July 14, 1931. A. PENN 1,814,454

DEEP WELL WATER SUPPLY SYSTEM

Filed Feb. 13, 1930

Fig. 1.

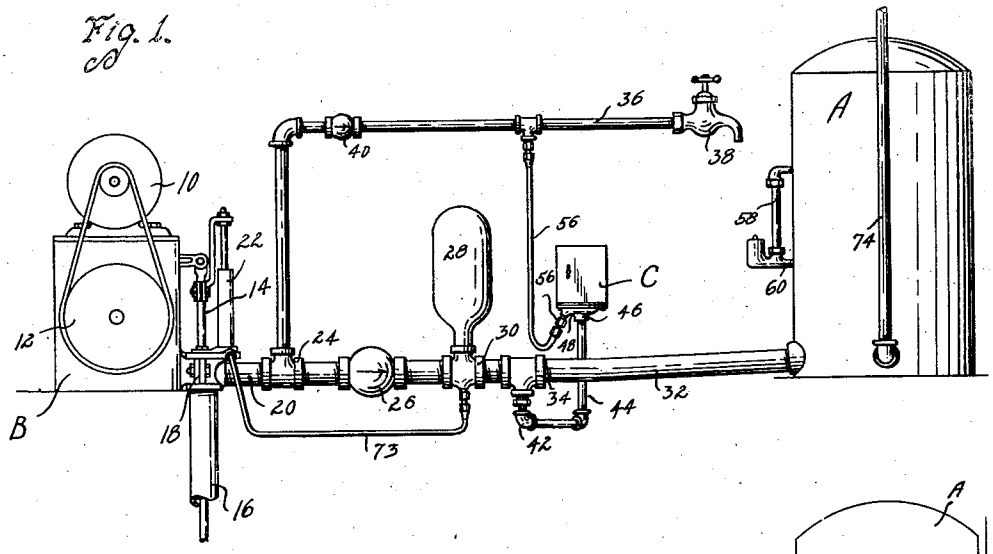


Fig. 3.

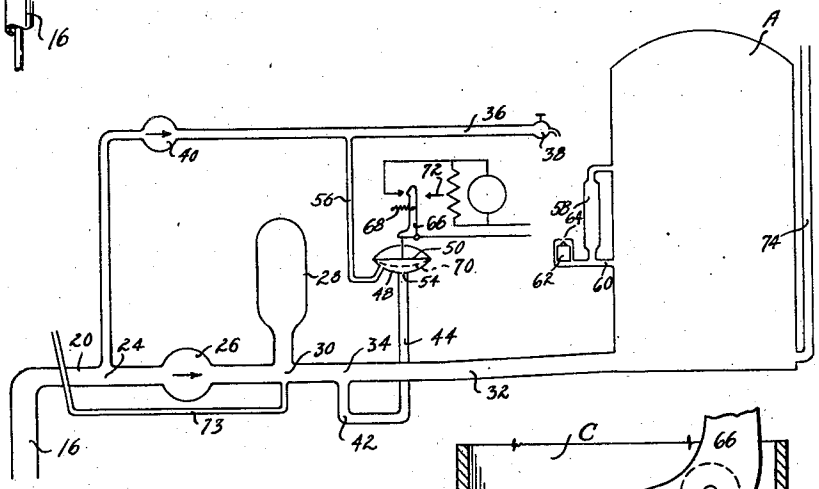
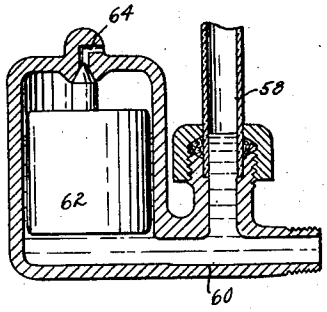


Fig. 2.



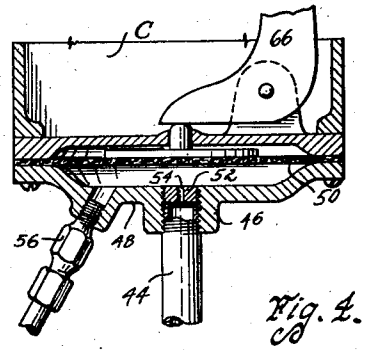


Fig. 4.

Witness
H. S. Munzenmaier

Inventor
~Albert Penn~
By Bair, Freeman & Sinclair
Attorneys

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UNITED STATES PATENT OFFICE

ALBERT PENN, OF DES MOINES, IOWA, ASSIGNOR TO PENN ELECTRIC SWITCH CO., OF DES MOINES, IOWA

DEEP WELL WATER SUPPLY SYSTEM

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The object of my invention is to provide a water supply system wherein a pump supplies air and water to a storage tank and wherein the fresh water take-off when opened immediately starts operation of the pump, and the air drawn in by the pump will be by-passed into the storage tank, so that the fresh water supply will not be mingled with air.

