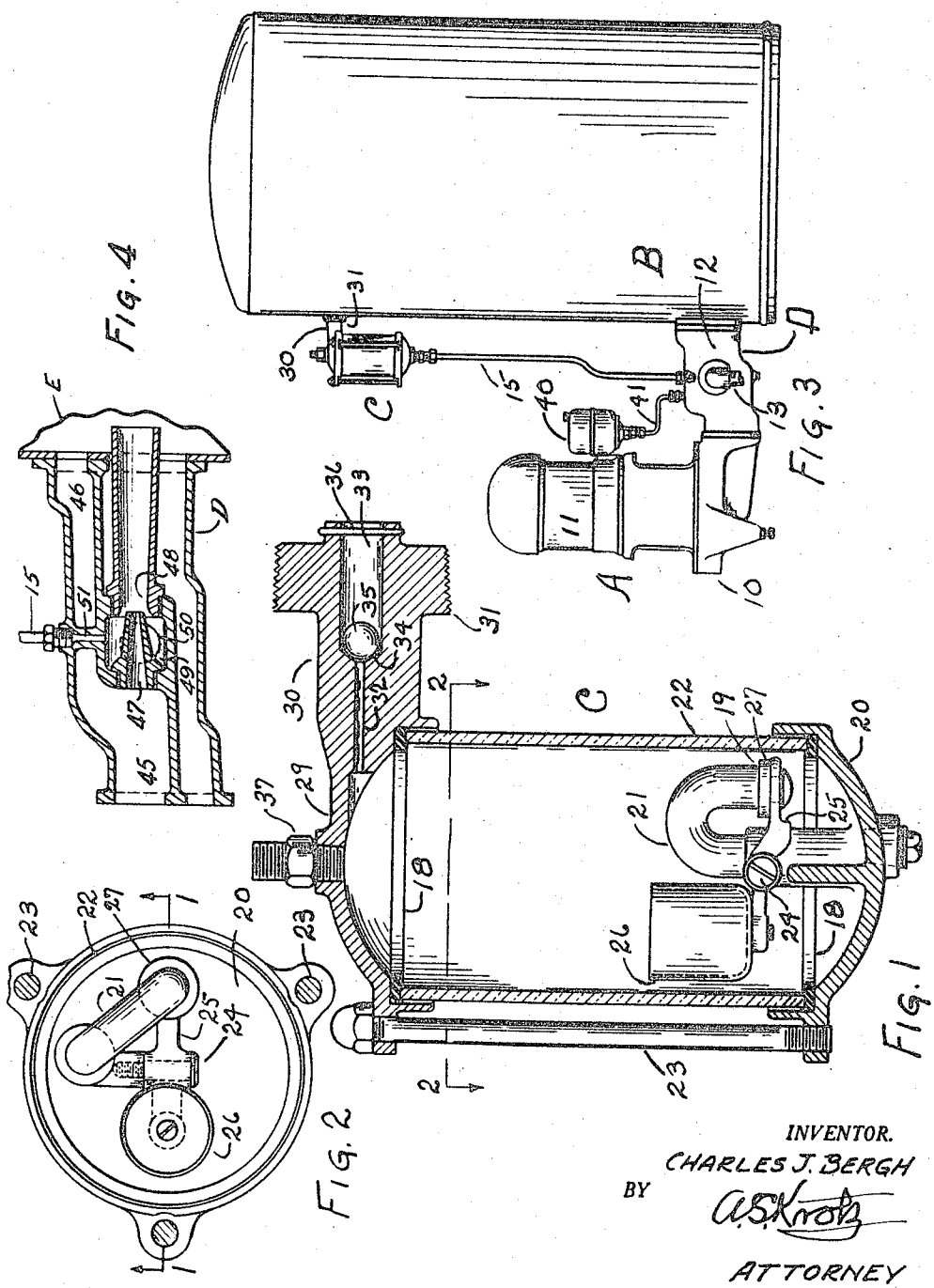
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AIR CHARGER FOR JET PUMPS

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AIR CHARGER FOR JET PUMPS

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The present invention relates to a device used in connection with deep and shallow well jet pumps, for maintaining a predetermined water level in the pressure tank.

