TREATING AGENT DISPENSING MEANS FOR AUTOMATIC WASHING MACHINE


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4 Claims. (Cl. 222—70)

ABSTRACT OF THE DISCLOSURE

Improved treating agent dispensing means for an automatic washing machine of the type having a wash chamber access door pivotal between a horizontal open position and a vertical closed position. The means comprise a hollow housing having an opening which faces downwardly when the access door is on its closed position. The detergent is held in a drawer-like container that is mounted for sliding movement through the housing opening. Means are provided for retaining the container substantially totally within the housing until they are released by cam means operated by a sequence control device within the access door, whereupon the force of gravity slides the container to a dispensing position substantially totally outside the housing.

This invention relates generally to automatic washing machines and, more particularly, to an improved treating agent dispensing means for an automatic washing machine.

Although not limited in its usefulness thereto, the present invention is particularly adapted for use in an automatic dishwasher. In an automatic dishwasher, it is desirable to provide one or more pre-rinse with hot water to warm the dishes and remove gross food soil. The pre-rinse are followed by a wash operation wherein detergent is added to the water. This is followed by one or more post-rinse and then a drying operation. The need for an automatic treating agent dispensing means or detergent dispenser should be apparent. If the detergent were deposited within the wash chamber simultaneously with the insertion of the articles to be washed, it would go into solution with the water for the pre-rinse. If the operator were required to manually deposit the detergent in the wash chamber at the beginning of the wash operation, the automatic aspects of the machine would be greatly compromised.

Moreover, it is sometimes desirable to provide two separate wash operations when heavily soiled articles, such as pots and pans, are being washed. This can be achieved when the dishwasher is properly programmed, by adding detergent to either the last pre-rinse or the first post-rinse thus converting one of the rinses into a wash operation. Accordingly, it would be desirable to provide a treating agent dispenser which would allow the option of two wash operations.

Since the detergent must be dispensed automatically, for the reasons set forth above, the sequence control device normally provided to control the admission of water, the energization of the spray and drain mechanisms, and the energization of the heating means for drying, is utilized to operate the detergent dispenser. This can be accomplished electrically, i.e., with a solenoid-operated dispenser or mechanically, i.e., by mechanically tripping a dispenser by means of linkage between the dispenser and the sequence control device. Since solenoids are relatively expensive, mechanical means have met with acceptance; however, the sequence control device is conventionally driven by a synchronous electric motor which is capable of driving only relatively light loads. Accordingly, when forced to operate a detergent dispenser mechanically, with arrangements heretofore available, stalling of the synchronous motor is a real possibility. Since the sequence control device controls energization of the other elements of the dishwasher, its stalling creates complete malfunction of the dishwasher. Thus it would be desirable to provide a treating agent dispensing means which is mechanically operated, to avoid the expense of a solenoid or similar device, but which will not create excessive load on the sequence control device motor.

It is an object of this invention to provide an improved treating agent dispensing means for an automatic washing machine.

It is another object of this invention to provide a treating agent dispensing means which automatically dispenses treating agent into the wash chamber of an automatic washing machine.

It is another object of this invention to provide a treating agent dispensing means which will automatically dispense two separate charges of treating agent into the wash chamber thus providing for two separate wash operations.

It is another object of this invention to provide a treating agent dispensing means which is mechanically tripped by the sequence control device but which minimizes the possibility of stalling the sequence control device.

Briefly stated, in accordance with one aspect of the present invention, a treating agent dispensing means is provided for use in an automatic washing machine having a wash chamber, an access opening for the wash chamber and a closure member for the access opening. The closure member is pivotal between a substantially horizontal open position and a substantially vertical closed position. The treating agent dispensing means comprises a housing carried by the closure member and having an opening in one wall thereof. At least one container is provided and has an open side with the container being adapted to receive and contain a treating agent. The container is movable through the opening in the housing between a first position substantially totally within the housing and a second position substantially totally outside the housing. The open side of the container faces upwardly when the closure member is in its open position and faces toward the wash chamber when the closure member is in its closed position. Means are provided to retain the container in its first position. A sequence control device is provided within the closure member to actuate the container at a predetermined time to release the container. The opening in the housing faces downwardly when the closure member is in its closed position whereby the container will move to its second position under the force of gravity as the means is actuated to release the container.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of an automatic washing machine employing the present invention;

FIGURE 2 is a fragmentary sectional view of the closure member of the automatic washing machine of FIGURE 1;

FIGURE 3 is a fragmentary sectional view taken along line 3—3 of FIGURE 2;

FIGURE 4 is a view similar to FIGURE 3 but showing the elements of the present invention in a different condition of operation;

FIGURE 5 is a view similar to FIGURES 3 and 4 but showing the elements in yet another condition of operation;

FIGURE 6 is a fragmentary perspective view of one element of the present invention; and,
FIGURE 7 is a graphic representation of the surface of the element of FIGURE 6.