It may be here mentioned that in the ordinary well water supply system, a storage tank is provided from which storage water may be withdrawn by air under pressure within the tank, and at the same time a fresh water take-off is provided, and the air within the system will mingle with the fresh water supply causing the fresh water supply to come in charges and intermittently a charge of air only comes forth from the fresh water take-off, and it is my object to provide a system wherein the fresh water take-off will not be interfered with by the air under pressure and only fresh water from the well will be discharged through the fresh water take-off instead of air with the water which causes objectionable sputtering and splashing.

Another object of my invention is to by-pass the air from the pump into the water storage tank, so that the air drawn in by the pump will not pass into the fresh water supply line.

A further object is to provide a switch mechanism operable for starting the electric motor when pressure within the tank falls below a predetermined amount, and also operable instantaneously upon opening the fresh water take-off irrespective of the amount of pressure within the storage tank.

More specifically, it is my object to provide a switch structure for starting and stopping the motor operable from the storage tank and also operable upon opening of the fresh water take-off, the connection between the storage tank and the switch structure being restricted.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my deep well water supply system, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of my well water supply system.

Figure 2 is a sectional view through the excess air discharge device forming a part of the storage tank.

Figure 3 is a diagrammatic view of the water supply system layout; and

Figure 4 is a sectional view through the diaphragm structure of the switch mechanism.

In the accompanying drawings, I have used the reference character A to indicate a water storage tank and B the pumping unit.

The pumping unit includes a motor 10 and a driving mechanism 12. The driving mechanism 12 is connected to the well or plunger rod 14. The plunger rod extends down into a drop pipe 16. The well head 18 has a take-off pipe 20 extending therefrom in communication with the water storage tank. The supply line from the well head 18 to the water storage tank A will hereinafter be more fully set forth.

During operation of the pumping unit, operation of an air attachment 22 is effected.

The line 20 between the well head 18 and the storage tank A includes a T-fitting 24, a check valve 26, and an air chamber 28. The air chamber 28 is connected to the line 20 by a fitting 30. A pipe 32 connects the fitting 30 to the storage tank A, and within the pipe 32 is a T-fitting 34.

The T-fitting 24 has a fresh water supply line 36 connected thereto with a take-off faucet 38. Within the fresh water supply line 36 is a check valve 40.

The pipe line 32 is slightly inclined upwardly so that the water storage tank is positioned in a plane above the fitting 34 or at least above the take-off from the fitting 34.

The take-off from the fitting 34 is referred to by the reference numeral 42 and extends to a switch structure C. The take-off 42 ex-

tends downwardly from the T-fitting 34, and thence upwardly to the switch structure C.

A short pipe 44 is secured to a neck 46 formed on the diaphragm chamber casing 48. The switch structure includes a diaphragm 50 which when moved in an upward direction causes the switch to open the circuit, and which when moved in a downward direction causes the switch to close the circuit for starting operation of the motor 10.

The switch structure C is in electrical connection with the motor 10 and makes and breaks the electric circuit to the motor 10. The diagram of this connection is clearly illustrated in Figure 3 of the drawings.

While I have used the term "upward" and "downward" in connection with the diaphragm 50, it will be understood that the terms are used only in connection with the position of the device as disclosed in the drawings, there being no intention to limit myself to the particular direction of movement of the diaphragm.

Within the neck 46 of the diaphragm casing, I mount a plug 52, which is provided with a restricted passageway 54.

The fresh water supply line 36 is connected to the switch structure by a passageway 56. The passageway 56 is in communication with the diaphragm chamber on the same side of the diaphragm as is the pipe 44. The passageway 56, however, is not restricted and is of considerably greater diameter than the passageway 54 in the plug 52.

It will be noted therefore that the two passageways leading into the diaphragm chamber are of different sizes, the one from the fresh water supply line being of greater size than the one from the storage water system side.

Air from the attachment 22 is by-passed into the fitting 30 around the check valve 26 by means of a pipe 73.

The storage water from the tank A may be withdrawn through a supply line 74 and controlled by ordinary faucets or the like.

The storage tank A includes a gauge 58 and a fitting 60, which is screwed into the tank A. When the water level within the tank drops, so that it no longer is indicated on the gauge 50, then a float 62 will likewise drop and open the air discharge passageway 64 permitting air from within the tank A to bleed to atmosphere.

