

Oct. 19, 1965

T. KRZEWINA

3,212,675

ADDITIVE DISPENSER FOR DISHWASHERS

Original Filed Dec. 31, 1962

3 Sheets-Sheet 1

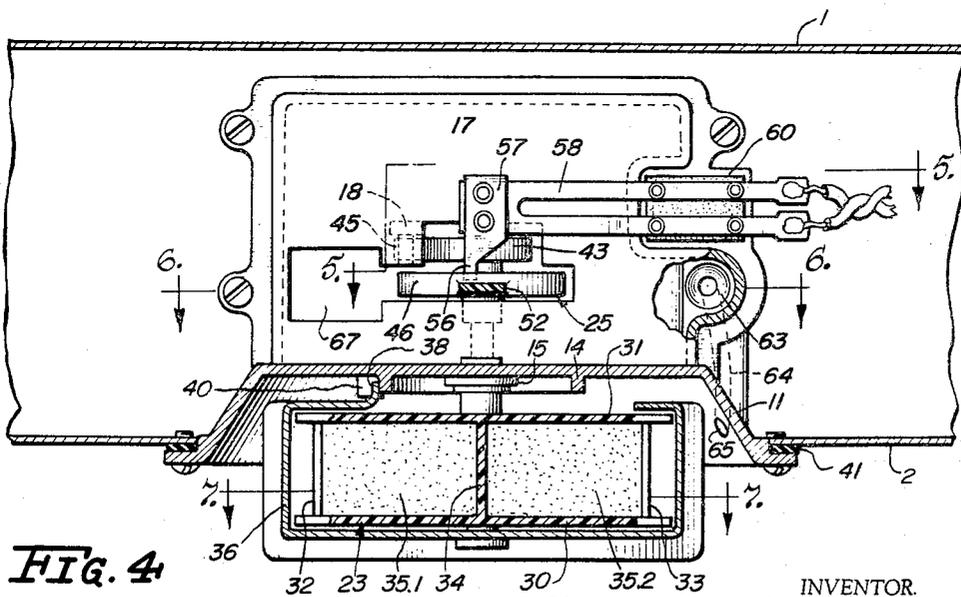
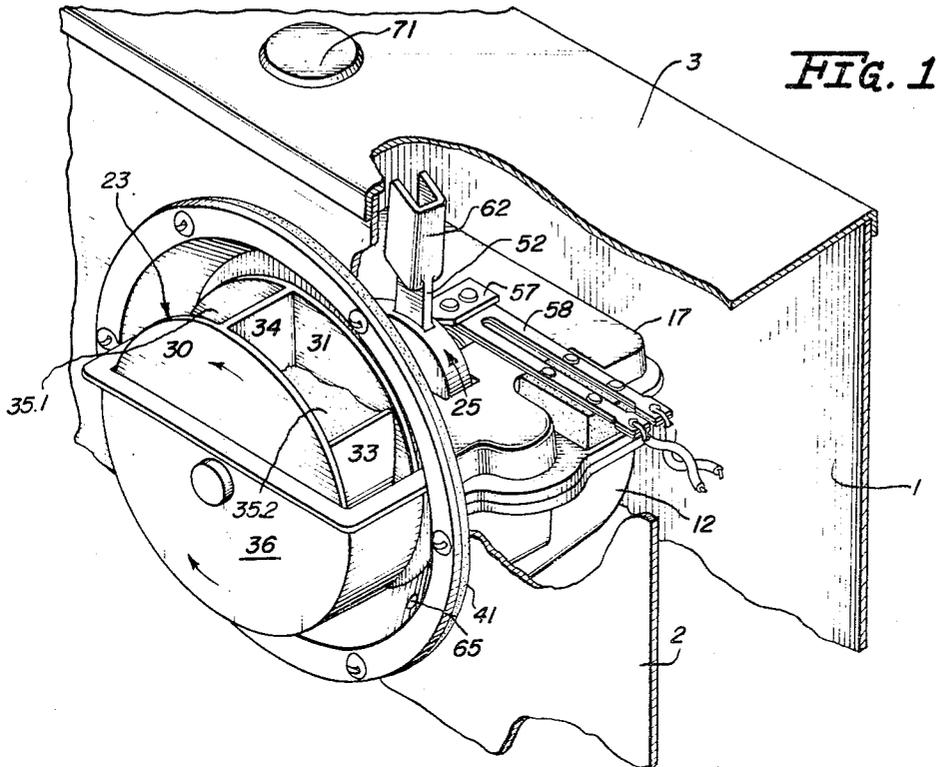


FIG. 4

INVENTOR
Thomas Krzewina

BY
Andrew S. Saband
Atty.

