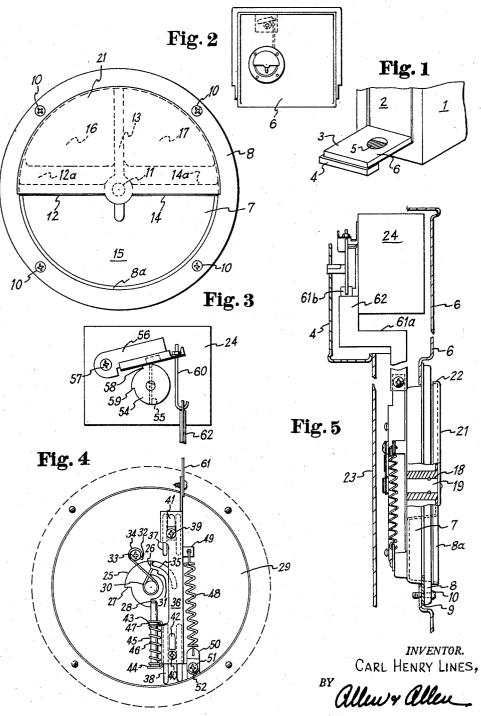
Sept. 3, 1963

C. H. LINES SEQUENTIAL DETERGENT DISPENSER

3,102,664

Filed Aug. 25, 1961



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United States Patent Office

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3,102,664 Patented Sept. 3, 1963

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3,102,664 SEQUENTIAL DETERGENT DISPENSER

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Filed Aug. 25, 1961, Ser. No. 134,018 10 Claims. (Cl. 222-70)

This application is related to the copending application of the same invention, Serial No. 13,471, now Patent No. 3,012,565, granted Dec. 12, 1961, filed March 8, 1960, and entitled Sequential Detergent Dispenser, and constitutes an improvement upon the apparatus therein disclosed. The invention concerns an automatic timer operated detergent dispenser for dishwashing machines 15 having at the front a door which swings downwardly to a horizontal position affording access to the interior of the machine. The invention is especially adaptable to under-the-counter dishwashing machines of a type in which the timing mechanism is built into the door. 20

It is a principal object of the invention to provide a detergent dispenser which will be positively actuated by the timing device of the machine so that the detergent will be dispensed at the desired point or points in the operation of the machine.

It is a principal object of the invention to provide an automatic detergent dispenser which is positively actuated and not dependent upon gravity.

It is an object of the invention to provide an automatic detergent dispenser in which the operating parts which are exposed to the operator when the door is open may be replaced as a unit.

Another object of the invention is to provide a detergent dispenser which, actuated by the timing mechanism of the washing machine, will dispense a plurality of increments of detergent at different specified times in the cycle of operations.

Other objects of the invention include the provision of a detergent dispenser which is simple in construction, inexpensive in cost, easy to fill, and positive in its action.

Another object of the invention is the provision of a detergent dispenser which is not unsightly in appearance and which is easily filled by the housewife, requiring very little manipulation.

These and other objects of the invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, are accomplished by that structure and arrangement of parts of which an exemplary embodiment will now be described. 50 Reference is made to the accompanying drawings wherein:

FIG. 1 is a partial perspective view of a front opening dishwashing machine with the door lowered.

FIG. 2 is an elevational view of the door liner and 55 detergent dispenser.

FIG. 3 is an elevational view of the detergent dispenser.

FIG. 4 is an elevational view of the actuating mechanism for the dispenser, the actuating mechanism normally lying between the inner and outer door liners.

FIG. 5 is an elevational view with parts in section, through the door showing the detergent dispenser and its actuating mechanism.

The term "detergent" as used herein is intended to 65 embrace any material which will be employed in water solution or suspension during a washing cycle of the apparatus, whether this material consists essentially of inorganic salts having water softening and other functions, or whether it contains or consists of surface-active 70materials having a detergent function, such as soap, or non-soap synthetics, or of substances containing both in2

organic salts and surface-active materials. The detergents for use in connection with the apparatus of this invention will be water-soluble substances in powdered or granular form.