Referring now to the drawings, and initially to FIGURE 3, there is illustrated an automatic washing machine in the form of an automatic dishwasher 10 having an outer cabinet 11 defining therein a wash chamber 12. Dishwasher 10 may be of the undercounter type wherein it would be built into the kitchen cabinet with a conventional kitchen countertop 13 disposed horizontally thereover.

A base 14 of the washing machine is provided in one wall of cabinet 11 to provide access to wash chamber 12. A closure member or door 14 is provided to close the access opening to prevent escape of liquid therethrough during operation of dishwasher 10. Door 14 is pivotal about its lower edge between a substantially horizontal open position, as illustrated in FIGURE 1, and a substantially vertical closed position. Disposed within wash chamber 12 are a pair of dish-supporting racks 15 and 16 which are adapted to receive and support articles to be washed within wash chamber 12. It is to be understood, that racks 15 and 16 are supported in a manner whereby they may be at least partially withdrawn from wash chamber 12 through the access opening to facilitate loading and unloading of the articles to be washed. A conventional dishwasher, such as dishwasher 10, would include the following elements which are not specifically illustrated in the drawings. Means to control the admission of water to wash chamber 12 would be provided and would conventionally take the form of an electrically-operated valve. Additionally, an electric motor and pump assembly would be provided to effectuate a wash action within wash chamber 12 by splashing, agitating or spraying fluids about and also to drain liquids from wash chamber 12 into the conventional household sewer system. An electrical resistance heating element would be provided to effectuate drying of the articles upon completion of the normal wash and rinse operations. The foregoing elements are not shown nor discussed in detail since such elements are well known in the dishwasher art and, with respect to the present invention, may be conventional in every detail.

In an automatic dishwasher of the type just described, a complete cycle of operation conventionally includes an initial charge of water to wash chamber 12 followed by energization of the motor and pump assembly wherein the water is moved about within wash chamber 12 to effectuate a pre-rinse. After a predetermined time interval, the motor and pump assembly drains the water from wash chamber 12 thus completing the first pre-rinse. The first pre-rinse may be followed by a second pre-rinse identical to the first. This is followed by a wash operation which is substantially identical to the pre-rinse operations except that it is of longer duration and includes the admission of detergent to the water. The wash operation is followed by one or two post-rinses which are identical to the above-described pre-rinses. Following the final post-rinse, the electrical resistance heating element is energized and the articles within wash chamber 12 are dried by evaporation.

The present invention is particularly concerned with means to dispense the detergent in the wash chamber 12 at the appropriate time during the aforesaid cycle of operation. In accordance with the present invention, an improved treating agent dispensing means, shown generally at 17, is provided to automatically dispense detergent into wash chamber 12. Dispensing means 17 includes a housing 18 carried by door 14. A relatively large container 19 and a relatively small container 20 are provided and are individually moveable between a first position wherein the containers are substantially totally within housing 18 and a second position wherein the containers are substantially totally outside housing 18. Housing 18 has an opening one wall thereof which faces downwardly when door 14 is in its closed position, as illustrated in FIGURE 2, and containers 19 and 20 move between their first and second positions through this opening. With the foregoing arrangement, containers 19 and 20 can be conveniently filled with granular detergent when door 14 is in its open position since the open side of each of containers 19 and 20 faces upwardly when door 15 is opened as illustrated in FIGURE 1.

Once containers 19 and 20 have been filled with detergent, they are moved to the position shown in solid lines in FIGURE 2 wherein the containers are substantially totally within housing 18 so that liquid being moved about within wash chamber 12 will not have access to the detergent within the containers. Moreover, housing 18 will retain the detergent within the containers even though door 14 is pivoted through 90° to its closed position. Container 19 has a hook-like element 21 which projects through an opening 22 in housing 18 and an opening 23 in inner wall 24 of door 14. Element 21 has a hook-like element 25 which allows element 21 to slip over and then engage a retaining means comprising a lever 26. Engagement between element 21 and lever 26 retains container 19 within housing 18. Similarly, container 20 is provided with a hook-like element 27 (FIGURE 3) which is not visible in FIGURE 2 inasmuch as it is disposed directly behind element 21 of container 19.

