

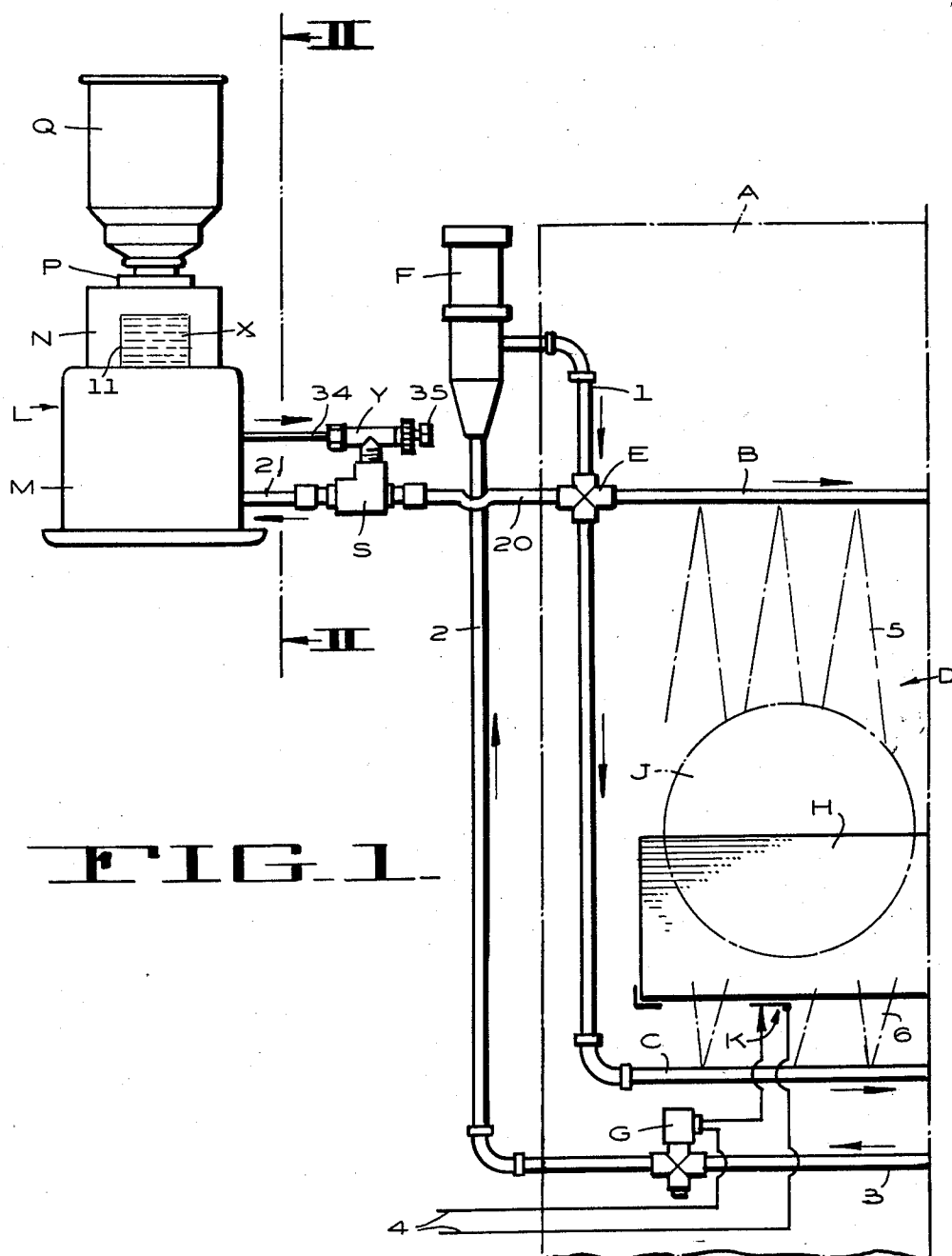
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PRESSURIZED DEVICE FOR INJECTING DRYING AGENT
INTO RINSE SPRAY SYSTEM