Switch structure

The switch structure C includes a lever 66, which is operated by the diaphragm 50 in one direction and by a spring 68 in the opposite direction.

When the diaphragm moves to the position shown by dotted lines 70 in Figure 3, then the lever will move in a direction indicated by the arrow 72 for closing the circuit and thus starting the motor 10.

Practical operation

The practical operation of my water supply system is as follows:

The pumping unit when operating forces water and air into the water storage tank A.

When the air pressure within the tank falls below a predetermined amount, that is an amount necessary for operation of the water supply system, the switch structure C is affected, and it operates to close the circuit for starting the motor 10.

Thus more water and more air will be forced into the storage tank A and the switch structure C will then stop the motor 10 at some higher predetermined pressure.

In order to withdraw fresh water for drinking purposes, I provide the fresh water take-off valve or faucet 38. As soon as the fresh water take-off is opened, it immediately withdraws all of the water within the lower side of the diaphragm chamber and instantly the diaphragm moves to its down position and the circuit is closed for starting the motor.

The motor operates the pump and the water will follow the line of least resistance and from the pipe 20 adjacent the well head will pass into the supply line 36 and be discharged through the faucet 38.

The air which is likewise being pumped during fresh water withdrawal will pass to the pipe 73 and into the fitting 30 directly below the air chamber or cushion 28, so that any air pumped during the time fresh water is withdrawn will go into the storage tank.

It will thus be seen that the fresh water supply is not affected by the air which is pumped at the same time that water is being forced into the fresh water supply. The air passing into the fitting 30 will naturally pass into the air chamber 28 and on into the tank A along the upper side of the pipe 32. The lower portion of the pipe will be filled with water, and for that reason water will fill the pipes 42 and 44 and pass into the diaphragm chamber through the restricted passageway 54.

So long as the fresh water supply line is open, the small amount of water passing through the pasageway 54 will not control the operation of the switch structure C, because the pipe or passageway 56 is of sufficient size to preclude any pressure being built up within the diaphragm chamber sufficient to force the diaphragm 50 upwardly for opening the electric circuit.

With the withdrawal of the fresh water, there may be a very slight amount of storage water, that is only the amount that will force its way through the restricted pasageway 54. The check valve 26 precludes any air from within the storage tank and likewise the storage water from forcing its way into the fresh water supply line 36.

As soon as the fresh water supply faucet 38 is closed, the pressure is soon built up within the diaphragm chamber forcing the diaphragm 50 upwardly, and the switch is then operated for opening the electric circuit and stopping the motor 10.

It will thus be seen that I have provided a well water supply system that permits fresh water to be withdrawn without any interference of the air pumped by the pump at the time it is forcing or withdrawing fresh water from the well.

The placing of the storage tank above the take-off connection between the switch C and the fitting 34 is necessary to form a water seal and prevent the air which will travel on the upward side of the passageway from forcing its way into the diaphragm chamber and thence through the passageway 56 into the fresh water supply line.

The operation of my device is primarily accomplished by by-passing the air from the pump into the storage tank and around the check valve 26, and likewise connecting the fresh water supply line between the pump mechanism and the check valve 26.

It will also be noted that the switch C is operated either by pressure within the tank A falling below a predetermined amount and/or instantly operated by opening of the fresh water take-off. This arrangement is accomplished by the openings into the diaphragm chamber being of two different sizes.

Some changes may be made in the arrangement and construction of the parts of my water supply system without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. In a water supply system, the combination with a supply pipe, a pump for supplying air and water to the pipe and a fresh water take-off from the pipe, of a control mechanism for starting and stopping operation of the pump, said control mechanism being hydraulically connected with the fresh water take-off and hydraulically connected through a reduced passageway with the supply pipe, and means for preventing air from the pump being discharged into the fresh water, as it is withdrawn.

2. In a water supply system, the combination with a supply pipe, pump mechanism for supplying air and water thereto and a fresh water take-off from the pipe, of a single control mechanism for starting and stopping operation of said pump mechanism, said control mechanism being hydraulically connected both with the fresh water take-off and through a reduced passageway with the supply pipe.

3. In a water supply system, the combination with a supply pipe, pump mechanism for supplying air and water thereto and a fresh water take-off from the pipe, of a control mechanism for starting and stopping operation of said pump mechanism, said control mechanism being hydraulically connected with the fresh water take-off and hydraulically connected through a reduced passageway with the supply pipe, said last passageway being in the form of a water trap.

4. In a water supply system, the combination with a supply pipe, pump mechanism for supplying air and water thereto and a fresh water take-off from the pipe, of a control mechanism for starting and stopping operation of said pump mechanism, said control mechanism being hydraulically connected with the fresh water take-off and hydraulically connected through a reduced passageway with the supply pipe whereby opening of said fresh water take-off instantly operates said control mechanism, but said control mechanism is retarded in its operation as a result of water being withdrawn from the supply pipe.

