Feb. 7, 1961 J. R. JOHNSTON 2,970,463

CLOTHES WASHING MACHINE HAVING A DISPENSING DEVICE

Filed Feb. 2, 1959 2 Sheets-Sheet 1

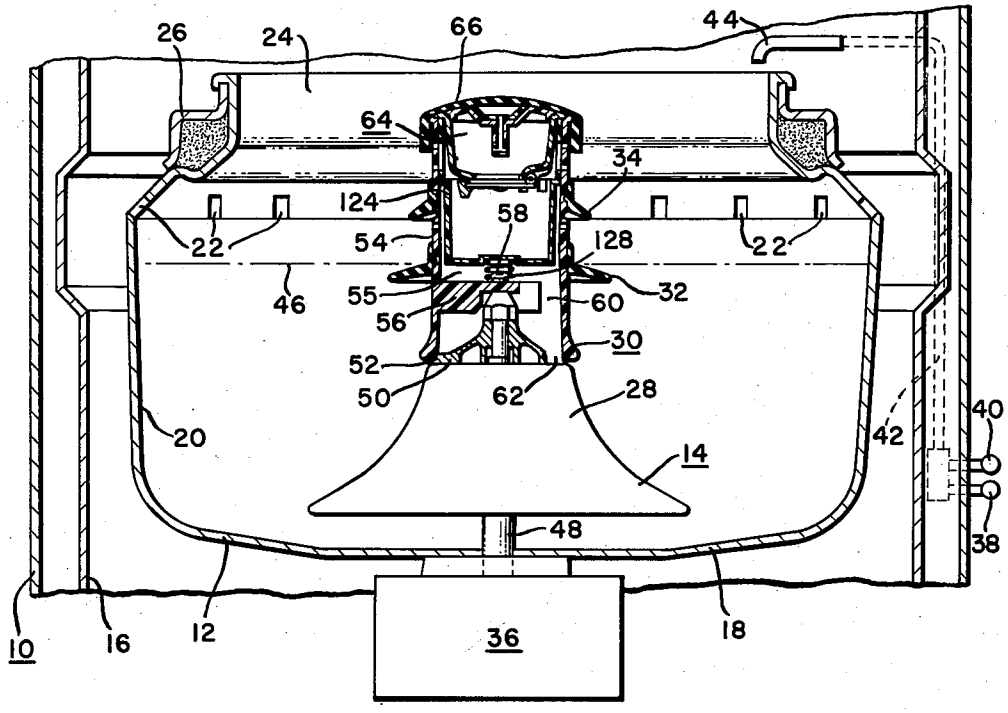


Fig. 1

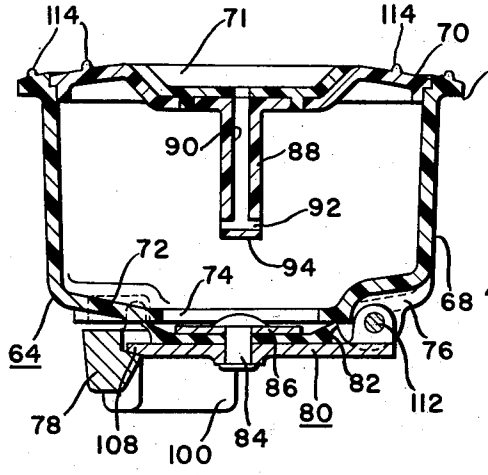


Fig. 2

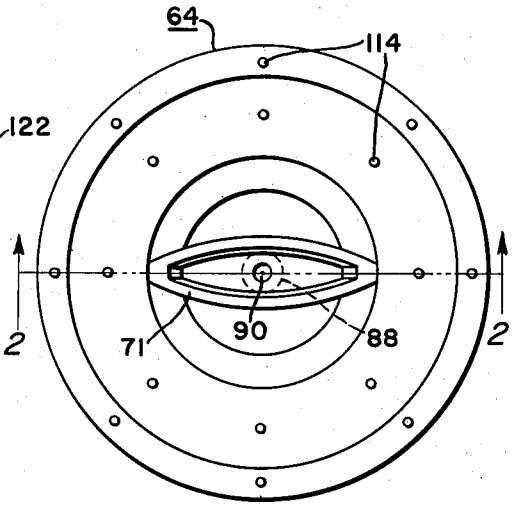


Fig. 3

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CLOTHES WASHING MACHINE HAVING A DISPENSING DEVICE

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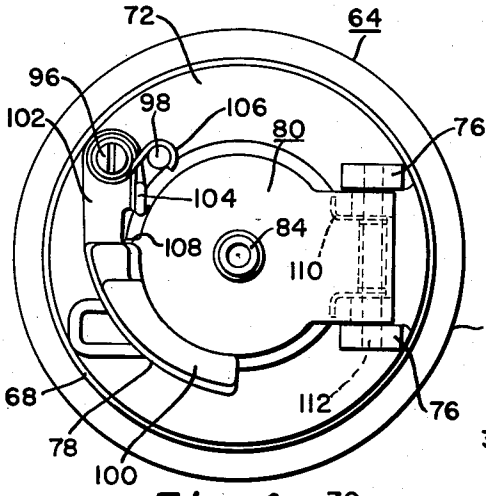