2,910,075

Filed April 1, 1957

3 Sheets-Sheet 1



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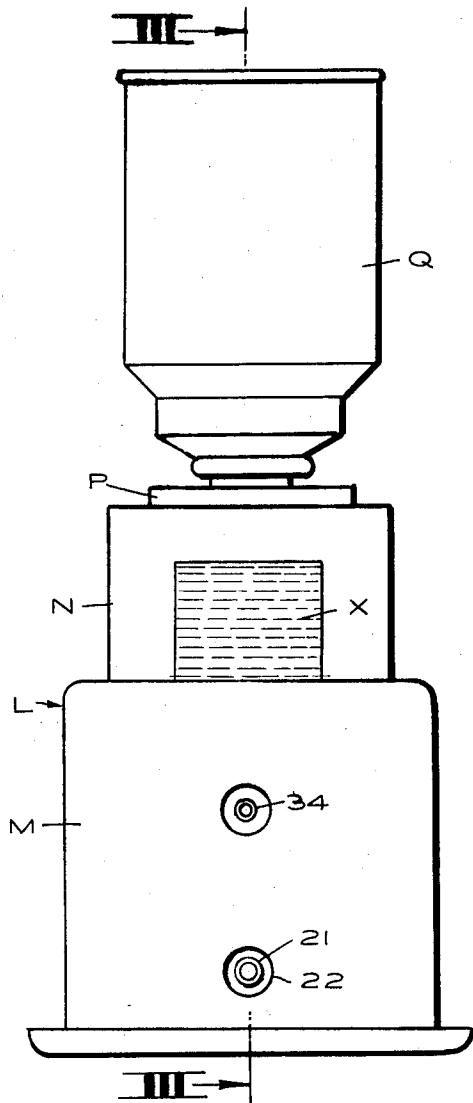


FIG. 2.

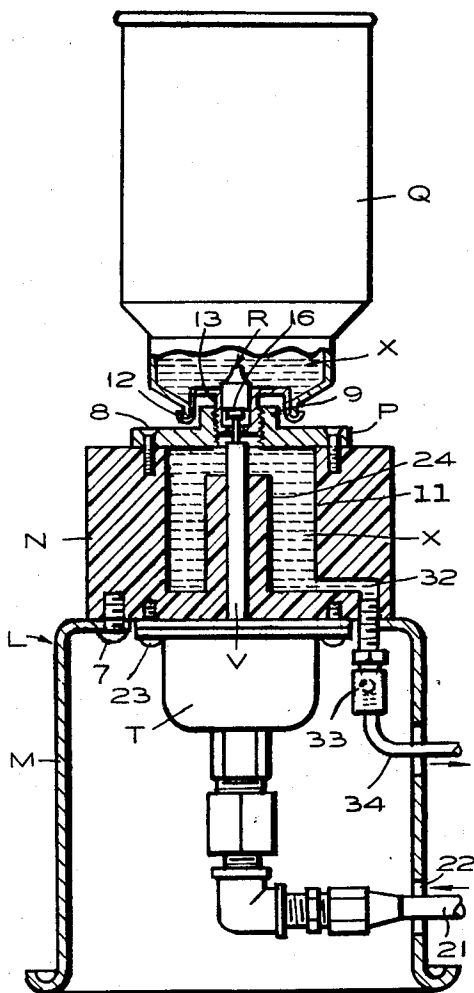


FIG. 3.

