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MEANS FOR PRIMING LIQUID PUMPS

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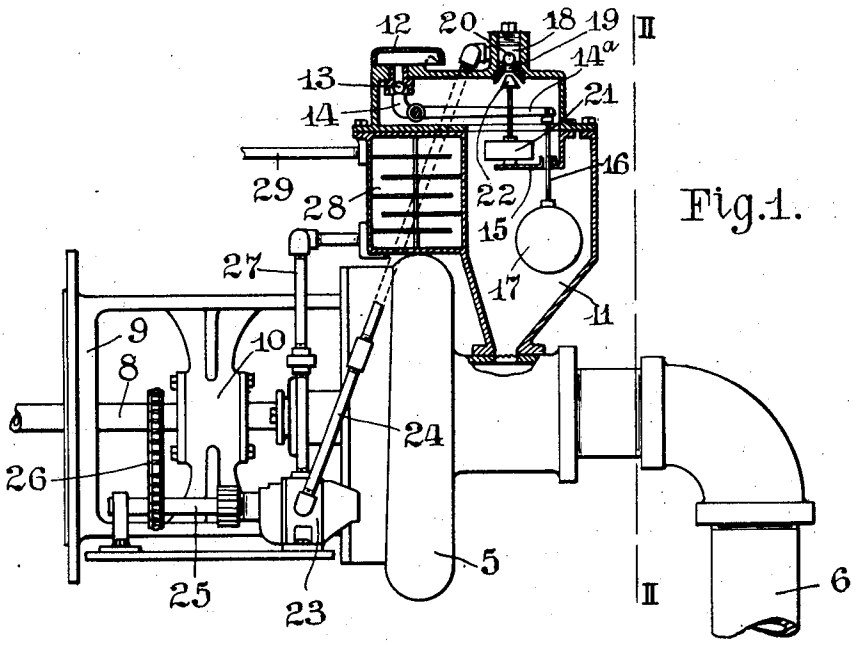


Fig.1.

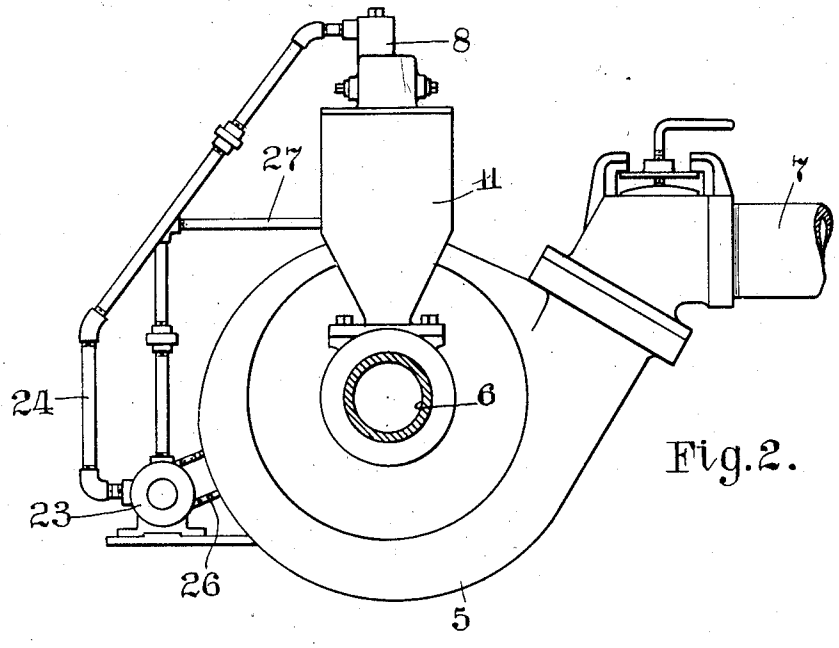


Fig.2.

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UNITED STATES PATENT OFFICE

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MEANS FOR PRIMING LIQUID PUMPS

Application filed September 13, 1930. Serial No. 481,746.

In self-priming centrifugal pumps in which the priming action depends upon the creation of a vacuum in the suction line, it is very desirable to prevent water from being drawn through into the vacuum pump. This is especially true if the water to be pumped contains mud and grit, it being obvious that the vacuum pump would be quickly ruined if muddy water were drawn into it. With a view to preventing water from being drawn into the vacuum pump and thus damaging the latter, a float is commonly provided in the priming chamber, said float actuating an air inlet to balance the vacuum.

I have found that in ditch pumping, a float and all parts in the lower section eventually become coated with a heavy layer of mud and silt so that the float does not function with certainty. Considerable time may be required to bring about this effect, but when the float is finally loaded with a sufficient amount of dirt, or from any other cause, the float loses its buoyancy and fails to rise and liberate the air valve to balance the vacuum, the result being that the vacuum pump draws the muddy water into itself and in a short time the pump is ruined.

Accordingly I provide an independent secondary float that, under ordinary conditions, is above the water level attained in the float main chamber, where it normally remains inactive, but which operates upon the failure of the primary float to neutralize the suction of the priming pump, with the result that dirty water cannot be drawn into that pump.

