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WELL PUMPING DEVICES

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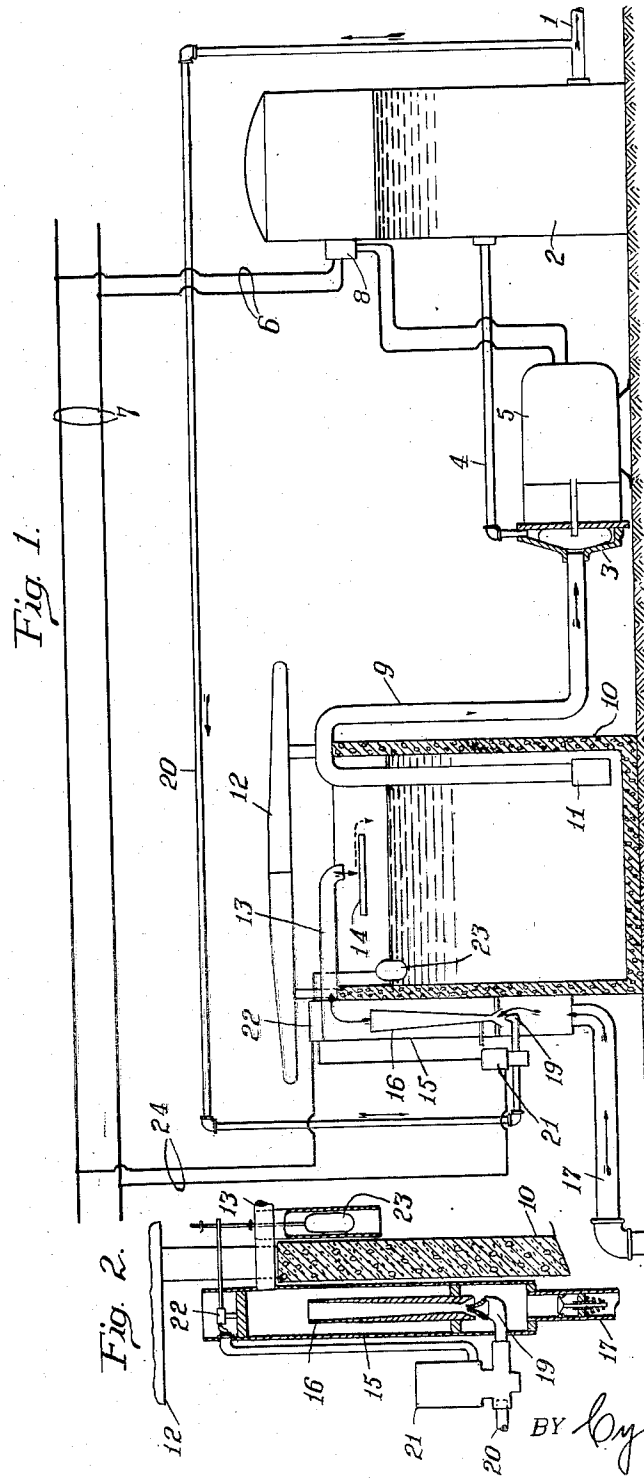


Fig. 1.

Fig. 2.

INVENTOR

H. H. Morgan

BY Cyprus Nicholas & Lawrence

ATTORNEYS

United States Patent Office

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WELL PUMPING DEVICES

Hilton H. Morgan, Sarasota, Fla.

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This invention relates to improvements in well pumping devices of the character used for pumping water out of a well in the ground and supplying the water to a household pressure system.

When the water in a well contains sulphur or other gases, these are objectionable in the household water system because of the odor thereof and discoloration resulting from the use of such water in the plumbing system, basins, etc. It has been the practice, heretofore, to aerate such water as it is pumped from the well so as to allow the separation and removal of the gases.

