Jan. 14, 1969 S. G. NORD 3,421,525

DOOR FOR DISHWASHER

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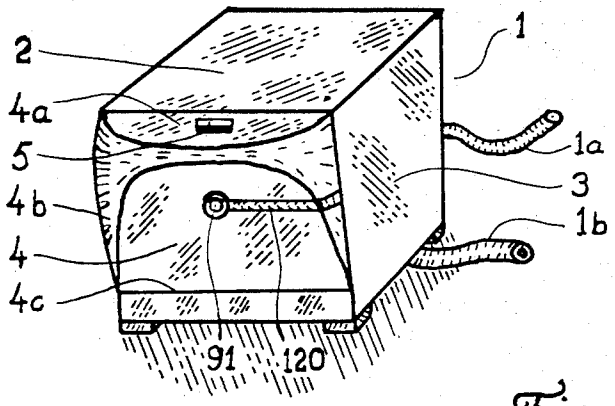


Fig. 1.

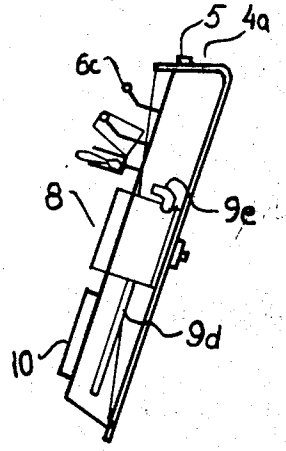


Fig. 2.

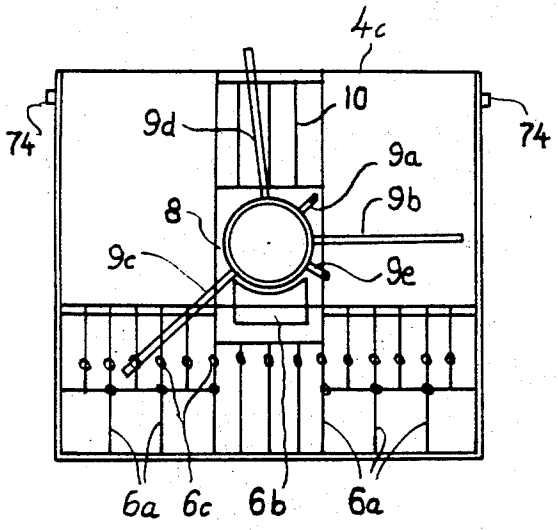


Fig. 4.

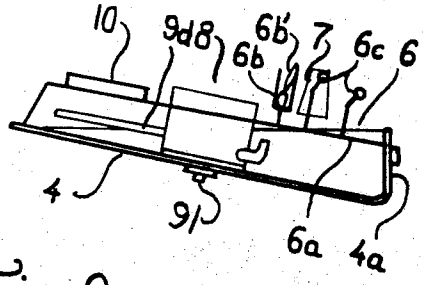
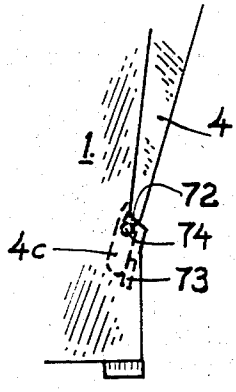


Fig. 3.

Fig. 7.



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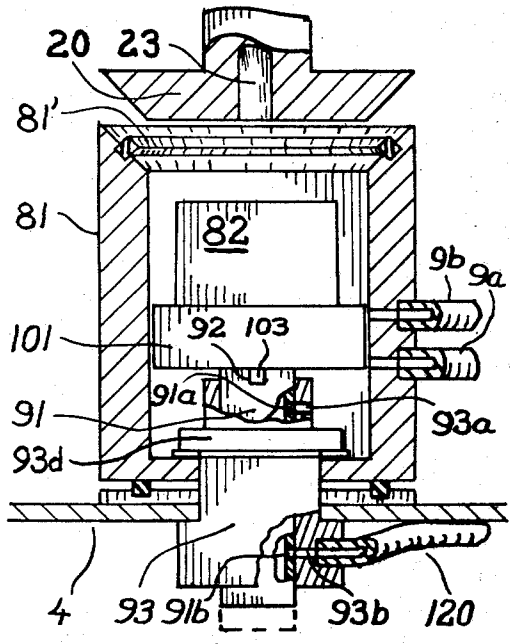


Fig. 6.

Fig. 5.

