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G. J. FEDERIGHI ET AL
AUTOMATIC DRYING AGENT RINSE INJECTOR
FOR DISHWASHING MACHINES

2,948,436

Filed July 21, 1958

2 Sheets-Sheet 1

FIG. 1

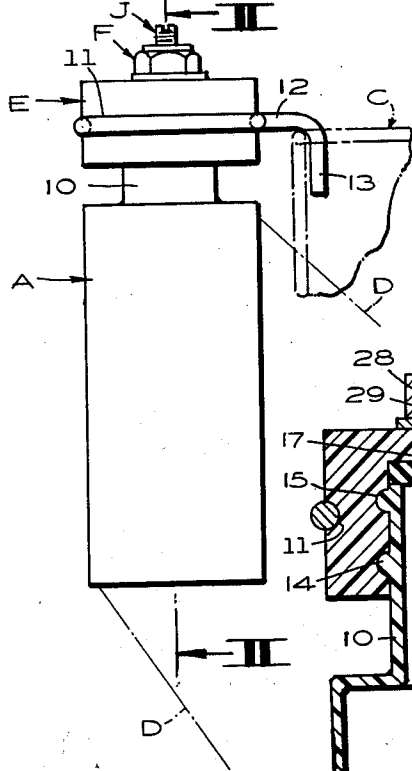


FIG. 3

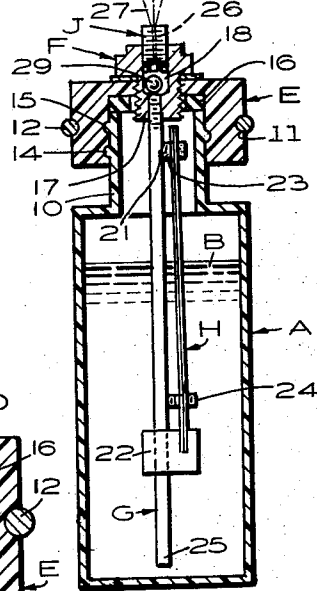
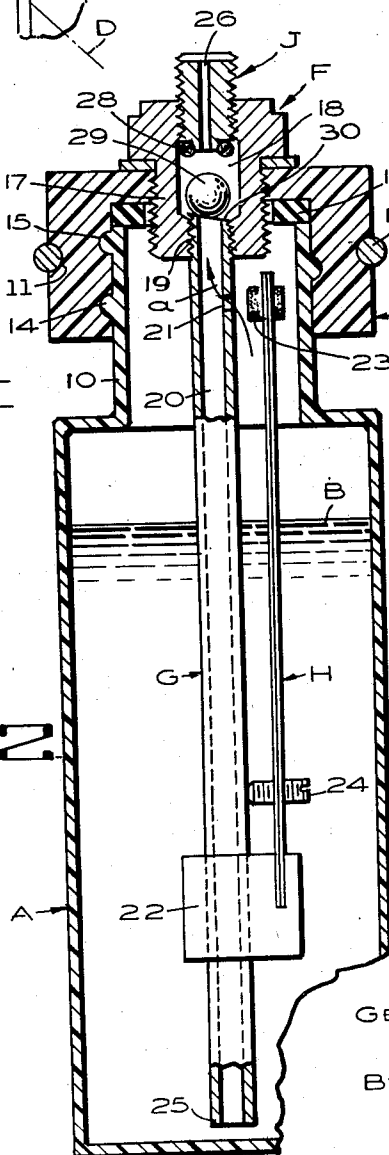


FIG. 2



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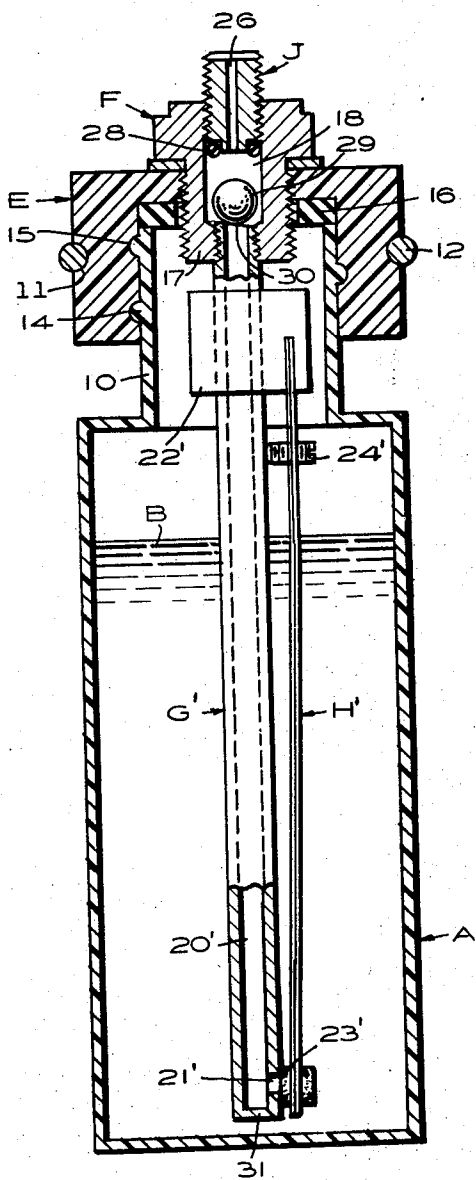


