Dec. 12, 1961 C. H. LINES 3,012,565

SEQUENTIAL DETERGENT DISPENSER

Filed March 8, 1960 2 Sheets-Sheet 1

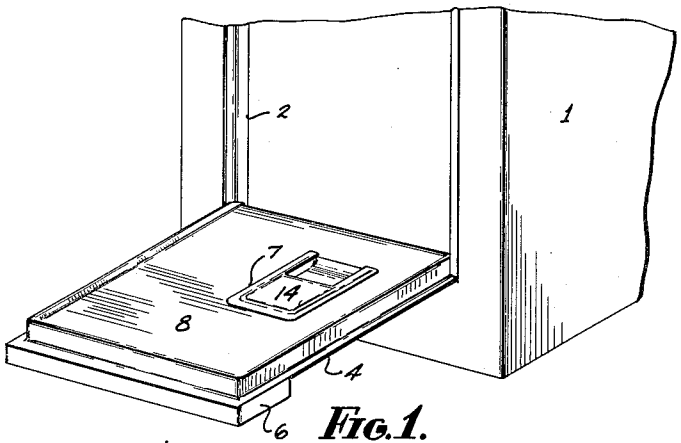


FIG. 1.

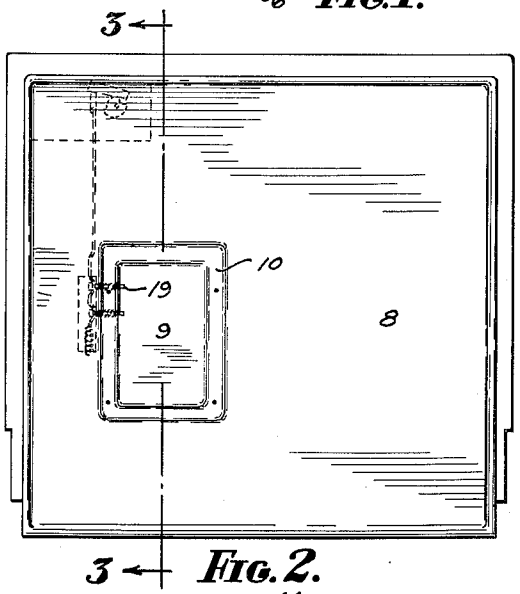


FIG. 2.

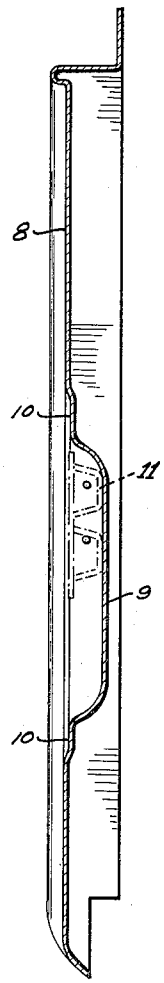


FIG. 3.

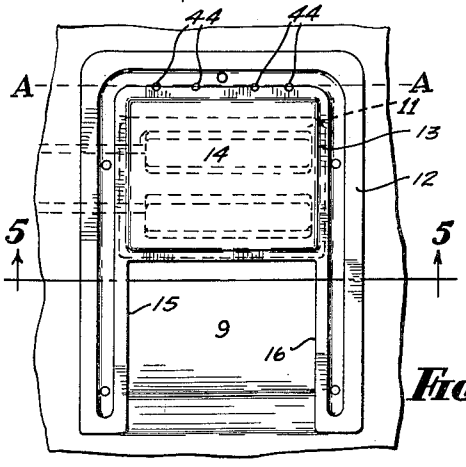


FIG. 4.

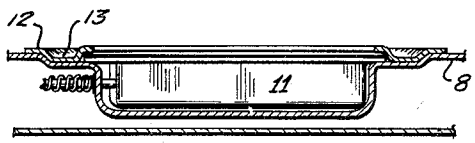


FIG. 5.