Fig. 4

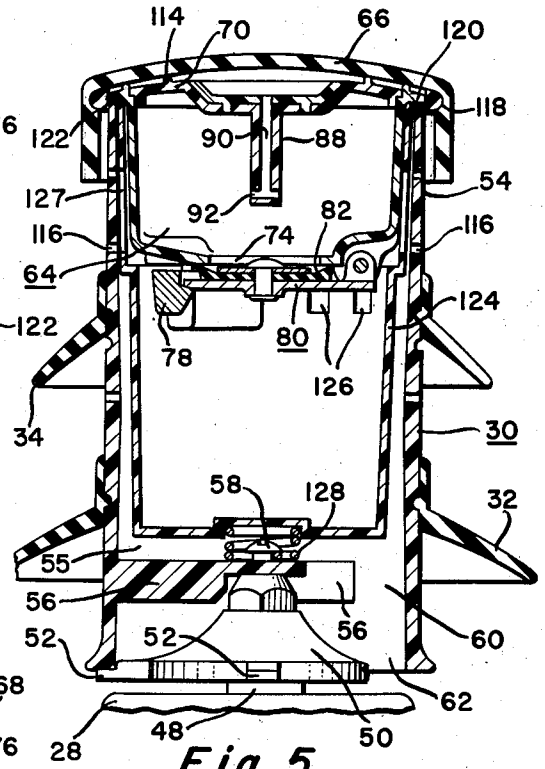


Fig. 5

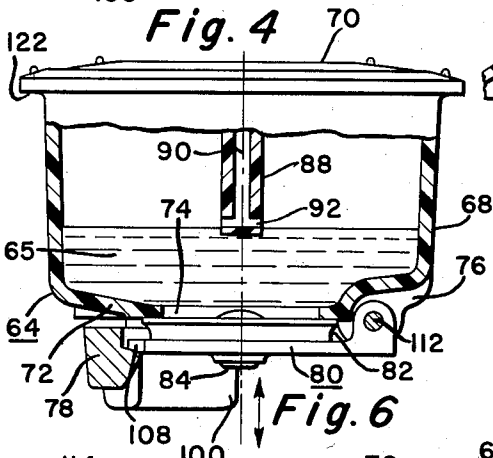


Fig. 6

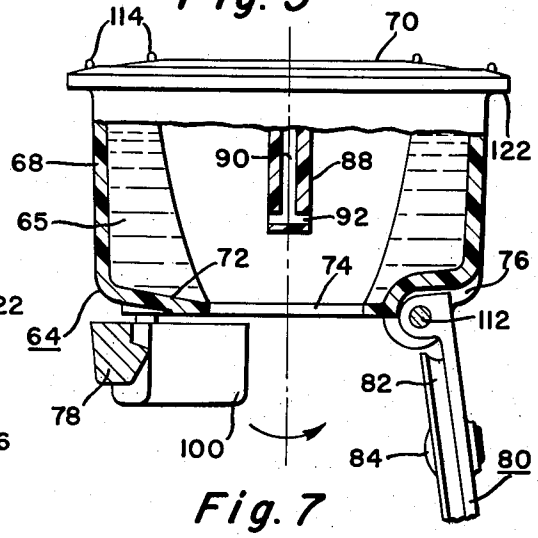


Fig. 7

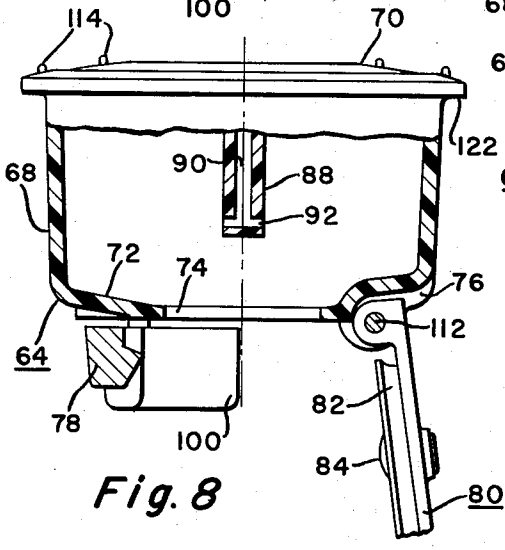


Fig. 8

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2,970,463

CLOTHES WASHING MACHINE HAVING A DISPENSING DEVICE

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3 Claims. (Cl. 68—17)

This invention relates to a domestic appliance and more particularly to an improved dispensing arrangement for a clothes washer.

With the improved washing cycles being marketed currently it has become desirable to dispense different types of laundry substances at different periods during the washing cycle. Most efforts to achieve this result have utilized the washing machine timer to sequentially actuate the different dispensing devices. This is costly and further complicates an already complicated timer. For this reason the dispensing arrangement of the present invention achieves its sequential dispensing by utilizing the various mechanical movements which arise during the washing or spinning portions of the wash cycle.

This invention is directed particularly to the situation where a normally closed, centrifugally actuated dispensing device is installed in a position which is subjected to changing temperatures within the clothes washer, and for which the operation of the dispenser is erratic. For instance, certain wash cycles include a cold water overflow at the conclusion of a relatively warm agitate cycle. In this situation the centrifugally actuated dispenser is first exposed to a hot washing fluid during the agitating portion of the cycle and subsequently to a cooler fluid during the cold water overflow. This sequence of events creates a vacuum within the dispenser which prevents the cover of the dispenser from opening even though the cover of the dispenser has been unlatched during spin.

Accordingly it is an object of this invention to provide a generally imperforate centrifugally actuated dispenser with a vent to equalize pressures inside and outside the dispenser.

It is also an object of this invention to provide a dispenser having only a bottom opening with a vent in the form of a standpipe which will extend above the fluid to be dispensed during the filling operation of the dispenser through said opening.

A further object of this invention is to provide a dispensing device with a side opening standpipe vent to prevent loss of the fluid to be dispensed while the dispenser is being filled.

