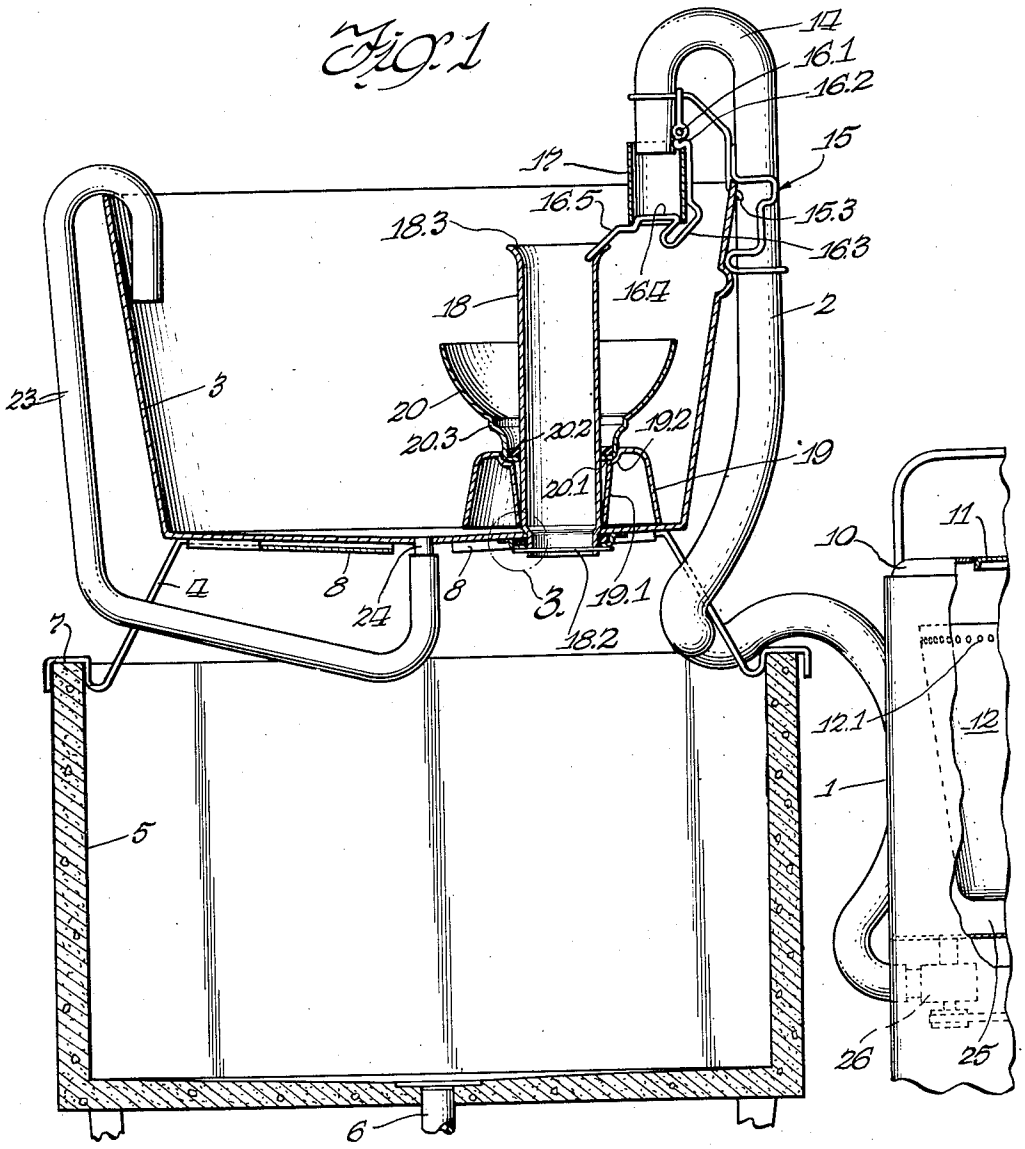
March 26, 1957 J. D. WARHUS 2,786,483

WATER SAVING APPARATUS FOR CLOTHES WASHING MACHINES OR THE LIKE

Filed April 22, 1954 2 Sheets-Sheet 1

Fig. 1



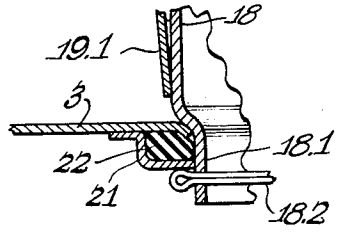


Fig. 3

