

Sept. 24, 1968

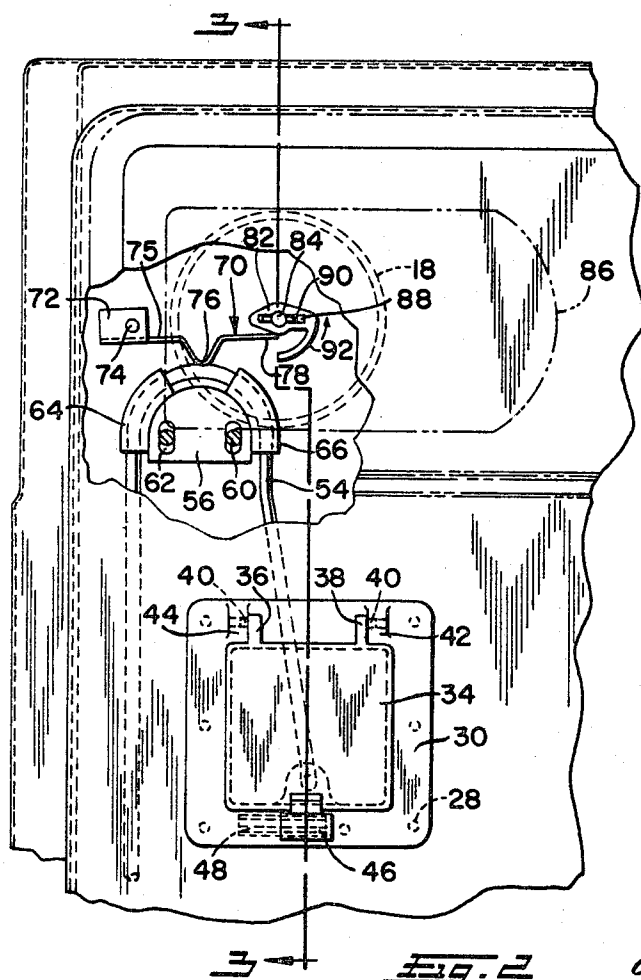
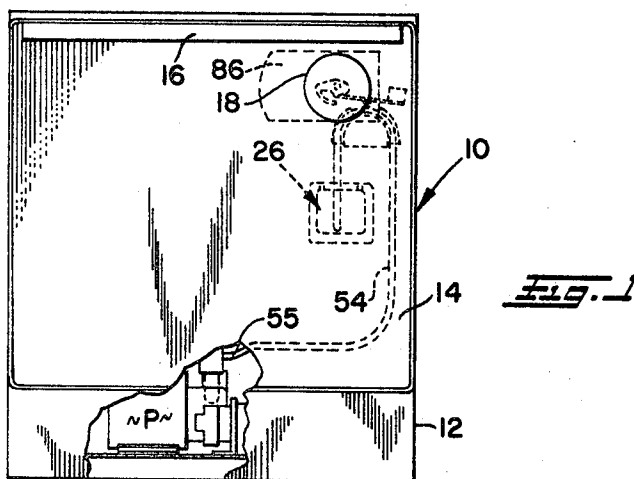
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3,402,853