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DOOR FOR DISHWASHER

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ABSTRACT OF THE DISCLOSURE

A door for dishwasher, where said door carries in its central part a spraying device with its spraying arms moving close to or adjacent the perimeter of the door and in its upper end bars to support dishware such as glasses, cups, tableware or the like.

This invention refers to doors for dishwashers, and especially to that kind of doors which in open position are swung outwards and downwards towards the horizontal plane.

The main object of the instant invention is to provide a light but rigid dishwasher door and to make the door itself a substantial portion of said dishwasher by constructing the door such, that it will support, i.a., a spray device and special devices or containers for dishware.

Another object of the invention is to provide a novel dishwasher door that may be utilized for dishwashers having different shapes.

Still another object of the invention is to provide a removable door for dishwashers and to enable the interior of the dishwasher to be utilized also for other primary purposes.

The invention also has as its object to enable simple attachment of a dishwasher detergent container or dishwasher detergent on the door itself.

An additional object of the invention is to eliminate a commonly provided check valve for the water supply when the dishwasher is directly connected to water under pressure.

Another important object of the invention is to provide a spraying system comprising the above-mentioned spraying device for enabling spraying and effective cleansing of all dishware placed in the dishwasher.

Furthermore, the invention has the object of providing effective cleansing of the dishware although utilizing a very small quantity of fluid or water in comparison to conventional dishwashers.

Other objects and a better understanding of the instant invention will be given by the following description and claims as well as by the accompanying drawings, in which:

FIGURE 1 shows a perspective view of a dishwasher casing with a closed door having the features of the invention,

FIGURE 2 shows a dishwasher door only in closed position,

FIGURE 3 shows the dishwasher door only in open position,

FIGURE 4 shows a horizontal view of the dishwasher door of FIGURE 3,

FIGURE 5 shows an exploded view of the details of the spraying device,

FIGURE 6 shows a sectional view of the spraying device, and

FIGURE 7 shows a proposed mounting device for a removable dishwasher door.

With reference to the accompanying drawings the invention will be illustrated as an embodiment applied to a dishwasher casing designated **1** and shown in a perspective view in FIGURE 1. The casing **1** is supported of a base

and is provided with tubing **1***a* for the water supply and tubing **1***b* for the water discharge. The tubing **1***a* cooperates in appropriate manner with a part of a spraying device, said part is surrounded by the casing **1** and will be described more in detail below. The tubing **1***b* is connected to the bottom of casing **1** and discharges water collected in the casing **1**. Tubing **1***b* should have a greater diameter than that of the tubing **1***a*. The casing is provided with two horizontal surfaces **2**, an upper one and a lower one, and three vertical surfaces **3**. A door **4** on the front of the casing **1** cooperates with the latter. The door **4** is provided with an upper flange **4***a* for rigidness. The flange **4***a* extends as a horizontal extension of the upper surface **2** and is provided with a handle **5** for opening the door. The flange **4***a* might also carry closure means for the door **4**. The vertical sides of the door **4** are also provided with flanges **4***b* for rigidness, which gives the door **4** approximately the form of a trough. This is appropriate not only so that dripping water may run towards the bottom of the interior of the casing but also for providing protection for the spraying device. The designation **4***c* refers to a broken edge at the lower portion of the door **4** and will be shown more in detail with reference to FIGURE 7.

It should be noted that as a general rule, the larger or wider the flanges **4***a*, **4***b* of the door are made, the easier is the accessibility to the interior of the dishwasher, and at the same time the spraying device will be given better protection. However, there is a practical optimum in this respect.

The dishwasher casing **1** may appropriately be adapted to support a number of horizontal racks, preferably of plastic covered wire, intended for plates etc. The racks should be placed in such a manner, that a plane associated with the plates forms a right angle or substantially a right angle towards a plane associated with the door.

FIGURE 2 illustrates the dishwasher door in closed position with the dishwasher casing **1** removed. Thus, this figure illustrates the position that the dishware will take during the dishwashing. FIGURE 3 illustrates the door in open position and shows the simplicity of the possibility of placing dishware on special racks, special containers or other means attached to the door **4**. The angle of inclination of the casing should of course be so selected that water collected in the trough portion of the door runs back into the casing.