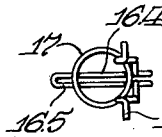


Fig. 4

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Fig. 2

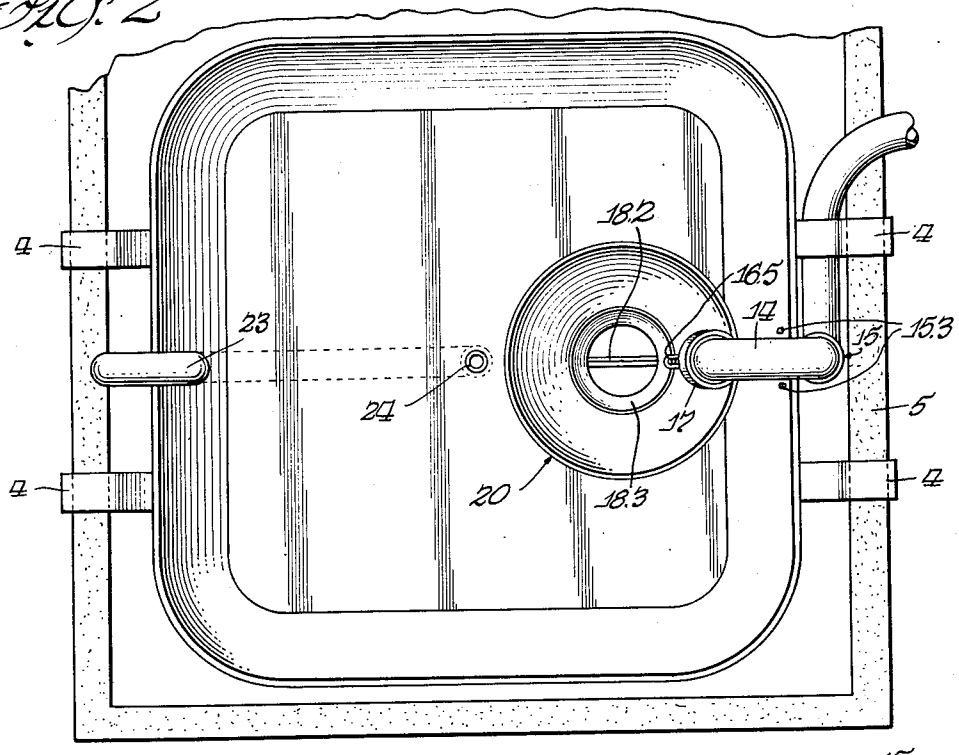


Fig. 5

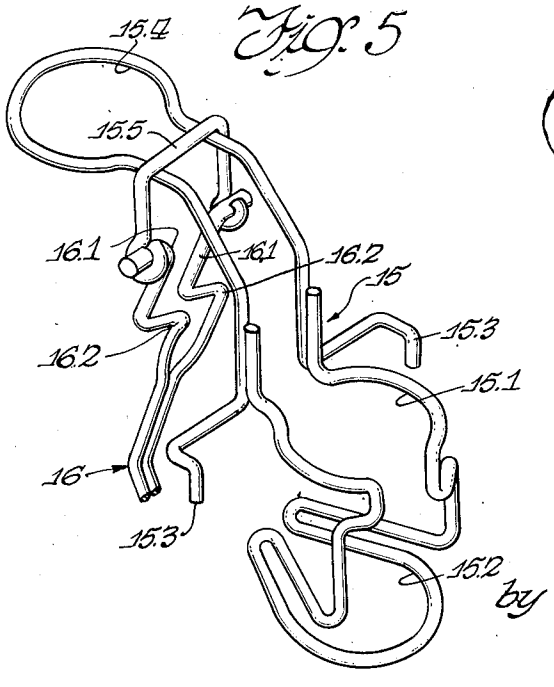
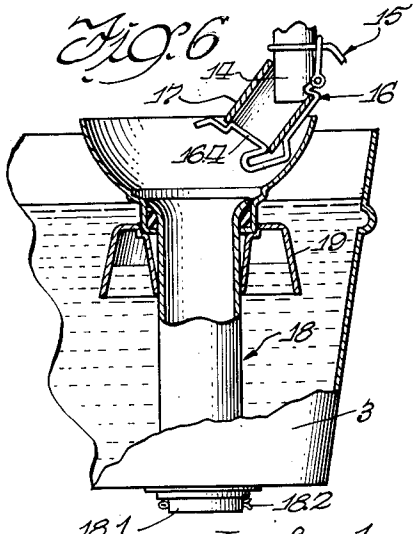


