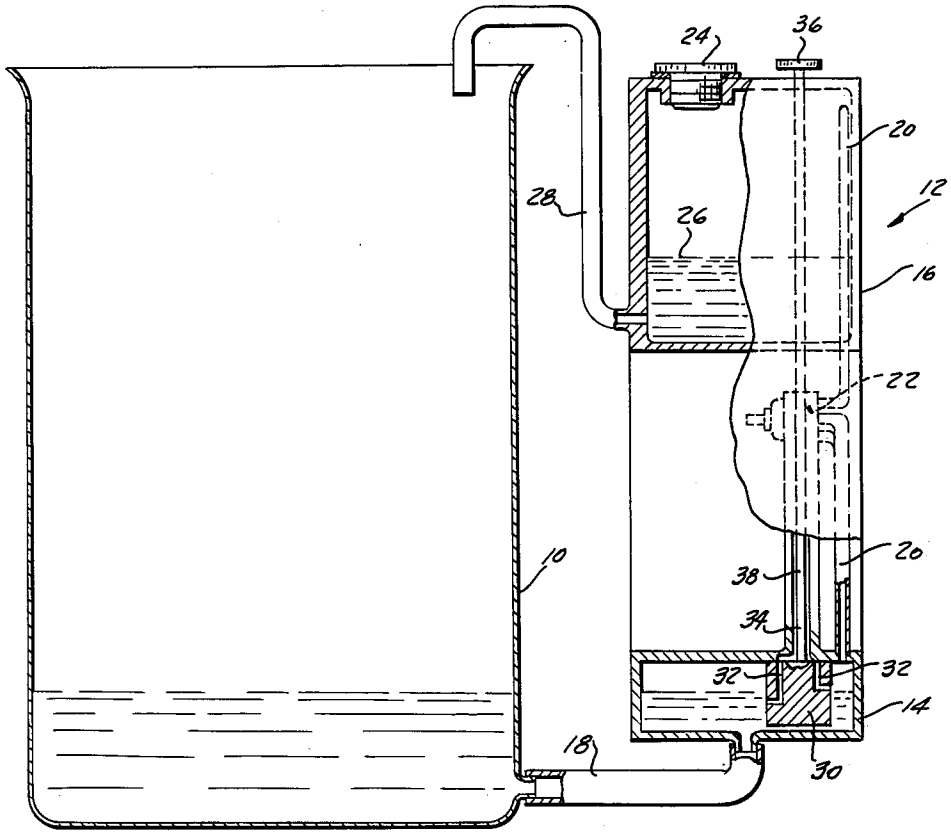
March 21, 1961 M. E. ANDERSON ET AL 2,975,945

LIQUID AGENT DISPENSER FOR WASHING MACHINE

Filed Oct. 31, 1957



INVENTOR.
MAYNARD E. ANDERSON
LEMUEL B. COOPER

BY

SMITH, WILSON, LEWIS & McRAE

United States Patent Office 2,975,945 Patented Mar. 21, 1961

2,975,945

LIQUID AGENT DISPENSER FOR WASHING MACHINE

Maynard E. Anderson, Detroit, Mich., and Lemuel B. Cooper, Edmonds, Wash., assignors to American Radiator & Standard Sanitary Corporation, New York, N.Y.

Filed Oct. 31, 1957, Ser. No. 693,725

9 Claims. (Cl. 222—396)

The present invention relates to a dispenser for injecting a liquid into a receptacle, and particularly for use in conjunction with an automatic washing machine. This is an improvement on the invention disclosed in copending application Serial No. 693,724 filed October 31, 1957.

It is an object of the present invention to provide a liquid dispenser for use with a receptacle, said dispenser utilizing energy from rising liquid in said receptacle to pump a desired quantity of a liquid agent into the receptacle.

It is still another object of the present invention to provide a liquid dispenser of the foregoing character which is constructed and arranged so that it can inject large volumes of liquids in predetermined amounts without employing expensive pumps, motors, valve units and the like.

It is still another object of the present invention to provide a liquid dispenser of the foregoing character which is constructed and arranged so that no moving parts contact the injected liquids thereby avoiding troubles which otherwise would arise because of corrosive properties that such liquids may have or because of their viscous properties or their tendencies to congeal.

It is still another object of the present invention to provide a dispenser of the foregoing character which utilizes low pressures and has clean, metered air as the working medium, whereby simple seals and valves may be employed.

