Mechanically actuated dispenser for dishwasher.

A structure for dispensing an additive into a wash chamber of a dishwashing apparatus at a predetermined stage in an operating cycle for the apparatus comprises a reservoir (34, 171) for a supply of additive, a cover (36, 181) movable between a closed position, wherein it seals the reservoir (34, 171) and an open position, wherein the reservoir is in communication with the wash chamber, and a timer mechanism (20) which moves a link (70) through a prescribed path as the dishwashing apparatus cycles and at one stage in the cycle moves the link (70) through a portion of the path in a first direction and at another stage the link retraces the path portion in an opposite direction. As the link (70) moves in the first direction it intercepts and moves a trigger arm (138, 208) and an associated member (62, 183) so that the cover (36, 181) moves from its closed position to its open position. Movement of the link (70) in the opposite direction causes the trigger arm (138, 208) to move relative to its associated member and the link portion encounters and moves beyond the trigger arm (138, 208) without moving the cover (36, 181) so that the cover (36, 181) is maintained in its closed position. This enables the apparatus to be manually reset without unrequired dispensing of additive.
This invention relates to dishwashing apparatus and, more particularly, to a structure for controlling the release of an additive into a wash chamber at a predetermined stage in an operating cycle.

It is known to provide a cover for a reservoir and an associated solenoid controlled by a timer automatically to move the cover to an open position at a predetermined stage in an operating cycle, so that an additive is released. It is also known to provide a mechanical linkage which is operated by a timer mechanism to control the cover, as exemplified in each of US-A-2872076, US-A-3012565 and US-A-3102664.

In each of these a structure for dispensing an additive in a dishwashing apparatus having a timer comprises:

- a reservoir for storing a supply of additive and having an outlet opening to a wash chamber;
- a cover movable between (a) a closed position wherein the cover prevents escape of additive from the reservoir outlet into the wash chamber and (b) an open position permitting the reservoir outlet to be in communication with the wash chamber;
- a member provided to interconnect the timer mechanism and the cover; and
- moving means driven by the timer mechanism for moving the member through a prescribed path in response to operation of the timer mechanism as the dishwashing apparatus is cycled through an operating cycle, the moving means moving the member in a first direction through a portion of the path during one part of the operating cycle and moving the member to retrace said portion of the path in an opposite direction during another part of the operating cycle.

The principal drawback with such structure is that if operation is interrupted in mid-cycle by the user and the user manually resets the timer, the cover will then be open at the beginning of the reset cycle and the additive is discharged before the stage in the cycle where discharge is required, for example, during a later wash cycle. Alternatively, the user has to open the door recharge the reservoir and manually reclose the cover, which is inconvenient.

This problem is also encountered where metered delivery of an additive occurs automatically in an operating cycle. If a user manually cycles the apparatus, the release of multiple charges of additive may result.

According to this invention such a structure for dispensing an additive also includes trigger means engageable by the member and engaging the cover for (a) engagement by the member to disengage the cover to allow it to move from its closed position to its open position as the member moves in said first direction over the part of the path, and (b) engagement by the member to move relative to the member as the member moves in the opposite direction over the part of the path without disengaging the cover from its closed position to its open position.

The invention may also be incorporated into structure wherein automatic, metered delivery of a charge of liquid from a container occurs during the operating cycle. In one exemplary structure, a plunger is spring biased to a sealing position on a liquid additive container. As the link moves in one direction, portion thereof engages an extension of the plunger and urges the plunger out of sealing engagement. The link moves against and beyond the extension in the path portion and upon the link passing the extension, the plunger resets. Movement of the link in the opposite direction collapses the extension without unseating the plunger.

Accordingly, through a very simply mechanical structure, inadvertent release of the cover upon manually resetting of the timer mechanism is prevented.