Fig. 6



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2,786,483

WATER SAVING APPARATUS FOR CLOTHES WASHING MACHINES OR THE LIKE

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Application April 22, 1954, Serial No. 424,819

10 Claims. (Cl. 137—122)

This invention relates to clothes washing machines, and, in particular, to means for accumulating in a separate container for subsequent reuse, the detergent-containing liquid extracted from the clothes after the washing operation.

In locations in which water is scarce, or where the hot water supply system is incapable of generating a sufficient quantity of water at desired temperature to supply a plurality of washing operations performed in succession, it may be desirable to save the hot detergent-containing water for reuse in laundering a subsequent batch of clothes.

Present day domestic washing machines, both of the automatic and non-automatic types, are equipped to pump the contents of the washing machine tube to a plumbing drain, usually the drain associated with the so-termed "set tubs" or "laundry tubs." In non-automatic machines, it is a simple matter for the user to hook the discharge hose of the washing machine over the edge of some separate tub or container within which the soapy hot water is to be stored and then, after the pump has emptied the machine, to place the discharge hose over the laundry tube or other drain so that the subsequently discharged rinse water will not dilute the hot water, and may be discarded. In automatic machines which operate without attendance, means must be provided which will save the soapy hot water, but discard the rinse water or cause it to flow into a separate container.

The patent art contains numerous examples of automatic valving arrangements, usually operated by the time-cycle apparatus of the washing machine, with which washing machines may be equipped automatically to accomplish this water saving objective. However, a large proportion of washing machine users either do not have to economize on water or do not wish to use the water from a previous washing operation, and it is therefore uneconomic to equip a machine with costly facilities which are not universally used.

It is therefore an object of this invention to provide a simple, inexpensive washing machine accessory which may be separately purchased and used by those who wish to save and reuse water from a previous washing operation.

It is another object of the invention to provide a water saving apparatus which does not require motors, electric valves, or the like to divert waste water from the container in which the soapy water is being stored.

It is another object of the invention to provide a water saver apparatus in which there will be relatively little loss of soapy water and substantially no dilution of the soapy water by the subsequently discharged rinse water.

It is yet another object of the invention to provide a valving arrangement which is exceedingly simple mechanically and will function throughout a long service life without failure.

In a preferred manner of accomplishing the above objects, I provide a water collector which can be mounted above a laundry tub and equip said water collector with a drain pipe which extends vertically therein to a level which will be attained when substantially all of the wash water is discharged from the washing machine. The water inlet system includes a pivotally mounted diverter tube which normally directs water into the collector, but which is rotatable to direct water into the drain pipe. By means of a novel float system which is guided for movement on the drain pipe, the diverter tube is swung into position for discharge of liquid into the drain pipe. Such diverter tube operation is timed by means of the float system to correspond substantially with the completion of the discharge of soapy water from the washing machine. The float system maintains the diverter tube in position to discharge all subsequent water into the drain pipe, through which it escapes into the laundry tub. A hose is provided for conducting the soapy water to the washing machine at a future time.

Other features and advantages of the invention will be apparent from the following detailed description of a presently preferred embodiment, read in connection with the accompanying drawings, in which:

Fig. 1 shows in vertical section a presently preferred form of the invention arranged to receive water from a washing machine;

Fig. 2 is a plan view of the water-saver apparatus;

Fig. 3 is a detail of a method of demountably securing the drain pipe to the tub;

Fig. 4 is a plan view of the diverter tube and its mounting device;

Fig. 5 is a fragmentary perspective view of the washing machine discharge hose mounting clamp; and

Fig. 6 is a fragmentary view showing the operation of the valving apparatus after the tub has been filled with water.