DETERGENT MIXING DISPENSER

Original Filed July 16, 1964

2 Sheets-Sheet 1



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Fig. 3

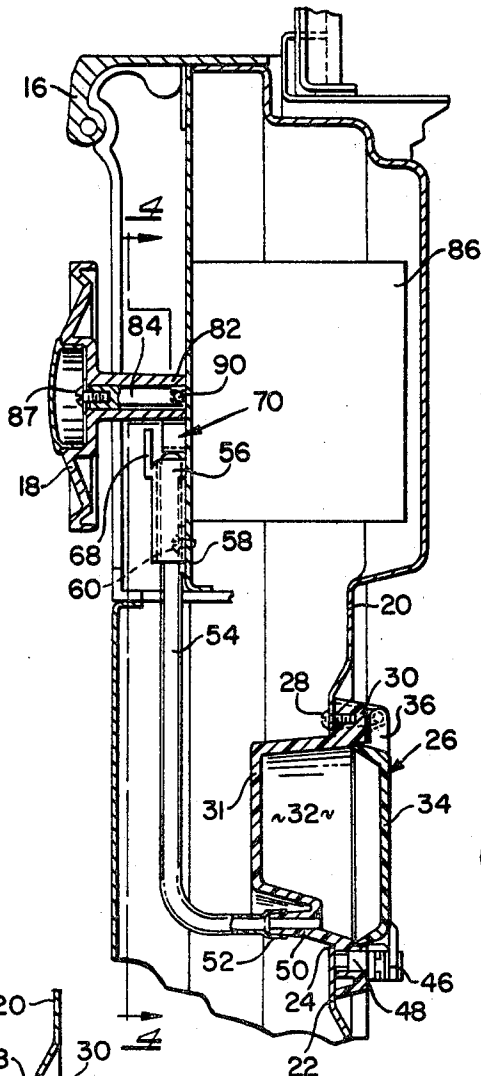


Fig. 4

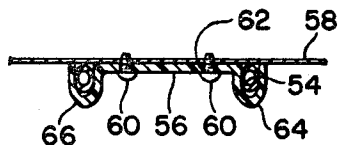
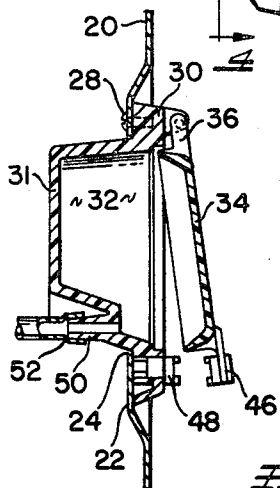
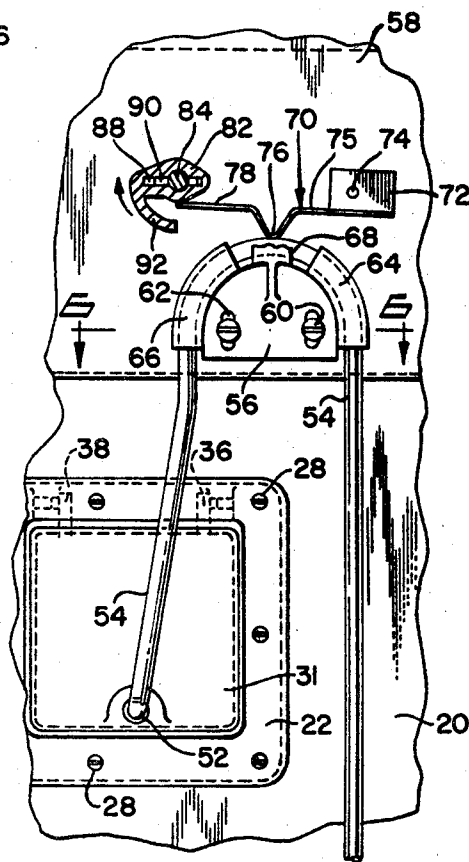


Fig. 6

Fig. 5

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DETERGENT MIXING DISPENSER

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Continuation of application Ser. No. 383,194, July 16, 1964. This application Aug. 4, 1966, Ser. No. 570,379
4 Claims. (Cl. 222—70)

This application is a continuation of Ser. No. 383,194 filed July 16, 1964, now abandoned.

The present invention relates as indicated to a detergent mixing dispenser and more particularly to a detergent dispenser wherein the detergent additive is mixed with a liquid diluent and dispensed as a resulting detergent solution into the washing chamber.

In presently available granular detergent dispensers, these being most common, the detergent compartment is normally closed by the compartment cover until a predetermined time has been reached in the operating cycle, as controlled by a timer unit, at which time the compartment cover is moved to an open position to permit emptying of the granular detergent into the washing chamber. Such detergent as may remain in the compartment is repeatedly subjected to the washing liquid directed into the washing chamber whereby most or all of such remaining detergent is eventually supplied to the washing chamber. Such an arrangement is less than satisfactory for a number of reasons. Improper adjustment of the control knob at the initiation of the washing operation is often capable of accidentally tripping the cover retaining means whereby the detergent is inadvertently supplied to the washing chamber well in advance of the washing cycle, with the undesirable result often being that the detergent is actually removed from the washing chamber, e.g. during a pre-wash rinse cycle, before the washing cycle. Further, even assuming proper setting of the control knob, not infrequently a considerable portion of the detergent will stick to the detergent compartment walls and not empty into the washing chamber at all, or if eventually washed by the washing liquid into the chamber, will reach the same relatively near the end of the wash cycle thereby detracting from the effectiveness of the detergent to properly clean the dishes, utensils and the like positioned in the washing chamber. Moreover, in order to remove any detergent sticking in the compartment by the circulating washing liquid, the dispenser must necessarily be located on the dishwasher door in a position to provide full exposure to the circulating washing liquid, and without regard to manufacturing or assembling considerations. Still further, the granular detergent is of course quite concentrated and when emptied in granular form into the washing chamber tends to adversely affect the metal surfaces of pans and the like.