The operation of lever 26 can best be understood from reference to FIGURES 3, 4 and 5. In FIGURE 3, lever 26 is illustrated in the position wherein it retains both of container 19 and container 20 adjacent doorway 14 in housing 18. In FIGURE 4, lever 26 has been moved, in a manner to be discussed hereinafter, so that element 27 of container 20 has been released. In FIGURE 5, lever 26 has moved to an extent wherein element 21 has also been released so that both containers 19 and 20 have moved to their positions outside housing 18. Lever 26 has a relatively narrow leg 28 and a relatively wide leg 29. Thus, as lever 26 moves from the retaining position of FIGURE 3 to the intermediate position of FIGURE 4, the narrowness of leg 28 results in release of container 19 while the width of leg 29 results in continued retention of element 21. Continued movement of lever 26 to the position of FIGURE 5 results in leg 29 also moving out of retaining relationship with element 21.

Lever 26 is pivotal about a bolt 30 which passes through lever 26 and threadedly engages a bracket 31 supported from wall 24 of door 14. Lever 26 is provided with an arcuate slot 32 through which a stationary pin 33 extends. Pin 33, due to its relationship with slot 32, provides rigidity for lever 26 while still allowing lever 26 to move relative to bracket 31. A retaining means 34 biases lever 26 toward the position of FIGURE 4. Movement of lever 26 is controlled by a cam 35 which has a series of teeth 36 about its periphery. A shaft 37 rigidly carries cam 35 whereby rotation of shaft 37 is transmitted to cam 35. Shaft 37 is driven by a synchronous electric motor 38 which comprises a portion of a sequence control device further including a plurality of cam operated switches disposed within casing 39. Since such sequence control devices are well known in the automatic dishwasher art, the various elements within casing 39 will not be described in detail. Gear teeth 36 mesh with gear teeth 40 on gear 41. Gear 41 is supported by a shaft 42 which in turn is supported by a bearing 43, bearing 43, of course, is supported from door 14. A manually operable knob 44 is also secured to shaft 42 so that the sequence control device, and other elements associated therewith, may be manually adjusted or the operation thereof manually initiated by rotation of knob 44.

Referring to FIGURE 6, cam 35 is shown in perspective. Cam 35 comprises an inclined surface 45 extending from point A to point B, a substantially flat surface from point B to point C, and a substantially flat surface from point C to point A. The graphic representation of FIGURE 7 more clearly shows the configuration of the surface of cam 35. The end of lever 26 opposite legs 28 and 29 includes a cam follower 46 which engages the surface of cam 35 and moves lever 26 against the biasing force of spring 34, in response to the configuration of
In practice, low friction plastic or nylon materials are employed to fabricate cam 35 and lever 26.

The sequence control device, including motor 38 and the elements within casing 39, is programmed so that the operational cycle of dishwasher 10 begins when cam 35 is positioned such that follower 46 engages cam 35 at the point denoted "Start" in FIGURE 7. As the motor 38 is energized and rotates cam 35, cam 35 moves relative to follower 46 so that, in effect, follower 46 moves relative to cam 35 from the "Start" point in FIGURE 7 to the "Finish" point. When point C of cam 35 passes follower 46, lever 26 will move from the position of FIGURE 3 to the position of FIGURE 4 thus causing cam 35 to rotate follower 46 counter-clockwise. As movement continues, container 19 will be released when point A of cam 35 passes follower 46 and lever 26 moves to the position of FIGURE 5. As the dishwasher continues through the operational cycle, cam 35 will continue to rotate until follower 46 is located relative thereto at the point denoted "Finish" in FIGURE 7.

As container 19 falls, under the force of gravity, as element 21 is released, movement is limited by a second hook-like element 47 which engages a stop 48. A second element, identical to element 47, is associated with container 20, but is not visible in FIGURE 2 because it lies directly behind element 47. Similarly, a stop identical to stop 48 is provided for container 20 but is not visible in FIGURE 2 since it lies directly behind stop 48.

Container 19 is provided with a flange 49 at each side thereof which rides within a cooperating groove 50 to guide movement of container 19 in a manner similar to a drawer. Container 20 is provided with identical flanges which cooperate with identical grooves but which are not specifically shown. Also, container 19 is partially defined by an end wall 51 which has secured thereto but spaced therefrom a second wall 52 which, in cooperation with housing 18, provides a baffle effect to prevent the ingress of fluid into container 19 when container 19 is in the position of FIGURE 2. Container 20 is provided with similar components but which once again is not visible in FIGURE 2.