5. In a water supply system, the combination with a supply pipe, pump mechanism for supplying air and water thereto and a fresh water take-off from the pipe, of a control mechanism for starting and stopping operation of said pump mechanism, said control mechanism being hydraulically connected with the fresh water take-off and hydraulically connected through a reduced passageway with the supply pipe whereby opening of said fresh water take-off instantly operates said control mechanism but said control mechanism is not affected to cease operation by high pressure in the supply pipe.

6. In a water supply system, a water supply pipe, pump mechanism for supplying water thereto, a storage tank connected therewith, a check valve between said pump mechanism and said storage tank, a fresh water take-off pipe connected with said supply pipe between said pump mechanism and said check valve, a second check valve in said take-off pipe and a control mechanism for said pump mechanism, hydraulically connected with said fresh water take-off pipe and through a reduced passageway with said supply pipe.

7. In a water supply system, a water supply pipe, pump mechanism for supplying water thereto, a storage tank connected therewith, a check valve between said pump mechanism and said storage tank, a fresh water take-off pipe connected with said supply pipe between said pump mechanism and said check valve, a second check valve in

said take-off pipe and a control mechanism for said pump mechanism, hydraulically connected with said fresh water take-off pipe between said second check valve and the discharge end thereof and through a reduced passageway with said supply pipe between said first check valve and said storage tank.

8. In a water supply system, a water supply pipe, pump mechanism for supplying water thereto, a storage tank connected therewith, a check valve between said pump mechanism and said storage tank, a fresh water take-off pipe connected with said supply pipe between said pump mechanism and said check valve, a second check valve in said take-off pipe and a single control mechanism for said pump mechanism hydraulically connected with said fresh water take-off pipe between said second check valve and the discharge end thereof and with said supply pipe between said first check valve and said storage tank.

9. In a water supply system, a water supply pipe, pump mechanism for supplying water thereto, a check valve in said supply pipe, a fresh water take-off pipe connected with said supply pipe between said pump mechanism and said check valve, a second check valve in said take-off pipe and a control mechanism for said pump mechanism, hydraulically connected with said fresh water take-off pipe and through a reduced passageway with said supply pipe.

10. In a water supply system, a water supply pipe, pump mechanism for supplying water thereto, a check valve in said supply pipe, a fresh water take-off pipe connected with said supply pipe between said pump mechanism and said check valve, a second check valve in said take-off pipe and a control mechanism for said pump mechanism, hydraulically connected with said fresh water take-off pipe between said second check valve and the discharge end thereof and through a reduced passageway with said supply pipe on the side of said first check valve away from said pump mechanism.

11. In a water supply system, a pair of water supply pipes, pump mechanism for supplying water thereto, a control mechanism for automatically rendering said pump mechanism operative and inoperative, said control mechanism being hydraulically connected with both of said supply pipes and check valve means for preventing water from one supply pipe from flowing to said control mechanism through the other supply pipe when said other supply pipe is opened.

12. In a water supply system, a pair of water supply pipes, pump mechanism for supplying water thereto, a control mechanism for automatically rendering said pump mechanism operative and inoperative, said control mechanism being hydraulically connected with both of said supply pipes, one of such connections having a reduced passageway and check valve means for preventing water from one supply pipe from flowing to said control mechanism through the other supply pipe when said other supply pipe is opened.

13. In a water supply system, a pair of water supply pipes, pump mechanism for supplying water and air thereto, a control mechanism for automatically rendering said pump mechanism operative and inoperative, said control mechanism being hydraulically connected with both of said supply pipes and check valve means for preventing water from one supply pipe from flowing to said control mechanism through the other supply pipe when said other supply pipe is opened.

14. In a water supply system, a pair of water supply pipes, pump mechanism for supplying water and air thereto, a control mechanism for automatically rendering said pump mechanism operative and inoperative, said control mechanism being hydraulically connected with both of said supply pipes, one of such connections having a reduced passageway and check valve means for preventing water from one supply pipe from flowing to said control mechanism through the other supply pipe when said other supply pipe is opened.

15. In a water supply system, the combination with a supply pipe, pump mechanism for supplying air and water thereto and a fresh water take-off from the pipe, of a control mechanism for starting and stopping operation of said pump mechanism, said control mechanism being hydraulically connected with the fresh water take-off and hydraulically connected through a reduced passageway with the lower side of said supply pipe.

Des Moines, Iowa, January 27, 1930.

ALBERT PENN.