A multiple charge dispenser has two compartments formed integral with the inner panel of a dishwasher door. A semi-circular lid selectively uncovers one or both of the compartments to sequentially dispense therefrom. The lid is on one end of a pivot shaft which extends through the inner door panel to receive a latch plate on the other side of the panel. Lid and latch plate are spring-biased to pivot together from a CLOSED position to an OPEN position with an INTERMEDIATE position therebetween. Such positions are defined by CLOSED, INTERMEDIATE and OPEN dispensing stops formed along one side of a slot in the latch plate. A detent which is stationary relative to the pivotal movement of the latch plate is normally biased toward the side of the slot with the dispensing stops to engage sequentially each one of the stops as the latch plate pivots past the detent. The opposite side of the slot has a pause stop pivotally between the CLOSED and INTERMEDIATE dispensing stops. A solenoid is energized to shuttle the detent away from said one side of the slot for releasing the CLOSED dispensing stop and to move the detent to the opposite side of the slot for intercepting the pause stop as the lid pivots. This causes the lid to substantially uncover one of the compartments. The solenoid is deenergized and the detent return shuts to its normal position in time to intercept the INTERMEDIATE dispensing stop thereby to condition the latch plate and, thus, the lid to uncover the other compartment when next the solenoid is energized.

6 Claims, 11 Drawing Figures
WASHING AGENT DISPENSER FOR DISHWASHER

This invention relates to a detergent dispenser for a dishwasher and, more particularly, to a dishwasher dispenser using a single electrical actuating device to dispense a plurality of separate charges of detergent for use throughout a dishwashing cycle.

Prior art dishwashing cycles have been timer-controlled automatically to advance sequentially through a plurality of soaking, washing and rinsing operations. In each of such operations, washing agents or detergents have been dispensed into the working fluid as an aid in removing soil from dishwasher or the like. Such multiple charge dispensing has in the past required either a plurality of separate dispensers each controlled by its own actuating device or a multiple step cam for selectively releasing each charge from a single dispenser by moving the lid or lids thereof at the right time and for the right distance throughout the washing cycle. Separate dispensers are expensive; and the problem with a multiple step cam is that close tolerances must be held in the mechanical linkage between lid and cam so that the lid will retain its proper orientation with respect to the dispenser body and the washing cycle. In the latter instance, moreover, the distance between a remote timer and the dispenser complicates the design of a mechanical linkage to span such distance and actuate the dispenser.

Accordingly, a general object of this invention is the provision of an improved dispenser having a shuttle step electrical actuating device repeatedly energizable to separately dispense multiple charges from different compartments in the dispenser at different times.

A further general object is the provision in a multiple charge dispenser of a unitary dispenser lid movable in successive steps to separately dispense each of said multiple charges, a movement of said lid throughout said multiple steps being controlled by a one-step solenoid which actuates a detent to shuttle between lid stops at each end of the step.

Another object of this invention is a two charge dispenser having a dispenser lid and latch plate at opposite ends of a pivot shaft for movement together, and a one-step solenoid-actuated detent which selectively engages both sides of a slot in the latch plate, said detent engaging one side of the slot to establish first and second dispensing positions for the lid and engaging the other side of said slot to precondition the latch plate for establishing said first dispensing position when the detent returns to said one side of said slot.

A more particular object of this invention is the provision of an improved dispenser having a pocket and two compartments formed in the inner door panel of a horizontally hinged dishwasher door and adapted to receive multiple charges of washing agent and wherein the pocket dispenses a first charge when the door is closed, said dispenser further having a lid for selectively uncovering the two compartments, said lid moving in one direction in response to a spring-biased latch plate and a release mechanism which is selectively electrically energizable to move in one step between two positions to engage inboard or outboard stops on the latch plate; the step (1) to dispense a second charge from one compartment when said release mechanism is energized to disengage a first inboard stop and to engage an outboard stop and (2) to condition the dispenser for dispensing from the other compartment when said release mechanism is deenergized to engage a second inboard stop and (3) to dispense a third charge from the other compartment when said release mechanism is subsequently energized to disengage said second inboard stop.