FIG. 4

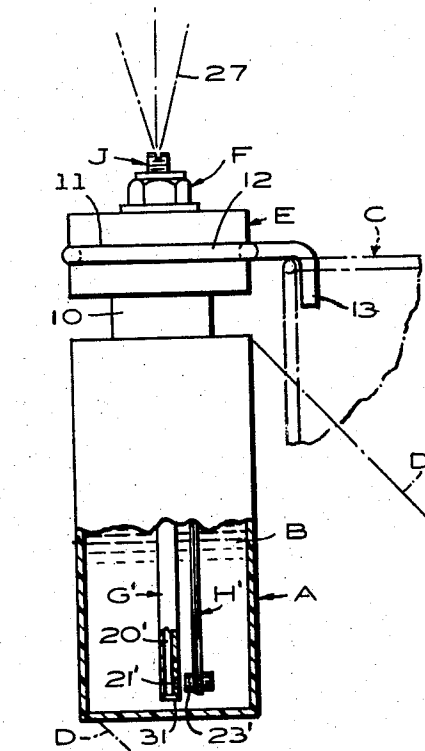


FIG. 5.

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AUTOMATIC DRYING AGENT RINSE INJECTOR FOR DISHWASHING MACHINES

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6 Claims. (Cl. 222—54)

The present invention relates to improvements in an automatic drying agent rinse injector for dishwashing machines. It consists of the combinations, constructions and arrangement of parts as hereinafter described and claimed. It has particular reference to improvements over the copending application of George J. Federighi (one of the applicants herein), entitled, "Drying Agent Dispenser for Use With a Dishwashing Machine," Serial No. 625,843, filed in the United States Patent Office on December 3, 1956 (now Patent No. 2,895,646, dated July 21, 1959).

As pointed out in the above-identified copending application, rinse water is discharged over dishes, glasses and silverware, after the washing cycle of the dishwashing machine, to rinse and sterilize them. However, this rinse water has a tendency to cling to the washed articles, which will leave spots or streaks when they dry. Accordingly, resort has been made to injecting a non-sudsing drying agent liquid into the rinse water so as to break up the surface tension of the latter, thus causing the rinse water to drain from the washed articles.

However, it has been found from actual practice that the dispenser shown in the copending case had a tendency to discharge the drying agent during cycles other than the final rinse cycle. This was caused by a syphoning action that was created, causing the drying agent liquid to continue to flow during subsequent cycles, such as the washing cycle. This resulted in a waste of the drying agent liquid.

As the cardinal object of the present invention, we propose to provide an automatic drying agent rinse injector which may be regulated in such a manner that the drying agent liquid will be conserved and discharged only during the final rinse cycle.

More specifically, we provide a bottle for holding the non-sudsing drying agent liquid, and an adjustable bimetallic strip is arranged in the bottle so as to control the discharge of the liquid. The bottle is mounted in a position to be impinged by hot rinse water sprays, and the bimetallic strip will permit discharge of the liquid primarily during the final rinse cycle of the dishwashing machine.

Other objects and advantages will appear as the specification continues. The novel features will be set forth in the appended claims.

Drawings

For a better understanding of our invention, reference should be had to the accompanying drawings, forming part of this specification, in which:

Figure 1 is a side elevational view of our automatic drying agent rinse injector for dishwashing machines;

Figure 2 is an enlarged vertical sectional view taken along the plane II—II of Figure 1, the bimetallic strip being arranged to allow only air to be discharged from the bottle;

Figure 3 is a view similar to Figure 2, but illustrating the bimetallic strip flexed into a position to cause the non-

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sudsing drying agent liquid to be sprayed from the bottle; Figure 4 is an enlarged vertical sectional view, similar to Figure 2, but disclosing a modified form, the bimetallic strip being disposed in a position to prevent discharge of drying agent liquid from the bottle; and

Figure 5 is an elevational view of the modified form, portions being shown in section, and the bimetallic strip being arranged to permit discharge of the drying agent liquid from the bottle.

While we have shown only the preferred forms of our invention, it should be understood that various changes, or modifications, may be made within the scope of the annexed claims without departing from the spirit thereof.

