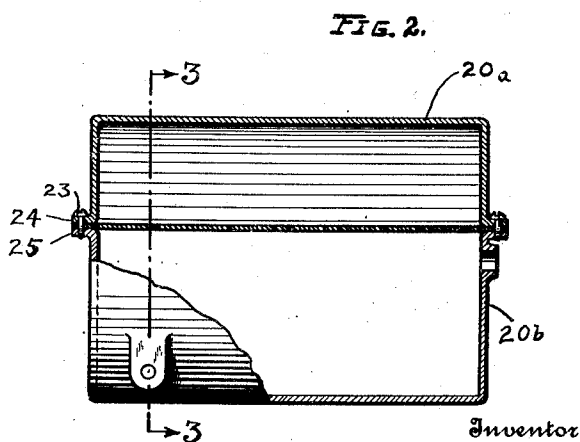
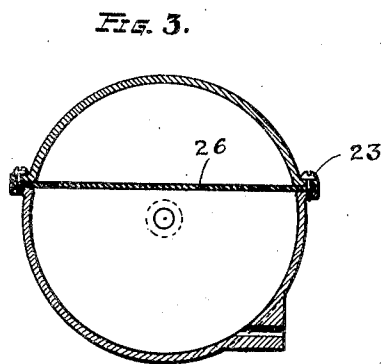
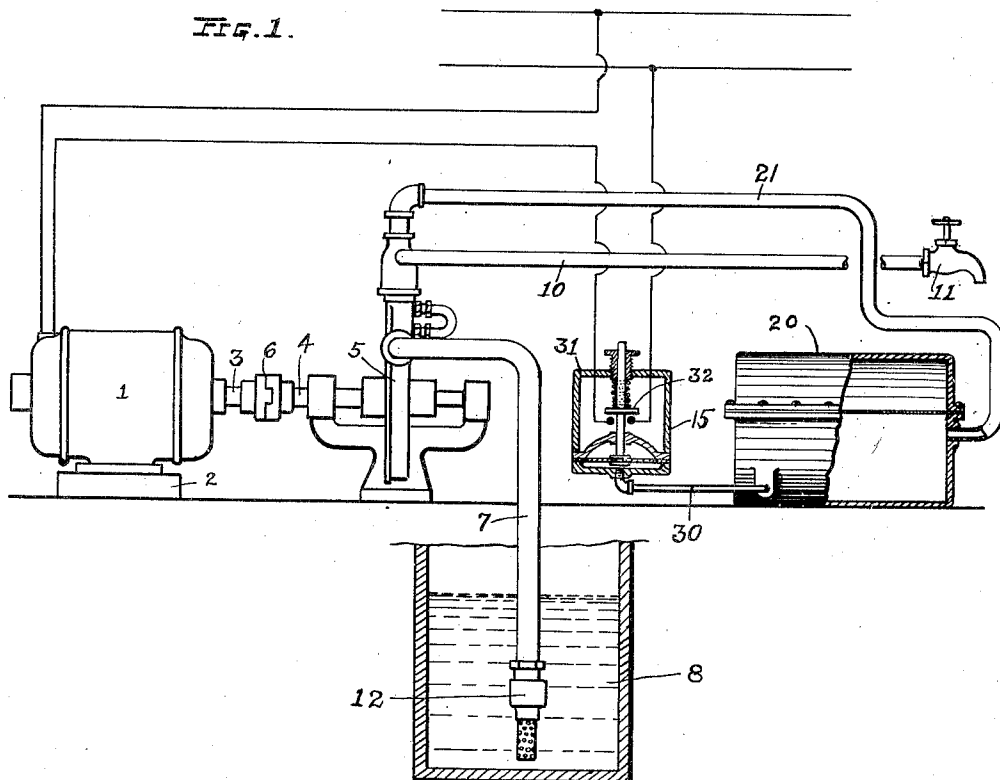


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W. I. DERRICK
LIQUID SUPPLY SYSTEM

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Inventor
Wm. I. Derrick

Lloyd L. Evans

Attorney

UNITED STATES PATENT OFFICE.

