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[54] **LIQUID SUPPLY SYSTEM WITH MOTOR OPERATED PUMP ACTUATED BY SWITCH CONTROLLED BY ON-OFF VALVE IN SYSTEM**

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[51] **Int. Cl.**.....**E03b 11/16**

[58] **Field of Search**.....137/335, 344, 330, 565; 251/304, 309; 417/1, 12, 15, 305, 279; 200/61.86

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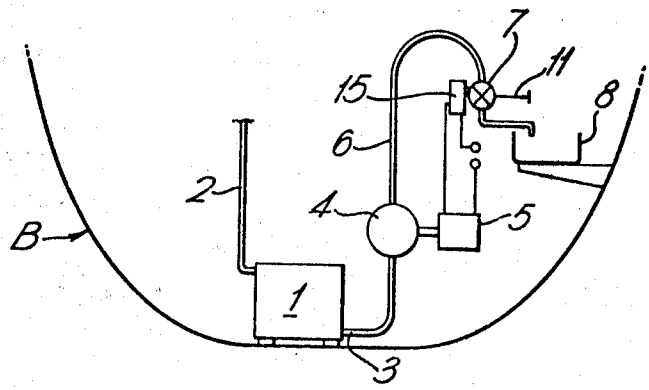
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[57] **ABSTRACT**

A liquid supply system includes a reservoir, a pipe connected to the reservoir and having a discharge end above the reservoir, a pump in the pipe between the reservoir and discharge end, a motor for driving the pump, a valve in the pipe between the pump and discharge end and a switch actuated by opening and closing of the valve for energizing and de-energizing the circuit that controls operation of the motor.

6 Claims, 2 Drawing Figures



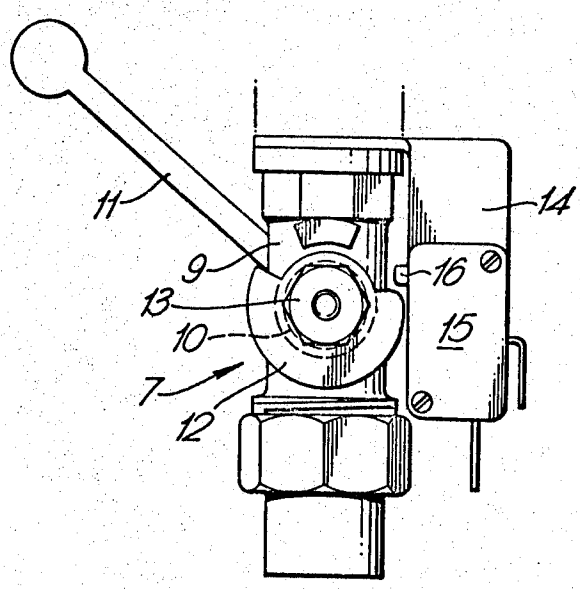


Fig. 2.

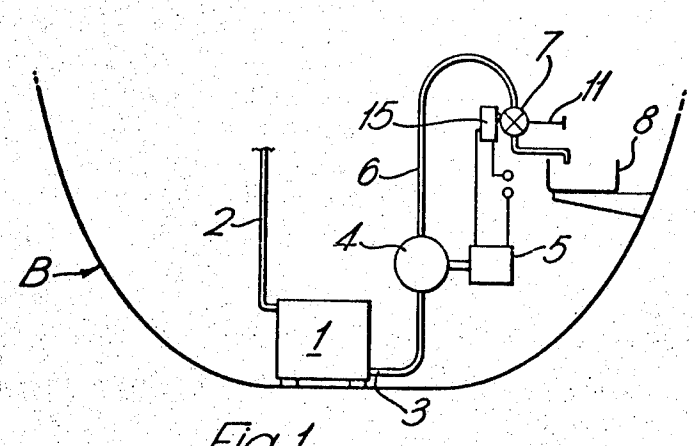


Fig. 1.

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LIQUID SUPPLY SYSTEM WITH MOTOR OPERATED PUMP ACTUATED BY SWITCH CONTROLLED BY ON-OFF VALVE IN SYSTEM

This invention relates to a liquid supply system and, more particularly, to a water supply system for use on water craft or in a trailer.

At present both in a boat or a trailer it is customary for the supply tank or reservoir to be located at a level below the tap, since the tank is placed in the bilge in the case of a boat or beneath the chassis frame in the case of a trailer, an electrically driven pump being provided to develop the necessary pressure. Control of the motor circuit driving the pump is by means of a pressure responsive switch in the pipeline leading from the tank to the tap. Assuming that the pump is pumping when the tap is turned to "off", pressure builds up, and when it is sufficient, it will operate the switch to cut out the pump.

This system is complicated and also has the disadvantage that, if an air leak develops in the tap, allowing the pressure in the pipe to fall between the pump and the tap, the motor will cut in even though the tap is not open. Over an extended period this can lead to damage to the pump and needless waste of electrical energy.

It has been found according to this invention that by actuating the switch directly from the tap, the advantage is obtained that the pump circuit will be energized and the pump started up to pump so that when the tap is fully open, water will immediately start to flow therefrom, whereas, formerly, when the tap is turned to "open", water will only trickle out of the tap and there is a delay before full flow commences.

According to the present invention there is provided a liquid supply system comprising a supply tank or reservoir having an outlet pipe, a manually operable valve device at or adjacent the discharge end of the pipe, this discharge end being located at a level above that of the tank or reservoir, an electrically driven pump providing a limited output pressure (as hereinafter defined) for generating the necessary pressure in the pipe line, and an electric switch actuatable by opening and closing movements of the valve device respectively to energize or de-energize the pump device circuit, energization taking place prior to the valve device being moved sufficiently to establish fluid communication between the pump and the discharge end and de-energization taking place after such fluid communication has been broken.

As used herein the expression "a pump providing a limited output pressure" is defined as meaning a pump of the type in which output pressure above a certain predetermined value is relieved by means of a relief valve or by the construction of its force generating members or by means of the compression of a compressible fluid retained within the pump.

In a preferred construction the valve device consists of a tap incorporating a valve turnable in a housing to and from a position in which the valve is fully open, movement of the valve directly actuating the switch to open and close the same.

The invention will now be illustrated with reference to the accompanying drawings, in which:

FIG. 1 is a schematic arrangement of a water supply system according to the present invention applied to a boat, and

FIG. 2 is a side elevation of a valve unit for use in the system of FIG. 1.

Referring to the drawings, there is shown a supply tank or reservoir 1 in the bilge of a boat B, the tank having an inlet pipe 2 and an outlet pipe 3, the latter leading to a pump 4 driven by an electric motor 5. A discharge pipe 6 from the pump leads to a manually operated tap 7 which serves to allow discharge of the water into a sink 8 situated above the level of the tank 1.

Tap 7, as best seen in FIG. 2, is formed as a plug valve having a body 9, a conical plug 10 seated in the body and rotatable therewithin and having a passage extending therethrough and a handle 11 secured to an extension of the plug so as to allow rotation thereof. An extension of the plug also projects through that end of the body remote from the handle, and a cam 12 is secured to the projection so as to be rotatable with the plug, a nut 13 serving both to secure the cam on the plug and also to retain the plug in position.

A bracket 14 is secured to the body of the valve, and a microswitch 15 having an actuating member 16 is mounted on the bracket so as to allow engagement of the member 16 by the operative face of the cam 12 when the handle 11 is moved to open the tap. Microswitch 15 forms part of the circuit connecting the motor 5 to a source of electric current (not shown), and cam 12 is shaped to close the switch 15 after a short movement of the handle 11 towards the "open" position and before fluid communication is established between the pump 4 and the outlet of the tap. Thus water under pressure is available as soon as the tap is opened. Movement of the handle 11 to the "closed" position allows the microswitch to open only after fluid communication between pump and tap outlet has been broken, and thus the pump does not stop until after the tap is closed. The microswitch returns to its open position under the influence of its built-in spring actuator, as is conventional. It is an important feature of this invention that pump 4 begins to operate before tap 7 opens and continues to operate for a short time after the closing of tap 7. If it were otherwise, water in the system could drain back to the reservoir and eventually would discharge into sink 8 with great force. Slow trickle control would be lost.

It will be apparent that, although the invention has been described specifically hereinbefore as being suitable for providing a water supply in a trailer or boat, it can be applied to any situation where gravity cannot be used to provide liquid pressure and a source of electric power is available. Similarly, although the invention has been described with reference to the use of a plug valve, other valve types may be used provided that their opening and closing movements can be utilized to operate the microswitch.

Clearly pumps which develop unlimited output pressure are not suitable for use in this invention unless fitted with means for relieving such pressure. Conveniently non positive displacement type pumps are used, and centrifugal pumps are preferred, as these are simple and inexpensive. However, self-priming pumps having flexible blades which yield above a certain output pressure, and diaphragm pumps containing a compressible gas such as air which also limits the output pressure can be used. If a centrifugal pump is em-

ployed, then providing it is below the water level on filling of the tank, it will remain primed unless an air leak develops in the tap. Consequently, pumps of this type should be sited below the upper level of water in the tank. In the case of a self-priming pump, however, this restriction on siting does not apply and an arrangement such as is illustrated in FIG. 2 can be used.

One additional advantage of the system of the present invention over prior art arrangements is that it is 'fail safe', as any air leakage through the tap does not cause a loss in pipe pressure and energization of the pump motor.

What I claim as my invention is:

1. A liquid supply system comprising a reservoir; a pump providing a limited output pressure and having a suction inlet and a discharge outlet; first pipe means connecting said reservoir and said suction inlet in fluid-flow relationship; second pipe means connected to said discharge outlet and having a discharge end located at a level above that of said reservoir; an electric motor connected to drive said pump; a motor control circuit for controlling operation of said motor; a manually operable valve device in said second pipe means for establishing and breaking fluid-flow communication between said discharge outlet of said pump and said discharge end of said second pipe means; an electric switch in said motor control circuit, said switch being actuable between first and second positions in one of which positions said switch is open and in the other of which positions said switch is closed to de-energize and energize said motor control circuit and said motor; and switch actuating means including means operable in response to movement of said valve device for actuating said switch from said first position to said second position, and means for actuating said switch from said second position to said first position; said switch, valve device and switch actuating means being so constructed and arranged that (a) said switch actuating means moves said switch from said one position into said other position prior to said valve device being moved sufficiently to establish fluid-flow communication between said discharge outlet of said pump and said discharge end of said second pipe means upon opening of said valve device and (b) said switch actuating means moves said switch from said other position to said one position after said valve device has been moved sufficiently to break fluid-flow communication between said discharge outlet of said pump and said discharge end of said second pipe means upon closing of said valve device.

2. A liquid supply system as claimed in claim 1 wherein said switch is actuated directly by movement of said valve device.

3. A liquid supply system as claimed in claim 2 wherein said switch is secured to said valve device.

4. A liquid supply system as claimed in claim 1 wherein said switch is actuated by means of a cam carried by a movable part of said valve device.

5. A liquid supply system as claimed in claim 4 wherein said valve device comprises a rotatable plug valve.

6. A liquid supply system as claimed in claim 1 wherein said pump is a centrifugal pump.

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