A particular example of a mechanism in accordance with this invention will now be described with reference to the accompanying drawings; in which:-

Figure 1 is a perspective view of a dishwashing apparatus incorporating additive dispensing structure according to the present invention;

Figure 2 is a perspective view of the additive dispensing structure on the inside of a door of the dishwashing apparatus and with a cover for a detergent reservoir in a closed position;

Figure 3 is a perspective view of the detergent reservoir in Fig. 2 with the cover in an open position;

Figure 4 is an enlarged sectional view of the detergent reservoir and associated cover generally along line 4-4 of Fig. 2;

Figure 5 is a front perspective view of the additive dispensing structure at a stage in the operating cycle prior to release of the cover for the detergent reservoir;

Figure 6 is a view similar to that in Fig. 5 with the detergent cover released to an open position;

Figure 7 is a view similar to that in Figs. 5 and 6 with the dispensing structure arranged to release a liquid additive;

Figure 8 is a view similar to that in Figs. 5-7 after the liquid additive has been released;

Figure 9 is an enlarged, sectional view of actuating structure for release of the liquid additive in a position prior to release thereof;

Figure 10 is a view similar to that in Fig. 9 at the point of release of the liquid additive;

Figure 11 is an enlarged, fragmentary, front elevation view of structure for controlling the interconnection of two elements on the dispensing structure; and

Figure 12 is a rear elevation view of a reservoir for containing liquid additive.

In Fig. 1 a dishwashing apparatus suitable for the incorporation of the present invention is shown at 10. The apparatus in Fig. 1 is an under-the-counter design and is floor mounted so that the top of the apparatus 10 resides closely beneath the underside 12 of a counter 14. A wash chamber at 15 accepts a
The wash chamber 15 has an opening at its front which is accessed through a hinged door 16, shown associated console 18 which houses the electrical voir 32 is always open to the wash chamber while timer mechanism 20. The console 18 conventional timer mechanism 20. The console 18 24 through which the user can manually cycle the operation of a conventional dishwashing apparatus typically includes alternating wash and rinse cycles followed by a dry cycle. Typically two different additives are released into the wash chamber. A detergent is mixed in the chamber 14 during separate wash cycles and a rinse aid additive releases in a rinse cycle late in the operating cycle to prevent formation of water stains on the dishes and utensils as they dry.

As seen in Figs. 2-4, the detergent is contained in two separate reservoirs 32, 34. The reservoirs 32, 34 and a mounting base 40 are integrally formed with a plastic and cooperatively define an elongate link that is fit on the inside door surface 43 and faces inwardly toward the chamber 14. Reservoir 32 is always open to the wash chamber while reservoir 34 has an associated cover 36 that is hinged about a pin 38 mounted in base 40 for movement between a closed position shown in Fig. 2, wherein the cover 36 seals the reservoir 34, and an open position, shown in Fig. 3, wherein the door pivots so that the reservoir 34 is in open communication with the wash chamber 14. The cover position is automatically controlled by structure hereafter described.

Before the user starts the apparatus 10, both reservoirs 32, 34 are filled with a supply of detergent. The cover 36, which is normally biased to its open position by a coil spring 44, is moved manually against the spring bias to the closed position in Fig. 2, wherein it covers the reservoir 34 and bears on the peripheral edge 46 about the reservoir 34. The cover 36 has an associated offset tab 48, which can be engaged by an enlarged head 49 having an inclined surface 51 at the free end of a pivotable latch arm 50 so that the head 49 blocks the cover 36 in its closed position.

The latch arm 50 is part of a pivotable latch assembly 52. The latch assembly 52 has a shaft 54, which extends through the wall 56 of the liner. The shaft 54 makes keyed connection inside the door with a body 58, from which the latch are 50 projects and has a splined portion 60 inside the door between the liner and front surface 30, which is splined to a lever 62 (Figs. 5, 6, 8 and 11). As seen in Figs. 5, 6, 8 and 11 and more fully described below, the lever 62 is biased by a coil spring 64 which urges the latch arm 50 in a counterclockwise direction in Fig. 2.

To lock the cover 36, the arm 50 is rotated clockwise in Fig. 2 by the action of tab 48 against inclined surface 51 as the cover 36 is rotated to its closed position sufficiently to allow clearance of the tab 48. With the cover 36 in its fully seated and closed position, the arm 50 passes tab 48 and is released so that the bias in spring 64 overtakes the arm and shifts it blockingly across the tab 48. To release the cover 36, the arm 50 must be pivoted against the bias of spring 64 downwardly to the position shown in phantom in Fig. 3 and, as this occurs, the cover will pivot open under the force of spring 44 to expose the inside of the reservoir 34 to the wash chamber 14. The first wash cycle uses the detergent in reservoir 32. A later wash cycle uses the detergent in reservoir 34 upon the cover 36 being released, which is accomplished automatically by the dispensing structure at 36, shown in detail in Figs. 5-11, as dictated by the controlling timer mechanism 20.

