United States Patent [19]

Janke

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[54] **APPARATUS FOR DISPENSING A LIQUID AND ANOTHER MATERIAL**

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[73] Assignee: **Whirlpool Corporation,** Benton Harbor, Mich.

[22] Filed: **June 20, 1973**

[21] Appl. No.: **372,465**

Related U.S. Application Data

[63] Continuation of Ser. No. 216,652, Jan. 10, 1972, abandoned.

[52] **U.S. Cl.** **222/70,** 134/93, 134/100, 222/453

[51] **Int. Cl.** **B08b 13/00**

[58] **Field of Search** 222/70, 135, 453; 134/570, 134/580, 93, 100, 101

[56] **References Cited**

UNITED STATES PATENTS

3,072,302 1/1963 Giovannoni 222/453

3,411,671 11/1968 Harvey 222/70

Primary Examiner—Robert B. Reeves
Assistant Examiner—Thomas E. Kocovsky
Attorney, Agent, or Firm—Hofgren, Wegner, Allen, Stellman & McCord

[57] **ABSTRACT**

An apparatus for dispensing liquid and another material, such as a particulate detergent material, at different times in an operating cycle of an apparatus such as a dishwasher. The liquid may comprise a rinse aid dispensed by the apparatus subsequent to a washing cycle, such as during the last rinse cycle of the dishwasher operation. A single solenoid operator is associated with each of the dispensing means for coordinated operation thereof. The control measures a preselected quantity of the liquid for delivery thereof from a storage tank in the apparatus.

8 Claims, 7 Drawing Figures

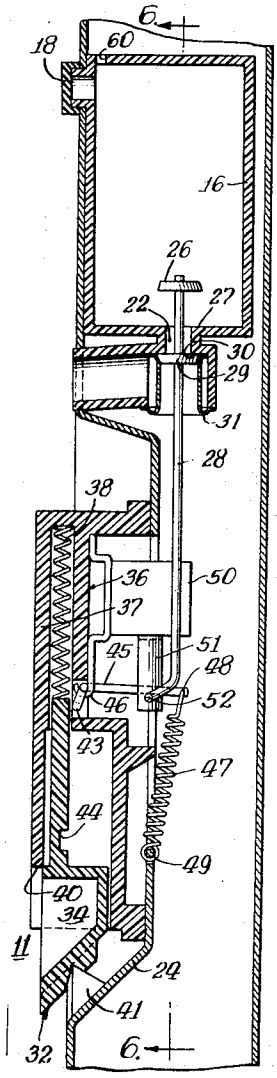


Fig. 1.

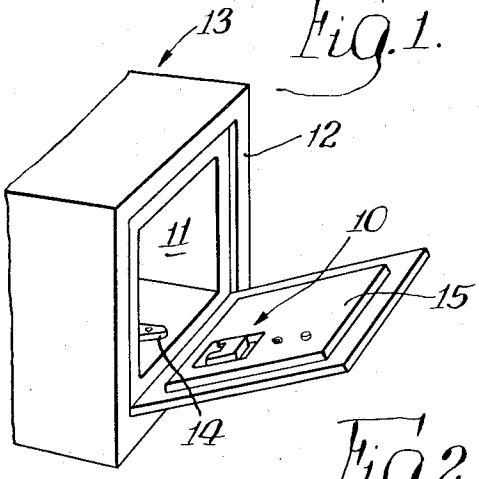


Fig. 2.

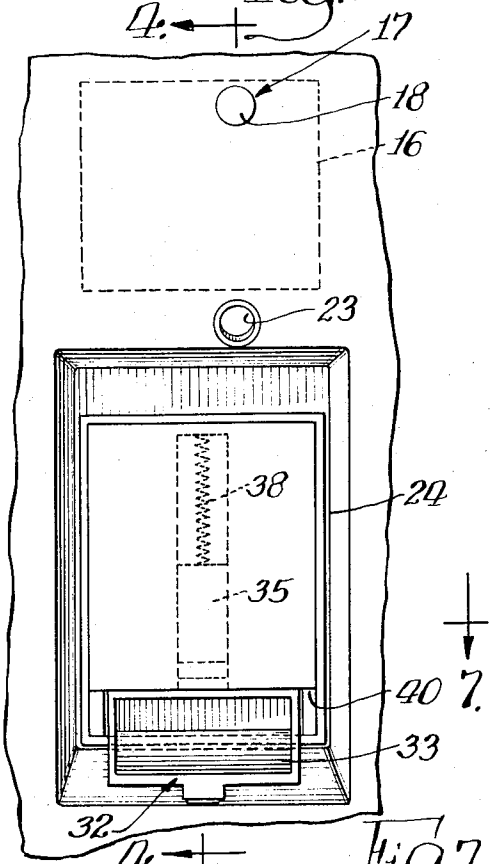


Fig. 7.

