Dec. 19, 1961 R. M. GETCHELL ET AL 3,013,568

DISHWASHER WITH DISPENSER FOR WATER CONDITIONING LIQUID

Filed Oct. 29, 1956 3 Sheets-Sheet 1

FIG. 1.

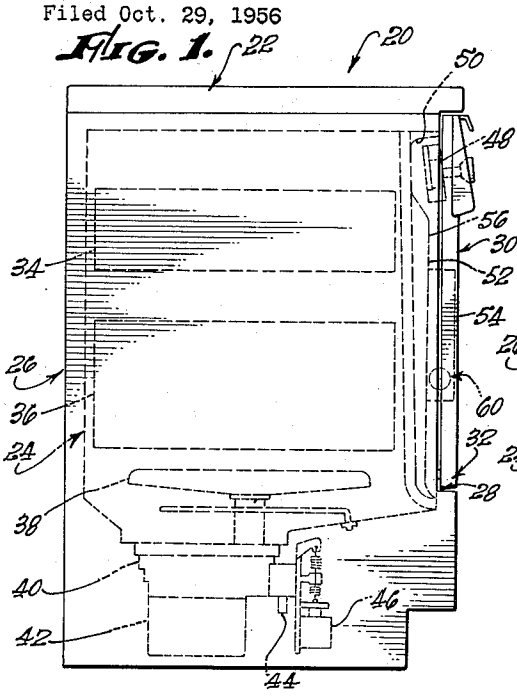
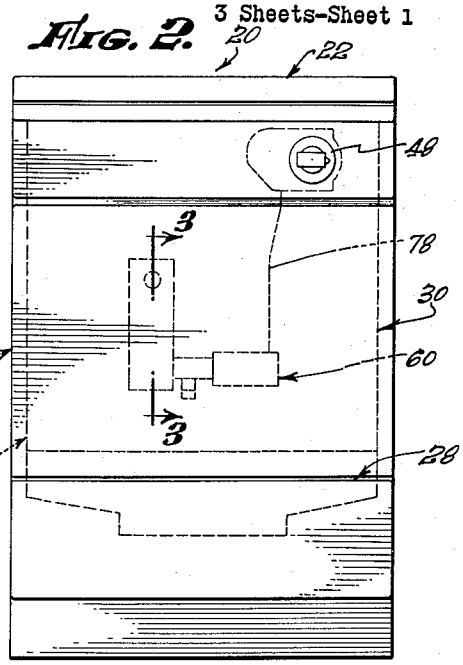


FIG. 2.



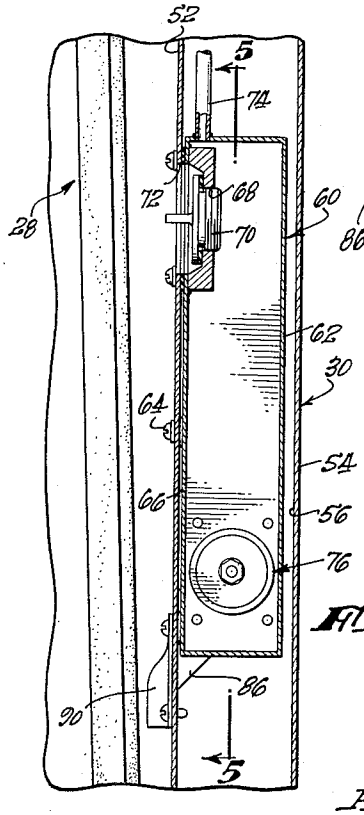
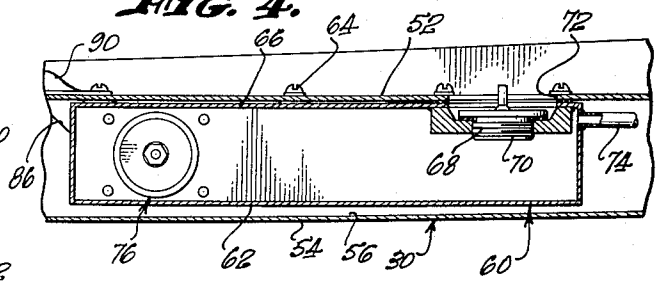


FIG. 3.

FIG. 4.



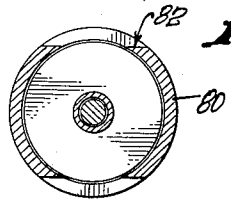


FIG. 6.

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FIG. 5.

