

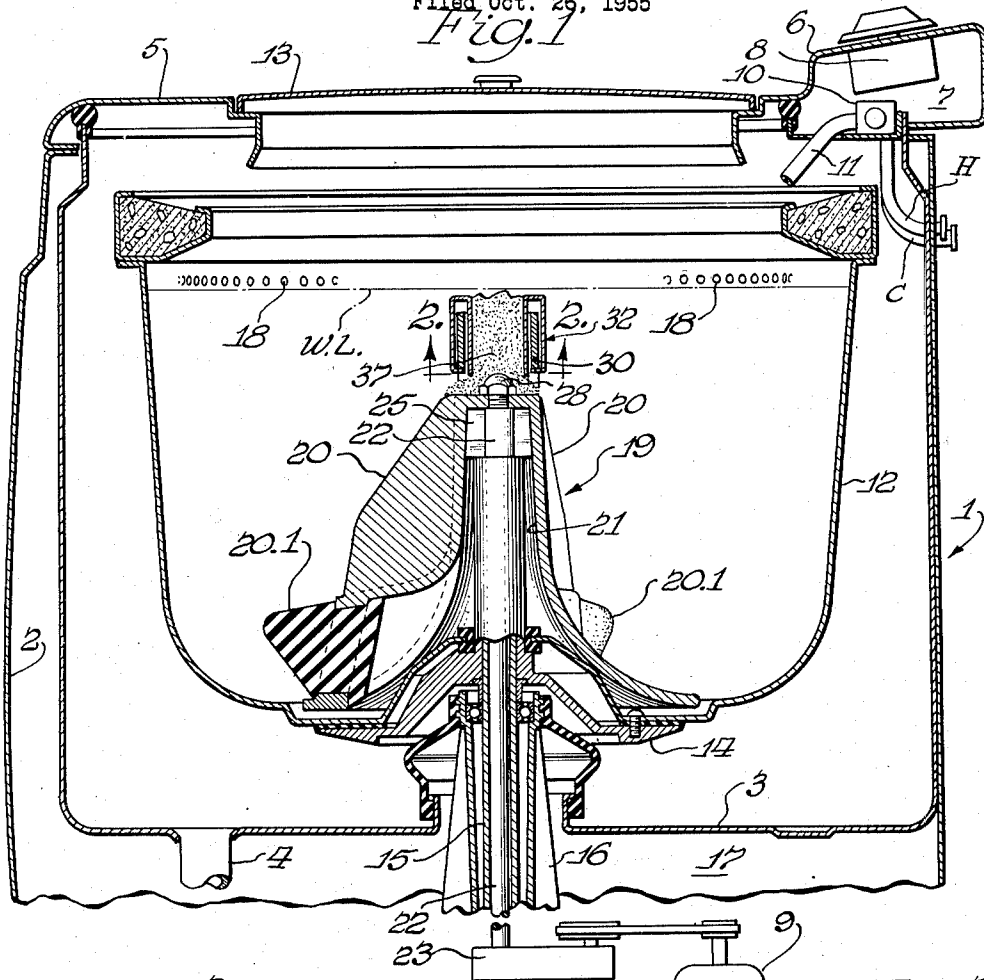
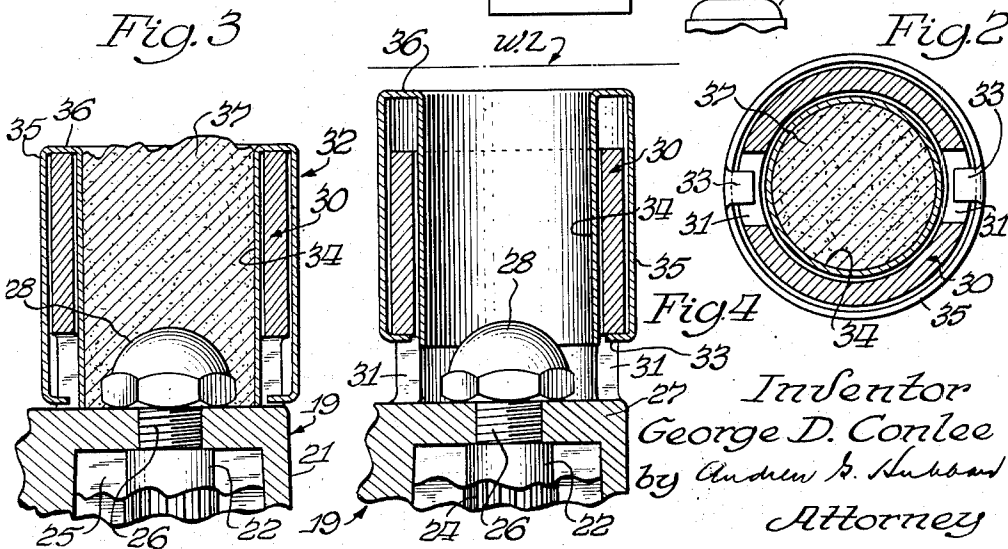
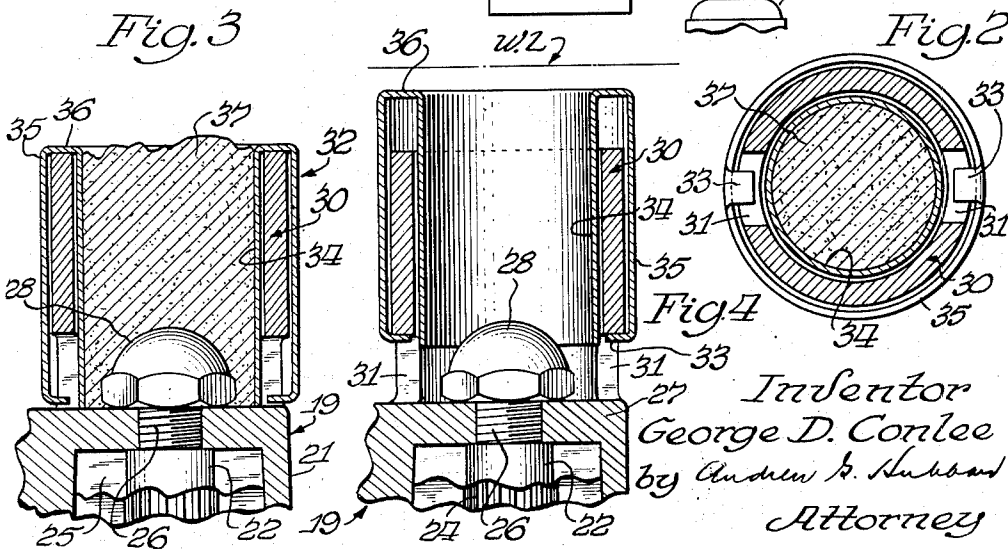
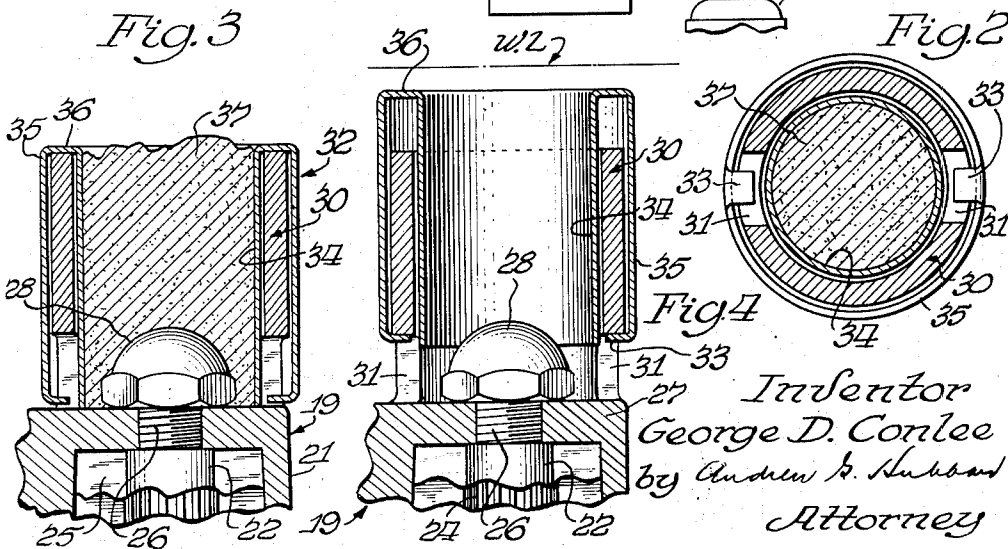
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AUTOMATIC SOAP DISPENSER FOR CLOTHES WASHING MACHINES

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AUTOMATIC SOAP DISPENSER FOR CLOTHES WASHING MACHINES

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This invention relates to clothes washing machines and, in particular, to a clothes washing machine having provisions for automatically introducing a measured charge of detergent into the tub of the machine during the filling thereof with water.

