLK, a citizen of the United States, and a resident of Bryan, in the county of Williams and State of Ohio, have invented certain new and useful Improvements in Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in water supply systems for houses or other buildings, and has particular reference to improved means for automatically controlling the pumping of cistern water or other fluid to a closed storage tank or receptacle by a pump actuated by city water or other fluid pressure systems.

The object of my invention is the provision of improved means of this character, which simplifies and cheapens the cost of installation of a system of the nature described, is efficient in its action, and enhances the practicability and commercial value of fluid actuated systems in which a predetermined quantity of rainwater or other fluid is maintained at approximately constant pressure within a storage tank.

The invention is fully described in the following specification, and while in its broader aspect it is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings, in which,—

Figure 1 is a side elevation of a pump embodying my invention. Fig. 2 is a longitudinal vertical section of the left end portion thereof taken on the line *x, x* in Fig. 3. Fig. 3 is an elevation of the left end thereof. Fig. 4 is a plan view of the left end portion of the pump with the dome containing the automatic regulating means removed. Fig. 5 is a plan view of such dome with its cap portion removed. Fig. 6 is a side elevation thereof with the lower portion in section.

Referring to the drawings, 1 designates a cylinder at the left hand portion of the pump in which the pistons 2, 2 work, said pistons being fixed in spaced relation upon a piston rod 3, which connects and operates the pumping piston (not shown) in the op-

posite end portion of the pump in a manner similar to pumps of this nature, as well understood in the art.

Provided above the cylinder 1 centrally thereof is a valve chamber 4, which is provided in its bottom with a set of three ports 5 the outer ones of which lead to the opposite ends of the cylinder chamber, as indicated at 5' in Fig. 2, to supply city water thereto for the purpose of working the pistons 2, while the center one of said ports 5 comprises the drainage port of the set. This drainage port is alternately placed in communication with the outer ones of said ports 5 by the movement thereof of an ordinary D slide valve 6 so as to permit water which was previously admitted to an end of the cylinder to return through the associated port 5 and discharge through the center one of such ports to the space within the cylinder between the pistons 2, from whence it passes through an outlet pipe 7 to a faucet 8 (Fig. 1) or other parts from which water may be drawn for house use or other purposes. It will be apparent that upon a movement of the valve 6 to uncover one of the ports 5 to the chamber 4 the other ports 5 will be placed in communication with the outlet 7 as is well understood in the art. The movements of the valves 6 are controlled by the movements of the two pistons 9, 9, which work in small cylinders 10 at opposite sides of the chamber 4 and are connected by a part 11 which is fashioned on the under side of its central portion to removably receive the slide valve 6.

The means for controlling the admission of water to the cylinders 10, 10 for working the pistons 9, 9 will now be described. In the bottom of the water distributing chamber 4 at the opposite end portion thereof to that in which the ports 5 are located are provided the three ports 12, the center of which is a drainage port for the other two ports and leads to the drainage space between the pistons 2, 2 while the outer ones of said ports lead to the outer end portions of the cylinders 10, 10, as indicated by dotted lines in Figs. 2 and 4. A D-slide valve 13 works over the ports 12 within the chamber 4 in a manner similar to the valve 6 to control the alternate flow of water from the chamber 4 through the outer of said ports to the respective cylinders 10 and to alternately place the outer ones of said ports in communication with the center drainage port 12, where-

by as water is passing through one port 12 to the respective cylinder 10 to work the associated piston 9 the water which was previously admitted to the other cylinder 10 is forced outwardly therefrom through the other of said ports 12 and communicating center port to the take-off pipe 7, as is apparent.

The movement of the valve 13 is controlled by the movements of pistons 14, 14 which work within cylinders 15 at opposite sides of the chamber 4 and are connected by a piston rod or part 16 which engages the slide valve 13. The pistons 14 are operated by the admission of fluid to the outer ends of the respective cylinders 15 from the outer end portions of the cylinder 1 through the pipes 17 and 18. These pipes tap into the cylinder 1 in proper position to be uncovered by the respective pistons 2, 2 when at the limit of their instrokes, so that when the pistons 2 are in the position shown in Fig. 2 the pipe 17 will be uncovered to the left end portion of the cylinder 1 to permit the piston actuating fluid in such end of the cylinder to flow through said pipe and into the outer end portion of the cylinder 15 at the right of the chamber 4 to force the pistons 14 and connected valve 13 to the left, whereby to uncover the right-hand port 12 to the distributing chamber 4 and place the left-hand port 12 in communication with the associated central drainage port. This being done a portion of the fluid in the chamber 4 then passes through the uncovered port 12 to the right-hand cylinder 10 with which it connects and acts on the piston 9 therein to force the valve 6 to the left so as to uncover the port 5 leading to the right-hand end of the cylinder 2 and to place the other two ports 5 in communication for the drainage of water from the left end of the cylinder 1. The admission of water or other operating fluid from the chamber 4 to the right-hand end of the cylinder 1 through the uncovered port 5 actuates the pistons 2 to move to the left. When such pistons have reached the limit of the instroke of the right-hand piston 2 the pipe 18 is uncovered to the right-hand end of the cylinder 1 to admit operating fluid from such cylinder to the left-hand cylinder 15 to move the pistons 14 and attached parts to effect a reversal of the position of the valve 13 and permit a consequent flow of fluid from the chamber 4 to the left-hand cylinder 10, which likewise effects a reversal of the position of the slide valve 6.

