

Dec. 5, 1967

L. J. MARTINIAC

3,356,431

DISHWASHER HAVING A SUDS SUPPRESSOR

Filed Jan. 27, 1966

FIG. 1

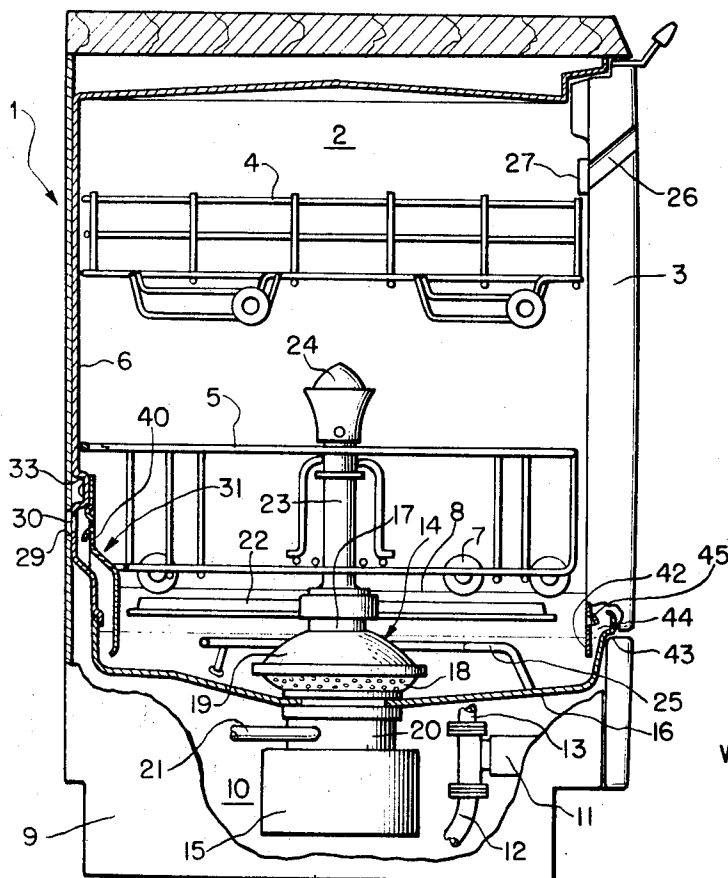


FIG. 2

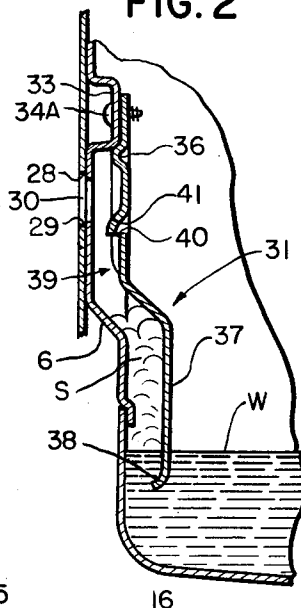


FIG. 3

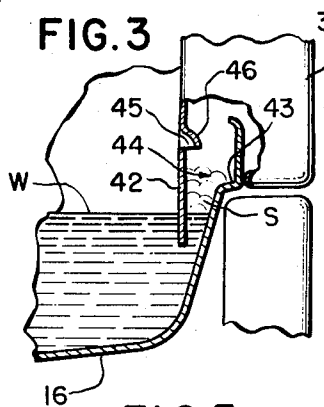


FIG. 4

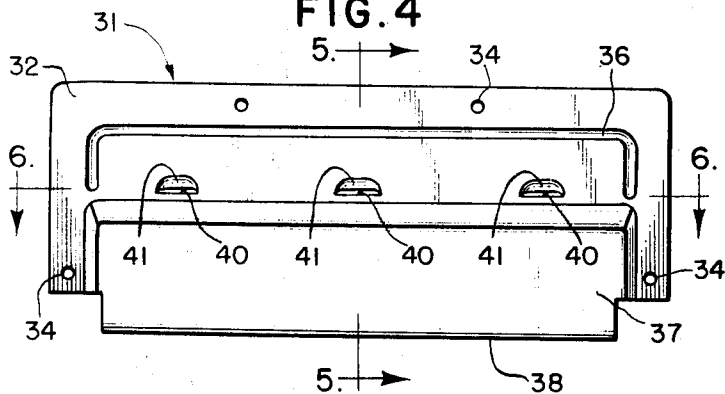


FIG. 5

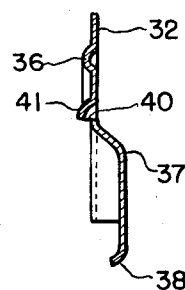


FIG. 6



INVENTOR.
Leonard J. Martiniak
BY *Dr. J. Lawrence*
Attorney

1

3,356,431

DISHWASHER HAVING A SUDS SUPPRESSOR
Leonard J. Martiniak, Waukesha, Wis., assignor to General Electric Company, a corporation of New York
Filed Jan. 27, 1966, Ser. No. 523,310
4 Claims. (Cl. 312-213)

This invention relates to dishwashers, and more particularly to an improved suds suppressor therefor.

It is conventional practice in the majority of dishwashers manufactured today to provide suitable vent means in the lower portion of the dishwasher tub; the vent means provide for a more rapid and thorough dissipation of steam vapor and aid in the prevention of condensation in the tub interior during the drying cycle. It is desirable to locate the vent means as close to the bottom of the wash chamber as possible, inasmuch as the greater concentration of water on the dishes in the lower rack must be evaporated and removed from the wash chamber before the dishes contained therein will dry. It is, of course, necessary to provide suitable water baffling members over the vent means to prevent water from passing out through the vent means during the washing and rinsing operations. In addition, water baffles have conventionally been provided along the bottom of the interior door structure to cover the junction between the door axis and the lower skirt portion to likewise prevent the leaking of water at this junction during operation of the dishwasher.

While improved air circulation may be obtained by locating the vent as low as possible along the tub wall, the problem of overflow of water through the vent means as the height of the vent is reduced with respect to the tub bottom presents a practical limitation to this reduction in height. The vent can be located at a point which is just above the normal water level of the tub, and the