Oct. 19, 1965

T. KRZEWINA

3,212,675

ADDITIVE DISPENSER FOR DISHWASHERS

Original Filed Dec. 31, 1962

3 Sheets-Sheet 3

FIG. 5

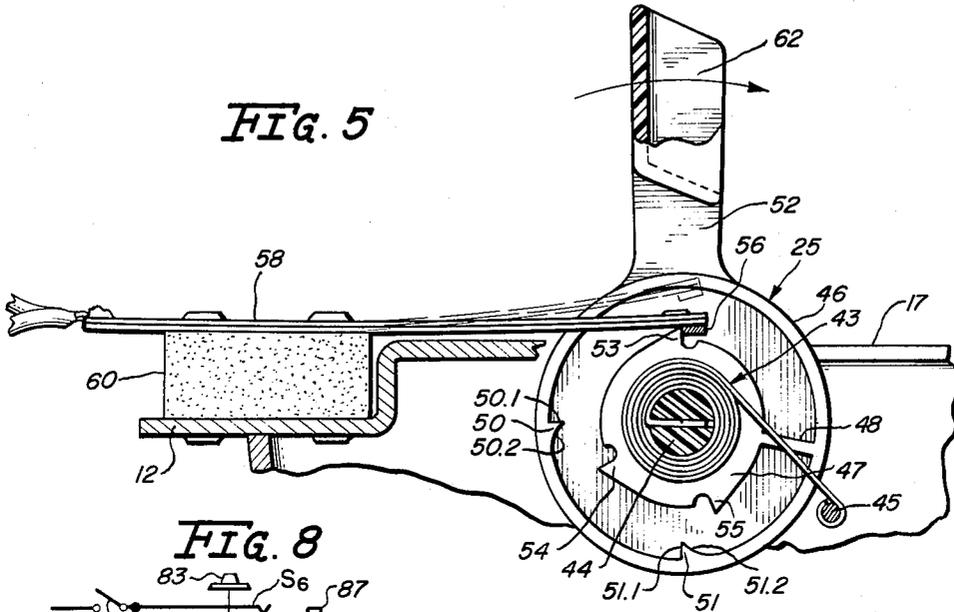


FIG. 8

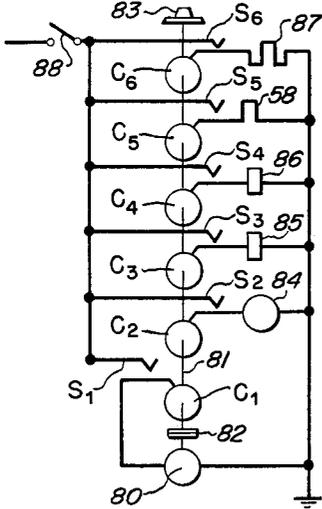


FIG. 6

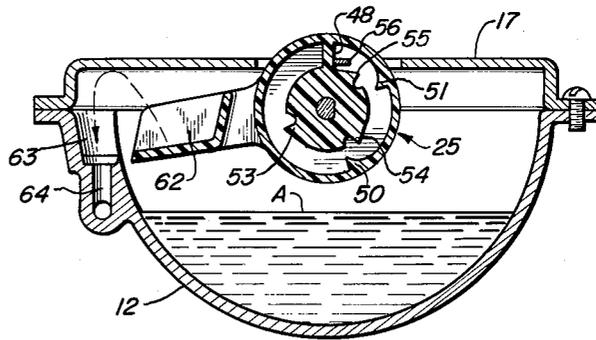


FIG. 9

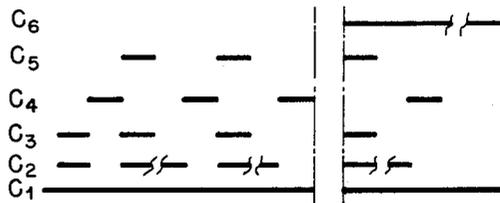
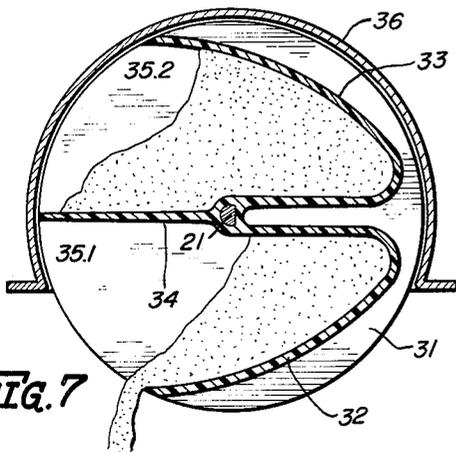


FIG. 7



INVENTOR
Thomas Krzewina
 BY *Andrew P. Hubert*
 Atty.

1

2

3,212,675

ADDITIVE DISPENSER FOR DISHWASHERS
 Thomas Krzewina, Milwaukee, Wis., assignor to General Electric Company, a corporation of New York
 Continuation of application Ser. No. 248,744, Dec. 31, 1962. This application Dec. 11, 1964, Ser. No. 419,279
 18 Claims. (Cl. 222—70)

This is a continuation of my application Serial Number 248,744, filed December 31, 1962, now abandoned.

This invention relates to dishwashers, and in particular to apparatus for adding a quantity of detergent to water at each of two dishwashing cycles and a charge of wetting agent to the final rinse water.

It is now well accepted in the dishwasher industry that two wash cycles, in each of which a washing solution is made by the addition of suitable detergent to the water entering the dishwasher tub, produces superior washing results. It is also accepted that the addition of a wetting agent to the final rinse water improves the drainage of water from the dishes after the final rinsing operation, thus leaving a minimum of water to dry on the dishes during the ensuing drying cycle.

Present domestic dishwashers use two independent devices for introducing the detergent and the rinse water conditioning agent. Although the independent devices perform very satisfactory, there is in most instances a duplication of certain operational components and therefore increased opportunity for failure or malfunction. It is therefore a principal object of the invention to provide a unitized detergent and wetting agent dispenser having an operating mechanism which is common to both units of the device.