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FIG. 4

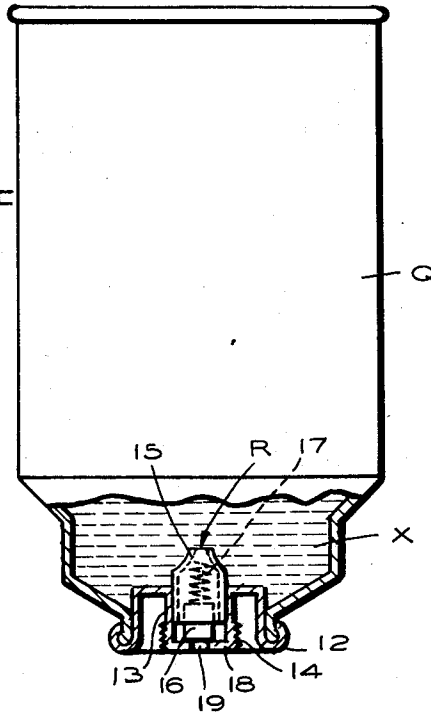
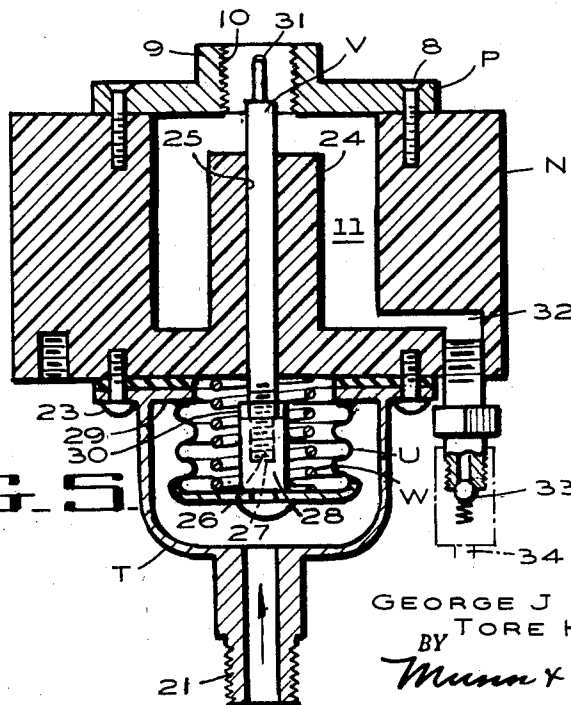


FIG. 5



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PRESSURIZED DEVICE FOR INJECTING DRYING AGENT INTO RINSE SPRAY SYSTEM

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Application April 1, 1957, Serial No. 649,704

6 Claims. (Cl. 134—56)

In the commercial washing of dishes, a rinse spray at a temperature of about 180° F. is applied to the washed dishes for rinsing and sterilizing the dishes, glasses and silverware. The rinse water has a tendency to cling to the washed articles in small droplets which require from four to ten minutes to dry. When these droplets dry, they usually leave white spots which is caused by the alkaline material in the water.

To prevent the white spots from showing on the articles, an operator is employed for hand toweleling the silverware and drying the glasses. If this is not done, there is an accumulation of alkaline deposits and the dishes, glasses and silverware will gradually acquire a white film thereon.

In our Patent No. 2,740,415, issued on April 3, 1956, on an apparatus for injecting a drying agent into the rinse spray system, we made use of the hot water pressure for actuating the device for delivering a predetermined quantity of any type of non-sudsing drying agent into the rinse spray automatically for breaking the surface tension of the rinse water that causes it to adhere to the washed articles. Any water drops left on the tableware will flow into a thin sheet and will run off immediately, leaving the tableware dry and unspotted in a matter of seconds.

The patented apparatus was fairly expensive to manufacture and install on a commercial dishwasher and it required the service of a mechanic from time to time to keep it in operating condition. The water pressure was not always uniform and too great a drop in water pressure might prevent the device from operating.

To overcome this variation in hot water pressure, we designed a motor-operated device and filed an application on March 22, 1956, Serial No. 573,291 (now Patent No. 2,843,137, dated July 15, 1958) for a motor-actuated apparatus for injecting drying agents into a rinse spray system. The variation in water pressure was overcome and the non-sudsing drying agent was thoroughly mixed with the rinse water prior to the spraying of the latter over the dishes, but the cost of equipment and installation was still too high because a motor driven pump was used. Moreover, the drying liquid agent had to be poured into a reservoir from time to time from which the liquid was pumped into the rinse water at the desired pressure and this required the constant attention of an operator to keep the reservoir from running dry.

To correct the above disadvantages, we designed an apparatus to be used with a container in which the drying agent was under a constant pressure of say twenty-five pounds. The container comes equipped with a valve that can be opened by the insertion of a pin into an opening provided in a casing housing the valve. The problem presented was to provide an apparatus in which water pressure from the rinse spray line had sufficient force to actuate the valve-opening pin each time the rinse spray was used, so that the quantity of the liquid drying agent would be delivered into the rinse water prior to the water being sprayed onto the dishes for rinsing and drying them.

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The present invention discloses an apparatus that solved the problem.

An object of our invention is to provide an apparatus that is actuated by the hot water pressure when the latter is turned on for rinsing the dishes, the apparatus automatically opening the valve of a pressurized container and permitting a measured quantity of the liquid drying agent to escape from the container and flow into the rinse water to mix therewith just prior to the water being sprayed upon the dishes for rinsing them. The apparatus will function properly, even though the water pressure is considerably below the pressure in the container that holds the liquid drying agent.

A further object of our invention is to provide a device of the type described in which the apparatus has novel means for showing when the pressurized container has been emptied of its contents, this means including a reservoir that initially receives the liquid drying agent from the container before delivering the liquid into the rinse water. The reservoir holds a sufficient quantity of the liquid to permit the empty container to be removed and a filled one substituted before the reservoir will be drained of its contents. The reservoir wall is made transparent so that the operator can see the liquid and determine whether the reservoir is full or not and thus be able to substitute a new container as soon as the old one becomes empty.

No tools are necessary to remove an empty container and attach a filled one to the apparatus. It is also not necessary to pour the liquid drying agent into the reservoir which is required in our patented device and in the device disclosed in our copending application, above mentioned.

The apparatus is simple in construction and is durable and efficient for the purpose intended.

Other objects and advantages will appear in the following specification, and the novel features of the device will be particularly pointed out in the appended claims.

Drawings

Our invention is illustrated in the accompanying drawings forming a part of this application in which:

Figure 1 is a schematic view of the device in its relation to a dishwashing machine and a simple electrical circuit is shown;

Figure 2 is a front elevation of the device on a larger scale, when looking in the direction of the arrows II—II in Figure 1;

Figure 3 is a vertical section through the device and is taken along the line III—III of Figure 2;

Figure 4 is a view of a pressurized container that holds the drying liquid agent, and the release valve for the container is shown in detail; and

Figure 5 is a transverse section of the transparent reservoir and valve-actuating mechanism on a larger scale than that shown in Figure 3.

Description

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

In carrying out our invention, we make use of a dishwashing machine indicated generally by the dot-dash lines A in Figure 1. Only the rinse spray pipes B and C are indicated in a dish-rinsing compartment D of the dishwashing machine. The rinse spray pipes B and C are interconnected by a four outlet coupler E, and a pipe 1, leads from a vacuum breaker F to one of the openings in the coupler E.

A hot rinse water pipe 2, connects with the entrance to the vacuum breaker F, and the other end of the pipe

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communicates with the outlet of a normally closed solenoid valve G. Another pipe 3, leads from a source of hot rinse water supply, not shown, to the solenoid valve G. When the solenoid valve G is opened by a tray H, of dishes J, closing an electric switch K, that connects the solenoid valve to a source of current through wires 4, and energizes the solenoid, hot rinse water under pressure will flow from the pipe 3, into the pipes 2 and 1 respectively, and then issue as sprays 5 and 6 from the spray pipes B and C, see Figure 1. Any other means for delivering hot rinse water to the spray pipes B and C, may be resorted to if desired.

The parts thus far described, form no part of our invention except insofar as they cooperate with the parts now to be described. The device for automatically dispensing a desired quantity of a liquid drying agent into the rinse water before it is sprayed onto the dishes is shown generally at L in Figures 1 and 2.

