C. L. WILKINS.

WATER SUPPLY SYSTEM.

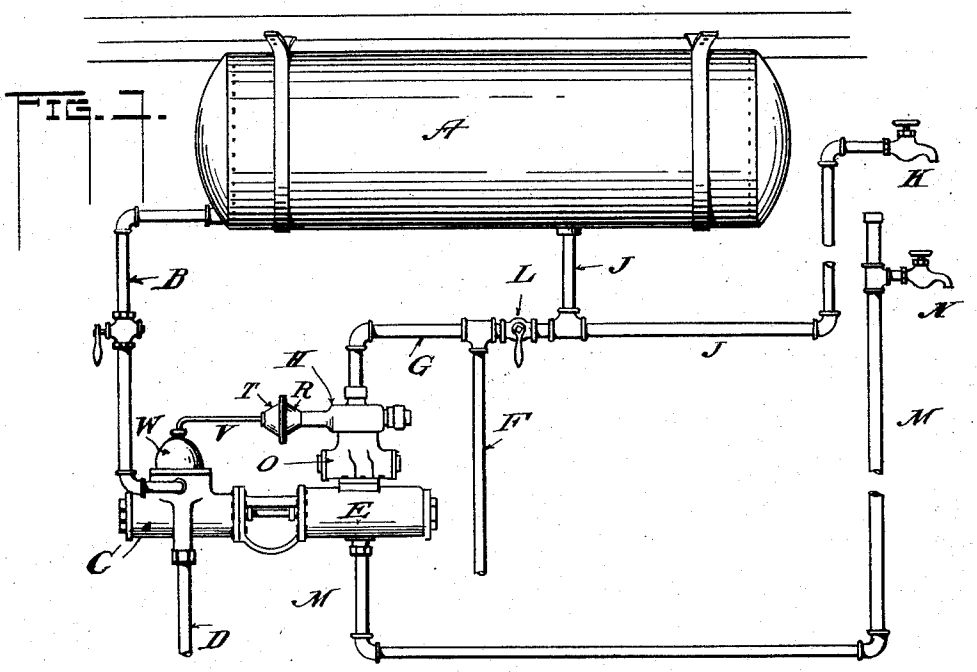
APPLICATION FILED DEC. 19, 1910.

1,015,464.

Patented Jan. 23, 1912.

2 SHEETS—SHEET 1.

FIG. 1.



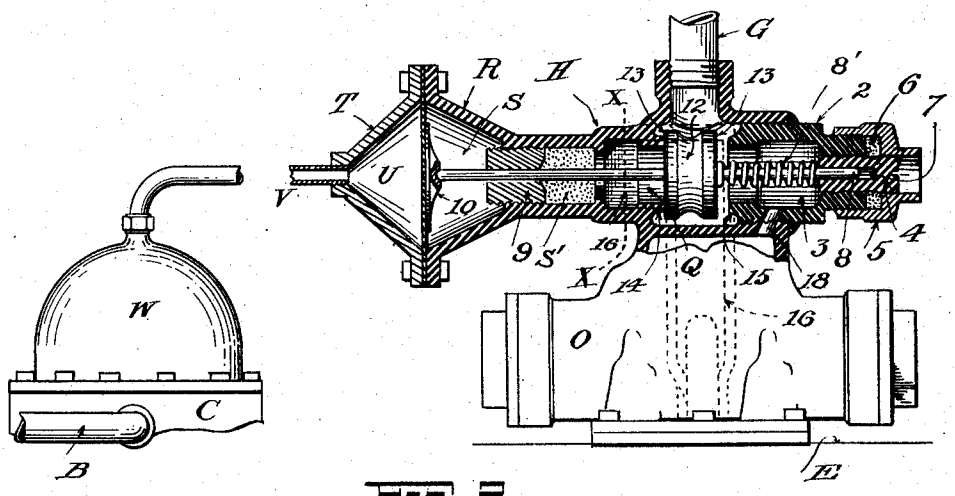


FIG. 2.