It is another object of the invention to provide a combination detergent dispenser and wetting agent dispenser in which the operation cycles are established and controlled by a simple escapement mechanism which is actuated by the displacement of a stop arm under control of a conventional time cycle mechanism.

It is a further object of the invention to provide a dispensing apparatus which is operated from one to the next of its operational cycles by an escapement mechanism powered by a spring in which energy is stored as the user returns the dispensing apparatus to a loading position in preparation for the next operation of the dishwasher.

It is yet another object of the invention to provide a composite dispenser for detergent and wetting agent which is easily loaded with the materials to be dispensed and in which the detergent is protected against being wet during operational cycles such as prerinsing operations in which gross soil is removed from the dishes by a water action preliminary to the first actual washing action.

In a presently preferred embodiment of the invention as applied to a dishwasher of the top loading type—that is, a dishwasher in which the dish receiving tub has an upwardly facing open top and a hinged lid or cover for the top—the device is positioned on a side wall of the tub, preferably near the top and near the front wall of the tub. Actually, the device is arranged to be mounted in an opening in said side wall whereby the detergent dispenser portion is within the tub and the wetting agent dispenser and the actuating mechanism are on the opposite side of the wall and thus in a protected location. It will be understood, of course, that the wetting agent dispenser has a passage leading into the interior of the tub for the discharge of the wetting agent therinto.

The dispenser comprises a cylindrical structure having a diametrical web and other wall means which provide two separate pockets for the reception of granular detergent. A rotatable cover is provided for preventing water from splashing into either of the detergent pockets dur-

ing any washing operation. This cylindrical structure is non-rotatably mounted on a shaft which extends horizontally through the tub wall fitting in which it is journaled for rotation. The portion of the shaft on the other side of the wall fitting—which places this shaft portion external of the dishwasher tub—passes transversely of a wetting agent receiving chamber which is fixed against rotation and provided with a cover having an opening which accommodates the movement of a scoop-like wetting agent dispenser, provides a facility for mounting the escapement triggering mechanism, and affords means through which the chamber may be filled. An escapement wheel, fixed on the shaft, is arranged to be rotated by a suitable spring mechanism. The wetting agent dispenser advantageously comprises an arm extending radially relative to the shaft; said arm has at its end a scoop which is propelled in step-by-step fashion into and through the liquid wetting agent in the cup, and in a last arc of movement of the shaft, carries the wetting agent to a point where it escapes into a discharge passage leading to the interior of the tub.

In a presently preferred form, the triggering device for the escapement constitutes a bi-metal element mounted on the detergent cup cover and having a trigger extending into operative relationship with the escapement wheel. Through the heating effect of electrical energy, the bi-metal element is flexed in one direction to a position releasing the wheel for predetermined arcuate movement; upon the interruption of current, the element cools for restoration to a second position preparing the escapement wheel for another rotation. By this simple mechanism, controlled rotation of the associated shaft causes first and second discharges of detergent into the dishwasher tub to form washing solution for the first and second washing operations, and a final action in which the wetting agent is released for flow into the tub and mixture with the rinse water therein.

Other features and advantages of the invention will best be understood from the following description of the presently preferred embodiment read in connection with the accompanying drawings in which:

FIG. 1 is a perspective view of a presently preferred embodiment with broken away portions of the fragmentarily shown side and top walls of the dishwasher to indicate the relationship of the device thereto;

FIG. 2 is a front elevation of the device with portion of the detergent cups and cover being broken away;

FIG. 3 is a side sectional elevation taken on line 3—3 of FIG. 2;

FIG. 4 is a top plan view of the device as mounted in the dishwasher tub wall, with said wall shown in section, the protective cover being in a position permitting the loading of the cups and a part of the wetting agent dispenser cover broken away;

FIG. 5 is a fragmentary rear view of the escapement wheel and triggering device, enlarged to show detail, with the wetting agent cup and its cover shown in section on lines 5—5 of FIG. 4;

FIG. 6 is a rear sectional view of the wetting agent cup and associated mechanism taken on line 6—6 of FIG. 4 and showing the wetting agent scoop in its ultimate operating position;

FIG. 7 is a sectional elevation of the detergent cups taken on line 7—7 of FIG. 4 showing the cups at the release of the first discharge of detergent;

FIG. 8 is a schematic wiring diagram; and

FIG. 9 is an abbreviated cam chart to show a simplified operational cycle.

Referring first to FIGS. 1 and 3, my invention is illustrated in its application to a dishwasher of the well-known type having a substantially rectangular, open-