It is also an object of this invention to provide a dependable sequentially actuated dispensing apparatus which is actuated by the selective reciprocation or rotation of a washing machine member.

A more specific object of this invention is the inclusion of a dispensing apparatus on the agitator of a clothes washing machine which has a first compartment for dispensing detergent, a second compartment for dispensing bleach and a third vented centrifugally actuated compartment for dispensing a rinse conditioner and means whereby the three compartments may be utilized independently.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a fragmentary view of a clothes washer to which this invention may be adapted;

Figure 2 is a side sectional view of the vented centrifugally actuated dispenser of this invention taken along line 2—2 in Figure 3;

Figure 3 is a top elevational view of the dispenser;

Figure 4 is a bottom elevational view of the centrifugally actuated latch on the dispenser;

Figure 5 is an enlarged fragmentary sectional view of a modified form of the sequentially actuated dispensing arrangement of this invention;

Figure 6 is a schematic representation, partially in section, showing the sequentially actuated dispenser during the agitate portion of a wash cycle;

Figure 7 is a schematic representation, partially in section, of the centrifugally actuated dispenser during the spinning portion of a wash cycle; and

Figure 8 is a schematic representation, partially in section, of the centrifugally actuated dispenser at the conclusion of the spinning portion of the wash cycle.

In accordance with this invention and with reference to Figure 1 a washing machine **10** is provided with a spin basket **12** and an agitator shown generally at **14**. A water container **16** surrounds the spin basket or tub **12** and directs water being removed from the tub **12** to a drain (not shown).

The spin basket **12** is formed with a substantially horizontal bottom wall **18**, a slightly outwardly tapered side wall **20** at the top of which are a plurality of circumferentially arranged outflow ports **22**. The tub **12** is formed with an access opening **24** at the top thereof through which clothing may be admitted to the tub. Surrounding the access opening **24** is a ballast ring **26** which serves to stabilize the spin basket or tub **12** during a spinning operation.

