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A. W. J. THEYSSEN

3,399,813

DETERGENT DOSING DEVICE FOR DISHWASHERS

Filed April 10, 1967

4 Sheets-Sheet 1

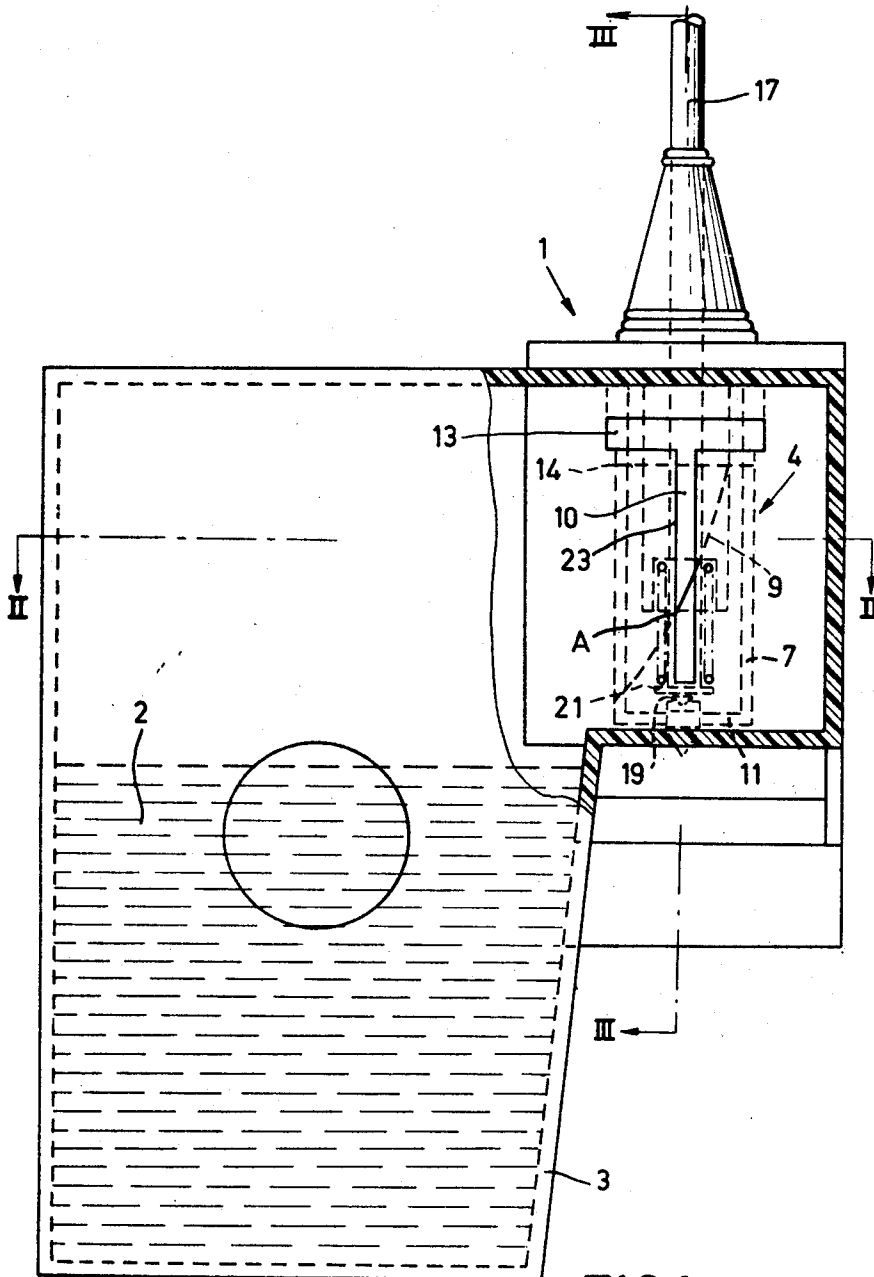


FIG. 1

INVENTOR.

