

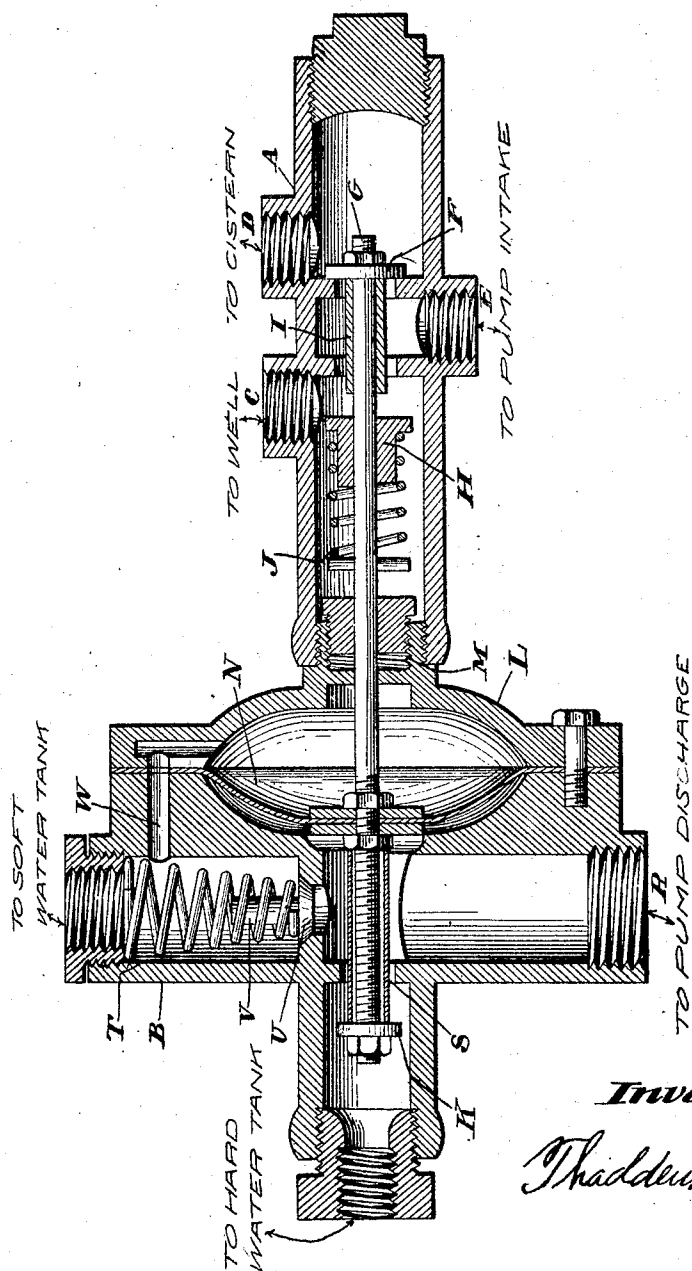
Nov. 9, 1926.

1,606,530

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AUTOMATIC VALVE

Filed Nov. 20, 1922



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AUTOMATIC VALVE.

Application filed November 20, 1922. Serial No. 602,236.

This improvement relates to a modification of the construction previously shown and described in my Patent No. 1,433,007, Oct. 24, 1922.

The object of this invention is to provide automatic means whereby one automatic electric pump may be used to supply two separate water systems from two corresponding separate sources.

Some of the advantages of this construction over my former one are that it provides a more compact and simple construction, it combines the plunger and diaphragm of my former construction into one element which is connected into the discharge line from a pump in such a manner that the variations in the pressure in the different portions of the discharge line cause it to move to operate the valves, eliminating the necessity of a spring member to move the three-way intake valve in one direction. This construction also eliminates the necessity of check valves in the discharge lines and provides a built in automatic feed back check valve which compensates for any leakage back through the valves of the pump, thereby preventing the pump starting at frequent intervals, in case of such leakage.

The two water systems which are supplied by this valve may consist of two pipe lines with faucets, or, two storage tanks, or one storage tank for soft water and a pipe line and faucet for obtaining hard water, or a tank for hard water and a pipe line and faucet for obtaining soft water, or, with the use of a check valve in the well water discharge line, two tanks and a fresh well water service line.

As illustrated in the accompanying drawing which shows a horizontal section through the median line, this valve comprises a three-way intake valve A and a three-way discharge portion B. The tubular casing of the intake end has port E, which is to be connected to the intake to the pump, port C which is to be connected to the well, and port D, which is to be connected to the cistern, said pump, well, and cistern not being shown in the drawing. Valve F is fixedly attached to rod G and opens the passage from cistern to pump when the rod G moves to the right. Valve H is preferably slidably mounted on rod G being normally held in close proximity to sleeve I by coil J. It at least approximately closes the passage

from the well to the pump when rod G moves to the right, but should it seat before valve K is seated, it allows the rod G to continue to move to the right until discharge valve K closes without encountering any resistance from member J.

Rod G extends through packing gland M to diaphragm chamber L, being fixedly attached to diaphragm N. One side of diaphragm chamber has an intake port R, which is to be connected to the discharge line from the pump, a discharge port S, which is to be connected to the hard water tank or hard water service line, not shown, and a discharge passage T, that is to be connected to the soft water tank or a soft water service line, not shown. A valve U in this passage is normally held closed by a spring V. If this valve is to be used with a soft water service line connected to port T spring V is preferably adjusted so that there is little or no pressure on valve U when it is seated, but if the valve is to be used with a tank connected to port T, spring V is adjusted to put some pressure on valve U when it is seated. A passage W connects the passage T to the opposite side of the diaphragm chamber.

A valve K is fixedly mounted on rod G so that when rod G moves to the right port S is closed, valve K seating under more or less pressure, which is communicated to it by rod G from diaphragm N. If this valve is to be used with only a service line and faucet connected to port T valve K is preferably made of somewhat greater diameter than when the valve is to be used with a tank connected to this port.

Should it be desired to use a pipe line and faucet connected to port S, instead of a tank, this does not affect the working of this valve in any material way, except that the automatic feed back check is then inoperative.

In operation diaphragm N is the operating element, being moved to the right or left as the pressures vary on its two sides. In so moving valves H and F and also valve K are operated. For instance, if, when using this valve with two service lines, the soft water faucet is opened, the pump is caused to start, by the drop in pressure, and discharge water through valve U and passage T. Since there is a drop in pressure at valve U there is an excess of pressure thrown against the left side of the

diaphragm N which causes it to move to the right, closing valve H and opening valve F so that water is drawn from the cistern, and after passing through the pump, is discharged through port R and passage T, to the soft water service line.

If, when using service pipe lines from ports S and T, the hard water faucet is opened, the pump starts and throws a pressure into the diaphragm chamber L. Since passage T has no outlet and there is practically no resistance to a small flow through valve V, the pressures on the two sides of diaphragm L remain the same. There is however a drop in pressure at valve K which causes it to move to the left, moving rod G and valves H and F to put the pump suction line into communication with the well.

If, when using two tanks connected to ports S and T, the pump is put in operation with no pressure in either tank (not shown) and the parts in the position shown, a slight pressure is produced on the left side of the diaphragm since port S is rather limited in capacity and valve U is closed under a slight pressure of spring V. This pressure immediately throws the diaphragm to the right closing valves K and H and opening valve F. Cistern water is then drawn and discharged through valve U to the soft water tank. Since the pressure on the right side of diaphragm N is always the same as that above valve U, being in communication through passage W, there is an excess of pressure on its left side so long as the pump is in operation since there is a drop in pressure of about five pounds per square inch at valve U. Since the diameter of the effective portion of the diaphragm is very much greater than that of port S minus rod G, a comparatively slight drop in pressure at valve U will hold valve K closed, even though there is no pressure in the hard water tank and a high pressure in the diaphragm chamber, although if this difference becomes too great and valve K opens a little, the pressure on the left side of the diaphragm drops instantly and the pressure in the soft water tank, exerting its influence through passage W, throws diaphragm N to the left, opening valves K and H and closing valve F. When the pressure in the hard water tank becomes somewhat greater than that in the soft water tank the diaphragm N again moves to the right, practically instantly, since when valve K commences to close the pressure on the left side of the diaphragm chamber increases rapidly, until valve K is entirely closed and valve K is thrown open by the rise in pressure under it. When the soft water tank is filled to the cutting out point of the switch the pump stops and the valve U closes, preventing any return of

the water from the soft water tank to the hard water tank while the pump is idle.