It will be understood by the skilled worker in the art that the operations of dishwashing machines include various washing cycles, rinsing cycles, and drying cycles. The specific steps performed by the machine may be selectable by the operator by means of control devices; but the timing is accomplished and the order of performance of the steps is determined by one or more timing devices which are mechanical or electrical in nature. Many dishwashing machines are arranged so that they can perform a plurality of separate washing operations with intermediate rinsings. Since a washing cycle requires the presence of a detergent, the apparatus of this invention is preferably arranged so that it can dispense a plurality of increments of detergent substance at different selected times.

Briefly, in the practice of this invention, the inner lining of the door of a dishwashing machine is provided with a perforation. The door lining may be of plastic material, or it may be a lining of metal, in which case it will normally be covered with a protective coating of enamel of some kind, unless the door lining is made of non-staining metal such as stainless steel. A circular member having a plurality of depressed segments adapted to contain increments of detergent, is affixed in the perforation in the door lining. A plate or cover element is 30 rotatably mounted over the circular member and is so configured as to provide a covering for the depressed segments when in one position, but to disclose one or more of them when rotated to other positions. When the segments are uncovered, the housewife fills them with detergent and then rotates the cover so as to enclose the detergent in the depressed segments. This is most conveniently accomplished when the dispensing apparatus including the tray is in a horizontal position as when the dispenser is located on the inner surface of a door which opens downwardly into a horizontal position.

In FIG. 1 there is shown a dishwashing machine having a body or casing 1, a front opening 2, and a door 4 which is shown swung downwardly into a horizontal position. In this exemplary embodiment, the door carries a casing 4 which contains various operating instrumentalities including one or more timing devices for controlling the cycles of operation of the washing machine. No attempt has been made to outline the operating instrumentalities of the dishwashing machine, since these are well known in the art as comprising a motor, various valves, heating means, and others. It will be understood that the timing devices will be connected to these apparatus elements and to a source of power by flexible cables lying between the inner and outer liners of the door, and not shown in the drawing. The casing 4 may also contain other instrumentalities, such as a latch for holding the door in closed position, a safety switch for de-energizing the apparatus when the door is open, and the like. A detergent dispenser, the visible parts of which are indicated at 5 in FIG. 1, is shown as mounted on or in connection with the inner liner 6 of the door.

The circular member 7 is shown in plan view in FIG. 3. It may be made, and preferably is made of molded synthetic resin, although metal will serve. As shown in FIGS. 3 and 5 the member 7 is provided with an annular flange 8 used to attach the member 7 to the edge of a perforation in the door liner 6 with the interposition of a sealing gasket 9 by means of screws 10. The portion of the sides of the circular member that extends above the flange 8 forms an annular rim 8a.

The circular member 7 has a raised central portion 11

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from which partitions or walls 12, 13 and 14 extend to the outer edge of the circular member. The partitions 12, 13 and 14 divide the circular member into a lower portion 15 and two segmental pockets 16 and 17. The circular member may be divided into fewer or a greater number of segments if desired. The central portion 11 has a perforation 18 and serves as a bushing for a shaft 19. An O-ring prevents passage of water or steam through the perforation 18 from the vat or tub of the dishwashing machine while in operation.

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A plate 21 is fixedly mounted to the shaft 19 and is so configured as to cover the segmental pockets 16 and 17 when in one position (see FIG. 3) and expose them when the shaft is rotated 180°. A lip portion 22 of the plate 21 extends over the rim 8a.

The segments 16 and 17 when covered by the plate form completely enclosed pockets for containing increments of detergent. When the door of the dishwasher is open as shown in FIG. 1, and the pockets 16 and 17 are uncovered, it is an easy matter for the housewife to fill either or both of the pockets 16 and 17 with detergent substance from a carton, can, or other container. She can then rotate the plate 21 to a position in which the pockets 16 and 17 are covered. Thus, when the door is swung from the horizontal to the vertical position, the circular member with its load of detergent substance, will be held in an upright position and the detergentfilled pockets will be protected by the plate 21 from water or washing solution thrown about within the dishwashing machine. It will be evident, however, to the skilled worker in the art that should the plate be rotated until one or both of the pockets 16 and 17 are uncovered, active water inside the dishwashing machine will wash the detergent from one or both of the pockets, which have been provided with slanted sides 12a and 14a to facilitate dispensing of the detergent increments into the tub or vat.