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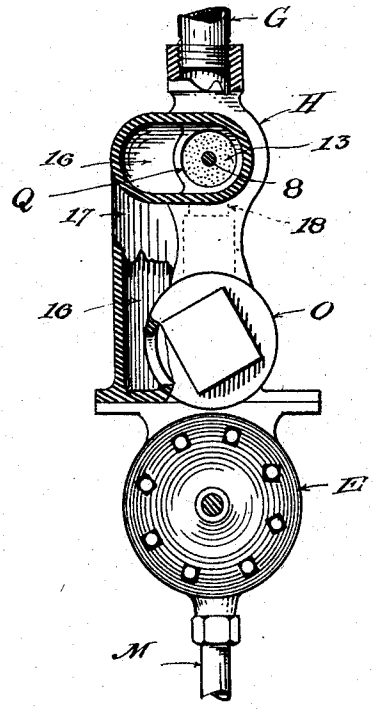
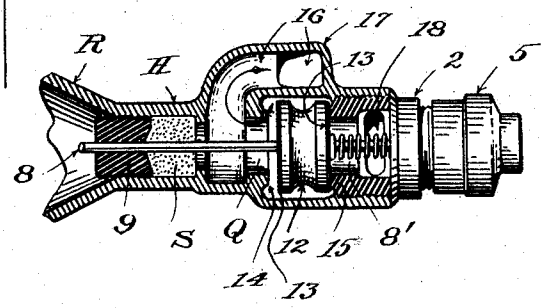


FIG. 3.

FIG. 4.



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UNITED STATES PATENT OFFICE.

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WATER-SUPPLY SYSTEM.

1,015,464. Specification of Letters Patent. Patented Jan. 23, 1912.

Application filed December 19, 1910. Serial No. 598,138.

To all whom it may concern:

Be it known that I, CHARLES L. WILKINS, citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Water-Supply Systems; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in water supply systems. It pertains more particularly to means for automatically controlling water elevating mechanisms in water supply systems in houses or wherever adapted to supply water at distant points.

The invention pertains still more particularly to a valve arrangement on a water lift or motor for directing the flow of motor-actuating pressure-water around or through the said lift or motor as occasion demands, said valve arrangement being applicable alike to all styles or makes whether of the "duplex" or the single cylinder type.

The system provides for a supply of water for dwellings, for example, furnished from different sources such as from city pressure service pipes or mains, and from cisterns or other sources of water not under pressure in which the service water from said city service pipes or mains, which is utilized to actuate a water-lift of any desired type, raises or forces the cistern water to a storage tank and in which, also, the pressure-water for actuating said water-lift when substantially equalled by and overcome by pressure in such tank, will be shunted around the said lift without operating it.

The object of my invention is to provide means for shunting the operating water-pressure of the city mains around the water-lift and combine such means with the lift or pump whereby both can be made in a single part or unit ready for installation.

A further object is to provide a pressure regulating mechanism in a water system of the class described for shunting the driving pressure for the pump around the driving member or motor which will not be susceptible to sudden changes in service pressure, all of which will be understood from the accompanying description aided by the drawings forming a part of this application and in which;

Figure 1 is somewhat in the nature of a diagram and shows a system of piping including my combined pump pressure regulating device. Fig. 2 is a side elevation of a portion of a pump and motor showing my regulator in connection therewith in longitudinal section. Fig. 3 is a vertical transverse section of the regulator on line X X, Fig. 2 showing a part of the water-motor with which it is associated, and Fig. 4 is a horizontal section of a part of the said regulator.

I have illustrated the manner of installing the lift or motor in a water system and the valve for directing the water pressure for said motor. Cheapness of construction, simplicity, and few number of parts are of importance as well as compactness of the device and the ease of installation over known ways, not losing sight of an important point—that of building a lift or motor and directing valve in a complete single article, the style of valve on account of its economical features being particularly adapted for use in locations where water is charged for at meter rates.