An example of the improvement is shown in the accompanying drawing and set forth in the following description.

In said drawing—

Figure 1 illustrates in side elevation, with parts in vertical section, a self priming pump according to the invention.

Fig. 2 is an elevational and sectional view from the line II—II of Fig. 1 looking to the left.

In the views 5 designates the main pump impeller chamber, 6 the intake, and 7 the discharge. The impeller which is of any suitable or ordinary form is driven by an extension shaft 8 coupled to the motor shaft, said extension shaft being journaled in a frame 9 attached to one side of the impeller chamber. By providing the bearing 10 for the extension shaft 8 in the frame 9 much difficulty in aligning shaft parts is avoided.

11 designates a vacuumizing or float chamber, it communicating with the intake by a screened opening. In the top of the chamber 11 is a hooded air inlet 12 containing a ball valve 13 supported by the short arm 14 of a lever, the longer arm 14^a of said lever with its pivotally connected float 17 being heavier and adapted to keep said air inlet normally closed.

Extended through an opening in a bracket 15 is the stem 16 of the float 17 that, when raised by an excess of water in the chamber 11 lifts the longer arm 14^a of the lever and lowers the short arm 14, thereby releasing the valve 13 permitting the entrance of air to balance the vacuum.

In the top of the vacuum chamber there is also a small chamber 18 having a port 19 on the upper end of which is a ball check valve 20. Normally resting on the bracket 15 is an auxiliary float 21 carrying at the upper end of its stem a valve 22.

23 designates a vacuum pump having its suction side connected by a pipe 24 with the chamber 18 above the check valve 20 so that the vacuum pump can exhaust the air from the chamber 11 raise the water in the suction pipe 6 and chamber 11 so as to prime the main pump chamber. The vacuum pump shaft 25 is driven by a sprocket chain 26 from the motor shaft 8. The vacuum pump 23 runs in oil, which becomes quite hot, and the oil is entrained by the air through pipe 27 into a baffle chamber 28. Said baffle chamber is preferably built integrally but not communicatingly with the vacuum chamber 11 so that the oil may be cooled by the water drawn into said chamber 11. The baffles in chamber 28 promote the separation of the air from the oil, the air discharging through pipe 29 and the oil returning by gravity to the vacuum pump through the line 27, the latter being connected with the lower end of the baffle or separating and cooling chamber.

The invention is especially useful in ditch pumping where the water is shallow and the vacuum frequently broken.

In practice the vacuum pump works constantly with the operation of the main pump. When the water drawn into the chamber 11 rises above the normal position of the float the float rises and causes the depression of the arm 14 and therefore admits air to balance the vacuum. If, from any cause, the operation just described does not take place, rising water elevates the auxiliary float 21, thereby closing the port 19 and preventing further vacuumization of the chamber 11 and any flow of water into the vacuum pump.

The forms of the parts can be changed without departing from the gist of the invention as claimed.

This application is a continuation, in part, of applicant's application filed Dec. 21, 1929, Ser. No. 415,835.

What I claim is:

1. Means for priming a liquid pump including a main vacuumizing or float chamber connected with the suction line of the pump, a supplemental chamber having a suction port communicatingly connecting said supplemental chamber with the main chamber and containing a gravity-actuated check valve at its outer end to normally close said port, a vacuum pump connected with said suction port for vacuumizing said main chamber, a vacuum-equalizing air inlet to said main chamber, a valve for the inner end of said inlet, a lever having one arm supporting said valve normally in closing position, and a float for actuating the other arm of said lever to release said valve when the water in the vacuum chamber reaches a predetermined level.

2. Means for priming a liquid pump including a main vacuumizing or float chamber connected with the suction line of the pump, a supplemental chamber having a suction port communicatingly connecting said supplemental chamber with the main chamber and containing a check valve at its outer end to normally close said port, a vacuum pump connected with said suction port for vacuumizing said main chamber, a vacuum equalizing air inlet, a valve for the inner end of said inlet, a lever having one arm supporting said valve normally in closing position, and a float for actuating the other arm of said lever to release said valve and admit air to the vacuumizing chamber when the water in the vacuum chamber reaches a predetermined level and a float and a valve actuated thereby located above the normal level of the water in the float chamber to close the valve port of the supplemental chamber in the event said lever-actuating float fails to function.

3. Means for priming a liquid pump including a float chamber connected with the main pump chamber, an oil and air separating chamber containing baffle means, said chamber contiguous with the float chamber, a vacuumizing pump for the float chamber operating in oil and having its oil line at the exhaust of the vacuumizing pump communicating with said oil and air separating chamber whereby air is separated from the oil and the oil cooled by the liquid of the float chamber.

4. Means for priming a liquid pump including a float chamber connected with the pump chamber to discharge by gravity thereinto, said float chamber having an air inlet and a valve for closing the same, a main float for actuating said valve to open said inlet when the liquid in the float chamber reaches a predetermined normal level, and an auxiliary and normally unactuated float in said float chamber located above the normal level of the liquid in said chamber to actuate the valve to admit air when the liquid level therein exceeds said predetermined normal level.

In testimony whereof I affix my signature.

ARTHUR C. SAXE.