

Dec. 20, 1960

C. C. BAUERLEIN

2,965,268

COLLAPSIBLE DETERGENT DISPENSER

Filed May 29, 1957

2 Sheets-Sheet 1

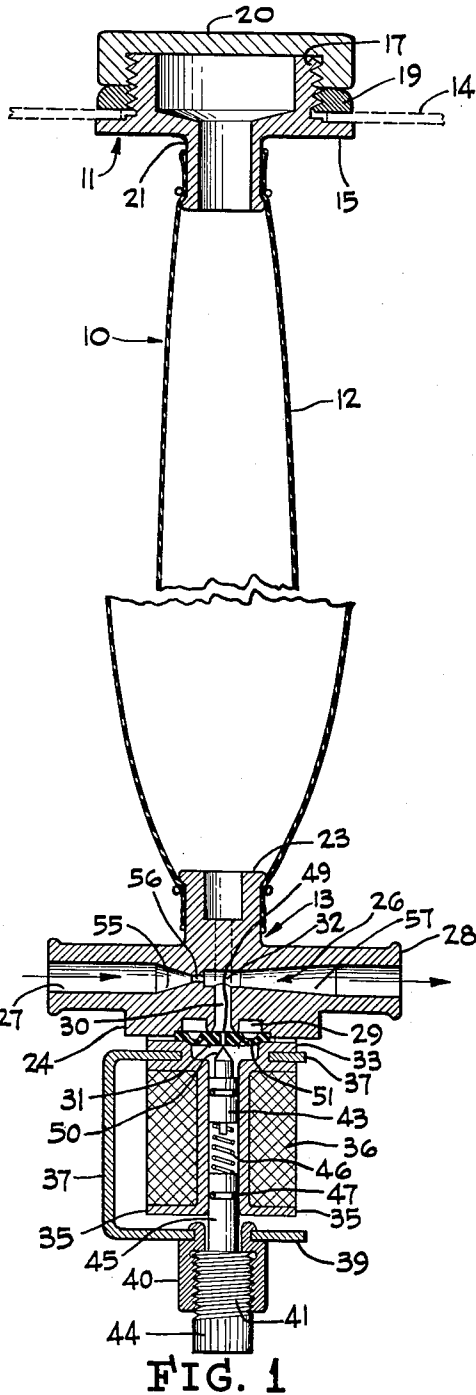


FIG. 1

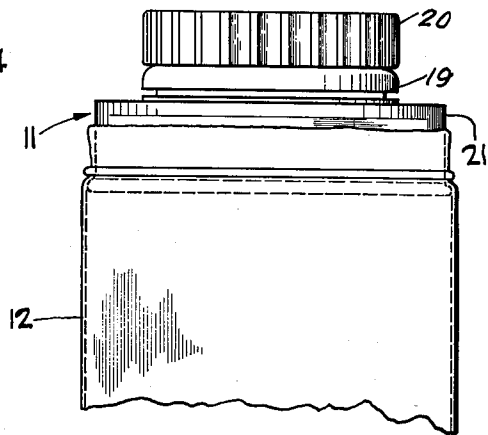


FIG. 2

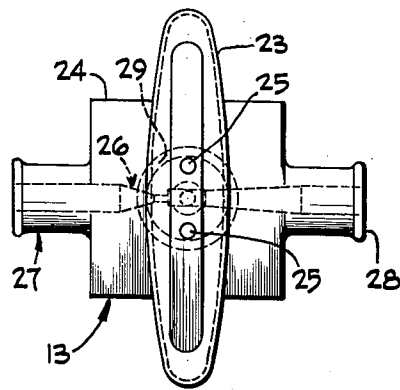


FIG. 3

INVENTOR.
CARL C. BAUERLEIN

By Hill, Sherman, Merritt, Gross & Simpson ATTORNEYS

Dec. 20, 1960

C. C. BAUERLEIN

2,965,268

COLLAPSIBLE DETERGENT DISPENSER

Filed May 29, 1957

2 Sheets-Sheet 2

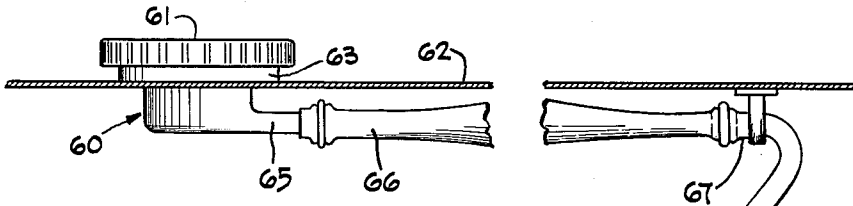


FIG. 4

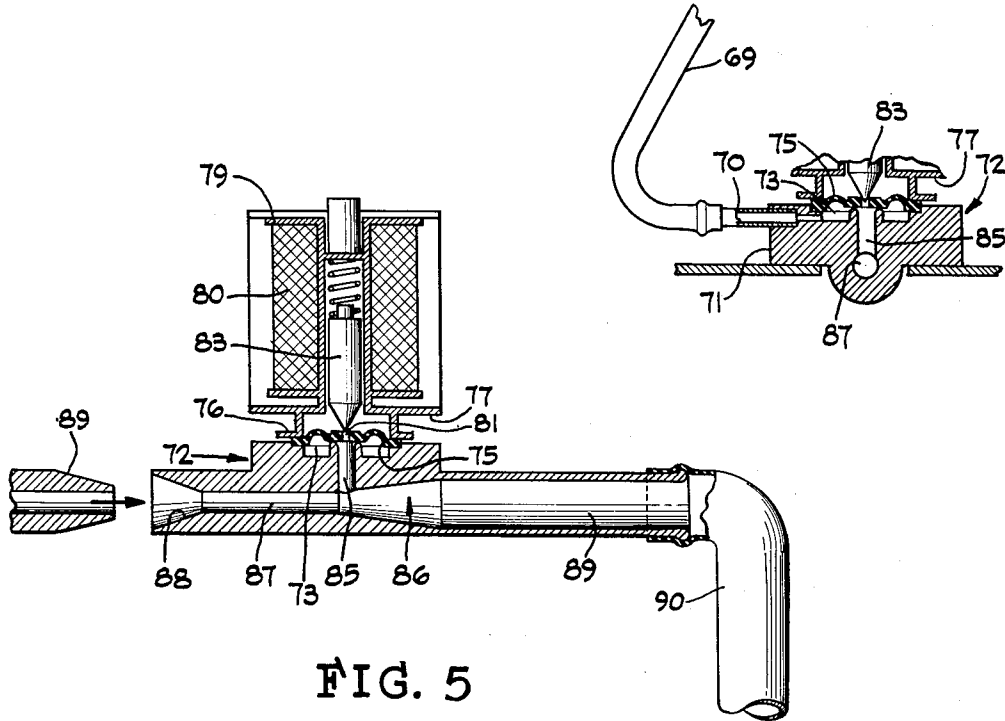


FIG. 5

INVENTOR.
CARL C. BAUERLEIN

By *Hill, Sherman, Meroni, Gross & Simpson* ATTORNEYS

1

2,965,268

COLLAPSIBLE DETERGENT DISPENSER

Carl C. Bauerlein, Lincolnwood, Ill., assignor to The Dole Valve Company, Morton Grove, Ill., a corporation of Illinois

Filed May 29, 1957, Ser. No. 662,363

3 Claims. (Cl. 222-193)

This invention relates to improvements in methods and apparatus for dispensing detergents and the like.

Heretofore, dispensers of various types have been used to add detergents, bleach, fabric conditioners and the like to the wash water of automatic washing machines under the cyclic control of the machine. While such dispensers operate satisfactorily if frequently cleaned, the various cleansing agents deteriorate with age and gum up the dispenser due to evaporation both during storage and dispensing of the cleansing agent making it necessary to frequently dismantle the dispenser to clean the gummed up material therein.