I desire to state that I am fully aware that it is not new to provide a regulator for shunting the operating pressure around a motor after storing up tank-pressure, but my invention relates more particularly to combining a regulator with a motor and pump and especially a regulator of the peculiar type to be described herein, or its equivalent, whereby as stated in the objects, a complete device in one part can be installed, thereby, simplifying the work of installation and enabling me to produce a system at a much lower cost than heretofore and having advantages of structure and operation also as will appear herein.

A indicates a tank into which cistern or other water is introduced under pressure through a pipe B by means of any suitable pump C from a pipe D connected into cistern or other source of soft water.

E represents a motor driven by water pressure from a city main, for example, through a pipe F and a lateral G connected therewith, my improved regulator being interposed between the said lateral G and the motor and represented as a whole by the letter H.

J is a pipe connected into the tank A for supplying the fixtures at various remote places with soft water; one of the said fixtures being indicated by a faucet or cock

K, said pipe J also having connections if desired with the service pipe F in the customary manner, there being a normally closed valve or cut-off L interposed between the two. The motor E has a service pipe M connected to it to receive both the water discharged from said motor and the direct city pressure when the motor is not in operation as will appear presently and through which other fixtures, one of which is indicated at N, for example, may be supplied with water from said city pressure or other source operating said motor.

The pump and motor are combined as is customary in such devices whereby by means of a piston, for example, not shown, the water being raised through the pipe D is forced through the pipe B into the said tank A.

The internal mechanism of the motor and pump will not be dealt with since these are old and well known and require no description herein the invention pertaining, as already stated, to the regulator now to be described.

Mounted upon the valve-cylinder O of the motor E is the small cylinder H already referred to which is provided with a bore Q. At one end it has a flared or coned extension R provided with a cavity S arranged to receive a coned hollow cap T, there being interposed between these two parts a diaphragm U of any suitable material having the desired thickness. One end of a pipe V is connected into the said cap T and its other end is connected into a dome W of the pump; this said pipe V having a free and uninterrupted connection through said dome to the pipe B. A plug 2 is screwed into the end of the cylinder H at its end opposite that having the diaphragm and though this plug may be a part of the cylinder if desired, for convenience I make it removable. It is provided with a bore 3 communicating at its inner end with the bore of the cylinder while its outer end is threaded to receive a screw plug 4. A cap 5 forming a stuffing box is screwed upon the end of the plug 2 and has a packing 6 to prevent leakage of water around and past said screw plug 4. The latter member is provided with a socket 7 to receive one end of the valve-stem 8, the other end of the latter being carried by and slidable within a screw-plug 9 held in the bore of the cylinder adjacent to the diaphragm-chamber S, as clearly shown in Fig. 2, a packing S′ preventing leakage of water toward and upon said diaphragm. The valve-stem at this end carries an abutment 10 to lie against the diaphragm as shown. The valve carried by the stem is indicated at 12 and has a disk 13 of suitable material lying at each side constituting packing members. Within the bore Q of the cylinder and facing one another are extensions 14 and 15 forming valve-seats, the disks 13 on the said valve adapted to seat on one or the other of them depending upon the conditions existing within the system; but this will be made clear hereinafter. The distance between the seats 14 and 15 is greater than the distance between the said disks 13, however, so that when the valve is seated on one of the extensions 14, 15 a free passage exists between the valve and the opposite extension.

Interposed between the screw-plug 4 and the valve 12 is an expansion spring 8^1 preferably carried by the valve-stem, as shown, and the pressure of this spring holds the valve normally upon the seat 14. Connecting with the bore Q is a passage 16 which leads to the exhaust pipe M beneath the cylinder in any of the usual ways, in this case being extended through an enlargement 17 at the side of the motor, Figs. 3 and 4, to discharge into the valve cylinder O from which it finds its way to the pipe M, but any other disposition of the water carried through said passage 16 may be made so long as it may finally preferably discharge into the said pipe M since therefrom it may be drawn under pressure through any fixture as N, for example, already referred to. As it is the desire to supply city water throughout the system for various uses where soft water is not needed it is better to take it from this source rather than from the pressure pipes F G, direct, since to do the latter would cause the motor-pressure to be variable which is not desirable. At 18 is a passage leading from the bore of the plug 2 into the said valve cylinder O, the water introduced through this passage serving to drive the motor.