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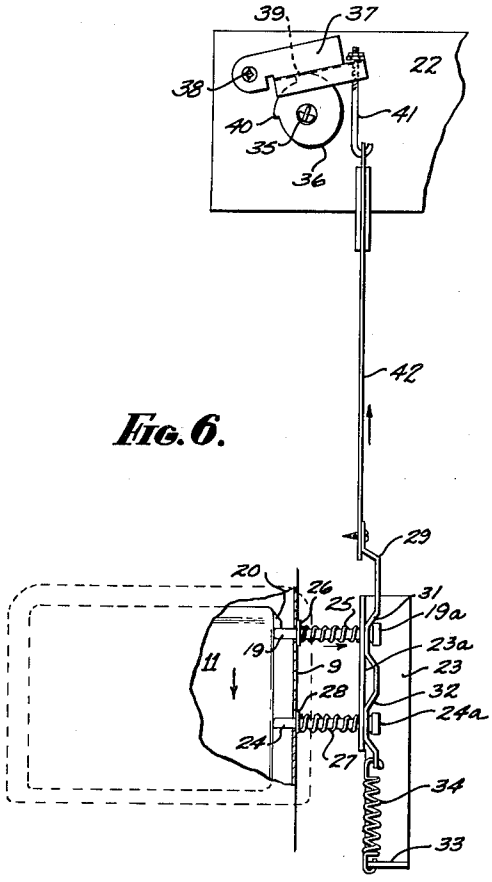


FIG. 6.

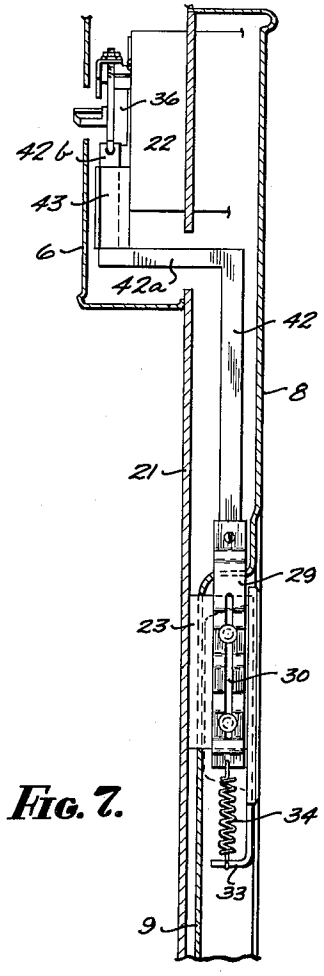


FIG. 7.

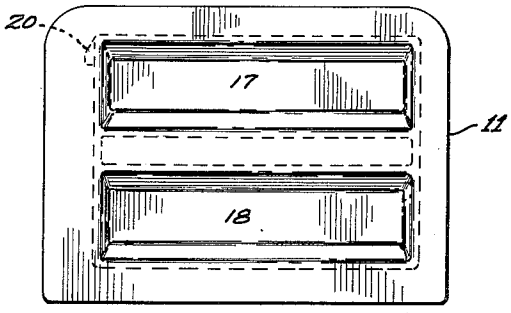


FIG. 8.

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United States Patent Office 3,012,565
Patented Dec. 12, 1961

3,012,565

SEQUENTIAL DETERGENT DISPENSER

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Filed Mar. 8, 1960, Ser. No. 13,471
19 Claims. (Cl. 134—93)

The invention has to do with detergent dispensers for dishwashing machines or other washing machines, having at the front a door which swings downwardly to a horizontal position to give 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 a casing at the top of the door.

A principal object of the invention is the provision of 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.

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 construction and arrangement of parts of which an exemplary embodiment will now be described. The embodiment is that of a front opening dishwashing machine, it being understood that this does not constitute a limitation upon the invention.

Reference is made to the accompanying drawings wherein:

FIG. 1 is a partial perspective view of a front opening diswashing machine with the door open.

FIG. 2 is an elevational view of the door liner taken from the inner side of the door.

FIG. 3 is a sectional view taken along the section line 3—3 of FIG. 2.

FIG. 4 is a partial elevational view of the door liner showing the protective plate in place.

FIG. 5 is a partial sectional view taken transversely of the door, along the section line 5—5 of FIG. 4.

FIG. 6 is an elevational view of the actuating mechanism for the detergent dispenser of this invention, the actuating means normally lying between the inner and outer door liners.

FIG. 7 is a vertical sectional view through the door showing also the detergent dispenser actuating means.

FIG. 8 is a plan view of the tray element of the detergent dispenser.

The term "detergent" as used herein is intended to 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 materials having a detergent function, such as soap, or non-soap synthetics, or of substances containing both inorganic 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 recess. 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 tray, having a plurality of pockets for containing increments of detergent, slides in the recess in the door lining. A plate element is attached over the recess in the door liner, and is so configured as to provide a covering for the tray when the tray is in one position in the recess, but to disclose the tray or one or more of the pockets therein, when the tray is in other positions in the recess. When the tray is uncovered, the housewife fills the pockets therein with detergent and then moves the tray to a position in which it is entirely covered by the plate aforesaid. 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 **6** 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 **6** 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 **7** in FIG. 1, is shown as mounted on or in connection with the inner liner of the door.