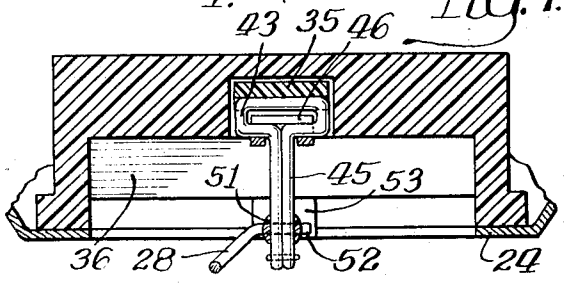


Fig. 6.

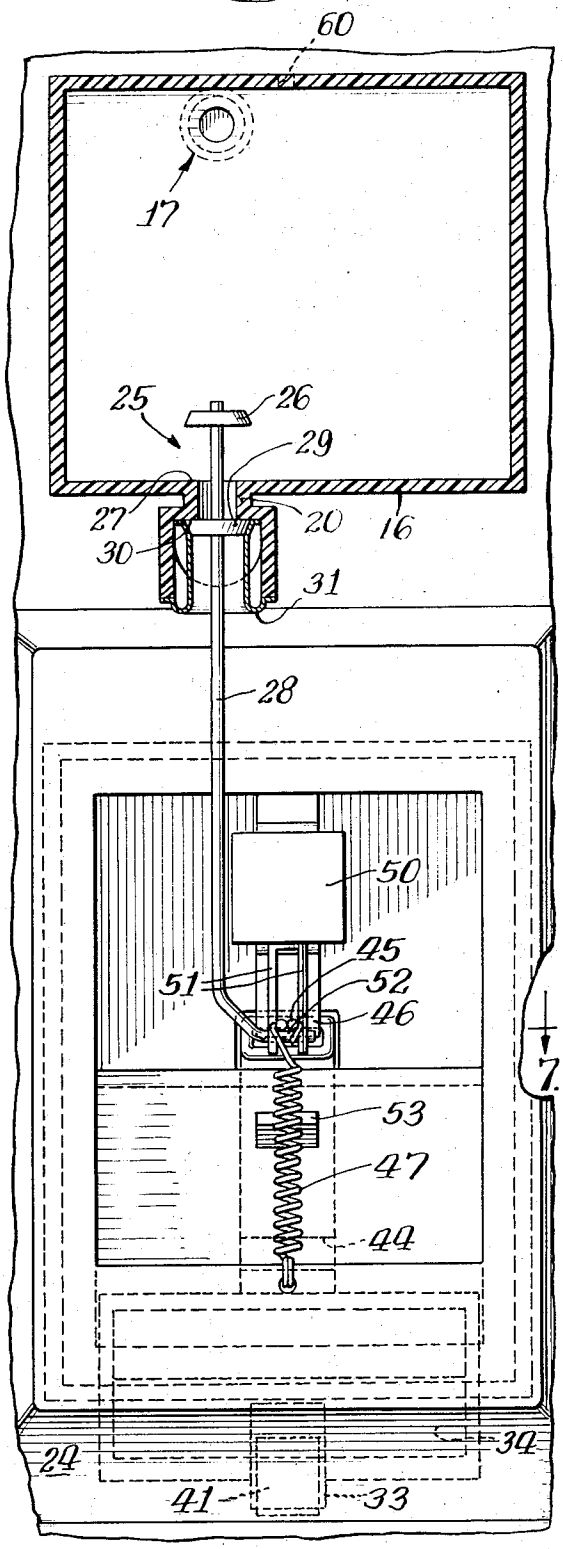


Fig. 3.