WILLIAM I. DERRICK, OF MOLINE, ILLINOIS, ASSIGNOR TO WESTCO-CHIPPEWA PUMP COMPANY, OF DAVENPORT, IOWA, A CORPORATION OF DELAWARE.

LIQUID-SUPPLY SYSTEM.

Application filed July 3, 1922. Serial No. 572,541.

To all whom it may concern:

Be it known that I, WILLIAM I. DERRICK, a citizen of the United States, residing at Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Liquid-Supply Systems, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to pumping systems and more particularly to liquid supply systems such as systems for furnishing water for residences, hotels, apartments, commercial purposes, etc.

15 An object of this invention is to provide an automatic pumping system capable of delivering an ample supply of water at a desired pressure directly through service pipes.

20 Another object of the invention is to provide a system which will pump when water is desired and in sufficient quantities so that large and inconvenient storage tanks heretofore used in such pressure systems are eliminated and yet all the advantages of such systems are retained.

25 Another object of the invention is to provide a system in which a pressure compensator is located between the pump discharge and the motor controlling means in order to prevent sudden or momentary fluctuations in the pressure from affecting the pressure operated motor controlling mechanism.

30 Another object of the invention is to provide a small tank or accumulator which causes the replacement of small losses of water from the discharge line, thus preventing a quick drop in the pressure in the line, due to leakage such as might be caused by incompletely closed faucets, faulty valves, etc.

35 Another object of the invention is to provide such a tank or accumulator which cannot become "water logged" or full of water in service to insure a sufficient quantity of compressible gas at all times to expand when the pressure is reduced and replace small losses of water from the system.

40 The following description and annexed drawings set forth in detail certain means embodying my invention, the disclosed

means, however, constituting but one of the various mechanical forms in which the principle of the invention can be employed.

In said annexed drawings,

Figure 1 is a diagrammatic view of the system.

Figure 2 is an enlarged longitudinal section of the tank or the accumulator.

Figure 3 is a section on line 3—3, Fig. 2.

In the drawings, 1 indicates a motor mounted on a suitable base 2 which drives a motor shaft 3. The shaft 4 of the pump 5 is connected by a suitable coupling 6 and is driven thereby. By way of example the pump diagrammatically illustrated consists of a casing in which is mounted a rotor of the type in which a portion of the rotor engages the water in an outer fluid channel. While this is the preferred type of pump it is to be understood that any pump capable of delivering a sufficient supply of water at an appropriate pressure can be used.

The pump 5 has an intake pipe 7 extending to a suitable source of supply 8. Leading from the pump is a discharge or service line 10 which may be extended to faucets 11 located in various places where it is desired to deliver water. A suitable check valve 12 may be supplied at the end of the intake pipe in the source of water, to prevent the pump losing its prime when the pump is not operating.

Between the discharge side of the pump and the automatic pressure operated motor controlling switch 15 is a relatively small accumulator tank 20 which is connected to the discharge side of the pump by line 21. The tank 20 consists of upper and lower sections 20^a and 20^b respectively, secured together by any suitable fastening means such as screws 23 passing through the outturned flanges 24 of the upper section of the tank and threaded into the outturned flanges 25 of the lower section of the tank. A suitable diaphragm or membrane 26 preferably of a flexible or yielding material such as rubber or the like, is clamped between the outturned flanges and separates the upper and lower portions of the tank. By tightening the screws 23 or otherwise clamping the sections of the tank together the upper portion

of the tank is rendered air-tight and the lower portion of the tank is rendered water-tight.

Communicating with the lower portion of the tank is a pipe 30 leading to the pressure chamber 31 of the motor controlling switch 32.

The specific electric switch mechanism is not shown herein in detail, for any pressure actuated switch which is positive and efficient in its operation and permits variation of pressure between its operating limits and may be adjusted to vary or change such limits is sufficient. In so far as the present invention is concerned, however, it is only necessary that a diaphragm be provided which is subjected to the pressure transmitted thru the tank 20 and is operable to open the motor switch when the pressure reaches a predetermined maximum and to close the switch when the pressure drops to a predetermined minimum.

Suitable wiring connects the electric service line with the switch and motor, so that when the switch is closed the motor will operate to drive the pump.