The agitator **14** is formed with a primary ring **28** for motivating or circulating the washing solution and a dispensing portion or housing shown generally at **30**. The dispenser housing **30** carries a secondary ring **32** for aiding in producing the toroidal circulation of the washing fluid and an upper ring **34** which aids in the removal of lint and scum from the surface of the washing fluid to the outflow ports **22**. Included within the dispenser housing **30** are the various compartments and mechanisms for sequentially dispensing a plurality of washing substances to the tub **12**. These will be explained more fully hereinafter. For the purposes of this description the dispensing housing **30** is fixed in juxtaposition to the water circulating ring **28** as described hereinafter.

For vertically reciprocating the agitator **14** and for spinning the tub **12** a power operated mechanism **36** is shown schematically. In accordance with a conventional washing machine timer (not shown) the mechanism **36** serves to move the agitator **14** in an up and down motion during the wash or agitate portion of the wash cycle while the spin tub **12** remains motionless. During a centrifuging or spinning operation the mechanism **36** through a system of concentric shafts rotates the tub **12** and the agitator **14** at a high rate of speed to remove the water from the clothing just washed. This general explanation of the functioning of the mechanism **36** is believed a sufficient basis for the explanation of this invention. However for additional details as to the details of mechanism **36** reference may be had to the patent to Sisson 2,758,685, issued August 14, 1956, wherein the agitating and spinning mechanism is taught more fully.

Water is supplied to the spin tub **12** by means of a hot water supply valve **38** and a cold water supply valve **40**. Both hot and cold water are supplied to the spin basket **12** through a mixing conduit **42** which terminates in a nozzle **44** overlying the access opening **24** of the

tub 12. Thus in accordance with the operation of a conventional washing machine timer the valves 38 and 40 are selectively energized to send a hot, cold or tempered water supply to the spin tub 12.

The particular problem to which this invention provides the solution arises in a washing cycle wherein hot and cold water is supplied alternately to the tub 12 in which the dispensing housing 30 is located. During a wash cycle the agitator 14 is first reciprocated in response to the action of mechanism 36 for a predetermined warm water agitation period. At the conclusion of the agitate cycle, but prior to spin, the cold water valve 40 is energized to supply a stream of cold water to the warm washing solution then in the tub 12. This causes the normal level of the water 46 which is just above the circulating ring 32 to raise until the water level reaches the circle of outflow ports 22. At this upper level the ring 34 is even with the liquid surface. Cold water continues to flow to the tub 12 until the temperature of the solution within the tub 12 is substantially cooler than it was during the agitate portion of the washing cycle. The duration of time in which cold water is flowed into the tub 12 is determined by conventional design and controlled by the operation of the timer. During the cold water overflow the agitator 14 is reciprocated rapidly so that the ring 34 may chase the scum and lint rising to the upper surface of the fluid out of the outflow ports 22. At this point it should be noted that the upper portion of the dispensing housing 30 is subjected to the effects of cold water during the overflow period and hot water during the agitate portion of the cycle.

The manner in which the agitator is connected to the agitating and spinning mechanism 36 will now be more fully described. A shaft 48 extends upwardly from the mechanism 36 into the spin basket 12. The primary circulating ring 28 is affixed against relative rotation at the upper end of the shaft 48 and a spacer nut 50 threaded on the upper end of the shaft 48 to secure the ring 28 to the shaft. The spacer nut 50 is formed with a plurality of radially directed ribs or fingers 52 which hold the bottom of the dispenser housing 30 a spaced distance from the top of the ring 28. The dispenser housing 30 is formed with a cylindrical wall portion 54 and a plurality of integral radially directed support vanes 56 which form a web utilized in fastening the dispenser housing 30 to the top of the spacer nut 50 by any suitable fastening means 58. This assembly permits free interchange of fluid from the interior 55 of the dispenser 30 to the spin tub 12 by means of a passageway 60 past the housing support vanes 56 and a passageway 62 between the cylindrical wall 54 and the spacer nut 50. The dispenser housing 30 is designed to enclose a centrifugally actuated dispensing cup 64 which is held within the dispenser housing 30 by a flexible cover 66. It is to this centrifugally actuated dispensing cup that the major aspect of this invention is directed and the details of the invention will be described more fully next following.