In domestic clothes washing machines of the fully automatic type, it is possible for the user to load the clothes into the machine, pre-select the desired washing time and temperature of the wash and/or rinse water, and then actuate a program controller which operates to fill the tub with the required amount of water, and then conducts the machine through a timed sequence involving washing, rinsing, and water extraction operations. The machine is intended to be so completely automatic that the user need only load the machine with the clothes to be washed, operate the control device as above noted, and return at a later time to remove the washed and damp-dried articles of clothing from the tub of the machine.

The single departure from almost full automaticity is the absence, or inadequacy, of means for automatically introducing the soap or detergent into the wash tub. Washing machines which are not equipped with automatic detergent introduction devices make it necessary for the user manually to add the detergent. Many users are reluctant to do this before the tub is filled with water, because pockets of soap powder or detergent tend to form in the still-dry articles of clothing, and during a substantial part of the ensuing washing operation, portions of the clothes may be subjected to strong concentrates of soap or detergent solution. The alternative to such a method of soaping, however, is to wait until the tub has become filled with the wash water and then to sprinkle the soap into the filled tub; but this is obviously inconsistent with the otherwise completely automatic operation of the machine. Other types of machines have externally arranged soap receiving chambers through which is discharged the flow of water for filling the tub of the machine. It is intended in such machines that the inflowing water will carry with it the charge of detergent, and although such arrangements have been generally successful, it has been found that some detergents cake-up solidly in the chamber and are not subjected to sufficiently powerful or extended water action to dissolve or disintegrate the cake, whereupon a soap residue remains in the soap chamber, and, after several operations of the machine, accumulates to such volume as to require manual removal by the user of the machine.

The present invention contemplates the addition to the agitator of a washing machine of the vertical axis agitation type of a soap or detergent container which will automatically dispense a proper quantity of detergent into the tub when the filling thereof has been completed. The oscillation or other movement of the agitator at the first stages of the washing operation creates water currents which pass through the soap container, and thus insure that it is emptied of its detergent charge. The extended period of agitator action—usually not less than five minutes—makes complete purging a certainty. In

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one aspect of the invention, the agitator is provided at its upper end with a soap receiving container having an open top and a plurality of passages adjacent its lower end. A sleeve valve fits telescopically within the soap container in free sliding fit with the inner walls thereof. Said sleeve extends to substantially the full depth of the soap container to close off the said passages. The valve has means for making it buoyant as the water entering the tub during the filling operation commences to rise above the soap container. The valve therefore rises with the increasing height of the water within the tub and as it does so, exposes the openings in the bottom of the soap container. Water, of course, enters the lower portion of the container and commences to mix with the soap content thereof. Eventually, the sleeve valve rises to its full permitted extent, and when the water reaches its maximum normal operating level, at or slightly above the top of the agitator, the soap container will be completely submerged. When the agitator begins to oscillate with the commencement of the clothes washing cycle, the water flow currents set up and maintained thereby within the tub create water movement into the soap container and out through the lower wall openings thereof, thus effecting complete dispersal of the soap into the wash water.

It is therefore an object of the invention to provide a washing machine in which a previously placed charge of soap will be introduced into the wash water commencing at the time when the wash water is approaching its full operating level in the washing tub.

It is another object of the invention to provide a soap dispenser in which at least a substantial portion of a previously placed soap charge will be evacuated into the tub of the washing machine at the time the level of wash water reaches its normal operating condition.