Referring now to Figs. 5-11, in which the inventive structure is detailed, it can be seen that the dispensing structure comprises generally a rotatable control cam 66, an associated cam follower 68 and an actuating member 70 which is joinable with the bottom free end 72 of the cam follower 68 as hereafter described. The cam follower 68 and actuating member 70 are preferably formed of plastic and cooperatively define an elongate link that is movable longitudinally thereof upon rotation of the control cam 66 which is driven by the timer through a drive pin 102 as the dishwashing apparatus is cycled by the timer mechanism 20 shown schematically in each of Figs. 5, 6 and 8.

At its lower end, the actuating member 70 mounts a pin 74 having oppositely projecting free ends 75, 78, which are admitted through the open end 80 of a support block 82 mounted on the liner 42 by conventional means such as screws through openings 83. The ends 76, 78 fit into spaced guide slots 84, which are formed in lateral block walls 86 and open towards each other. At the upper region of the actuating member 70, a T-shaped slot 88 having a cross bar 94 is defined. The liner 42 has an associated disk-shaped projection 90 with lugs 92 projecting in opposite directions from the faces thereof.

To assemble the actuating member 70, the pin ends 76, 78 are first introduced to the slots 84 and the member 70 is moved sufficiently downwardly to align the lugs 92 with the cross bar 94 of the T-shaped slot 88. With the lugs 92 directed entirely through the slot, the actuating member 70 can be shifted downwardly so that the lugs 92 overlie the forwardly facing surface 96 of the actuating member 70 and thereby confine forward tilting of the upper portion of the member 70 relative to the liner 42.

The cam follower 68 has an elongate body 98, defining a lengthwise rectangular slot 100, which accepts drive pin 102 projecting rearwardly of the door at the rotational axis of the cam 66. The pin guides vertical movement of the cam follower. The cam follower 68 has a forwardly projecting guide lug 104 which traverses the three step, cam surface 106 on the control cam 66. The cam follower 68 is biased upwardly by a coil spring 108 so that an upwardly facing guide surface 110 on the lug 104 maintains intimate contact with the cam surface 106 and the cam follower 68 responds positively and consistently.
to the movement of the control cam 66.

The upper region of the actuating member 70 defines an upwardly opening, rectangular recess 112 with an integrally formed row of teeth 114 extending lengthwise of the member 70 at one side of the recess 112. The cam follower 68 has at its lower free end a lengthwise row of teeth 116 for cooperation with the teeth 114 on the actuating member 70. The lower portion of the cam follower has a weakening cut-out 118 which defines a flexible side 120 that is collapsible into the cut-out 118 to effectively narrow the width of the cam follower 68 at its bottom portion. The bottom of the cam follower has a rounded leading edge 122 for guiding the cam follower into the recess 112 in the member 70.

By moving the cam follower 68 and member 70 towards each other in a longitudinal direction, with the lower portion of the cam follower introduced to the recess 112, the teeth progressively engage to move the control cam 66. The cooperating rows of teeth 112, 114, make it possible for the cam follower 68 and member 70 to be locked relative to each other in a plurality of longitudinal positions as dictated by the number and spacing of teeth.

The lever 62 is used to establish a desired relationship between the cam follower and member 70. The lever 62 has an associated arm 124 with a surface 126 at its free end that can be disposed beneath a downwardly facing shoulder 128 on the member 70. The surface 126 is placed in the path of the shoulder by pivoting the lever 62 about the lever shaft 54 in a counterclockwise direction, until, as shown in Fig. 11, a flat surface 130 on the arm 124 facially encounters a laterally facing surface 132 on the actuating member 70. The actuating member 70 can be shifted downwardly with the surfaces 130, 132 against each other until the surface 126 and shoulder 128 abut, at which point further downward shifting of the actuating member 70 is arrested.