Referring now to Figure 2 the dispenser 64 is formed with a cup-like portion 68 and a cover or lid 70, both members being formed of a transparent plastic-like material such as acrylonitrile styrene. The cup portion 68 is formed with a bottom wall 72 having an opening 74. Adjacent the opening and formed integrally with the bottom wall 72 is a hinge pin support 76 and a latch 78. Pivotally carried by the hinge pin support is a door or cover shown generally at 80. The door 80 is pivotally mounted to close the opening 74 and is latched in a closed position by the latch 78. To insure a complete seal of the opening 74 a gasket or seal 82 may be provided on the door 80 and held positively thereto by a rivet 84 and washer 86.

The cover 70 of the dispenser 64 is formed with a vent pipe 88 which extends into the dispenser cup 68 and has a central port or passageway 90 at the terminus of which is a right angle orifice 92. The vent pipe 88 is designed so that when the cup 64 is inverted for placing the fluid to be dispensed within the cup through the opening 74, the end 94 of the vent pipe will extend above the fluid being admitted. The right angle orifice 92 also aids in preventing any fluid from entering the passageway 90 of the vent during filling and thus prevents a loss of the fluid. The design of the vent pipe 88 contemplates that lid 70 is cemented to the cup 68 and to effect a unitary imperforate structure which may be filled only through the opening 74. However, it is within the purview of this invention to provide the lid 70 with threads which may be screwed into complementary threads on the cup 68. In this arrangement the cup 64 could then be filled through the upper end thereof, thereof, thereby eliminating the need for inverting the cup to fill. In this latter arrangement the vent pipe 88 could then take the form merely of an orifice in the lid 70. In either design removal of the dispenser 64 from the housing 30 is facilitated by a handle 71 cemented or heat peened to the lid 70.

With reference to Figure 4 the latch 78 will be understood more clearly. A pivot pin 96 is attached to the bottom wall 72 of the cup portion 68 and an integral boss or stud 98 formed adjacent thereto. The latch 78 itself is formed with a weighted end 100 and a pivot end 102 on which an upstanding stop 104 is provided. To bias the latch 78 in a closed or latched position a spring 106 is wrapped about the pivot pin 96 with its terminal ends carried on the boss 98 and the stop 104 respectively. Cooperating with the latch 78 is an extension 108 on the cover 80. The extension 108 is formed with a bottom cam surface which is complementary to a similar upwardly facing surface on the latch 78 as best seen in Figure 2. For biasing the cover 80 into an open position a spring 110 is wrapped about a cover hinge pin 112 and terminates on the cover 80 itself. Thus it should be seen when the weight portion 100 of the latch 78 is moved outwardly, such as by centrifugal force, the extension 108 on the cover 80 is unblocked and the cover 80 is moved to an open position by the bias of spring 110.

One of the novel features of this invention contemplates the equalization of pressures between the inside and outside of the dispenser 64 during a wash cycle. Since the cover 66 on the dispenser housing 30 fits snugly over the top thereof, the cover 70 of the dispenser 64 is formed with small protuberances 114 which retain the cover 66 a spaced distance from the surface of the lid 70. This will facilitate a venting of the interior of the dispenser 64 as will be described in connection with the operation of the device.

Another embodiment of this invention is seen in Figure 5 wherein an enlarged view of the dispenser housing 30 is more clearly seen. The cylindrical portion 54 of the housing 30 is shown with ports 116 which permit an interchange of fluid between the inside 55 and outside of the housing 30. At the uppermost end of the wall 54 a radially outwardly directed rib 118 is formed for retaining the cover 66 in seated position thereon. The circular rib or lip 118 is formed with a shoulder 120 which supports a radially extending flange 122 of the dispenser cup 68. The arrangement of Figure 5 includes a second dispensing cup 124 which is suitable for containing a bleach or other type substance to be dispensed gradually during the agitate portion of the wash cycle. The bleach cup 124 is formed with a plurality of circumferentially arranged ports such as 126 to permit a slow but thorough interchange of fluid from the interior of the bleach cup 124 to the compartment 55 when the dispenser housing 30 is being reciprocated vertically. The bleach cup 124 has an upper portion 127 which extends upwardly into juxtaposition with the shoulder 120, thereby effecting a solid assembly with the dispenser cup 64.

The dispenser 64 and the bleach cup 124 may be used independently of one another as the user may desire. Where the bleach cup 124 is used alone, a clear-

ance exists between the cover 66 and the top of the bleach cup 124 due to the absence of the flange 122 of the dispenser 64. In this situation agitation of the housing 30 will set up an undesirable noise or rattle. For this reason a spring 128 is secured by the mounting bolt 58 to the housing 30. The spring will serve to exert a constant bias on the bottom wall of the bleach dispenser cup 124. This bias will force the upper end of the bleach cup into engagement with the cover 66, thereby preventing any possible rattling when the dispensing arrangement is utilized without the cup 64.