The controlling means for the detergent dispenser is best indicated in FIGS. 4 and 5. In the latter figure the outer door shell is indicated at 23. The casing 4, containing a timing device 24, is partially shown at the upper end of the outer liner.

A double rotary latch 25 with shoulders 25, 27 and 28 is fixedly attached to that part of the shaft 19 which ex-45 tends beyond the rear surface 29 of the circular member 7. A release spring 30 is located on the end of the shaft 19. An end 31 of the release spring is hooked around the shoulder 26 of the double rotary latch 25. The other end 32 of the spring 30 is fixedly mounted by means of the screw 33 to a lug 34 on the rear surface 29 of the circular member. The spring 30, therefore, tends to urge the latch 25 in a counterclockwise direction.

It will be understood that since both the latch 25 and the plate 21 are fixedly mounted to the shaft 19, when 55the latch is rotated the plate will rotate as well. These parts are so configured that when the latch 25 is in the position shown in FIG. 4, the plate 21 covers the segmental pockets 16 and 17 and is in the position shown in FIG. 3. As shown in FIG. 4, the latch is prevented from 60 further clockwise rotation by the abutment of the shoulder 26 and a lug 35 on the surface 29.

A metal member 36 is slidably mounted on lugs 37 and 38 (on the surface 29) by means of screws 39 and 40 in slots 41 and 42 respectively, in the member 36. The member 36 has two ears 43 and 44 with coaxial perforations through which a release pin 45 is slidably mounted. The pin 45 is urged upwardly by means of a compression spring 46 which bears against the ear 44 and an annular rim 47 on the pin 45.

The member 36 is urged downwardly by the spring 48 affixed at one end to an ear 49 on the member 36 and at its other end to a plate 50 held by the screw 51 to lug 52 on the surface 29.

a cam member 54 affixed thereto by a pin 55. This cam actuates a lever 56 pivoted at 57. It will be noted that the cam has two steps 58 and 59 the first of which is higher, i.e. further from the center of the shaft 53, than is the second.

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The outer end of the lever 56 is connected by linkage means 60 and 61 to the metallic member 36 which actuates the pin 45.

FIG. 5 shows that when the timer 24 and the actuating cam 54 are located in the casing 4, the link member 61 will have to be provided with angularly related portions 61a and 61b. Under these circumstances it is preferable to provide a guide means 62 within the casing 4 for the portion 61b of the lower link.

When the cam device 54, which may be thought of as 15 rotated by the timer in a clockwise direction in FIG. 4, has turned sufficiently to permit the step 58 to pass the lever 56, or a clearance cut-out in that portion of lever 56 bearing on cam 54, the lever will rotate a predeter-20 mined distance in the clockwise direction permitting the metallic member 36 to move downwardly to a limited extent under the influence of the spring 48. The pin 45, abutting against the shoulder 28 and thereby holding the latch 25 in place against the counterclockwise urging of the spring 30, is moved downwardly releasing the latch 2525. The latch will rotate 90° until the shoulder 27 stops against the pin. As the latch rotates 90° the plate 21 rotates the same amount (in a clockwise direction as seen in FIG. 3) exposing the segment 16. The action of water within the dishwashing machine during a wash-30ing cycle will wash the detergent out of the pocket thus providing a washing solution of the desired strength for the washing cycle.

At a subsequent period in the operation of the machine the step 59 of the cam 54 may release the lever 56, permitting it to turn a further distance in the clockwise direction. The spring 48 will then be able to pull the metal member 36 downwardly. This will remove the pin 45 from the shoulder 27 and the latch 25 and plate 21 will rotate 90° until the shoulder 28 abuts the lug 35. The rotation of the plate exposes the segment 17.

The cam 54 is so configured that this will occur during a subsequent washing cycle, and the detergent contained in the upper pocket 17 will be washed out into the water in the machine during that cycle. The cam 54 is intended to rotate through 360° during a complete operation of the dishwashing machine.

At the end of the dishwashing operation, the housewife will lower the door to the position shown in FIG. 1, withdraw the racks (not shown) carrying the dishes or tableware, and unload them. If another dishwashing operation is desired, the racks will be reloaded, moved into the body 1 of the dishwashing machine, and the pockets 16 and 17 which are now in fully exposed position, will be reloaded with detergent. The housewife will then rotate the plate 21 until it completely covers the segmental pockets 16 and 17. This will rotate the latch 25 in a clockwise direction as seen in FIG. 4. The spring 46 enables the pin 45 to be depressed thereby allowing the shoulders 27 and 28 to rotate past the pin until the latch is again in the starting position as shown in FIG. 4.

While the circular member 7 has been shown as having two segmental pockets 16 and 17, more may be provided 65 if desired. Under these circumstances the number of shoulders on the rotary latch 25, and the number of steps on the cam 54 will be multiplied.

Modifications may be made in the invention without departing from the spirit of it. The invention having been described in an exemplary embodiment, what is claimed as new and desired to be secured by Letters Patent is:

1. In a dishwashing machine having timing means and a door swinging from a vertical closed position to a The timing device 24 is provided on its shaft 53 with 75 horizontal open position, said door having inner and outer

panels, a detergent dispensing device comprising circular dish-like means at the inner panel of said door presenting at least one sector shaped pocket, a circular cover member pivoted at the center of said circular member forming the axis of said pocket and being cut away in part so that 5 in one rotative position it will cover said pocket and in another rotative position it will uncover said pocket, means between said inner and outer panels urging said cover member in one rotative direction, releasable latch means between said panels for holding said cover mem- 10 ber in said rotative positions selectively, there being means between said panels connecting said latch means and the timing means of said dishwashing machine effective to release said latch means and permit movement of said cover from a pocket-covering to a pocket-uncovering 15 position.

2. The structure claimed in claim 1 in which said cover member is returnable manually from the pocket-uncovering position to the pocket-covering position, in which last mentioned position it is again retained by said latch.

3. The structure claimed in claim 2 wherein said circular dish-like means is configured to present more than one pocket and in which said latch means is configured to release said cover member for step-wise rotation in which one of said pockets is first uncovered, after which another 25 of said pockets is uncovered.

4. In a detergent dispensing device, a substantially circular member adapted to be let into the inner panel of the door of a dishwashing machine, said member having an axially located bearing part, a shaft in said bearing part, a cover member on one end of said shaft, at latch member on the other end of said shaft, means tending to cause a rotation of said shaft in one direction, said circular member being configured to present at least one pocket for the reception of detergent, said cover member being cut away in part so that in one position it will uncover said pocket, said latch member having a plurality of abutments,

and releasable means for engaging said abutments to hold said cover member in selected rotative positions.

5. The structure claimed in claim 4 in which said releasable means comprises a slide mounted on said circular member and a spring-pressed plunger mounted on said slide.

6. The structure claimed in claim 5 including the timing device of a dishwasher, and a connection between said slide and said timing device.

7. The structure claimed in claim 6 wherein said circular member is configured to provide a plurality of pockets, and wherein said latch member is configured to provide abutment means for establishing rotative positions of said cover member in which said pockets are successively uncovered.

8. The structure claimed in claim 7 wherein said latch member has another abutment coacting with a boss on said circular member to establish a rotative position of said circular member in which all of said pockets are covered.

9. The structure claimed in claim 8 in combination with said timing device having a rotative cam, a lever in contact with said cam, said cam being configured to present camming surfaces separated by abutments, there being an abutment for each rotative position of said cover member, and a connection between said lever and said slide.

10. The structure claimed in claim 9 including a tension spring engaged between said slide and attachment means on said circular member, said spring arranged to urge said slide toward a position in which said plunger releases said latch means.

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