Referring to Fig. 1, 1 represents apparatus which during the course of operation uses and discharges quantities of liquid. The apparatus may, for example, be a clothes washing machine which by manually controlled or automatic means uses hot water for washing clothes, following which said hot water is removed from the washing machine. After the washing operation, the clothes are rinsed in a suitable quantity of tepid or cold rinsing water, which later is drained or otherwise extracted from the machine. In the operation of an automatic machine, a time-cycle controller (not shown) introduces a predetermined quantity of hot water to which detergent is added by the user, and then institutes the operation of a washing mechanism such as an agitator or tumbler (not shown) to effect the washing of the articles within the machine. The washing solution is then usually spun out of, or otherwise extracted from, the clothes and pumped to a drain through a discharge hose such as the rubber hose 2. The control thereupon causes the inflow of a quantity of clear rinsing water and after a predetermined rinsing period, extracts the rinse water from the articles, whereupon the rinse water is again automatically pumped through hose 2 to the drain. Such machines are now very well known and detailed illustration or description thereof is thought to be unnecessary herein.

The instant invention provides a mechanically simple apparatus for retaining the first quantity of liquid being discharged from the machine, and causing subsequently discharged quantities of liquid to flow to another receptacle from which it may flow to a plumbing drain, or in which it, also, may be retained for future use. It is an important feature of the invention that the valve means which directs the flow first to the first receptacle for retention therein, and then directs subsequent flows to the second receptacle or drain system operates in a positive and relatively abrupt manner to reduce almost to the point of complete elimination the possibility of dilution of the first batch of liquid by the second.

The apparatus embodies a tub 3 having a plurality of legs 4 for supporting said tub above a drain-provided device. As illustrated, the legs 4 are arranged to support tub 3 above a conventional laundry tub or similar permanent basin or plumbing fixture 5 having a drain 6 which communicates by means of a conventional plumbing trap (not shown) with the plumbing waste line of the building. In the usual domestic laundry installation, the washing machine 1 is installed adjacent to the laundry tubs in order to have convenient access to the hot and cold water facilities (not shown) with which laundry tubs are customarily provided. Accordingly, the legs 4 may have feet 7 arranged to fit over the side walls of the tub 5, and said legs may be slidably arranged in channels 8 secured to the bottom of tub 3 to permit lateral adjustment of the legs 4 to suit the wall-to-wall width of the laundry tub 5. The legs are sufficiently high to position the bottom of the tub 3 above the top 10 of the washing machine, whereby upon raising the usual hinged loading door 11 in the top of the machine, the washing basket 12 thereof is exposed and the stored liquid from tub 3 may be caused to flow by gravity to the washing basket, as later explained.

The washing machine discharge hose 2 is shown as having the conventional crooked-end discharge end 14. The hose is arranged to be supported in a fixed position at the tub 3 by a clamp or bracket member 15, best shown in Fig. 5. Said bracket is advantageously formed of two pieces of relatively heavy wire welded together after shaping and then galvanized or otherwise protected against corrosion. A lower portion of the hose clamp is formed to have two loops 15.1 and 15.2 sized to fit about the hose 2 in a clamping or gripping relation therewith. The upper portion of the clamp is formed with the extended foot portions 15.3 which hook through openings (not shown) below the edge of the tub 3, and a loop portion 15.4 which receives the downwardly extending end 14 of the hose 2, as best appears in Fig. 1. The relationship of the offset foot portions 15.3 to the loops 15.1 and 15.2 is preferably that which will cause a slight compression of the wall of the hose against the side portion of the tub. This provides an advantageous stability of the hose relative to the tub. The clamp additionally includes a hanger portion 15.5 which terminates in the downwardly extending loops into which pivotally fit the outwardly turned end portions of the deflector tube pivot support 16. Said pivot support is also advantageously formed from bent wire and comprises the pivot end portions 16.1 and a carrier portion which includes offset loops 16.2, a cam portion 16.3 (see Fig. 1), a support portion 16.4, and a stop or tip 16.5. The several convolutions of the support 16 are adapted to receive and secure the rigid metallic diverter tube 17. Accordingly, an upper edge portion of the tube fits within the loops 16.2 of the support 16 and is retained thereby, and the support portion 16.4 extends diametrically across the bottom of tube 17, the lower portion of which frictionally engages the offset ends of the support portion 16.4, all as shown in Figs. 1 and 4. By comparison of Figs. 1 and 6, it will be noted that the deflector tube may swing between the vertical position of Fig. 1 and the angular position of Fig. 6, and that in said latter position the end 14 of the hose 2 acts as a stop.