A vertical section through the automatic dispensing unit is illustrated in Figure 3. A hollow metal base M is designed to be supported on top of the dish washing machine or on any other support. A transparent liquid-holding reservoir N, is mounted on top of the base M, and is secured thereto by screws 7, or other suitable fastening means, see Fig. 3. A cap P, closes the open top of the transparent reservoir N, and is held in place by screws 8. An enlarged sectional view of the cap P is shown in Fig. 5, and the cap has a central boss 9, that has a threaded bore 10, therein for communicating with a liquid-receiving compartment 11, in the transparent reservoir N.

Figure 4 illustrates a container Q, or pressurized can in which the liquid drying agent is retained under a desired pressure, say twenty-five pounds. The container Q, with its liquid under pressure, is a manufactured article so designed that all of the liquid in the can will be expelled from the container at the same initial pressure of twenty-five pounds, and a valve controls the release of the liquid from the container. It is possible to make the container of any desired size and to hold a liquid under any desired pressure.

The container Q, has a cover 12 with a liquid release valve R, mounted therein. The cover has a central cylindrical portion 13, with a threaded outer end at 14. The valve R comprises a tubular casing 15, rigidly secured in the cylindrical portion 13. A valve insert 16, is loosely received in the tubular casing 15, and a coil spring 17, normally keeps the insert against the closed end 18, of the cylindrical portion 13, so as to close an outlet opening 19, in this end. The inner end of the valve casing 15, is crimped inwardly to provide a seat for one end of the coil spring 17. Fluid from the can or container Q, however, will be free to flow through the interior of the valve casing 15, past the insert 16, and out through the opening 19, when the valve insert is moved away from covering the opening. The spring 17, will instantly seat the valve insert to close the outlet opening 19, as soon as the insert is freed. The valve R, and container Q, are of standard construction.

We provide novel means for opening the valve R, each time the rinse water is turned on for rinsing the dishes. Figure 1 shows a water pipe 20, leading from one of the openings in the four outlet coupler E, to a fitting S. Another pipe 21, leads from the fitting S, to a casing T, that houses a bellows U, see Figures 3 and 5. The pipe 21, extends through an opening 22 in the base M. The casing T, is sealed to the bottom of the transparent reservoir N, and is held in place by screws 23.

The transparent reservoir N, has a central integral plug 24, that rises in the liquid-receiving compartment 11, and is provided with an axial bore 25, for slidably receiving a valve-opening pin V, see Fig. 5. The lower end of the pin V, is threaded at 26, and this end is adjust-

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ably received in a threaded bore 27, provided in a central stud 28. The stud 28 is secured to the closed lower end of the bellows U. The upper end of the bellows is attached to an inwardly extending flange 29 of the casing T. A lock nut 30, is mounted on the threaded portion 26, and when the pin V, has been adjusted in the threaded bore 27, to the desired point, the lock nut 30, will secure the pin against accidental movement.

The bellows U, is held in a slightly expanded condition by a coil spring W, see Figure 5, the spring bearing against the bottom of the bellows and against the bottom of the reservoir N. Figure 3 shows the container Q, inverted, and screwed into place in the boss 9, of the cap P. The pin V, has a reduced tip 31, that is loosely received in the opening 19 of the container Q. Normally, the pin tip 31, does not unseat the valve insert 16, and therefore no fluid will escape from the container. However, when the rinse water is turned on, a surge of water pressure will flow through the pipes 20 and 21, from the coupler E, and this water pressure will enter the casing T, and compress the bellows U, against the spring W. The compressing of the bellows will lift the pin V, in the bore 25, and the pin tip 31, will lift the valve insert 16, and uncover the outlet opening 19.

Immediately the liquid drying agent X, will be expelled from the container Q, and will fill the compartment 11. The liquid is preferably colored, such as the color red, so that an operator can determine how much liquid is in the reservoir by looking through the transparent wall. The reservoir is preferably made of a plastic such as transparent Lucite. The compartment 11, should normally be filled with liquid.