water baffles conventionally used will be effective to preclude the direct outward flow of water during the wash and rinse cycles. However, because the suds generated during the wash cycle rise to a much higher level behind the water baffle than does the water, the vents have been placed at a somewhat higher level to avoid the overflow of suds, with a concurrent reduction in effectiveness of air flow.

The problem of suds overflow becomes more acute when going from a dishwasher having two separate wash cycles in which smaller concentrations of detergent are used in each cycle, to a dishwasher having a single wash cycle where it is necessary to introduce a greater concentration of detergent to effect the same cleansing of ware. The greater concentration of detergent in the single wash cycle gives rise to excessive suds which may overflow the tub at both the vent means and the door junction.

In addition to the overflow problem, as the suds build up and recede behind the conventional water baffles over a period of time, a deposit of powder and residue builds up on the back side of the baffle, which eventually interferes with air circulation from the vent. Inasmuch as the space between the water baffle and the wall to which it is secured is very narrow, this area is difficult to clean without removing the water baffle completely, clearly an undesirable situation so far as the operator is concerned.

It is, accordingly, the primary object of my invention to provide an improved suds suppressor for a dishwasher.

Yet an additional object of my invention is to provide a dishwasher in which a novel combination water baffle and suds suppressor cooperates in one instance with a vent in the rear wall, and in a second instance in a particular improved manner to form a seal with the door structure to thereby prevent the escape of suds from the machine at both the rear vent and the bottom portion of the door, the water baffle in both instances providing for a suppression of suds during the wash cycle, and a wash-

2

down of suds during the rinse cycle, to thereby prevent the build-up of foam and suds residue which occurs behind the conventional water baffles now in use.