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

Fig. 1 is a side sectional elevation of a washing machine embodying the invention, the agitator drive mechanism and motor being shown somewhat schematically in that they form no part of the present invention;

Fig. 2 is a plan section, taken through the agitator and soap container control valve, looking in the direction of the arrows 2—2 of Fig. 1;

Fig. 3 is a vertical sectional elevation of the upper portion of the agitator showing the loaded soap container and the valve in its lower position; and

Fig. 4 is similar to Fig. 3, but showing the action of the valve to expose the soap container exit ports for flow of the contents thereof from the chamber into the filled washing machine tub.

In the accompanying drawing which shows a presently preferred embodiment of the invention, the basic elements of the washing machine 1 are intended to be merely representative of contemporary machines now very common in the trade; the machine may be fully automatic or manually controlled, although, of course, the advantages of the invention are most apparent in machines of the fully automatic type.

The washing machine 1 comprises the usual outer casing 2 within which is disposed a water receiver 3, said receiver having a water discharge connection such as the discharge hose 4, usually comprising the inlet hose of a discharge pump (not shown). The machine further includes a cover having a raised rear portion 6 defining a chamber 7, housing among other things a control switch 8 for the drive motor 9, a water valve 10 of the well-known type having individually operable solenoid controlled ports for the introduction of hot and cold water or mixtures thereof. The valve 10 has hot and cold water

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inlet connections H and C respectively, which receive hot and cold water through appropriate piping connections (not shown). Valve 10 discharges the water through a spout 11 into the washing tub 12, as now well known in the art. The cover 5 is provided with a removable lid 13 through which articles of clothing (not shown) may be loaded into the tub 12 and removed therefrom.

The tub 12 is suitably supported within the collector 3 for rotation about a vertical axis; the method of mounting the tub and of rotating it is of no interest in the present invention. It is sufficient to note that the tub is fixed to a bracket or spider 14, which in turn is suitably fixed to a tubular shaft 15 rotatably supported within a frame element 16 securely mounted by appropriate means (not shown) within the machinery compartment 17 below the water collector 3. By means (not shown) the shaft 15 is driven by the motor 9 at appropriate portions of the rinsing and drying cycle of the machine. The washing machine thus described is of the centrifugal extraction type, in which rotation of the tub 12 at relatively high speed causes the liquid content of the tub to climb the wall of the tub and to discharge into the water collector through the line of escape ports 18 near the upper rim of the tub. However, the invention is equally adaptable to machines of the well-known wringer type in which the tub is stationary at all times.

Washing action within the tub is accomplished by the oscillation of an agitator 19, having a suitable plurality of blades 20 extending radially from a central tubular post 21. The agitator is securely fastened to a drive shaft 22, which extends into the machinery compartment 17 to be oscillated by means of a conventional transmission 23, belt driven by the motor 9; a commonly used transmission in the art is that shown in the Patch U. S. Patent 1,964,440, granted June 26, 1934, for "Oscillating Mechanical Movement for Washing Machines and the Like." Specifically, the agitator post may be secured to the shaft 22 through the agency of a fluted end 24, received within a block 25, secured to the agitator post 21. A threaded extension 26 of said shaft passes through a plate 27 comprising the top of the post 21. An acorn nut or the like 28 removably secured the agitator to the drive shaft 22. When the motor 9 is energized by appropriate operation of the switch 8 in circuit therewith, it drives the transmission 23, which thereupon imparts oscillatory movement to the agitator 19, whose blades 20 and blade extensions 20.1 create currents within the wash water contained within the tub. The surging movement of the wash water within the tub causes the articles of clothing (not shown) within the tub to move and tumble about to expose all surfaces thereof to the cleansing action of the wash water, as is well known.

The detergent container according to the present invention comprises a cylindrical cup 30 at the top of the agitator 19. Advantageously, of course, the container can be an integral extension of the agitator. In either event, its base comprises the plate 27, and the container rises to a point at or just below the normal operating water level in the washing machine tub, as indicated at W. L. in Figs. 1 and 4. The container or cylindrical extension 30 is entirely open at its upper end, and at or near the base 27 is provided with a plurality of side wall ports 31. Two such ports suffice, as indicated in Fig. 2.