With the above in mind, a primary object of the present invention is to provide a detergent mixing dispenser in which the detergent additive is pre-mixed with available liquid to form a detergent solution prior to being admitted to the washing chamber. The detergent most likely will be of granular form, although other forms of concentrates, including liquids, can be similarly treated in the mixing and dispensing operation.

A more specific object of the present invention is to provide a detergent mixing dispenser in which liquid, usually water, is injected into the detergent compartment while the same is closed by the dispenser cover, the liquid mixing with the detergent in the closed compartment to form the desired detergent solution, with the eventual buildup of pressure in the compartment as a result of the injection of such liquid effecting an opening of the dispenser cover to permit emptying of the detergent solution into the washing chamber.

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A further object of the present invention is to provide a detergent mixing dispenser which can be mounted on the dishwasher door panel without regard to the position of the spray arm or like liquid circulating means or, more particularly, the spray pattern of such circulating means.

A further object of the invention is to provide a detergent mixing dispenser which is automatically controlled and entirely self-cleaning.

A further object of the invention is to provide a detergent mixing dispenser which is simply constructed, economical to manufacture and reliable in use.

These and other objects and advantages of the present invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features herein-after fully described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

FIG. 1 is a front elevational view of a dishwasher embodying the detergent mixing dispenser, shown in dashed lines, of the present invention, with the front of the dishwasher being broken away to expose the circulating pump;

FIG. 2 is a fragmentary, enlarged view of the inside panel of the dishwasher door, with the panel being broken away in certain areas to expose parts of the control mechanism;

FIG. 3 is a sectional view on a slightly enlarged scale taken on line 3—3 of FIG. 2;

FIG. 4 is a sectional view taken on line 4—4 of FIG. 3;

FIG. 5 is a fragmentary view of a portion of FIG. 3, with the dispenser cover being shown in a slightly opened position; and

FIG. 6 is a sectional view taken on line 6—6 of FIG. 4.

Referring now in detail to the drawings, wherein like parts are designated by like reference numerals, and initially to FIG. 1, a dishwasher embodying the present invention is generally indicated at 10 and comprises a cabinet 12 and a bottom hinged door 14 pivotally mounted at the bottom and front of the cabinet in conventional manner for movement between a vertical, closed position and a substantially horizontal, open position. The upper end of the door is provided with a hand grip portion 16 to facilitate opening and closing thereof. Suitable control knob 18, are mounted on the door 14 for variably controlling the washing operation. Any suitable means, e.g. a spray arm (not shown), can be mounted in the washing chamber of the dishwasher for directing washing liquid into the washing chamber for cleansing the dishes, utensils and the like positioned therein, with such liquid directing means not being illustrated and forming no part of the present invention. A conventional circulating pump P is mounted adjacent the bottom of the dishwasher for circulating the washing liquid, with the pump additionally supplying liquid to the detergent mixing dispenser, as will be hereinafter described. The dishwasher thus far described is conventional and has been described only in sufficient detail to provide a clear understanding of the present invention. It will be understood that although the dishwasher illustrated is of the so-called front loading type, the principles of the present invention are readily adaptable to other type dishwashers as well.

The inside panel 20 of the door 14 is formed at any suitable location with a recessed portion 22 which has formed therein an opening 24. The detergent mixing dispenser of the present invention is generally indicated at 26 and is adapted to be disposed within the opening 24 and

mounted to the inside panel 20 by means of a plurality of peripherally spaced mounting bolts 28 preferably of the self-tapping type which extend into openings provided therefor in a peripheral rim portion 30 of the dispenser 26. The detergent mixing dispenser 26, which preferably is formed of a plastic material, comprises, in addition to the above-noted rim portion 30, a main body portion 31 which defines a detergent receiving compartment 32 adapted to be closed by a dispenser cover 34 which is, in the form shown, similarly formed of a plastic material. The cover 34 is provided with a pair of upwardly extending resilient arms 36 and 38 which are provided with laterally outwardly extending, preferably integral mounting pins commonly designated at 40. The upper portion of the peripheral rim 30 is provided with forwardly extending embossed sections 42 and 44 which are transversely apertured to receive the pins 40. To mount the cover 34, the resilient arms 36 and 38 are grasped and pulled toward each other until the pins 40 clear the adjacently disposed end faces of the embossed portions 42 and 44, at which time the arms 36 and 38 are released permitting the pins 40 to snap in place in the transverse openings in the embossed sections 42 and 44.