In one aspect of my invention, I provide in a dishwasher having at least a wash and rinse cycle, a wash chamber formed with a bottom wall, a top wall, and side walls, at least one of said walls being movable to provide access to the wash chamber. A vent is provided in a side wall to permit the entrance of ambient air to the wash chamber during the dry cycle. A water baffle is secured to the side wall directly above the vent; the baffle has a portion spaced from the wall at a point above the vent which extends downwardly past the vent toward the bottom wall where it is spaced therefrom. The spaced portion of the baffle and the wall define a passage for the inward flow of air from the vent to the bottom of the wash chamber. During the wash and rinse cycles, the spaced portion of the baffle which overlies the vent prevents the outward passage of water therethrough. The spaced portion of the baffle has a number of slots therethrough which are positioned just below the vent in the rear wall. The baffle is deformed immediately above each slot to provide a louver-shaped deflector extending into the passageway defined by the baffle and rear wall. In this manner, water passing through the slots during the wash and rinse cycles is deflected by the louvers downwardly into the passage and toward the bottom wall of the wash chamber, the downward deflection of water effecting a suppression of suds within the passageway during the wash operation and a wash-down of suds residue within the passage during the rinse operation.

Other features and advantages of my invention will be apparent from the following detailed description of a presently preferred embodiment thereof, read in connection with the accompanying drawings in which:

FIGURE 1 is a side elevational view in cross section of a dishwasher embodying my improved water baffle and suds suppressor;

FIGURE 2 is an enlarged fragmentary view of the dishwasher of FIGURE 1, and illustrates my improved water baffle and suds suppressor in the back wall of the dishwasher and showing the maximum water level therein;

FIGURE 3 is an enlarged fragmentary view of the dishwasher of FIGURE 1, and illustrates my improved water baffle and suds suppressor in conjunction with the dishwasher door structure; and shows the maximum water level within the dishwasher;

FIGURE 4 is an enlarged front elevational view of the water baffle for the back wall of the dishwasher and illustrating my invention in greater detail;

FIGURE 5 is a view along line 5-5 of FIGURE 4 and illustrating the wash down slots and water baffling plate in greater detail; and

FIGURE 6 is a top view taken along the line 6-6 of FIGURE 4 and illustrating the cross section of the wash down slots in greater detail.

Referring first to FIGURE 1, my invention is shown in an otherwise conventional domestic dishwasher in which an outer casing 1 supports a dishwasher tub, or chamber 2. The tub 2 and outer structure are constructed to provide registering front wall openings, with respect to which a door 3 is hinged at its bottom (hinges not shown) so as to swing between the normally closed vertical position shown in FIGURE 1, and a horizontal open position (not shown). Suitable gasket means (not shown) are normally interposed between the door and the periphery of the tub opening to provide for sealing against the leakage of water during operation of the machine.

A pair of vertically spaced racks 4 and 5 are provided within tub 2. Each of the two racks is formed of wire in the conventional manner so as to receive, in suitable posi-

3

tion for washing, a varied assortment of dishes, glassware and the like (not shown). During operation, the racks 4 and 5 abut the rear wall 6 of tub 2, and for loading and unloading, each of the two racks is mounted so as to move horizontally forward (to the right, as viewed in FIGURE 1) when door 4 is opened, so that the articles in the racks are accessible. Conventionally, rack 5 is provided with roller members 7 secured thereto. Rollers 7 roll on tracks 8 secured to side walls 9 of tub 2, and then, as the rack moves horizontally out of the tub, continue to roll on appropriately formed surfaces (not shown) provided on the inner face of the door, which, has been stated, is horizontal when open.

A conventional time cycle control (not shown) may be mounted in a convenient location in the upper portion of door 3. By well known circuitry, the timer is arranged to control the operating mechanism disposed in a machinery compartment 10 below the tub, programing the mechanism so as to provide a desired sequence of washing and rinsing operations, and the final drying operation. The mechanism within compartment 10 may include, for instance, a solenoid valve 11 connected by piping 12 to a hot water supply (not shown) and supplying water to tub 2 by way of a pipe 13 which is arranged in a conventional manner to a side wall inlet fitting (not shown) so as to provide the one inch air-gap generally required by plumbing codes.

The operating components may further include a pump 14 arranged to be driven by a reversible electric motor 15 and providing for recirculation of water from the sump portion 16 of the tub to a cylindrical pump discharge outlet 17. This recirculation system will normally include a peripheral inlet to the pump, the inlet being provided with any suitable screening or filter device such as that shown at 18. Pump 14 is usually of the centrifugal type, having a shroud or cover 19 which diverts the pump discharge from its normal radial pattern to a vertical flow through outlet 17.

The pump structure of the dishwasher shown also includes in its lower portion a secondary pump chamber 20 containing a bladed rotor (not shown) which is effective to pump a substantial amount of liquid when rotating in one direction, but has substantially no pumping action when rotated in the opposite direction. The discharge pump casing communicates with a discharge conduit 21 which carries vitiated fluids from the dishwasher to any suitable sewer or septic line (not shown) when the pump is rotating in the appropriate direction.

Outlet 17 communicates with a reaction-type spray arm 22 having orifices arranged in the usual way so, that, upon issuance of water therefrom, spray arm 22 is caused to rotate, the water upon issuance providing a cleansing effect on dishes contained in racks 4 and 5. In addition to the spray arm 22, the dishwasher may include a conduit 23 leading from the spray arm up to another water discharge device, such as that shown at 24, which is particularly suited to discharge liquid between the racks 4 and 5. This has the effect of improving the washing of articles in rack 4 and of rinsing down any food particles which may be on the articles in rack 5. It will be understood that member 24 may be either rotated by mechanical connection to spray arm 22 through conduit 23, or by having jet orifices of its own to provide the reaction force necessary for rotation.

In the washwasher thus far described, water supplied to tub 2 will fill the sump portion 16 thereof to the level shown by the letter W in FIGURES 2 and 3, at which time the pump 14 will impel the water upwardly through opening 17 and out spray arm 22 and nozzle 24. The water will continue to recirculate through the pump, coming in by way of filter 18 and again be forced upwardly through opening 17 and out the spray arms until the washing operations and rinsing operations are completed. Of course, fresh water is supplied to this area between each wash and rinse operation. Cleansing of the ware will

4

be accomplished in the usual manner through these several wash and rinse cycles.

In the present embodiment, the drying of dishes within tub 3 is expedited by the heating means 25 positioned near the sump portion 16 of the dishwasher. During the drying cycle, the hot moist air rises within tub 2 and passes out of the dishwasher and into the room by way of exit passage 26 in the upper part of door 3. A suitable water baffle 27 is provided over the inlet opening of passage 26 to preclude entry of water therein during the washing and rinsing cycles.

No air will flow out through passage 26 however, unless there is a source of incoming air to replace it. It is desirable to introduce a flow of dry air as close to the heating element 25 as possible in order to provide for a wider circulation of the heated dry air over the dishes in the lower rack. It is also desirable to introduce the air from the rear of the dishwasher, so that the air must completely traverse the dishwasher from rear to front before it can exit therefrom, thus passing over all the ware within the chamber. Accordingly, along the rear wall of tub 2 there is provided an opening 28. Outer casing 1 has a matching opening 29 which is in alignment with opening 28, and openings 28 and 29 define an air inlet vent 30 for the dishwasher tub.

To direct the flow of inlet air toward the heating element 25 and sump portion 16, and concurrently to provide a water baffle and suds suppressor for the inlet vent 30, I have provided the novel combination water baffle and suds suppressor shown best in FIGURES 2 and 3, and indicated generally by the numeral 31. Water baffle 31 comprises a generally rectangular plate 32 which is adapted to be secured at the top thereof to a channel 33 formed in the rear wall of the dishwasher tub above opening 28. Plate 32 has a number of openings 34 by which the plate may be secured to channel 33 and the rear tub wall by suitable fastening means such as screws 34A.

It will be observed from FIGURES 4 and 5, that plate 32 has a first upper embossment 36. This embossment facilitates the easy alignment of plate 32 with the lower edge of channel 33, as shown in FIGURE 2. Plate 32 has a second lower embossment 37 which begins well below opening 28 and extends downwardly and inwardly into tub 2, terminating in a lip 38 which extends back toward the rear wall 6 of the tub at a point substantially parallel to heating element 25. Embossment 37 follows the contour of rear wall 6 and is spaced therefrom. The space between plate 32, and the rear wall 6 of the tub provides a passageway 39 through which ambient air may enter from vent 30 and subsequently be directed downwardly by embossment 37 towards the sump portion 16 of the wash chamber.