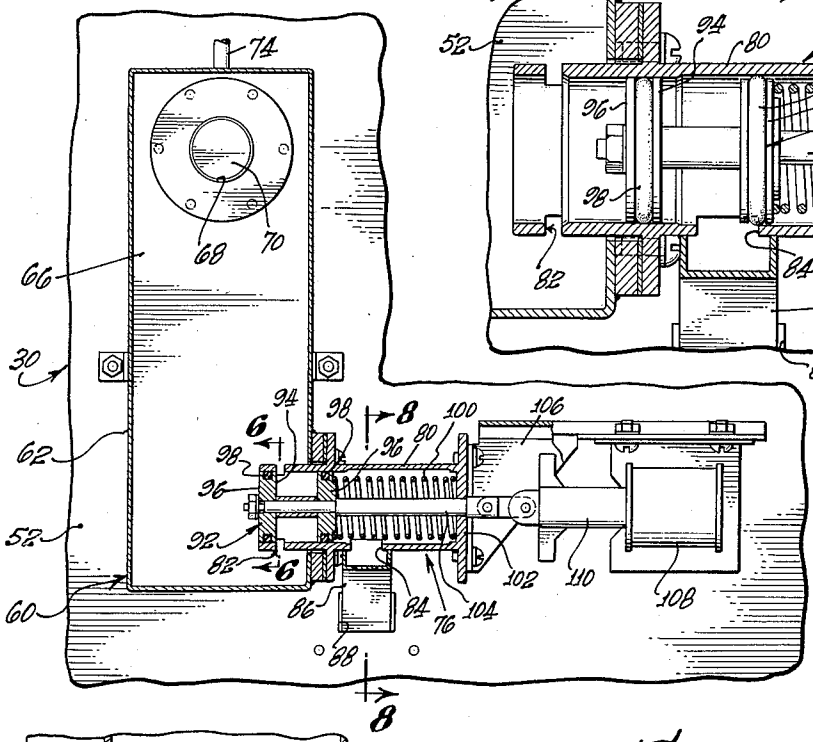


FIG. 7.

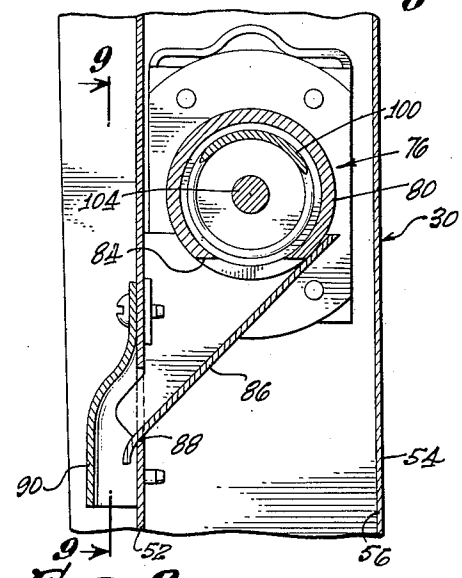
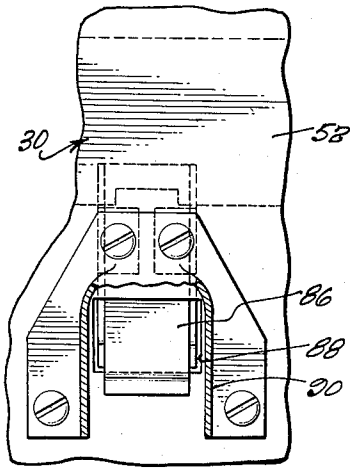


FIG. 8.

FIG. 9.



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FIG. 10.

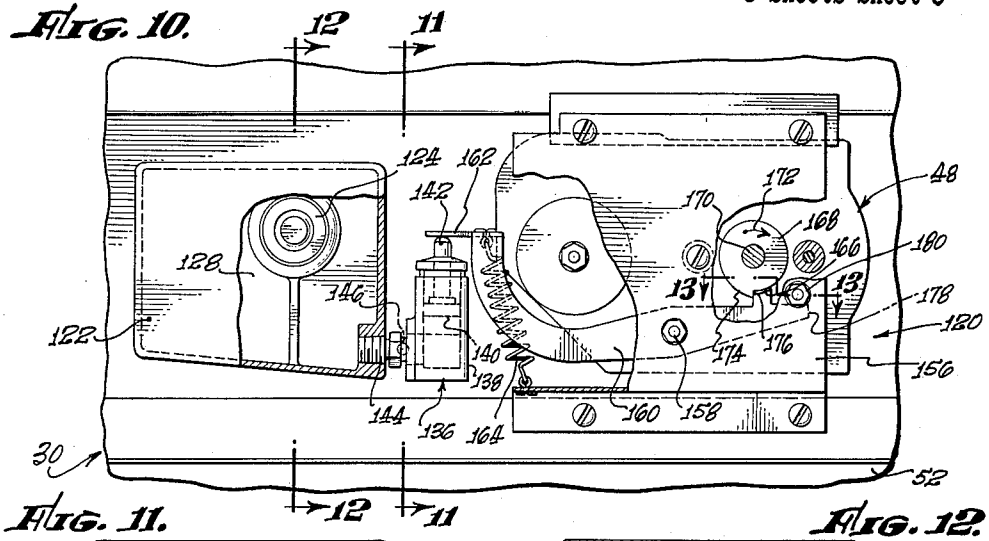


FIG. 11.