With the cam follower 68 in operative relationship with the control cam 66 and the free end of the cam follower introduced at the top of the recess 112, the cam 66 can be manually rotated through the knob 24 in a complete operating cycle. The rows of teeth 114, 116 will progressively increase in overlap until the extreme downward travel position of the cam follower is realized. The combined length of the cam follower 68 and actuating member 70 can be precisely established by the assembler and connection involves only the simple steps of pivoting the lever 62 to abut the actuating member 70 and thereafter manually cycling the control cam 66. Not only does this assure consistent, predetermined relationship between the actuating member and cam follower, but it also assures that undue stress is not transmitted through the linkage between the timer mechanism 20 and lever 62 during assembly and operation. After the actuating member 70 reaches its downwardmost travel position, it will be drawn upwardly and, as this occurs, the bias of spring 64 will urge the lever 62 to its normal position in a clockwise direction from that shown in Fig. 11.

To facilitate separation of the cam follower 68 and actuating member 70, the front side of the recess 112 is open. This permits the cam follower to be drawn rearwardly of the door to separate the teeth on the cam follower and actuating member and obviates having to force the teeth on the cam follower over the teeth on the actuating member by moving the cam follower 68 and actuating member 70 longitudinally away from each other.

It can be seen that the contour of cam surface 106 causes joined cam follower 68 and actuating member 70 to follow a reciprocating path as the apparatus is cycled. The cam follower 68 is urged progressively downwardly from its Fig. 8 position as the cam rotates clockwise in Fig. 8. The extreme downward position of the cam follower is achieved with the lug at the position immediately adjacent the first cam step 134 (Fig. 5). A second cam step 136 moves the cam follower from an intermediate position to its Fig. 8 position upon continued rotation of the cam.

Operation of the detergent door latch in response to movement of the cam follower 68 and actuating member 70 is accomplished through the cooperation of a lateral projection 137 on the actuating member 70 with a trigger arm 138 associated with the lever 62. The trigger arm 138 has a cylindrical portion 140 which snaps into a cylindrical slot 142 on the lever so that the trigger arm 138 pivots about an axis substantially parallel to but spaced from the axis of pivoting of the shaft 54. The trigger arm 138 has a laterally projecting, flat surface 144 which is borne by the force of spring 64, connected between the trigger are 138 and support block 82, facially against the force of spring 64, connected between the trigger and support block 82, facially against a laterally facing surface 146 on the lever 62. This imparts the aforementioned bias to the lever 62 in the clockwise direction in Figs. 5, 6, 8 and 11.

The free end of the trigger arm 138 has an enlarged head 148 which projects rearwardly of the lever 62 and into the path of movement of the lateral projection 137 of the actuating member 70. Upon the actuating member 70 moving from its Fig. 5 position towards a later wash cycle, the member 70 moves upwardly at cam surface 134 and bears an upwardly directed edge 150 against the underside of the enlarged head 148 of the trigger arm, thereby causing a counterclockwise rotation to be imparted to the lever 62 and as an incident thereof of the latch arm 50 pivots from its Fig. 3 position to the position shown in phantom in Fig. 3 so that the cover 36 is released and moves to an open position in preparation for the subsequent wash cycle. Continued operation of the timer mechanism causes the projection 137 to pass vertically beyond the enlarged head 148 of the trigger arm 138 at which point the spring 64 draws the trigger arm and lever 62 clockwise to its position in Figs. 5, 6, 8 and 11.
Sometimes, a user may interrupt operation of the dishwashing apparatus in mid-cycle. For example, with the dispensing structure in the Fig. 8 position, a user may manually reset the timer mechanism 20. This involves moving the cam follower and associated actuating mechanism from the Fig. 8 position to the Fig. 5 position. This can be accomplished with the inventive structure without having to reset the cover 36 and is made possible by the connection of the trigger arm with the lever.