FIGURES 2 and 3 show that the flange **4***a* cooperates with a device for supporting dishware. This device is designated **6** and consists of a plurality of parallel bars **6***a* which extend substantially parallel to the flat surface of the door **4**. Adjacent the center of the door a special tableware container **6***b* cooperates with the parallel bars **6***a* in such a manner that the tableware container forms a right angle (or possibly an angle of 80°) to the bars **6***a*. Tableware consisting of small forks, knives and spoons is primarily intended to be placed in said tableware container **6***b*. FIGURES 2 and 3 illustrate a spoon **6***b'* placed with the bowl of the spoon downwards.

Bars **6***c* extending at right angles to the bars **6***a* are provided for carrying and supporting glasses **7** or cups turned upside down. These additional bars **6***c* are mounted between the tableware container **6***b* and the edge **4***a* of the door. In certain cases it may be appropriate to make the bars, intended for cups, smaller than that of the corresponding bars **6***c* for glasses. It is also proved appropriate to provide the upper ends of the bars **6***c* with a ball of elastic material, for instance of rubber, plastic or the like, for preventing the dishware from sliding. The device **6** for supporting dishware may appropriately be positioned on that portion of the door **4** that is the highest when the door is closed, and it may also

be appropriate to let the device **6** extend over the total width of the door, which is best illustrated in FIGURE 4. The tableware container **6***b* may appropriately be positioned at such distance from the adjacent bars **6***c* that it also serves as a support for the dishware placed on said bars **6***c*. The tableware container **6***b* may of course also serve as a support for other dishware. The portions of the parallel bars **6***a* remote from the edge **4***a* of the door are bent at right angles or approximately 80° from the flat surface of the door, and they extend almost along the entire width of the door **4**. Thus, they form a support for dishware placed on the device **6**.

A rotable spraying device is mounted close to the center of the door **4** and is provided with a number of spray arms **9** having one or more spray apertures or nozzles. The lengths of the longest spray arms are chosen so, that their outer ends will move close to or adjacent the circumference of the door. The spraying device **8** and the spray arms **9** will be described more in detail in connection with FIGURES 5 and 6. From the center portion of the device **6** additional means **10** for supporting dishware and having the form of a container for carrying dishware and having the form of a container for carrying large tableware such as large knives, forks, spoons etc. extend towards the lower edge **4***c* of the door. The device **6** and the additional means **10** may be appropriately united or integral with respect to each other. The large tableware should appropriately be placed with their soiled portions close to the center of the door, i.e., adjacent the spraying device **8**. The tableware container **6***b* is also placed close to said center, i.e., adjacent the spraying device **8**, which is provided with a spray arm designed in a specific manner and having a spray aperture intended for spraying and cleansing the small tableware in longitudinal direction. Other spray apertures on other spray arms or spray pipes are also intended to cooperate in effectively cleansing the portions of both the large tableware and the small tableware facing the center of the spraying device **8**.

FIGURE 5 shows an exploded view of a number of details of a proposed spray device provided with facilities for separately spraying the interior of the dishwasher, but the details for said separate spraying have not been introduced into FIGURE 5 but only into FIGURE 6. The spraying device **8** consists of a hollow cylindrical portion or housing **81**, from which straight spray pipes **9***b*, **9***c* and **9***d* extend at right angles to a center line associated to the housing. The pipes **9***b*, **9***c* and **9***d* are fixed to the housing at a distance from one partly closed end of the housing. Also, a short spray pipe **9***a* extends outside the housing **81** but in the axial direction of the hollow cylinder or housing, and this pipe is attached closer to the partly closed end of the housing than that of the pipes **9***b*, **9***c* and **9***d*. In addition to this short spray pipe **9***a* a longer spray pipe **9***e* is provided and also extends in the axial direction of the hollow cylinder or housing **81** and is attached at the same distance from the partly closed end of the housing as the spray pipe **9***a*. The spray pipes **9***b*, **9***c* and **9***d* are provided with a plurality of spray apertures, and these spray pipes are primarily intended for spraying and cleaning plates etc. placed in racks at right angles to the door **4** in the casing **1** of the dishwasher. It may be appropriate to provide a different number of spray apertures for the individual spray pipes. Spray pipe **9***a* is provided with one single spray aperture of such design that the water **9***a'* passing through the spray aperture and directed longitudinally of the small tableware **6***b'* will have a large dispersion angle. Although this water jet **9***a'*, which may have a form of a pyramid, primarily is intended for passing and cleansing the small tableware placed in the container **6***b* it will also clean the portions of the tableware placed in the container **10**. The spray pipe **9***e* is provided with a number of spray apertures which direct water jets **9***e'* substantially in the radial direction of the housing. Spray pipe **9***e* with its spray apertures is intended to give the spray jets another direction towards the small tableware positioned in container **6***b* and the tableware positioned in container **10** than the spray jets from the spay pipe **9***a*. The water jets from the remainder of the spray pipes may have conical shape.