Still another object of the present invention is to provide a dispenser of the foregoing character which provides gradual injection of the liquid agent to assure proper mixing with the water or other liquid being introduced into the receptacle, thereby avoiding damage to fabrics or other materials in the receptacle because of excessive localized concentration of the liquid agent.

Another object of the present invention to provide a dispenser of the foregoing character which is constructed and arranged that when low concentration of the liquid is required, the pumping action will occur at a later period of the liquid filling cycle thereby avoiding too high concentration of the liquid agent during any phase of the filling cycle.

It is still another object of the present invention to provide a dispenser of the foregoing character wherein a selector knob is provided at a convenient location for selectively determining the quantity of liquid agent to be introduced into the receptacle, and which employs a unique selector valve operatively connected to said selector knob which controls the volume of liquid agent pumped according to the volume of liquid rising in said receptacle.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the drawing:

The figure of the drawing is a fragmentary vertical section showing one embodiment of the dispenser operatively positioned adjacent a receptacle such as a laundry tub.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring now to the drawing, a more detailed description of the invention will be given. Any suitable timer such as is employed on automatic washing machines may be used in conjunction with the present invention. A schematic illustration of a suitable timer circuit can be seen in the aforesaid copending application Serial No. 693,724.

A receptacle or washer tube 10 is shown having a variable charge, automatic liquid dispenser 12 mounted adjacent one side. The dispenser 12 has an air chamber 14 formed in its lower portion and a reservoir 16 formed in its upper portion. A passageway 18 provides liquid communication between the bottom of air chamber 14 and the bottom of receptacle 10 so that when liquid or water is filled into receptacle 10, such liquid will seek to rise in air chamber 14.

An air passageway 20 extends between the top of air chamber 14 and the upper regions within reservoir 16, whereby air displaced from metering chamber 14 by rising liquid is in effect pumped into reservoir 16. A solenoid operated air valve 22, shown by way of example, is positioned in passageway 20 so as to control the operation of the dispenser. Other means could be used for actuating the air valve 22. For example an electrically actuated heat motor, characterized by a bi-metallic leaf and a resistance wire heater, would also be satisfactory. Thus, when air valve 22 is open the dispenser will function in a manner to be described more fully hereinafter, and conversely, when air valve 22 is closed, the dispenser is rendered inoperative for pumping liquid agent.

The reservoir 16 has a fill cap 24 which can be removed for filling an agent such as liquid detergent, liquid bleach, or the like into reservoir 16. The liquid agent 26 will be pumped from the reservoir 16 by the action of pressurized air flowing in through air passageway 20. For this purpose, a dispenser tube or passageway 28 communicates between the bottom of reservoir 16 and the receptacle 10.

One of the features of the present invention is that it allows the user to vary selectively the amount of liquid agent 26 that is pumped into receptacle 10 for a given rise of liquid therein. This is accomplished by discharging air from air chamber 14 to the atmosphere until the rising liquid in receptacle 10 reaches a variable pre-selected level. Air is then allowed to flow through air passageway 20 and displace the liquid agent 26 from reservoir 16. Obviously, the more air that is discharged from air chamber 14 to the atmosphere, the less is available for pumping liquid agent 26 from reservoir 16.

The valve means employed for this purpose may include, as shown, a rotary valve element 30 which has a plurality of vertical ducts 32. Only two are shown, but it will be understood that any number may be employed. Each duct 32 opens at its upper end at the same radial distance from the axis of valve element 30. The lower end of each duct opens radially outwardly at different horizontal levels.

There are other methods for varying the elevation at which air is bled from the air chamber 14 whereby a predetermined volume of air may be bled therefrom and

allowed to escape to the atmosphere while the remainder of the trapped air is retained for use in the injection process. One other possible means would include a hollow tube slidably mounted through an aperture in a seal secured to the top of air chamber **14**. The tube could be moved up and down to effect air bleeding at different levels.

In the illustrated embodiment an air bleed passageway **34** opens into air chamber **14** into communication with whichever duct is in registry therewith. The various ducts **32** can be placed selectively in registry with air bleed passageway **34** merely by turning selector knob **36** which is operatively connected to valve element **30** by rod **38**.

From the foregoing, it will be understood that proper positioning of valve element **30** will determine when air can be pumped through air passageway **20** for injecting liquid agent **26** into receptacle **10**. Thus, when the valve element **30** is in the position shown in the drawing, and assuming air valve **22** is open and that liquid is rising in receptacle **10**, pumping action will then be occurring because the rising liquid in the metering chamber has covered the lower end of duct **32** which is in registry with air bleed passageway **34**. Since this duct **32** is covered, no further bleeding of air will occur, and all additional air displaced from air chamber **14** by the rising liquid must flow up air passageway **20**.