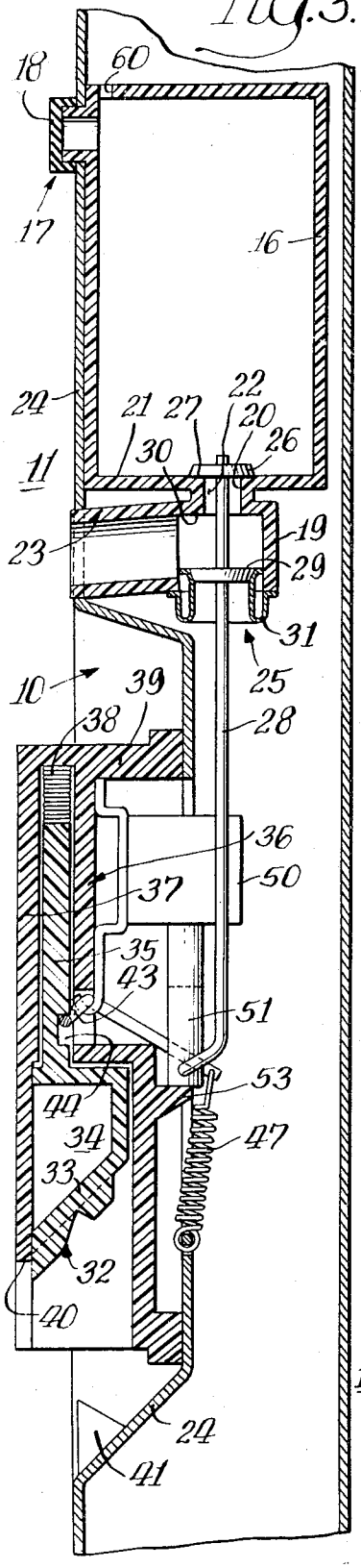


Fig. 4.

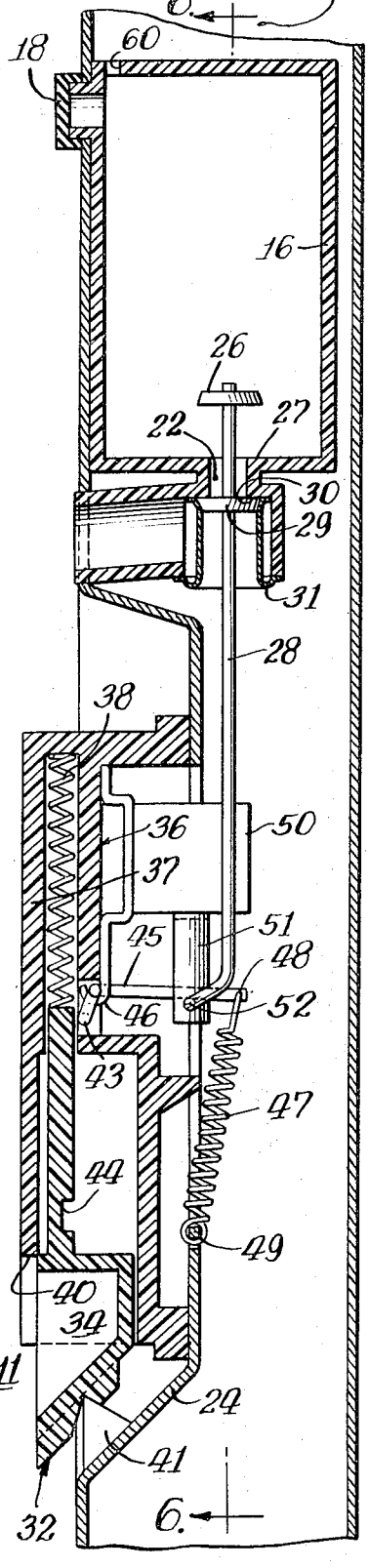
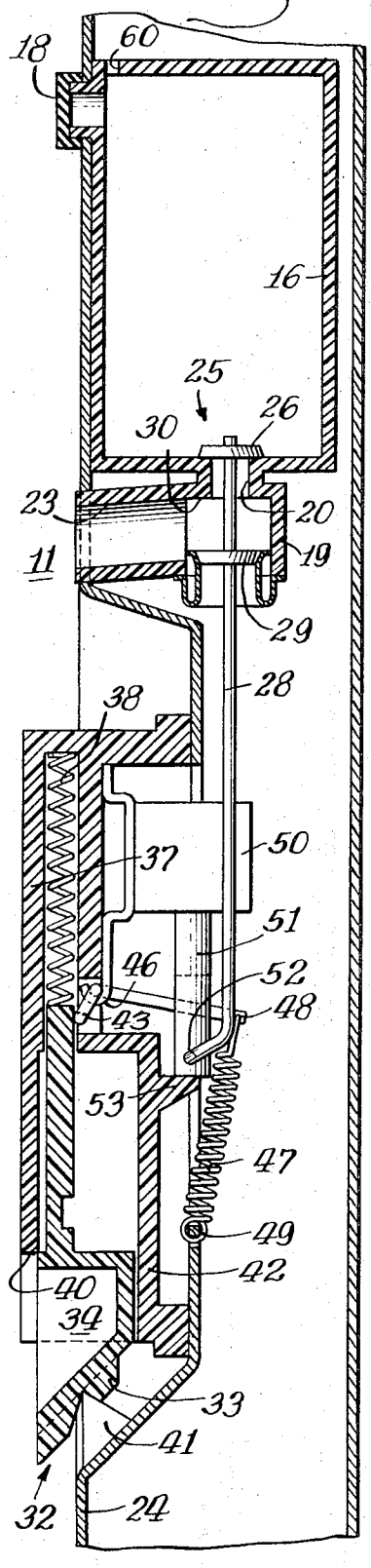