It will be seen from FIGS. 2 and 3 that the inner liner **8** of the door is provided with an elongated recess **9**, there being a slight depression **10** about the edges of the recess. A detergent holding tray, hereinafter described more in detail, is slidably mounted in the recess.

As shown in FIGS. 4 and 5 a plate element having marginal portions **13** shaped to enter the recess **10** is fastened to the inner liner of the door. Preferably the plate element is detachable for cleaning, but it may be held in place in any suitable way. The device **12**, has in its upper portion a solid cover part **14** which overlies the tray when the tray is at one end of the recess **9**. The cover part **14**, however, extends only about half way down the length of the element **12**, so that the tray

is capable of moving in the recess to a position in which it will be uncovered. The lower end of the element 12, thus, is formed into two leg portions 15 and 16 which, by engaging lateral edges of the tray 11 serve to keep the tray from coming wholly out of the recess. The element 12 will usually be made of metal, although other substances can be used.

The tray is shown in plan view in FIG. 8. It may be made, and preferably is made of molded synthetic resin, although metal will serve. The tray is provided with two elongated and relatively deep pockets 17 and 18 in the specific embodiment. Fewer or a greater number of pockets may be provided if desired. When the door of the dishwasher is open as shown in FIG. 1, and the tray element 11 is uncovered, it is an easy matter for the housewife to fill either or both of the pockets 17 and 18 with detergent substance from a carton, can, or other container. She can then push the tray within the recess to a position in which it lies partly or wholly, as desired, beneath the cover part 14. It can be retained in this position by means of either pin 19 or 24 operating through the recess in the inner liner of the door, the pin engaging a detent 20 on the tray. Thus, when the door is swung from the horizontal to the vertical position, the tray, with its load of detergent substance, will be held in an upper position so that the detergent-filled cup or cups will be protected by the element 14 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 tray be released it will move downwardly by gravity until one or both of the pockets 17 and 18 are uncovered, so that active water inside the dishwashing machine will wash the detergent from one or both of the pockets.

The controlling means for the detergent dispenser is best indicated in FIGS. 6 and 7. In the latter figure the outer door shell is indicated at 21. The casing 6 is partially shown at the upper end of the outer door liner. It contains a timing device 22.

A bracket 23 is shown as attached to the outer surface of the inner door liner. The pin 19, previously mentioned, extends through the wall 9 of the depression in the inner door liner and also through a perforation in an angularly bent portion 23*a* of the bracket 23. The pin 19 has a head 19*a*.

In the preferred embodiment of the invention there is a second pin 24, similarly mounted, and having a head 24*a*. A compression spring 25 bears between the angularly related portion 23*a* of the bracket and a washer 26 or other abutment member on the pin 19. Similarly, the pin 24 will be provided with a compression spring 27, and an abutment 28. The springs serve to urge the pins toward latching position as will be evident from FIG. 6.

Between the heads of the pins and the upturned portion 23*a* of the bracket there is a sliding metal member 29. As will be evident from FIG. 7, this member is slotted as at 30 so that it may slide with respect to the pins. FIG. 6 shows that the sliding metal member 29 is bent so as to have a camming surface 31 for the upper pin 19 and a camming surface 32 for the lower pin 24. These camming surfaces coact with the heads of the pins respectively; and they are so positioned that a downward movement of the member 29 can actuate first the pin 19 and thereafter the pin 24. The metal member 29 is connected to an upturned ear 33 on the bracket 23 by means of a tension spring 34.

The timing device 22 is provided on its shaft 35 with a cam member 36. This cam actuates a lever 37 pivoted at 38. It will be noted that the cam has two steps 39 and 40 the first of which is higher, i.e. further from the center of the shaft 35, than is the second.

The outer end of the lever 37 is connected by linkage means 41 and 42 to the metallic member 29 which actuates the pins.

FIG. 7 shows that when the timer 22 and the actuating cam 36 are located in the casing 6, the link member 42 will have to be provided with angularly related portions 42*a* and 42*b*. Under these circumstances it is preferable to provide a guide means 43 within the casing 6 for the portion 42*b* of the lower link.