It should be emphasized that it has proved appropriate to provide the spray arm or the spray pipes **9***c* and **9***d* (see FIGURE 5) with a plurality of apertures and the water jets will be directed at right angles to a center axis associated to each pipe **9***c* and **9***d*. The spray arm or spray pipe **9***b* should be provided with fewer holes and should have its water jets **9***b'* directed approximately 45° from the center axis of pipe **9***b* and directed from the center portion of the spraying device or the housing **81**. In this manner cleansing of the plates, etc., positioned in the casing will be ensured. Spray pipe **9***e*, too, is provided with apertures of the type mentioned in connection with the description of pipe **9***b*.

The designation **82** refers to a dishwasher detergent container, the function of which will be described more in detail with reference to FIGURE 6. However, it may be mentioned that the dishwasher detergent container **82** is provided with a removable cover **83**, which in turn is provided with a nipple **84** and a central inlet aperture **85**. The container **82** itself is provided with a number of small outlet apertures **82'**, preferably at its upper portion and on its envelope surface. Moreover, spacer means **82''** are provided for centering the container **82** in the inside of the housing **81**. Before washing the dishes the container **82** is filled up to some extent with liquid and preferably foaming neutral nontoxicating detergents. When water now is supplied, as will be described with reference to FIGURE 6, the dishwasher detergent will progressively be diluted and will be consumed by the passage of the mixture of water and detergent through the apertures **82'**.

A valve device **101** surrounds the bottom part of the container **82** and may be introduced into the housing **81**. The valve **101** is provided with a circumferential recess **102** of specific type and to apertures **102***a* as well as a diametrical cam **103** adapted to cooperate with a groove **92** in a shaft **91**, see FIGURE 6, said shaft **91** is extending through the door **4**. Valve **101** does not participate in the rotation of the spraying device, due to its interaction with the groove **92**, but may be axially displaced, so that, with the valve **101** in one of its displacement positions, the pipe **9***a* will only be supplied with water during a definite portion of its rotation. In another displacement position as illustrated in FIGURE 6 and enabling separately spraying of the interior of the dishwasher, the valve **101** will close the water supply to the spray pipes **9***b*, **9***c* and **9***d*. In the illustrated displacement position (the second displacement position) of the valve and the shaft **91** an aperture **91***a* provided in the shaft cooperates with an aperture **93***a* in the side of a central portion **93** affixed to the door **4** by means of screws or the like. The central portion **93** surrounds the shaft **91**, which is hollow, and clamps the housing **81** by means of a nut **93***d*. However, the housing **81** may rotate around the central portion **93**. With the shaft **91** in the illustrated position fluid or water may pass through the valve **102***a* and through the apertures **93***a*, **91***a* that cooperate with each other and furthermore through the hollow shaft **91** and through the apertures **91***b*, **93***b* that cooperate with each other. The aperture **93***b* is connected to a horizontal pipe **120**, which is best illustrated in FIGURE 1. The water passes through the piper **120** and is supplied to tubing and cooperating with the pipe **120** positioned within the dishwasher. Said tubing may appropriately be provided with spray apertures. An appropriate coupling will naturally have to be provided between the casing **1** of the dishwasher and pipe **120** on the outside of the door **4**. This will enable additional rinsing of the dishware in the dishwasher merely by depressing shaft **91**. Spring means (not shown) reset the

shaft to its normal position (indicated by a dotted line) in which apertures **93***a*, **91***a* and **93***b*, **91***b* do not cooperate with each other and water may be supplied to pipes **9***b*, **9***c* and **9***d*.

FIGURE 6 illustrates the manner in which a container **82** filled with detergent is positioned within the hollow cylindrical portion **81** with valve means **101** when the door **4** has assumed a nearly completely closed position. With the door in completely closed position a gasket **81'** will provide a seal against the conical portion **20**. The delivery of water through the aperture **23** cooperating with tubing **1***a* will make the water pass into and around the container **82**. Part of the water mixes with the detergent positioned in container **82** and will pass out through the outlet aperture **82'** and thereafter through the various spray pipes, for instance pipes **9***a* and **9***b*. This will take place when valve **101** assumes a position not shown in FIGURE 6. The water that thus has been used will run down into the lower portion of casing **1** and through the outlet tubing **1***b*.