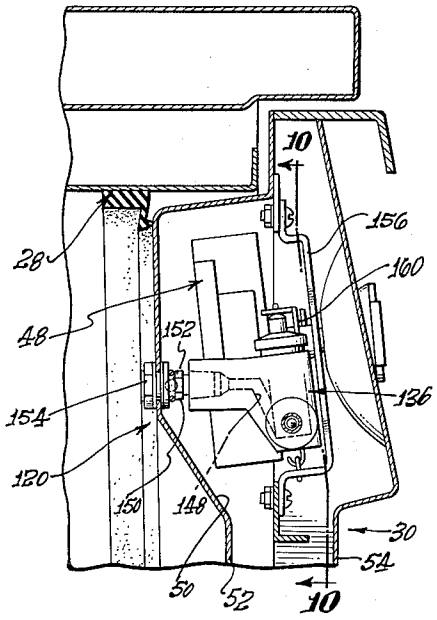


FIG. 12.

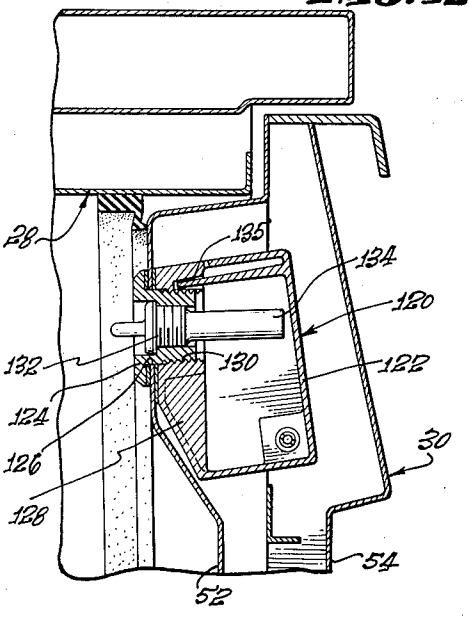
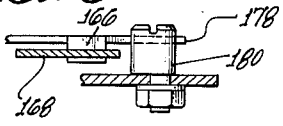


FIG. 13.



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3,013,568

DISHWASHER WITH DISPENSER FOR WATER CONDITIONING LIQUID

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Filed Oct. 29, 1956, Ser. No. 618,966
7 Claims. (Cl. 134—58)

The present invention relates in general to dishwashers and, more particularly, to a dishwasher having means for automatically introducing a metered quantity of a water conditioning liquid into the interior of the dish chamber of the dishwasher at one or more points in the operating cycle thereof, the means for dispensing such a liquid being activated or energized by a timer for controlling the operating cycle.

The present invention is not limited to introducing any particular water conditioning liquid into the interior of the dish chamber, nor is it limited to introducing such a liquid at any particular time in the operating cycle. For example, the invention contemplates introducing a liquid detergent into the dish chamber at the beginning of each of one or more washing operations forming part of the operating cycle. The invention also contemplates introducing a so-called drying agent in liquid form into the dish chamber at the beginning of or during any rinsing operation which forms part of the operating cycle and which immediately precedes a drying operation forming part thereof, such a liquid drying agent serving to reduce the surface tension of the rinse water so that relatively little water clings to the dishes, thereby reducing the length of the drying operation. Various other water conditioning liquids, such as liquid soaps, liquid water softeners, and the like, may also be introduced into the interior of the dish chamber at various points in the operating cycle of the dishwasher within the scope of the present invention.

A primary object of the present invention is to provide a liquid dispensing device for the foregoing purposes which includes a liquid dispenser comprising a reservoir having a side wall provided with a filling opening and comprising liquid metering means communicating with the reservoir adjacent the bottom thereof, and which includes means mounting the liquid dispenser for movement between an operating position wherein the side wall of the reservoir is generally upright and a filling position wherein the side wall of the reservoir is so oriented that the filling opening faces upwardly. Thus, when the liquid dispenser is moved to its filling position, the filling opening faces upwardly for filling purposes even though the filling opening is not so oriented as to permit filling of the reservoir when the liquid dispenser is in its operating position, which is an important feature of the invention.

More particularly, a primary object of the invention is to provide a dishwasher which includes a housing provided with a dish chamber and provided at the front thereof with a doorway for access to the interior of the dish chamber, which includes a door pivotally connected adjacent its lower edge to the housing for movement between a generally vertical closed position wherein it closes the doorway and a generally horizontal open position, and which includes a liquid dispenser of the foregoing nature carried by the door, the specified side wall of the reservoir of the liquid dispenser facing inwardly toward the interior of the dish chamber when the door is in its closed position, and facing upwardly when the door is in its open position so that the filling opening is oriented generally vertically for easy introduction of a water conditioning liquid into the reservoir.

Another object is to provide a dishwasher wherein the liquid dispenser is mounted in a compartment between spaced inner and outer walls, or rear and front walls, of the door, the filling opening in the recited side wall of the reservoir being accessible through an opening in the rear wall of the door, and the liquid metering means communicating with the interior of the dish chamber, when the door is in its closed position, by way of a discharge opening or passage, or the like, through the inner wall of the door.