Another object of this invention is a multiple charge dispenser having a dispenser lid and lid latch connected and biased for movement together in one direction, and a shuttle step, two position detent selectively engageable with successive stops on the lid latch at each of the two detent positions, said detent engaging successive dispensing stops at one of said detent positions to establish a plurality of dispensing orientations for the lid and engaging a pause stop between successive dispensing stops at the other of said detent positions to precondition the lid latch for establishing a first lid dispensing orientation while preparing for the next following lid orientation when the detent returns to said one of said detent positions.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a embodiment of the present invention is clearly shown.

IN THE DRAWINGS:

FIG. 1 is a perspective view of a dishwasher having the multiple charge dispenser of this invention on the inner panel of a horizontally hinged dishwasher door;

FIG. 2 is a fragmentary view of the dishwasher door from the front side thereof with a portion of the outer door panel broken away to show the dispenser actuating mechanism deenergized to show a latch plate in its CLOSED position when the dispenser lid is in the CLOSED position of FIG. 3;

FIG. 3 is a fragmentary elevational view of the dispenser in the inner door panel showing the dispenser lid in its CLOSED position and exposing a manual dump pocket thereabove;

FIG. 4 is a fragmentary elevational view of the dispenser in the inner door panel showing the dispenser lid in its INTERMEDIATE position for automatically dispensing a first charge of detergent;

FIG. 5 is a fragmentary elevational view of the dispenser in the inner door panel showing the lid in its OPEN position for automatically dispensing a second charge of detergent;

FIG. 6 is a fragmentary elevational view similar to FIG. 2 but with the actuating mechanism energized to show the latch plate in its pause stop position when the dispenser lid is in the pause stop position of FIG. 4 (solid line);

FIG. 7 is an elevational view similar to FIG. 2 with the actuating mechanism deenergized to show the latch plate in its INTERMEDIATE position when the dispenser lid is in the INTERMEDIATE position of FIG. 4 (phantom line);

FIG. 8 is an elevational view similar to FIG. 2 with the actuating mechanism energized (solid line) and deenergized (phantom line) to show the latch plate in its OPEN position when the dispenser lid is in the OPEN position of FIG. 5;

FIG. 9 is a fragmentary sectional view partly in elevation through the dishwasher door and dispenser taken along line 9—9 in FIG. 2;

FIG. 10 is a fragmentary sectional view through the dishwasher door and dispenser taken along line 10—10 in FIG. 2; and
FIG. 11 is a fragmentary sectional view through the dishwasher door and dispenser taken along line 11—11 in FIG. 2.

In accordance with this invention, a dishwasher 10 (FIG. 1) has a front opening 12 closed by a door 14 hingedly mounted at 16 for movement about a horizontal axis. Door 14 has a molded plastic inner door panel 18 which supports the dispenser shown generally at 20. Dispenser 20 is comprised of a bottom container portion 22 formed or molded as an integral part of the inner panel 18 of the door. A generally semi-circular dispenser lid 24 is adapted for pivotal movement with respect to the container portion 22. An integrally molded pocket 26 in the container portion is adapted to contain and manually dump an initial detergent charge when the door is closed.

Two dispensing compartments 30, 32 are also formed in the container portion. Lid 24 is configured to cover both compartments when in a CLOSED position (FIG. 3); uncover compartment 30 while continuing to cover compartment 32 when in an INTERMEDIATE position (FIG. 4); and uncover both compartments when in an OPEN position (FIG. 5).

The container 22 is also formed with ribs to divert water from the granular detergent adapted to be held in compartments 30, 32. For this purpose, an inverted V-shaped diverter rib 34 forms a water shelf over the two compartments. It also forms one side of pocket 26. Thus, diverter 34 sheds water in both directions toward an annular trough or channel 38 which wraps around the underside of both compartments. Trough 38 is formed in part by a plateau 39 from which a rib or rim 40 projects to circumscribe and define the opening of compartment 30 and a rib or rim 42 projects to circumscribe and define the opening of compartment 32. The tops of ribs 34, 40 and 42 lie in the same plane and provide a bearing surface for the underside of lid 24.