According to the invention, the trigger arm is rotatable counterclockwise in Figs. 5, 6, 8 and 11 relative to the lever against only the resistance developed by the spring 64. As the bottom edge 152 of the lateral projection 137 encounters the head 148 of the trigger arm, the trigger arm pivots sufficiently to allow the part 137 to go downwardly beyond the trigger arm without pivoting the lever 62. To facilitate deflection of the trigger arm, the bottom edge 152 is inclined in the same direction as an upwardly facing surface 154 at the free end of the trigger arm. The bottom edge 152 of the part 137 progressively deflects the trigger arm in a counterclockwise, rotative path until clearance is made. Accordingly, the user is given the freedom of manually moving the actuating member downwardly past the trigger arm without having to reset the cover 36 over the reservoir 34. This prevents inadvertent release of detergent in reservoir 34 into the wash chamber prior to a subsequent wash cycle.

The cam follower 68 and actuating member 70 are also responsible for releasing a rinse aid additive into the wash chamber at a prescribed stage in the operating cycle. The rinse aid additive is distributed in the wash chamber during a rinsing cycle and allows a limited amount of relative vertical shifting between the projection 204 and actuating arm 70. To control the size of the charge delivered to the wash chamber 15, the chamber 158 has a baffle 168 which partially encloses a flow directing baffle 168 defining a collecting area 170 and a metering cavity 171. With the door being closed, a portion 190 is received in a rectangular opening 191 in the upper portion of section 194. The slots 84, as seen clearly in Figs. 9 and 10, each comprise a lower vertically extending portion 210, an offset portion 212 slightly above the metering cavity 171 through the port 174 and cap 166 is controlled by a plunger 176, which is moved upwardly to allow the rinse additive to discharge by gravity into the wash chamber 15.

The rinse aid dispensing mechanism is detailed in Figs. 5-10 and 11. The plunger 176 has an internal control stem 178 which is part of a control element 180 which slides guidingly upwardly and downwardly in a recess 182 in the block 82. The element 180 is guided principally by an associated leg 183 connecting the stem 178 and body 181 of the element 180. The leg moves vertically in a channel 179 defined by the block 82 and closely matched to the cross-section of the leg 183. A coil spring 184 biases the plunger and associated control element 180 downwardly into sealing engagement with the port 174 as shown in Figs. 5, 6, 8 and 12. The plunger has a stepped outer surface 186, with the port 174 sealed by a first diameter portion 188. A larger diameter portion 190 (Fig. 12) seals an opening 191 in the upper wall 192 of the container 156. With the plunger in its downwardmost position, the port 174 is sealed by the plunger. Upward movement of the plunger opens the port allowing vented circulation of the liquid from the metering cavity 171 into the wash chamber 15.

Referring to Figs. 9 and 10, the control element 180 has a collapsible, serpentine, trigger section 194 extending between the leg 183 and body 181. The upper portion of section 194 is hingedly connected to the body at 200. The section 194 is enlarged at its upper region 196 and defines a rearward projection 204 having a downwardly facing shoulder 206. The projection 204 is received in a rectangular opening 208 (Fig. 7) having a lower surface 209 in the bottom portion of the actuating member 70. The opening allows a limited amount of relative vertical shifting between the projection 204 and actuating arm 70.

Before the actuating member 70 is assembled, the guide element 180 rests in the Fig. 9 position, being drawn downwardly by the coil spring 184. In the Fig. 9 position, the projection 204 and shoulder 206 reside in the path of the pin 74, which moves in the slots 84. The slots 84, as seen clearly in Figs. 9 and 10, each comprise a lower vertically extending portion 210, an offset portion 212 slightly above the projection 204 in the Fig. 9 position and a second vertically extending portion 214 above the offset portion 212.

With the pin free ends 76, 78 in the slots 84 and the actuating member moved downwardly during assembly (shown in phantom in Fig. 9), the pin 74 traversing the offset portion 212 of the slot encounters an angled surface 216 on the enlarged portion 196. Further downward movement of the actuating member 70 deflects a portion of the section 194 in the direction of arrow 218 in Fig. 9 forwardly into a recess 220 in the guide element 180. Upon continued downward movement of the actuating member, the lower surface 209 of the plunger 176 clears the projection 204 and allows the collapsible section 194 to reassume its Fig. 9 position. In the Fig. 9 position, the shoulder 206 blocks against surface 209 to prevent upward movement of pin 76 so that the pin 74 is effectively captured therein. With
the actuating member 70 so positioned, the projection 204 extends through the opening 208 and thereby guides relative vertical movement of the guide element 180 and actuating member 70.