With the foregoing construction, as soon as the door of the dishwasher is pivoted into its open position, the filling opening faces upwardly and is readily accessible for the introduction thereinto of a supply of a suitable water conditioning liquid, the liquid metering means communicating with the interior of the dish chamber when the door is closed to permit the introduction of a metered quantity of such liquid into the dish chamber at any desired point in the operating cycle of the dishwasher. In addition to having the advantage of ready accessibility, the present invention, by utilizing space within the door for the liquid dispenser, also has the advantage of minimizing the over-all size of the dishwasher for a given dish-chamber capacity.

Another object of the invention is to provide a dishwasher wherein a liquid dispenser of the foregoing nature and a timer for controlling the operating cycle of the dishwasher, and for activating or energizing the liquid dispenser at one or more predetermined points in the operating cycle, are both located in a compartment between spaced inner and outer walls of the door, thereby furthering the advantages hereinbefore mentioned. In this connection, reference is hereby made to the copending application of Bertram Given and Walter Peglow, Serial No. 625,398, filed November 30, 1956, and assigned to the same assignee as the present application, for a detailed disclosure of the advantages accruing from locating the timer in a compartment between spaced inner and outer walls of the door, and particularly in a controls compartment adjacent the top of the door.

Another object of the invention is to provide a dishwasher wherein the liquid dispenser within the door is actuated by a solenoid energizable by the timer within the door at one or more points in the operating cycle.

A further object is to provide a dishwasher wherein the liquid dispenser within the door is actuated by a lever one end of which is connected to the liquid metering means of the liquid dispenser and the other end of which is connected to a cam or cam means driven by the timer within the door.

Still another objective of the invention is to provide a liquid metering means including a metering member having therein a metering cavity which communicates with the interior of the liquid reservoir for one position of the metering member and which communicates with the interior of the dish chamber, when the door is closed, in another position of the metering member.

Another object is to provide a liquid metering means which includes a cylinder having an inlet communicating with the interior of the liquid reservoir and an outlet communicating with the interior of the dish chamber when the door is closed, reciprocable in such cylinder being a metering piston having therein an annular metering cavity which communicates with the inlet for one position of the metering piston in its cylinder and which communicates with the outlet for another position of the metering piston therein.

Another object is to provide a liquid metering means which includes a pump having an inlet communicating with the liquid reservoir and an outlet communicating with the interior of the dish chamber when the door of the dishwasher is closed.

Yet another object is to provide a liquid metering pump

which includes a reciprocable piston cooperating with inlet and outlet check valves.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will be quite apparent to those skilled in the art in the light of this disclosure, may be attained with the exemplary embodiments described in detail hereinafter and illustrated in the accompanying drawings, in which:

FIG. 1 is a side elevational view of a dishwasher which embodies the invention;

FIG. 2 is a front elevational view of the dishwasher;

FIG. 3 is an enlarged, fragmentary sectional view taken along the arrowed line 3—3 of FIG. 2 with a door of the dishwasher in a generally vertical, closed position;

FIG. 4 is a view similar to FIG. 3, but with the door in a generally horizontal, open position;

FIG. 5 is a fragmentary sectional view taken along the arrowed line 5—5 of FIG. 3;

FIG. 6 is a fragmentary sectional view taken along the arrowed line 6—6 of FIG. 5;

FIG. 7 is an enlarged, fragmentary sectional view duplicating a portion of FIG. 5;

FIG. 8 is an enlarged, fragmentary sectional view taken along the arrowed line 8—8 of FIG. 5;

FIG. 9 is a fragmentary sectional view taken along the arrowed line 9—9 of FIG. 8;

FIG. 10 is a fragmentary sectional view which illustrates another embodiment of the invention and which is taken along the arrowed line 10—10 of FIG. 11;

FIGS. 11 and 12 are fragmentary sectional views respectively taken along the arrowed lines 11—11 and 12—12 of FIG. 10; and

FIG. 13 is an enlarged, fragmentary sectional view taken along the arrowed line 13—13 of FIG. 10.

Referring particularly to FIGS. 1 and 2 of the drawings, the dishwasher of the invention is designated generally by the numeral 20 and includes a housing 22 which provides a dish chamber 24 enclosed by a cabinet 26 in the particular construction illustrated. The housing 22 is provided at the front thereof with a doorway 28 for access to the interior of the dish chamber 24, the doorway being adapted to be closed by a door 30 pivotally connected to the housing 22 adjacent the lower edge of the door by a horizontal pivot means 32. Thus, the door is pivotable between a generally upright or generally vertical closed position, shown in FIGS. 1 and 2 of the drawings and fragmentarily in FIG. 3 thereof, and a generally horizontal open position, shown fragmentarily in FIG. 4 of the drawings.