ARTUR W. J. THEYSSEN

BY

Frank R. Jeffrey

AGENT

Sept. 3, 1968

A. W. J. THEYSSEN

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4 Sheets-Sheet 2

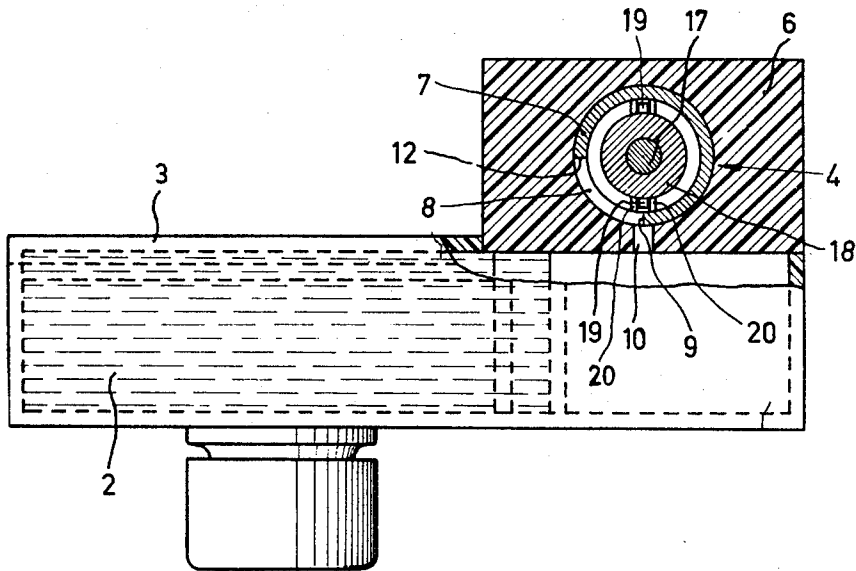


FIG. 2

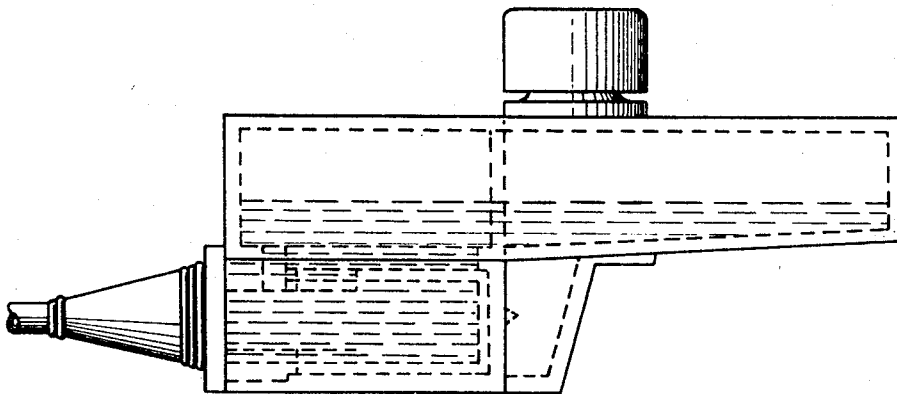


FIG. 4

INVENTOR.
ARTUR W. J. THEYSSEN
BY
Frank R. Lufari
AGENT

Sept. 3, 1968

A. W. J. THEYSSEN

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4 Sheets-Sheet 3

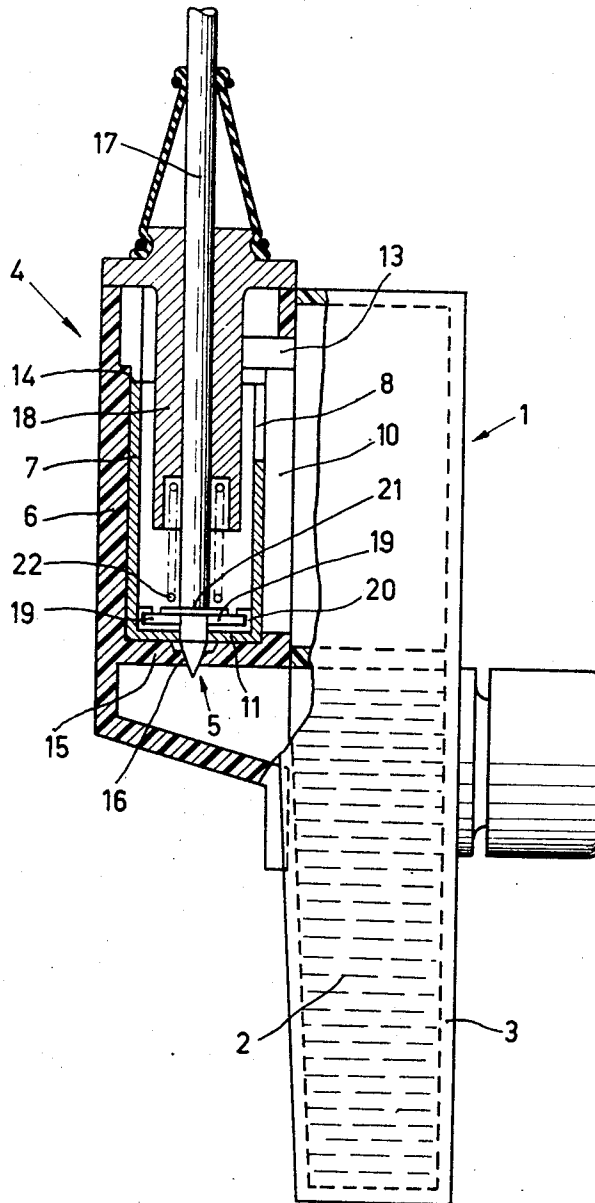


FIG. 3

INVENTOR.
ARTUR W. J. THEYSSEN

BY

Frank R. Juffe
AGENT

Sept. 3, 1968

A. W. J. THEYSSEN

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4 Sheets-Sheet 4

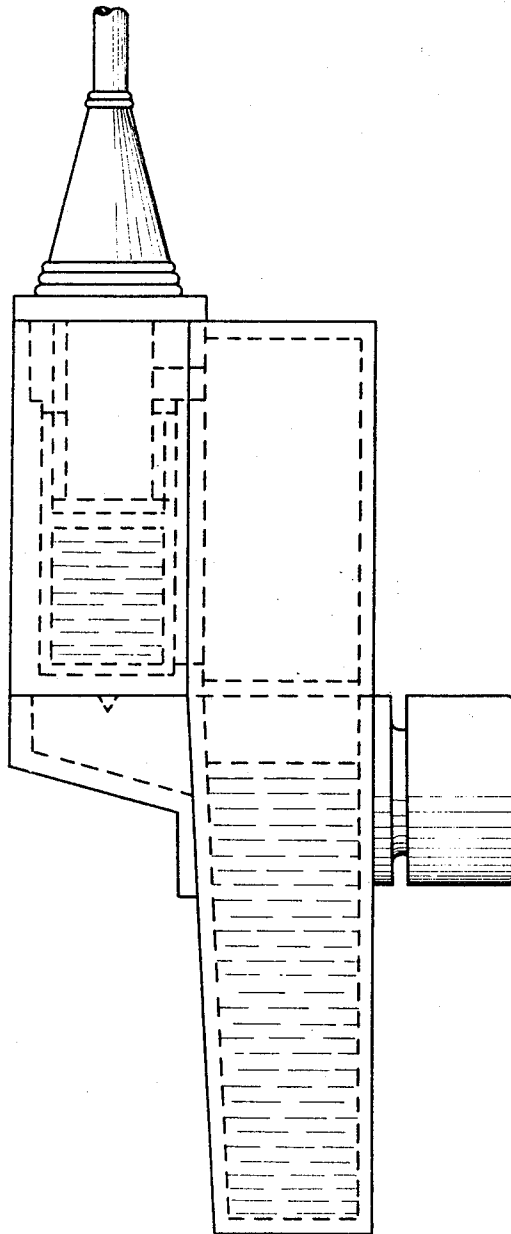


FIG. 5

INVENTOR.
ARTUR W. J. THEYSSEN

BY
Frank R. Luffin
AGENT

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DETERGENT DOSING DEVICE FOR DISHWASHERS

Artur Wilhelm Josef Theysen, Schwelm, Westphalia, Germany, assignor to North American Philips Company, Inc., New York, N.Y., a corporation of Delaware

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G 46,560

8 Claims. (Cl. 222-438)

ABSTRACT OF THE DISCLOSURE

A dosing device for introducing a predetermined amount of detergent into the wash region of a dishwasher. The dosing device is mounted on a pivoting door of the washer. The device includes a container and a cylinder-plunger unit which receives a fixed amount of detergent from the supply container when the door of the dishwasher is pivoted to a position substantially normal to the initial position. The structure providing access between the supply container and the cylinder-plunger unit controls the amount of detergent introduced into the unit.

Dosing devices for the automatic supply of liquid detergents in dishwashers or the like, comprising a tiltable lid or door are known in various embodiments. Particularly known are those which comprise a detergent container connected with the lid or the door and a cylinder-plunger unit, joined to the container and having an outlet-valve and a control-member for the cylinder-plunger unit and the outlet-valve. Such dosing devices serve to provide the possibility of adjusting the quantity of liquid detergent to be supplied in dishwashers at any instant. In the known embodiments the cylinder-plunger units are, in general, formed by fairly complicated dosing pumps which are relatively difficult and costly to manufacture. These disadvantages are avoided by the present invention.