An outlet passage 32, leads from the compartment 11, and a fitting with a spring-pressed ball check valve 33, communicates with the passage and connects with a tube 34. Figure 1 shows the tube 34, connected to a needle valve Y, and the valve in turn controls the amount of liquid drying agent X, to enter the fitting S, and mix with the water therein. The liquid drying agent is of such a nature that it quickly disperses through the water in the tube 20, and enters the water flowing into the coupler E. Therefore, the liquid drying agent X, will mix with the rinse water flowing into the rinse spray pipes B and C, just before the water is sprayed upon the dishes. The adjustment of the size of the opening of the needle valve Y, is accomplished by the knob 35, see Fig. 1.

Operation

From the foregoing description of the various parts of our invention, the operation thereof may be readily understood.

The water pressure for the hot rinse water may be low, and yet the valve R, in the pressurized can Q, will be opened when the rinse water is turned on. The reason for this is that the water pressure in the casing T, exerts a pressure against the entire area of the bottom of the bellows. All of this pressure is concentrated on the pin V, for lifting it and again all of this pressure is exerted on the tip 31, which is reduced in diameter so as to enter the can opening 19, and leave enough space in the opening for the fluid to issue forth when the valve R is opened. All of this pressure is exerted on the valve insert 16, to lift it against a weak spring 17.

Opposed to this lifting pressure on the valve insert 16, is the twenty-five pounds pressure in the container Q. This pressure can only be exerted through the small opening provided in the reduced crimped top of the casing 15. The opposed force is far less than the lifting force even though the water pressure in the pipe 20, may be considerably less than the pressure in the container Q. As soon as the rinse water is shut off, the spring W, in the bellows U, will return the bellows to normal position, and this will retract the pin V, and permit the valve insert 16, to seat and close the can valve R. The pressure of the

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liquid in the compartment 11, is the same as the pressure in the container Q. The pin V, fills the bore 25, so this pressure cannot be transferred to the bellows interior.

At the start of the operation, the rinse water is turned on and it remains on until the compartment 11, fills. Thereafter, the liquid drying agent will be fed from the compartment 11, past the check valve 33, and into the rinse water each time the rinse water is turned on. A constant pressure is maintained on the liquid drying agent X, until the container Q is empty. The operator knows when to replace with a filled container because the level of the liquid in the compartment 11, will start to drop. It is a simple matter to unscrew the empty container Q, from the boss 9, on the cap P, and immediately screw a new filled container onto the boss.

It has already been pointed out how a predetermined quantity of the liquid drying agent X, is delivered into the rinse water, each time the solenoid valve G is opened, and a fresh supply of hot rinse water is delivered to the spray pipes B and C. The check valve 33 prevents any back pressure on the liquid in the compartment 11. The water pressure in the rinse pipes 1 and 2 may vary, but this will have no effect on opening the can valve R. Moreover, the liquid drying agent X, will be delivered at a constant pressure from the container Q, regardless of any variation in water pressure that there might be in the rinse water.

It is possible to use the device for aiding in cleaning the dishes just prior to feeding them into the dishwashing machine. The hot water pipe used for this purpose to spray the food off from the dishes, could have liquid soap or other chemical added to it by our present device each time the water was turned on. The increase in the water pressure makes the device operate and it automatically stops as soon as the water is shut off.

The present invention works by hydraulically operated means. The pin V, could be operated by a solenoid (not shown) when energized by an electric current that could be closed by the same switch K, when a basket filled with washed dishes, reaches the rinse compartment in the dish washing machine.

The check valve 33, will also prevent any return flow of fluid back into the reservoir N, during the changing of an empty container Q, from the reservoir inlet and the substitution of a filled container and its attachment to the boss 9.

The pressure in the container Q is always higher than the water pressure in the pipe 20. This differential in pressure will cause the liquid drying agent X to be forced through the fitting S, even though there is a static column of water in the pipe 20.

We claim:

1. The combination with a dishwashing machine having a rinse compartment adapted to receive dishes; hot water rinse spray pipes disposed in the compartment; a hot water inlet pipe connected to the spray pipes; and a valve for controlling the flow of hot water into the spray pipes for rinsing the dishes; of a pressurized container having a liquid drying agent under pressure therein which pressure is higher than the water pressure in said hot water inlet pipe; the container having an outlet provided with a self-closing valve for releasing the liquid when the container valve is opened; a liquid drying agent conveying means communicating with the container outlet and with the hot water inlet pipe; and means actuated by the hot water pressure when the hot water valve is turned on for opening the valve-controlled outlet of the container; whereby the pressure in the container will expel liquid therefrom into the liquid conveying means that in turn will carry the liquid into the rinse water for mixing with the latter; the container valve being operable for automatically closing the container outlet when the hot rinse water valve is closed.