Within the dish chamber 24 are upper and lower dish racks 34 and 36 to receive dishes to be washed and rinsed, and preferably dried, these racks being accessible through the doorway 28 when the door 30 is in its open position. Below the lower dish rack 36 within the dish chamber 24 is an impeller 38 for spraying water, into which suitable additives have been introduced, upwardly against dishes carried by the two dish racks. In the particular construction illustrated, the impeller 38 is of the reaction type and is supplied with water from the bottom of the dish chamber 24 by a pump 40 driven by a motor 42, the inlet of the pump 40 communicating with the bottom of the dish chamber. The outlet of the pump 40 is selectively connectible either to the impeller 38, or to a drain 44, under the control of a solenoid 46, as more fully disclosed in the co-pending application of Robert M. Getchell, Horace E. Karig and John A. Fay, Serial No. 631,150, filed December 28, 1956, and assigned to the same assignee as this application.

The operation of the dishwasher 20 is controlled by a timer 48 which preferably provides a fully automatic operating cycle. As more fully disclosed in said co-pending application of Bertram Given and Walter Peglow, the timer 48 is mounted in a controls compartment 50 within the door 30 adjacent the top thereof. This controls compartment is formed by spaced inner and outer walls, or rear and front walls, 52 and 54 of the door 30, the space between such inner and outer walls also providing a dispenser compartment 56. In the particular construction illustrated, the dispenser compartment 56 is located below and adjacent the controls compartment 50.

Within the dispenser compartment 56 is a liquid dispenser 60 which is actuated by the timer 48 to dispense a metered quantity of a suitable liquid into the dish chamber 24 at one or more points in the operating cycle of the dishwasher 20. As hereinbefore discussed, the liquid dispenser 60 may be utilized to introduce metered quantities of any desired water conditioning liquids into the dish chamber 24, and may be actuated to do this at any desired points in the operating cycle. For example, the liquid dispenser 60 may be utilized to introduce a metered quantity of a liquid detergent in connection with each of one or more washing operations, or it may be utilized to introduce a metered quantity of a drying agent in connection with each of one or more rinsing operations.

A salient feature of the present invention is that the door 30 pivots the liquid dispenser 60, through an angle of approximately 90 degrees, from an operating position wherein the dispenser is operative to introduce a metered quantity of a water conditioning liquid into the dish chamber 24, to a filling position wherein a supply of water conditioning liquid may be introduced into the dispenser. The operating position of the liquid dispenser 60 corresponds to the closed position of the door 30, while the filling position thereof corresponds to the open position of the door.

Referring particularly to FIGS. 3 and 4 of the drawings, the liquid dispenser 60 includes a reservoir 62 disposed within the dispenser compartment 56 and shown as mounted on the inner wall 52 of the door, as by means of screws 64. The reservoir 62 is provided with a side wall 66 having a filling opening 68 therein which is adapted to be closed by a stopper 70. This filling opening is accessible through an opening 72 in the inner wall of the door 30. When the door 30 is in its closed position, the side wall 66 of the reservoir 62 is in an upright position, this upright position being generally vertical so that the filling opening 68 is oriented generally horizontally. However, when the door is in its open position, the side wall 66 of the reservoir 62 is so oriented that the filling opening 68 faces upwardly, this position of the side wall 66 being generally horizontal. Thus, when the door 30 is in its open position, the generally vertical orientation of the filling opening 68 permits filling of the reservoir 62 with a water conditioning liquid upon removal of the stopper 70, which is an important feature of the invention.

The top of the reservoir 62, considering the upright position thereof, is provided with an air vent 74 which admits air into the reservoir 62 as metered quantities of a water conditioning liquid therein are discharged into the dish chamber 24 when the door 30 is closed. It will be noted that, when the reservoir 62 is in its filling position, the air vent 74 is located at a level slightly above the level of the filling opening 68 so that the reservoir will not overflow through the air vent during filling.

The liquid dispenser 60 includes a liquid metering means 76 which communicates with the reservoir 62 adjacent the bottom thereof, considering the upright position of the reservoir, and which communicates with the interior of the dish chamber 24 when the door 30 is in its closed position. The liquid metering means 76 is controlled by the timer 48 and is electrically connected thereto, as illustrated diagrammatically by the dotted-line electrical connection 78 in FIG. 2 of the drawings.

Referring particularly to FIGS. 5 to 9 of the drawings, the liquid metering means 76 includes a metering cylinder 80 which is suitably mounted on the reservoir 62 and which projects thereinto. The cylinder 80 is

provided within the reservoir **62** with an inlet **82**, comprising two chordal slots in the cylinder in the particular construction illustrated. Externally of the reservoir **62** the cylinder **80** is provided with an outlet **84** having the form of a chordal slot in the cylinder. A water conditioning liquid discharged from the cylinder **80** through the outlet **84** when the door **30** is in its closed position enters a generally funnel-like chute **86** mounted on the inner wall **52** of the door below the outlet **84**, the lower end of the chute **86** communicating with the interior of the dish chamber **24** when the door is closed through an opening **88** in the inner wall of the door. A downwardly-facing hood **90** mounted on the inner wall **52** of the door **30**, and located within the dish chamber **24** when the door is closed, shields the opening **88** to prevent the entry of water into the chute **86**, either as the result of the upward spraying action of the impeller **38**, or as the result of water draining down the inner wall of the door.