topped tub. Such a dishwasher is illustrated, for example, in Design Letters Patent 192,178, patented February 6, 1962, and assigned to my assignee herein. In a dishwasher of this type, the tub is disposed within an outer appearance cabinet of which wall 1 is an external side wall. The tub side wall 2 on which the dispenser is mounted is suitably spaced from the outer wall to accommodate the dispenser mechanism later described; it is unnecessary for the other three side walls (not shown) of the tub to have this relatively large spacing from the adjacent cabinet walls. In any event, there is a top wall 3 extending between the tub walls and the external cabinet walls; this top wall is arranged to prevent any entry of water between the tub and cabinet walls. The tub has an open top and there is provided a rear hinged lid or cover 4 which has a peripheral gasket 5 seating against the top marginal wall 3. As is well known in the art, the lid is arranged to be secured by suitable latch means (not shown) which, when the lid is latched home, places the gasket 5 under compression to seal against the escape of liquid during a washing or rinsing operation. It will be understood that the dishwasher tub is provided with racks (not shown) for the accommodation of dishes and other articles to be washed, and that there are provided water inlet and discharge devices (not shown) by means of which water is admitted to and drained from the tub under control of conventional time cycle mechanism (not shown). Also, there will be motor-driven impellers or other water distribution devices (not shown) by means of which washing and rinsing liquid is circulated over the articles to effect a washing and a rinsing action. For purposes of illustration, it will be assumed that the time cycle controller—for example, a controller of the type illustrated in Illian U.S. Patent 2,668,589 of February 9, 1954, and assigned to my present assignee—is arranged to establish a cycle of operation which includes the following:

(1) Introduce water for a preliminary rinsing operation to remove gross soil from the dishes and to purge the water line of cold water therein; in this operation the drainage means is operative to provide a continuous discharge of this liquid from the tub.

(2) With the drainage means inoperative, introduce a desired quantity of hot water into the machine.

(3) Actuate the dispenser triggering mechanism to introduce a charge of detergent into the tub to form the first washing solution.

(4) Either following or during this introduction of water, activate the water impelling mechanism and continue such action for a desired washing period.

(5) Operate the drainage mechanism to remove the spent washing liquid from the tub.

(6) Inactivate the drainage means and introduce another charge of liquid.

(7) Actuate the dispenser triggering mechanism to introduce the second detergent charge into the tub to create a second washing solution.

(8) Activate the water impelling mechanism for a second washing operation.

(9) Drain the spent second wash liquid.

(10) Inactivate the drainage mechanism and introduce a quantity of water for rinsing the dishes.

(11) Activate the triggering mechanism to introduce the wetting agent into the rinse water.

(12) Actuate the water impelling means to effect a rinsing of the dishes.

(13) Actuate the drainage mechanism to remove the rinsing liquid; and

(14) Activate some form of heating and air circulating means to dry the dishes while they remain in the tub.

This operational sequence is by way of example only and is well known to those skilled in the art. Actually, there may be a non-wetting agent rinse between the first and second wash, and one or more rinses between the final one in which the wetting agent is supplied to the

rinse water. Also, heating means within the tub may be energized throughout the operational cycle to prevent cooling down of the wash and rinse water. The precise operating schedule is not important to the present invention, nor are the actual mechanisms for admitting and draining water or water circulation. Operational sequences and the methods of obtaining them are now so well known in the dishwasher art—both domestic and commercial—as to make specific illustration unnecessary.

As FIGS. 2 and 3 show, the detergent and wetting agent dispenser 10 has a principal support structure which includes a dished mounting plate 11 and a wetting agent reservoir 12. These may be molded in one piece. A phenolformaldehyde condensation plastic such as Bakelite is excellent for this structure. The plate 11 has a circular guide track 14 for a protective cover and a wall 15 providing a circular pocket concentric with an opening 16 which provides a shaft bearing. A cover 17 for the reservoir 12 is removably attached thereto; said cover has a wall structure 18 which provides a rear bearing and serves to anchor an actuating spring, all as later described.

The opening 16 in plate 11 journals a shaft 20 therein. The forward part 21 of said shaft is non-circular (see FIG. 3) and nonrotatably mounts the detergent container 23. The rear portion 24 of said shaft is also noncircular and nonrotatably mounts the escapement wheel 25. Said wheel has a circular shaft extension 26 which is rotatably carried by the wall 18. The shaft 20 is axially restrained by conventional means such as the snap ring 26' and bearing washer 27, and a seal such as an O-ring seal 28 is retained by the wall 15.

The detergent container 23 is a substantially cylindrical structure having front and rear circular walls 30, 31, with a wall extending therebetween. As best shown in FIG. 2, this wall resembles a "W" with all portions 32 and 33, and a central web 34, providing open-topped cups 35.1 and 35.2. It will be noted that whereas the wall 34 extends radially to the periphery of the walls 30 and 31, the non-radial walls 32 and 33 are arranged to provide each of the cups with a large top opening through which the cups may be filled with the detergent and through which the detergent empties into the tub at the appropriate time. As shown in FIG. 3, the detergent container 23 is housed within the dished mounting plate 11 to minimize the projection of the container into the tub.

A cover 36 is mounted for rotation relative to the container 23. As shown, the cover extends substantially below the diameter of the container. At its front wall the cover 36 is journaled for rotation on an enlarged portion 37 of the shaft 20, and at its rear the cover has a flange 38 which rides on the circular wall 14. This flange 38 does not define a complete circle but rather an arcuate cut-out as indicated in dotted line in FIG. 2. The weight disposition resulting from the shape of the cover 36 is such as normally to urge it into counterclockwise rotation as viewed in FIG. 2; said rotation is restrained by the engagement of the flange 38 with a stop 40 extending radially of the wall 14 of the mounting plate 11. When in its home position the cover completely shields the detergent cups against entry of water during any washing or rinsing operation. To expose the cups for loading with detergent, the user manually rotates the cover in a clockwise direction until it is in the inverted position of FIG. 1; the center of gravity is then such as to retain the cover in such position, giving the user freedom to place the detergent in the cups. Protection of the wetting agent cup and its associated escapement and operating mechanism against water contact is provided by suitably gasketing the tub wall opening through which the structure extends, as indicated by the gasket 41, FIG. 3.

FIGS. 3, 4 and 5 illustrate the escapement wheel and its triggering mechanism. A coil spring 43 has one end anchored in a diametric slot in the hub 44 of the escapement wheel 25, and its other end is suitably fixed to a

5

pin 45 projecting from the wall 18. This spring is tensioned as the user manually rotates the detergent dispenser from its final operating position to its re-use position, as later explained. Under tension the spring exerts an effort to rotate the shaft in a counterclockwise direction as viewed in FIGS. 1 and 2. Rotation is resisted and controlled in step-by-step fashion by an electrically operating triggering device.

As shown in FIGS. 4 and 5, the escapement wheel is essentially a cup having an annular space defined by the outer rim 46 and the inner ratchet wheel 47. These parts are integral with each other and there is a radial web 48 extending therebetween. The rim 46 is formed with two teeth 50 and 51 which with the web 48 established the two discharge positions of the detergent container and the final movement of the wetting agent scope arm 52, as later described. The teeth 50 and 51 have radial leading edges, respectively 50.1 and 51.1, and sloping trailing edges, respectively 50.2 and 51.2. The ratchet wheel 47 has three ratchet teeth, respectively 53, 54 and 55, which also have radial leading edges and sloping trailing edges. The apexes of the respective series of teeth 50, etc., and 53, etc., are spaced sufficiently to provide an annular channel only slightly greater than the thickness of the triggering finger 56 which extends into the escapement wheel, as shown in FIG. 4.

The triggering finger 56 comprises the tip end of a block 57 of insulation material, said block being affixed to the free end of a member 58 mounted in an insulating terminal block 60 fastened to the cover 17 in a pocket provided therefor. The member 58 is essentially a lever rotatable about its point of attachment to the cover 17. As illustrated, the member 58 is a bi-metal structure, arranged to be electrically heated; specifically, it is heated by the passage of electric current therethrough, as later explained. In its cold state the bi-metal assumes the solid line position of FIG. 5, in which position the finger 56 is in the path of rotation of the ratchet wheel tooth 53 so as to latch the escapement wheel against movement under the urging of spring 43. As it flexes on heating, the bi-metal member disengages finger 56 from tooth 53 and interposes the finger 56 in the path of the tooth 50 on the inside of the rim 46; when in such position the finger operates to stop rotation of the wheel 25.

In completion of the general description of the escapement and wetting agent dispenser, it is noted that the arm 52 extends generally radially from the wheel 25 and has at its outer end, wall means forming the scoop 62, the function of which is to scoop up a quantity of the wetting agent and direct it into a cup-like structure 63. The capacity of the scoop 62 is greater than that of the cup 63; its exact relationship is not of importance, for most of the excess of wetting agent will return to the reservoir 12 before that which is deposited in the cup 63 has drained through the passage 64 which terminates in the opening 65 in the mounting plate 11 (see FIG. 4). As presently explained, the scoop 62 passes from its cocked position, shown in FIG. 5, to its final operating position, shown in FIG. 6; in so doing it passes through the quantity of wetting agent in the container 12. Desirably the container 12 has its bottom wall formed as a channel 66, as shown in FIG. 3. Said channel accumulates the last small quantity of the agent and positions it for pick-up by the scoop as it passes through the channel. It also appears from FIGS. 1 and 5 that in the cocked position of the detergent dispenser the scoop 62 is above the cover 17. Also, the external mounting of the bi-metal member and the triggering block 57 necessitates that portions of the wheel 25 and spring 43 are also above the cover. This requires, of course, that the cover have an appropriate aperture as indicated at 67, FIG. 4; said aperture freely accommodates the movement of the scoop 62 therethrough. The aperture 67 affords facility for filling the cup 12. Specifically, it is located immediately beneath an opening 70 in the top cabinet wall 3. Said opening is

6

normally closed by a screw cap or plug 71. It is contemplated that the dishwasher owner would be provided with a syringe-like device, such as the familiar battery filling syringe, which could be inserted through the openings 70 and 67.

Assume now that the dishwasher, having completed an operating cycle, is being prepared for another operation. The detergent container 23 will be inverted (that is, will have rotated counterclockwise more than 180 degrees from its FIG. 2 position). The scoop 62 will be as shown in FIG. 6 and the detergent cup cover 36 will be in its normal covering position. The user will now want to place new charges of detergent in the respective cups 35.1 and 35.2. He will reach into the open tub, place his thumb in the space 72 between the cups and his fingers on the top of the cover, and rotate the assembly in a clockwise direction, as viewed from the front of the container. This, of course, is a counterclockwise direction, as viewed in FIGS. 5 and 6. The bi-metal being cold, it will be in the unflexed condition, and the web 48 will be resting against the trigger finger 56. Because of the slope of the teeth 55, 54, 53, the teeth will "click" over the finger 56 without difficulty; and when the detergent container reaches its upright or loading position, the triggering mechanism will be as shown in FIG. 5. The cover 36 will be inverted as in FIG. 1, and the cups 35.1 and 35.2 ready to receive detergent. After loading the cups, the cover will be brought to its FIG. 2 position. Dishes are then placed in the tub, the lid 4 is closed and latched home, and the control device actuated.

