United States Patent

[11] 3,565,291

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[21] Appl. No. **771,139**
[22] Filed **Oct. 28, 1968**
[45] Patented **Feb. 23, 1971**

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[32] Priority **Oct. 26, 1967**
[33] **France**
[31] **126013**

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[54] **CLEANSING AGENT DISPENSER**
5 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **222/76,** 222/516
[51] **Int. Cl.** **B67d 5/06**
[50] **Field of Search** 222/70, 76, 516, 517

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ABSTRACT: A dispenser for detergents or the like to be used in dish or clothes washing machines. The dispenser includes a housing having preferably a pair of cavities therein for retaining detergent, with a cover overlying one of the cavities. Detergent from the exposed cavity is utilized in the first wash cycle and detergent from the covered cavity is released for the second wash cycle. The cover is held in this initial position by a tensioned torsion spring. A solenoid device coupled to a member around which the cover pivots serves to release the torsion spring in response to a signal from the washer timer-programmer. Rotation of the cover to expose the initially covered cavity is effected by the spring energy.

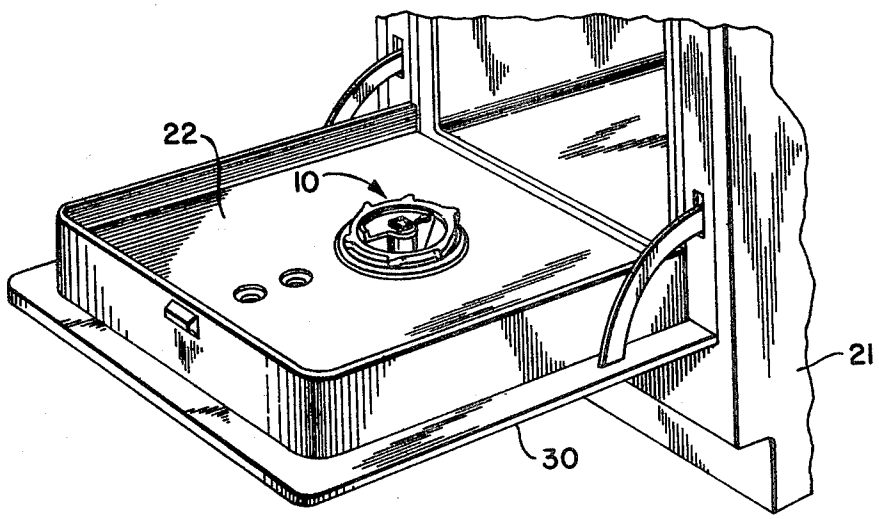
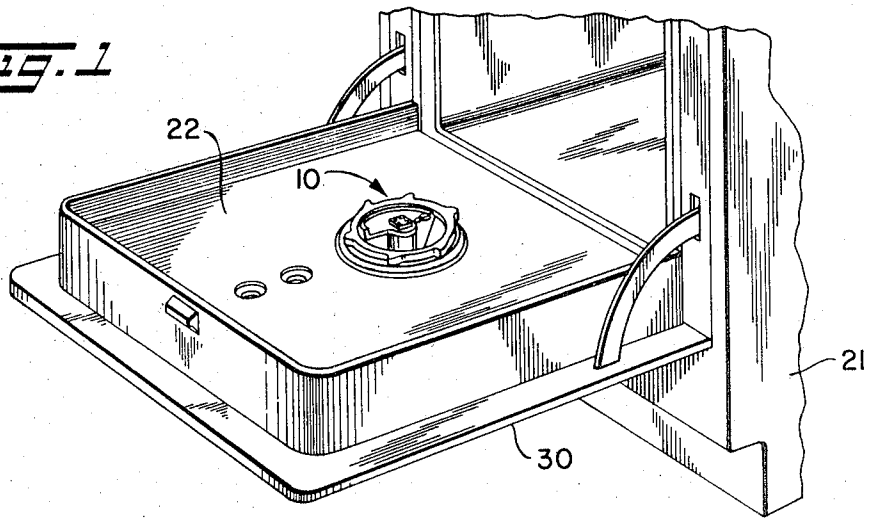