The valving system additionally comprises the drain pipe 18, float 19 and bowl 20. The drain pipe is arranged to be vertically supported in the tub 3. To accomplish this in a simple fashion, permitting the valving system to be assembled on the job by unskilled labor, the drain pipe is formed with a necked-down end portion 18.1 which may be crowded through the gasketed bottom opening of the tub 3. Said opening has a downwardly extruded rim, as shown in Fig. 3, beneath which a flange 21 confines a soft gasket 22 in such fashion that its inner portion encroaches upon the area of the opening

in the tub bottom. The neck portion of the drain pipe is forced through the opening in snug contact with the inner wall of the gasket 22 and is secured in position by a cotter pin 18.2. The upper or inlet end of the drain pipe is flared outwardly, as shown in 18.3. The drain pipe preferably comprises a smooth walled cylindrical tube and its height, measured from the bottom of the tub 3 to the rim of the inlet end, is established relative to the dimensions of the tub for accommodation of substantially the full quantity of "wash water" of the washing machine before overflow into the drain pipe. A typical automatic washing machine uses fourteen gallons of hot wash water and the drain pipe would be sized so that such an amount of water would fill the tub 3 to slightly below the point of overflow into the drain pipe 18.

Float 19 is advantageously an inverted, annular cup of water impervious material such as high impact polystyrene. The inner wall 19.1 of the float is tapered to a diameter which slidably fits over the drain pipe 18. It will be seen therefore that the buoyancy of the float is attained by the entrapment of air therein as the tub 3 fills with water to a level above the float. The float is formed with an annular shoulder 19.2 which receives and supports the base of the bowl 20. Said bowl, which may be of material similar to that of float 19, has an inwardly turned base flange 20.1 defining an opening sufficiently larger than the drain pipe to have a sliding fit thereon. The flange accommodates a gasket 20.2 which is arranged to seat against the base of the flared end 18.3 of the drain pipe as presently described. The bowl is additionally characterized by the stepped wall portion 20.3 into which fits the flared end 18.3, as shown in Fig. 6, thus limiting the upward travel of the bowl. It will be noted that the flared end 18.3 then comprises a smooth continuation of the upper wall of the bowl 20, thus insuring complete drainage of the contents of the bowl into the drain pipe.

In assembly of the valving apparatus, the bowl 20 and then the float 19 are threaded over the bottom end of the drain pipe prior to securement of the drain pipe within the tub opening.

The water saver apparatus is completed by the return hose 23 attached to the drain tube 24 at the low portion of the tub 3. Hose 23 is sufficiently long so that it may be unhooked from the tub 3 and brought through the opening washing machine door 11 to drain the contents of tub 3 into the washing basket 12.

Assume now that the apparatus is as shown in Fig. 1, and the washing machine has completed its washing cycle. The next step of the operation is to remove the soapy water from the machine and the clothing therein. In automatically controlled machines of the type shown, this is accomplished by rapidly spinning the basket 12 so that the water therein and the water contained within the articles of clothing therein pass from the basket through the plurality of openings 12.1 thereof into the water collector chamber 25 from which it flows into the pump 26. The pump is being simultaneously driven by the washing machine mechanism (not shown) and pumps the water through the tube 2.

