

March 6, 1962

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3,023,757

DISHWASHING APPARATUS

Filed May 6, 1960

FIG. 1.

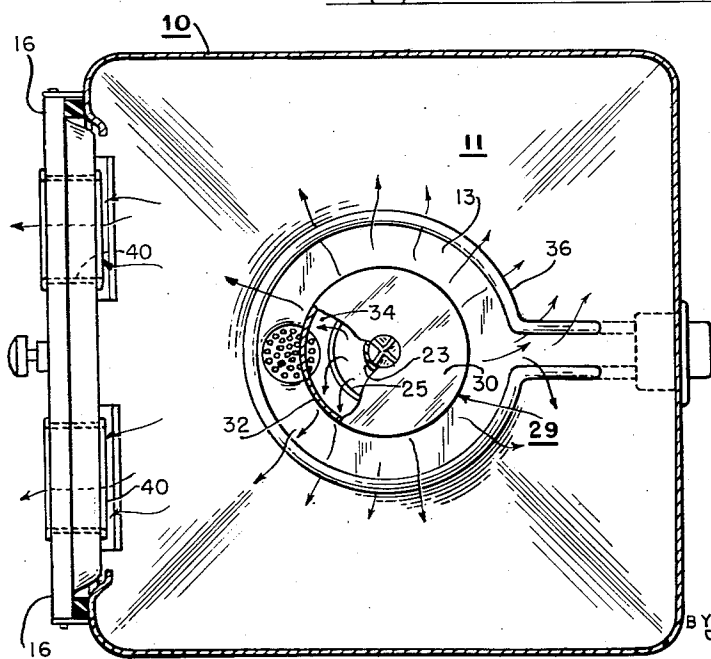
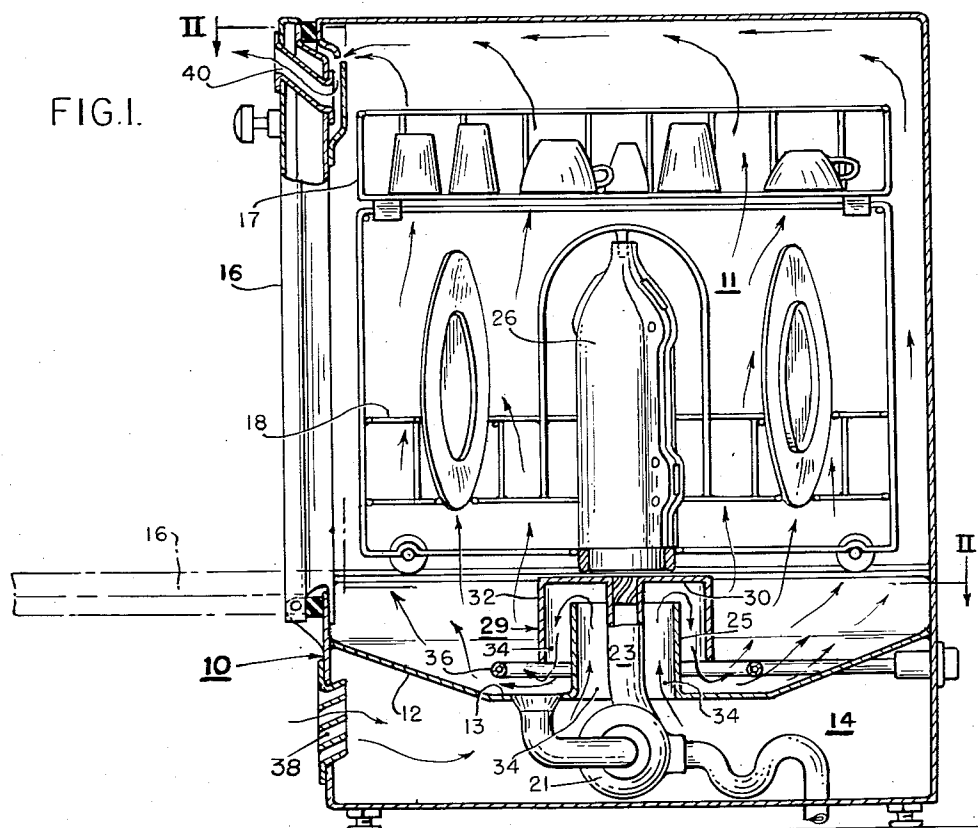


FIG. 2.

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3,023,757

DISHWASHING APPARATUS

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Filed May 6, 1960, Ser. No. 27,371

1 Claim. (Cl. 134-99)

This invention relates to dishwashing apparatus, especially domestic dishwashers used in the home for washing and drying dishes, and more particularly to improved means for drying dishes and the like with air currents after they have been washed and rinsed.

Domestic dishwashers usually have a washing chamber or vat with a sump formed at the bottom thereof to hold the liquid used for washing and rinsing the dishes. Generally, liquid is sprayed on the dishes either by a bladed impeller mounted in the sump or by a tubular distributor mounted for rotation in a central region of the washing chamber. Dishwashers using the bladed impeller have an advantage in that the impeller may be employed during the drying cycle, after liquid has been evacuated from the sump, to promote the dispersed flow of air through the vat for drying dishes. On the other hand, a centrally located liquid distributor is thought to obtain improved washing action because less soil is redeposited on the dishes. However, one disadvantage of the latter type of dishwasher is that the distributor is incapable of moving air over the dishes during the drying cycle; and, although it is possible to add a blower for this purpose, the cost thereof is a serious drawback. Despite this disadvantage, dishwashers employing a centrally located water distributor are now in common use because they are well suited to the currently popular, front-opening kind of dishwasher. This invention copes with the problem of providing a dispersed flow of air by natural air currents through the dishwasher vat in order to dry dishes at a uniform rate, without the use of a blower.

Apparatus embodying the invention includes a cabinet provided interiorly with a washing chamber and an apparatus compartment. Dishes are held in the washing chamber by dish storage racks, preferably two, arranged one above the other. Communication between the apparatus compartment and the washing chamber is provided by means of wall structure in which is formed an opening. Extending through the opening is a conduit for conveying liquid to the washing chamber, and which has an end portion projecting into the washing chamber beyond the wall structure. Also provided is a collar which includes a tubular portion arranged in spaced relation to the wall structure, and which further includes an annular flange connected between the tubular portion of the collar and the end portion of the conduit. The conduit, the wall structure, and the collar are respectively received one within the next to define a sinuous air passageway between the apparatus compartment and the washing chamber, and thus prevents liquid splashed about the washing chamber during the washing or rinsing cycles from entering the apparatus compartment through the air passageway.

The present arrangement provides for the introduction of air to the vat from the same general region in which liquid is introduced to the washing chamber, preferably through a central region of the sump so that the air has an opportunity to come into contact with all of the dishes before it exits from the vat. An electrical resistance heater is provided in a lower portion of the washing chamber, below the lower dish storage rack, to heat the air introduced and to promote the flow of air over the dishes and through the washing chamber.

The various objects, features and advantages of the

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present invention will appear more fully from the detailed description which follows, taken in connection with the accompanying drawing, forming a part of this application, in which:

FIG. 1 is a view, partly in vertical section and partly in elevation, of a domestic dishwasher, as viewed from the side, constructed and arranged according to the invention; and

FIG. 2 is a horizontal sectional view of the dishwasher of FIG. 1, taken along line II—II of FIG. 1.

The invention, as shown, is applied to a domestic dishwasher of the front-opening type which includes a box-like cabinet 10. A vat 11, defining a washing chamber, is disposed within an upper portion of the cabinet 10 and has a bottom wall 12 which slopes downwardly and inwardly to define a sump 13 for liquid serving as a washing and/or rinsing agent. The bottom wall 12 also partitions the vat 11 from an apparatus compartment 14 which houses a liquid return and pumping system, as well as apparatus for admitting and discharging liquid, in the lower portion of the cabinet 10.

A conventional access opening to vat 11 is formed in a front wall of the cabinet 10 and is closed by a hingeably mounted door 16, movable to an open, horizontal position below the access opening.

Within the vat 11 upper and lower dish storage racks 17 and 18, respectively, are suitably supported for rolling horizontal movement. The racks 17 and 18 are preferably of open-work construction and are movable into and out of the vat through the access opening for convenient loading and unloading of dishes.

The apparatus compartment 14 houses a pump 21 which is driven by an electric motor (not shown) and has its inlet connected to the sump 13, and its outlet connected to a conduit 23 which delivers liquid to the vat 11. The conduit 23 extends upwardly and enters the vat 11 through an opening or passageway in the sump 13 defined by upstanding, tubular wall structure 25. The latter may be formed integrally with the bottom wall 12, it projects into the vat 11 beyond the sump 13, and the opening it defines provides communication between the vat 11 and the apparatus compartment 14.