By directing the ambient air downwardly toward the sump portion 16, it must then pass heating element 25 before rising within tub 2, which thereby aids in reducing the amount of condensation of water on the ware positioned in lower rack 5. As the heated air rises within tub 2, it will traverse the tub from rear wall 6 to door 3 before leaving the wash chamber by means of passageway 26. The location of vent 30 on the rear wall thus provides for a greater circulation of ambient air which accordingly results in a faster drying of the ware within the chamber.

During the wash and rinse operations, the normal water level within the tub is indicated by the line represented by the letter W in FIGURES 2 and 3. During these cycles, plate 32 will prevent water from passing out of the dishwasher vent opening 30. During the wash cycles however, the suds generated rise to a much higher level behind the baffle than does the water, as shown by the letter S in FIGURES 2 and 3. In addition, the suds which enter passageway 39 are shielded from the wash chamber and are thereby prevented from being reduced by the normal water action. In the case of a single detergent wash cycle, this sudsing is of greater severity and the suds may continue to build up to the point of overflowing through the

5

vent opening 30. Because the suds are trapped in passage 39 and cannot normally be reduced by the water action, and as the suds build up and recede over a period of time, a deposit of powder and residue tends to build up on the rear wall of the water baffle and the tub.

To prevent the overflow of suds through passage 39 and out vent 30, and to concurrently provide means for washing down the rear wall of the baffle to eliminate any deposit of powder and residue which normally builds up thereon, I have provided the novel suds suppressor slots 40 in plate 32. As can best be seen in FIGURE 2, these slots are positioned between the upper embossment 36 and the lower embossment 37. Slots 40 open into passage 39 just below the opening 28 in rear wall 6. Plate 32 is deformed above each slot 40 to extend inwardly into passage 39, to thereby provide a louver-shaped deflector 41 for each of the slots. Louvers 41 prevent the outward passage of water from slots 40 through opening 28.

The louvered slots serve as suds suppressors or wash-down slots, depending on whether the dishwasher is in the wash or rinse cycle. Thus, during the wash operation, water will enter slots 40 and be directed downwardly into passage 39 by the louvered portion 41, to thereby suppress the build-up of suds which would normally occur in this passage during the wash operation. During the rinse operation, clean water will enter slots 40 and again will be deflected downwardly by the louvers 41 into passage 39, the clean water thereby washing down the wall 6 and the side of the baffle plate 32 which faces the rear wall. This wash-down eliminates the formation of residues and powders which would otherwise build up on the rear side of the baffle plate 32 and rear wall 6, in the area above the normal water level.

As previously mentioned, water baffles have heretofore been provided along the bottom of the interior door structure to cover the junction between the door axis and the lower skirt portion. It will be observed from FIGURES 1 and 3, that the inner side of door 3 has an extension 42 which overlaps the tub lip 43 when the door is closed, to form a chamber 44, opened at the bottom for air intake during the drying cycle. Extension 42 serves as a water baffle or suds barrier bridging the area of the door hinge. In the same manner in which a suds build up occurs in the rear passage 39, the suds may also build up within chamber 44 during the wash cycle. Accordingly, slots 45 and louvers 46 are provided in member 42 just below the tub lip 43. The suds suppressor slots 45 will be effective in this area in the manner heretofore described with respect to the rear passage 39.

A dishwasher constructed in accordance with the present improvements can be used effectively for single detergent wash cycles in which excessive suds may be generated, and I have provided a unique way of eliminating the normal build up of residues and powders which develop in the water baffles conventionally used today. I have accomplished this in a manner which is without complication in construction and which completely eliminates the problem of maintenance of the water baffle by the operator. While I have located the vent in the rear wall to obtain the optimum pattern of air flow, the suds suppressor slots could, of course, be used if the inlet vent is on the side wall.

While there has been described what is at present thought to be the preferred embodiment of my invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall in the true spirit and scope of the invention.