If it is desired to shorten the time interval of pumping or injecting liquid agent **26** into the receptacle **10**, it is only necessary to rotate the valve element **30**, for example, so that the other duct **32** registers with air bleed passageway **34**.

Since the lower end of this duct **32** is still above the rising liquid, the bleeding of air will continue until the rising liquid covers the inlet of this duct. This duct **32** having its lower end at a higher elevation will allow more air to be bled from air chamber **14** before any will be pumped through air passageway **20**, and hence, less is available for displacing liquid agent from reservoir **16**.

Thus, a simple but very effective control is provided for varying the charge of liquid agent **26** that is injected into receptacle **10**. As can be seen, the liquid agent **26** does not come into contact with any moving parts to affect their operation. Furthermore, since the liquid agent is kept in a sealed container it will not readily evaporate or cause clogging of any parts.

Having thus described our invention, we claim:

1. A liquid dispenser for a washing machine comprising means forming a closed air chamber connected in liquid communication with a lower portion of the washer tub of said washing machine, means forming a closed reservoir for a liquid agent adapted to be injected into said tub, an air passageway extending between upper regions in said air chamber and said reservoir by which air can flow from the former into the latter when water flows from the tub into said air chamber, another passageway leading from a lower region of said reservoir into said tub through which liquid agent displaced from said reservoir by the incoming air can flow into said washer tub, and air escape means in said air chamber for allowing air to escape therefrom to the atmosphere until the water flowing into the air chamber rises to a predetermined level after which the remaining air will begin to flow through the first-named air passageway.

2. A variable charge liquid dispenser for a washing machine comprising means forming a closed air chamber connected in liquid communication with a lower portion of the washer tub of said washing machine, means forming a closed reservoir for a liquid agent adapted to be injected into said tub, an air passageway extending between upper regions in said air chamber and said reservoir by which air can flow from the former into the latter when water flows from the tub into said air chamber, another passageway leading from a lower region of said reservoir into said tub through which liquid agent displaced from said reservoir by the incoming air can flow into said washer tub, and means in said air chamber for allowing air to escape therefrom to the atmosphere until the water flowing into the air chamber reaches a variable, selected predetermined level after which the remaining air will begin to flow through the first-named air passageway.

3. A variable charge liquid dispenser for a washing machine comprising means forming a closed air chamber connected in liquid communication with a lower portion of the washer tub of said washing machine, means forming a closed reservoir for a liquid agent adapted to be injected into said tub, an air passageway extending between upper regions in said air chamber and said reservoir by which air can flow from the former into the latter when water flows from the tub into said air chamber, another passageway leading from a lower region of said reservoir into said tub through which liquid agent displaced from said reservoir by the incoming air can flow into said washer tub, air valve means in said first-named air passageway to control the flow of air from said air chamber to said reservoir, air escape means in said air chamber for permitting the escape of air therefrom to the atmosphere only during the period when the water flowing into the air chamber rises to a predetermined level after which the remaining air will begin to flow through the first-named air passageway, and means for selectively varying the effective level of said air escape means so that the volume of air transmitted to said reservoir can be varied for a given rise of water in the tub.

4. A variable charge liquid dispenser for a washing machine comprising means forming a closed air chamber connected in liquid communication with a lower portion of the washer tub of said washing machine, means forming a closed reservoir for a liquid agent adapted to be injected into said tub, an air passageway extending between upper regions in said air chamber and said reservoir by which air can flow from the former into the latter when water flows from the tub into said air chamber, another passageway leading from a lower region of said reservoir into said tub through which liquid agent displaced from said reservoir by the incoming air can flow into said washer tub, said air chamber having an air escape port, a valve member having a plurality of ducts with outlets adapted to register selectively with said escape port on movement of said member, said ducts having inlets at spaced vertical levels so that selection of the appropriate duct for registry with said escape port will determine the level of which water can rise in said air chamber before additional rising of water will cause air to flow through the first-named passageway.

5. A variable charge liquid dispenser for a washing machine comprising means forming a closed air chamber connected in liquid communication with a lower portion of the washer tub of said washing machine, means forming a closed reservoir for a liquid agent adapted to be injected into said tub, an air passageway extending between upper regions in said air chamber and said reservoir by which air can flow from the former into the latter when water flows from the tub into said air chamber, another passageway leading from a lower region of said reservoir into said tub through which liquid agent displaced from said reservoir by the incoming air can flow into said washer tub, said air chamber having an air escape port, a valve member having a plurality of ducts with outlets adapted to register selectively with said escape port on movement of said member, said ducts having inlets at spaced vertical levels so that selection of the appropriate duct for registry with said escape port will determine the level of which water can rise in said air chamber before additional rising of water will cause air to flow through the first-named passageway, and a valve in the first-named passageway for controlling the flow of air to said reservoir.