Dispenser lid 24 is keyed to a lid release or latch plate 44 behind the inner door panel 18. In particular, lid 24 has a bearing portion 45 forming a central cavity 46 in the center of which is an upstanding cylindrical spring retainer 48. Retainer 48 has a cutout section 50 as keyway. A PUSH TO RELEASE button 52 nests within cavity 46 and has a key 53 (FIG. 11) interfitting with keyway 50 in the retainer to interconnect lid and button for pivotal movement together. The button has a stem or pivot shaft 54 extending through the retainer and through a hub 56 on the back side of dispenser container portion 22. The hub forms the pivot axis for pivot shaft 54 and, thus, for lid 24. The other end of pivot shaft 54 is keyed as at 55 (FIG. 11) to a hub 57 on the lid release plate 44. A lid release spring 60 is assembled in a cavity 62 of hub 56 and connected (FIG. 9) at one end 64 to the hub and at its other end 66 to the lid release plate 44. Spring 60 is wrapped in torsion to apply a lid-opening bias to the lid release plate that will, through its keyed connections 50–53 and 55, move lid 24 in a direction to uncover compartments 30 and 32 in sequence. A retainer pin 70 extends through indexed holes in the hub of the lid release plate and the pivot shaft 54 to lock the dispenser parts in assembled relationship.

It is desirable to prevent water from leaking to the actuating parts of the dispenser which lie between the inner and outer door panels. For this purpose, a circular rib 72 rims the opening to a socket 80 in the container portion provided for journaling the bearing portion 45 of the lid. The underside of the lid slides as it pivots on the top of rib 72 to resist the entry of water into socket 80. An annular rubber seal 82 in a recess at the bottom of socket 80 sealingly bears against the underside of lid bearing portion 45 and against the side of pivot shaft 54 to prevent the passage of water along the pivot shaft.

A release mechanism 90 for the dispenser is positioned between the inner and outer door panels and alongside lid release plate 44. It is comprised of a solenoid 92 and a detent or finger 94 interconnected by the solenoid armature 96. Solenoid 92 is carried in a U-shaped bracket 98 supported on a boss 100 on the back side of inner door panel 18. Another boss 102 supports a shuttle track 104 which guides detent 94 as it shuttles back and forth in response to the brief periodic energization of the solenoid. Armature 96 pulls detent 94 in one direction while a spring 106 pushes the detent in a return direction.

The shuttling movement of the solenoid-actuated detent is used in combination with a specially configured lid release or latch plate 44 to achieve the successive uncovering of dispenser compartments 30, 32. More particularly and with reference to FIG. 7, the lid release plate is formed with an annular or arcuate slot 110 defined by an inboard track 112 and an outboard track 114. In general, dispensing stops A, C and D are provided along the inboard track which correspond respectively to each orientation desired for lid 24 with respect to the dispensing compartments 30, 32. The number of dispensing stops will depend on the number of compartments from which material is to be dispensed. Thus in the dispenser embodiment illustrated, stop A corresponds to a lid orientation covering both compartments 30 and 32, i.e., CLOSED; stop C corresponds to lid orientation uncovering compartment 30 while maintaining compartment 32 covered, i.e., INTERMEDIATE; and stop D corresponds to a lid orientation in which the next succeeding compartment 32 is uncovered, i.e., OPEN.

Between the pair of successive dispensing stops A, C is a pause stop B on the outboard track 114 of the lid release plate. Pause stop B is laterally displaced from the inboard track a distance equal to the solenoid-actuated stroke of detent 94. Pause stop B also leads dispensing stop C by approximately 10° relative to the pivoting movement of lid release plate 44. It should be understood that for each pair of dispensing stops corresponding to successive lid orientations to uncover successive compartments, there would be a pause stop therebetween. If, for instance, the dispenser had a third compartment similar to the next following compartment 32, then there would be another pause stop like B between dispensing stops C and D. Of course, in such modification, lid 24 would be reconfigured to cover the third compartment as well as compartments 30, 32.