A sleeve valve 32 is arranged in freely slidable telescoping relation with the container 30, and depending upon its vertical position relative to said container, closes or exposes the ports 31. The limit of upward movement of the valve 32 is established by the tabs 33 of the valve which ride freely within the ports 31. The inner sleeve portion 34 extends the full length of the cylindrical detergent container 30 and the bottom of the sleeve 34 will come to rest upon the base wall 27. In such position, the ports 31 are closed. The vertical movement of the valve 32 to expose the ports 31 is accomplished

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by causing the valve to float upwardly as the water in the tub 12 approaches its normal operating water level. Although the buoyancy can be accomplished in various ways, as by affixing to the valve 32 a buoyant element (not shown), I prefer to create the buoyancy by a volume of air trapped within the valve itself, for then the valve can be devoid of outer wall projections or extensions which might interfere with the clothes turnover.

Accordingly, I construct the valve to have an outer wall or sleeve 35 joined to the inner sleeve 34 by an imperforate wall 36 which extends over the upper end of the cylindrical container 30. Obviously, the walls 34, 35, and 36 form an air bell within which air will be trapped as the water in the tub rises above the lowermost edge of the sleeve 35. As the water continues to rise, the air trapped within the air bell has a buoyant effect on the valve 32, causing it to travel from its Figs. 1 and 3 position to the Fig. 4 position, in which the wall openings 31 of the detergent container 30 are fully exposed.

When the user is readying the machine for operation, at which time the valve 32 would be in its lowermost position covering the ports 31, the user fills the detergent container 30 with the detergent. For proper washing of a clothes load of about eight pounds of dry weight, a proper detergent charge will be of the order of eight ounces of granulated or flaked soap or detergent, and the container 30 is designed to accommodate this quantity when the container is full. Liquid detergents usually are more concentrated, and a smaller quantity may be used. With the charge of detergent 37 in place and the clothes placed in the tub, the user effects the flow of water into the tub by manual or automatic means according to the capabilities of the machine. When the water attains the level indicated in Fig. 3, it will, of course, begin to enter the relatively small annular spaces between the respective valve walls 34 and 35 and the wall of the container 30. Some water will penetrate into the container. The valve 32 will not, of course, tightly seal the ports 31. If liquid detergent is used, the small amount of escape thereof into the tub during the filling operation is not of importance because it goes quickly into solution. The preliminary wetting of dry soap or detergent does not affect the operation of the device. When the water attains the full operating level, the valve will have risen to the maximum permitted by the tabs 33 and the ports 31 will have been fully exposed. A liquid detergent charge will have completely entered the wash water at this time, and a dry detergent thoroughly wetted at this stage of operation. The dry detergent will begin to dissolve and pass into the wash water within the tub. At this time, again either by manual or automatic control, the motor 9 is energized to begin the oscillation of the agitator, whereupon the creation of water action within the tub 12 and the container 30 causes water flow into and out of the container 30 and effectively completely evacuates the detergent into the wash water in the tub. The relatively long period of agitation, usually not less than three minutes even for "delicate" fabrics, will reduce even caked detergents to soluble form.

By means of the present invention, therefore, a proper amount of soap or detergent is admitted to the wash water at a time when the clothes are floating or otherwise in motion within the tub, whereupon there is no opportunity for heavy concentrations of detergent to pocket within any of the articles being washed.

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. A detergent dispenser for a clothes washing machine having a tub to receive clothes to be washed and means

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for filling said tub with wash water to a normal operating level, said dispenser comprising an upstanding, cup-like, detergent container having an open top and a plurality of discharge ports at the base thereof, means for supporting said container within said tub with the opening of said container below the wash water operating level, valve means in said tub to close or open said detergent container discharge ports, said valve means being manually operable to close said ports, and float means on said valve means and responsive to an increase in the water level during the filling of said tub to operate said valve means into port-opening position to permit the passage of detergent from the chamber to the tub.

2. A detergent dispenser according to claim 1 in which said detergent container supporting means is adapted to oscillate the said container within the tub.

3. A clothes washing machine comprising, in combination, a tub, means for filling said tub with washing liquid to a desired operating level, a washing device in said tub, means for operating said washing device to create movement of liquid within said tub, an open-topped detergent container supported by said washing device within said tub with the top of said container below the operating level of washing liquid, said container having discharge ports at the base thereof, sleeve valve means disposed slidably within said container for axial movement therein to cover or expose said ports according to the axial displacement of said sleeve valve means relative to said ports, and float means responsive to the rise in liquid level within said tub during the filling thereof to displace said sleeve valve to port-opening position for passage of detergent from the container into the tub and the free passage of liquid into said container by entry through said ports.