The system used for aerating the water and pumping it from the well to the household pressure system has required the use of two pumps, one of which pumps water from the well into the aerator and a separate pump to supply the water from the aerator to the pressure system. Such an arrangement, with separate power operated pumps for the respective purposes, not only is expensive to construct and maintain and operate, but it is difficult to control the relative functions of the pumps, and such a system does not always function satisfactorily or automatically.

One object in this invention is to overcome the objections to well pumping systems used heretofore as noted above.

Another object of the invention is to simplify and improve the construction and manner of operation of well pumping systems of this type to provide for the operation thereof by means of a single pump as distinguished from two pumps used heretofore.

Still another object of the invention is to improve the manner of controlling the system, both as to the filling of the aerator and as to the supply of water therefrom to the household or pressure system.

According to this invention, a jet is used for drawing the water from the well which is supplied and operated by a column of liquid taken from the household pressure system, and discharges in to the aerator. The water is withdrawn from the latter by the pump and supplied to the pressure system. An electrical control on the pressure side of the jet functions in response to the liquid level in the aerator to withdraw water from the well whenever the aerator becomes low in quantity.

One embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a diagrammatic view of the well pumping system as an illustration of this invention, and Fig. 2 is a detailed sectional view of the jet and controls therefor on somewhat larger scale.

The invention is shown as adapted to supply water to a household water pressure system generally designated by the numeral **1** from a pressure tank **2**. This tank **2** contains a body of water maintained under pressure so as to discharge through the line **1** whenever the latter is opened at any valve connected therewith.

Water is supplied to the pressure tank **2** by a pump **3** through a pipe **4** extending from the pump to the tank **2**. The pump **3** is shown as operated by an electric

motor **5** supplied with current through wires **6** that are connected with the electric power line **7**. The electric current, including the wires **6**, is controlled by a pressure switch **8** mounted in a side of the pressure tank **2** and operating automatically in response to the pressure therein. The switch **8** is constructed to close the electric circuit **6** to the motor **5** whenever the pressure falls to the said low point. Most tanks operate on a pressure from twenty to forty pounds, in which event the switch **8** would close the circuit to the motor **5** when the pressure falls to twenty pounds and would open the circuit to stop the operation of the motor and the pump when the pressure in the tank reaches forty pounds. The setting of these pressures may be varied as desired.

The pump **3** has a suction line **9** connected therewith and leading into an aerated tank **10**, preferably to a point near the bottom of the latter where a foot valve **11** is provided on the lower end of the suction line **9** to permit the withdrawal of water from the aerated tank **10** by the operation of the pump **3**. The suction line **9** is shown as extending over the upper edge of the tank **10**, although it may be connected in any suitable manner therewith as desired.

The aerated tank **10** is shown as a receptacle having an open top on which a cover **12** is supported in upwardly spaced relation from the top of the tank to permit freedom of circulation of air through the upper portion of the latter for aerating the water in the tank and the discharge therefrom of obnoxious gases.

The water is supplied to the tank **10** through a filler pipe **13** that extends inwardly substantially to the center of the tank and has a down-turned open end over a deflector plate **14** mounted in the tank **10**, onto which the water is discharged at a point above the liquid level in the tank so as to facilitate the aeration of the water and the discharge of the obnoxious gases therefrom.

The filler pipe **13** extends inwardly from a jet column **15** shown as mounted externally of the tank **10** and having a jet tube **16** mounted therein and extending upwardly in the column **15**.

The lower end of the jet column **15** is connected with a well pipe **17** that extends downwardly in the well to a point below the water level therein and usually has a foot valve **18** mounted on the lower end of said pipe **17**. Any suitable well structure may be used as desired for supplying water to the pumping system and is not illustrated in detail.

A jet is shown at **19** at the lower end of the jet tube **16** in cooperating relation with the latter to direct a jet fluid upwardly from the jet tube under pressure sufficient to cause a liquid flow through the column **15** and into the filler pipe **13**, thereby withdrawing water from the well through the pipe **17**. The jet **19** is shown as operated by water pressure, having a water line **20** connected therewith and extending thereto from the main pressure line **1** of the household system.