Fig. 1



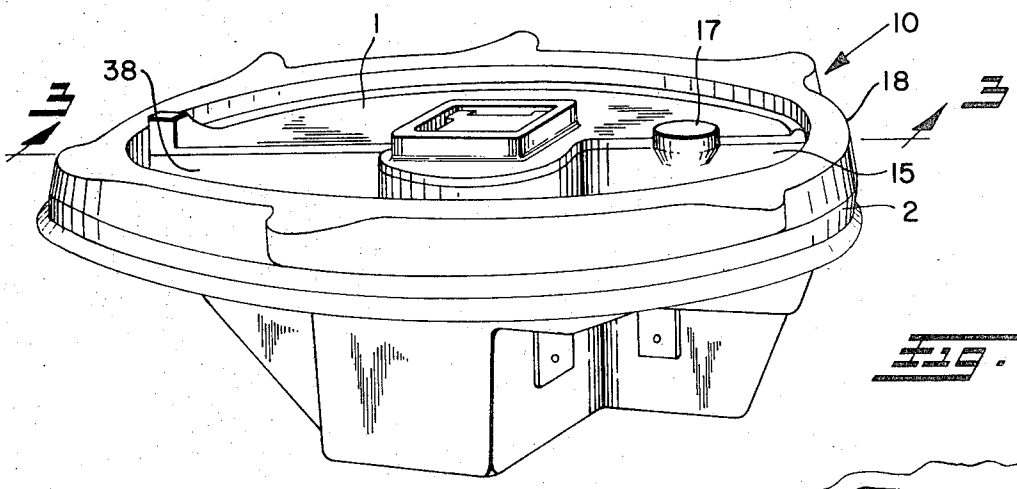


Fig. 2

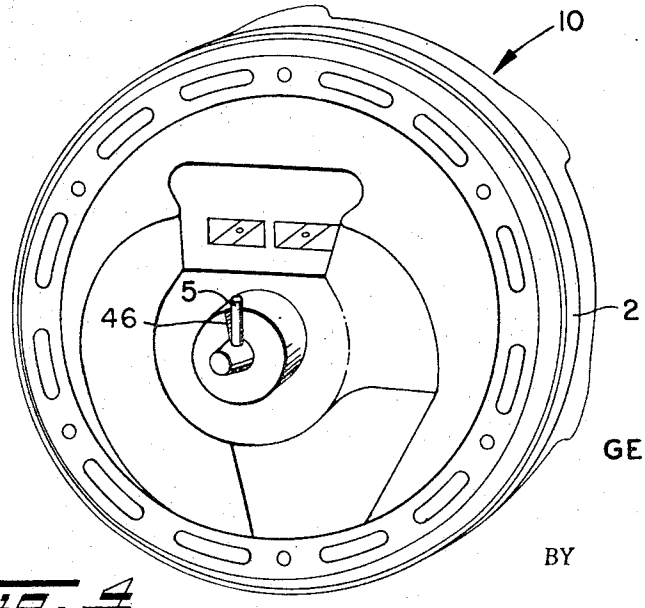


Fig. 4

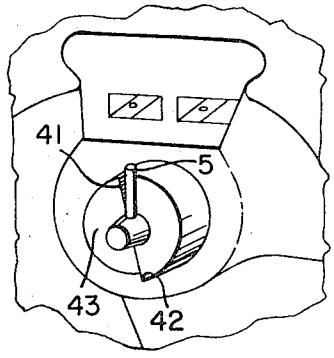


Fig. 5

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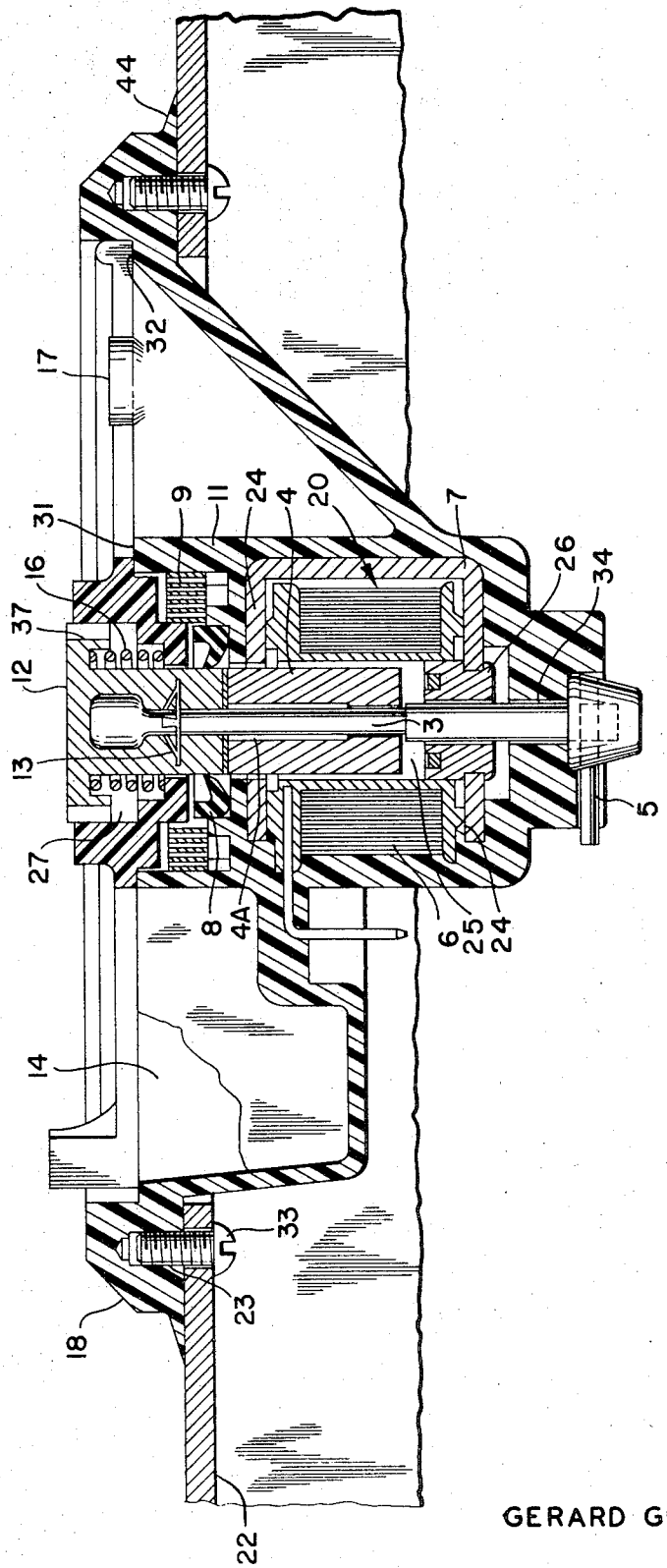

FIG. 3

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CLEANSING AGENT DISPENSER

This invention relates to a dispenser for materials such is detergents or soaps used in dish or clothes washers. More particularly, this invention relates to a dispenser which is to be located in the door or sidewall of a washing machine which will automatically dispense detergent in response to an electrical signal from a timer-programmer control unit.

One of the features of modern dish washers and washing machines is the provision for multiple wash cycles. Upon actuation of the initial wash cycle a first quantity of cleansing agent is introduced into the wash chamber. At the termination of the initial wash cycle a final wash cycle will be initiated, thus requiring a second quantity of cleansing agent to be introduced into the wash chamber. Devices for automatically injecting a cleansing agent during a plurality of cycles are well known. However, these devices are often complex in construction, expensive to fabricate and assemble, difficult to seal in order to protect the operative components from the wash chamber and difficult to install on the washing machine.

It is an object of this invention to provide a compact detergent dispenser which is readily utilized on a dish washer.

It is a further object of this invention to provide a dispenser which will automatically eject soap from the dispenser in response to an electrical signal from the timer-programmer control unit.

It is a further object of this invention to provide a compact reliably functioning solenoid-actuated release mechanism for the dispenser during the detergent injection operation.

In furtherance of these and other object of the invention, a dispenser for washers which releases a predetermined amount of cleansing agent, most particularly powdered detergent, into a washer at the beginning of each wash cycle is provided. The dispenser according to the instant invention includes a dispenser housing which is disposed in the door of the dish washer. A plurality of cavities is incorporated into the dispenser housing; the number of cavities generally corresponds to the number of wash cycles which the dish washer is designed to perform. A cover normally overlies all of the cavities but one. A torsion spring is coupled to the cover and is pretensioned by manual rotation into the position wherein the cover overlies all but one of said cavities. A solenoid mechanism mounted centrally of the housing and coupled to a shaft around which the cover pivots serves to release the cover for rotation to expose a cavity in response to a signal from the washer timer-programmer. The cover exposes a different cavity each time a signal is received. By exposing a cavity, detergent spills into the wash compartment.