In operation the dispenser assembly shown in Figure 5 will work as follows. Prior to the start of a clothes washing operation the operator will remove the cover 66 of the dispenser housing 30. The rinse conditioner cup or dispenser 64 and the bleach cup or dispenser 124 are removed from the detergent compartment or housing interior 55. Into the compartment 55 of the housing 30 a measured amount of detergent may be placed. Then the desired quantity of bleach is placed in the cup 124 and this cup returned to the interior 55 of the housing 30. Finally, the rinse conditioner dispenser 64 is inverted and the cover 80 opened to permit an amount of rinse conditioner or some other laundry substance 65 to be inserted within the cup. Since the end 94 of the vent pipe 88 is closed none of the substance will be permitted to run through the vent orifice 90. The cup 64 is filled with the amount suggested by the manufacturer of the substance to a point below the orifice 92 when the cup 64 is inverted. At the conclusion of this filling operation the cover 80 is closed and the latch 78 will set automatically due to the return bias of spring 106. The dispenser assembly 64, as shown in Figure 6, is then placed within the dispenser housing 30, its radial flange 122 resting on shoulder 120 of the dispenser housing wall 54. It should now be seen that the bleach cup 124 is held firmly between the flange 122 of the cup 64 and the compressed spring 128 at the bottom of the detergent compartment 55. With the return of cover 66 to its position on the dispenser housing 30 as seen in Figure 5 the rattle-free assembly is completed and the washing cycle in condition for start.

In accordance with conventional timer operation hot or tempered water is admitted through nozzle 44 to the tub 12. After a predetermined time the water flow ceases and the mechanism 36 is energized to reciprocate vertically the agitator 14 which carries the dispensing housing 30. The detergent which was placed within the compartment 55 of the dispenser will fall through the passageways 60 and 62 into the tub 12 and the circulating ring 28 will thoroughly intermix the detergent with the water. At the same time a substantial interflow or splashing of water will exist between the compartment 55 and the tub 12, by means of passageways 60 and 62 in the lower part of the housing as well as through ports or slots 116 in the side wall 54 of the dispenser housing 30. This interflow of washing fluid together with the vertical reciprocation and jiggling of the bleach within the cup 124 will cause a slow measured mixing of the bleach with the washing solution through the bleach cup ports 126.

All during the agitation portion of the wash cycle the closed rinse conditioner cup 64 is bathed with the hot or tempered water as it is vertically reciprocated (Figure 6). The result of such increased temperatures causes the pressure within the container 64 to increase. Without a vent opening such as 90 these positive pressures would leak past the gasket or seal 82 on the cover as long as the temperature within the dispenser 64 is being increased by the surrounding washing fluid. Assume now that the closed dispenser 64 is suddenly cooled, such as by exposure to a surrounding bath of cold water. A partial vacuum within the dispenser 64 would result. Then, if the latch 78 were tripped as by centrifugal force, the cover 80 wou'd be held closed by the vacuum and the action of the dispenser 64 negated. However the vent 90 of this invention prevents the build up of pressure within the dispenser and facilitates equalization, the positive pressures forcing their way through the vent passageway 90 and between the cover 66 and the lid 70 of the cup 64. The plastic-to-plastic fit between the shoulder 120 and the flange 122 and the separating effect of the protuberances 114 aid in providing an escape passage connecting the interior of the container 64 with exterior of the dispenser housing 30.

As the agitate portion of the wash cycle draws to a close, cold water valve 40 is energized and the water level within the tub 12 is raised from the normal level 46 to the overflow level at the outflow ports 22. The continued admission of cold water lowers the temperature of the washing solution as well as the temperature of the dispenser 64 and its contents. This lowering of pressure within the dispenser 64 will cause the vent 90 to operate in reverse and air will be forced past the loose fit housing shoulder 120 and flange 122 of the dispenser, past the protuberances 114 between the cover 66 and the lid 72 of the dispenser. Thus pressures are always equalized between the inside and outside of the centrifugally actuated dispenser 64.