The invention has for its object to provide a dosing device for the automatic supply of liquid detergents in dishwashers comprising a tiltable lid or door. Such a device is particularly advantageous due to the simple and compact structure incorporated therein which can be manufactured easily with minimal cost.

The invention relates to a dosing device for the automatic supply of liquid detergents in dishwashers or the like comprising a tiltable lid or door, said device comprising a detergent container, connected with the lid or the door and a cylinder-plunger unit, joined to said container and having an outlet-valve, and a control-member for the cylinder-plunger unit and the outlet-valve. The invention includes a cylinder-plunger unit which comprises a pot-shaped plunger adapted to be turned in the cylinder and having a recess, extending throughout the length of the plunger in the wall thereof. At least one edge of the recess has a helical shape and is adjustable by turning the plunger with respect to a flow channel extending in the longitudinal direction of the cylinder between the cylinder and the container also an outlet-valve is arranged in the bottom of the plunger and of the cylinder, which in the open position of the tilted lid or door the cylinder-plunger unit is turned from a substantially vertical position into the horizontal position and is located beneath the liquid level in the container. As a result, when the lid or the door is opened, the detergent flows from the container into the cylinder and the plunger, which are thus completely filled. When the lid or the door of the dishwasher is closed, the dosing device is returned to the vertical position, so that a quantity of detergent flows out of the cylinder and the plunger into the container, which cannot be held by the

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plunger. The dosing volume of the plunger is variable simply by turning the plunger. The helical boundary of the recess in the plunger wall and the substantially perpendicular flow channel or a boundary of said flow channel constitute so to say a point of intersection which determines the height of the liquid level in the plunger. When the plunger is turned this point of intersection shifts in accordance with the sense of turning in the longitudinal direction of the plunger, that is to say, from the open end of the plunger down to the bottom thereof so that the volume of the plunger can be reduced to an arbitrary dosing volume.

The advantages provided by the invention mainly reside in that the dosing device according to the invention has a simple and compact structure and performs reliably the automatic supply of liquid detergents. Simply by opening and closing the lid or the door of the dishwasher for removing or inserting dishes respectively the dosing device or the plunger is automatically filled with the liquid detergent, up to a volume which is adjustable by the control-member of the plunger in accordance with the program. The delivery of the liquid detergent through the outlet-valve can be performed automatically at a predetermined instant. This simple and reliable dosing device according to the invention has furthermore the advantage of low manufacturing costs, so that it is economical to manufacture.

The invention will be described more fully with reference to a drawing which shows only one embodiment, wherein

FIG. 1 is a front sectional view of a dosing device according to the invention;

FIG. 2 is a sectional view of the device of FIG. 1 taken on the line II—II;

FIG. 3 is a sectional view of the device of FIG. 1 taken on the line III—III;

FIG. 4 shows a dosing device according to the invention in the tilted position corresponding with the lid of the dishwasher being in the open position and

FIG. 5 shows the device of FIG. 4 in the vertical position, corresponding with the lid of the dishwasher being in closed position.

The dosing device 1 shown in the figures serves to automatically introduce liquid detergents 2 into dishwashers or the like. The dishwasher and the lid are not shown in detail. The dosing device comprises a detergent container 3 which is adapted to be joined to the lid or the door of the dishwasher and a cylinder-plunger unit 4 attached to the container 3. The cylinder-plunger unit includes an outlet valve 5, a control-member for the outlet valve. The control-member is not shown in the figures; it may be formed by a lifting magnet, a bimetal element or the like or appropriate structural elements such as control-members having control-discs, cams or the like and it may be directly connected to a time switch. According to the invention the cylinder plunger unit 4 comprises a cup-shaped plunger 7 journalled in the cylinder and having a recess 8 in the plunger wall, extending throughout the length of the plunger 7 at least one boundary 9 of the recess 8 is helical in shape as shown in FIG. 1. The amount of open area of the recess 8 which is exposed to the flow channel 10 can be regulated by rotating the plunger 7 with respect to the flow channel 10. Flow channel 10 extends in the longitudinal direction of the cylinder and is positioned between the cylinder 6 and the container 3. According to the invention the outlet valve 5 is arranged in the bottom 11 and 15 respectively of the plunger 7 and of the cylinder 6. In the open position of the tilted lid or door the cylinder-plunger unit 4, is pivoted from a substantially vertical position into the horizontal position, and is located beneath the liquid level in the container 3 as shown in FIG. 4. The recess 8 of the plunger wall is formed by a cut,