The spraying device **8** or the hollow cylindrically shaped portion or housing **81** may be rotated either by separate means attached to the door or by means driving the conical portion **20**.

FIGURE 7 illustrates an appropriate removable interconnection between the door **4** and the casing **1**. This enables removal of the door **4** when desired. The lower portion of casing **1** is trough-shaped and is provide with two substantially vertical grooves **72** facing each other and each being adapted to cooperate with individual pins **74** mounted at the lower portion **4***c* of the door **4**. When the door **4** is closed its lower portion **4***c* lies within the casing **1**. By means of an elastic gasket **73** fastened to the casing **1** or the lower portion **4***c* of the door **4** a desired seal with respect to water leaks between the lower portion **4***c* of the door **4** and casing **1** is achieved.

Under certain circumstances, it may be appropriate to seal the central inlet aperture **85** in the detergent container **82** with a wax or similar that will melt at a temperature of for instance 40° C., thereby enabling initial prewashing of the dishware with cold water without detergent, before the cleansing with warm or hot water together with a detergent is initiated.

Although the invention only has been described in certain detailed portions above, it is apparent that the disclosed embodiment only must be considered as an example and that a number of different changes in the structural details of well as combinations may be made within the scope of the invention as defined in the claims. Thus the invention does not exclude the utilization of various conventional spraying devices positioned within the circumference of the door **4**. It has also proved possible to utilize one or more spray devices which may be connected alternately during the rotation.

The spray pipe **9***a* is disclosed as being provided with one single nozzle, and this may be of the International Spraying Systems Standard full-cone type or a pyramid type having a wide top angle, thereby providing a very great number of liquid particles that are insulated from each other and that displace the air so that they strike the spoon bowls, etc., placed at the bottom of the tableware container **6***b* only at a distance of approximately an inch with unreduced speed. It will immediately be noted that the tableware continually change during the dishwashing and that coverage of the entire soiled surface is ensured. A nozzle of this type requires a great deal of fluid and would mean a waste of fluid (water) if the dishware (tableware) were not placed close to the center of the axis of rotation, so that the greater portion of the fluid is utilized for the pertinent articles. This also refers to the larger knives etc. positioned in the device **10**. With respect to the substantial consumption of water it is appropriate to provide this nozzle with fluid (water) only during the portion of the rotation when the nozzle actually sprays the tableware in container **6***b* and possibly in container **10**. For this purpose valve **101** is utilized.

The individual spraying as described above will become more effective when spray pipes **9***b*, **9***c* and **9***d* are cut off from the water supply by means of valve **101**. If the individual rinsing is to be carried out without tubing **120** it is possible to arrange a pipe positioned parallel to the axis of rotation of the spraying device so that it will pass through a special coupling between portions **20** and **81**, wherein tubing cooperating with portion **20** may be utilized as separate rinsing means.

What I claim is:

1. A door for dishwashers of the type which in open position is pivoted outwards and downwards towards the horizontal plane, comprising means for supporting the door in the casing of the dishwasher, means for supporting dishware, preferably cups and glasses, mounted at one end of said door, bracing means for the dishware cooperating with said means for supporting dishware and a rotatable spraying device close to the center of said door comprising at least one spray arm provided with spray apertures and having a longitudinal dimension such, that its outermost portion is rotatable adjacent the perimeter of said door.

2. A dishwasher door in accordance with claim **1**, provided with bent flanges arranged around the perimeter.

3. A dishwasher door in accordance with claim **1**, wherein said spraying device is provided with a centrally located recess, in which a container for dishwasher detergent is positioned.

4. A dishwasher door in accordance with claim **1**, wherein said spraying device comprises a hollow cylinder provided with spray arms extending radially and axially outwards and upwards respectively.

5. A dishwasher door in accordance with claim **1**, provided with a container for tableware positioned adjacent to an axis of rotation associated with said spraying device.

6. A dishwasher door in accordance with claim **5**, wherein said spraying device comprises at least one spray arm provided with a spray aperture for directing a jet of water in the longitudinal direction of said tableware.

7. A dishwashed door in accordance with claim **1**, wherein said spraying device surrounds valve means, the axial actuation of which enables the passage of water through individual tubing placed in the interior of said dishwasher.

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U.S. Cl. X.R.

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