In case the pressure in the hard water tank should exceed that in the soft water tank the diaphragm N moves to the right closing valve K and preventing any flow from the hard water tank to the soft water tank when the pump is idle.

A special advantage of this construction is that should there be a leakage past the pump valves the pump is not caused to start at frequent intervals as it would be if ordinary check valves were used in the discharge lines, between the valve and the tanks, for valve K operates as an automatic feed back check which, while preventing a flow from the hard water tank to the soft water tank while the pump is idle, yet opens to allow a flow from the hard water tank to the main discharge line to compensate for leakage past the pump valves. This automatic movement of valve K is caused by the pressure on the left side of the diaphragm falling below that on the right side, which latter, with the soft water tank well filled, is much greater than the pressure at which the automatic cut out causes the pump to start.

I claim as new:

1. In an automatic valve the combination of a three-way valve comprising a casing with two transverse partitions, openings in said partitions, a rod extending through said openings, valves on said rod and adapted to close or open said openings, a diaphragm chamber fixedly attached to said three way valve casing, a diaphragm in said chamber, a packing gland between said diaphragm chamber and said three-way valve casing through which said rod extends, said rod being fixedly attached to said diaphragm, an intake port in one side of said diaphragm chamber, a discharge passage one end of which communicates with said intake port, a valve in this end of the passage, a spring which normally holds said valve closed, an opening from said passage communicating with that side of the diaphragm chamber that is opposite to said intake port, a discharge opening from that side of the diaphragm chamber that has the intake opening, a valve in said port, said valve being operably connected to said diaphragm.

2. In an automatic valve, the combination of a chamber, a movable partition in said chamber, an intake port into said chamber on one side of said movable partition, said port being adapted to be connected to the discharge port from a pump, a second passage from said side of said chamber, said passage being adapted to be connected to a pipe line, a valve in said passage, said valve being operably connected to said partition and being of materially less diameter than said partition and closing said passage at certain times so that there is no communication

between said pipe line and said chamber, a third passage from said side of said chamber, said passage being adapted to be connected to a second pipe line, a valve in said passage, said valve being independent of said movable partition but opening away from said chamber and against a yieldable resistance, a passage from said chamber on that side of said movable partition that is opposite from said intake passage, said passage being adapted to be put in communication with said second pipe line, a valve assembly adapted to be connected into the intake supply to said pump, said valve assembly being operably connected to said movable partition.

3. In a duplex automatic valve an automatic feed back check valve comprising a diaphragm chamber, a diaphragm in said chamber, a passage from one side of said chamber adapted to be connected to the discharge line from a pump, another passage from this side of said chamber adapted to be connected to a storage reservoir, a valve in said passage, said valve being operably connected to said diaphragm, said valve, when closed cutting off all communication between said tank and said diaphragm chamber and a passage from the other side of said diaphragm chamber adapted to put that side of the diaphragm chamber in direct communication with a second storage reservoir.

4. In an automatic valve a suction chamber, and a distributing chamber, a movable partition in said distributing chamber, said movable partition being operably connected

to a valve assembly in the said suction chamber, an intake port into that portion of said distributing chamber that is on one side of said movable partition, two discharge passages from this portion of said distributing chamber, the first of said discharge passages having a valve which is operably connected to said movable partition, a yieldable resistance interposed between said intake port and the second of said discharge passages, and a passage from that portion of said distributing chamber which is on the opposite side of said movable partition from said intake port.

5. In an automatic valve, a valve shifter comprising a chamber, a movable partition in said chamber, an inlet passage into one side of said chamber and an outlet passage from said side of said chamber, adapting said chamber to be connected into the discharge line from a pump, a resistance to the flow through said outlet passage, said resistance being so disposed that when said chamber is connected into said discharge line, said movable partition is in communication, on one side, with that portion of said discharge line that is on one side of said resistance and on the other side by means of a by-pass connection with that portion of said discharge line that is on the opposite side of said resistance, a second outlet passage from said side of said chamber, a poppet type valve and resistance in said passage, said valve and resistance being operably connected to said movable partition.

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