Fig. 5.



APPARATUS FOR DISPENSING A LIQUID AND ANOTHER MATERIAL

This is a continuation, of application Ser. No. 216,652 filed Jan. 10, 1972 now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to washing apparatuses and in particular to means for dispensing material into the apparatus during the operation thereof.

2. Description of the Prior Art

In U.S. Pat. No. Re. 25,814 issued to E. J. Buzicky et al. and owned by the assignee hereof, an apparatus for dispensing particulate material is shown and described for use in an appliance such as a dishwasher. The dispenser includes a pair of receptacles selectively closed by closure plates which are swung from a receptacle closing position at different times in the operation of the apparatus. The operation of the closure plates is effected by a solenoid and spring operating means. The amount of material dispensed upon opening of the receptacle is the entire amount previously placed in the receptacle by the user.

Another form of dispenser for use in a washing apparatus is shown in the Braga et al. U.S. Pat. No. 3,038,640 also owned by the assignee hereof. In this patent, a pair of cups are caused to dispense the desired material at different times by the selective operation of a control rod controlling the pivotal movement of the cups. To dispense the ingredient, the cups are pivoted to an inverted position wherein a closure plate across the top of the cup swings away to dump the material therefrom. The operation of the control is effected by a cam driven by a timer mechanism.

Other U.S. patents which show dispensers for dispensing materials in washing mechanisms are illustrated in U.S. Pat. Nos. 3,012,565, C. H. Lines; 3,013,568, Getchell et al.; 3,220,607, J. D. Seal; and 3,411,671, W. F. Harvey et al.

SUMMARY OF THE INVENTION

The present invention comprehends an improved dispensing means including a liquid container having an inlet for delivery thereto of a liquid to be dispensed, first control means for dispensing from the container incremental quantities of the liquid, the first control means being selectively disposed in a potentiated arrangement and an actuated arrangement and being constructed to deliver the incremental quantity of liquid as an incident of being operated to change from the potentiated arrangement to the actuated arrangement, a second container for selectively holding a second quantity of material to be dispensed, second control means for arranging the second container for dispensing of the second material therefrom as an incident of the first control means being disposed in the potentiated arrangement, and means for operating the control means for effecting disposition of the control means in the selective arrangements. The means for operating the control means includes an electrical actuating means energized by an electrical signal, energization of the actuating means causing the first control means to be in the potentiated arrangement and the second control means to dispense the material from the second container, and de-energization of the actuating means causing the first control means to be in the actuated arrangement.