The solenoid mechanism includes a coil integral with the housing and a tubular armature disposed on the cover pivot shaft. Both the armature and the shaft pass through the center of the coil. The armature is axially and radially movable with respect to the shaft to allow for alignment of the armature with the magnetic field established by the coil without necessitating alignment of the shaft with the magnetic field. This feature insures free movement of the shaft.

Further objects and advantages of the invention will be apparent in connection with the following description of the preferred embodiment of this invention illustrated in the accompanying drawings wherein:

FIG. 1 illustrates a dispenser according to the instant invention attached to the door of a dish washer;

FIG. 2 is a perspective view of the detergent dispenser;

FIG. 3 shows a cross-sectional view of the dispenser and illustrates the detergent chambers and solenoid mechanism;

FIG. 4 shows a perspective view illustrating the base of the dispenser; and

FIG. 5 illustrates an alternative embodiment of the base configuration illustrated in FIG. 4.

Referring now to the drawings, FIG. 1 illustrates a front opening dish washer in which the door 30 is in the open position. A detergent dispenser 10 is inserted within an opening formed in the inner wall 22 of the door 30.

The dispenser assembly 10 as shown in FIGS. 2 and 3 includes a substantially cup-shaped housing 2, a semicircular cover 1 rotatably attached to the housing and a solenoid assembly 20 located interiorly of the housing for rotating the cover 1. The housing 2 is preferably a molded synthetic resin structure. However, the housing may be fabricated out of metal or other materials. The housing 2 includes a substantially cylindrical central core 11 around which is formed a plurality of cavities. The number of cavities corresponds to the number of wash cycles which the washer is designed to perform. In the illustrated embodiment as shown in FIGS. 2 and 3 two cavities, 14 and 15, separated by a partition 38, are provided. Cavity 14 is adapted to contain detergent for a first wash cycle and cavity 15 is adapted to contain detergent for a second wash cycle.

An annular lip 18 is disposed on the outer edge of the cavity defining structure. The annular lip includes a plurality of threaded bores 23 for receiving a corresponding plurality of screws 33. The screws pass through the inner wall 22 on the washer door and fasten and dispenser housing 2 to the door 30. A lip 30 is located at the periphery of the annular flange 18 and is adapted to contact wall surface 22. Tightening of the screws 33 in order to draw the housing 2 snugly against the inner wall 22 will cause the lip 44 to flare outwardly into positive sealing engagement with the door and thereby preclude the entry of moisture into the interior of the door 30.

The cover 1 overlies a first bearing surface 31, the latter of which is defined by the end face of the core 11. On the inner edge of annular lip 18 in the same lateral plane as bearing face 31 is located a second bearing face 32. These annular coplanar bearing surfaces provide both supporting and guiding surfaces for the semicircular cover 1.

A coil 6 of the solenoid assembly 20 is located at the base of the core 11. The legs 24 of a U-shaped pole member 7 surround the end faces of the cylindrical coil 6. Both the coil 6 and pole member 7 are molded integrally with the core 11. The coil in the illustrated embodiment is of conventional wire wound coil construction and the pole member is fabricated from ferromagnetic material. A central passageway 25 extends through the core of the coil and the legs 24 of the pole plates. Disposed within the passageway 25 adjacent the cylindrical coil 6 is a tubular armature 4. The centerlines of the armature 4 and the coil are theoretically coincident.

A stepped cylindrical shaft 3 passes through the central opening 4a of the armature 4. On the upper end of the shaft 3, as shown in FIG. 3, is a molded cap 12. The cap 12 can be integrally molded on to the expanded end of the shaft 3. In the illustrated embodiment a spring clip 13 is attached to the shaft 3 which insures that the cap 12 will be securely retained thereon. At the lower end of the shaft is an enlarged diametrical stepped section 34. The enlarged diametrical end portion of the shaft 3 passes through a central opening in a guide bushing 26. The guide bushing 26 serves to hold the shaft armature and cap assembly in axial movement with the centerline of the core 6 as well as to provide a limit for axial movement of the shaft 3-armature 4-cap 12 assembly. The tubular armature 4 is interposed the lower end face of cap 12 and the stepped section 34. The tubular armature is free to move in an axial and radial direction with respect to the shaft 3. The allowance for radial and axial movement between the armature 4 and the shaft 3 permits the armature 4 to become aligned with the magnetic field generated by actuation of the coil 6 without causing a misalignment of the shaft 3 within the guide bushing 26. Consequently, free axial movement of the shaft 3 within the guide bushing 26 is permitted without interference due to the misalignment of the armature 4 with the shaft 3.