the boundary 12 of which extends in the direction of length of the plunger, whereas the other boundary 9 thereof has a helical shape and joins the former boundary in the vicinity of the plunger bottom 11. As an alternative (not shown), the recess in the plunger wall may be formed by a helical slot extending throughout the length of the plunger. The flow channel 10 has the form of a T-shaped slot in the side of the cylinder wall facing the container and at the same time the cylinder wall forms the partition between the plunger 7 and the container 3, which is apparent from FIGS. 2 and 3. The transverse part 13 of the T-slot projects above the open end 14 of the plunger 7. The cylinder plunger unit 4 and the container 3 may be made of plastic, so that, when the door or the lid of the dishwasher are also made of plastic, the component parts may be integral with the lid or the door. The outlet valve assembly 5 comprises a valve seat 16 in the cylinder bottom 15 and a valve rod 17, pressed against the seat by spring 22. The valve rod 17 is slidable in a guiding body 18, arranged in an air-tight manner on the cylinder 6 and extending into the plunger and provided above the plunger bottom 11 with catches 19, which grasp between extensions 20 on the inner wall of the plunger 7 and transfer the rotational movement to the plunger 7, when the valve rod 17 is turned. In the direction of length of the plunger the catches 19 with the valve rod 17 are freely movable, which means that in this direction of movement they are not in contact with the plunger 7. The valve spring 22 surrounds the valve rod 17 between the guiding body 18 and a thrust-bearing 21. From FIG. 1 it will be apparent that the helical boundary 9 of the recess 8 in the plunger wall and the straight boundary 23 of the T-slot in the direction of length of the cylinder form a point of intersection A, which determines the dosing volume or the height of the level of the liquid detergent in the plunger 7. When the valve rod 17 or the plunger 7 is turned to the right, this point of intersection A is shifted upwards up to the open end 14 of the plunger 7. In the reverse sense the point reaches the bottom 11 of the plunger, so that any dosing volume can be chosen, however, not in excess of the full capacity of the plunger 7. When the door or the lid of the dishwasher is opened and hence the dosing device is moved into the horizontal position as is shown in FIG. 4, the detergent flows from the container 3 into the cylinder 6 and the plunger 7, which are completely filled. When the door or the lid are swung back and hence also the dosing device 1 as is shown in FIG. 5, a predetermined quantity of the detergent is left in the cylinder 6. The remainder of the liquid flows back into the container 3, in which the liquid level is invariably located beneath the plunger 7 and the T-shaped slot in the cylinder wall. By opening the outlet valve 5 the dosed delivery can then be carried out.

What is claimed is:

1. A dosing device for attachment to a tiltable dishwasher door for supplying detergent into the dishwasher comprising: a detergent container adapted to be coupled

to said tiltable door; a cylinder-plunger unit joined to said detergent container for receiving detergent from said detergent container in response to tilting of said tiltable door, said cylinder-plunger unit comprising, an outlet valve in said unit for releasing detergent therefrom to said dishwasher; and a cup-shaped plunger rotatably journaled interiorly of said unit, said plunger having a recess extending substantially along the entire length thereof with one lengthwise boundary of said recess being angularly disposed with respect to the longitudinal axis of said plunger; and said cylinder-plunger unit having a flow channel therethrough extending longitudinally thereof, with said recess and said flow channel defining an access opening for providing fluid communication between said detergent container and the interior of said plunger, wherein the area of said access opening is varied in response to rotation of said plunger.

2. A dosing device as recited in claim 1 wherein the recess in the plunger wall is a helical slot extending throughout the length of the plunger.

3. A dosing device according to claim 1 wherein the flow channel is a T-shaped slot in the side of said unit adjacent said detergent container, and said side of said unit is a separating partition between said plunger and said detergent container.

4. A dosing device according to claim 3 wherein the transverse portion of the T-slot projects above the open end of the plunger.

5. A dosing device according to claim 1 wherein at least the cylinder-plunger unit and the container are a synthetic resin.

6. A dosing device according to claim 1 wherein the outlet valve comprises a valve seat located in the base of said unit, and a valve rod normally biased against said seat.

7. A dosing device according to claim 6 further comprising a guiding body arranged in an air-tight manner on said unit and projecting into said plunger wherein said valve rod is slidably disposed in said guiding body, and catch means coupled to said valve rod for engaging the inner wall of said plunger to transfer the rotational movement of the valve rod to the plunger.

8. A dosing device according to claim 7 further comprising a valve spring coupled to the guiding body and surrounding the valve rod for biasing said valve rod in a normally closed position.

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ROBERT B. REEVES, *Primary Examiner*.

H. S. LANE, *Assistant Examiner*.