

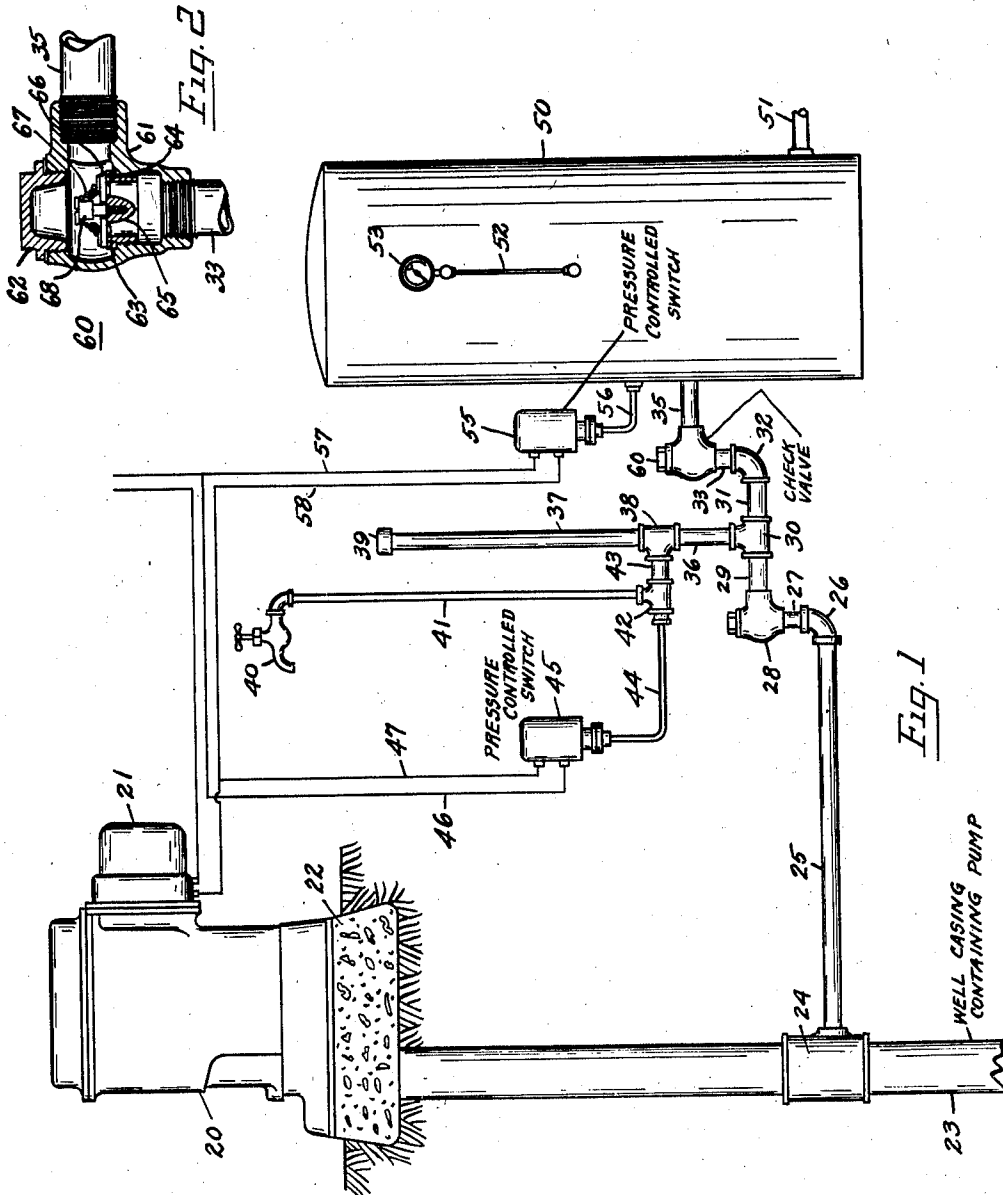
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PUMPING APPARATUS

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UNITED STATES PATENT OFFICE.

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PUMPING APPARATUS.

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To all whom it may concern:

Be it known that I, GEORGE A. BUVINGER, a citizen of the United States of America, residing at Dayton, county of Montgomery, and State of Ohio, have invented certain new and useful Improvements in Pumping Apparatus, of which the following is a full, clear, and exact description.

This invention relates to water supply systems and particularly to the kind of system wherein a power driven pump is automatically started and stopped by a device responsive to pressure in the system.

It is among the objects of the present invention to obtain fresh water from the source of supply whenever desired, while providing also for storing water in a storage tank.

In order to attain these aims, the disclosed embodiment of the present invention provides a water system having a fresh water line for supplying fresh water directly from the well, and means for automatically causing the operation of the pumping mechanism as soon as there is a demand for fresh water and for automatically causing said pumping mechanism to cease operation substantially as soon as the demand for fresh water ceases. The system includes other means which automatically controls the pumping mechanism for supplying water to the storage tank.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing, wherein a preferred embodiment of one form of the invention is clearly disclosed.

In the drawings:

Fig. 1 is a diagrammatic view showing a water system including the present invention.

