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DOOR STRUCTURE FOR WASHING APPLIANCE

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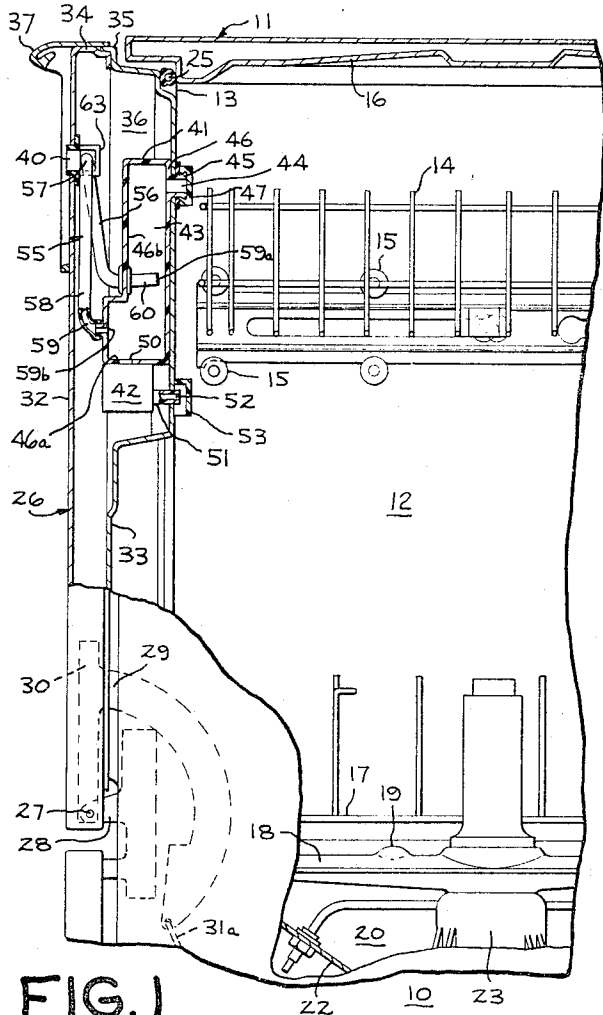


FIG. 1

FIG. 4

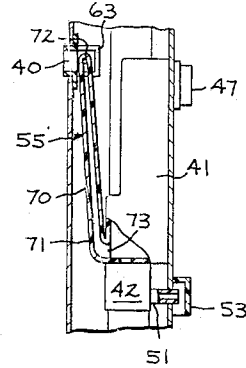


FIG. 3

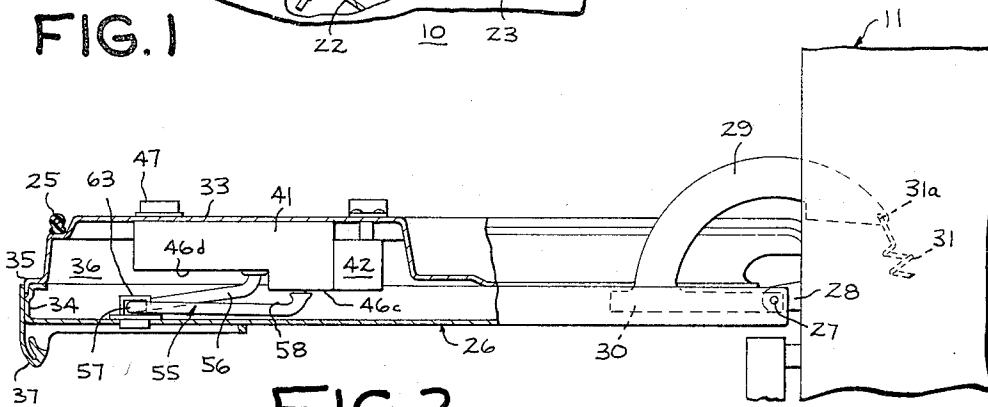
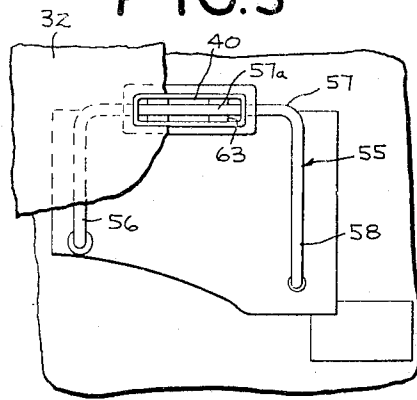


FIG. 2

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**DOOR STRUCTURE FOR WASHING APPLIANCE**  
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 8 Claims. (Cl. 222-154)

This invention relates to appliances for washing, and more particularly to a door structure for opening and closing the wash chamber of a washing appliance and to washing appliances so equipped.

An object of this invention is the provision of a door structure for holding in supply a liquid aid available to be dispensed into a wash liquid in the wash chamber of a washing appliance while the door structure maintains an access opening to the wash chamber closed, and which door structure is capable of giving a visible indication as to whether the supply of the liquid aid held in the door structure is above a predetermined depletion location or has reached that location.

Another object of this invention is the provision of a door structure of the character noted in which a portion of the supply of the liquid aid stored in the door structure to be dispensed from the door structure is availed upon for an indication to be given that the supply is above the predetermined depletion location.

Another object is that of providing a door structure of the character set forth, wherein movement of the door structure allows the door structure to be brought to a position in which the supply of liquid aid to be dispensed from the door structure may be replenished from an external source.

A further object herein is the provision of a door structure of the character noted in which replenishment of the supply of liquid aid in the door structure also assures a restored indication that the supply is above the predetermined depletion location.

Another object of this invention is the provision of a door structure of the character noted in which the liquid aid in being in supply above the predetermined depletion location maintains in conjunction with the door structure a portion of the supply sealed off for indicating the latter condition.

A further object is the provision of a door structure of the character indicated wherein the seal is broken when the supply of liquid aid diminishes to the depletion location, and a quantity of the previously sealed liquid then escapes from the door structure to indicate depletion by absence of the previously sealed liquid.

Another object of this invention is the provision of a door structure of the character noted in which the liquid aid to be sealed for indication, may drain from supply to be sealed, be retained by supply upon being sealed, and drain off when the seal is broken at supply.

Other objects of this invention in part will be obvious and in part pointed out more fully hereinafter.

As conducive to a clearer understanding of certain features of the present invention, it may be noted at this point that in any of a variety of heretofore known washing machines, among which typically are those for the specialized purpose of washing dishes, clothing, or other objects or material, a wash chamber accommodates a cleaning liquid, most often water, in one or more stages of operation of the machine, for the cleaning liquid to perform washing, rinsing, or other cleaning functions on the work in the wash chamber. The cleaning functions of such machines are well known to be enhanced by the addition of liquid soap, liquid detergent or some other aid in liquid form, as for example a liquid rinsing aid, to the wash liquid in the wash chamber. The addition of these aids into the wash chamber, though, has sometimes entailed

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no other mode of accomplishment than opening a door of the machine to the wash chamber, manually pouring a charge of the aid into the wash chamber, and then closing the door for a washing operation to be performed having the aid in the cleaning liquid. To dispense quantities of the aid into the wash chamber of the washing machine from a liquid supply which is housed on the machine, and for the supply to endure repeated demands, becomes indeed worthwhile, and the instant invention importantly contributes improvements toward quite satisfactory accomplishment of this and other objectives in washing machines, including typically machines for the specialized purposes of washing dishes, clothing or other objects or material, the machine having a wash chamber wherein a cleaning liquid is provided to perform any one or more of washing, rinsing, or other cleaning function or functions on the work in the wash chamber.

In accordance with one aspect of the present invention a door structure is provided which comprises container and dispenser means in combination with a door for the wash chamber of an appliance, the container and dispenser means referred to having a liquid storage chamber and outlet and inlet openings communicating with the storage chamber respectively for a liquid washing aid, such as soap, detergent or a rinsing aid to be dispensed from the storage chamber through the outlet opening into a wash chamber while the door closes the wash chamber and for the storage chamber to be re-filled with wash aid liquid through the inlet opening. The door structure also contributes a hollow indicator means in the washing appliance with which the door structure is used. An external port is disposed in the door structure and coextends with a transparent portion of the indicator means for the hollow in the indicator means to extend upward of a wash aid liquid supply depletion location in the storage chamber and be viewed through the transparent portion in alignment with the port when the door is closed. The indicator means, moreover, is connected with the storage chamber and arranged for the aforementioned hollow to be filled into the transparent portion of the indicator means with the liquid aid from the storage chamber while the door is open and for the hollow thus filled to be sealed into the liquid aid in the storage chamber until the liquid aid in the storage chamber breaks seal at the depletion location while the door is closed. The wash aid liquid which is visible through the transparent portion of the indicator means in alignment with the viewing port will thus be retained as an indication that there is an adequate quantity of wash aid liquid in supply in the storage chamber until the seal is broken, at which time liquid in the hollow of the indicator means drains from the hollow. The resultant lack of wash aid liquid notable through the door structure viewing port is indicative of the fact that an attendant should add wash aid liquid into the storage chamber to replenish the supply of this liquid for use in further operation of the appliance.

In the accompanying drawing, wherein two exemplary embodiments of the present invention are represented:

FIGURE 1 is a partial sectional view in side elevation of a dishwasher wherein the door structure in the combination is up and thus in the closed position in the appliance;

FIGURE 2 is a partial sectional view corresponding to FIGURE 1 and more particularly the door structure is in open position in the appliance;

FIGURE 3 is a partial front elevation of the appliance and broken away to show details including those of an indicator means; and

FIGURE 4 is a side elevation partially in section of a modified door structure taken with the door structure in the up and thus closed position.

In the drawings like reference characters represent like components throughout.

Referring now more particularly to the illustrative embodiment of the present invention represented in FIGURES 1, 2 and 3 of the accompanying drawing, a dishwasher apparatus, designated generally by the reference numeral 10 is provided having a casing 11 wherein there is a wash chamber 12 and an access opening 13 into the wash chamber. A wire basket 14 for receiving dishes is removably carried in the wash chamber 12 on suitable supports 15 connected with the casing wall. This basket is situated a distance below the top 16 of the casing and has an upper position in the wash chamber. Downward within this same chamber and thus in a lower position is a wire rack 17 mounted to the inside wall of the machine casing in any suitable known manner further to receive dishes or other household utensils which are to be washed. Also in the wash chamber 12, and located near the bottom 22 is a rotary wash water spray device 18 having apertures upwardly directed through the bottom of wire rack 17 and toward the wire basket 14 for delivering wash water to objects which thus are to be washed in the rack and basket. One such aperture is designated by reference numeral 19 and it will be understood that a plurality of these apertures exist in the spray device but at other positions not shown. The spray device may for example be of the well known jet reaction type wherein the water delivery apertures are upwardly inclined for the devices to be propelled by a jet reaction effect of the water being delivered into the wash chamber. The wash water issued through spray device 18 into the wash chamber is recycled in accordance with usual practice from sump 20 by a recirculation pump 23. This recycling may be effected during or after a supply of water is admitted in any suitable known manner into the wash chamber 12 from an outside source such as from a domestic hot water tank fed by a city main.

Access opening 13 is equipped with a seal 25 and is reclosably associated with a door structure 26 having lower horizontally axially directed pivots interconnecting the door structure with brackets mounted to the appliance casing. One such pivot 27 and bracket 28 are indicated in FIGURE 1 and it will be understood that a corresponding pivot and bracket are likewise disposed and engaged adjacent to the opposite edge of the door structure. The door structure also is connected with a counterbalance arm 29 which projects from a mounting 30 in the door structure into the casing 11 and to a spring 31 (see FIGURE 2) secured to the casing. The lead end of the spring is indicated at 31a having connection with the inner end of counterbalance arm 29. The door structure 26 accordingly may be opened against counterbalance outwardly about pivots 27 and maintain the substantially horizontal open position indicated in FIGURE 2 of the drawing, at which time the wash chamber 12 is available through the access opening 13 for dishes to be removed or inserted into the chamber.

Door structure 26 includes outer and back walls 32 and 33, respectively, which have peripherally overlapping flanges 34 and 35 suitably secured to each other for the related walls to form an interior compartment 36. A handle 37 extends securely over the top side of the overlapping outside and back wall flanges 34 and 35 and projects forwardly for an attendant to grasp and operate the door structure about its pivots 27. Also near the top of the door structure is a viewing port or window 40 which for reasons hereinafter to be disclosed extends through the outside wall 32 into compartment 36.

A wash aid liquid container 41 and dispenser 42 are secured within compartment 36 between the outside wall 32 and back wall 33 of the door. As seen more clearly in FIGURE 1 of the drawing, container 41 comprises a liquid aid storage chamber. The storage space 43 within this chamber has an inlet opening 44 in an extension 45 of wall 46 of the chamber and this extension protrudes through an aperture in the back wall 33 of the door structure. A reclosable cover 47 outside the back wall 33 fits reclosably over the inlet opening 44 and is engaged with

the chamber extension 45 as by means of screw threads internally on the cover and externally on the extension.

A portion 46a of the chamber wall 46 serves as the bottom of the storage chamber when the door structure is in the FIGURE 1 position which closes the access opening 13 of the dishwasher. Meanwhile the dispenser 42 in the present embodiment is disposed beneath the storage chamber 41 and therefore can receive wash aid liquid gravity fed from the storage chamber, there being an outlet aperture 50 leading for this purpose through the wall portion 46a into communication with the inside of the dispenser. A tube 51 having an outlet opening 52 therein from the inside of the dispenser 42 leads through the back wall 33 of the door structure and discharges toward a downwardly open shield 53 on the back wall, the discharge being into the wash chamber when the door structure is in the closed position represented in FIGURE 1.

The dispenser 42 for the wash aid liquid illustratively may be a device such as any suitable manually or automatically controlled valve which closes off the supply of wash aid liquid available through aperture 50 in liquid storage chamber from the dispenser outlet opening 52 and being movable for letting out a quantity of the supply of the wash aid liquid from the storage chamber through aperture 50 and the outlet opening 52 into the wash chamber 12 of the appliance and then to reclose. In certain instances the dispensing device 42 employed is a suitable well known quantity measuring or metering type which per actuation will measure or weigh a quantity of the wash aid liquid admitted from the storage chamber and then issue that quantity to the wash chamber of the appliance, thereafter closing off the remainder of the wash aid liquid supply in the storage chamber 41 until the metering or measuring device is again actuated and measures off a further quantity of the wash aid liquid from the storage chamber 41 and issues that further quantity to the wash chamber 12.

The wash aid liquid storage chamber 41 in the embodiment of FIGURES 1, 2 and 3 is equipped with hollow indicator means 55 within the compartment 36 of the door structure and thus between the outside wall 32 and back wall 33 of the door structure. Indicator means 55 has hollow opposite open end portions 56 and 58 and a hollow intermediate transparent portion 57 interconnecting the open end portions. In the form represented a generally U-shaped tube which includes the hollow intermediate transparent portion as a bight portion has the hollow opposite end portions as legs interconnected by the bight portion. The several portions define a passageway 59 for containing wash aid liquid. Port 40 in the outside wall 32 of the door structure substantially coextends with the hollow intermediate transparent portion 57 of the indicator means. This hollow intermediate transparent portion thus in view through port 40 is upward of a depletion location in storage chamber 41 when the door structure is in the FIGURE 1 or closed position with respect to the appliance access opening 13 into the wash chamber 12.

The hollow opposite open end portions 56 and 58 of the indicator means are connected with wall 46b of the wash aid liquid storage chamber for the passageway 59 to communicate at both of these end portions, through openings 59a and 59b, respectively, with the inside of storage chamber 41. Furthermore, end portions 56 and 58 curve upwardly and thence extend generally vertically to the intermediate transparent portion 57, the latter having a horizontal length 57a exposed through the viewing port 40, when the door structure 26 is in the closed position noted in FIGURE 1. End portions 56 and 58 having their openings 59a and 59b disposed in the storage chamber so that opening 59a is at the depletion location in the storage chamber and opening 59b is below this depletion location. In the open position of the door structure 26, indicated in FIGURE 2, the end portions 56 and 58 of the indicator means maintain their connections with the storage chamber 41 so that the end openings 59a

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and 59b are at different altitudes in the storage chamber. This comes about in the present embodiment by having side 46b of the storage chamber of a stepped configuration with end portion 58 of the indicator means connected through the lower step 46c (see FIGURE 2) of the side and thus terminating at opening 59b immediately inside the storage chamber and with end portion 56 of the indicator means connected through the upper step 46d (see FIGURE 2) of the side and projecting at 60 to dispose opening 59a at a higher altitude in the storage chamber than the opening 59b when the door structure is in the open position as shown in FIGURE 2. Side 46b of the storage chamber in the latter position thus becomes the bottom of the chamber.

Also, it will be noted that with the door structure disposed in the FIGURE 2 position the indicator means 55, as arranged and disposed underneath the storage chamber 41, can have the passageway 59 completely filled with wash aid liquid from the storage chamber 41. The filling progresses through inlet opening 59b. If further wash aid liquid is needed to re-fill the storage chamber this liquid is poured in through the inlet opening 44 after first removing the cover 47, and the pouring is continued until the rise in liquid fills the passageway 59 and both openings 59a and 59b are immersed in the liquid. Cover 47 then is reclosed to shut off the inlet opening 44 and the door structure is ready to be moved about pivots 27 back and forth between the FIGURE 2 position and the FIGURE 1 position as occasion may demand. The passageway openings 59a and 59b in the indicator means will remain immersed in the wash aid liquid in the storage chamber 41 during this movement and while the door structure is in the closed position represented in FIGURE 1. Accordingly, wash aid liquid is retained in the passageway 59 and is visible through the hollow transparent portion 57 and through port 40 to indicate that the wash aid liquid in the storage chamber 41 is adequate in supply. Visibility is sometimes enhanced by having a plate 63 of suitable finish or color securely in the door structure behind the transparent portion 57. A lamp (not shown) may of course be added for like purpose if desired.

Eventually, repeated operation of the dispenser 42 for adding wash aid liquid to the wash chamber 12 of the appliance diminishes the available supply of the wash aid liquid present in the storage chamber 41 and port 59a in the depletion location becomes exposed while the door structure 26 is being moved upwardly about pivots 27 or while the door structure is in the closed position shown in FIGURE 1. Exposure of port 59a above the level of the wash aid liquid in the storage chamber 41 thus allows wash aid liquid to drain off from passageway 59 of the indicator means and the absence of this liquid from the hollow transparent portion 57 is notable through port 40 and is indicative of a need for the storage chamber to be re-filled through the inlet opening 44.

In an embodiment of the present invention, according to FIGURE 4, a modified form of hollow indicator means designated by the reference numeral 55' supplants the hollow indicator means 55 of FIGURES 1 to 3 in the door structure. Indicator means 55' in the FIGURE 4 position is in a door structure having a closed position corresponding to FIGURE 1, and indicator means 55' has a transparent hollow portion 70 and open and closed opposite ends 71 and 72 respectively. The hollow transparent portion 70 and closed end 72 extend above a wash aid liquid depletion supply location represented by the end opening 73 of the open end portion 71 near the bottom storage chamber 41 and the hollow transparent portion 70 exposes the hollow of the indicator means 55' to view at port 40 in the appliance door structure. By having the hollow in the indicator means 55' of appropriate dimensions to account for such factors as viscosity of the wash aid liquid which is to be received, the wash aid liquid will enter to fill the hollow and drain off from the

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hollow through the same opening 73. Thus the hollow is filled through opening 73 when the door structure is placed in an open position comparable to FIGURE 2 and the liquid is retained in the hollow until the wash aid liquid in the storage chamber uncovers this same opening which is at the depletion location while the door structure is other than open.

As many possible embodiments of the invention may be made and as many possible changes may be made in the embodiments hereinbefore set forth, it will be distinctly understood that all matter described herein is to be interpreted as illustrative and not as a limitation.

I claim:

1. A door structure for the wash chamber of a washing appliance comprising:
  - (a) a door pivotal about a horizontal axis between closed and open positions,
  - (b) dispenser means carried by said door and including a liquid storage chamber, and
  - (c) hollow indicator means communicating with said storage chamber and having a transparent portion disposed above a predetermined supply depletion level in said storage chamber when said door is in said closed position but below said storage chamber when said door is in said open position,
  - (d) said transparent portion being visible from outside the washing appliance when said door is in said closed position,
  - (e) said indicator means and said storage chamber having at least one point of communication in the lower portion of said storage chamber when said door is in said open position whereby said indicator means is adapted to be substantially filled with liquid from said storage chamber when said door is in said open position,
  - (f) said indicator means and said storage chamber having a point of communication at said supply depletion level when said door is in said closed position whereby substantially all the liquid in said indicator means is free to flow into said storage chamber when the level of the liquid in said storage chamber drops below said predetermined supply depletion level.
2. A door structure for the wash chamber of a washing appliance comprising:
  - (a) a door pivotal about a horizontal axis between closed and open positions,
  - (b) said door having an outer wall and a back wall spaced from each other to form a compartment therebetween,
  - (c) dispenser means carried by said door within said compartment and including a liquid storage chamber,
  - (d) hollow indicator means communicating with said storage chamber and having a transparent portion disposed above a predetermined supply depletion level in said storage chamber when said door is in said closed position but below said storage chamber when said door is in said open position.
  - (e) a port in said outer wall,
  - (f) said transparent portion being at least partially disposed in registry with said port to be visible from outside the washing appliance when said door is in said closed position,
  - (g) said indicator means and said storage chamber having at least one point of communication in the lower portion of said storage chamber when said door is in said open position whereby said indicator means is adapted to be substantially filled with liquid from said storage chamber when said door is in said open position,
  - (h) said indicator means and said storage chamber having a point of communication at said supply depletion level when said door is in said closed position whereby substantially all the liquid in said indi-

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cator means is free to flow into said storage chamber when the level of the liquid in said storage chamber drops below said predetermined supply depletion level.

3. A door structure for the wash chamber of a washing appliance comprising:

- (a) a door pivotal about a horizontal axis between closed and open positions,
- (b) dispenser means carried by said door and including a liquid storage chamber,
- (c) indicator means including hollow opposite open end portions and a hollow intermediate transparent portion interconnecting said open end portions,
- (d) said end portions and said intermediate portions defining a passageway for liquid,
- (e) said intermediate portion being disposed above a predetermined supply depletion level in said storage chamber when said door is in said closed position but below said storage chamber when said door is in said open position,
- (f) at least one of said open end portions communicating with said storage chamber at a point in the lower portion of said storage chamber when said door is in said open position whereby said indicator means is adapted to be substantially filled with liquid from said storage chamber when said door is in said open position,
- (g) at least one of said open end portions communicating with said storage chamber at said supply depletion level when said door is in said closed position whereby substantially all the liquid in said indicator means will be free to flow into said storage chamber when the level of the liquid in said storage chamber drops below said predetermined supply depletion level.

4. A door structure as set forth in claim 3, wherein said indicator means includes tubing having said hollow intermediate transparent portion as a bight portion and having said hollow opposite end portions as legs interconnected by said bight portion.

5. A door structure as set forth in claim 3 wherein said end portions communicate with said storage chamber at different levels when said door is in said open position.

6. A door structure for the wash chamber of a washing appliance comprising:

- (a) a door pivotal about a horizontal axis between closed and open positions,
- (b) dispenser means carried by said door and including a liquid storage chamber,
- (c) hollow indicator means communicating at one end with said storage chamber having a transparent portion disposed above a predetermined supply depletion level in said storage chamber when said door is in said closed position but below said storage chamber when said door is in said open position,
- (d) said transparent portion being visible from outside the washing appliance when said door is in said closed position,
- (e) said indicator means having a closed end opposite said one end,
- (f) the point of communication between said one end of said indicator means and said storage chamber being in the lower portion of said storage chamber when said door is in said open position whereby said indicator means is adapted to be substantially filled with liquid from said storage chamber when said door is in said open position,
- (g) said point of communication also being at said supply depletion level when said door is in said closed position whereby substantially all the liquid in said indicator means is free to flow into said storage chamber when the level of the liquid in said storage chamber drops below said predetermined supply depletion level.

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7. A door structure for the wash chamber of a washing appliance comprising:

- (a) a door pivotal about a horizontal axis between closed and open positions,
- (b) said door having an outer wall and a back wall spaced from each other to form a compartment therebetween,
- (c) dispenser means carried by said door within said compartment and including a liquid storage chamber,
- (d) said storage chamber having an outlet communicating through said back wall with said wash chamber whereby liquid may be dispensed from said storage chamber through said outlet opening into said wash chamber while said door is in said closed position,
- (e) said storage chamber having an inlet opening extending through said back wall whereby said storage chamber may be re-filled with liquid while said door is in said opened position,
- (f) a cover removably closing said inlet opening,
- (g) indicator means including hollow opposite open end portions and a hollow intermediate transparent portion interconnecting said open end portions,
- (h) said end portions and said intermediate portion defining a passageway for liquid,
- (i) a port in said outer wall,
- (j) said transparent portion being at least partially disposed in registry with said port to be visible from outside the washing appliance when said door is in said closed position,
- (k) said intermediate portion being disposed above a predetermined supply depletion level in said storage chamber when said door is in said closed position but below said storage chamber when said door is in said open position,
- (l) at least one of said open end portions communicating with said storage chamber at a point in the lower portion of said storage chamber when said door is in said open position whereby said indicator means is adapted to be substantially filled with liquid from said storage chamber when said door is in said open position,
- (m) at least one of said open end portions communicating with said storage chamber at said supply depletion level when said door is in said closed position whereby substantially all the liquid in said indicator means is free to flow into said storage chamber when the level of the liquid in said storage chamber drops below said predetermined supply depletion level.

8. A door structure for the wash chamber of a washing appliance comprising:

- (a) a door pivotal about a horizontal axis between closed and open positions,
- (b) said door having an outer wall and a back wall spaced from each other to form a compartment therebetween,
- (c) dispenser means carried by said door within said compartment and including a liquid storage chamber,
- (d) said storage chamber having an outlet communicating through said back wall with said wash chamber whereby liquid may be dispensed from said storage chamber through said outlet opening into said wash chamber while said door is in said closed position,
- (e) said storage chamber having an inlet opening extending through said back wall whereby said storage chamber may be re-filled with liquid while said door is in said open position,
- (f) a cover removably closing said inlet opening,
- (g) hollow indicator means communicating at one end with said storage chamber and having a transparent portion disposed above a predetermined supply depletion level in said storage chamber when said door is in said closed position but below said stor-

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- age chamber when said door is in said open position,
- (h) a port in said outer wall,
- (i) said transparent portion being at least partially disposed in registry with said port to be visible from outside the washing appliance when said door is in said closed position, 5
- (j) said indicator means having a closed end opposite said one end,
- (k) the point of communication between said one end of said indicator means and said storage chamber being in the lower portion of said storage chamber when said door is in said open position whereby said indicator means is adapted to be substantially filled with liquid from said storage chamber when said door is in said open position, 10
- (l) said point of communication also being at said supply depletion level when said door is in said 15

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closed position whereby substantially all the liquid in said indicator means is free to flow into said storage chamber when the level of the liquid in said storage chamber drops below said predetermined supply depletion level.

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