Reciprocable within the cylinder **80** is a metering piston **92** having intermediate the ends thereof an annular metering cavity **94**, the ends of the metering cavity being closed by piston elements **96** equipped with O-rings **98**. The piston **92** is movable from a filling position wherein the metering cavity **94** communicates with the interior of the reservoir **62** through the inlet **82**, to a discharge position wherein the metering cavity **94** communicates with the interior of the dish chamber **24**, when the door **30** is closed, through the outlet **84**, the chute **86** and the opening **88**. As will be apparent, when the metering piston **92** is in its filling position, the metering cavity **94** is filled with a metered quantity of the water conditioning liquid in the reservoir **62**. When the metering piston **92** is subsequently moved to its discharge position, this metered quantity of the water conditioning liquid is introduced into the dish chamber **24**.

The metering piston **92** is biased toward its filling position by a compression spring **100** seated against one end of the piston and against a closed end **102** of the metering cylinder **80**. Connected to the metering piston **92** is a piston rod **104** which is encircled by the spring **100** and which projects through the closed end **102** of the cylinder **80**. Mounted on the closed end **102** of the cylinder **80** is a bracket **106** which carries an electromagnet or solenoid **108**, the armature **110** of this solenoid being connected to the piston rod **104**. As will be apparent, when the solenoid **108** is energized, the metering piston **92** is moved from its filling position to its discharge position to introduce a metered quantity of the water conditioning liquid in the reservoir **62** into the dish chamber **24**. The solenoid **108** is energized by the timer **48** through the electrical connection **78**.

Considering the operation of the embodiment of the invention which is illustrated in FIGS. 1 to 9 of the drawings, it will be apparent that the reservoir **62** of the liquid dispenser **60** may readily be filled with the desired water conditioning liquid by moving the door **30** to its open position and removing the stopper **70**, the filling opening **68** facing upwardly when the door is open so that the filling operation may be carried out easily, which is an important feature of the invention. Subsequently, when the dishwasher **20** is in operation with the door **30** in its closed position, the timer **48** energizes the solenoid **108** at the proper point or points in the operating cycle of the dishwasher to discharge the desired metered quantity or metered quantities of the water conditioning liquid into the dish chamber **24**. Preferably, the capacity of the reservoir **62** is such that the supply of water conditioning liquid therein needs be replenished only after a number of operating cycles. Thus, it is not necessary to introduce the water conditioning liquid into the reservoir **62** for every operating cycle, which is an important feature.

Turning now to FIGS. 10 to 13 of the drawings, illustrated therein is another liquid dispenser embodiment

of the invention, this embodiment being designated generally by the numeral **120**. In the embodiment of FIGS. 10 to 13, the liquid dispenser **120** is located directly in the controls compartment **50** between the inner and outer walls **52** and **54** of the door **30**, the liquid dispenser **120** being located adjacent the timer **48** and being actuated mechanically by the timer.

The liquid dispenser **120** includes a reservoir **122** mounted on the inner wall **52** of the door **30** by means of a flanged bushing **124** which extends through an opening **126** in the inner wall of the door and which clamps the inner wall of the door adjacent such opening between the reservoir and the flange of such bushing. The bushing **124** is threaded into a side wall **128** of the reservoir **122** and provides a filling opening **130** adapted to be closed by a stopper **132** threaded into the filling opening. When the door **30** is in its closed position, the side wall **128** is upright so that the filling opening is oriented generally horizontally. However, when the door **30** is in its open position, the side wall **128** of the reservoir **122** is oriented generally horizontally so that the filling opening **130** faces upwardly. Under the latter conditions, a water conditioning liquid may be introduced into the reservoir **120** through the filling opening **130** readily upon removal of the stopper **132**. In this embodiment, the stopper **132** is provided with an extension acting as a dip stick **134** by means of which the liquid level in the reservoir **122** may be determined when the door is in its open position. If desired, the stopper **70** of the embodiment previously described may be provided with a similar dip-stick extension. The reservoir **122** is provided with an air vent **135** corresponding to and performing the same function as the air vent **74**.

Communicating with the reservoir **122** adjacent the bottom thereof is a liquid metering means **136** having the form of a pump. More specifically, the liquid metering means **136** includes a cylinder **138** having therein a piston **140** provided with a piston rod **142** which projects from one end of the cylinder, the piston rod being spring biased toward such end of the cylinder in a manner not specifically shown. The opposite end of the cylinder **138** communicates with the interior of the reservoir **122** through an inlet fitting **144** threaded into the reservoir adjacent the bottom thereof, considering the door **30** in its closed position. This inlet fitting incorporates an inlet check valve **146** which opens toward the cylinder **138** to admit liquid thereinto from the reservoir **122** in response to movement of the piston **140** in the upward direction, as viewed in FIG. 10 of the drawings.

Also communicating with the cylinder **138** adjacent the end thereof with which the inlet fitting **144** communicates is an outlet passage **148** terminating in an outlet fitting **150** incorporating an outlet check valve **152** which opens in a direction away from the cylinder **138**. Thus, movement of the piston **140** in the downward direction, as viewed in FIG. 10 of the drawings, results in opening of the outlet check valve **152** to discharge liquid from the cylinder **138**, the inlet check valve **146** closing under such conditions. The outlet fitting **150** extends through the inner wall **52** of the door **30** and thus communicates with the interior of the dish chamber **24** when the door is closed, this fitting being attached to the inner wall of the door by a nut **154**.