6. A liquid dispenser for a washing machine comprising means forming a closed air chamber connected in liquid

communication with a lower portion of the washer tub of said washing machine, means forming a closed reservoir for a liquid agent adapted to be injected into said tub, an air passageway extending between upper regions in said air chamber and said reservoir by which air can flow from the former into the latter when water flows from the tub into said air chamber, another passageway leading from a lower region of said reservoir into said tub through which liquid agent displaced from said reservoir by the incoming air can flow into said washer tub, and air escape means in said air chamber for allowing air to escape therefrom to the atmosphere until the water flowing into the air chamber rises to a predetermined level after which the remaining air will begin to flow through the first-named air passageway, and a valve in the first-named passageway for controlling the flow of air to said reservoir from said air chamber.

7. A variable charge liquid dispenser mounted adjacent the side of the tub of a washing machine, said dispenser having a closed air chamber in its lower portion and a closed reservoir in its upper portion, liquid conduit means between the tub and air chamber, an air passageway extending between said air chamber and said reservoir opening into the top of said air chamber and into the upper regions of said reservoir, a solenoid air valve in said passageway for controlling flow of air from said air chamber to said reservoir, a dispensing tube communicating with the lower portion of said reservoir and adapted to extend into said tub for discharging thereinto liquid agent from said reservoir, said dispenser being adapted for mounting adjacent the side of said tub so that as the level of water in said tub rises during a filling operation water will also rise in said air chamber to pump air through said passageway into said reservoir thereby displacing a proportionate amount of liquid agent into said tub and means for varying the effective amount of air that can be pumped from the air chamber to the reservoir.

8. A variable charge liquid dispenser mounted adjacent the side of the tub of a washing machine, said dispenser having a closed air chamber in its lower portion and a closed reservoir in its upper portion, liquid conduit means between the tub and air chamber, an air passageway extending between said air chamber and said reservoir opening into the top of said air chamber and into the upper regions of said reservoir, a solenoid air valve in said passageway for controlling flow of air from said air chamber to said reservoir, a dispensing tube communicating with the lower portion of said reservoir and adapted to extend into said tub for discharging there into liquid agent from said reservoir, said dispenser being adapted for mounting

adjacent the side of said tub so that as the level of water in said tub rises during a filling operation water will also rise in said air chamber to pump air through said passageway into said reservoir thereby displacing a proportionate amount of liquid agent into said tub and a valve member for bleeding off predetermined volumes of the air from said air chamber before air can be pumped to said reservoir, and a selector member on the upper portion of said dispenser and operatively connected to said valve member for varying the amount of bleed-off of air that will occur.

9. A variable charge liquid dispenser mounted adjacent the side of the tub of a washing machine, said dispenser having a closed air chamber in its lower portion and a closed reservoir in its upper portion, liquid conduit means between the tub and air chamber, an air passageway extending between said air chamber and said reservoir opening into the top of said air chamber and into the upper regions of said reservoir, a solenoid air valve in said passageway for controlling flow of air from said air chamber to said reservoir, a dispensing tube communicating with the lower portion of said reservoir and adapted to extend into said tub for discharging thereinto liquid agent from said reservoir, said dispenser being adapted for mounting adjacent the side of said tub so that as the level of water in said tub rises during a filling operation water will also rise in said air chamber to pump air through said passageway into said reservoir thereby displacing a proportionate amount of liquid agent into said tub, and a rotary valve member positioned in said air chamber and operative to bleed air from said chamber until a predetermined level of water therein is reached, and a selector knob mounted on the top of said reservoir and operatively connected to said rotary valve member for varying the effective position of the latter so that different predetermined levels can selectively be set.

References Cited in the file of this patent

UNITED STATES PATENTS

994,431	Unger	June 6, 1911
1,615,413	Snyder	Jan. 25, 1927
2,228,914	Pierce	Jan. 14, 1941
2,351,579	Beckman	June 20, 1944
2,598,377	Herrera	May 27, 1952
2,812,119	Bethune	Nov. 5, 1957

FOREIGN PATENTS

3,485	Great Britain	of 1913
597,267	Great Britain	Jan. 22, 1948