It has been found that if air can be excluded from the cleansing agent during storage and if the cleansing agent is dispensed from an air tight container that the deterioration and gumming up of the cleansing agent in the dispenser is avoided.

A principal object of the present invention, therefore, is to provide a method and apparatus for dispensing cleansing agents and the like, in which the deterioration of the cleansing agent is avoided by excluding air therefrom during storage and dispensing of the detergent, and thereby preventing evaporation thereof.

A further object of the invention is to provide a novel and improved form of dispenser in which a collapsible tube sealed at its inlet end contains the cleansing agent, and in which the cleansing agent is drawn from the sealed tube by the mixing water under pressure.

A still further object of the invention is to provide a simplified form of detergent dispenser in which detergent is drawn from a sealed container by suction, collapsing the container, and thereby excluding air from the container during storage and dispensing of the cleansing agent.

A still further object of the invention is to provide a novel and improved form of liquid dispenser for washing machines and the like, in which the pressure of water passing through a Venturi draws the cleansing agent from its container and effects the collapse of the container on the upstream side of the cleansing agent therein, all under the control of valve means controlled by the cyclic control system of the machine.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

Figure 1 is a fragmentary vertical sectional view taken through a dispenser constructed in accordance with the invention;

Figure 2 is a fragmentary view in side elevation of the inlet end portion of the dispenser shown in Figure 1;

Figure 3 is a plan view of the dispensing valve;

Figure 4 is a fragmentary view in side elevation illustrating a modified form in which my invention may be embodied; and

Figure 5 is a vertical sectional view taken through the dispensing valve shown in Figure 4 and showing the anti-siphoning air gap at the entrance of the valve.

2

In the embodiment of the invention illustrated in Figures 1, 2 and 3 of the drawings, I have shown a dispenser 10 including an inlet fitting 11 adapted to be mounted on the top of a washing machine cabinet, a container for the cleansing agent, shown as being in the form of a relatively flat collapsible tube 12 sealed to the inlet fitting and extending downwardly therefrom, and a valve 13 sealed to the discharge end of said tube, and serving to supply the pressure to draw liquid from said tube and collapse the tube as liquid is withdrawn therefrom.

The inlet fitting 11 has a flange 15 engaging beneath the top of a washing machine cabinet or the like, as shown by dashed lines in Figure 1 and designated by reference character 14. The inlet fitting 11 has a threaded inlet boss 17 extending through the top 14. A sealing nut 19 is threaded on the boss 17 and engages the top side of the top 14 of the washing machine cabinet. A filler cap 20 is shown as being threaded on the boss 17 into engagement with the seal 19 to prevent the passage of air through said inlet fitting when the filler cap 20 is in place thereon.

The inlet fitting 11 also has an elongated outlet neck 21 about which extends the inlet end of the tube 12, which may be suitably sealed thereto. The tube 12 is a flat seamless tube, which is flat when empty and disconnected from the inlet fitting 11 and the valve 13, and collapses to substantially its flat form as the cleansing agent is exhausted therefrom by suction.

The inlet fitting 11 and valve 13 may be made of a thermosetting plastic, such as urea, or a thermoplastic material, such as polystyrene. The tube 12 may be made from one of the well known forms of thermoplastic materials, such as a polyethylene thermoplastic material. Various other thermoplastic materials, however, such as cellulose derivatives and vinyl resins, may also be satisfactorily used in place of a polyethylene thermoplastic, if desired.

The discharge end of the tube 12 extends about a widened inlet fitting 23 of the valve 13 and is suitably sealed thereto. The inlet fitting 23 is of a width substantially equal to the width of the tube 12. The valve 13 has a body 24 having the inlet fitting 23 formed integrally therewith.

