

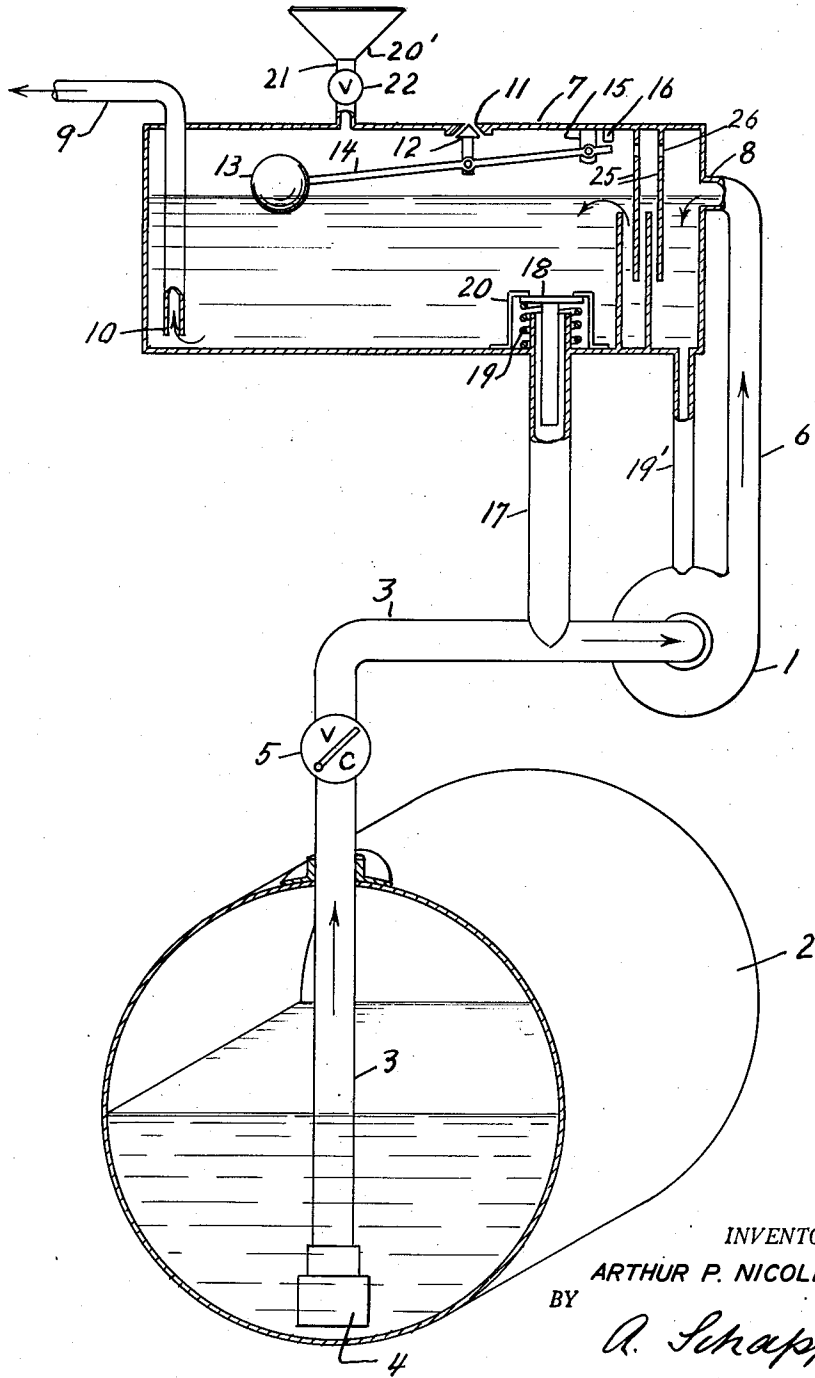
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FLUID PRIMER AND AIR ELIMINATOR

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FLUID PRIMER AND AIR ELIMINATOR

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4 Claims. (Cl. 103-113)

1

The present invention relates to improvements in a fluid primer and air eliminator, and its principal object is to provide a device of the character described which, when attached to a pump, will automatically prime the same and will cooperate with the pump in removing air from the suction side thereof.

More particularly it is proposed to provide a device of the character described which is adapted for connection into the discharge conduit of the pump in such a manner as to maintain a reservoir of liquid over the pump.

Another object of my invention is to provide means whereby liquid is automatically fed from this reservoir toward the pump for priming the latter and for replacing any air that may have collected on the suction side of the pump.

It is still further proposed in the present invention to provide means whereby air discharged by the pump into the reservoir may be made to escape into the atmosphere.

And finally, I propose to provide an automatic control valve between the reservoir and the suction line of the pump, made to be normally open and to remain open whenever the pump operates on air or gas, while the said valve is closed automatically when the pump operates on liquid.

Further objects and advantages of my invention will appear as the specification proceeds, and the novel features of my arrangement will be fully defined in the claims hereto attached.

The preferred form of my invention is illustrated in the accompanying drawing, forming part of this application, the one figure of which shows a vertical section through the main portion of the invention, parts being shown in elevation.

While I have shown only the preferred form of the invention, it should be understood that various changes or modifications may be made within the scope of the claims hereto attached without departing from the spirit of the invention.

Referring to the drawing in detail, the rotary pump 1 is shown as drawing on a large tank 2, which may be an underground tank as used in service stations. The suction line 3 extends into the tank to a place near the bottom thereof, where it is provided with a foot-valve 4. Above the tank, or at any convenient point between the tank and the pump, I provide a check valve 5.

The pump discharges through a conduit 6 into a chamber 7 of suitable proportions, the conduit entering the chamber at a point elevated above the bottom of the chamber, say, about two-thirds up, as shown at 8.