The timer **48** is mounted within the controls compartment **50** adjacent the liquid dispenser **120** by means of a bracket **156** suitably connected to the structure of the door **30**. Mounted on this bracket by means of a pivot **158** is a lever **160** having at one end thereof a finger **162** which engages the projecting end of the piston rod **142**. The piston **140** is maintained in its lowermost position by a tension spring **164** connected at one end to the lever **160** and at its other end to the bracket **156**, this spring tending to rotate the lever **160** in the counterclockwise direction, as viewed in FIG. 10.

The lever **160** is provided adjacent its other end with

a finger **166** which engages a cam **168** on a shaft **170** of the timer **48**, the cam **168** being rotated by the timer in the clockwise direction, as indicated by the arrow **172**, and being provided with a gradual rise **174** terminating in a sharp fall **176**.

As will be apparent, rotation of the cam **168** in the direction of the arrow **172** results in pivoting of the lever **170** in the clockwise direction as the finger **166** engages the rise **174** of the cam. This permits the spring, not shown, incorporated within the liquid metering means **136** to move the piston **140** upwardly, as viewed in FIG. 10, to draw a metered quantity of the water conditioning liquid from the reservoir **122** into the cylinder **138** through the inlet check valve **146**. Subsequently, when the finger **166** on the lever **160** encounters the fall **176** of the cam **168**, the spring **164** pivots the lever in the counterclockwise direction to move the piston **140** downwardly, as viewed in FIG. 10. This results in the discharge of a metered quantity of the water conditioning liquid from the cylinder **138** into the interior of the dish chamber **24**, assuming that the door **30** is closed, through the outlet passage **148** and the outlet fitting **150** past the outlet check valve **152**. Thus, for each revolution of the cam **168**, a metered quantity of the water conditioning liquid is introduced into the dish chamber **24**. If the cam **168** rotates through one complete revolution during each operating cycle, one metered quantity of the water conditioning liquid is introduced during such cycle. If the introduction of more than one metered quantity is desired, the cam **168** may be rotated through more than one complete revolution during each operating cycle, or the cam may be provided with more than one rise **174** and fall **176**.

The end of the lever **160** adjacent the cam **168** is provided with another finger **178** which is engageable with an eccentric stop **180** mounted on the bracket **156**. By setting this stop in various angular positions, the amount of inward movement of the finger **166** upon disengagement from the rise **174** of the cam **168** may be varied to vary the stroke of the piston **140**, thereby varying the magnitude of the metered quantity of liquid which is dispensed, this being an important feature of the invention.

The over-all operation of the embodiment illustrated in FIGS. 10 to 13 is similar to that of the embodiment illustrated in FIGS. 1 to 9 so that a detailed description is thought to be unnecessary.

Although exemplary embodiments of the present invention have been disclosed herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiments without departing from the spirit of the invention as defined by the following claims.

We claim:

1. In a dishwasher, the combination of: a housing provided with a dish chamber therein and provided at the front thereof with a doorway for access to the interior of said dish chamber; a door pivotally connected adjacent its lower edge to said housing for movement between a generally vertical closed position wherein it closes said doorway and a generally horizontal open position, said door having spaced inner and outer walls providing a compartment therebetween; a liquid dispenser in said compartment and including a reservoir having a bottom and having a side wall provided with a filling opening, said liquid dispenser including liquid metering means having an inlet communicating with said reservoir and having an outlet communicating with the interior of said dish chamber through said inner wall of said door when said door is in its closed position for dispensing metered quantities of liquid from said reservoir into the interior of said dish chamber, said side wall of said reservoir being generally vertical and facing inwardly toward the interior of said dish chamber when said door is in its closed position, and said side wall of said reservoir being generally horizontal and facing upwardly when said door is in its open position, said filling opening in said side wall of said reservoir facing upwardly when said door is in said open position and being accessible through said inner wall of said door; a timer for controlling the operating cycle of said dishwasher disposed in said compartment; and means in said compartment and controlled by said timer for actuating said liquid metering means.

2. In a dishwasher, the combination of: a housing provided with a dish chamber therein and provided at the front thereof with a doorway for access to the interior of said dish chamber; a door pivotally connected adjacent its lower edge to said housing for movement between a generally vertical closed position wherein it closes said doorway and a generally horizontal open position, said door having spaced inner and outer walls providing a compartment therebetween; a liquid dispenser in said compartment and including a reservoir having a bottom and having a side wall provided with a filling opening, said liquid dispenser including liquid metering means having an inlet communicating with said reservoir and having an outlet communicating with the interior of said dish chamber through said inner wall of said door when said door is in its closed position for dispensing metered quantities of liquid from said reservoir into the interior of said dish chamber, said side wall of said reservoir being generally vertical and facing inwardly toward the interior of said dish chamber when said door is in its closed position, and said side wall of said reservoir being generally horizontal and facing upwardly when said door is in its open position, said filling opening in said side wall of said reservoir facing upwardly when said door is in said open position and being accessible through said inner wall of said door; a timer for controlling the operating cycle of said dishwasher disposed in said compartment adjacent the top of said door; and means in said compartment and controlled by said timer for actuating said liquid metering means.