The wash water discharging through the diverter pipe 17 at the end of the hose 2 flows into the bowl 20 and into the tub 3. None of the water will enter the drain pipe 18. The bowl contains about one-and-one-half pints of water which, of course, weighs down the float. The float remains at the bottom of the tub until the wash water in the tub 3 has climbed to about three-quarters up the outer wall of the bowl. The float system has a rather slow rise in the tub, because of the weight of water in the bowl. As the quantity of liquid discharging from the washing machine nears an end, the uppermost rim of the bowl rises above the rim of the drain pipe, whereupon the liquid within the bowl flows into the drain pipe and the bowl becomes less of a restraint on the float. There is also, of course, leakage

through the base of the bowl into the tub. The bowl, therefore, very quickly lightens to such an extent that the float drives rapidly upwardly and establishes the bowl **20** in the Fig. 6 position. The movement of the diverter tube **17** from its Fig. 1 to its Fig. 6 position, which began slowly as the rim of the bowl **20** began to engage the cam **16.3**, is completed rapidly as the float drives upward to its maximum height. There will, of course, be some loss of wash water from the bowl into the drain pipe and there may be a residual discharge from the hose **2** which will flow into the drain pipe. The total loss, however, is rarely more than two pints out of the total of fourteen gallons of water.

The bowl will always rise to the Fig. 6 position. If, for example, the discharge of liquid through the tube **17** ceased just as the rim of the bowl reached the level of the drain pipe inlet, the difference in head between the liquid in the bowl and the liquid in the tub would result in leakage from the bowl into the tub through the clearance space between the bowl flange **20.1** and the drain pipe. The float system would therefore continue to rise until the bowl reached its uppermost position. If for some reason there was an excess of liquid in the washing machine, it is possible that there would be a substantial flow of liquid into the bowl even after the rim of the bowl reached the top of the drainpipe. The liquid would spill into the drainpipe and into the tub, and the buoyancy of the float system would increase with the increase of liquid level in the tub. The bowl will rise and as it does so, an increased amount of spillover into the drain pipe will occur. There is also the leakage from the bowl into the tub, as above noted, with the inevitable rise of the bowl to maximum height.

The tub **3** remains full to the brim of the drain pipe and the float system remains in its Fig. 6 position. All further discharges of liquid from the washing machine such as the cool rinsing water which is used at later operational stages will flow directly to and through the drain pipe. Such water will collect in the tub **5** and flow therefrom to the plumbing waste system. It is possible, of course, for the user to place a conventional stopper (not shown) to seal off the outlet **6** of the tub **5** and thus save a volume of water within which additional articles of clothing may be soaked in preparation for washing. The leg members **4** provide ample clearance above the tub **5** for the user to place articles of clothing into said tub.

The gasket **20.2** at the base of the bowl **20** seats against the base of the flared portion **18.3**, as previously noted, and therefore serves to prevent any appreciable dilution of the water within the tub **3** by the later discharged rinsing water.

As the water from the tub **3** is drained through hose **23** back into the washing machine basket for the second washing operation, the valving system returns to its Fig. 1 position in preparation for a succeeding operation.

It will thus be seen that I have provided a valving system which by means of controlled buoyancy operates in a positive manner to divert inflowing liquid from a collection chamber to a drainage system.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

I claim:

1. In combination, a tub, a drainpipe secured in said tub and having a portion extending upwardly to terminate in an inflow end establishing a desired tub capacity before spillover into said drainpipe, liquid inlet means including a diverter tube, mounting means for said diverter tube, said mounting means being in pivotal association with said tub for positioning the discharge end of said tube above the inflow end of said drainpipe for

movement of said tube between first and second positions respectively discharging liquid from said tube into said tub or into said drainpipe, a float within said tub, means for guiding said float for movement in a path intersecting the plane of movement of said diverter tube, means carried by said float for loading said float to restrain floatation thereof during a first portion of the filling of said tub, means for unloading said float during a final portion of the filling of said tub to accelerate the upward movement of said float, means including a cam member on said diverter tube mounting means engaged by said float-loading means as it reaches a predetermined level within said tub to rotate said diverter tube to a position in which further discharge therefrom will pass into said drainpipe, means for draining said tub for return of said float to its initial position, and means effective upon such return of said float to restore said diverter tube to its said first position.