It will be understood that jet pumps are always positioned a distance above the water level, therefore they must, when operating, create a considerable vacuum to lift the water from the well. Pumps of the character when not supplied with priming water, do not create a vacuum; therefore every time the pump is started it must be full of water in order to function.

The object of the present invention is to maintain a predetermined water level in the pressure tank. This requires a supply of air from time to time, otherwise the tank would become waterlogged. In order to maintain a desired water level in the pressure tank, the air charger must at times cause a quantity of air to flow into the pressure tank.

One of the novel features of my invention is the manner of controlling the drain valve. I provide preferably a metal cup which is open at its top having preferably a lever connection to the valve and a weight associated therewith which when the cup is not submerged in water, the valve will be closed by the weight of water in the cup and whereby the valve will be opened when the cup is submerged, thus to operate the valve more definitely than would be possible with the use of a common float controlled valve.

To these and other useful ends my invention consists of parts, combinations of parts, or their equivalents and mode of operation as hereinafter described and claimed and shown in the accompanying drawings in which:

Fig. 1 is a transverse sectional view of my improved charger taken on line 1—1 of Figure 2.

Fig. 2 is a view of my device taken on line 2—2 of Figure 1.

Fig. 3 is an elevational view showing a pump installation for shallow wells, equipped with my improved charger.

Fig. 4 is a vertical section through the center of member D.

As thus illustrated the pump and motor assembly in their entireties are designated by reference character A; the pressure tank in its entirety is designated by reference character B; the air charger in its entirety is designated by reference

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character C; and the injector in its entirety is designated by reference character D; a pump 10 whose shaft is vertically arranged, is supplied with an electric motor 11. Injector 12 of the installation forms an operating connection between the pump 10 and tank B. In installations of the kind the injector is preferably positioned as shown.

In deep wells the pumps are positioned sufficiently below the ground level so the water pressure supplied to the injector will create sufficient vacuum to cause the water to flow into the injector, in either event the injector is designed so a portion of the water pumped is used for operating the injector and the surplus not so used in discharged into the pressure tank.

A flow port is supplied to the suction side of the injector and because of the operation of my air charger there is always water enough in the tank to keep the pump filled and ready to operate immediately the motor is started.

In Figure 3 I illustrate a shallow well installation wherein the injector is positioned between the pump and pressure tank. In my device the water may be discharged directly into the bottom of the tank from the injector and a portion of this water flows back into the pump for operating the nozzle of the injector, the suction side of which is connected to the well pipe 13. It may therefore be said that the suction side of the pump 10 is connected to the bottom of the tank. Thus all of the water discharged by the venturi enters the tank and part of this discharged water flows back into the suction side of the pump.

My improved air charger C is connected to the injector housing by means of pipe 15 and to the tank by means of a valve member 30, which is positioned on the general water level of the tank and is constructed as follows:

Pipe 15 is connected directly to the suction chamber of the injector as illustrated in my copending application Serial #581,876, filed March 9, 1945. Members B and D are similar to members D and E in this copending application.

I provide a base 20 and a cap 29 between which is held the glass tube 22 by means of a number of bolts 23. Gaskets 18 form a sealing means between the ends of the glass tube and the base and cap. Member 20 is provided with a loop 21 to the bottom of which pipe 15 is connected, the

loop end being machine finished as at 19. I provide a pivot bolt 24 which hingedly supports a lever 25.

On the left end of lever 25 I preferably attach an open top metal cup 26 and at the other end of this lever I detachably mount a rubber valve member 27, the top of which acts as a valve to close loop 21 as at 19. It will be seen that the weight of cup 26 when filled with water and not submerged, will hold valve member 27 snugly against surface 19 so as to close the opening; if however member 26 is submerged in water it will not be heavy enough to hold the valve closed, because of the weight of member 27 and the weight of the valve end of the lever 25. It will be understood that cup 26 is made from very thin material. Thus when the water level is low or near the bottom of cup 26 the valve will be held closed and when the water level is above cup 26 the valve will be open.

Member 29 is provided with a projection 30 which is screw threaded into tank B as at 31. A passageway 32 is provided in member 30 having an enlarged opening 33 forming a seat 34 for a ball 35, the ball being held from leaving opening 33 by means of a cotter pin 36. In the top of member 29 I provide a fitting 37 to which is attached preferably an inner tube type air valve (not shown), this valve being adapted to permit air to flow into member C when there is a partial vacuum in this member.

