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TRANSFER VALVE ASSEMBLY

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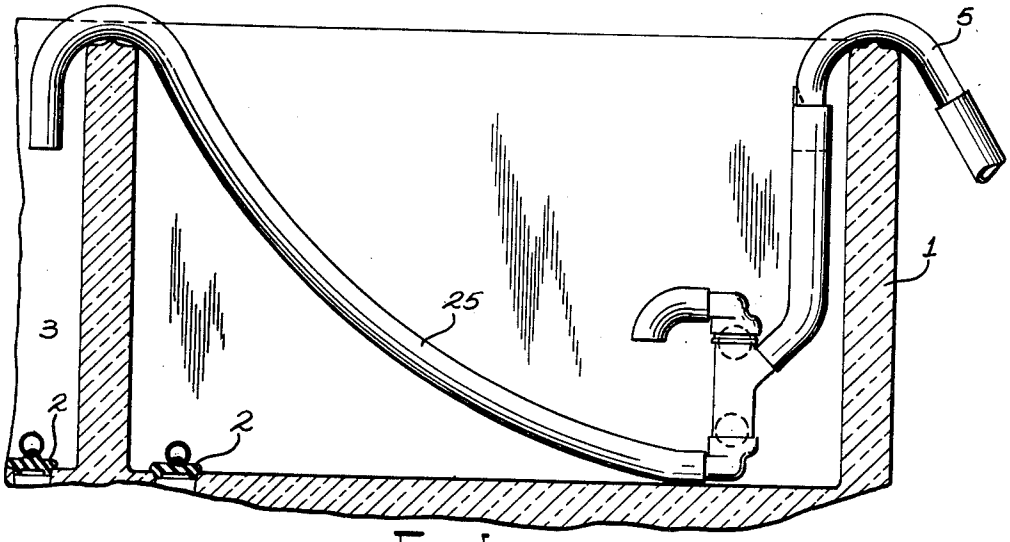


Fig. 1

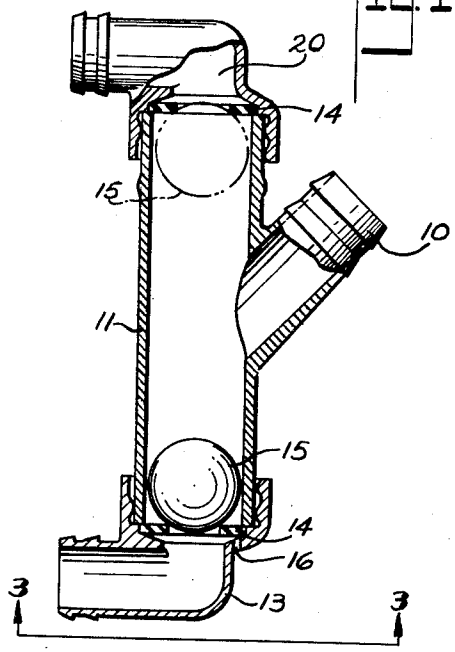


Fig. 2

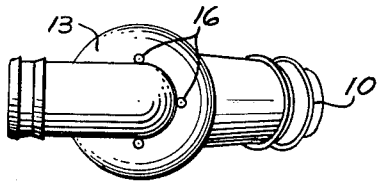


Fig. 3

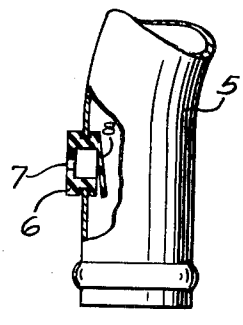


Fig. 4

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TRANSFER VALVE ASSEMBLY

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This invention relates generally to the valve art and is particularly concerned with a new automatic transfer valve assembly for uses, such as with a washing machine.

In various industries it is frequently desirable to transfer a liquid from a work tank to a storage tank and later return it to the work tank after a second liquid has been handled in that tank. In this manner the first liquid may be stored while the second liquid is being handled in the work tank and then reused in the work tank. An automatic washing machine is a good illustration of this use. In such a machine the soapy water may be used more than once if stored during the rinsing operation and thereafter returned to the washing machine.

Various devices have been proposed for this purpose, but each one with which I am familiar has possessed some disadvantage. The present invention aims to avoid all such disadvantages and accomplishes this purpose by apparatus which will function automatically, and will serve to discharge one liquid into a storage tank and then to pass another liquid through the tank and to a drain or another tank, as desired, without commingling the two liquids.

The present invention will be better understood by reference to the drawings which accompany and form a part of this specification and in which:

Fig. 1 is a side elevational view of one form of apparatus embodying the present invention;

Fig. 2 is a vertical sectional view through the automatic valve portion of the apparatus of Fig. 1;

Fig. 3 is a bottom plan view of the lower end of the apparatus of Fig. 2; and

Fig. 4 shows in cross-section a syphon-breaker in the pipe leading to the valve of Fig. 2.

In Fig. 1 portions of a storage tank 1 are shown. This tank is provided with a stopper 2 for drainage and adjacent to tank 1 is indicated another tank 3 also provided with a stopper 2.