Detailed description

In carrying our invention into practice, we provide a bottle indicated generally at A which contains a non-sudsing agent liquid B. This liquid may be a commercial product known as "Rinse-Dry," which is composed of a non-ionic alkyl aryl sulfonate wetting agent and alcoholic solvent for blending. This bottle is adapted to be mounted in a combined washing and rinsing compartment of a dishwashing machine (not shown). The usual rack C is disposed in this compartment for holding dishes, glasses and silverware for washing and rinsing operations.

The circulatory systems for the wash and rinse waters have not been shown, since they are well known in the art. Generally speaking, detergent-carrying wash water of suitable temperature is directed over the dishes and the like for a predetermined length of time. After the washing cycle has been completed, this water is automatically discharged from the machine. Subsequently, a fresh supply of hot rinse water, for example, of a temperature of 100°–140° F. is admitted to the machine, and this water is sprayed over the dishes and the like during the pre-rinse or first rinse cycle. Thereafter, this water is discharged, and another supply of hot rinse water, for example, 150°–180° F. is delivered to the machine for a final rinse cycle. Of course, we do not wish to be limited to any particular type of dishwashing machine or temperature of water.

As suggested in Figure 1, the bottle A is mounted in a dishwashing machine in a position to be impinged by sprays of water D, which includes sprays of the final rinse water. A cap E is removably secured to the neck 10 of the bottle A, and this cap is fashioned with an annular groove 11 in its periphery, and a spring bail 12 fits into the groove and is provided with a hook 13. The latter is adapted to engage with the rack C for thus supporting the bottle A. Any other suitable means may be provided for supporting the bottle in the wash-rinse compartment of the dishwashing machine.

For the purpose of removably securing the cap E to the neck 10 of the bottle, we have provided threads 14 on the bottle neck which engage with corresponding grooves 15 formed in the cap. A gasket 16 has been interposed between the top of the neck 10 and the interior of the cap E to form a liquid-tight seal therebetween.

It will be noted that a fitting F is carried by the cap E, the former having a threaded shank 17 extending downwardly through the top of the latter. This fitting is fashioned with a passageway 18 extending therethrough.

With particular reference to Figure 2, it will be seen that a tube G has an upper threaded end 19 which is screwed into the bottom of the fitting F, so that its bore 20 will communicate at its upper end with the passageway 18 of this fitting. The tube G extends downwardly into the bottle A and the liquid B therein. This tube has a normally opened port 21 in its wall, which is located near the top of the tube in a position to allow discharge of air from the upper part of the bottle A, as suggested

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by the arrow *a*, when the air is initially expanded by hot water sprays D striking the bottle.

In Figures 2 and 3, we show a bimetallic strip H, mounted in the bottle A, this strip being flexible toward and away from the tube G in response to changes in temperature. For the purpose of supporting the bimetallic strip H, the latter has its lower end anchored to a block 22 that is fixed to the tube G. A rubber valve 23 is carried by the free end of the strip H in a position to close the port 21 when the strip H is flexed toward the tube G, and to uncover the port 21, when the strip is flexed away from the tube.

The bimetallic strip H is made of such construction that its upper free end will flex toward the tube G as the temperature of the liquid B and the air in the bottle is raised. When this temperature reaches a predetermined point, the valve 23 will close the port 21, as suggested in Figure 3. The particular temperature at which this valve will close the port may be regulated by an adjusting screw 24 mounted in the strip H between the block 22 and the valve 23 to bear against the tube G.

It will be apparent that when the valve 23 closes the port 21, and the liquid B and the air in the bottle are further expanded by hot rinse sprays D striking the bottle, the liquid B will be forced through the lower open end 25 of the tube G and will flow upwardly through the bore 20 and into the passageway 18 of the fitting F.

A plug J is threaded into the top of the fitting F and has an outlet orifice 26 communicating with the passageway 18 of the fitting F for discharge of the drying agent liquid, as suggested by the sprays 27 in Figure 3, when the hot rinse water D striking the bottle A has created sufficient expansion of the air and the liquid B in the bottle to force the liquid upwardly through the bore 20 of the tube G.

It will be observed that the plug J is provided with a gasket ring 28 at its lower end (see Figure 2). Moreover, a ball valve 29 is mounted in the passageway 18 of the fitting F in a position to seal against the gasket ring 28, when this ball valve is raised by the liquid B being forced upwardly through the tube, closing off further discharge of the liquid.

The upper end of the tube has an inclined surface 30 to prevent the ball valve 29 from fully seating thereagainst, when the ball valve drops. This will allow air to enter through the orifice 26 of the plug J, the passageway 18 of the fitting F, and the bore 20 of the tube G to recharge the bottle A with air.

The movement of the bimetallic strip H may be controlled by the adjusting screw 24 so that the drying agent liquid B will be discharged only during the final rinse cycle of the dishwashing machine, it being noted that the temperature of the final rinse water is the highest of all water used in the machine.