A rotatable water distributor 26 of the type shown in FIG. 1 of the drawing is employed for receiving and projecting the entire output of the pump 21 toward dishes or other articles stored on the racks 17 and 18. The distributor 26 has an entrance opening formed in its base for admitting water thereto from the conduit 23. Preferably the distributor 26 is supported in a central region of the vat 11 by portions of the lower rack 18 and is movable therewith into and out of the vat. Although, various kinds of distributors may be used with this invention, reference is made to the copending application of Anthony B. Marmo and Vinal D. Thurston, Serial No. 680,461, filed August 27, 1957, and assigned to the assignee of the present invention, for a detailed description of the liquid distributor shown in FIG. 1.

Referring again to the pump outlet conduit 23 which extends vertically upwardly through the sump opening, this part is preferably in spaced relationship to the tubular wall structure 25, and it has an end portion projecting into the vat 11 beyond the wall structure 25. The inner or upper ends of the conduit 23 and the wall structure 25 are above the level of the maximum quantity of liquid present in the vat at any time. At or near the upper end portion of the conduit 23 is secured a collar 29. The latter includes an annular baffle or flange 30 by which the collar 29 is secured to conduit 23, and which extends horizontally, or transversely, of the conduit so as to overlie the opening defined by the tubular wall structure 25. The collar 29 also includes a tubular member 32 depending

from the flange 30, and which extends downwardly toward sump 13, in overlapping and surrounding relationship with the tubular wall structure 25. The conduit 23, the wall structure 25, and the collar 29 are respectively received in spaced relationship one within the next to define a sinuous air duct or passageway 34 between the compartment 14 and the vat 11.

Air leaving compartment 14 first flows upwardly through the region between the tubular wall structure 25 and the conduit 23, next outwardly under collar flange 30, and then downwardly in the region between conduit 23 and the tubular member 32 of collar 29 before entering the vat 11. The flange 30 of collar 29 is preferably imperforate so as to provide an "umbrella" which shelters the duct 34 and prevents liquid splashed about vat 11 during the washing and rinsing cycles from entering the apparatus compartment 14.

An electrical resistance heating element 36 is mounted in the vat 11 at the outlet of the air duct 34 to heat and promote the flow of air over the dishes and through the vat 11 when no liquid is present in the vat. For this purpose, the heating element 36 surrounds the wall structure 25 and the adjacent outlet of the duct 34, in spaced relationship with the collar 32 and the bottom wall 12; and it lies below the lower rack 18, in a region usually occupied by liquid when the sump 13 is filled with water during the wash and rinse cycles. During the drying cycle, when the vat 11 is devoid of liquid, air enters the vat from the duct 34, it is heated by the heating element 36, and then rises in the vat. The air duct 34 is located in a lower central region of the vat 11 and, since air flows radially outwardly and upwardly from the duct 34, the induced flow of heated air is well dispersed throughout the vat 11 as it moves upwardly, therefore drying dishes and other articles stored on the racks 17 and 18 at a fairly uniform rate.

The heating element 36 may also be used during the washing cycle, or the rinsing cycle, or both, to maintain the liquid in the sump 13 at a given minimum temperature, say 140° F.

In a lower front portion of the cabinet 10 louvered openings 38 to the apparatus compartment 14 are provided to admit fresh air. The cabinet 10 is also provided with baffled apertures 40 in the upper portion of the door 16.

Unlike prior art arrangements which require a blower to promote the uniform distribution of air for drying

dishes, the present arrangement utilizes a heating element to promote circulation of drying air through the vat.

While the invention has been shown in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What is claimed is:

Dishwashing apparatus including a cabinet having a wall portion therein dividing the interior of said cabinet into a washing chamber above said wall portion and an apparatus compartment below said wall portion, said cabinet being provided with an air outlet opening in an upper region of said washing chamber and an air inlet opening in said apparatus compartment, said wall portion having a sump formed therein for containing liquid and upstanding tubular wall structure which projects into said washing chamber beyond said sump and defines an opening providing communication between said chamber and said compartment; rack means in said washing chamber for holding dishes; a stationary conduit for conveying liquid to said washing chamber extending upwardly through said opening and including an end portion which projects into said washing chamber beyond said wall structure; a liquid distributor mounted in said washing chamber in liquid receiving relationship with said conduit for receiving liquid therefrom and projecting it about said washing chamber; a pump disposed in said apparatus compartment for supplying liquid to said distributor through said conduit; a collar having a tubular portion surrounding said wall structure in spaced relationship, and an annular flange secured between said tubular portion and the end portion of said conduit; said conduit, said wall structure, and said collar being respectively received one within the next to define a sinuous air duct between said apparatus compartment and said washing chamber which is sheltered from liquid by said collar, and a heating element in said washing chamber below said rack means to heat and promote a flow of air from said inlet, through said air duct and washing chamber, and out said outlet.

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