It will be apparent that the working of the pistons 2 will actuate the pumping parts in the right-hand end of the pump and effect a pumping of a fluid, rain water for instance, from a cistern or other receptacle through the intake pipe 19 into the pumping chamber 20 of the pump and thence forces

such fluid from such pumping chamber through an outlet pipe 21 into a closed storage tank 22 as is common with pumps of this class.

The automatic control means of the pump which comprises the main feature of my invention and which effects a stopping of the operation of the pump when a predetermined pressure has been obtained in the tank 22 and causes the operating fluid for the pump to flow therethrough without operating the pumping parts will now be described. This automatic means is located in the present instance within a dome 23 which is mounted over and closes the top of the fluid distributing chamber 4, being secured to the casing at the sides thereof by stud bolts 24, or in any other suitable manner. This dome is provided with an annular chamber 25, and within such chamber with a central vertically disposed chamber 26, which latter is always open at its lower end to the fluid distributing chamber 4. The chamber 25 has one or more drainage tubes or channels 27 leading downward therefrom through the chamber 4 and in communication at their lower ends with a common centrally disposed drainage port 28 which leads to the drainage space in the cylinder 1 between the two pistons 2 therein.

Countersunk upon the top of the dome 23 and closing the top of the chamber 25 therein, except for a narrow annular passage 29 opening communication between the upper ends of the chambers 25 and 26, is a ring-like member 30, which has its central opening in register with and of the same size as the upper end of the chamber 26. Diaphragms 31, 31 are mounted upon the top of the dome 23 and ring 30, being spaced from each other at their edges by a ring 32 and having a disk-like member 33 disposed therebetween within such ring and presenting a smaller surface to the lower diaphragm than to the upper diaphragm for the purpose hereinafter described. The diaphragms 31 and associated parts are held at the top of the dome by a cap 34, which is secured thereto by screws 35 or in any other suitable manner and coöperates with the upper diaphragm 31 to form a chamber 36 having a port or passage 37 leading thereto through the top of the cap.

Attached to the diaphragms 31 and intermediate part 33 and movable therewith within the chamber 26 is a hollow cylindrical valve 38. This valve fits closely within the chamber 26 and when raised by an upward movement of the diaphragms its upper edge is adapted to cover and close the annular passage 29 between the chambers 25 and 26. When the diaphragm is lowered by pressure occasioned within the cap chamber 36, as hereinafter described, the valve is adapted to lower sufficiently

within the chamber 26 to uncover the passage 29 as shown in Fig. 2. When the passage 29 is uncovered by a lowering of the valve 38 the fluid within the distributing chamber 4, instead of passing through the sets of ports 5 and 12 to operate the pump parts, finds an easier exit from such chamber upwardly through the chamber 26, hollow valve 38, passage 29, chamber 25 and passages 27 and 28 to the drainage portion of the cylinder 1 from whence it passes through the outlet pipe 7.

The pressure within the tank 22, or in the present instance the pumping chamber 20, which is occasioned by the pumping of fluid into said tank and chamber is communicated through a tube 39 to the chamber 36 in the dome cap 34, said tube, in the present instance, extending to and tapping into the pumping chamber 20 so that when a predetermined pressure has been obtained in the pumping chamber 20, such pressure will exert itself upon the upper surface of the diaphragm 31 and effect a lowering of the valve 38 against the city water or other pump actuating pressure within the dome chamber 26.

In the use of my invention in connection, for instance, with a city-water operated pump for pumping rain-water from a cistern to a closed storage tank, it will be understood that the pump is interposed in the city water system within the house if used in a house system, and that water which is drawn from such system for house purposes passes through the pump actuating parts and either operates such parts to work the pump or not depending upon the position of the valve 38 within the dome chamber 26. Should the pressure within the pump chamber 20 be less than the pressure required to overcome the city water pressure upon the under side of the diaphragm 31, which city water pressure is usually about forty pounds, the valve 38 will be held in raised position to close the passage 29 between the chambers 25 and 26, thus preventing the water which is used for house purposes from bypassing the motor actuating parts but causing it to pass through the ports 5 and 12 as the same are opened to the chamber 4 by the movements of their respective valves and to operate the motor. When water has been pumped to a predetermined pressure, for instance 15 pounds, within the storage tank 22, such pressure, which is the same in the pumping chamber 20, is communicated to the diaphragm chamber 36 in the dome cap through the tube 39 and acts upon the exposed upper surface of the diaphragm to lower the same and attached valve 38 against the city water pressure on the under surface thereof, the exposed upper and lower surfaces of the diaphragm being properly proportioned for such purpose. The lowering