Assume now that dishwasher 10 has been programmed for a timed dishwashing cycle. Detergent has been placed in pocket 26 for the soak portion of the cycle; in compartment 30 for the first wash portion of the cycle; and in compartment 32 for the second wash portion of the cycle. The compartments are covered by grasping a rib 120 on the lid and pivoting the lid in a spring-wrapping direction against the bias of torsion spring 60. Such lid movement covers the compartments, first 32 and then 30. During this movement, detent 94 is biased by spring 106 to slingly ride on in-
board track 112 and to act as a ratchet as the dispensing stops slide by. When the detent slips into the notch beside dispensing stop A, the compartments are covered and the dispenser is ready for use (FIGS. 2 and 3). When the dishwasher door is closed, detergent in pocket 26 falls into the tub and is used for the soak position of the timed cycle. At the beginning of the second fill, solenoid 92 is briefly energized as the dishwasher timer. Solenoid armature 96 pulls detent 94 from slot A to its outward position along track 114 allowing lid release spring 60 to turn lid release plate 44 approximately 80° until lever 94 strikes pause stop B (FIGS. 6 and 4 — solid line). Since dispenser lid 24 turns with the plate, pocket 30 in the door is uncovered to allow the detergent to fall into the tub. As soon as solenoid 94 is deenergized by the dishwasher timer (actually within 8 to 20 seconds, but acceptably within 1 second), the armature spring 106 pushes detent 94 from pause stop B so that plate 44 may turn approximately 10° further until dispensing stop C strikes detent 94 (FIGS. 7 and 4 — phantom line). At the beginning of a third fill in the timed dishwashing cycle, solenoid 92 is again briefly energized to pull detent 94 away from stop C. This allows plate 44 and lid 24 to pivot again this time approximately 90° to stop D (FIGS. 8 and 5). This action uncovers compartment 32 and detergent may then fall into the tub for the second wash portion of the dishwashing cycle.

It may be that lid 24 has been inadvertently closed and the user would like to uncover the compartments manually. The push-to-release button 52 serves this purpose. A plate spring 126 in compression between lid 24 and lid release button 52 biases the lid release plate toward the container portion 22 of the dispenser so that solenoid-actuated detent 94 is in alignment with and may engage stops A, B, C, and D on the lid release plate as they pass. By pushing lid release button 52, the stops on lid release plate 44 move axially away from detent 94 so that the plate escapes the blocking action of the detent and is pivoted by the lid release spring 60 back to the OPEN position.

The foregoing describes an improved dispenser which utilizes the brief shutting action of a single solenoid-actuated detent to progress progressively from a series of progressively oriented compartments by successively moving a single lid in one direction to a plurality of uncovering positions. It is within the purview of this invention to increase the number of compartments and dispensing functions. This may be done by extending the configuration of the lid to cover the additional compartments and by modifying the lid release plate to include at one end of the detent's shuttle step additional dispensing stops for the additional compartments, each pair of which dispensing stops have a pause stop between at the other end of said shuttle step.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is:

1. A multiple charge dispenser comprising a container having a plurality of compartments and a lid adapted to cover all of said compartments and successively uncover each of said compartments, said lid having successive dispensing and pause stops affixed thereto and biased for movement therewith in one direction as said lid successively uncovers each of said compartments, a successive pair of said dispensing stops having a pause stop therebetween and laterally spaced therefrom during the movement of said stops in said one direction, and a detent for releasing said lid for biased movement in said one direction, said detent repeatedly movable in a shuttle step between a first detent position in alignment with the biased movement of said dispensing stops and a second detent position in alignment with the biased movement of a pause stop, the length of said shuttle step being equal to the lateral spacing between the dispensing stops and said pause stop, said detent as it moves repeatedly to said first detent position engaging successive dispensing stops to establish a plurality of lid orientations with respect to the compartments, and said detent as it moves to said second detent position engaging said pause stop between the establishment of successive lid orientations to precondition one of said pair of dispensing stops and said lid for establishing one lid orientation to uncover one of said compartments when said detent next moves to said first detent position, said detent as it subsequently again moves to said second detent position releasing said one of said pair of dispensing stops and said lid for biased movement of the lid and stops to the next following lid orientation to uncover the next succeeding one of said compartments.

2. The dispenser of claim 1 wherein the dispensing and pause stops of the lid are arranged respectively along the inboard and outboard sides of a track in a lid release plate affixed for movement with said lid and wherein the detent is movable in said track between said sides.

3. A multiple charge dispenser comprising a container having a plurality of compartments arranged in an arc and a lid adapted to cover all of said compartments and pivot successively to uncover each of said compartments, said lid including a lid release plate connected thereto for movement therewith, said lid release plate having successive dispensing and pause stops arranged in an arc thereon and biased for movement therewith in one arcuate direction as said lid pivots successively to uncover each of said compartments, a successive pair of said dispensing stops being located on an inboard track of said lid release plate and having a pause stop therebetween and laterally spaced therefrom outboard of said dispensing stops during the movement of said stops in said one arcuate direction, and a detent for releasing said lid release plate for biased movement in said one arcuate direction, said detent being normally biased against said inboard track for relative sliding movement therealong and repeatedly movable in a solenoid-actuated shuttle step between a first detent position against said inboard track and in alignment with the biased movement of said dispensing stops when the solenoid is selectively energized in one manner and a second detent position in alignment with the biased movement of a pause stop when the solenoid is selectively energized in another manner, the length of said shuttle step being equal to the stroke of the solenoid armature and to the lateral spacing between the dispensing stops on said inboard track and the outboard pause stop, said detent as it moves repeatedly to said first detent position in response to its normal bias and the selective energization of the solenoid in said one manner engaging successive dispensing stops to establish a plurality of pivotal lid orientations with respect to the compartments, and said detent as it moves to said second detent position in response
to the selective energization of the solenoid in said other manner engaging said pause stop between the establishment of successive lid orientations to precondition one of said pair of dispensing stops and said lid for establishing one lid orientation to uncover one of said compartments when said detent next moves to said first detent position, said detent as it subsequently again moves to said second detent position releasing said one of said pair of dispensing stops and said lid for biased movement of the lid and stops to the next following lid orientation to uncover the next succeeding one of said compartments.

4. The multiple charge dispenser of claim 3 wherein substantially a 10° arc separates said pause stop and said one of said pair of dispensing stops and the normal bias of said detent is sufficient to move said detent from said second detent position in engagement with said pause stop to said first detent position in time to engage said one of said pair of dispensing stops during biased movement of said lid release plate in said one arcuate direction.

5. In combination with the horizontally hinged door for a dishwashing chamber, a dispensing device on the inner panel of said door for receiving multiple charges of detergent or the like when the door is horizontally open and for dispensing said multiple charges into said chamber when said door is vertically closed, said device comprising a generally circular body having formed therein a pair of side-by-side, open-ended compartments with the openings to said compartments in a common plane and facing in one direction normal to the inner door panel, cover movable between CLOSED, INTERMEDIATE and OPEN positions, said cover configured to cover both of said openings when said cover is in its CLOSED position, uncover one of said openings and close the other of said openings when said cover is in its INTERMEDIATE position and uncover both of said openings when said cover is in its OPEN position, means mounting said cover for pivotal movement in said plane between said positions about a pivot axis in the center of said circular body to selectively cover and uncover the openings to said compartments, said mounting means including an operating pivot shaft extending along said pivot axis and attached at one end thereof to said cover for pivotal movement with said cover, torsion spring means around said pivot shaft tending to pivot said cover from its CLOSED position toward its INTERMEDIATE and OPEN positions, a lid release plate attached to the other end of said pivot shaft for pivotal movement therewith in a plane parallel with the plane of said cover as said cover moves between said positions, said lid release plate including a semi-circular slot therein having a plurality of dispensing stop means along one side thereof corresponding respectively to the CLOSED and INTERMEDIATE positions of said cover for opposing the tendency of said torsion spring means to pivot said cover toward its OPEN position, pause stop means along the opposite side of said slot corresponding to a position of said cover between its CLOSED and INTERMEDIATE positions, a detent within said slot normally spring-biased to engage the side of said slot having said dispensing stop means, and a solenoid-actuated, two position shuttle release mechanism connected to said detent and operable to one of its positions for shutting said detent from the side of said slot having said dispensing stop means to the opposite side thereof to release the opposition of said dispensing stop means to the tendency of said torsion spring means to pivot said cover so that said torsion spring means pivots said cover from its CLOSED position toward its INTERMEDIATE position and pivots said lid release plate to move said pause stop means into engagement with said detent after said detent has been shuttled to the opposite side of said slot, said detent after the operation of said release mechanism to the other of its two positions and substantially immediately after engagement with said pause stop means returning to the side of said slot with said dispensing stop means in time for engaging the one of said plurality of dispensing stop means corresponding to the INTERMEDIATE position of said cover thereby to uncover the opening to one of said compartments for dispensing therefrom while maintaining the opening to the other of said compartments closed, said release mechanism reoperating to one of its positions for shuttling said detent out of engagement with the last named one of said plurality of dispensing stop means thereby to release said lid release plate to uncover the opening to the other of said compartments for dispensing therefrom by moving said cover to its OPEN position.

6. The combination of claim 5 wherein the body of said dispensing device is a molded integral part of the inner door panel.

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