June 1, 1954 J. F. KAMP 2,679,850

DETERGENT DISPENSER FOR DISHWASHERS

Filed Nov. 4, 1952 3 Sheets-Sheet 1

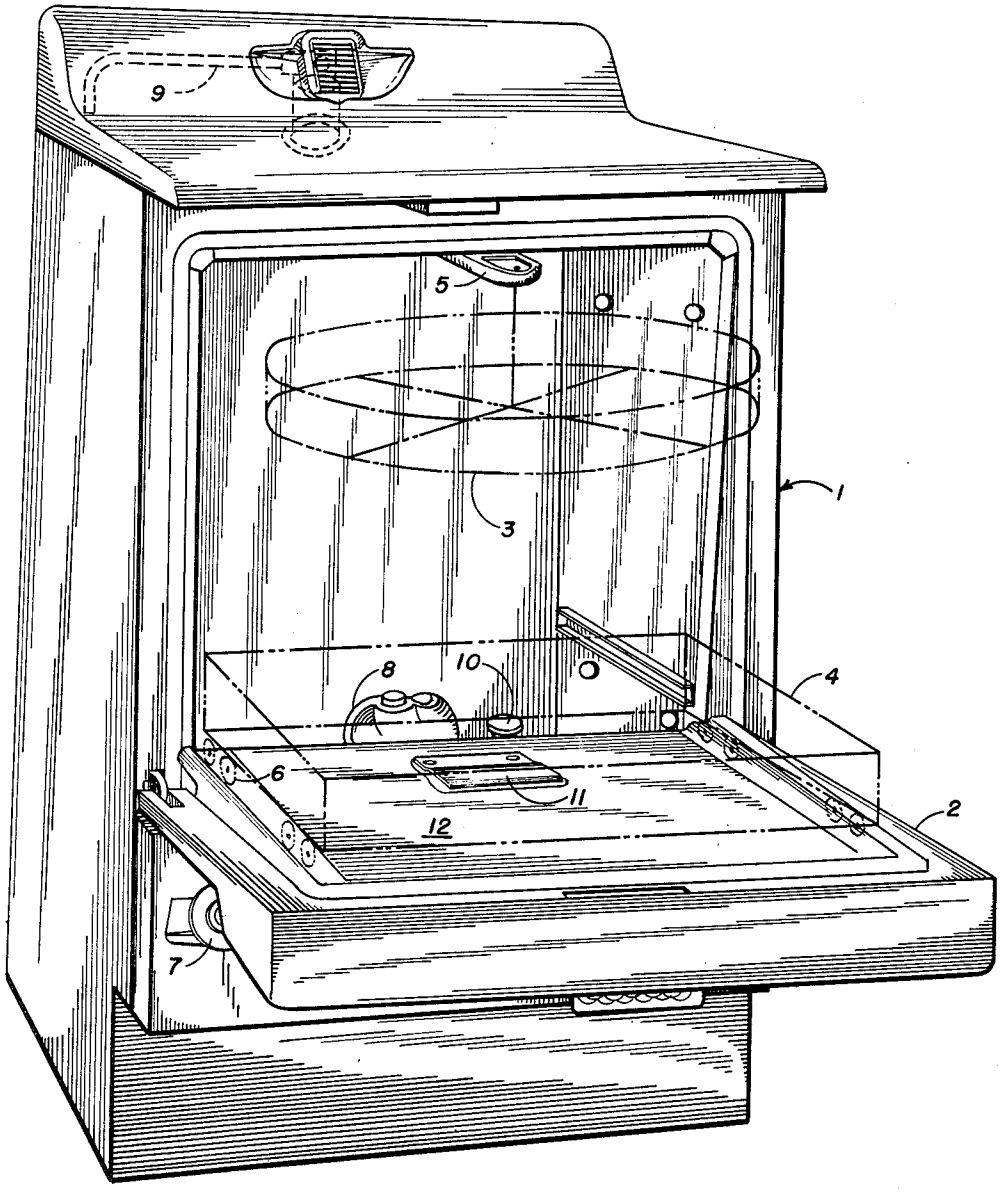

Fig 1

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Filed Nov. 4, 1952 3 Sheets-Sheet 2

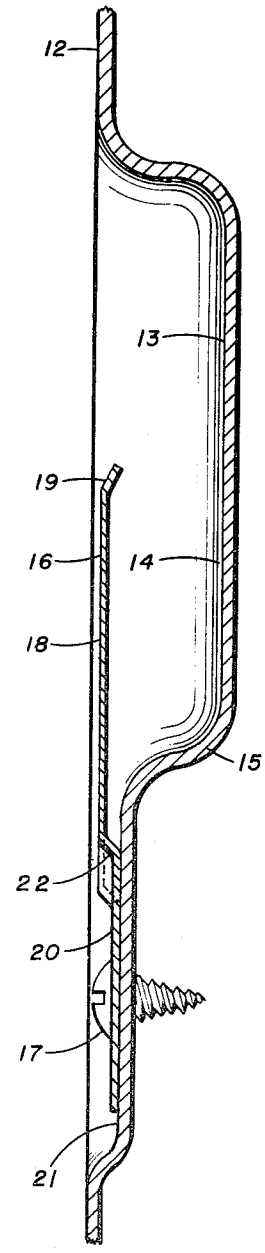

Fig 3

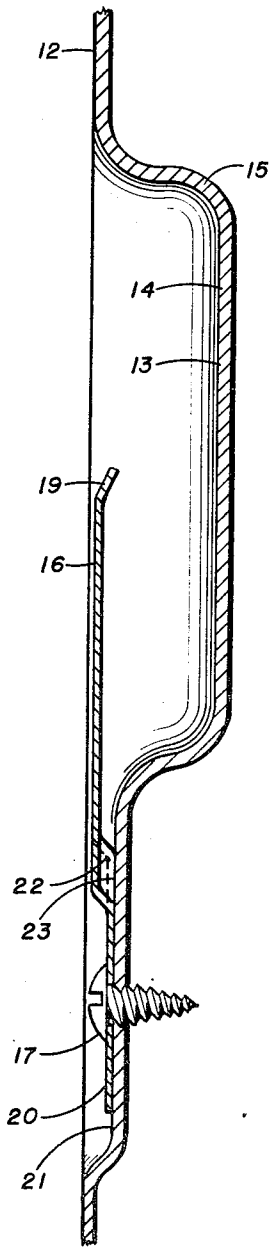

Fig 4

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DETERGENT DISPENSER FOR DISHWASHERS

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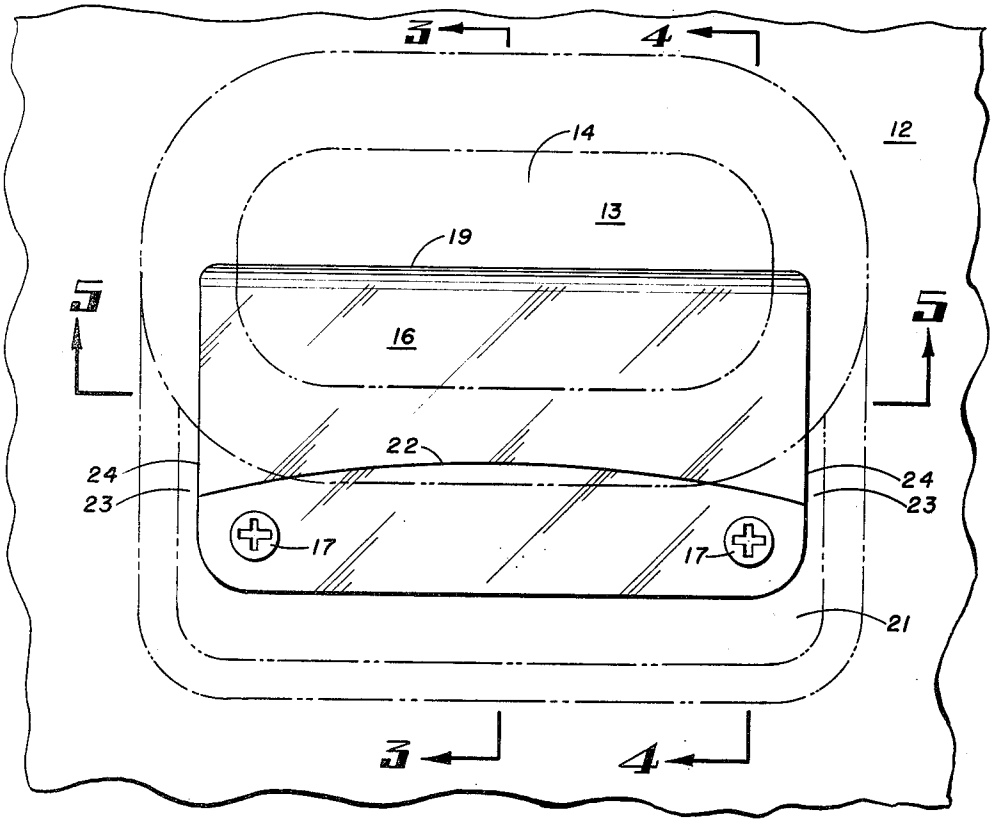

Fig 1

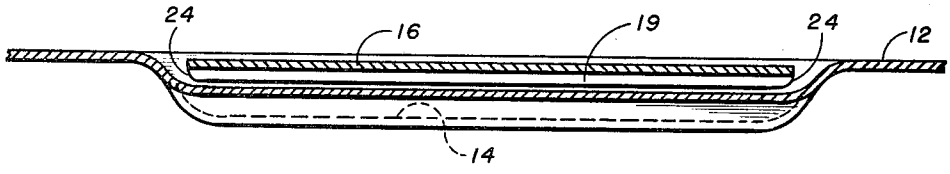

Fig 3

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UNITED STATES PATENT OFFICE

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DETERGENT DISPENSER FOR DISHWASHERS

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Application November 4, 1952, Serial No. 318,612

7 Claims. (Cl. 134—93)

1

The present invention relates broadly to a dishwasher and more specifically to a detergent dispenser for supplying detergent to the dishwasher in the course of its operation.

Most modern dishwashers subject the dishes being cleaned to a number of operations which may include a couple of pre-rinses during which the dirty dishes are sprayed with clean water to remove food particles prior to energization of the washing means, which often is in the form of a power driven impeller. It is desirable to supply detergent to the dishwasher immediately prior to, or shortly after, the impeller begins operation so that a predetermined concentration of detergent is present in the dishwasher throughout the washing period. After washing is completed, the dishes may be rinsed again with fresh water and finally dried in a blast of warm air.

It is desirable in the operation of a dishwasher to load the dishes into it and then to add a suitable quantity of detergent before the dishwasher is closed and finally put into operation. A particularly desirable feature of the modern dishwasher is that it is fully automatic and it would be highly undesirable to have to open the dishwasher to add detergent after the pre-rinse, prior to initiation of washing. For this reason, it is necessary to provide in a dishwasher some means for retaining the detergent during the pre-rinse period and for releasing the detergent thereafter as washing is begun.

Several devices have been produced for this purpose. Many of them are complicated and necessitate spring-loaded doors, latches, levers, and tripping devices to release the detergent inside of the dishwasher at the proper time. In other dishwashers, the detergent problem has been avoided by merely eliminating the pre-rinse period with its attendant benefits. In this type of dishwasher, the detergent is merely added after the dishes are loaded, and the washing operation is initiated as soon as the dishwasher is closed.

The present invention, although structurally very simple, makes it possible to pre-rinse dishes before the washing operation is initiated without loss of detergent from the means retaining it within the dishwasher. Briefly stated, the invention comprises an offset plate secured to the inner face of the dishwasher door in overlying relationship adjacent a pocket formed in the inner liner of the access door. The detergent is introduced into the pocket after the dishes are loaded. The door may then be closed and the dishwasher placed in operation, and the dishes pre-rinsed without loss of detergent from the

2

pocket. The particular formation of the pocket and plate is such, however, that the detergent will immediately be washed into the dishwasher as soon as circulation of water is established by the impeller during the washing period. The invention requires no moving parts and depends entirely for its efficacy on the formation of the plate and pocket. This obviously is highly desirable and not only leads to economies in manufacture but also to trouble-free and dependable use.

In view of the foregoing, it is broadly an object of the present invention to provide a detergent dispenser of improved design for a fully automatic dishwasher.

A more specific object of the invention is to provide a detergent dispenser associated with the inner liner of a dishwasher door, constructed and arranged to retain detergent during rinsing of the dishes while dispensing the detergent as soon as washing is begun.

Another object of the invention is to provide a detergent dispenser which will rapidly dispense the detergent within the dishwasher immediately after the washing operation is initiated.

A general object of the invention is to provide a detergent dispenser which can be easily filled with detergent and one from which the detergent is thoroughly washed as soon as washing of the dishes is begun.

The novel features that are considered characteristic of the invention are set forth in the appended claims; the invention, itself, however, both as to its organization and use, together with additional objects and advantages thereof, will best be understood from the following description of a preferred embodiment when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of a dishwasher including the present invention, the dishwasher being shown with its door open to facilitate a description of its interior arrangement;

Fig. 2 shows, to an enlarged scale, a plate formed in accordance with the present invention in overlying relationship with a detergent pocket formed in the inner liner of the dishwasher door;

Fig. 3 is a cross-sectional view taken on plane 3—3 of Fig. 2, showing the relationship between the plate and pocket near its mid portion;

Fig. 4 is a cross-sectional view taken on plane 4—4 of Fig. 2, showing the relationship of the plate and pocket near the ends of the pocket; and

Fig. 5 is a longitudinal sectional view of the plate and pocket taken along plane 5—5 of Fig. 2.

The environment in which the present invention finds utility is illustrated in Fig. 1 which

shows a dishwasher generally designated 1 having a forward opening access door 2 through which the dishes are loaded and unloaded into racks schematically indicated at 3 and 4. Upper rack 3 is rotatably supported on an extensible bracket 5 secured to the top interior wall of the dishwasher as more fully set forth and described in pending application, Serial No. 288,460 filed in the name of Lloyd H. Davidson on May 17, 1952, entitled "Domestic Dishwasher Having Rotary Dishrack on Extensible Bracket." Lower rack 4 is provided with a plurality of rollers 6 to facilitate its being rolled out of the dishwasher onto door 2 for ease of loading, after which the rack may be rolled back into the dishwasher.

An automatic timer 7 is provided in the lower part of the dishwasher and is designed to be manually rotated to initiate operation of the dishwasher. The dishwasher also includes an impeller 8 centrally disposed within the dishwasher for rotation about a vertically positioned axis. Other elements of the dishwasher comprise a water inlet pipe, indicated schematically at 9, and an electrically operated drain valve 10 positioned in the bottom of the dishwasher.

After the racks have been loaded with dishes and the racks properly located within the dishwasher, door 2 is closed and locked, and timer 7 is placed in operation. During the first part of the dishwasher operation impeller 8 is inactive and water is supplied to inlet pipe 9 through an automatic control valve (not shown), the water spraying down through the dishes and rinsing away any food particles. Depending upon the particular operating cycle of the dishwasher, one or two, or more if desirable, pre-rinses may be provided before the automatic timer 7 advances to energize impeller 8. When the impeller is in operation, it throws water, which tends to collect in the lower part of the dishwasher, up through the dishes in the racks, carrying away any remaining food particles and thoroughly washing all surfaces of the dishes. As described more fully in the beforementioned application, upper rack 3 is rotated by the influence of the water thrown upwardly by impeller 8, thereby presenting all of the surfaces of the associated dishes to the washing action of the water.

At the completion of the washing operation impeller 8 comes to rest and clean rinse water is again supplied through inlet pipe 9. After this final rinse, the dishes remain within the dishwasher for drying which may be accelerated by an electric heater (not shown) which may be provided near the impeller. If desired, the impeller may be rotated to circulate warm air within the dishwasher to further accelerate drying.

As will be appreciated by those skilled in the art, it is necessary to supply detergent to the water in the dishwasher at the time impeller 8 is set into operation to wash the dishes. It is important that the detergent be added to the water as soon as the impeller begins operation or immediately thereafter. Furthermore, it is necessary that all of the detergent be introduced to the water at one time so that a substantially constant concentration of detergent is present in the wash water throughout the washing period.

To perform the foregoing functions a detergent dispenser is provided at 11 on inner liner 12 of door 2. The detergent dispenser is shown in detail in Figs. 3 through 5.

Reference should be made to Fig. 2 showing a pocket 13 formed in liner 12. As illustrated more fully in Figs. 3 and 4, pocket 13 is relatively

shallow, having an indented rear wall 14 lying parallel to the surface of the inner liner. The indented rear wall is joined on all sides by radiused portion 15 which blends smoothly into the wall of the surrounding liner. An offset plate 16 (see Fig. 2) is secured to the inner door liner by removable fasteners, as at 17. The plate, as illustrated in Fig. 3, includes a main planar portion 18 having an angularly disposed lip 19 along one edge. Lip 19 not only improves the strength and appearance of plate 16 but also shields the interior of the pocket from water draining down the face of the door liner. The lip also minimizes danger to the user of being cut by the top edge of plate 16. A base portion 20 is offset from and parallel to planar portion 18 and lies contiguous to a recessed section 21 formed in inner liner 12 adjacent pocket 13.

It will be noted that base portion 20 and planar portion 18 are integrally joined by a curved intervening section 22, illustrated in Fig. 2. The purpose of this curved configuration will be discussed more fully later in this specification.

A comparison of the various figures will show that lip 19 extends above the center of pocket 13 laterally to points above radiused portion 15 at the sides of the pocket. This is best illustrated by Fig. 5. The intervening section 22 of plate 16 extends from a center point above radiused portion 15 laterally to regions 23 at the sides of recessed section 21. This relationship is fully illustrated in Figs. 2 and 4.

After the racks have been loaded with dishes and located within the dishwasher, a suitable quantity of detergent, in the order of 1 to 2 tsp., is poured into the part of pocket 13 not covered by plate 16. As the door of the dishwasher is closed, the detergent falls against plate 16, settling between the plate and the adjacent portions of the pocket. When the door is closed, the plate assumes a vertical position which shields the detergent from the spray action of the water entering through pipe 9 during the pre-rinse period. During this period very little water, if any, enters pocket 13 and in any event too little enters to wash out any significant amount of the detergent.

After the dishes are pre-rinsed and impeller 8 is set into operation, a forceful and widespread dispersion of water is established within the dishwasher and large quantities of water enter pocket 13, washing the detergent out of the pocket, past plate 16, and into the dishwasher. All of the detergent is washed completely out of the pocket immediately after the impeller goes into operation so the wash water in the dishwasher is immediately supplied with detergent to the proper concentration and the washing action becomes immediately effective.

As the water enters the pocket it is confined between the pocket and plate 16 and must flow out of this confined space past side edges 24 of the plate. The curved section 22 favors ready egress of the water and assures that the water will completely carry away all of the detergent originally placed within the pocket.

To fully appreciate the present invention, it must be understood that edges 24 of plate 16 are sufficiently close to the boundary areas of the pocket to prevent the detergent from sifting out of the pocket and into the dishwasher during the pre-rinse period. On the other hand, sufficient space is provided at regions 23 to permit the detergent to immediately and completely wash into the dishwasher as soon as impeller 8 sets up a

forceful circulation of water within the dishwasher.

Were the plate omitted the detergent would immediately wash into the dishwasher and down the drain with the pre-rinse water. A similar result would occur if the plate were widely spaced from the pocket and inner liner of the door. It is by virtue of the close spacing between the plate and pocket that the detergent is retained during the pre-rinse period. It is to be noted, however, that plate 16 is sufficiently spaced from the sides of the pocket to readily facilitate dispersion of the detergent into the dishwasher at the proper time.

It is also to be noted that curved section 22 and the location of plate 16 beneath the pocket when the dishwasher door is closed prevents water from settling anywhere between the plate and the door liner. This is obviously desirable since it assures that at the end of the drying operation not only the dishes but also the interior surfaces of the dishwasher will be thoroughly dry.

An important aspect of this invention is that it is completely effective, although simple in construction, and does not require any moving parts whatsoever. Thus the complicated spring loaded doors, latches and releases which characterize prior art devices for this purpose have been eliminated.

In view of the foregoing description it will be appreciated by those skilled in the art that the invention, although very simple, is highly novel and represents a substantial advance in the art of dishwasher construction. The fool-proof nature of the structure and its simplicity and economy make it equally attractive to manufacturer and user alike.

I claim:

1. In combination with a dishwasher having an access door including a planar inner liner disposed vertically when the door is closed, a detergent dispenser comprising a pocket formed in the door liner and facing toward the interior of the dishwasher when the door is closed, a recessed section formed in the liner beneath and adjacent to the pocket, a plate secured to said recessed section of the door liner, said plate including a planar portion extending in overlying relationship above a portion of the pocket and being offset outwardly away from the door liner, said planar portion having side edges close to the sides of the pocket, said plate including a curved intervening section joining the planar portion and the portion secured to the recess of the liner, said intervening section being curved downwardly at its ends when the plate and door are disposed in a vertical position.

2. Apparatus as defined in claim 1 in which the downwardly curved ends of said intervening section terminate adjacent the recessed section of the door liner.

3. In combination with a dishwasher having an access door including a planar inner liner disposed vertically when the door is closed, a detergent dispenser comprising a pocket formed in the door liner and facing toward the interior of the dishwasher when the door is closed, and a plate secured to the door liner beneath the pocket and having a planar offset portion extending vertically in front of a portion of the pocket, said plate having side edges close to the sides of the pocket.

4. In combination in a dishwasher, an access door including a planar inner liner, a pocket formed in said liner facing toward the interior of the dishwasher when the door is closed, a radiused portion integrally joining said pocket and said door liner, a recessed section in said liner formed adjacent to and immediately beneath said pocket, a plate having a base portion secured to said recessed section of said liner and having an offset planar portion extending in overlying relationship above a portion of the pocket, an intervening section joining said planar portion to said base portion, said intervening section being curved downwardly when the door liner is disposed in a vertical position, the curved intervening section terminating adjacent said recessed section of said liner.

5. Apparatus as defined in claim 4 and, in addition, an angularly disposed inwardly extending lip formed integrally with said planar portion of said plate and extending laterally across the pocket.

6. In combination in a dishwasher, a vertical planar surface within the dishwasher, a pocket formed in the surface facing toward the interior of the dishwasher, a recessed section formed adjacent and immediately beneath the pocket and communicating therewith, a radiused portion integrally joining the pocket and said surface, a plate including a base portion secured to said recessed section of said surface and an offset planar portion extending in overlying relationship above a portion of the pocket, an intervening section joining said planar portion and said base portion, the side edges of said offset planar portion being close to the radiused side portions of the pocket, the ends of said intervening section terminating in front of and close to said recessed section.

7. In combination with a dishwasher having an access door including a planar inner liner disposed vertically when the door is closed, a detergent dispenser comprising a pocket formed in the door liner and facing toward the interior of the dishwasher when the door is closed, and a plate secured to the door liner beneath the pocket and having a planar portion extending vertically in front of a portion of the pocket, said plate having side edges close to the sides of the pocket and said plate and the side edges of the pocket forming ports for permitting dissolved detergent to run out.

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