of the valve in this manner permits the water to flow through the chamber 26, valve 38 and passage 29 into the annular dome chamber 25 from whence it flows through the passages 27 and 28 into the cylinder 1 and thence through the pipe 7 to the point of discharge, the pump remaining quiet during such flow. It is evident that when water has been drawn from the tank 22 and the pressure therein reduced the city water pressure raises the diaphragm to move the valve 38 to close the exit passage 29 and causes any water which is drawn from the house system to pass through the operating parts of the motor to operate the same.

It is apparent that I have provided simple and compact means for automatically regulating the pumping action of the pump and that the same is easily and quickly installed in the systems commonly in use and without extra piping.

I wish it understood that my invention is not limited to use in connection with the particular style of motor shown and described or to any specific construction or arrangement of parts except in so far as such limitations are specified in the claims.

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

1. In an apparatus of the class described, the combination with a pump, fluid pressure actuated mechanism for operating said pump, and a closed receptacle to which fluid is delivered by said pump, of means associated with said mechanism and actuated by both fluid pressure therein and by pressure within said receptacle for automatically controlling the passage of the actuating fluid to or around said pump actuating mechanism.

2. The combination with a pump, and fluid actuated mechanism for operating said pump, of a chamber for distributing the fluid to the actuating parts of said mechanism, and valved controlled means in communication with said chamber, said means being operable by fluid pressure within said chamber to cause the fluid in said chamber to find an exit therefrom through the pump actuating mechanism to operate same and operable by a predetermined pressure created by the pump to cause the fluid in said chamber to by-pass the pump actuating mechanism.

3. The combination with a pump, and fluid actuated mechanism for working said pump, said mechanism having a fluid delivery chamber therein and a fluid exit passage therefrom, of control means for the pump having a valve chamber in communication with said fluid distributing chamber and a passage from said valve chamber to the exit passage of said mechanism, a valve movable to open and close the communication between said valve chamber and exit

passage, and diaphragm means operable by pressure of the actuating fluid on one side thereof to move said valve to close said passage to cause said fluid when flowing to
 5 actuate said mechanism, and operable by pump created pressure on the opposite side thereof to move the valve to open said passage to permit said fluid to flow to and through said exit without operating the
 10 mechanism.

4. The combination with a pump and the fluid operated mechanism therefor, said mechanism having a fluid delivery chamber and means associated therewith for directing the operating fluid to the operable parts
 15 of the mechanism, of an outlet passage from said chamber, a valve for opening and closing said passage, and means automatically operable by fluid pressure within said chamber to move the valve to close said passage
 20 and by a predetermined pressure without said chamber to move the valve to open said passage.

5. The combination with a pump and the fluid operated mechanism therefor, said mechanism having a fluid distributing chamber and a fluid outlet passage in communication with said chamber for the exit of fluid after actuating the operable parts of said
 25 mechanism, of a passage from said chamber to said outlet which by-passes the operable parts of said mechanism, a valve for opening and closing said outlet passage, and diaphragm means exposed on one side to the
 30 pressure in said chamber and on its other side to the created pressure of said pump and operable by pressure within said chamber to move the valve to close said passage and by predetermined pump created pressure to move the diaphragm and valve
 35 against said chamber pressure to open said passage.

6. In combination, a pump and fluid actuated mechanism for operating said pump,

said mechanism having a fluid distributing 45 chamber and an outlet passage in communication with said chamber, a dome closing the top of said chamber and having a passage therethrough and thence downwardly through said chamber and a portion of the 50 mechanism to said outlet passage, a valve for opening and closing said dome passage, and means automatically operable by fluid pressure within said chamber to move the valve to close said passage and by a predetermined pressure created by said pump to 55 overcome the said chamber pressure and move the valve to open said dome passage to permit an exit of fluid from said chamber without operating said mechanism. 60

7. In combination, a pump, a motor for operating the pump disposed in a city water supply, said motor having a water distributing chamber, an outlet passage for the water, and a by-pass through the chamber to said 65 outlet for diverting the water from the actuating parts of said motor, a valve for opening and closing said by-pass, and diaphragm means for operating said valve, said means having one side exposed to the water 70 pressure in said chamber, a compartment in which pressure is created by an operation of said pump, a pressure chamber on the opposite side of said diaphragm to the distributing chamber and having communication 75 with said compartment, said means being normally actuated by city water pressure to move the valve to close said by-pass and being actuated by a predetermined pump actuated pressure to move the valve against 80 said water pressure to open said by-pass.

In testimony whereof, I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL E. FOLK.

Witnesses:

C. W. OWEN,
 E. E. THOMAS.