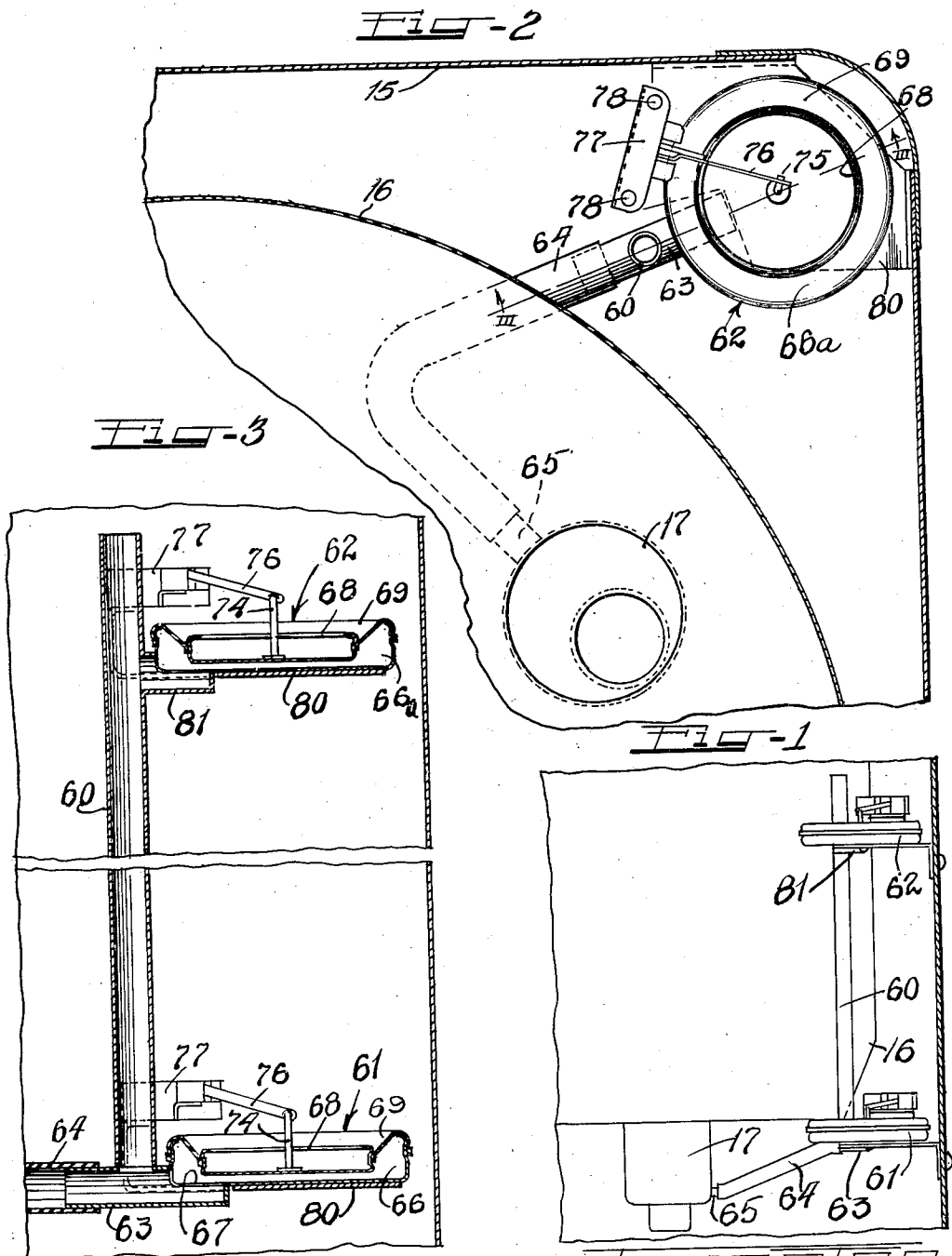


Filed May 3, 1943

FLUID RESPONSIVE CONTROL APPARATUS

2 Sheets-Sheet 1



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2,471,778

FLUID RESPONSIVE CONTROL APPARATUS

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FIG-4

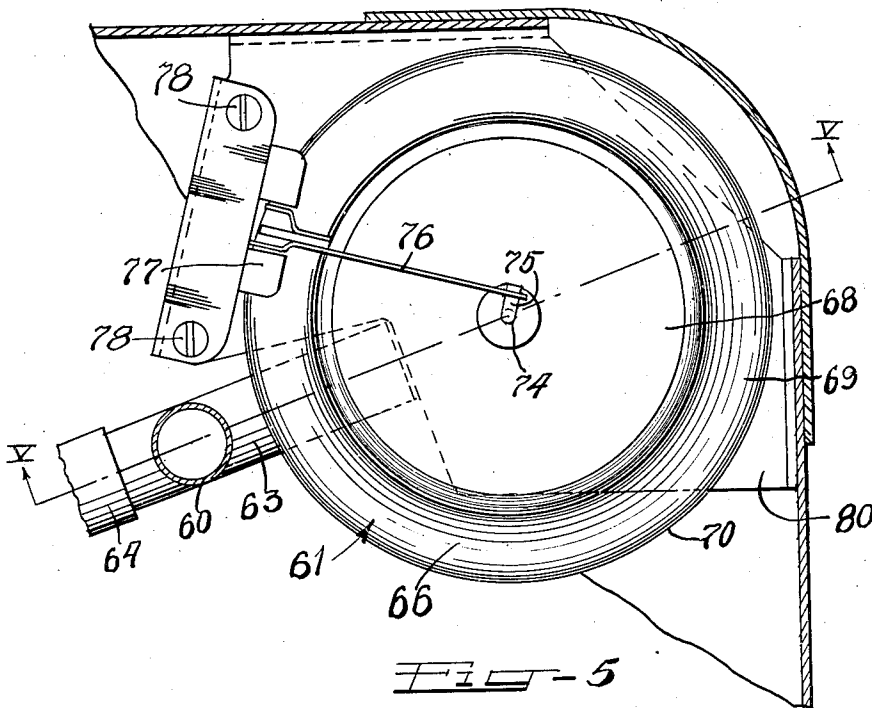
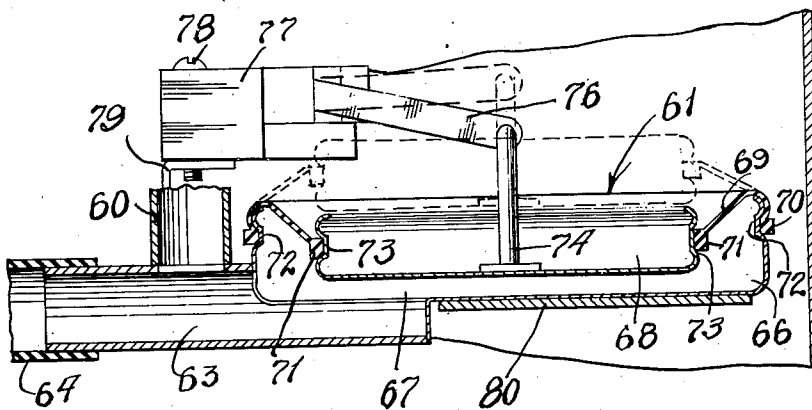


FIG-5



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FLUID RESPONSIVE CONTROL APPARATUS

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3 Claims. (Cl. 137—68)

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This invention relates to a fluid responsive control means, and more particularly to means which responds to the rising and falling of the fluid level in a container for controlling the supply and removal of fluid to and from said container, as well as for maintaining the fluid level desired for certain operations to be performed in said container.

It is an object of the present invention to provide a method of and means for controlling the fluid level in a container such, for example, as the tub of an automatic washing machine or the like, and to utilize the fluid level therein to effect a control of the supply and removal of the fluid to and from the body of the container of such a machine.

Another object of the present invention is to provide an improved method of controlling a series of operations which are dependent upon the level of the fluid in an area in which said operations are to be performed.

Still another object of this invention is to provide a novel means responsive to the height or lack of height of fluid in a container to control the influx or efflux of fluid to or from said container, as well as to exercise a control over certain other operations which depend upon the nature of the fluid level in the container for their initiation.

A still further object of the invention is to provide a novel type of actuating means for a fluid responsive control mechanism.