The valve body 24 has cleansing fluid passageways 25 leading therethrough from the inlet fitting 23 and opening to the opposite side of the valve body 24 from the inlet fitting 23. The passageways 25 extend along opposite sides of a Venturi 26, leading along the valve body 24 perpendicularly to the passageways 25 and having an inlet 27 at one end thereof and an outlet 28 at the opposite end thereof, which may have a pipe or tube (not shown) attached thereto leading to the bottom of the washing machine tub.

The cleansing fluid passageways 25 have communication with an annular passageway 29, shown as opening to the opposite side of the valve body from the inlet fitting 23. The annular passageway 29 extends about a suction passageway 30, leading upwardly from the underside of the valve body, parallel to the passageways 25 and opening into a vacuum chamber 32 of the Venturi 26.

The passage of cleansing fluid, such as detergent through the inlet passage 30 is controlled by a diaphragm valve 31 seated at its margin in the bottom of the valve body 24 and extending about the annular passageway 29 and maintained in sealing engagement with the underside of the valve body by a lower flanged portion 33 of a spool 35, forming a core for an electromagnet 36, wound about said spool between the end flanges thereof. A bracket 37 is shown as being recessed within the flange 33 and as extending outwardly therefrom and as having a depending intermediate portion and a lower leg 39 parallel to the opposite end flange of the spool 35 from the flange 33. The leg 39 has a threaded sleeve 40 spun

or crimped thereto, and depending therefrom. The sleeve 40 has a stop 41 for an armature 43 threaded therein. The stop 41 has a knob 44 on its outer end and has a stem 45 extending inwardly therefrom within the spool 35 and abutting a compression spring 46, interposed between the inner end of the stem 45 and the armature 43. A suitable sealing means is provided to seal the stem 45 to the spool 35, which may be of any well known form, but is herein shown as being an O-ring seal 47. A suitable securing means (not shown) is provided to maintain the flange 33 in sealing engagement with the diaphragm valve 31 and to maintain said spool and the coil 36 to the bottom of the valve block 24.

The diaphragm valve 31 may be a well known form of pressure operated solenoid controlled diaphragm valve having a central pilot opening 49 leading therethrough and engaged by a conical end 50 of the armature 43, forming a valve, which is releasible from said pilot opening upon energization of the magnet coil 36. This will effect opening of the diaphragm valve 31 by the pressure of fluid thereon and will accommodate the flow of cleansing fluid, such as detergent or the like through the passageways 25, the annular passageway 29 and inlet passageway 30 to the vacuum chamber 32 of the Venturi 26.

The diaphragm 31 has a bleeder passageway 51 leading therethrough, accommodating the passage of fluid to the underside of the diaphragm valve 31 to hold said valve closed by the pressure of fluid acting thereon, as long as the pilot passageway 49 is closed by the armature 43, and accommodating the valve to open by pressure on the inner side of said diaphragm, upon opening of the pilot passageway 49, and the relief of pressure from the underside of the diaphragm valve 31.

The Venturi 26 includes a converging passageway 55 in axial alignment with the inlet passageway 27 and converging to a reduced diameter throat 56 leading to the vacuum chamber 32. The vacuum chamber 32 in turn leads to a diverging passageway 57 in axial alignment therewith, and communicating with the outlet 28 for discharging a mixture of water and detergent, bluing, or other water conditioning agent to the washing machine tub.

In operation of the device shown in Figures 1, 2 and 3, the nut 44 may be adjusted to provide a desired amount of detergent or the like to be dispensed through the outlet 28 under a given water pressure, it being understood that the stop 44 is usually calibrated for a desired solution prior to installation of the dispenser.