2. The combination as set forth in claim 1: and in which the liquid drying agent conveying means includes

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a transparent reservoir for receiving liquid from the container; said reservoir having an inlet for removably receiving the outlet of the container; the means for opening the container valve being positioned with respect to the reservoir inlet so that a connection of the container outlet with the reservoir inlet will cause the valve opening means to open the container valve each time the valve opening means is operated.

3. The combination with a dishwashing machine having hot water rinse spray pipes; a hot water inlet pipe communicating with the spray pipes; and a valve for controlling the flow of hot water into the spray pipes; of a transparent reservoir having an inlet; a container having an outlet removably connectable to the reservoir inlet; said container having a liquid drying agent under pressure therein which pressure is higher than the water pressure in said hot water inlet pipe; the container having an outlet provided with a self-closing valve in the outlet; a valve-opening pin mounted in the reservoir inlet and designed to open the container valve when the container outlet is connected to the reservoir inlet, and when the pin is actuated; and means actuated by the water pressure from the hot water inlet pipe when the hot water valve is turned on, for moving the pin for opening the container valve and permitting liquid under pressure from the container, to enter the reservoir; and communications between the reservoir and the hot water pipe for delivering liquid from the reservoir into the hot water prior to the water reaching the spray pipes.

4. The combination with a dishwashing machine having hot water rinse spray pipes; a hot water inlet pipe communicating with the spray pipes; and a valve for controlling the flow of hot water into the spray pipes; of a transparent reservoir having an inlet; a container having a liquid drying agent under pressure therein which pressure is higher than the water pressure in said hot water inlet pipe; the container having an outlet provided with a self-closing valve for controlling the flow of liquid through the outlet; a bellows; a housing for the bellows and being in communication with the hot water pipe for receiving water that presses upon the bellows; a pin operated by the bellows for opening the self-closing container valve each time the bellows is actuated; the hot water valve when opened permitting the water pressure to act on the bellows for moving the pin and opening the container valve; communications between the reservoir and the hot water pipe; whereby an opening of the container valve will permit liquid from the container to enter the reservoir and flow to the hot water pipe for mixing with the hot water prior to the hot water entering the spray pipes; the container valve being operable for automatically closing the container outlet when the hot water valve is closed.

5. The combination as set forth in claim 4: and in which a check valve is provided in the communications between the reservoir and the hot water pipe so as to prevent any reverse flow of liquid back into the reservoir during the time when a used container has its outlet disconnected from the reservoir inlet and a new filled container is substituted and has its outlet connected to the reservoir inlet.

6. The combination with a dishwashing machine having a rinse compartment adapted to receive dishes; hot water rinse spray pipes disposed in the compartment; a hot water inlet pipe connected to the spray pipes; and a valve for controlling the flow of hot water into the spray pipes for rinsing the dishes; of a pressurized container having a liquid drying agent under pressure therein which pressure is higher than the water pressure in said hot water inlet pipe; the container having an outlet provided with a self-closing valve for releasing the liquid when the container valve is opened; a liquid drying agent conveying means communicating with the container outlet and with the hot water inlet pipe, and including an inlet to which the outlet of the container may be removably coupled;

a valve-opening pin positioned in said inlet of the liquid drying agent conveying means and being operable to open the self-closing valve of the container outlet when the container is coupled to said inlet; and means actuated by the hot water pressure when the hot water valve is turned on for operating said pin for opening the valve-controlled outlet of the container, whereby the pressure in the container will expel liquid therefrom into said liquid conveying means that in turn will convey the dry-

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ing agent liquid into the rinse water for mixing with the latter.

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