It is the aim of this invention to provide a simple control means to be associated with a fluid container in such fashion that the fluid level within the container may be employed to instigate and control the supply and removal of the fluid to and from the container in addition to certain other operations. The device of the instant invention finds particularly advantageous application in apparatus such, for example, as an automatic washing, rinsing and drying apparatus, in which such fluid responsive means may be employed in effecting such operations as, supplying the washing or cleansing fluid to the machine, pumping the fluid out of the machine, agitating the fluid and, finally, controlling the operation of an extractor unit employed in the removal of the fluid from the clothes after they are laundered and the fluid is emptied from the machine.

In accordance with the general features of my invention there is provided herein a method which includes the steps of supplying fluid to the area, setting apart a body of fluid from that in said area but maintaining said fluid body in com-

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munication with the fluid in said area whereby any rise or fall in the fluid level in said area will be reflected by said fluid body, withdrawing portions of the fluid body at points therein spaced vertically from each other as the fluid level in said area and said fluid body rises and utilizing the portions withdrawn from the fluid body to interrupt the supply of fluid to the area and to initiate those operations which are to be performed when the area is filled with fluid.

In accordance with still other general features of this invention, there is provided a fluid responsive control means connected to suitable electrical switches and associated with the vessel or container for the storage of fluid therein. The apparatus of the invention operates to open and close said switches directly as a result of the rising or falling of the level of the fluid in the container. It is to be understood that the fluid responsive means of the present invention may be associated in any suitable manner with the vessel or container employed for the storage of the fluid; it may, therefore, within the purview of the present invention, be disposed within or without the confines of the vessel or container.

Moreover, the fluid responsive means of the present invention may also be advantageously employed to arrest any ancillary operation to be performed in the vessel or container and depending upon the presence or absence of fluid therein in the event that the fluid level either falls or rises, as the case may be, through an inadvertent loss or accumulation of the fluid. Assuming again, by way of illustration, that the apparatus of the invention is applied to a washing, rinsing and drying machine, it will be apparent that the fluid responsive means of the invention would function, in the event that a quantity of the fluid employed in the washing operation were lost due to splashing, leakage, evaporation, or the like, while the agitator mechanism thereof is operating so that the quantity of fluid will be less than that required for most effective operation, to arrest or stop the agitator, restore the fluid in the machine to the proper operating level and thereafter set the agitator in motion for the remainder of its operating cycle.

Still other objects and advantages of the invention will be apparent to those skilled in the art from the following description directed to a number of embodiments of the invention as illustrated in the accompanying drawings, in which:

Figure 1 is a view illustrating one embodiment

of the invention employing float means in the control mechanism;

Figure 2 represents a plan view, with parts in section and at an enlarged scale, of the embodiment of the invention shown in Figure 1;

Figure 3 is a partial sectional elevation of the apparatus of Figure 2 as seen from the line III—III therein;

Figure 4 is a plan view with parts in section and at an enlarged scale of the lowermost fluid responsive control means of the invention as shown in Figure 1; and

Figure 5 is a partial sectional elevation of the device of Figure 4 as seen from the line V—V therein.

It is believed that my novel method may be fully understood from the following description of a typical apparatus for practicing the same.

For purposes of illustration, the fluid responsive control means of the present invention have been shown in the accompanying drawings as being applied to an automatic washing, rinsing and drying apparatus in which the operating mechanism is enclosed by a shroud or casing 15 and comprises a container or tub 16 in the base of which is provided a sump 17.

The structure of the illustrated embodiment of the present invention employs a pair of reservoirs 61, 62 which are fixed with respect to the vertical standpipe 60 and have disposed therein suitable float members which are responsive to and actuated by the rising or falling of the fluid level in the container and standpipe associated therewith.

A standpipe 60 is connected with a connection 65 of sump 17 by a flexible hose connection 64 communicating with the lowermost port 63 thereof. The port 63 is secured to an opening 67 in the base of a lower reservoir 61, which in this case takes the form of a basin 66, by a suitable water tight joint preferably formed by soldering, or brazing the parts together. Flexibly suspended within the basin 66 is a float 68 which is preferably sufficiently smaller than the inside dimension of the basin 66 that it may be suitably spaced from the outermost walls thereof. A flexible diaphragm 69 supports the float 68 in the basin 66. Diaphragm 69 is provided with a bead 70 on the outer periphery thereof which engages the substantially annular depression 72 in the wall of the basin 66 and a bead 71 on the innermost periphery of diaphragm 69 which similarly engages an annular groove 73 formed on the outer wall of the float 68.

A vertically extending pin member 74 is suitably secured to the approximate center of the base of the float member 68 so as to extend up over the uppermost edge of the basin 66 and float 68. A hooked portion 75 of the pin 74 is secured to the arm 76 of a toggle switch 77 which is mounted as by means of the bolts 78 to an upstanding portion 79 of the bracket 80 secured in any suitable fashion to the inner wall of casing 15. Bracket 80 also serves to support the basin 66.

The upper unit 62 comprising a basin 66a is identical in construction to that of the lower unit 61 just described and is likewise supported from a bracket 80 mounted inside the casing 15. The connection between the basin 66a of the upper unit 62 is effected through a port 81 disposed in a standpipe 60 at a point adjacent the uppermost end thereof and secured to the basin 66a. Since both the basins 66 and 66a are advantageously rigidly secured to standpipe 60 by

the ports 63 and 81 and said basins are supported by the brackets 80, the standpipe 60 is maintained in a vertical position adjacent to the tub 16.

The method of operation of the apparatus of this embodiment of the invention will now be described. Fluid is admitted to the container 16 and rises to a corresponding level in the standpipe 60 connected to said container by the flexible hose connection 64. The fluid, as it rises above the point at which the port 63 is disposed, will enter the basin 66 of the lower unit 61 thereby causing the float member 68 therein to be raised and actuating the lever arm 76 of the switch 77 by reason of its connection with the pin 74 mounted in the base of the float member 68. This operation of switch 77 may or may not, depending upon the character and setting of the control circuit into which the switch is connected, cause some unit of the apparatus to function. As the fluid level continues to rise in the standpipe 60, it will, as we have seen, enter the connection 81 and thereafter fill the basin 66a of the upper unit 62 and cause its float 68 to raise actuating the switch 77 associated therewith through the pin 74 and lever arm 76. Again, depending upon the character and setting of the control circuit into which the switch 77 associated therewith is connected, any one of several operations may take place when said last switch 77 is actuated.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. Fluid responsive means for controlling the level of fluid in a vessel comprising a container, a standpipe extending substantially parallel to the axis of said container and interconnected therewith at the lowermost portion thereof, a plurality of basins disposed at points along said standpipe intermediate its ends corresponding generally with the fluid level desired to be maintained in said container, means for connecting said basins and said standpipe to admit fluid from said standpipe to each of said basins when the fluid level in the container and the interconnected standpipe rises to the level of the connecting means for each of said basins, float means in each of said basins actuated by the rise and fall of the fluid in said container and said standpipe, flexible means for maintaining said float means in said basins without restricting their freedom of movement, switch means for controlling the supply and removal of fluid to and from said container, and means for connecting said float means and said switch means.

2. Fluid responsive means for controlling the fluid level in a vessel comprising a vertical standpipe interconnected with the base of said vessel and extending substantially parallel to the axis thereof, a pair of fluid basins connected to said standpipe, one of said basins being disposed adjacent the lowermost end of said standpipe and the other adjacent the uppermost end thereof at points generally corresponding to the minimum and maximum fluid levels desired to be maintained in said vessel, each of said basins having a flexible upper wall including float means therein depending into each of said basins to raise and lower with the rise and fall of the fluid level in

said basins, switch means associated with each of said basins to control the supply and removal of fluid to and from said vessel depending upon the nature of the fluid levels therein, and means connecting said float means and said switch means.

3. Apparatus for actuating a plurality of different controls in response to different predetermined levels of fluid in a vessel comprising a standpipe adjacent said vessel and in fluid connection with the bottom of said vessel, fluid receivers separate and distinct from said standpipe spaced from said standpipe and disposed at points intermediate the ends thereof, fluid conduits connecting each receiver to said standpipe, each of said receivers having a different one of said controls associated therewith, each of said receivers having a yieldable top wall, the central portion of which extends down into the receiver to be raised and lowered by the flow of fluid into and out of said receiver, each of said central portions being connected with said control associated therewith to actuate the same.

LUTHER RINGER.

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