A charge of the rinse aid additive is released upon the actuating member moving upwardly and thereby drawing with it the guide element and plunger. As shown in Fig. 10, the surface 209 bears upwardly against the shoulder 206 as the actuating member rises and shifts the guide element 180 upwardly. This occurs as the guide lug 104 approaches the second step 138 on the cam 66. As the pin 74 reaches the offset portion 212 of the slot, drawing with it the guide element 80, the pin 74 will shift outwardly into the offset simultaneously as the lug 104 moves upwardly at third offset 135 to its Fig. 8 position. Movement of the guide element 180 upwardly to the point of separation draws the plunger upwardly sufficiently to release the rinse aid liquid into the wash chamber. Upon the pin and thus surface 209 clearing the projection 204 when lug 104 reaches offset 135, the coil spring 184 draws the guide element downwardly so as to bring the plunger into sealing engagement with the container.

A short summary of the operation of the dispenser mechanism is as follows. At the beginning of the dishwasher cycle the cam 66 and follower 68 are in the positions shown in Figure 5. As the cam rotates in the clockwise direction driven by the timer 20 the lug 104 of cam follower 68 travels against surface 106 of the cam 66. When the rotation of the cam brings the follower to the first step 106 the bias of spring 108 rapidly moves the cam follower upward forcing the projection 137 against the enlarged head 148 which rotates latch arm 50 so that head 49 unblocks the cover 36. The cover is rotated by the spring 38 to the open position such that the detergent contents of the cup 34 are free to be washed from the cup by water within the washing chamber. The cam 66 is now in the position shown in figure 6 and as it continues its rotation the lug 104 approaches the second step 136. When the lug 104 reaches the step 136 the cam follower and lever 70 are pulled upward with surface 209 pulling projection 204 upward. Movement upward of the projection 204 lifts the plunger 176 from its seat allowing rinse additive in the metering cavity 171 to flow into the dishwashing chamber. As the cam 66 continues further rotation, the lug 104 reaches the third step in the cam 135. At this point cam follower 68 and member 170 move upwardly again to their upper-most position moving surface 209 past projection 204 and allowing the force of spring 184 to return the plunger 176 to its seated position. Further rotation of cam 66 through the remainder of the cycle brings the lug 104 in cam follower 68 back to the position of figure 5. During this travel of cam 66 the follower 68 moves downward such that projection 137 is forced past enlarged head 148 and surface 209 is forced past projection 206. The dispenser actuating mechanism is now in position to repeat the actuation cycle. If for any reason, after the operation of the detergent dispenser cover to its open position, the operator should manually rotate the timer mechanism it will be noted that the steps 136 and 135 are closely adjacent each other such that during manual rotation the plunger 176 would be raised and lowered from its seat in rapid succession such that only a small amount of rinse aid would be allowed to exit the metering cavity 171. Thus, even though the timer would be manually rotated to its starting position, and the door not opened sufficiently to recharge the metering chamber, there would be sufficient rinse aid left in the chamber 171 to provide rinse aid at the proper point in the cycle to perform the rinse aid function.

It can be seen that the container is positively sealed by the plunger and that the snap-fit engagement of the collapsible section 194 and actuating member can be accomplished without releasing a charge of the liquid additive. Movement of the actuating member downwardly through the operating cycle will effect engagement of the actuating member 70 and guide element 180 without releasing rinse aid additive, while movement of the actuating member upwardly releases the plunger for a sufficient time to discharge the additive into the wash chamber.

Claims

1. Structure for dispensing an additive into a wash chamber of a dishwashing apparatus (10) having a timer mechanism (20) for automatically controlling its operation, the structure comprising:

   a reservoir (34, 171) for storing a supply of additive and having an outlet opening to a wash chamber;

   a cover (36, 188) movable between (a) a closed position wherein the cover (36, 188) prevents escape of additive from the reservoir outlet into the wash chamber and (b) an open position permitting the reservoir outlet to be in communication with the wash chamber;

   a member (26) provided to interconnect the timer mechanism (20) and the cover (36, 188); and