During the pre-rinse, or the "flush-away" rinse as it is sometimes called, no current is sent through the bi-metal and the dispenser is held against operation.

During the admission of water for the first wash, the bi-metal is electrically activated, whereupon it heats and flexes upwardly. Releasing tooth 53, it comes into the path of tooth 50 as the temporary release of the spring 43 rotates the shaft. As indicated in FIG. 5, this produces an abrupt stop after a rapid 90-degree rotation of the detergent dispenser, placing it in the FIG. 7 position, and permits the detergent to spill out of the cup 35.1. Although there will be a shifting of detergent in cup 35.2, there is little if any loss of detergent therefrom because of the web 34 and the close covering proximity of the cover 36.

Immediately after the first washing operation commences, the bi-metal circuit is broken and the cooling bi-metal moves to its unstressed position. The finger 56 releases the tooth 50 and comes immediately into the path of the tooth 54, abruptly halting the escapement wheel after about a 30-degree rotation. This movement and abrupt stop shakes loose any detergent remaining in the cup 35.1, but the web 34 of the detergent dispenser is not yet below the rim of the cover 36 and there is again very little if any loss of detergent from cup 35.2. The scoop arm 52 is then within the reservoir chamber, but the scoop 62 is not yet into the body of wetting agent.

The first washing action is completed and the spent washing liquid discharged from the tub. A second charge of hot water is introduced, and at the commencement of such introduction, the bi-metal 58 is again heated, with the result that the finger 56 disengages from the tooth 54 and comes into the path of the tooth 51. The movement of the escapement action is of the order of 60 degrees and is effective for a complete inversion of the cup 35.2 and release of the detergent content thereof. Once again, the bi-metal is inactivated and withdraws from tooth 51 to engage with tooth 55. This contemplates a rotation of the wheel 25 of about 20 degrees. At this time the scoop 62 is substantially vertical and immersed in the wetting agent.

Following the introduction of rinse water, the thermostat is again heated, whereupon it releases tooth 55 to permit the final rapid movement of the wheel 25 as determined by the position of the web 48. During this final

7

movement, the scoop 62 picks up the wetting agent. The abrupt stopping of scoop 62 when finger 56 reaches web 48 causes the agent to be thrown by momentum, upwardly and toward the cup 63, as suggested in FIG. 6. The wetting agent passes into and through the passage 64 and enters the tub for mixture with the rinse water during the final rinsing operation.

In the schematic wiring diagram of FIG. 8, a conventional timer motor 80 rotates a cam shaft 81 through the usual slip clutch 82 which permits the cam shaft to be manually rotated by the control knob 83 without damage to the motor or its gear train (not shown). The cam shaft carries cam C1 which controls the closure of the normally open switch S1; cam C2 which controls the normally open switch S2; cam C3 which controls the normally open switch S3; cam C4 which controls the normally open switch S4; cam C5 which controls the normally open switch S5; and cam C6 which controls the normally open switch S6. Switch S1 is in the electric energy circuit for timer motor 80; switch S2 is in circuit with the water circulation pump motor 84; switch S3 is in circuit with the solenoid 85 which operates a solenoid control water inlet valve (not shown) of the conventional type which is closed when the solenoid is deenergized; switch S4 controls the solenoid 86 of a solenoid-operated drain valve (not shown) of the conventional type which is open when the solenoid is deenergized; switch S5 is in the energy circuit of the bi-metal element 58; and switch S6 is in the energy circuit for the heating element 87 which is within the dishwasher tub and may be energized at various times during the dishwasher operation. However, the heating element 87 is always energized during the drying cycle following the final rinse.

The schematic cam chart of FIG. 9 illustrates by the heavy lines the several intervals during which the various switches are closed by their respective cams. The jagged broken lines which interrupt certain of the closed-switch designation for the cams C2 and C6 are intended to convey that the respective switches may be closed for substantially longer periods than indicated in the figure; and the gap between the vertical broken lines is intended to suggest that prior to the final rinse the dishwasher may have one or more intermediate rinses, each of which would require operation of the circulation pump motor, inlet and drain valves, and possibly the heater 87. However, there would be no operation of the bi-metal actuator 58 during these pre-rinse periods.

Assuming the detergent dispenser to have its charge of detergent and the placement in the dishwasher of the articles to be washed, the user closes the lid 4 and latches it closed. If the lid is equipped with a latch-operated switch, such as shown in Jellies U.S. Patent 3,005,065 of October 17, 1961, for example, the closure of the latch closes the switch 88 in the main power line which is assumed to be the usual 115 volt, A.C. domestic system. The user then rotates knob 83 to its "on" position. This brings cam C1 to its switch-closing position, energizing the timer motor 80 for continuous operation during the dishwashing, rinsing and drying cycles. Soon thereafter the timer motor operates cams C2 and C3 to energize circulation pump motor 84, and the inlet valve solenoid 85; the dishwashing apparatus accomplishes the flush-away rinse cycle. The continued operation through the remaining cycles, previously described, is apparent from the cam chart.

While there has been described what is at present thought to be the preferred embodiment of the invention, it will be appreciated that it is intended to cover in the appended claims all modifications which fall within the true spirit and scope of the invention.

I claim as my invention:

1. Dispensing apparatus, comprising in combination, a wall structure adapted to be mounted in a location in which one side thereof is exposed to impingement of water thereagainst, a first material container rotatably

8

mounted relative to said wall adjacent the said one side thereof, said container having first and second pockets adapted to contain a quantity of material to be dispensed, a cover normally shielding said pockets against exposure to water impingement, said cover being arranged whereby rotation of said container through a first predetermined arc empties said first pocket while said second pocket remains shielded and rotation of said shaft through a second predetermined arc empties said second pocket, a second material container disposed adjacent the opposite surface of said wall to be protected thereby from water action, a dispensing device operatively associated with said second container for abstracting a quantity of material therefrom, means for rotating said container and said dispensing device through a succession of arcs in a selected one of which said last-named device removes some material from its associated container, and means for actuating said shaft rotating means.

2. Dispensing apparatus, comprising, in combination, a wall structure adapted to be mounted in a location in which one side thereof is exposed to impingement of water thereagainst, a shaft rotatably mounted on said wall structure and extending therethrough, means remote from said one side for rotating said shaft in sequence through first and second and third arcs, a first material container mounted on said shaft outwardly of the said one side, said container having first and second pockets adapted to contain a quantity of material to be dispensed, a cover rotatably mounted relative to said container for normally shielding said pockets against exposure to water impingement, said cover being arranged whereby rotation of said shaft through said first arc empties said first pocket while said second pocket remains shielded and rotation of said shaft through said second arc empties said second pocket, a second material container fixed relative to said shaft and disposed outwardly of the opposite surface of said wall to be protected thereby from water action, a dispensing device adapted to be rotated by said shaft for abstracting a quantity of material from said second container only during a selected one of said three arcs of movement, means for conducting said last-named material through said wall, and means for actuating said shaft rotating means.

3. Dispensing apparatus, comprising, in combination, a wall structure adapted to be mounted in a location in which one side thereof is exposed to impingement of water thereagainst, a shaft rotatably mounted on said wall structure and extending therethrough, means for rotating said shaft in sequence through first and second and third arcs, a first material container mounted on said shaft adjacent the said one side of said wall structure, said container having first and second open-topped pockets adapted to contain a quantity of material to be dispensed, a cover normally enclosing the open tops of said pockets against entry of water, said cover being arranged whereby rotation of said shaft through said first arc empties said first pocket while said second pocket remains covered and rotation of said shaft through said second arc empties said second pocket, said cover, further, being manually rotatable to expose said pockets for loading, a second material container, means for mounting said second container remote from water action, a dispensing device for abstracting a quantity of material from said second container during a selected one of said arcs of movement, and means for actuating said shaft rotating means.

4. Dispensing apparatus according to claim 2, in which said first container comprises a cylindrical structure having open-topped pockets separated by a wall radial to the axis of rotation.

5. Dispensing apparatus according to claim 2, in which said second container includes an arcuate trough receiving material by gravity flow and said dispensing device comprises an arm arranged to sweep through said trough to pick up said material therefrom.

6. Dispensing apparatus, comprising, in combination, a substantially imperforate mounting plate, a shaft extending rotatably therethrough, a first material container fixed to said shaft for rotation therewith adjacent one side of said plate, said container having first and second open-topped pockets disposed side by side, a second material container fixed relative to said shaft on the opposite side of said plate, a dispensing device fixed on said shaft for passage through said second container, spring means for effecting rotation of said shaft, means for latching said shaft against rotation, said latching means releasably establishing said first container with the pockets thereof in an upright position and said dispensing device in non-dispensing position relative to the material in said second container, mechanism for effecting a step-by-step rotation of said shaft through a total arc of more than one hundred eighty degrees, means for effecting a first rotation sufficient only to dump the material from said first container, means for effecting a second rotation sufficient only to dump the material from second container, and means for effecting a third rotation sufficient to cause said dispensing device to dispense a quantity of material from said second container.

7. Dispensing apparatus according to claim 6, in which said latching and shaft rotating means comprises an escapement mechanism including a triggering finger arranged to effect a controlled rotation thereof.

8. Dispensing apparatus according to claim 7, in which said triggering finger is actuated by a lever mechanism arranged to move said finger between first and second positions respectively releasing and engaging said escapement mechanism to effect the successive rotations of said shaft.

9. Dispensing apparatus according to claim 6, in which said latching and shaft rotating means comprises an escapement mechanism, and an electrically energized member for operating said escapement mechanism to release said shaft for rotation and to effect the subsequent rotations thereof.

10. Dispensing apparatus according to claim 9, in which said electrically energized member comprises a bimetal element adapted to be heated by passage of electric current therethrough.

11. Dispensing apparatus according to claim 9, in which said electrically energized member comprises a bimetal element adapted to be heated by electrical energy.

12. Dispensing apparatus comprising, in combination, a frame, a shaft rotatably mounted therein, a first material container fixed to said shaft for rotation therewith, said container being arranged to discharge a first portion of its contents upon rotation through a first predetermined arc, and a second portion of its contents upon rotation through a second predetermined arc, a second material container fixed relative to said shaft, a dispensing device rotatable by said shaft through said second container for discharging a quantity of material from said second container upon rotation of said shaft through a third arc, mechanism for rotating said shaft sequentially through said first and second and third arcs, and means for actuating said mechanism.

13. Dispensing apparatus, comprising, in combination, a support structure including a plate adapted to be mounted on a wall in an environment in which one side of said plate is exposed to impingement of water thereagainst, a shaft rotatably mounted in said plate and extending therethrough, means for rotating said shaft in sequence through first and second and third arcs, a first material container mounted on said shaft adjacent said one side of said plate, said container having first and second pockets adapted to contain a quantity of material to be dispensed, a cover normally shielding said pockets against exposure to water impingement, said cover being arranged whereby rotation of said shaft through said first arc empties said first pocket while said second pocket remains shielded

and rotation of said shaft through said second are empties said second pocket, a second material container fixed relative to said shaft and disposed adjacent the opposite side of said plate to be protected thereby from water action, a dispensing device mounted on said shaft for movement thereby relative to said second container, said dispensing device being arranged to abstract a quantity of material from said second container during one, only, of said arcs of movement of said shaft, means for conducting said abstracted quantity of material through said plate, and means for actuating said shaft rotating means.

14. Dispensing apparatus comprising:

a scoop;

a reservoir for containing a treating agent;

operating means for (1) moving said scoop at a predetermined time from a position within said reservoir in a direction to retain agent within said scoop, and (2) abruptly stopping said scoop so as to cause the agent it contains to fly out by momentum;

a cup-like receiving structure arranged to overflow into said reservoir and having a discharge passage adjacent the bottom thereof, said receiving structure being positioned to catch enough of the agent flying out of said scoop at least to fill said receiving structure;

said scoop having a substantially larger capacity than said receiving structure thereby to insure discharge of a uniform amount of agent through said passage.

15. Dispensing apparatus comprising:

a scoop mounted for rotation in a substantially vertical plane;

a reservoir for containing a treating agent positioned below the axis of rotation of said scoop;

operating means for (1) abruptly rotating said scoop at a predetermined time through an arc from a substantially downward position, where it is within said reservoir, upwardly in the direction for retaining agent within said scoop and (2) abruptly stopping rotation of said scoop at the end of said arc so as to cause the agent it contains to fly out by momentum;

a cup-like receiving structure arranged above said reservoir so as to overflow thereinto, and having a discharge passage adjacent the bottom thereof, said receiving structure being positioned to catch enough of the agent flying out of said scoop to fill said receiving structure;

said scoop having a substantially larger capacity than said receiving structure thereby to insure discharge of a uniform amount through said passage.

16. The apparatus defined in claim 15 wherein said scoop is secured on a substantially horizontally extending shaft, and said operating means comprises an escapement mechanism and is arranged to operate said scoop by rotation of said shaft.

17. Dispensing apparatus comprising, in combination:

a support structure including a wall positioned in an environment in which one side of said wall is exposed to impingement of water thereagainst;

a shaft substantially horizontally mounted in said wall and extending therethrough;

means for abruptly rotating said shaft through first and second arcs;

a material container mounted on said shaft on the side of said wall exposed to impingement of water thereagainst, said container being arranged to discharge its contents during one of the arcuate rotations of said shaft;

a scoop secured to said shaft on the other side of said wall and rotatable in a vertical plane;

a reservoir for containing a treating agent positioned beneath said shaft, said scoop rotating through said reservoir in a direction to retain agent within said scoop during one of said arcuate rotations of said shaft;

11

a cup-like receiving structure arranged to overflow into said reservoir and having a discharge passage adjacent the bottom thereof extending through said wall, said receiving structure being positioned to catch enough agent flying out of said scoop by momentum at the end of said one arcuate rotation at least to fill said receiving structure; 5
 said scoop having a substantially larger capacity than said receiving structure thereby to insure discharge of a uniform amount through said passage. 10
18. Dispensing apparatus comprising: 10
 a support structure;
 a shaft rotatably mounted on said support structure; energy storing and releasing means for causing rotation of said shaft from a starting position to a finishing position; 15
 means cooperating with said energy storing and releasing means to divide rotation of said shaft into at least two abrupt arcuate movements of said shaft; 20
 a container including a wall forming a pair of cups for containing treating agent secured to said shaft; a cover rotatably mounted relative to said support structure and to said container, said cover being biased to a position wherein it covers said cups in starting position of said shaft and prevents discharge of the agent in said cups; 25
 movement of said shaft through a first arc causing said first cup to have its opening move from beneath

12

said cover into exposed position whereby the contents of said first cup are discharged, movement of said shaft through a second arc causing said second cup to have its opening move from beneath said cover into exposed position so that the contents thereof are discharged;
 said container and cover being manually rotatable together, after shaft movement to said finishing position to effect storing of energy in said energy storing means and to return said cups to their loading position with the cover open, said cover thereafter being manually returnable to its biased position.

References Cited by the Examiner

UNITED STATES PATENTS

1,200,269	10/16	Talbert	-----	222—369	X
1,801,004	4/31	Holcomb	-----	222—369	
2,295,258	9/42	Cann	-----	222—139	X
2,401,345	6/46	Finney	-----	222—369	X
2,532,698	12/50	Corkins	-----	222—139	X
2,729,365	1/56	Fettkether et al.	-----	222—369	X
3,043,479	7/62	Gaukstern	-----	222—70	X
3,062,412	11/62	Cushing	-----	222—70	X
3,091,371	5/63	Marx et al.	-----	222—70	X

M. HENSON WOOD, JR., *Primary Examiner.*