The first control means includes a measuring valve arranged to measure the incremental quantity of liquid and effect the subsequent dispensing thereof. Means are provided for biasing the second control means to a retracted position and the first control means to a dispensing position. The second container is latched against its biasing means and means are provided in cooperation with the first control means for releasing the latch, thereby permitting the biasing means to effect a dispensing of material from the second container.

The liquid container may be disposed directly above the second container for facilitated dispensing of the liquid into the washing chamber. The outlet from the liquid container may be at the bottom thereof when the container is in the dispensing position.

The second control includes a cover panel and means for selectively disposing the second container behind the panel for preventing dispensing thereof until release of the second container by the second control means.

The dispensing means of the present invention is extremely simple and economical of construction while yet providing the highly desirable selective dispensing of the liquid and other material into the washing chamber at preselected times in the washing cycle. The liquid dispenser is operated by the same means as that operating the second dispenser and automatically provides a measured quantity of the liquid from the storage chamber during the dispensing operation.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. **1** is a fragmentary perspective view of a washing apparatus provided with a dispensing means embodying the invention;

FIG. **2** is a fragmentary enlarged front elevation of the dispensing means;

FIG. **3** is a fragmentary enlarged vertical section thereof;

FIG. **4** is a fragmentary vertical section thereof taken substantially along the line **4—4** of FIG. **2**;

FIG. **5** is a fragmentary vertical section similar to that of FIG. **4** but with the dispensing means arranged as upon completion of the liquid dispensing operation;

FIG. **6** is a fragmentary enlarged transverse section taken substantially along line **6—6** of FIG. **4**; and

FIG. **7** is a fragmentary horizontal section taken substantially along the line **7—7** of FIG. **6.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, a dispensing means generally designated **10** is provided for dispensing selectively a liquid material and another material into a washing chamber **11** defined by a cabinet **12** of a washing apparatus generally designated **13.** In the illustrated embodiment, the washing apparatus **13** comprises a dishwasher having a spray arm **14** within chamber **11.**

Dispensing means **10** may be carried by a door **15,** which in the illustrative embodiment is swingably mounted to the cabinet **12** to be selectively disposed in a generally horizontal open position, as illustrated in

FIG. 1, and in a generally vertical closed position across the front of chamber 11.

The dispensing means includes a reservoir container 16 disposed within the door 15 and provided with an inlet 17 having a removable closure 18. When the reservoir is in the horizontal position, as shown in FIG. 1, it may be filled with the desired liquid to be dispensed by opening inlet 17 and pouring the liquid therethrough into the container. Replacement of the cap 18 may be effected to prevent loss or dilution of the liquid within the container during subsequent use of the apparatus. The liquid is delivered from container 16 through an outlet 19, as shown in FIG. 3, defining a first outlet passage 20 in an end wall 21 of the container 16 defining the bottom wall thereof in the upright position of the container, i.e., when the door 15 is swung to the upright closed position. Outlet passage 20 comprises a tubular element having a preselected axial length and diameter to define a preselected measuring chamber 22. Liquid from container 16 is delivered from chamber 22 through another outlet passage 23 opening through the rear wall 24 of the door 15 so as to deliver the liquid into the chamber 11 during the dispensing operation. Delivery of the liquid from container 16 through chamber 22 is controlled by a valve generally designated 25 having a first, movable valve member 26 selectively engagable with an annular seat 27 at the upper end of tubular passage 20. Valve member 26 is carried on a valve stem 28 which further carries a second valve member 29. The lower end of the chamber 22 defines a second valve seat 30 and valve member 29 is spaced below seat 30 when first valve member 26 is seated on valve seat 27. Valve member 29 is sealingly connected to the outlet 19 by a flexible diaphragm 31.

When valve stem 28 is raised, as shown in FIG. 4, valve member 26 becomes spaced above valve seat 27 and valve member 29 seats on valve seat 30 so as to prevent delivery of liquid from container 16. However, in the arrangement of FIG. 4, it will be noted that a quantity of liquid from tank 16 may flow downwardly into measuring chamber 22. Container 16 is vented at the top front as shown in FIGS. 3–5 by an opening 60 in its top wall to allow air to enter the container as liquid is dispensed.

Dispensing means 10 further includes a second container 32 comprising a cup-shaped element 33 defining a material-holding reservoir 34 and an elongated extension 35 slidably received in a slide 36. Slide 36 includes a front wall 37 overlying chamber 34 when the extension 35 is disposed substantially fully within the slide 36. A coil spring 38 is compressed between an upper wall 39 of the slide 36 and the end of the extension 35 to bias the second container downwardly to a position wherein chamber 34 is exposed beyond the distal end 40 of the front wall 37. This position of the second container is illustrated in FIG. 5. As shown, in this position the cup member 33 abuts a stop 41 on the door panel 24. Slide 36 includes a lower portion 42 for slidably guiding the cup member 33 to the exposed position.

Cup member 33 is retained in the raised position of FIG. 3 by means of a latch 43 releasably received in a notch 44 in extension 35. Latch 43 comprises a turned end portion of an arm 45 pivotally mounted on a pivot 46 carried on the slide 36. Arm 45 is biased in a clockwise direction, as seen in FIGS. 3–5, by a coil spring 47 connected between the distal end 48 of arm 45 and a connector 49 on door panel 24.

To dispense the desired material from cup member 33, the user fills the chamber 34 with the cup member in the exposed disposition of FIG. 5 and with the apparatus door 15 in the horizontal position of FIG. 1. The cup member is then urged to the retracted position behind the front panel 37 against the biasing action of spring 38. Upon the movement of the notch 44 into alignment with the latch 43, spring 47 urges the latch into the notch thereby effectively preventing return movement of the cup member 33 by the spring 38 and maintaining the structure in the arrangement of FIG. 3 with the material to be dispensed effectively retained in chamber 34 for subsequent release as desired.

The release of the cup member 33 to dispense the material from chamber 34 is effected herein by means of a solenoid 50 mounted on slide 36 and having a bifurcated plunger 51 straddling arm 45 as shown in FIG. 6. Valve stem 28 includes a lower extension 52 turned to extend across the bifurcated plunger 51 under the arm 45. Rearwardly of space 34, a stop shoulder 53 is provided on slide 36, disposed in the path of movement of the solenoid plunger 51 to limit the downward movement thereof upon de-energization of the solenoid coil, as shown in FIGS. 3 and 5.

In the use of dispensing means 10, the user may swing the door 15 to a generally horizontal position, as shown in FIG. 1. The solenoid 50 is de-energized at this time and the second container 32 is exposed beyond the end 40 of the front wall 37 to permit placement of the desired powdered detergent material, or the like, in the chamber 34. Upon placement of the material therein, the user may urge the second container 32 to the recessed position shown in FIG. 3 wherein the chamber 34 is closed by the overlying portion of wall 37. When the second container is urged to the fully retracted position of FIG. 3, coil spring 47 biases the arm 45 sufficiently to insert the latch 43 in notch 44 thereby holding the second container 32 against the return spring 38 in the retracted position of FIG. 3 with the material to be dispensed effectively retained in chamber 34. The valve 25 is maintained with the valve member 26 closing passage 20 by the solenoid plunger 51 which is biased to the position of FIGS. 3 and 5 with the solenoid coil de-energized.

When during the operation of the dishwasher the solenoid 50 is energized, plunger 51 is retracted to pull the valve stem upwardly and to rotate arm 45 in a counterclockwise direction, as seen in FIG. 4, thereby to release the latch 43 from notch 44. The raising of valve stem 28 opens chamber 22 to the reservoir container 16 permitting the chamber 22 to fill with the liquid to be dispensed. At the same time, the release of latch 43 permits spring 38 to move the second container 32 downwardly to the exposed position of FIG. 4, thereby dispensing the powdered ingredient to the chamber 11 by exposure to the wash water from spray arm 14 of the receptacle chamber 34 beyond the end 40 of wall 37.