When the pressure in the system falls below the predetermined amount for which the automatic pressure governor is set, the governor will operate the switch 15 to close the motor circuit and the pump will operate until the pressure is built up to a predetermined maximum, when the switch will be opened automatically by the pressure governor. As there is no storage tank in the system, when a faucet is turned on the water comes directly from a well, the only old water being that which stood in the supply and suction lines themselves, and that is quickly withdrawn.

The small tank or accumulator 20 operates as a permanent gas container to assist in compensating pressure changes caused by opening or closing a faucet suddenly or starting the pump as the tank is located between the pump and the motor controlling switch. Consequently, only substantial or sustained variations of pressure are transmitted through the tank to the switch.

The accumulator also acts to replace small losses of water from the discharge line and to prevent a quick drop in the pressure in the line due to leakage such as might be caused by failure to close the faucet tightly, faulty valves, etc. It is possible for a small tank to accomplish this result since it contains a gas, preferably air, which is compressible, whereas water or other liquid in the system is relatively incompressible so that a considerable volume of water can leak from the system before the pressure in the tank is reduced sufficiently to permit the motor switch 15 to be closed. If the pressure is reduced by leakage sufficiently to start the motor the pump will again establish the

maximum pressure in the tank 20 which will permit leakage for a considerable time before the motor is again operated. Without the tank a leak in the system would cause fluctuations of pressure in the line which would cause the motor switch to be constantly moving to and from closed position starting and stopping the motor which would subject the pump motor and driving connections to excessive wear.

By having the air chamber 20^a of the tank positively and permanently situated from the chamber 20^b which may become filled with water during use, it will be seen that it is always possible to obtain the benefit of a compressible medium such as air in the system, as it is not possible for the entire tank to become filled with water, or "water logged," as heretofore.

Furthermore, it is to be understood that the particular forms of apparatus shown and described, and the particular procedure set forth, are presented for purposes of explanation and illustration and that various modifications of said apparatus and procedure can be made without departing from my invention as defined in the appended claims.

Having thus described my invention, what I claim is:

1. A liquid supply system comprising in combination a pump, a suction conduit extending from said pump to the source of supply, a discharge conduit leading from the pump, means for driving said pump, a pressure operating device for controlling said driving means, an accumulator interposed between said discharge conduit and said pressure operating device, said accumulator comprising a plurality of chambers, one of said chambers containing a gas and being separated from the other chamber by a fluid tight medium, said medium being adapted to transmit pressure from one chamber to the other.

2. A liquid supply system comprising in combination a pump, a motor for driving the same, discharge and inlet ports leading from and into the pump, a pressure operated motor controlling device, and an accumulator tank connected to the discharge side of the pump and to said pressure operated motor controlling device, said accumulator tank having compartments, one of said compartments being a gas tight compartment capable of receiving pressure from and transmitting pressure to the other compartment.

3. A liquid supply system comprising in combination a pump, suction and discharge lines connected to the pump, a motor for actuating the pump, an automatic motor controlling device, and a relatively small accumulator connected to the discharge line to replace fluid loss through leakage in the

line, said accumulator having a gas chamber sealed to prevent egress of gas and ingress of liquid.

4. A liquid supply system comprising in
5 combination a pump, a suction conduit extending from said pump to the source of supply, a discharge conduit leading from the pump, means for driving said pump, a
10 pressure operating device for controlling said driving means, and an accumulator interposed between said discharge conduit and said pressure operating device, said accumulator comprising a plurality of chambers,
15 one of said chambers containing a gas and being separated from the other chamber by a fluid tight medium, said medium being adapted to transmit pressure from one chamber to the other, and means connecting said

discharge conduit and pressure operating device with one of said chambers. 2

5. A liquid supply system comprising in combination a pump, means to actuate the same, a pressure operated device to control said actuating means, an accumulator tank
25 interposed between the pump and said pressure operated device, said accumulator tank having superposed compartments, means connecting the discharge side of the pump and the pressure operated device with the
30 lower compartment, and means preventing interchange of fluid between the compartments.

In testimony whereof I hereunto affix my signature.

WILLIAM I. DERRICK.