2. In combination, a tub, a drainpipe secured in said tub and having a portion extending upwardly in spaced relation to the side walls of said tub to terminate in an inflow end establishing a desired tub capacity before spillover into said drainpipe, liquid inlet means including a diverter tube pivotally mounted at one end relative to said tub above the inflow end of said drainpipe and movable between positions respectively discharging liquid into said tub or into said drainpipe, a float within said tub, means for guiding said float for movement in a path intersecting the plane of movement of said diverter tube, means carried by said float to receive liquid discharging into said tub from said diverter tube to impose a restraining load on said float during a portion of the filling of said tub, means for discharging liquid from said float-carried means into said drainpipe to lighten the float for accelerating the rise thereof during the final portion of the filling of said tub, and means interposed between said float-carried means and said diverter tube to rotate said tube to a position in which further discharge therefrom will pass into said drainpipe.

3. In combination, a tub, a drainpipe secured in said tub and having a portion extending vertically in spaced relation to the side walls of said tub to terminate in an inflow end establishing a desired tub capacity before spillover into said drainpipe, a float disposed about said vertical drainpipe portion for guided movement thereon, an upwardly facing bowl member carried by the upper portion of said float member adjacent said drainpipe, liquid inlet means including a diverter tube pivotally mounted relative to said tub above said bowl to direct inflowing liquid into said bowl for spillover into said tub whereby liquid accumulating in said bowl reduces the buoyancy of said float to slow the rise thereof in said tub, and means engaged by said bowl as said float reaches a predetermined level in said tub to displace said diverter tube to a position directing further inflow of liquid into said drainpipe.

4. The combination as in claim 3, in which said tub has means for draining the accumulated liquid therefrom.

5. The combination as in claim 3, in which said drainpipe has means establishing the uppermost limit of travel of said float and bowl member.

6. The combination as in claim 3, in which said bowl member comprises an outwardly and upwardly flaring structure disposed symmetrically about said drainpipe and having an inwardly turned bottom flange loosely embracing said drainpipe.

7. The combination as in claim 3, in which said float member comprises a downwardly-facing cup-like member of water impervious material.

8. In combination, a tub, a drainpipe secured within the bottom of said tub and extending vertically upward therefrom to present a substantially smooth cylindrical surface terminating in an outwardly flaring rim defining an inlet to said drainpipe, a float member disposed about said drainpipe for guided movement thereon, an upwardly

facing bowl member disposed symmetrically about said drainpipe and carried by the upper portion of said float member, said bowl member having an inwardly facing flanged base slidably embracing said drainpipe, means for introducing liquid into said tub, including a diverter tube pivotally mounted relative to said tub, means engaging with said drainpipe to position said diverter tube for discharge into said tub, and a cam member carried by said diverter tube engageable by the rim of said bowl member as the latter approaches the top of the drainpipe to rotate said diverter tube to discharge liquid directly into the drainpipe.

9. The combination as in claim 8, in which said bowl member has a gasket member carried by said flanged base for engagement with said flaring rim to establish the maximum elevation of said float and bowl within said tub and to restrict leakage of liquid from said bowl into said tub.

10. In combination, a tub, a drainpipe secured within the bottom of said tub and extending upwardly therefrom to present a substantially smooth cylindrical surface terminating in an outwardly flaring rim defining an inlet to said drainpipe, a float member disposed about said drainpipe for guided movement thereon, an upwardly facing bowl member disposed symmetrically about said drainpipe and carried by the upper portion of said float member, said bowl member having an inwardly facing

flanged base portion slidably embracing said drainpipe and engageable with said outwardly flaring rim of said drainpipe to establish the upper limit of travel of said float and bowl member, means for introducing liquid into said tub including a diverter tube pivotally mounted relative to said tub, means engaging with said drainpipe to position said diverter tube for discharge into said bowl member and tub, whereby the accumulation of liquid within said bowl member reduces the buoyancy of said float member for relatively slow initial rise within said tub until the upper rim of said bowl member rises above said drainpipe inlet and flow of liquid from said bowl member into said drainpipe lessens the weight on said float member and permits the float member to rise rapidly during the last portion of its travel, and a cam member carried by said diverter tube and engageable by the rim of said bowl member as the latter approaches the top of the drainpipe to rotate the diverter tube toward said drainpipe for further discharge wholly into said drainpipe.

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