3. In a dishwasher, the combination of: a housing provided with a dish chamber therein and provided at the front thereof with a doorway for access to the interior of said dish chamber; a door pivotally connected adjacent its lower edge to said housing for movement between a generally vertical closed position wherein it closes said doorway and a generally horizontal open position, said door having spaced inner and outer walls providing a compartment therebetween; a liquid dispenser in said compartment and including a reservoir having a bottom and having a side wall provided with a filling opening, said liquid dispenser including liquid metering means communicating with said reservoir and communicating with the interior of said dish chamber through said inner wall of said door when said door is in its closed position for dispensing metered quantities of liquid from said reservoir into the interior of said dish chamber, said side wall of said reservoir being generally vertical and facing inwardly toward the interior of said dish chamber when said door is in its closed position, and said side wall of said reservoir being generally horizontal and facing upwardly when said door is in its open position, said filling opening in said side wall of said reservoir facing upwardly when said door is in said open position and being accessible through said inner wall of said door; a timer for controlling the operating cycle of said dishwasher disposed in said compartment; and means in said compartment and controlled by said timer for actuating said liquid metering means, said actuating means including an electrically energizable element connected to said liquid metering means and energizable by said timer.

4. In a dishwasher, the combination of: a housing provided with a dish chamber therein and provided at the front thereof with a doorway for access to the interior of said dish chamber; a door pivotally connected adjacent its lower edge to said housing for movement between a generally vertical closed position wherein it closes said doorway and a generally horizontal open position, said door having spaced inner and outer walls providing a

compartment therebetween; a liquid dispenser in said compartment and including a reservoir having a bottom and having a side wall provided with a filling opening, said liquid dispenser including liquid metering means communicating with said reservoir adjacent the bottom thereof and communicating with the interior of said dish chamber through said inner wall of said door when said door is in its closed position for dispensing metered quantities of liquid from said reservoir into the interior of said dish chamber, said side wall of said reservoir being generally vertical and facing inwardly toward the interior of said dish chamber when said door is in its closed position, and said side wall of said reservoir being generally horizontal and facing upwardly when said door is in its open position, said filling opening in said side wall of said reservoir facing upwardly when said door is in said open position and being accessible through said inner wall of said door; a timer for controlling the operating cycle of said dishwasher disposed in said compartment; and means in said compartment and energizable by said timer for actuating said liquid metering means, said actuating means including a lever pivotable relative to said door within said compartment, one end of said lever being connected to said liquid metering means, said timer including cam means connected to the other end of said lever.

5. A dishwasher as defined in claim 4 wherein said liquid metering means comprises a pump operable by said lever.

6. A dishwasher according to claim 3 wherein said liquid metering means includes a metering member connected to said electrically energizable element, said metering member having a metering cavity therein and being movable from a position wherein said metering cavity communicates with said reservoir to a position wherein said metering cavity communicates with the interior of said dish chamber.

7. In a dishwasher, the combination of: a housing provided with a dish chamber therein and provided at the front thereof with a doorway for access to the interior of said dish chamber; a door pivotally connected adjacent its lower edge to said housing for movement between a

generally vertical closed position wherein it closes said doorway and a generally horizontal open position, said door having spaced inner and outer walls providing a compartment therebetween; a liquid dispenser disposed in said compartment and including a reservoir having a bottom and having a side wall provided with a filling opening, said liquid dispenser including a liquid metering chamber having an inlet communicating with said reservoir and having an outlet communicating with the interior of said dish chamber through said inner wall of said door when said door is in its closed position, said side wall of said reservoir being generally vertical and facing inwardly toward the interior of said dish chamber when said door is in its closed position, and said side wall of said reservoir being generally horizontal and facing upwardly when said door is in its open position, said filling opening in said side wall of said reservoir facing upwardly when said door is in said open position and being accessible through said inner wall of said door, said liquid dispenser further including discharge means for discharging liquid from said metering chamber through said outlet into the interior of said dish chamber; actuating means in said compartment for actuating said discharge means; and timer means in said compartment for controlling said actuating means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,423,220	Arpin	July 1, 1947
2,468,584	Wotring	Apr. 26, 1949
2,679,850	Kamp	June 1, 1954
2,699,886	James	Jan. 18, 1955
2,709,536	Yeager	May 31, 1955
2,711,178	Sharp et al.	June 21, 1955
2,809,648	Martiniak	Oct. 15, 1957
2,812,881	Karig	Nov. 12, 1957
2,867,224	Martiniak et al.	Jan. 6, 1959
2,872,076	Bloom	Feb. 3, 1959

FOREIGN PATENTS

403,282	Great Britain	Dec. 21, 1933