Fig. 2 is a sectional view of a check valve employed in the present system.

A pump driving mechanism 20, driven by an electric motor 21 mounted directly thereon, is supported on a suitable foundation 22 and is connected with a pump located in the well casing 23 which includes a discharge head 24 located below the surface of the earth. Head 24 is connected with pressure-storage tank 50 by pipe 25, elbow 26, pipe 27, check valve 28, pipe 29, T 30, pipe 31, elbow 32, pipe 33, check valve 60 and pipe 35. Pressure-storage tank 50 is pro-

vided with an outlet 51, water gauge 52 and air pressure gauge 53. A pressure controller switch 55, adapted to close circuit at about 25 pounds and to open circuit at about 50 pounds per square inch, is connected with tank 50 by pressure pipe 56 and with a suitable source of current and motor 21 by wires 57 and 58 respectively.

A pipe 36, secured to T 30, connects with pipe 37 through T 38, the upper end of pipe 37 being closed by a cap 39. A fresh water faucet 40 has connection with the T 38 through pipe 41, T 42 and pipe 43. Pressure controlled switch 45, adjusted to close circuit at about 5 pounds, and to open circuit at about 15 pounds per square inch, is connected with T 42 through pipe 44, and is connected with wires 57 and 58 by wires 46 and 47. Thus the switches 45 and 55 are arranged in parallel. Either one or both together may close to render the motor operative.

Check valve 60 comprises a valve body 61 provided with a threaded plug 62. A valve seat is provided by threaded hollow plug 63 screwed into the valve body 61. This plug 63 is provided with a small notch 64. A bridge 65, extending across the top of plug 63, supports a valve 66 which is pressed against the valve seat by a coil spring 67 which is held in place by a screw 68 which passes through the spring and through the valve 66 and is screwed into the bridge 65.

Check valve 28 is similar to check valve 60, with the exception that valve 28 is not provided with a notch as indicated by 64.

Mode of operation.

To operate the water system, current is supplied from the current source. Assuming there is no pressure within the system, the switches 45 and 55 will operate to close the circuit connections between the source of current and the motor 21 thereby operating it to drive the pump. Water is drawn up through the pipe 23 to the discharge head 24 from whence it is forced through pipe 25, elbow 26, pipe 27, check valve 28, pipe 29, T 30, pipe 31, elbow 32, pipe 33, check valve 60, pipe 35 into tank 50. A part of this water will rise in pipe 36 and through the connections leading to the fresh water faucet 40 and also into the pipe 37 until the pressure of the air in pipe 37 has reached 15 pounds, thus forming an air spring there-

in and causing the circuit connections through the switch 45 to be broken. As the pumping continues and the air pressure between the level of the water and the top of the tank 50 reaches 50 pounds, the switch 55 will operate to break the circuit connections leading to the motor 21, thus causing the pumping operation to cease.

Because pipe 37 is relatively small, when water is drawn from the faucet 40, the pressure within pipe 37 will decrease rapidly to a pressure of about 5 pounds. Then the switch 45 will operate to make circuit to the motor 21, thereby causing the motor 21 to operate the pump driver 20. Water will then be drawn up through casing 23, through discharge head 24, pipe 25, elbow 26, pipe 27, check valve 28, pipe 29, T 30, pipe 36, T 38, pipe 43, T 42 and pipe 41 to the faucet, thus furnishing fresh water direct from the well. Water in excess of what is used at the faucet 40 will be pumped into the tank 50. As soon as the demand for fresh water ceases, the pressure will be almost instantly built up to about 15 pounds in the fresh water line because of the small size of pipe 37. Therefore the pumping will cease almost as soon as the demand for fresh water ceases.

Very little water is stored in the fresh water line and pressure pipe 37, hence fresh water will be supplied in a very short time after a faucet 40 is opened. The check valve 60 prevents any appreciable amount of stale water flowing from the tank 50 to the fresh water line.

In the event water is withdrawn from the tank 50 through the outlet 51 for other purposes and the pressure therein is reduced to 25 pounds, the switch 55 will operate to connect the source of current and the motor 21, thereby causing the motor to operate the pump driver 20 to pump water direct to the tank 50. When the pressure again reaches 50 pounds within the tank 50, the operation of the pump 20 and motor 21 will be discontinued through the automatic operation of the switch 55.

Should the faucet not be entirely closed off, and permitted to drip, it will be appreciated that the pressure within the pipe 37 will gradually decrease until such point as the motor 21 will be caused to operate through the action of pressure switch 45, thus causing useless pumping to take place. This useless pumping becomes an important factor, especially where the system is operated from a storage battery such as that commonly used in connection with isolated house lighting systems of the present day type, tending toward rapid depletion of the battery and requiring more frequent recharging thereof. To overcome this difficulty, the check valve 60 is employed, wherein is provided the notch 64, through which

water may drip slowly from the tank 50 through pipe 35, pipe 33, elbow 32, pipe 31, T 30, pipe 36, T 38 into pipe 37. This dripping will gradually tend to rebuild the pressure within the pipe 37 or compensate for the loss in pressure occasioned by the dripping of the faucet 40, so that unnecessary pumping to furnish water to the fresh water line will be avoided.