The flow of water through the line **20** to the jet **19** is controlled by an electrically operated valve **21**, such as a solenoid valve, controlled by a switch **22** mounted at the upper end of the jet column **15**. The switch **22** preferably is controlled by a float **23** in the aerated tank **10** in response to the liquid level in the latter. The valve **21** and switch **22** are shown as connected in an electric power circuit generally indicated at **24** that extends from the power line **7**.

The operation of this system will be evident from the foregoing description. After the water system is installed, the aerator must first be filled to the desired water level therein, preferably more than half full, before the operation is started. After the first filling of the aerator, the pump may be primed and the cycle will then function automatically.

The pressure in the tank **2** being below the minimum set point, the switch **8** will be closed, thereby closing the circuit **6** to the motor **5** and operating the latter as well as the pump **3**. The pump **3** withdraws water through the suction line **9** from the aerator tank **10** and forces it through the pipe **4** into the pressure tank **2**, thence to the house line **1**. This will continue until the pressure in the tank **2** reaches the maximum set point when the switch **8** will be opened by the pressure in the tank, thereby opening the circuit **6** to the motor and stopping the latter and the pump.

As water is withdrawn from the tank **10**, the water level therein will be lowered. This lowering of the water level causes the float **23** to close the switch **22**, thereby closing the circuit **24** to the electrically operated valve **21**, thus opening the valve. This allows the column of water under pressure in the line **20** to be discharged through the jet **19** into the jet tube **16** in the form of an injector. This injector acts to lift water from the well through the pipe **17** and the injector tube **15**, discharging therefrom through the filler pipe **13** into the tank **10**. This cycle continues until the float **23** rises sufficiently to open the switch **22** and thereby closing the valve **21**.

So long as the water level in the tank **10** is maintained within the desired range, the injector **15—19** will remain inoperative, but as soon as the water level lowers sufficiently, the injector will function to withdraw water from the well into the aerator to maintain a sufficient quantity therein. This injector functions in response to the pressure built up by the single pump **3** and therefore does not require a separate pump for its operation. The pump operates also automatically in response to the pressure in the tank **2**, being turned on or off automatically as the pressure varies within the desired range. This cycle continues to maintain a full supply of aerated water at all times.

The invention has been illustrated and described in one embodiment, although it is realized that variations and changes may be made therein without departing from the invention as set forth in the claims.

I claim:

1. In a well pumping system, the combination of a water storage tank enclosing a body of water with air under pressure over the water and having a discharge pipe leading therefrom, an aerating tank, a pump having conduit means connected therewith and with the storage and aerating tanks for withdrawing water from the aerating tank and discharging said water into the storage tank, a well pipe adapted to be submerged in a well and extending therefrom to the aerating tank, an injector device connected with the well pipe, a pipe connection into the system below the water level in the storage tank and directly therefrom to the injector device and acting in response to the withdrawal of water from the storage tank to cause a withdrawal of water from the well into the aerating tank, and means connected with the aerating tank and responsive to the liquid level therein for controlling said injector device to fill the aerating tank to a predetermined extent.

2. In a well pumping system, the combination of a water storage tank enclosing a body of water with air under pressure over the water and having a discharge pipe leading therefrom below the water level therein, an aerating tank, a pump having conduit means connected therewith and with the storage and aerating tanks for withdrawing water from the aerating tank and discharging said water into the storage tank, a well pipe adapted to be submerged in a well and extending therefrom to the aerating tank, an injector device connected with the well pipe, a pipe connection from the system below the water level in the storage tank directly to the injector device and acting in response to the withdrawal of water from the storage tank to cause a withdrawal of water from the well into the aerating tank, and means operative in response to the level of liquid in the aerating tank for controlling the action of the injector device.

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