After a predetermined period the agitating and spinning mechanism 36 will be energized to rotate the tub 12 and agitator 14 in a centrifuging process to remove the water from the clothes. At a predetermined rotational speed, as determined by the weight 100 and the action of spring 106, the latch 78 will be centrifugally actuated to uncover the extension 108 on the cover 80. This movement will permit spring 110 to bias the cover 80 into an open position as seen in Figure 7. However the bottom wall 72 of the dispenser cup 64 forms a shoulder which prevents the substance 65 to be dispensed from falling by gravity from the cup 64 during rotation. Centrifugal force holds the fluid or substance 65 in an annular donut-shaped form against the side walls of the dispenser during the continuation of the spinning cycle. When the mechanism 36 is deenergized and the tub 12 and agitator 14 decelerate to a stop, the substance 65 within the dispenser cup 64 falls by gravity into the bleach cup 124 below as shown by the empty container in Figure 8. It should be obvious if the dispenser 64 is used without the bleach cup 124 the substance dispensed at the conclusion of the spinning cycle will fall directly into the spin tub 12 through passageways 60 and 62.

The rinse portion of the washing cycle is then accomplished by the timer energization of one or the other of valves 38 and 40 to admit water to the tub 12. This water will mix with the substance 65 dispensed from the cup 64 (where the bleach cup 124 is omitted) and the rinsing procedure is accomplished by again energizing the mechanism 36 for vertical reciprocation of the agitator 14. If the bleach cup 124 is used with the dispenser 64, the substance 65 dispensed at the conclusion of the spin cycle will drop into the cup 124 and be mixed with the rinse water due to the reciprocation and interflow of water between the housing 30 and tub 12.

It should now be seen that an improved dispensing apparatus has been provided which will sequentially dispense three different substances during different portions of a washing cycle. Further the apparatus is seen to include a dispenser with a centrifugally actuated cover—a dispenser which is provided with novel means to prevent the change of temperatures within the dispenser during a washing cycle from overriding the desired operation of the centrifugally actuated cover.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A centrifugally actuated dispensing device for a washer tub comprising, a container having top and bottom walls and adapted to contain a laundry substance,

means for selectively reciprocating and rotating said container inside said washer tub, said bottom wall having an opening, means for closing said opening, means for latching said closing means during said reciprocation and for unlatching said closing means during said rotation, a shaft depending from said top wall for continuously venting said container to the atmosphere during said reciprocation thereby to equalize pressures between the exterior and interior of said container, said shaft including an axial passageway from said top wall to a point adjacent the inner end of said shaft, and a second passageway at an angle to said first passageway, said shaft extending above the surface of said substance when said container is inverted.

2. A dispensing device for installation in a washer tub comprising, an imperforate container having top and bottom walls and adapted to contain a washing fluid, means for selectively vertically reciprocating and rotating said container inside said washer tub, said bottom wall having a fluid exhaust opening, means for closing said opening including a flexible seal, means for latching said closing means during said reciprocation and for unlatching said closing means during said rotation, a vent shaft depending from said top wall for continuously venting said container to the atmosphere during reciprocation thereby to equalize pressures between the exterior and interior of said container, said vent including an axial passageway from said top wall to a point adjacent the inner end of said vent shaft, and a second passageway at right angles to said first passageway, said second passageway extending above said fluid when said container is bottom-side-up.

3. A multiple substance dispensing apparatus for a washing machine having a tub and an agitating ring comprising, power operated means to selectively vertically reciprocate and rotate said agitating ring, fastening means for attaching said dispensing apparatus to said agitating ring for movement therewith, said dispensing apparatus including a generally vertical open ended housing spaced at its lower open end from said agitating ring for directing a first substance to said tub when said agitating ring is reciprocated, a first container upwardly biasingly supported in said housing and having an aperture in an upper portion thereof for passing a second substance through said housing to said tub when said agitating ring is reciprocated, and an imperforate second container having an opening, means for closing said opening and adapted to be centrifugally opened for dispensing a third substance into said first container at the conclusion of the rotation of said agitating ring, said second container including a vent from the interior of said second container to the atmosphere, and a cover for locking said housing and said first and second containers in assembled relationship.

References Cited in the file of this patent

UNITED STATES PATENTS

2,267,351	Gohl	Dec. 23, 1941
2,312,950	Zimarik	Mar. 2, 1943
2,406,198	Clark	Aug. 20, 1946
2,498,894	McCormick	Feb. 28, 1950
2,522,242	Wagner	Sept. 12, 1950
2,792,701	Bochan	May 21, 1957
2,868,006	Tingley	Jan. 13, 1959