It will be noted that stored water and fresh water can be obtained from the system at the same time, without the stored water being delivered to the fresh water faucet. The demand for either kind of water will not interfere with the demand for the other kind, and the satisfying of one demand will not cause the pump to cease operation in case the other demand is not satisfied. For example, if the pressure in tank 50 should fall below 25 pounds and the pump has started to operate, the opening and closing of the fresh water faucet will not cause the pump to cease operation until the pressure in the tank reaches 50 pounds per square inch. If the 50 pound pressure should be reached and fresh water should be demanded at the same time, the pump will not cease operation until the fresh water demand is supplied.

The pressure values 5 to 15 pounds, and 25 to 50 pounds are to be taken as examples and not as limiting the practice of the invention to any particular pressure values. The switch 45 preferably operates at lower pressures than switch 55.

While the form of mechanism herein shown and described constitutes a preferred embodiment of one form of invention, it is to be understood that other forms might be adopted and various changes and alterations made in the shape, size, and proportion of the elements therein without departing from the spirit and scope of the invention.

What is claimed is as follows:

1. In a water system, the combination with a pump; of power means for driving the pump; a storage tank connected with the pump; a fresh water pipe connected to the pump between the tank and pump; means for causing the pump driving mechanism to operate when the pressure in the storage tank falls below a certain amount and to cease operation after a relatively large volume of water has been pumped into the storage tank; and other means for causing the pump driving mechanism to operate substantially as soon as there is demand for water from said fresh water pipe and for causing said mechanism to cease operation substantially as soon as the demand for water ceases regardless of the pressure in the storage tank.

2. In a water system, the combination with a pump; of power means for driving the pump; a relatively large pressure stor-

age tank connected with the pump; a relatively small pressure storage tank connected to the pump between the storage tank and pump and provided with a water outlet; means for automatically causing the pump driving mechanism to cease operation after a relatively large volume of water has been pumped into the storage tank; and other automatic means for causing the pump driving mechanism to operate substantially as soon as there is demand for water from said smaller tank and for causing said mechanism to cease operation substantially as soon as the demand for water ceases, said last means being operative regardless of the pressure in the large storage tank.

3. In a water system, the combination with a pump; of an electric motor for driving the pump; a relatively large pressure storage tank connected with the pump; a relatively small pressure storage tank connected to the pump between the storage tank and pump and provided with a water outlet; an automatic switch for causing the motor to operate when the pressure in the storage tank falls below a certain amount and to cease operation after a relatively large volume of water has been pumped into the storage tank; and another automatic switch arranged in parallel with said first switch for causing the pump driving mechanism to operate substantially as soon as there is demand for water from said smaller tank and for causing said mechanism to cease operation substantially as soon as the demand for water ceases.

4. In a water system, the combination with a pump; of power means for driving the pump; a relatively large pressure storage tank connected with the pump; a relatively small pressure storage tank connected to the pump between the storage tank and pump and provided with a water outlet; means for automatically causing the pump driving mechanism to cease operation when a predetermined high pressure exists within the storage tank; and other means for automatically causing the pump driving mechanism to operate and cease operation when predetermined low and high pressure values exist respectively within the smaller tank, said last means being operative regardless of the pressure in said high pressure storage tank.

5. In a water system, the combination with a pump; of power means for driving the pump; a storage tank connected with the pump; a fresh water pipe having a faucet

connected to the pump between the tank and pump; means for causing the pump driving mechanism to operate when the pressure in the storage tank falls below a certain amount and to cease operation after a relatively large volume of water has been pumped into the storage tank; other means for causing the pump driving mechanism to operate substantially as soon as there is demand for water from said fresh water outlet pipe and for causing said mechanism to cease operation substantially as soon as the demand for water ceases regardless of the pressure in said storage tank; and means for permitting a limited amount of water to flow from said storage tank into said water outlet pipe to compensate for losses in pressure therein caused by a drip at said faucet.

6. In a water system, the combination with a pump; of power means for driving the pump; a storage tank connected with the pump and adapted to receive water from said pump and store said water under pressure; a fresh water pipe connected to the pump between the tank and pump; and means for rendering the pump driving mechanism inoperative when the pressure in said tank attains a certain value and for causing the pump driving mechanism to operate substantially as soon as there is a demand for water from said fresh water pipe and for causing said mechanism to cease operation substantially as soon as the demand for water in said pipe ceases regardless of the pressure in the storage tank.

7. In a water system, the combination with a pump; of power means for driving the pump; a storage tank connected with the pump and adapted to receive water from said pump and store said water under pressure; a fresh water pipe connected to the pump between the tank and pump; and means for causing the pump driving mechanism to operate substantially as soon as there is a demand for water from said fresh water pipe and for causing said mechanism to cease operation as soon as the demand for water ceases, said means being responsive to the pressure in said fresh water pipe and operative regardless of the pressure in the storage tank.

In testimony whereof I hereto affix my signature.

GEORGE A. BUVINGER.

Witnesses:

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WARREN SCHMIEDING.