Water under pressure may flow through the inlet 27 under the control of the cyclic control system of the washing machine, to fill the washing machine tub (not shown). Where the water is recirculated and filtered during the washing operation, water may be continuously forced through the Venturi 26 under the pressure of the pump of the washing machine. During the filling cycle of the tub, the magnet coil 36 may be energized under the cyclic control of the washing machine to effect withdrawal of the valve end 50 of the armature 43 from the pilot opening 49 in the valve 31, to accommodate opening of the valve 31 by the pressure of fluid thereon. Cleansing fluid filling up the passageway 30 by the pressure head thereon, and the suction created in the vacuum chamber 32 by the pressure drop at the throat 56 of the Venturi 26, will then force the detergent or cleansing agent out the outlet 28 with sufficient force to withdraw the cleansing agent or conditioner from the sealed tube 12, and therefore excluding air from the detergent or other cleansing or conditioning agent, and preventing deterioration of the cleansing or conditioning agent by evaporation and preventing clogging of the dispenser.

In the form of the invention illustrated in Figures 4 and 5, I have shown a dispenser operating on principles like those shown in Figures 1, 2 and 3, except that the collapsible tube is shown as extending horizontally along

the underside of the top of the washing machine cabinet, and a vacuum breaker is provided to prevent the drawing of the washing water back through the dispensing valve upon negative pressure conditions at the source of supply. This form of my invention is particularly adapted for use where water is supplied directly to the machine from an outside source of supply, whereas the form of my invention shown in Figures 1, 2 and 3 is adapted for use in washing machines of the type in which the wash water is continually recirculated and filtered.

In the modified form of the invention, an inlet or filler fitting 60 is mounted on a top 62 of a washing machine cabinet and has a filler cap 61 threaded on the outer end thereof, accommodating the placing of a cleansing fluid therein. The cap and filler fitting are sealed as by a seal 63, when the filler cap 61 is tightened on said filler fitting, to exclude air during storage and dispensing.

The filler fitting 60 has an outlet 65 extending horizontally beneath the bottom of the cabinet top 62 and has a flat collapsible tube 66 sealed to the discharge end thereof. The tube 66, like the collapsible tube 12, may be made from a polyethylene thermoplastic material, and is sealed at its outlet end to a fitting 67 which may be clamped to the bottom of the top 62 of the washing machine cabinet. A flexible tube 69 is sealed to and extends from the fitting 67 and has connection with an inlet fitting 70, leading into a valve body 71 of a dispensing valve 72, and is sealed to said inlet fitting.

The inlet fitting 70 has communication with an annular passageway 73 opening to the top of the valve body 71 and having a diaphragm valve 75 extending thereabout and maintained in sealing engagement therewith by an annular flange 76 extending from a lower flange 77 of a spool or core 79 for an electromagnet 80. The diaphragm valve 75 is like the diaphragm valve 31 and has a pilot passageway 81 leading therethrough, closed by the conical end of an armature 83 slidably guided within the spool or core 79, and opening the pilot passageway to effect opening of the valve by pressure of fluid on the underside thereof, upon energization of the electromagnet 80, as in the valve 31 shown in Figure 1.

The valve 75 serves to close a passageway 85 leading into the valve body 71 coaxially with the center of the annular passageway 81 leading therethrough, and leading into a Venturi 86, on the downstream side of a throat 87 thereof.

The Venturi 86 has a converging passageway 88 at the inlet end thereof opening to the end of the valve body and converging to a throat 87. A pipe or tube 89 is shown as being axially aligned with the converging passageway 88 and as being spaced therefrom to direct fluid under pressure to said converging passageway, to flow through the Venturi 86 and out an outlet 89 thereof. As herein shown, a flexible tube 90 is sealed to the outlet 89 and may lead to the bottom of the washing machine tub, to effect filling of the tub, as fluid under pressure is supplied to the Venturi through the pipe 89.

The outlet end of the pipe 89 is spaced sufficiently from the inlet end of the converging passageway 88, to form an air gap of sufficient length to prevent the drawing of water back through the passageway 89 upon negative pressure conditions at the source of supply of fluid under pressure.