When the cam device 36, which may be thought of as rotated by the timer in a clockwise direction in FIG. 6, has turned sufficiently to permit the step 39 to pass the lever 37, or a clearance cut-out in that portion of lever 37 bearing on cam 36, the lever will rotate a predetermined distance in the clockwise direction permitting the metallic member 29 to move downwardly to a limited extent under the influence of the spring 34. The camming surface 31, engaging the head 19*a* of the upper pin will move this pin to the right in FIG. 6 so that the detent 20 on the tray 11 will be released by the upper pin. Under the influence of gravity the tray will descend as shown by the arrow in FIG. 6 until the lower pocket 18 in the tray lies below the covering member 14. The tray will be held from further descent, however, by the engagement of the detent 20 with the pin 24. When the lower pocket 18 is exposed, the action of water within the dishwashing machine during a washing 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 40 of the cam 36 may release the lever 37, permitting it to turn a further distance in the clockwise direction. The spring 34 will then be able to pull the metal member 29 downwardly for such a distance that its camming surface 32 will engage the head 24*a* of the lower pin and move the lower pin to the right in FIG. 6. This will release the tray 11 for further descent so that now the pocket 17 will become uncovered.

The cam 36 is so configured that this will occur during a subsequent washing cycle, and the detergent contained in the upper pocket 17 of the tray 11 will be washed out into the water in the machine during that cycle.

In the particular embodiment, the power needed to actuate the pins 19 and 24 is provided by the tension spring 34. This is a preferred construction since it diminishes the power requirements at the cam 36. It would be possible so to arrange the parts that the pins would be actuated in the desired sequence upon an upstroke of the member 29; but in this event the cam 36 would have to be so configured that it would suddenly raise the member 29, and the power requirements would be greater. It will be understood that in the embodiment illustrated, continued rotation of the cam 36 will merely reset the pins. The cam is intended to rotate through 360° during a complete operation of the dishwashing machine.

At the end of a 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 tray 11, which is now in fully exposed position, will be reloaded with detergent. The housewife will then push the tray beneath the shield 14 until the detent 20 is caught by the pin 19. The apparatus is then ready for another dispensing operation.

While the tray 19 has been shown as provided with two pockets 17 and 18, more may be provided if desired. Under these circumstances the number of pins will be multiplied, as will the camming surfaces 31 and 32 on the sliding member 29 and the steps on the cam 36.

It should be evident from the foregoing that in the preferred embodiment utilizing two compartments in the tray 11, as well as in other embodiments using more than two compartments, the tray 11 can be pushed beneath the covering element 14 until the detent 20 is caught by

any of the pins, and does not necessarily have to be pushed into the wholly covered position. This permits the by-passing of one or more of the initial washing operations to a later preferred washing operation, at which time the proper detergent compartment will come into a position to pass below the covering element **14**, thus exposing the contained detergent for admission into the wash water.

As shown in FIG. 4 the upper part of the plate **12** may be provided with some tiny holes **44**. During the operation of the machine, a small amount of water entering these holes will flow downwardly over the tray and associated parts. This amount of water will not be sufficient to dissolve any significant amount of the detergent; but it will act to lubricate the parts and prevent sticking. Instead of providing the small holes **44** for the above designated purpose, the same effect may be attained by eliminating the upper margin of the plate **12** as though it were cut along the dotted line A—A in FIG. 4. This will leave a narrow slot through which a small amount of water may enter.

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 or like structure, a detergent dispenser comprising a tray having at least one pocket open at the top but otherwise closed for detergent therein, said tray slidable within a recess in an inner wall of said machine, a plate element adapted to retain said tray within said recess, said plate element having a cover part adapted to cover said tray when in one position in said recess and an open part adapted to expose the pocket in said tray to water within said machine when said tray is in another position in said recess, whereby said water can wash detergent from said pocket, and means for producing movement of said tray from covered to uncovered position.

2. In a dishwashing machine or like structure, a detergent dispenser comprising a tray having at least one open pocket for detergent therein, said tray being slidable in a recess in a vertical wall of said machine, a plate-like element located over said recess and the tray therein, said plate-like element having an upper covering portion and a lower open portion, means for holding said tray behind said covering portion whereby said tray is protected from water in said machine, and means for releasing said holding means whereby to permit said tray to move by gravity to another position in said recess where said pocket is exposed to water in said machine so that detergent in said pocket can be washed therefrom.

3. The structure claimed in claim 2 wherein said wall element is a door of said machine swingable from a closed vertical position to an open horizontal position whereby the pocket in said tray may be filled while said tray is horizontal, said tray thereafter being movable in said recess to a position in which it is covered as aforesaid.

4. The structure claimed in claim 3 wherein said tray has a plurality of pockets, and including means permitting movement of said tray to successive positions in which said pockets are successively uncovered.