2

Discharge from the chamber takes place through a pipe 9 which extends into the chamber to a point near the bottom thereof, as at 10.

Air is discharged, or allowed to escape from the chamber, through a hole 11 in the top thereof, the hole being controlled by a valve 12, which in turn is controlled by a float 13 at the end of a rod 14 pivoted in a bracket 15 suspended from the top of the chamber. A stop 16 limits the downward movement of the float.

The chamber 7 communicates with the suction conduit 3 through a pipe 17, which projects into the chamber through a short distance, and which enters the suction conduit near the pump, or between the check valve 5 and the pump.

The pipe 17 is controlled by a valve 18, which latter is urged into open position by a spring 19, a pair of stops 20 limiting the upward movement thereof.

The valve 18 is normally open, but will be closed by the suction of the passing liquid as long as the pump operates on a compact body of liquid. If, however, the liquid becomes static, due to the presence of air in the pump, the valve 18 opens automatically and feeds liquid to the pump.

A short pipe 19' establishes the connection between the highest point in the pump, and the bottom of the chamber 7, to allow air to escape from the pump housing.

Liquid may be fed into the chamber 7 from above through a funnel 20' and the pipe 21, which latter may be closed by a valve 22.

In operation, the chamber 7 may first be filled to the proper height with a priming liquid through the funnel 20. Valve 18 being normally open, the liquid will spread, through pipe 17, into the suction pipe 3, down to the check valve 5, and also, through pipes 17 and 19', into the pump 1.

In the simple form shown, this priming liquid will drive out the air from the suction pipe, above valve 5, and also from the pump, and this air is free to escape from the chamber 7 through the port 11. After the chamber has been filled to a suitable height, substantially as shown in the drawing, the valve 22 is closed.

While in the arrangement shown, probably all of the air has been eliminated above the check valve 5, in more complicated installations, there might be some air pockets which the descending liquid could not crowd out.

If now, the pump is started, and there are some air pockets in the liquid line above valve 5, the pump will draw out the air with the liquid and discharge the same into chamber 7 for escape through port 11.

3

While the air passes through the pump it may arrest liquid flow temporarily; but whenever this happens, valve 18 opens automatically and causes liquid to flow toward the pump, until the latter is filled with liquid again.

After all the air has been removed from the suction line above the check valve 5, the suction of the pump draws on the lower end of pipe 3. Some air will probably be contained in this pipe, and in passing through the pump, may temporarily arrest the flow of liquid. But here again, as soon as suction of the pump on valve 18 ceases, the latter will open and again feed liquid into the suction line.

After all the air has been exhausted from the entire suction line, the pump will continue to operate on a compact body of liquid and the suction of the pump keeps valve 18 closed.

Any supply of liquid withdrawn through valve 18 will be immediately compensated for by the pump discharging into the chamber, so that a suitable supply is always available, even after the pump has been stopped.

Thus, after the pump has been primed manually, no further manual priming will be necessary in the normal use of the pump, since the latter itself keeps re-filling the priming chamber.

A series of baffles 25 may be interposed in the chamber between the receiving point 8 and the valve 18 to create a more or less quiescent zone in the major part of the chamber, the upper baffles being suitably apertured, as at 26, to allow air to escape toward the hole 11.

I claim:

1. A primer and air eliminator for a pump having an intake pipe, a check valve for trapping a supply of liquid in the intake pipe, and a discharge conduit having a chamber connected into the said conduit to form a reservoir adapted for retaining a body of liquid during inactive pump periods, a by-pass gravity feed tube between the chamber and the intake pipe adapted to prime and feed the pump for entraining air and for discharge of the air-laden liquid back into the chamber in a circulatory path, an air outlet for the chamber separate from the discharge conduit and permitting said air to escape, a valve in the by-pass tube operable by the suction of the pump for closing when air has been eliminated from the intake, whereby the liquid level in the chamber is raised, and a float control responsive to the rising liquid level for closing the air outlet, the by-pass feed tube extending above the bottom of the chamber to maintain a desired level in the latter.

2. A primer and air eliminator for a pump having an intake pipe, a check valve for trapping a supply of liquid in the intake pipe, and a discharge conduit having a chamber connected into the said conduit to form a reservoir adapted for

4

retaining a body of liquid during inactive pump periods, a by-pass gravity feed tube between the chamber and the intake pipe adapted to prime and feed the pump for entraining air and for discharge of the air-laden liquid back into the chamber in a circulatory path, an air outlet for the chamber separate from the discharge conduit and permitting said air to escape, a valve in the by-pass tube operable by the suction of the pump for closing when air has been eliminated from the intake, whereby the liquid level in the chamber is raised, and a float control responsive to the rising liquid level for closing the air outlet, the by-pass feed tube extending above the bottom of the chamber to maintain a desired level in the latter, and the discharge conduit being made to discharge from the chamber at a point below said level.

3. A primer and air eliminator for a pump having an intake pipe, a check valve for trapping a supply of liquid in the intake pipe, and a discharge conduit having a chamber connected into the said conduit to form a reservoir adapted for retaining a body of liquid during inactive pump periods, a by-pass gravity feed tube between the chamber and the intake pipe adapted to prime and feed the pump for entraining air and for discharge of the air laden liquid back into the chamber in a circulatory path, and a valve in the by-pass tube operable by the suction of the pump for closing when air has been eliminated from the intake, the by-pass feed tube extending above the bottom of the chamber to maintain a desired level in the latter.

4. A primer and air eliminator as defined in claim 3, in which the chamber has controlled means allowing the air to escape and in which the discharge conduit is made to discharge from the chamber at a point below said level.

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