A pipe 5 which, in this instance, leads from an automatic washer, extends over the top of tank 1 and is provided near the top of the tank, and above the highest intended level of liquid therein, with a syphon breaker which is illustrated in Fig. 4. This syphon-breaker includes an insert 6 in pipe 5, having a passage 7 extending therethrough. A flap 8 is fastened to insert 6 and serves to cover the inner end of passage 7 when water is being discharged through pipe 5. Since the flap 8 is fastened to the insert only along its upper edge it will swing inwardly and open passage 7 and admit air into pipe 5, whenever a partial vacuum is created in pipe 5. Thus any tendency for the liquid in the tank to syphon back through pipe 5 will be overcome.

Pipe 5 leads downwardly in tank 1 and at its lower end is fitted onto an inlet pipe 10 which extends into the body 11 of an automatic valve. The body of this valve is preferably cylindrical and positioned with its longitudinal axis in a vertical line which means that the inlet 10 will deliver water downwardly and at an acute angle to the vertical center line of body 11. The body 11 is

provided with an elbow fitting 13 at its lower end and this fitting carries a valve seat 14 which is held in place against upward displacement by body 11. The valve seat is composed of resilient material, for example, natural or synthetic rubber, is ring-like, and its central opening is of a size to receive the ball valve 15 and seal against flow of fluid into fitting 13. This valve is free to move lengthwise of body 11. Fitting 13 is provided with vent holes 16 to admit liquid from the tank into the valve and aid in moving the valve to the upper end of body 11.

At its upper end body 11 is provided with an elbow fitting 20 quite like fitting 13 except that it lacks the vent hole 16. This valve rests on the upper end of body 11 and is restrained against upward movement by fitting 20. The ball valve 15 may be pressed into sealing engagement with seat 20 by liquid in body 11 to seal the upper end of body 11 against egress of liquid.

The lower fitting 13 has a hose 25 attached thereto by means of which liquid may be conducted from the fitting to tank 3 or to another receptacle or to a drain as may be desired.

The ball valve 15 is preferably composed of material having low flotation characteristics. For example, polyethylene, having a specific gravity of about .92 to .93 has been found to be quite satisfactory. Other materials having low flotation characteristics may be used in making ball valve 15. The purpose in using such materials is to provide a ball which does not have a pronounced tendency to float. Since one purpose of the valve is to seal against flow of liquid out through fitting 13 and to divert the incoming liquid into fitting 20, it is important that the force of the incoming liquid should hold the valve on its seat. A ball with high flotation characteristics would tend to rise in the body 11 against the force of the incoming water and would thus interfere with the intended operation of the valve.

The operation of the above-described apparatus is substantially as follows when used with an automatic washing machine to conserve the soapy water:

Soapy water discharged from the washing machine through pipe 5 into tank 1, which is empty at the beginning of the discharge, will flow into the body 11 through inlet 10 and by reason of its force and the low flotation characteristics of ball valve 15 will result in the latter remaining seated on gasket 14 and in preventing escape of water into lower fitting 13. Since the incoming water enters body 11 on an acute angle to its longitudinal center line, the turbulence will be low and insufficient to dislodge the ball valve from its seat. The incoming soapy water will fill body 11 promptly and will flow out through top elbow 20 and into the tank 1. This operation will continue as long as the soapy water is being discharged from the washing machine. When the last of the soapy water has been discharged from the machine, the water pressure will force valve 15 upwardly in body 11 and press it against gasket 14 in fitting 20. Coincident therewith soapy water will flow into pipe 25 filling it to the water level in the tank.

When rinse water has been used in the washing machine and is to be discharged therefrom, it is discharged through pipe 5, body 11, lower elbow 13 and through pipe 25 into tank 3. This flow of rinse water will exert upward force on ball 15 holding it on upper seat 14 and will exert downward force on lower gasket 14 distorting it to cover inlet holes 16. Thus the rinse water will pass through tank 1 and the soapy water therein without escaping into the soapy water to any pronounced extent and without removing substantial quantities of the soapy water. When the rinse water has been discharged from the washing machine, the soapy water may be returned from the tank 1 to the washing machine by a pump (not shown) or any other suitable means.

As the level of the soapy water falls in tank 1, ball valve 15 moves down with it until it is seated on seat 14 and the device is ready for a repetition of the foregoing cycle.

While the present invention has been described in use with water from a washing machine, it is to be understood that the invention may be used with water from many other machines or tanks and also that the invention may be used with many liquids other than water provided the valve ball and valve seats are made from materials suitable for use with such liquid to accomplish the above described operation.

Having thus described the present invention so that those skilled in the art may be able to understand and practice the same, I state that what I desire to secure by Letters Patent is defined in what is claimed.

What is claimed is:

1. A transfer valve assembly for use in storing one liquid in a tank and passing another liquid therethrough which comprises a valve to be positioned in a tank and including a hollow upright cylinder having a side wall, outlets at each end and an inlet between the outlets, upper and lower valve seats adjacent to each outlet, a ball of low flotational characteristics in the cylinder to engage with either seat and seal the adjacent outlet against egress of liquid, an outlet conduit connected to the lower outlet and extending above the surface of any body of liquid in which the valve is positioned, and an inlet conduit connectible to a source of liquid under pressure and extending from above the surface of any body of liquid in which the valve may be positioned to and connected with said inlet, the valve having holes extending through its side wall below the lower seat.

2. The combination of elements set forth in claim 1 in which the inlet conduit is provided with a syphon breaker at a place above the surface of any liquid in which the valve is positioned and in which the inlet conduit extends from below to above the level of said liquid and then downwardly to said valve.

3. The combination of elements set forth in claim 1 in which the inlet is inclined downwardly at an acute angle to the longitudinal center line of the cylinder.

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