The dispenser cover 34 is biased to a closed position by magnetic closure means in the form of magnetic closure sections 46 and 48 mounted respectively on the cover 34 adjacent the bottom thereof and on the lower portion of the peripheral rim 30. The magnetic closure sections are conventional and form no part of the present invention and serve in the usual manner to draw the cover 34 to a closed position and tightly hold the same in such position. It will be apparent that other closure means, e.g. a spring or similar resilient means, could as well be provided for retaining the cover 34 in a closed position.

The dispenser body 31 is formed with a tubular section 50 in the lower central portion thereof, the outer end of which is adapted to receive the adjacently disposed end 52 of a flexible, preferably elliptical dispenser hose 54. The opposite end 55 of the dispenser hose 54 is adapted to be connected to the outlet side of the circulating pump P as shown in FIG. 1 whereby washing liquid can be directed through the hose 54 to the detergent compartment 32. It will be understood that means other than that illustrated could be employed for supplying liquid to the compartment 32. It will be noted that the dispenser hose could be mounted to direct water into the side of the compartment 32 rather than the back thereof, as illustrated.

A dispenser hose retaining member 56 is mounted on mounting panel 58 preferably by means of sheet metal screws 60 which extend through vertically elongated slots 62 formed in the retainer into threaded engagement with openings provided therefor in the mounting panel. The slots 62 permit vertical adjustment of the retainer 56 to properly position the same to insure closing of the dispenser hose by means to be presently described. The retainer 56 comprises a pair of curved side portions 64 and 66 which are open at the mounting panel side thereof and which are grooved to receive the dispenser hose 54. The retainer 56 further comprises a vertically extending central arm 68 which serves to laterally confine the uppermost portion of the dispenser hose 54 to insure contact thereof by a clamping lever generally indicated at 70.

The clamping lever 70 is provided with a vertical flange portion 72 which is adapted to be mounted on the mounting panel 58 by any suitable means such as rivet means or the like 74. The clamping lever further comprises an elongated, resiliently movable arm 75 having a central, downwardly extending finger 76, the bottom surface of which is adapted to contact the dispenser hose 54 and in certain positions of adjustment of the clamping lever 70 to completely close the same, and an outer, cam-engaging end portion 78 by which the clamping lever can be moved downwardly to effect a closing of the dispenser hose 54 by the finger 76. The clamping lever 70 is preferably made of a resilient spring steel and in the absence of external

forces acting thereon, will assume the position shown in FIG. 4, in which position the clamping finger 76 is above the hose 54 thereby permitting free flow of washing liquid through such hose.

The control knob 18 is provided with an inner cam portion 82 which is adapted to control the position of the clamping lever 70. The control knob 18 is mounted on a timer shaft 84 which in turn is operatively driven by a conventional timer unit 86 mounted on the mounting panel 58. The control knob 18 is retained on the timer shaft by means of holding screw 87 which extends into a threaded opening formed in the end of the timer shaft. The inner, cam portion 82 of the control knob is formed with an elongated slot 88 at the end thereof which is adapted to receive a transverse pin 90 preferably integrally formed on the timer shaft 84. The pin and slot arrangement insures proper alignment of the control knob when mounted and additionally serves to insure rotation of the control knob by the timer shaft.

The cam portion 82 of the control knob includes a cam finger 92 which is formed on a relatively enlarged radius whereby when the control knob 18 is set in or rotated to a position wherein the cam finger 92 engages the outer free end 78 of the clamping lever 70, the latter will be forced downwardly to a position wherein the clamping finger 76 clamps shut the dispenser hose 54 thereby preventing the flow of washing liquid to the detergent compartment 32. As above noted, the hose retaining member 56 is adjustable on the mounting plate 58 to vertically position the dispenser hose to insure complete closing of the same by the clamping finger. As will be apparent, the arcuate length of the cam finger 92 will depend upon the speed of the timer unit and the precise time within the operating cycle in which it is desired to supply the detergent solution to the washing chamber.