   moving means driven by the timer mechanism (20) for moving the member (26) through a prescribed path in response to operation of the timer mechanism (20) as the dishwashing apparatus (10) is cycled through an operating cycle, the moving means (66) moving the member (26) in a first direction through a portion of the path during one part of the operating cycle and moving the member (26) to retrace said portion of the path in an opposite direction during another part of the operating cycle;

   characterised in that the structure also includes trigger means (62, 137; 216, 209) engageable by the member (26) and engaging the cover (36, 188) for (a) engagement by the member (26) to disengage the cover (36, 188) to allow it to move from its closed position to its open position as the member (26) moves in said first direction over the part of the path, and (b)
engagement by the member (26) to move relative to the member (26) as the member moves in the opposite direction over the part of the path without disengaging the cover (36, 188) from its closed position to its open position.

2. An additive dispensing structure according to claim 1, wherein the cover comprises a plunger (188) that is normally spring biased sealingly against the reservoir (171) outlet.

3. An additive dispensing structure according to claim 7, wherein the trigger means (216, 209) has a collapsible section (196) extending from the cover (188), the member (26) draws the trigger means with it as it moves against the trigger means (216, 209) in the first direction, thereby unseating the cover (188) and as the member (26) moves in the opposite direction against the trigger means (216, 209) the collapsible section (196) collapses to allow passage of the member (26) beyond the trigger means (216, 209) without unseating the cover (188).

4. An additive dispensing structure according to claim 3, wherein the trigger means comprises a projection (209) defining a shoulder (206), a block member (86) and defining a guide slot (210, 214) and the member (26) has a pin (74, 78) which is guided in the guide slot (210, 214), the pin (74, 78), upon the member (26) moving in the first direction engaging the shoulder (206) and moving the collapsible section and cover (188) the pin, upon the member (26) moving in the opposite direction engaging the projection (209) and collapsing the collapsible section (196) as the pin moves against and beyond the projection (209) without unseating the cover (188).

5. An additive dispensing structure according to claim 4, wherein the slot comprises a vertical portion (210) and an offset portion (214) and the pin (74, 78) moves through the vertical portion (210) and then the offset portion (214) as the member (26) moves in the first direction and as the pin (74, 78) moves into the offset (214) the member (26) separates from the trigger means (209) thereby allowing the cover (188) to reseat.

6. An additive dispensing structure of claim 1, wherein the cover (36) is pivotiable between the open and closed positions, there is a latch (49)movable between a first position wherein it locks the cover (36) in its closed position and a second position wherein the cover (36) can be opened, the trigger means (62, 137, 139) is mounted movably relative to the latch (49) and upon the member (26) moving against the trigger means (62, 137, 139) in the first direction the trigger means (62, 137, 139) moves the latch (49) to its second position so that the cover (36) can open and upon the member (26) moving against and beyond the trigger means (62, 137, 139) in the opposite direction the trigger means (62, 137, 139) moves relative to the latch (49) without moving it.

7. An additive dispensing structure according to claim 6, wherein the latch (49) is pivotally mounted and turns between the open and closed positions, the trigger means includes a trigger arm (139) and a lever (62) to transmit movement of the trigger arm (139) to the latch (49) the trigger arm (139) being mounted on the lever (62), the trigger means also including a linking part (137) on the member (26), as the linking part (137) moves against and beyond the trigger arm (139) in the first direction the trigger arm (139) bears against and moves the lever (62), and as the linking part (137) moves against the trigger arm (139) in the opposite direction the trigger arm (139) moves relative to the lever (62) sufficiently to allow the linking part (137) to move beyond the trigger arm (139).

8. An additive dispensing structure according to claim 7, wherein the movement of the member (26) and linking portion (137) is translatory, and the trigger arm (139) is pivotally mounted for rotation relative to the lever (62).

9. An additive dispensing structure according to claim 8, wherein movement of the linking portion (137) in the one direction bears the trigger arm (139) against the lever (62) so that the lever (62) pivots to move the latch (49), and movement of the linking portion (137) in the opposite direction pivots the trigger arm (139) so that it rotates in a first sense with respect to the lever (62) without turning it, the triggering means including bias means (64) to bias the trigger arm (139) in a rotational sense opposite to the first sense.

10. An additive dispensing structure according to any one of claims 6 to 9, wherein means (64) bias the latch to its first position to lock the cover (36).