

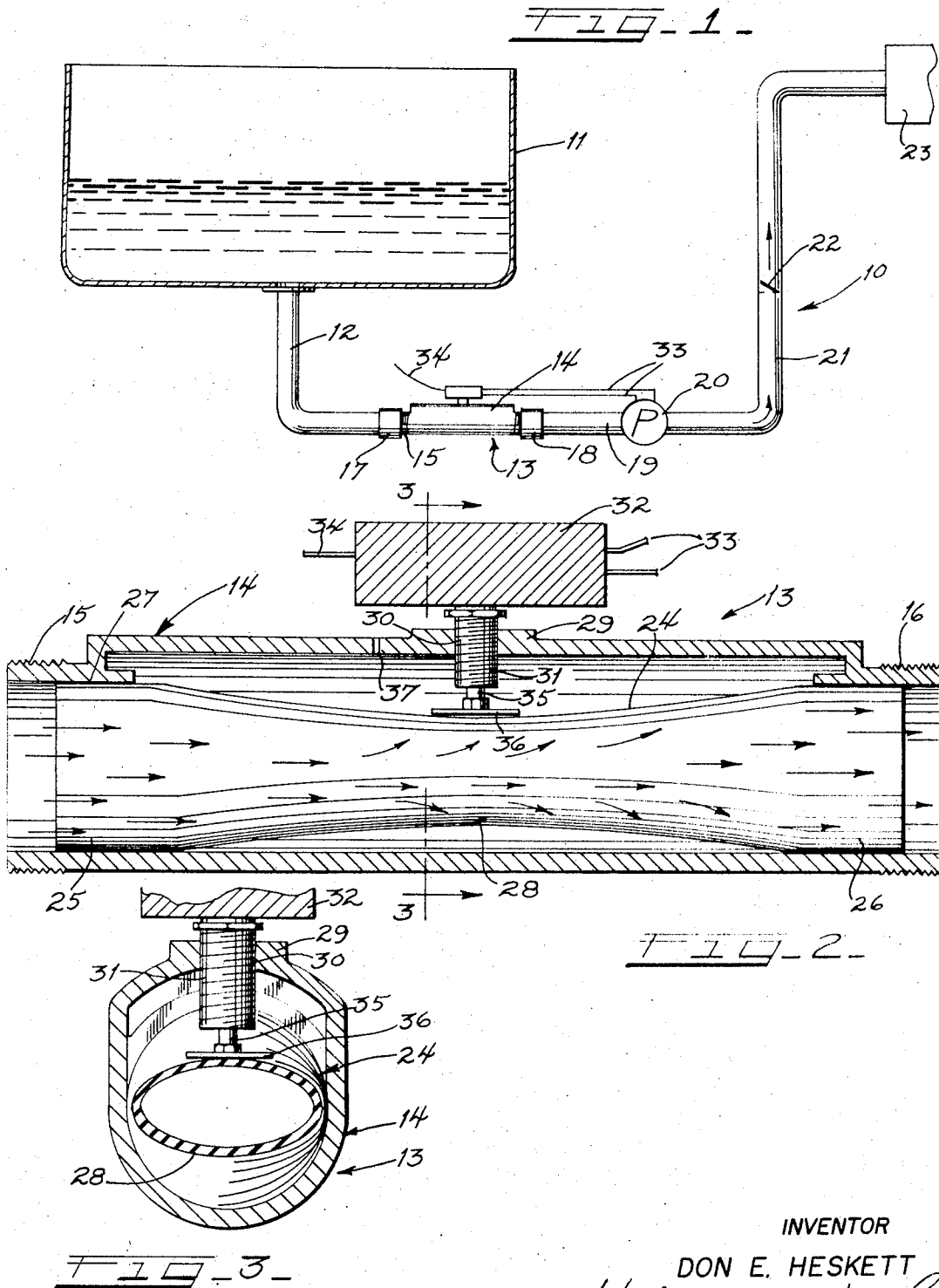
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FLUID CONDUCTING DEVICE AND PRESSURE SENSITIVE CONTROL MEANS

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1

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FLUID CONDUCTING DEVICE AND PRESSURE SENSITIVE CONTROL MEANS

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7 Claims

ABSTRACT OF THE DISCLOSURE

A gravity flow liquid conducting device having a flexible tubular member of unobstructed smooth interior surface adapted to be connected to a pressure head of liquid and having an expandable conduit portion operable by a switch to operate a pump to send the liquid through the conduit portion removing the pressure head of liquid to allow the conduit portion to return to its unexpanded condition.

This invention relates to a fluid conductor and pressure sensitive control means arrangement. More specifically it relates to pressure sensitive fluid control device responsive to fluid pressure.

In the prior art fluid pressure sensitive devices are generally associated in combination with bellows or diaphragms which in response to pressure would be actuated to either turn on or off fluid flow by means of suitable valving.

In certain devices a conduit means in the form of a housing would be provided which in turn would have switch means projecting into the fluid transmission or conducting chamber and which would then be moved in response to the liquid flowing therethrough to actuate the necessary electrical control to operate a suitable valve or pump for effecting the desired control. Devices of this type will operate in cases where the fluid is consistently liquid and where there is no possibility of the fluid becoming contaminated with solids or matter such as lint (from a washer) or from stones, earth, etc. (from a sump pump) which would tend to gather around the switch element within the transmission chamber or conduit and thus soon clog the conduit and render the unit inoperable. Thus the switch element within the conduit unit would be ineffectual for its intended purpose.

It is a prime object therefore to provide an improved fluid conducting device and pressure sensitive switch combination wherein proper flow control can be achieved despite the presence of solids within the fluid which is conducted through the device.

Another object is to provide a greatly simplified pressure sensitive switch and conduit combination wherein the conduit consists of a rubber-like material and said conduit itself is effective during internal pressure for actuating said pressure sensitive switch.

Another object is to provide an improved fluid conductor comprising a flexible rubber conduit of oval configuration in non-operative position, said conduit being flexible to a substantially circular condition during operation by fluid pressure therein and thereby in its movement to said position to actuate a pressure sensitive switch for controlling the fluid flow therethrough.

These and other objects will become more fully apparent from a reading of the description and an examination of the drawings, in which:

FIG. 1 is a schematic side elevational view of a washer system such as might be used for washing clothes wherein a tank is provided for containing liquids and has suitable outlet means showing the invention utilized in connection therewith;

FIG. 2 is a cross-sectional view of a fluid conducting

2

and pressure sensitive control means indicating the invention also disclosed in FIG. 1;

FIG. 3 is a cross-sectional view taken along the lines 3—3 of FIG. 2.

Referring now particularly to FIG. 1 a clothes washer system is designated by the reference character 10. The clothes washer system 10 may be a simple washer or laundry tank which may be disposed in the basement of a home and wherein it is desired to drain the liquid from the tank when a certain level has been reached. Or a suitable water containing tank may be located within the basement of a home or commercial establishment wherein the tank is to be drained when a certain level has been reached and a pump then elevates the liquid from the basement by means of suitable conduits. The present invention also can of course be utilized in such systems as sump pumps, drainage systems, etc., and only one embodiment showing the invention in one form of environment has been disclosed in FIG. 1. The tank 11 is provided with an outlet conduit 12 which in turn is suitably connected to a fluid conducting and pressure sensitive control means generally designated by the reference character 13. The fluid conducting and pressure sensitive control means 13 comprises a cylindrical housing 14 having threaded end connector portions respectively designated at 15 and 16.

As best shown in FIG. 1 the threaded end 15 is suitably connected to the conduit 12 by means of a cylindrical threaded connector 17. Similarly a threaded connector 18 connects the threaded end 16 to a conduit 19 which in turn is connected to a pump 20. The pump 20 may be of the impeller type having a plurality of impeller vanes not shown, these being conventional in the art. A conduit 21 is connected to the pump 20 and extends upwardly having disposed therein a one-way check valve designated at 22 and being suitably connected to an outlet tank 23.

Referring now particularly to FIGS. 2 and 3 a tubular member of flexible material such as rubber or other similar material is designated generally at 24. The tubular member is disposed at opposite ends with circular end connector portions 25 and 26 which are suitably bonded as indicated at 27 to portions of the housing 14 so as to provide open end communication with the threaded connectors 15 and 16. The end portions 25 and 26 are substantially circular or cylindrical but as the tubular member 24 is of gradually flattened configuration as best shown in FIGS. 2 and 3 the substantially central portion of the tubular member as indicated at 28 is of oval shape substantially as indicated.

The housing 14 is also provided with a boss 29 as shown in FIGS. 2 and 3 which is provided with a threaded opening 30 having secured therein a threaded tubular switch element 31 forming part of a switch designated at 32. The switch 32 is provided with electrical connecting wires 33 suitably connected to the pump 20 and a wire 34 suitably connected to a source of electrical current. The switch is of the usual plunger type and need not be described in detail having however a plunger 35 which extends outwardly from the switch element 31 and which has connected thereto an engaging plate 36 which is normally in touching engagement with the oval portion 28 of the tubular member 24. As best shown in FIG. 2 the housing 14 is also provided with a breather opening 37.