4. The combination according to claim 3 in which said washing device has a central upstanding post portion and said detergent container constitutes a cylindrical extension of said post portion.

5. A detergent dispenser for a clothes washing machine having a tub to receive clothes to be washed and means for filling said tub with wash water to a normal operating level, said dispenser comprising an upstanding cylindrical container for the reception of detergent and having at least one discharge port in the lower portion of the side wall of said container, means for supporting said container within said tub with the open top of said container below the normal operating level of the wash water, a sleeve valve mounted on said container, said valve comprising an inner imperforate sleeve extending to below the said discharge port in relatively close slidable relation with the inner wall of said container, an outer imperforate sleeve in relatively close slidable relation to the outer wall of said container and extending over said discharge port, and a top imperforate wall portion extending from one to the other of said sleeves over the upper end of said container, said sleeves and top wall defining means for entrapping air as the wash water in said tub rises during the filling thereof to above the bottom of said inner and outer sleeves, the volume of said air-entrapping means being effective to raise said sleeve valve means to expose the discharge port of said container as the water level in said tub reaches normal operating level.

6. The combination according to claim 5, in which said sleeve valve has means for limiting the vertical movement of said valve.

7. A clothes washing machine comprising, in combination, a tub to receive articles to be washed, means for filling said tub with washing liquid to a desired operating level, a wash in device in said tub, said device comprising an agitator arranged for oscillation about a vertical axis, a detergent container carried by said

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agitator for oscillation therewith, said detergent container having an open top and discharge ports disposed below a predetermined operating level of washing liquid in said tub, sleeve valve means arranged in slidable relation to said container and normally gravity-biased to cover said ports to permit filling said container with a measured charge of detergent, float means integral with said sleeve valve means to displace the same to expose said discharge ports for escape of detergent into said tub upon the attainment of said predetermined operating level of washing liquid, and means for oscillating said agitator and detergent container to facilitate the escape of detergent therefrom and the admixture thereof with said washing liquid.

8. A clothes washing machine comprising, in combination, a tub to receive articles to be washed, means for filling said tub with washing liquid to a desired operating level, a washing device in said tub, said device comprising an agitator arranged for oscillation about a vertical axis, a cylindrical detergent container concentric with said agitator and extending from the upper end thereof for oscillation therewith, said detergent container being open to the atmosphere and extending to below a predetermined operating level of washing liquid in said tub, a wall portion of said container below said liquid level having discharge ports, sleeve valve means slidably engaging said wall portion and normally gravity-biased to cover said ports to permit filling said container with a measured charge of detergent, air entrapping means forming a part of said sleeve valve means and providing buoyancy to lift said sleeve valve means upon the rise of liquid within said tub, whereby to expose said discharge ports for escape of detergent into said tub, and means for oscillating said agitator and detergent container to facilitate the escape of detergent therefrom and the admixture thereof with said washing liquid.

9. A clothes washing machine comprising, in combination, a tub to receive articles to be washed, means for filling said tub with washing liquid to a desired operating level, an agitator within said tub, means for oscillating said agitator about a vertical axis, means providing an upstanding tubular container at the upper portion of said agitator, said container being arranged to receive a quantity of detergent, said container having ports communicating with said tub below the said normal operating level of liquid therein whereby liquid may enter said container for mixture with said detergent and the mixture pass therefrom into said tub, valve means disposed within said container in vertical slidable relation with the side wall thereof, said valve means being movable to a first operative position relative to said container ports to prevent escape of detergent therethrough and upwardly movable from said first position to a second position exposing said container ports for the passage of detergent into said tub, means for rendering said valve means sufficiently buoyant as the washing liquid attains a level submerging the said container ports to move from said first to said second position, and stop means for preventing upward movement of said valve means beyond its said second position, whereby said valve means may be manually moved to its first position and will attain its port-exposing position as a result of the filling of the tub with washing liquid.

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