5. The structure claimed in claim 3 including a timing device and an operative connection between said timing device and said tray to permit movement of said tray at a pre-selected point in a cycle of operations carried on by said washing machine.

6. The structure claimed in claim 4 including a timing device and an operative connection between said timing device and said tray, said connection acting at spaced time intervals to permit successive movements of said tray whereby to uncover in succession a plurality of pockets in said tray.

7. In a dishwashing or like machine a door swingable from a horizontal open position to a vertical closed position, said door having inner and outer liner elements, the inner liner element having an elongated recess therein, a tray slidable within said recess, said tray having at least one pocket for detergent, a plate-like element fastened to said inner liner, acting to retain said tray in said recess, and having a portion serving to cover said tray when in one position in said recess, said tray being slidable by gravity in said recess to another position in which said pocket is exposed, a detent on said tray, a pin coacting with said detent to retain said tray in the covered position, said pin extending through said inner door liner at said recess, and being resiliently mounted, and means between the inner and outer door liners for moving said pin to release said detent whereby to permit movement of said tray from a covered to an uncovered position.

8. The structure claimed in claim 7 wherein said tray is formed with a plurality of pockets for detergent, wherein a plurality of differently positioned pins is provided for coacting with said detent, and wherein said means located between the inner and outer door liners acts successively on said pins whereby to permit movements of said tray in which said pockets are successively uncovered.

9. The structure claimed in claim 7 wherein the top of the covering portion of said plate-like member is so configured as to permit limited entrance of water into said recess to act as a lubricant.

10. The structure claimed in claim 7 including a timing device mounted on said door and a connection between said timing device and the means for moving said pin.

11. The structure claimed in claim 7 in which said pin is mounted in a bracket on the inner door liner, said pin having a head, and in which said means for moving said pin is an element slidable along said bracket and having camming surface for engaging the head of said pin and moving said pin in a direction outwardly of said recess.

12. The structure claimed in claim 7 including a timing device mounted on said door and a connection between said timing device and the means for moving said pin, and in which said pin is mounted in a bracket on the inner door liner, said pin having a head, and in which said means for moving said pin is an element slidable along said bracket and having a camming surface for engaging the head of said pin and moving said pin in a direction outwardly of said recess.

13. The structure claimed in claim 8 including a timing device mounted on said door and a connection between said timing device and the means for moving said pins.

14. The structure claimed in claim 8 in which said pins are mounted in a bracket on the inner door liner, said pins having heads and in which said means for moving said pins is an element slidable along said bracket and having camming surfaces for engaging the heads of said pins and moving said pins in a direction outwardly of said recess, said camming surfaces being spaced to provide for movement of said pins in succession.

15. The structure claimed in claim 8 including a timing device mounted on said door and a connection between said timing device and the means for moving said pins, and in which said pins are mounted in a bracket on the inner door liner, said pins having heads, and in which said means for moving said pins is an element slidable along said bracket and having camming surfaces for engaging the heads of said pins and moving said pins in a direction outwardly of said recess, said camming surfaces being spaced to provide for movement of said pins in succession.

16. The structure claimed in claim 8 wherein the top of the covering portion of said plate-like member is so configured as to permit limited entrance of water into said recess to act as a lubricant.

17. The structure claimed in claim 12 wherein the top of the covering portion of said plate-like member is so configured as to permit limited entrance of water into said recess to act as a lubricant.

18. The structure claimed in claim 15 wherein the top of the covering portion of said plate-like member is so configured as to permit limited entrance of water into said recess to act as a lubricant.

19. In a dishwashing machine or like structure, a detergent dispenser comprising a tray containing a plurality of pockets for detergent, and a cover member, said tray and said cover member being movable relatively to each other from a position in which said pockets are covered by said cover member to positions in which said pockets are selectively uncovered by said cover member, means acting to maintain said parts in covering relationship after said pockets have been filled with detergent, a timer controlling the operations of said dishwashing machine and a connection between said timer and one of said parts to cause said parts to assume a relationship in which said pockets are uncovered so that detergent may be washed therefrom by water in said dishwashing machine.

References Cited in the file of this patent

UNITED STATES PATENTS

485,992	Snorf	Nov. 8, 1892
2,591,080	Loeb	Apr. 1, 1952
2,679,850	Kamp	June 1, 1954
2,709,536	Yeager	May 31, 1955
2,711,178	Sharp et al.	June 21, 1955
2,812,881	Karig	Nov. 12, 1957
2,816,427	Vela	Dec. 17, 1957
2,819,600	Aberle	Jan. 14, 1958