The present invention provides the option of two wash operations, i.e., converting either a pre-rinse or a post-rinse into a wash operation, by providing the independently operable containers 19 and 20. In practice, cam 35 and the sequence control device would be programmed to release container 19 during the initial portion of the regular wash operation, thus automatically dispensing detergent into the wash chamber at that time. Additionally, container 20 would be programmed to be released during the initial portion of the second pre-rinse which immediately precedes the regular wash operation. If the housewife is washing exceptionally soiled articles, she may add detergent to both containers 19 and 20 and move them to the position of FIGURE 2. This having been done, dishwasher 10 will provide one pre-rinse, a wash operation, a second wash operation, and then the regular post-rinse to be followed by the drying operation. If, on the other hand, the operator of dishwasher 10 desires only a single wash operation, container 20 will not be filled with detergent and may be left either in the released position of FIGURE 1 or may be moved to the position of FIGURE 2 with no effect on the operational cycle of the dishwasher. In this circumstance, container 20 would be released at the same time as when two wash operations are desired; however, since no detergent is contained within container 20, the effect of the second pre-rinse will be simply a rinse and not a wash operation. Additionally, the present invention provides a mechanically tripped treating agent dispensing means, thus avoiding the relatively expensive electrical solenoid or other electrical device, but minimizes the possibility of stalling the sequence control device due to the type of cam arrangement employed. It has been found in practice that the cam and follower arrangement described herein results in a minimum load on motor 38. It should be noted also that motor 38 is required, through cam 35, to slowly move a release mechanism a short distance with the energy for the quick release movement coming from spring 34 rather than motor 38.

As will be evident from the foregoing description, certain aspects of the invention are not limited to the particular details of construction with the example illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What we claim is new and desire to secure by Letters Patent of the United States is:

1. In an automatic washing machine comprising a wash chamber, an access opening for said wash chamber and a closure member for said access opening, said closure member being pivotal between a substantially horizontal open position and a substantially vertical closed position, treating agent dispensing means comprising:

(a) a housing carried by said closure member and having an opening in one wall thereof,
(b) at least one container having an open side and adapted to receive and contain a treating agent,
(c) said container being moveable through said opening in said housing between a first position substantially totally within said housing and a second position substantially totally outside said housing,
(d) said open side facing upwardly when said closure member is in said open position and facing toward said wash chamber when said closure member is in said closed position,
(e) retaining means to retain said container in said first position, and
(f) a sequence control device within said closure member to actuate said retaining means at a predetermined time to release said container,

2. Said housing opening facing downwardly when said closure member is in said closed position whereby said container will move to said second position under the force of gravity as said retaining means is actuated,

(b) retaining means comprising:

(1) a lever mounted for pivotal movement relative to said closure member,
(2) a cam driven by said sequence control device,
(3) means to bias one end of said lever into engagement with said cam,
(4) a hook extending from said container and adapted to be engaged by the other end of said lever whereby release of said container is effected by said container moving said lever to the extent that said other end of said lever moves out of engagement with said hook.

3. In an automatic washing machine having a wash chamber, an access opening for said wash chamber and a closure member for said access opening, said closure member being pivotal between a substantially horizontal open position and a substantially vertical closed position, treating agent dispensing means comprising:

(a) a housing carried by said closure member,
(b) a first container having an open side and adapted to receive and contain a treating agent,
(c) a second container adjacent said first container and having an open side and adapted to receive and contain a treating agent,
(d) each of said containers being moveable between a first position substantially totally within said housing and a second position substantially totally outside said housing,
(e) said open side of said first container and said open side of said second container facing upwardly when said closure member is in said closed position.

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side of said second container each facing upwardly when said closure member is in said open position and facing towards said wash chamber when said closure member is in said closed position,

(f) retaining means to retain said first and said second containers in said first positions, and

(g) a sequence control device within said closure member to actuate said retaining means to release said first container and then subsequently release said second container,

(h) said housing having at least one opening, facing downwardly when said closure member is in said closed position, through which said first container and said second container will move from said first position to said second position under the force of gravity as said retaining means is actuated,

(i) said retaining means comprising:

(1) a lever mounted for pivotal movement relative to said closure member and having first, second and third legs,

(2) a cam driven by said sequence control device,

(3) means to bias said first leg of said lever into engagement with said cam,

(4) a first hook extending from said first container and adapted to engage said second leg of said lever to retain said first container in said first position, and

(5) a second hook extending from said second container and adapted to engage said third leg of said lever to retain said second container in said first position,

(6) said cam being configured to move said first leg to remove said second and third legs from engagement with said first and second hooks whereby said containers are released.

4. The invention of claim 3 wherein said second leg is narrower than said third leg whereby movement of said lever by said cam results in said second leg moving out of engagement with said first hook prior to said third leg moving out of engagement with said second hook.

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