The dispenser illustrated in Figures 4 and 5 operates exactly like that shown in Figures 1, 2 and 3, and as fluid under pressure is flowing through the throat 87 on the Venturi 86 and the electromagnet 80 is energized to open the pilot passageway 81, the vacuum created by the pressure drop at the discharge end of the throat 87 will withdraw detergent from the collapsible tube 66, effecting the collapse of said tube on the upstream side of the detergent therein and preventing evaporation of the detergent during storage and thereby preventing deterioration of the detergent or conditioning or cleansing agent, and avoiding the clogging of the dispenser heretofore present with such dispensers.

5

It will be understood that modifications and variations in the present invention may be effected without departing from the spirit and scope of the novel concepts thereof.

I claim as my invention:

1. In a liquid dispenser for proportioning and dispensing cleansing agents and the like, an inlet fitting for attachment to a washing machine cabinet, a container for a cleansing agent in the form of a flat thermoplastic tube exposed to the atmosphere and having an inlet end sealed to said inlet fitting and also having an opposite outlet end, a filler cap for said inlet fitting accommodating the filling of said container and sealing said fitting from the admission of air thereto, a valve body in communication with the outlet end of said tube and having a first passageway leading therethrough, forming a passageway for withdrawing cleansing agent from said tube, a valve at the opposite end of said valve body from said tube, a fluid pressure passageway leading through said valve body transversely of said first passageway and spaced from said first passageway and adapted to have connection with a source of fluid under pressure, and a second passageway leading from said valve to said fluid pressure passageway and affording fluid communication from said first passageway to said fluid pressure passageway under the control of said valve, and solenoid means controlling operation of said valve and accommodating fluid passing through said fluid pressure passageway to withdraw a liquid cleansing agent from said tube and thereby effect the collapse of said tube from the inlet to the outlet end thereof by the suction created by withdrawing liquid cleansing agent from said tube, and protecting the liquid cleansing agent in said tube from contamination by air.

2. In a dispenser particularly adapted to add liquid cleansing agents and the like to washing machine wash water, a liquid container for the cleansing agent in the form of a relatively flat collapsible tube exposed to the atmosphere and having an inlet at one end thereof and an outlet at the opposite end thereof, means sealing the inlet end of said tube when filled with a cleansing agent, a source of supply of diluting and filling water under pressure including a valve body in communication with the outlet end of said tube and having a Venturi leading therethrough having a restricted throat, an outlet pas-

6

sageway having communication with the outlet end of said tube and leading through said valve body along one side of said Venturi a second passageway having communication with said Venturi downstream of said restricted throat, a valve affording communication between said outlet passageway and said second passageway, and solenoid means controlling operation of said valve and the passage of cleansing agent from said outlet passageway to said Venturi and accommodating the pressure of water passing along said Venturi during filling of the washing machine tub to create suction to withdraw the cleansing agent from said tube and proportion the cleansing agent with the water passing through said Venturi prior to entering a washing machine tub.

3. A detergent dispenser comprising a collapsible liquid detergent container in the form of a flat tube made from a thermoplastic material having an inlet end and an outlet end, an inlet fitting for said tube having the inlet end of said tube sealed thereto, a filler cap for said inlet fitting accommodating the filling of said tube with detergent and the sealing of said inlet when closed, a valve body having a detergent inlet sealed to the outlet end of said tube, a Venturi extending along said valve body and having a throat, a vacuum chamber on the downstream side of said throat and an outlet leading from said valve body, a passageway from said detergent inlet to said vacuum chamber to effect the withdrawing of detergent from said tube upon the passage of fluid under pressure through said Venturi, a valve in said valve body controlling the passage of detergent from said detergent inlet to said vacuum chamber, and a supply tube spaced from and aligned with said Venturi to supply diluting water to said Venturi and to provide an air gap between said supply tube and said Venturi to prevent the back flow of fluid through said Venturi upon negative pressure conditions at the source of fluid under pressure.

References Cited in the file of this patent

UNITED STATES PATENTS

2,523,800	Woodson	Sept. 26, 1950
2,653,802	Bauerlein	Sept. 29, 1953
2,811,389	Fischer	Oct. 29, 1957
2,859,899	Kramer et al.	Nov. 11, 1958