Referring now to the modified form shown in Figures 4 and 5, it will be noted that the modification pertains only to the tube G' and the bimetallic strip H'. Like reference characters have been applied to corresponding parts of the two forms of the invention.

As clearly shown in Figure 4, the tube G' has a port 21' located near the lower end of the tube to allow flow of the drying agent liquid B from the bottle A to the bore 20' of the tube, when the port 21' is uncovered by the rubber valve 23' on the strip H'. The bottom of the tube is sealed, as at 31, whereby the liquid B will flow into the bore 20' only when the port 21' is uncovered.

It will be apparent that the bimetallic strip H' in Figure 4 is inverted as compared with the bimetallic strip H in Figure 2, the block 22' and adjusting screw 24' being arranged near the top of the tube G'. The construction of the strip H' is such that the valve 23' will be moved away from the tube G' so as to uncover the port 21' (see Figure 5), when the final rinse water

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sprays D strike the bottle A during the final rinse cycle of the dishwashing machine.

In both embodiments of our invention, the bottle A is preferably made of transparent plastic so that the amount of the liquid B remaining therein can be seen. After one bottle has been emptied, a new one containing a supply of the liquid B may be readily substituted.

We claim:

1. In an automatic drying agent rinse injector for dishwashing machines; an injector bottle adapted to contain a non-sudsing drying agent liquid; the injector bottle being adapted to be mounted in a dishwashing machine in an upright position to be impinged by hot rinse water sprays; a cap removably secured to a neck of the bottle; a fitting carried by the cap and being fashioned with a passageway extending therethrough; a tube having a bore communicating at its upper end with the passageway of the fitting; the tube extending downwardly into the bottle and the liquid therein; the tube being provided with a port in a side wall thereof; a bimetallic strip mounted in the bottle to extend lengthwise of the tube, and being adapted to be flexed toward and away from the tube in response to changes in temperature due to the impingement of the hot rinse water sprays on the injector bottle; a valve carried by the strip in a position to close the port when the strip is flexed toward the side of the tube, and to uncover the port when the strip is flexed away from the tube; and a plug carried by the fitting and having an outlet orifice communicating with the passageway of the fitting for discharge of the drying agent liquid, when the hot rinse water striking the bottle has created sufficient expansion of air and liquid in the bottle to force the liquid upwardly through the tube.

2. An automatic drying agent rinse injector for dishwashing machines, as set forth in claim 1; and in which the plug is provided with a gasket ring at its lower end; and a ball valve is mounted in the passageway of the fitting in a position to seal against the gasket ring, when the ball valve is raised by the liquid being forced upwardly through the tube, closing off further discharge of the liquid.

3. An automatic drying agent rinse injector for dishwashing machines, as set forth in claim 2; and in which the upper end of the tube has an inclined surface to prevent the ball valve from fully seating thereagainst, when the ball valve drops, thus allowing air to enter through the orifice of the plug, the passageway of the fitting, and the bore of the tube to recharge the bottle with air.

4. An automatic drying agent rinse injector for dishwashing machines, as set forth in claim 1; and in which a block is secured to the tube; one end of the bimetallic strip being anchored to this block; the valve carried by the strip being disposed adjacent to the opposite end of the strip; and an adjustment screw mounted in the strip between the block and the valve on the strip to bear against the tube; said screw being adjustable to flex the bimetallic strip away from the tube.

5. An automatic drying agent rinse injector for dishwashing machines, as set forth in claim 1; and in which the port in the tube is normally opened and is located near the top of the tube in a position to allow discharge of air from the upper part of the bottle, when the air is initially expanded by the hot water striking the bottle; the lower end of the tube being open so as to receive the liquid, when the valve on the strip closes the port in the tube, and the air and liquid in the bottle are further expanded by the hot rinse water striking the bottle.

6. An automatic drying agent rinse injector for dishwashing machines, as set forth in claim 1; and in which the port in the tube is normally closed by the valve on the strip; the port being located near the lower end of the tube to allow flow of liquid from the bottle to the bore of the tube, when the port is uncovered by the valve on the strip; the bottom of the tube being sealed, whereby

the liquid will flow into the bore of the tube only when the port is uncovered.

References Cited in the file of this patent

UNITED STATES PATENTS

1,295,321	Hurlbrink	Feb. 25, 1919
2,017,701	Millis	Oct. 15, 1935

2,231,211
2,244,302
2,430,956
2,560,523
2,698,022
2,867,224

Halsey et al.	Feb. 11, 1941
Lynn et al.	June 3, 1941
Scott	Nov. 18, 1947
Efford	July 10, 1951
Fahnoe	Dec. 28, 1954
Martiniak et al.	Jan. 6, 1954