The operation of the system and the regulator will be understood from the following:—The city or other pressure for operating the motor enters the regulator through the pipes F and G, the spring 8^1 exerting its pressure to hold the valve 12 upon the seat 14 with the result that the water entering the regulator passes the said valve 12 and enters the bore 3 and passage 18 into the valve cylinder O where it is properly discharged into the cylinder E to drive the motor and from which it then passes into the pipe M, the valve N connected with the pipe M being opened to allow free discharge of the water pressure as the motor in operating the pump introduces the water into the tank A. As water is pumped into said tank the air contained in the latter is compressed to any desired extent the water being thereby under pressure sufficient to force it to remote fixtures. Now let it be supposed that the air pressure in the tank is to be held at 50 pounds. The motor remains in operation until this pressure has been reached and at this point the back pressure from

said tank through the pipe B, dome W, and pipe V, acts upon the diaphragm U to overcome the pressure which drives the motor. This back-pressure in being placed upon the diaphragm which is of much greater area than the valve 12, is able to easily overcome the spring 8^1 and the pressure of water upon said valve at that side. The result is that said valve is forced against its spring; the bore 3 being closed by it thereby stopping the motor, the water being shunted past the latter through the bore Q into the discharge pipe M. As the pressures from both sources are now practically in state of equilibrium the flow will be around the motor until a quantity of soft water is drawn from the tank A at which time the pressure in said tank will relieve the pressure upon the soft water side of the diaphragm. The spring 8^1 then carries the valve 12 to its first position this being aided more or less by the city pressure which is now being permitted to divide and pass by the valve toward the cylinder O exerting its force upon said valve. The motor is now once more in operation to restore the pressure in the tank.

The pressure is substantially constant within the pipe M since the water flows into it at all times either through or around the motor although it may be slightly reduced, perhaps, in passing through the latter but it is never interrupted. It is seen that both the water from the city mains and soft water from the pressure tank can be drawn from their respective fixtures.

My regulator is very simple in structure, operates directly in connection with the motor and pump and is absolutely positive in action. The adjustment of the screw-plug 4 provides for imparting any desired tension to the spring 8^1 in order to arrange for any desired pressure in the tank A since obviously the stronger the tension the higher the pressure will be raised before the water of the city mains is shunted around the motor.

It is observed that the pressure in the pipe M is practically constant at all times and sufficient to discharge from the fixture N since the water must pass into said pipe in either position of the valve 12, *i. e.* whether the motor is in operation or not so that it is not required that the pipe through which the pressure flows should be directly connected into the pipe M as is customary in order to maintain a pressure at the fixtures.

The regulation of the spring-tension also provides for the expansion of the air in the tank due to varying temperature in the room in which said tank is installed, that is to say, the spring may be set so that the motor will be stopped when the pressure from the tank is a little less than the pressure that may obtain therein due to the higher temperature described. If, therefore, the tank pressure is to be 50 pounds maximum, the regulator is set for that pressure less the estimated expansion.