The chamber 22 is closed at its lower end at this time by second valve member 29 which seats against valve seat 30. Thus, valve 25 is potentiated concurrently with the dispensing of material from the second container 32 but no liquid is dispensed at this time to chamber 11. At the proper time in the washing cycle, solenoid 50 is de-energized, permitting the solenoid plunger to be biased downwardly to the stop 53, as shown in FIG. 5, thereby repositioning valve 25 so as to cause valve

member **26** to close the opening of passage **20** to container **16** and cause valve member **29** to be spaced from valve seat **30** thereby opening chamber **22** to discharge passage **23** to effect dispensing of the measured quantity of liquid from chamber **22** into the washing chamber **11.**

Thus, operation of solenoid **50** causes automatic dispensing of the material from the second container **32,** and measuring and subsequent dispensing of the measured quantity of liquid from tank **16** at preselected times in the operation of the washing apparatus. Valve **25** effectively defines a first control means for dispensing from the upper receptacle **16** incremental quantities of liquid. The control means defined by the valve is selectively disposed in a potentiated arrangement and an actuated arrangement by means of solenoid **50** so as to deliver the desired incremental quantity of liquid as an incident of being operated to change from the potentiated arrangement to the actuated arrangement. As defined in Webster's Third New International Dictionary and as used herein, the potentiation of the control makes the control more capable of effecting the subsequent operation to the actuated arrangement. The second dispensing means is arranged to dispense a second material as an incident of the first control means being disposed in the potentiated arrangement. Thus, the control means of the present invention is extremely simple and economical of construction while yet providing the improved dispensing operation as discussed above.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

I claim:

1. In an apparatus arranged to be operated through a plurality of successive cycles, dispensing means for sequentially dispensing a liquid and a second material respectively during different ones of said cycles, comprising: a liquid container having an inlet for delivery thereto of a liquid to be dispensed; first control means for dispensing from said container incremental quantities of liquid, said first control means being selectively disposed in a potentiated arrangement and an actuated arrangement and being constructed to deliver a single one of said incremental quantities of liquid as an incident of being operated from said potentiated arrangement to said actuated arrangement; a second container subjacent said liquid container for selectively holding a quantity of second material to be dispensed; means for biasing said second container to an open, dispensing position; latch means for releasably maintaining the second container in a closed position holding a said quantity of said second material; second control means for releasing said latch means and thereby permitting said biasing means to open said second container for dispensing of the second material therefrom during one of said apparatus cycles and including electrical means energized for concurrently causing said first control means to be moved into said potentiated arrangement prior to a dispensing of liquid from said container; and means for de-energizing said electrical means and operating said first and second control means during a subsequent one of said apparatus cycles to concurrently dispense an incremental quantity of said liquid and permit repositioning of said latch means for subsequent manual latching of said second container to releasably maintain a said quantity of second material subsequently placed in said second container.

2. The dispensing means of claim **1** wherein the means for operating said first and second control means includes an electrical actuating means energized by an electrical signal, energization of said actuating means causing the first control means to be disposed in said potentiated arrangement and release of said latch means to permit said second control means to dispense said second material, and de-energization of said actuating means causing said first control means to be disposed in said actuated arrangement and said repositioning of said latch means.

3. The dispensing means of claim **1** wherein said first control means includes a measuring valve arranged to measure said incremental quantity of liquid concurrently with the dispensing of said second material from said second container.

4. The dispensing means of claim **1** including a single spring for concurrently biasing said first control means to said actuated arrangement and said latch means toward a latching arrangement.

5. The dispensing means of claim **1** wherein said liquid container includes an outlet at the bottom thereof overlying said second container.

6. The dispensing means of claim **1** wherein said first control means includes connecting means extending vertically downwardly from said liquid container to rearwardly adjacent said second container.

7. The dispensing means of claim **1** wherein said first control means comprises an annular outlet carried by said liquid container adjacent the bottom thereof, a valve stem extending through said outlet, a first valve closure member on the valve stem in said container adjacent an inner end of the outlet and a second valve closure member on the valve stem adjacent the outer end of the outlet and spaced from said first valve closure member a distance greater than the axial length of said outlet, and means for moving the valve stem for alternatively causing said valve closure members to seat on said outlet for closing the same whereby a substantially preselected quantity of liquid is dispensed from the first container as a result of movement of said second valve closure member outwardly away from sealed engagement with said outer end of the inlet and said first valve closure member into seating engagement with said inner end of the outlet.

8. The dispensing means of claim **1** further including a wall defining a chamber into which said liquid and second material are to be dispensed, said liquid container being mounted rearwardly of said wall, said inlet and dispensing means including portions extending through said wall, and said second container being mounted forwardly of said wall whereby said second container is exposed to said chamber in the open arrangement thereof.

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