The operation of the detergent mixing dispenser is as follows. Before the washing operation, the door 12 is lowered to a generally horizontal, open position, the dispenser cover 34 open and the compartment 32 filled with detergent to the desired level. The cover 34 is then closed thereby retaining the detergent therein, and the dishwasher door 12 moved to a closed position. The control knob is then moved to the proper setting for the desired washing cycle. In such setting the cam finger 92 engages the free end 78 of the clamping lever 70 thereby forcing the clamping finger 76 of the clamping lever to a position closing the dispenser hose 54. As the washing operation commences, the control knob 18 will of course slowly rotate as controlled by the timer unit 86, and as long as the cam finger 92 remains in contact with the outer end 78 of the clamping lever 70, the dispenser hose 54 will remain closed. As the control knob 18 continues to rotate in a clockwise direction, as seen in FIG. 4 and indicated therein by the directional arrow, the cam finger 92 will eventually rotate out of contact with the end 78 of the clamping lever at which time the resilience of the clamping lever and the pressure of the liquid in the dispenser hose will bias the lever upwardly thereby raising the clamping finger 76 to unclamp and thus open the dispenser hose 54. The washing liquid is then directed to the compartment 32 and mixes therein with the granular detergent thus to form a foaming detergent solution. As the cover 34 is closed at this time by the magnetic closure means, there will be a buildup of pressure within the compartment 32, which pressure will eventually reach a point where the bias of the magnetic closure will be overcome and the cover 34 will be forced slightly open thereby permitting the detergent solution to enter the washing chamber. It will be noted that the detergent cannot be supplied to the washing chamber until the pressurized washing liquid is directed to the compartment 32 following actuation of the circulating pump P for the wash cycle. Thus, accidental or inadvertent tripping of the lever 70 resulting from improper setting of the control knob 18 is ineffective to dump the detergent into the washing

chamber before the wash cycle, at which time the detergent solution is supplied thereto. Continued injection of the washing liquid into the detergent compartment will effect a complete mixing of all the detergent therein with the washing liquid with the result that the detergent is completely emptied in the form of detergent solution into the washing chamber during the relatively early stages of the wash cycle. The dispensing hose 54 will continue to supply washing liquid to the detergent compartment 32 as long as the circulating pump P continues to run, whereby the compartment 32 and cover 34 are thoroughly cleaned after the detergent has been completely dispensed therefrom. When the circulating pump is inoperative, the magnetic closure means will of course be effective to again tightly close the cover 34.

It will be apparent that while only one detergent compartment has been illustrated, a second similarly constructed compartment could in addition be provided, with the latter being adapted to receive washing liquid in a similar manner for supplying detergent solution to the washing chamber. Such a second compartment could be controlled separately and such control could provide for supplying of washing liquid thereto at a different period in the washing operation, e.g. in a second wash cycle.

It will thus be seen that the detergent mixing dispenser of the present invention affords many advantages over present detergent dispensers of this general type. The detergent is admitted into the washing chamber only in the form of detergent solution during the initial stages of the wash cycle thereby eliminating the above-noted disadvantages of storing and dispensing purely granular detergent. Further, since the complete emptying of the detergent into the washing chamber is not dependent upon the spray pattern of the spray arm or like liquid directing means, the detergent compartment can be mounted in any suitable location on the inside panel of the dishwasher door better to accommodate manufacturing and assembling techniques. The addition of the detergent solution to the washing chamber is effected entirely automatically and the detergent compartment and dispenser cover are thoroughly cleaned by the washing liquid following the emptying of all the detergent in the form of detergent solution into the washing chamber. The detergent dispenser and associated control components for regulating the flow of washing liquid thereto are of simple and economical construction and the dispenser is inherently reliable in use.

I claim:

1. In an automatic dishwashing machine and the like having a washing chamber and timing means for controlling the washing operation of the machine, a detergent mixing dispenser comprising a container for detergent having an open side and being mounted in the machine

with said open side at an interior wall section of the washing chamber, whereby communication is provided between the container and the chamber, cover means for fully closing the open side of the container and thus shielding detergent placed therein from the washing operation while the cover means is in closed condition, the container being provided with a liquid inlet and except for said inlet and open side being otherwise closed, liquid supply means including a delivery line connected to said inlet for supplying liquid under pressure therethrough to the container, means for controlling said liquid supply means by said timing means to supply the liquid to the container at a predetermined point in the washing operation, and means for normally maintaining said cover means in the container closing condition thereof and opening the same after an interval following initiation of the supply of the liquid to the container, whereby mixing of the liquid with detergent previously placed in the container commences with such initiation of the supply of the liquid and the cover means is delayed in the opening thereof which discharges the detergent solution to the washing chamber.

2. The combination set forth in claim 1, wherein the means for normally maintaining the cover means in the container closing condition exerts a bias thereon in the closing direction of such degree as to be overcome by buildup of liquid pressure within the container for the opening of the cover means and discharge of the detergent solution.

3. The combination set forth in claim 1, wherein the means for controlling the liquid supply means includes a spring biased pinch valve element cooperating with a flexible section of said delivery line normally to hold the same closed and operated under the control of said timing means to open said section for the liquid flow therethrough.

4. The combination set forth in claim 1, wherein the machine includes pump means for circulating washing solution within the chamber, and said delivery line is connected to the outlet side of said pump means for the delivery of liquid to the detergent container.

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