In the operation it is desired that when a certain liquid level is achieved in the tank 11 that the fluid conducting and pressure sensitive control means 13 automatically function to start the pump 20 so that the liquid is pumped through the conduit 21 past the check valve 22 to the outlet tank 23. When a certain head is established in the tank 11 the liquid pressure in the conduit 12 and in the

3

tubular member 24 is sufficient to change the shape of the oval portion 28 which now assumes a more cylindrical or rounded condition thereupon causing the plunger 35 to move in an upward direction to thus trip the switch and actuate the pump 20 to begin its pumping action. Thus the pump now empties out the tank 11 whereupon the lessening of the fluid pressure within the tubular member 24 causes the oval portion 28 to again assume its first position as shown in FIG. 3 whereupon the plunger 35 moves to its normal position and the electrical circuit to the pump 20 is broken. The check valve 22 of course functions to close so that the liquid above the check valve does not reenter through the pump or into the tubular portion 14.

Thus it is clear that whenever the pressure in the oval portion 28 builds up sufficiently the tube changes in configuration thereby actuating the plunger 35 to start the pump thus emptying out the tank until all of the liquid has been removed. This particular fluid conducting device utilizes the fluid conductor itself as the movable member which actuates the switch which is disposed entire exteriorly of the tubular member and thus any waste materials or foreign matter which may be in the tank and in the fluid cannot become clogged within the tube since the interior of the tube is entirely unobstructed and presents no opportunity for other than fluid materials to engage and become trapped within the conduit or conductor portion. Thus the conductor itself changes its shape or has a portion thereof assume a second position from a normal position which in turn then causes the tripping of the exterior switch to actuate the control for the pump which is utilized. The device of course can be utilized with other arrangements than pumps and in many other different types of systems and the present adaptation or use is only one of many different uses to which the present control device may be placed. The breather hole 37 permits access of the interior of the housing 14 to the atmosphere so that air cannot be trapped within the housing to preclude proper function of the flexible tubular conductor 24.

Thus the object of the invention has been clearly achieved by the disclosure. And it must be understood that changes and modifications may be made which do not depart from the spirit of the invention as disclosed nor from the scope thereof as defined in the appended claims.

What is claimed is:

1. A gravity flow liquid conducting device comprising a tubular member of flexible material having an interior relatively smooth surface capable of conducting a liquid therethrough in an unobstructed manner, said tubular member including longitudinally spaced inlet and outlet connector portions adapted to be connected to suitable liquid conveying means, said inlet connector portion being adapted to be connected with a gravitationally acting mass of liquid of a predetermined volume, whereby the weight of the liquid creates a pressure within the tubular member, a conduit portion of said flexible tubular member connecting with said inlet and outlet connector portions for passage of the liquid to and from the conduit portion and being expandable in a flexible manner from a first position to a second position in response to the liquid pressure within

4

said tubular member due to the weight of the mass of predetermined volume upon the interior of the conduit portion, and an electrical switch operatively associated with said tubular member, means for causing the flow of liquid from the conduit portion connecting with said switch and with said outlet portion, said switch including a movable member in contact with and actuated by said conduit portion of said tubular member to actuate said switch in response to movement of said conduit portion from said first to said second position for operation of said last mentioned means to remove the liquid from the conduit portion to allow the conduit portion to return to the first position.

2. A liquid conducting device in accordance with claim 1 wherein said tubular member comprises a rubber-like conduit.

3. A liquid conducting device in accordance with claim 1 and said conduit portion having an oval-like shape in cross-section in said first position and a more circular shape in the second position.

4. A liquid conducting device in accordance with claim 1 wherein said switch is located exteriorly of said conduit portion.

5. A liquid conducting device in accordance with claim 1 wherein said electrical switch is pressure sensitive to the movement of said conduit portion which in turn is moved from the first to the second position by the fluid pressure within said conduit portion.

6. A liquid conducting device in accordance with claim 1 and including a housing enclosing said tubular member, said housing having means supporting said switch exteriorly of said tubular member and including said switch element projecting into said housing and engaging said tubular member.

7. The invention according to claim 1 and said last mentioned means including liquid pumping means operatively connected with said switch and said conduit portion and operated by said movable member in the second position of the conduit portion to remove the liquid from the conduit portion to return the conduit portion to the first position.

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