I claim:

1. A dishwasher having at least wash and rinse cycles, and comprising:

(a) a wash chamber formed with a bottom wall, a top wall, and side walls, at least one of said walls being movable to provide access to said wash chamber;

6

(b) one of said side walls having a vent therethrough permitting the entrance of air to said wash chamber;

(c) baffle means mounted on said side wall above said vent and having a portion thereof spaced from said side wall from a point above said vent and extending downwardly past said vent toward said bottom wall where it is spaced therefrom; said spaced portion of said baffle means and said side wall defining a passage for the inward flow of air from said vent to the bottom of said wash chamber upon termination of said wash and rinse cycles; said baffle means preventing the outward passage of water from said wash chamber through said vent when said dishwasher is in a wash or rinse cycle;

(d) said portion of said baffle means spaced from said side wall having at least one slot therethrough positioned below said vent in said side wall; and

(e) said portion of said baffle means immediately above said slot being deformed to provide a louver-shaped deflector extending into said passage, whereby water passing through said slot during the wash and rinse cycles will be deflected downwardly into said passage and toward the bottom wall of said wash chamber, said downward deflection of water effecting a suppression of suds within said passage during the wash cycle, and effecting a wash-down of suds residue within said passage during the rinse cycle.

2. The combination according to claim 1 wherein said access wall comprises a bottom hinged front door including means forming an exit passage near the top thereof; said side wall including said vent and baffle means comprises the rear wall of said wash chamber, whereby air entering through said vent must traverse said wash chamber from the rear wall to the front thereof before it can exit from said passage in said front door.

3. A dishwasher having at least wash and rinse cycles, and comprising:

(a) a wash chamber formed with a bottom wall, a top wall, a rear wall, side walls, and a bottom hinged front door providing access to said wash chamber;

(b) said bottom having an upwardly extending front edge terminating in an inwardly turned lip along a line substantially adjacent the bottom edge of said front door, the space between said lip and the bottom edge of said door providing an opening for the entrance of air to said wash chamber;

(c) the side of said front door facing said wash chamber when said door is closed having an extension thereon terminating below said lip and spaced therefrom when said door is closed, said extension and said lip defining a chamber for the inward flow of air from said opening and into said wash chamber, said extension preventing the outward passage of water from said wash chamber through said opening when said dishwasher is in a wash or rinse cycle;

(d) said portion of said extension spaced from said lip having at least one slot therethrough positioned below the termination of said lip when said door is closed; and

(e) said portion of said extension immediately above said slot being deformed to provide a louver-shaped deflector extending into said chamber, whereby water passing through said slot during the wash and rinse operations will be deflected downwardly into said chamber and toward the bottom wall of said wash chamber, said downward deflection of water effecting a suppression of suds within said chamber during the wash cycle, and effecting a wash down of suds residue within said chamber during the rinse cycle.

4. The combination according to claim 3 wherein:

(a) said rear wall has a vent therethrough permitting the entrance of air to said wash chamber;

(b) baffle means mounted on said rear wall above said vent and having a portion thereof spaced from said rear wall from a point above said vent and extend-

7

ing downwardly past said vent toward said bottom wall where it is spaced therefrom; said portion of said baffle means and said rear wall defining a passage for the inward flow of air from said vent to the bottom of said wash chamber upon termination of said wash and rinse cycles; said baffle means preventing the outward passage of water from said wash chamber through said vent when said dishwasher is in a wash or rinse cycle;

(c) said portion of said baffle means spaced from said rear wall having at least one slot therethrough positioned below said vent in said rear wall; and

(e) said portion of said baffle means immediately above said slot being deformed to provide a louver-shaped deflector extending into said passage, whereby water passing through said slot during the wash and rinse cycle will be deflected downwardly into said passage and toward the bottom wall of said wash chamber, said downward deflection of water effecting a sup-

8

pression of suds within said passage during the wash cycle, and effecting a wash down of suds residue within said passage during the rinse cycle.

References Cited

UNITED STATES PATENTS

1,511,825	10/1924	Burns	-----	134—200	XR
2,871,082	1/1959	Karig et al.	-----	134—182	XR
3,024,074	3/1962	Jacobs et al.	-----	134—200	XR
3,026,628	3/1962	Berger et al.	-----	34—231	
3,117,582	1/1964	Perl	-----	134—94	
3,292,645	12/1966	Braden et al.	-----	134—183	XR

FOREIGN PATENTS

484,442	7/1952	Canada.
---------	--------	---------

CHARLES A. WILLMUTH, *Primary Examiner.*R. L. BLEUTGE, *Examiner.*