I have described and shown the tubular extension or valve-seat 15 through which the water-pressure communicates with the port 18 of the motor and I have also shown one of the disks 13 for seating thereon but it is to be stated that I may not use said valve-seat and the valve need not be constructed so as to close a passage at that side of the valve at all, merely leaving a free passage between the pipe G and the said port 18. The spring 8^1 holds the valve upon the seat 14 so that the pressure must normally pass into the motor but when the pressure in the tank A equals or slightly more than equals the city water-pressure, the valve is moved against the tension of the said spring. Now, since the valve has been opened the path of the least resistance for the city pressure is naturally through the passage 16 rather than through the said port 18 to drive the motor. This is stated in order to make it understood that I am not necessarily confined to what has been shown and described and I desire to state, also, that I may make such other changes in my device as will suggest themselves and such as will fall within the meaning and intent of the invention and the claims. By having the said regulator a part of the said pump and motor it is only necessary to connect the pipes to it and the latter and the work of installation is complete as to these portions, whereas in a system of which I am aware the pump and the regulator are separate and distinct parts and require to be set up separately thus entailing considerable unnecessary work and expenditure of time. And in this connection it may be stated that I am aware of a regulator which is not mounted directly on the pump being, in fact, a part of the pipe system and removed some distance from said pump and this regulator employs a diaphragm for operating a valve in the path of the city water pressure but that pressure is only allowed to pass through this regulator in one direction. When the valve is closed the water does not flow at all being merely interrupted in its movement toward said regulator and made to pass off through another part of the system or without entering said regulator.

Having thus described my invention, I claim:—

1. In combination with a fluid driven motor and means operated thereby to store water under pressure, a device to control the motor and constituting a part of the same and including a valve, there being an inlet port leading to said motor from said device and an exhaust port, means to automatically

operate the valve through pressure of the stored water to cause passage of the water through one of the ports, and means in control of said valve to cause the passage of the water through the other of the ports.

2. In combination with a motor operated by fluid pressure for storing water under pressure, of means mounted thereon provided with a port leading to the pressure side of the motor and also having an exhaust port, a valve constantly tending to close one of the ports, and means to move the valve automatically to divert pressure of fluid through the other of said ports due to the pressure being stored.

3. In combination with a motor operated by fluid pressure for use in storing water under pressure, of means mounted thereon provided with a port leading to the pressure side of the motor and having also an exhaust port, a valve to separately control one or the other of said ports, means to automatically move the valve toward and upon one of them, said valve being adapted for movement toward and upon the other of said ports by pressure of the water being stored.

4. In combination, a combined pump for storing water under pressure and a motor to operate the same, and a regulating device mounted on one of them provided with a passage communicating with the motor and with the motor-actuating force, and having a place of discharge, a valve in said passage to interrupt communication with the motor and to close the place of discharge, means constantly tending to hold the valve in position to close said place of discharge, and other means in control of the valve and operated by pressure of the water being stored to move the valve against the force exerted by the last named means.

5. In combination, a pump for storing water under pressure and a motor to operate the same combined in a single structure, a regulating device mounted thereon and forming a part of said structure and provided with a passage to receive water pressure for actuating said motor, said passage communicating with the motor and also with a discharge opening, oppositely disposed valve-seats, a valve adapted to rest upon either seat, means constantly tending to place the valve upon the seat lying in that part of the passage leading to the discharge opening, and other means in control of the valve and operated by pressure of the water being stored to move said valve in opposition to the force exerted by the last named means.

6. In combination, a pump for storing water under pressure and a motor to operate the same combined in a single structure, a regulating device mounted thereon provided with a passage to receive water-pressure for said motor and having a passage in communication with the motor and a passage communicating with a discharge opening including a valve seat in each, a valve adapted to rest upon either seat, means constantly tending to place the valve upon the seat of the passage leading to the discharge opening, and other means in control of the valve and operated by pressure of the water stored to move said valve in opposition to the force of the last named means.

7. The combination with a pump for storing water under pressure and an actuating motor combined therewith, of a regulating device for and mounted on said motor in the path of the actuating pressure, including a valve, there being a port-opening leading to the motor, and an exhaust, means to hold the valve upon and to close the exhaust, said valve being operated automatically by stored pressure at a predetermined time to open said exhaust.

8. In combination with a combined pump to store water under pressure and a water motor, of a pressure regulator comprising a member provided with a cavity to receive a driving water-pressure and having an inlet for such pressure thereto, and also having two openings communicating with and leading from said cavity, one of them leading to the motor and the other to an outlet, a valve within the cavity adapted to close one of the openings, and adapted to be operated by back-pressure of water being stored to close the other of the openings.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES L. WILKINS.

Witnesses:
F. P. WYNE,
L. M. THURLOW.