Referring now to Fig. 4, 45 designates the pressure side of the injector which leads from the outlet of the pump, a duct 46 leads to the pressure tank from inlet 45 and a nozzle 47 receives pressure from inlet 45 and discharges a jet of water into the venturi 48. Thus, it will be seen that 49 is a vacuum chamber having an inlet 50 for a pipe connection into the well. Pipe 15 has an opening 51 which leads to the vacuum chamber.

Member 30 is connected to pressure tank B at about the general water level in the tank and unless ball 35 is held against seat 34 by a vacuum in member C and the water level is above passageway 32, water will flow into member C. When the water level in member C is high enough to permit valve 27 to open, then when the pump starts, because of connection 15 to the suction side of the pump, water will be drawn out of member C, and a partial vacuum created in this member which will move ball 35 on its seat and lift the valve on member 37 and permit member C to fill with air until valve 27 is again closed. Due to equalized pressure between tank B and member C, ball 35 will open allowing compressed air in member C to flow through passageway 32 into tank B.

Thus it will be seen that every time the pump operates member C will be drained of surplus water and more or less air will be drawn into this member and eventually flow into the pressure tank. Member C will therefore operate to maintain a predetermined water level in the pressure tank by adding air.

The operation of applicant's device is, it will be seen, dependent upon the pump operating on the on and off principle. I therefore supply a motor controlling switch 40 having a pipe connection 41 to the duct leading to pressure tank B. Number 40 is designed so the motor will be caused to operate when the pressure in the pressure tank is below normal and whereby when the pressure in the pressure tank is above normal the motor will be disconnected or discontinue to operate.

Clearly my improved charger will not permit the pressure tank to become air bound due to the fact that when the water level is low enough to uncover valve 35, air will pass from the tank to the charger and no vacuum will be created in the charger, therefore no air from the atmosphere will then pass into the charger when the pump operates, and when the water in the pressure tank is again normal operation will again be normal.

It will be understood that I have shown the preferred embodiment of my invention and therefore that many minor detail changes may be made without departing from the spirit and scope of my invention as recited in the appended claims.

I claim:

1. A device of the character described, comprising a pressure tank, a pump having a driving motor and an injector associated with said pump adapted to discharge water into the tank, an air charger having at its top a valved connection to the tank at substantially the normal water level in the tank, an air inlet check valve in the top of the charger, the valve in said tank connection adapted to close under the action of a vacuum in the air charger, a drain valve near the bottom of the air charger, a lever operatively connected at one end to said drain valve having a pivotal support intermediate its ends and having an open top cup secured to the other end and means whereby when the cup is not submerged the valve will be closed and when the cup is submerged the valve will be opened, an operating connection from said valve to the suction side of said injector, means whereby normal pressure in the tank is maintained on the on and off principle and air or water may pass from the tank into the charger when the pump is standing, and whereby air from the atmosphere will pass into the charger and surplus water in the charger will pass into the suction side of the injector when the pump is operating.

2. A device of the character described comprising, a pump and a motor for driving the same, a pressure tank, an injector having an operating connection from the outlet of said pump, said injector having a suction chamber with an outlet into said tank and an inlet from a well pipe, means forming an operating connection between said tank and motor adapted to maintain a predetermined pressure in the tank on the on and off principle, an air charger having a valve in its bottom and a float associated therewith and a connection to said suction chamber adapted to cause the valve to permit surplus water in the charger to flow into said suction chamber when the pump is operating, a connection between the top of said air charger to the tank at substantially the normal water level in the tank and having a valve adapted to prevent flow from the tank into the charger when the pump is operating, another valve in the top of said charger adapted to permit outside air to flow into the charger when the pump is operating.

3. A device as recited in claim 2 including, the connection between said valve and float comprising a lever pivotally mounted intermediate its ends, the seat of said valve comprising the end of a downwardly turned pipe, said valve comprising a rubber or the like disc which lies on the top of the lever and having a stem with a flange at its bottom, an opening in said lever adapted to receive said stem and flange, the flange act-

ing as a means for holding the valve on the lever, means on the valve end of said lever adapted to more than balance the weight of the float when submerged and whereby the weight of the float when not submerged will close the valve, said float comprising an open top cup whereby the float when submerged will not be buoyant and will have considerable weight when not submerged.

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