The cap 12 includes a head 37 of substantially square cross section when viewed in a plan normal to the axis of the shaft 3. The head 37 is disposed within a central opening 27 within the cover 1 which is of complementary cross section in order to preclude relative rotation between the head 37 and the cover 1. Axial movement therebetween is permitted, however, A coil spring 16 normally biases the shaft 3-armature 4-cap 12

assembly in an axial upward direction as viewed in FIG. 2 whereby the armature 4 is in axial spaced relation from the guide bushing 26 and partially withdrawn from the central cavity of core 6. A spiral torsion spring 9 connects the core 11 and the cap 12. In the illustrated embodiment the torsion spring is tensioned by rotation of the cover 1 and hence the shaft 3-armature 4-cap 12 assembly in a counterclockwise direction. In the untensioned condition the torsion spring retains the cover 1 against the stop 17 as shown in FIG. 2.

Located axially inwardly of the torsion spring is an annular seal 8. The inner diametrical surface of the seal rides on the external diametral surface of the cap 12 to provide a seal therebetween. This seal serves to preclude entry of moisture from the dish washer into the solenoid assembly 20 located at the base of the core 11.

A pin 5 passes through the stepped end 34 of shaft 3 and is disposed normally thereto. A shoulder 46 is located at one point on the end face of the housing 2 for receiving the pin 5. The function of the shoulder is to locate the cover over the second detergent cavity 15. The pin 5 will slide freely along the end face surface in response to rotation of the cover 1 until the cover 1 is positioned over the second detergent cavity 15, at which point the pin 5 overlies the shoulder 46. The coil spring 16 continually biases the shaft 3-armature 4-cap 12 assembly upwardly, as shown in FIG. 3. Thus, the pin 5 will be drawn into positive engagement with the shoulder 46. Rotation of the cover to the position overlying cavity 15 tensions the torsion spring 9.

The operation of the detergent dispenser will now be described.

The second detergent cavity 15 is normally filled with detergent first since the cover 1 normally overlies the first cavity 14. The operation next rotates in a counterclockwise direction until the cover overlies the cavity 15, at which point pin 5 is engaged against the shoulder 46 by the biasing action of the spring 16. The detergent in cavity 15 is now enclosed in the cavity 15. Detergent is now added to the first cavity. The dispenser is now ready for operation.

Upon closing the door 30 of the dish washer 21 the detergent in cavity 14 will spill out into the interior of the dish washer for utilization during the first wash cycle. Upon completion of the first wash cycle an electrical signal received from the timer-programmer control unit of the dish washer will initiate operation of the solenoid assembly. Coil 6 will be activated, thereby generating a magnetic field which attracts armature 4 axially inwardly until the armature abuts against the radial end face of guide 26. This axial movement is sufficient to remove pin 5 from contact with the shoulder 46. The pretensioned torsion spring 9 will then rotate the cover 1 in a clockwise direction until the cover abuts stop 17 as shown in FIG. 3. This clockwise rotation will expose the second detergent cavity 15 to the interior of the dish washer, thereby permitting the detergent therein to spill into the cavity. The position of the cover 1 with the tab abutting the stop 17 defines the normal position of the dispenser.

It should be noted that the cover may be rotated manually into and out of the operating position with no deleterious effect on any of the components of the dispenser.

FIG. 5 illustrates an alternative embodiment for the base of the housing 2. In this embodiment a first and second lip 41 and 42 respectively are provided 180° apart on the end face of the housing 2. The first lip corresponds to the recess 33 illustrated in FIG. 4. That is, when the pin abuts the first lip, the cover overlies the second detergent cavity and the torsion spring is pretensioned. The 180° of surface between the first lip and the second lip define a helical camming surface 43, and the second lip defines a stop which replaces stop 17 illustrated in FIG. 2. The lip 42 corresponds with the position where the cover 1 overlies the first detergent cavity 15. