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3,439,688

WATER INLET SYSTEM FOR DISHWASHER

Filed Oct. 11, 1965

Sheet 1 of 2

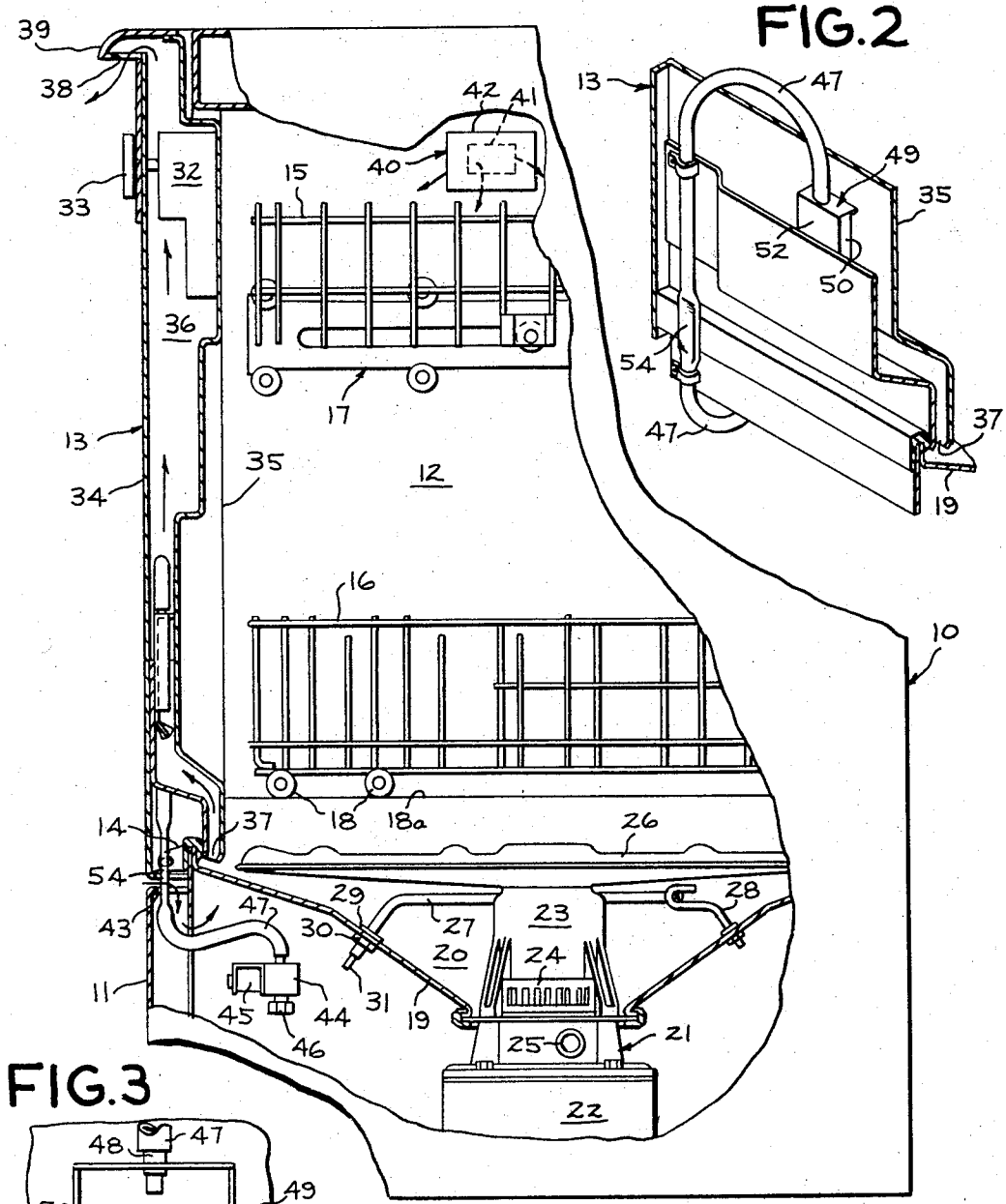


FIG. 2

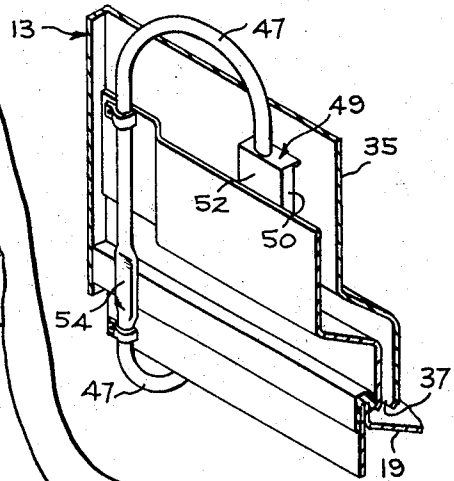


FIG. 3

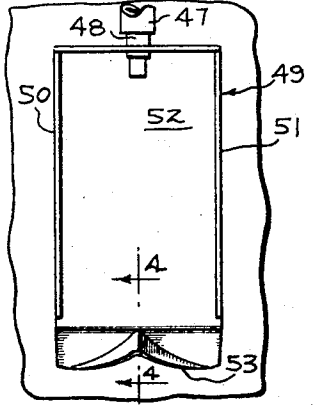
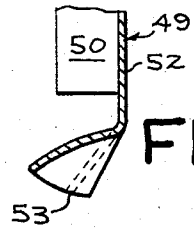


FIG. 1

FIG. 4



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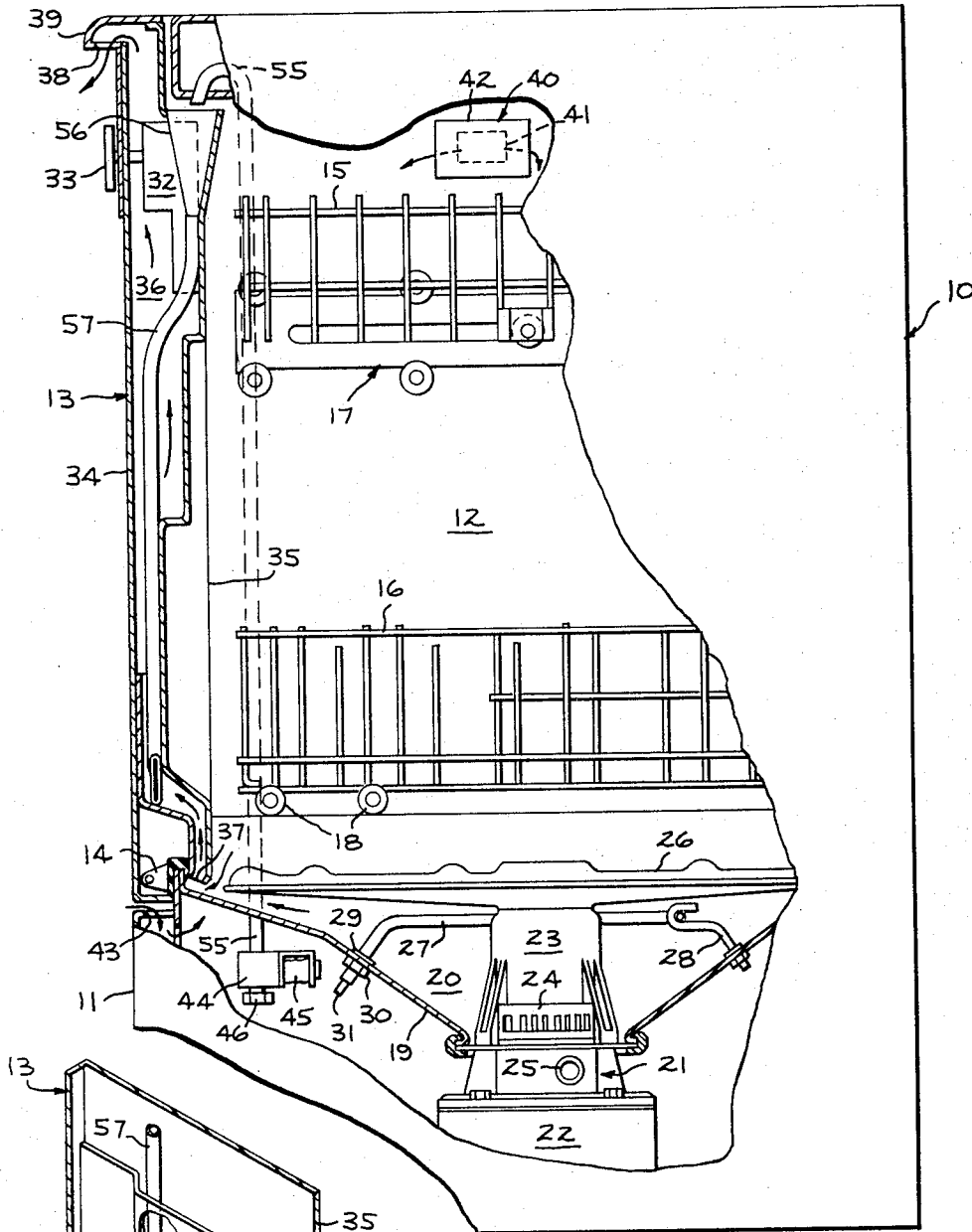


FIG. 6

FIG. 5

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1

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**WATER INLET SYSTEM FOR DISHWASHER**  
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5 Claims

## ABSTRACT OF THE DISCLOSURE

A water inlet system for a front-opening dishwasher closed by a door having a vent passageway therethrough used during the drying operation to vent the dishwasher wash chamber. When the door is closed, the vent passageway inlet opening is located adjacent the door lower portion. Inlet water for the pre-rinsing and washing operations is introduced into the wash chamber through the door vent passageway inlet opening to flush away food particles that may have collected adjacent the vent inlet opening and thus prevent it from becoming clogged thereby.

This invention relates generally to dishwashers and, more particularly, to an improved water inlet system for a dishwasher.

In practically all automatic dishwashers designed for use in the home, means are provided to dry the dishes upon completion of the normal wash and rinse operations. These means usually include an electrical resistance heating element to heat the air within the dishwasher wash chamber to assist evaporation of moisture from the wet dishes. Also, the means include a venting arrangement so that the moisture-laden air can be removed from the wash chamber and replaced by cooler and drier air. Such means usually operate for several minutes as the terminal portion of a completion dishwasher cycle of operation.

In an undercounter, or drop-door, dishwasher which is built into the permanent kitchen cabinets in a home, the areas through which the dishwasher may be vented are limited due to the surrounding cabinetry. Accordingly, conventional practice has been to vent the dishwasher through its door since the door faces away from the cabinet. Certain limitations are still encountered, however, as to venting through the door since during the wash and rinse operations, wash fluid or rinse water is vigorous sprayed and splashed about within the wash chamber. A simple oven vent through the door may result in the escape of wash fluid or rinse water which would be intolerable.

Therefore, the usual practice is to have a hollow door with the hollow providing a passageway between the wash chamber and the exterior of the dishwasher. The passageway communicates with the wash chamber near the bottom of the door and communicates with the exterior of the dishwasher near the top of the door. The foregoing "top" and "bottom" references indicate the closed position of the door in which position it is substantially vertical. By so communicating the passageway with the wash chamber and the exterior of the dishwasher, two advantages are gained. First, the passageway creates a chimney effect to assist in venting and, second, the inlet to the passageway is below the spray device within the dishwasher and therefore not in the area of vigorous spray action. The latter advantage minimizes the possibility of wash fluid or rinse water entering the passageway.

Having the inlet to the passageway at the above-described location, though advantageous in other respects, creates a problem by the fact that food particles tend to collect there which are not subject to spray action and therefore not washed away. Continued collection of food particles over a long period of time will create obvious

2

problems. The present invention provides a solution to this problem along with other advantages which will become evident as this description continues.

It is an object of this invention to provide an improved means to keep the vent passageway clean in a front opening dishwasher.

It is another object of this invention to provide an improved water inlet means for a front opening dishwasher.

It is a further object of this invention to provide a front opening dishwasher with a water inlet system which will clear the vent passageway as it fills the dishwasher with water.

Briefly stated, in accordance with one aspect of the present invention, a dishwasher is provided with a cabinet and a wash chamber within the cabinet adapted to receive articles to be washed. Spray means are provided to effectuate a wash action upon articles in the wash chamber. There is a door in one wall of the cabinet to provide access to the wash chamber and the door has a generally vertical closed position. A passageway is provided in the door to vent the wash chamber. An inlet opening in the lower portion of the door interconnects the passageway and the wash chamber while an outlet opening in the door interconnects the passageway with the exterior of the dishwasher. Means are provided to admit water to the passageway above the inlet for flow through the inlet into the wash chamber. The last mentioned means serves to charge the dishwasher with sufficient water to perform the normal wash or rinse operation and, at the same time, by passing through the passageway inlet, this water flushes out any food particles which may have collected in the passageway adjacent the inlet.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a partial elevational view, partly cut away to show details, of a dishwasher employing the present invention;

FIGURE 2 is a perspective view of a portion of the door of the dishwasher of FIGURE 1 showing details of the water inlet system;

FIGURE 3 is a detailed view of an element of the water inlet system of FIGURE 2;

FIGURE 4 is a view taken along line 4—4 of FIGURE 3;

FIGURE 5 is a view similar to FIGURE 1 but showing a second embodiment of the present invention; and

FIGURE 6 is a view similar to FIGURE 2 but showing the water inlet system of FIGURE 5.

Referring now to the drawings, and particularly to FIGURE 1, there is shown an automatic dishwasher 10 having an outer cabinet 11 with a wash chamber 12 therein. Access to wash chamber 12 is provided by means of a closure member or door 13 which pivots about a substantially horizontal axis defined by a pair of hinges 14, only one of which is visible in FIGURE 1. Dish supporting racks 15 and 16 are provided in wash chamber 12 to support dishes or other articles to be washed therein. Rack 15 is provided with a slide assembly 17 which allows rack 15 to be at least partially withdrawn from the wash chamber horizontally out through the access opening created by the opening of door 13. Rack 16 is provided with rollers 18 which ride upon a ledge 18a formed within wash chamber 12 and which further ride upon the inner surface of door 13 when door 13 is in its open position. This allows rack 16 to be at least partially withdrawn from wash chamber 12 when door 13 is opened.

The bottom wall 19 of wash chamber 12 has a centrally depressed portion forming a sump 20 wherein wash

fluid or other liquids will collect. Disposed within sump 20, and supported by bottom wall 19, is a motor-pump assembly 21 including an electrically reversible motor 22 and a pump 23. Pump 23 is provided with an inlet 24 through which fluid is withdrawn by pump 23 from sump 20 and, in one direction of rotation of motor 22, is propelled through an effluent discharge outlet 25 and, in the opposite direction of rotation of motor 22, is propelled upwardly into a spray means or arm 26. Spray arm 26 is mounted on the top of pump 23 for rotation about a substantially vertical axis and is provided with a plurality of orifices which eject the fluid pumped by pump 23 upwardly into wash chamber 12 to effectuate a wash action upon articles supported by racks 15 and 16. Certain of the orifices in arm 26 are directed in a manner whereby the reaction force created by the ejection of the fluid causes arm 26 to rotate.

A generally annular electrical resistance heating element 27 is supported by bottom wall 19 at one point by means of a bracket 28 and at another point by means of a flange 29 on element 27 and a threaded nut 30. Heating element 27 has an electrical terminal 31 to which an electrical conductor (not shown) may be connected to provide electrical energy to heating element 27. Heating element 27 may be employed to heat wash fluid present within wash chamber 12 during the washing and/or rinsing operations of dishwasher 10; however, the more important function of heating element 27 is to effectuate drying of articles supported by racks 15 and 16 upon completion of the washing and rinsing operations.

Sequence control means 32, which may be of the conventional type, are provided conveniently in the upper portion of the door 13 to control the sequence of operation of the electrical components of the dishwasher in such a manner that an integrated dishwasher cycle of operation is performed. Such a dishwasher cycle of operation may include one or two pre-rinses, one or two washes during which detergent is added to the water in wash chamber 12, one or two rinses and, finally, a drying operation. A manually operated control knob 33 extends from control means 32 out through the front of door 13 so that operation of dishwasher 10 may be manually initiated or modified.

As mentioned earlier, during the above-described drying operation, it is conventional to employ the door 13 as a vent to allow the escape of moisture-laden air in wash chamber 12 to thereby facilitate the drying of articles supported by racks 15 and 16. In order to so use door 13, door 13 is constructed with an outer wall 34 providing a suitable outer appearance for the dishwasher and an inner wall 35 which, in effect, defines one side of wash chamber 12. Outer wall 34 and inner wall 35 define therebetween a passageway 36. An inlet opening 37 interconnects, or provides communication between, wash chamber 12 and passageway 36. Inlet opening 37 is in the lower portion of door 13 and may comprise simply a spacing between outer wall 34 and inner wall 35 so that inlet opening 37 will extend substantially the full width of the door 13. An outlet opening 38 is provided in the upper portion of the door to interconnect, or provide communication between, passageway 36 and the exterior of dishwasher 10. Door 13 is conventionally provided with a handle 39 to facilitate the opening and closing of door 13. A convenient, and unobtrusive, location for outlet opening 38 is along the underside of handle 39 and, if so desired, outlet 38 may extend for substantially the full width of handle 38 which may be substantially coextensive with the width of door 13. It is to be understood that the term "width" is taken as viewing door 13 from the left side FIGURE 1 as one would face door 13 to open or close it. The magnitude of this dimension in presently available dishwashers for use in the home is approximately twenty-four inches.

If desired, suitable means such as that shown at 40 may be provided to allow cool dry air to enter wash chamber 12 from the exterior of the dishwasher 10. Means 40 would

include an opening 41 and suitable baffle means 42 to prevent the escape of liquids from wash chamber 12 during operation of pump 23. The direction and path of air flow during the drying operation of dishwasher 10 is shown by arrows and includes the ingress of air through an opening 43 in cabinet 11 below door 13 into the area below bottom wall 19. Air may flow from this area upwardly externally of wash chamber 12 to enter wash chamber 12 through opening 41. From there, air passes down through wash chamber 12 to enter passageway 36 through inlet opening 37. The air passes upwardly through passageway 36 and out through opening 38 to the exterior of dishwasher 10. Of course, the air picks up moisture as it passes through wash chamber 12 to facilitate the drying of articles therein.

Inlet opening 37 is conventionally positioned at or below the level of spray arm 26 to prevent the escape of wash fluid up through passageway 36 or, at least, to obviate the expense of providing baffle means in passageway 36 which may be necessary to avoid the escape of liquids if inlet opening 37 were above spray arm 26. Because inlet 37 is at substantially the same level, or slightly above, the static level of wash fluid in wash chamber 12 during the periods when pump 23 is not operating food particles tend to flow to the surface of this static body of water and collect at inlet opening 37. Further, because inlet opening 37 is not subjected to the spray action created by spray arm 26, it is possible for food particles to collect at inlet opening 37 over a long period of time which, if not ameliorated, would create obvious problems.

In accordance with the present invention, means are provided to overcome the problem created by the collection of food particles at inlet opening 37. A valve 44, operated by a solenoid 45 which in turn is controlled by control means 32, is connected in fluid receiving relationship with the normal household plumbing system (not shown) by coupling 46. Valve 44 has an outlet connected to a flexible conduit 47 which extends upwardly through opening 43 in cabinet 11 into passageway 36. Conduit 47 has an approximately 180° bend within passageway 36 so as to terminate in a downward direction and is provided at its downwardly directed terminal end with an insert 48 which in turn is secured by the upper portion of member 49. Insert 48 is, of course, hollow so that fluid passing through valve 44 and conduit 47 will in turn pass through insert 48 and enter the confines of member 49. Member 49 has side walls 50 and 51 projecting toward inner wall 35 of door 13 and a front wall 52. The lower end of member 49 is substantially open; however, spaced below the open end is means 53 to spread water passing through insert 48 whereby substantially the entire inlet opening 37 is subjected to the flow of water.

The opening and closing of valve 44 is controlled by sequence control means 32 and is correlated with the operation of the other electrical components of the dishwasher in such a manner that water is allowed to pass through valve 44, conduit 47, passageway 36 and inlet 37 to thereby enter wash chamber 12 and collect in sump 20. When a sufficient quantity of water has been allowed to collect in sump 20, valve 44 is closed and motor 22 is energized to power pump 23 to effectuate a wash action within wash chamber 12. Subsequently, motor 22 is reversed and pump 23 drains sump 20 through discharge outlet 25. This series of events is repeated once for each wash or rinse operation. Therefore, it can be seen that with the present invention, each and every time wash chamber 12 is charged with a quantity of water prior to a rinsing or washing operation, inlet 27 is flushed so that food particles are not given an opportunity to collect therein over any extensive length of time.

It should be noted that, although in the preferred embodiment of the present invention, all water admitted to the wash chamber 12 passes through inlet 37, it would be equally within the scope and spirit of the present

5

invention to provide a second conduit for the frequent refilling of sump 20 and program valve 44 so that it only occasionally causes the flow of water through inlet 37.

In the embodiment illustrated in FIGURES 1-4, and as most clearly illustrated in FIGURES 1 and 2, conduit 47 is provided with a flat portion 54 positioned in alignment with hinges 14 so that conduit 47 may bend in the area of flat portion 54 without detrimental effect to conduit 47.

Turning now to the embodiment illustrated in FIGURES 5 and 6, all of the conventional components of dishwasher 10 have been given identical reference numerals as in the embodiment illustrated in FIGURES 1-4. Since the only distinction between the two embodiments is limited to the water inlet system downstream from valve 44, the discussion to follow concerning FIGURES 5 and 6 will be limited to that area. In the embodiment illustrated in FIGURES 5 and 6, a conduit 55 extends upwardly from valve 44 externally of wash chamber 12 and terminates above an upper surface of door 13. The upper portion of conduit 55 has a substantially 180° bend therein so that its terminal end is directed downwardly. Disposed immediately below the terminal end of conduit 55 is a funnel-like member 56 which opens toward the terminal end of conduit 55. Extending downwardly from member 56 is a conduit 57 which passes down through passageway 36 and terminates in the lower portion of door 13. As most clearly seen in FIGURE 6, the lower terminal end of conduit 57 is flared, or configurated, to spread water flowing therethrough whereby substantially the entire inlet 37 will be subjected to the flow of water. Preferably, conduit 57 will be positioned adjacent one side of door 13 so that the water issuing from the lower end thereof will pass across substantially the full width of the door 13 and, thereby, through substantially the entire area of inlet 37.

It should be realized, that conduit 57 could be made to terminate in a member similar to member 49 illustrated in FIGURE 3 whereby means 53 could be employed to spread the water across substantially the entire inlet 37. Similarly, conduit 47 could be configurated as conduit 57 to obviate member 49 in the embodiment of FIGURES 1-4.

Thus it can be seen that the present invention provides an improved water inlet system which will clean the vent passageway and inlet to the passageway as it fills the dishwasher with water. Another advantage is that the water inlet system is at the front of the dishwasher so that access for service may be gained without necessitating the removal of the entire dishwasher from the surrounding cabinetry.

As will be evident from the foregoing description, certain aspects of the invention are not limited to the particular details of construction of the examples illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

6

1. A dishwasher comprising:

- (a) an outer appearance cabinet,
- (b) a washer chamber adapted to receive articles to be washed within said cabinet,
- (c) spray means to effectuate a wash action upon articles in said wash chamber,
- (d) a door in one wall of said cabinet to provide access to said wash chamber and having a generally vertical closed position,
- (e) a passageway in said door to vent said wash chamber,
- (f) an inlet opening in the lower portion of said door interconnecting said passageway and said wash chamber, said inlet opening extending substantially the full width of said door,
- (g) an outlet opening in said door interconnecting said passageway and the exterior of the dishwasher,
- (h) means to admit water to said passageway above said inlet opening for flow through said inlet opening into said wash chamber, and
- (i) means within said passageway to spread the water flowing through said inlet opening whereby substantially the entire inlet opening is subjected to the flow of water therethrough.

2. The invention of claim 1 wherein said means to admit water comprises: a flexible conduit extending upwardly from within said cabinet below said wash chamber and having a flat portion; said door being pivotally attached to said cabinet by hinge means to pivot thereabout between closed and open positions; and, said flat portion being positioned in alignment with said hinge means to bend as said door is pivoted.

3. The invention of claim 1 wherein said means to admit water comprises a first conduit within said passageway having a funnel-like upper end; a second conduit positioned thereabove with an open end directed toward said funnel-like upper end; said first conduit being movable with said door while said second conduit remains stationary within said cabinet.

4. The invention of claim 3 wherein said first conduit has a lower end adjacent said inlet opening and configurated to direct water along substantially the entire inlet opening.

5. The invention of claim 1 wherein said inlet opening is disposed below said spray means.

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U.S. CI. X.R.

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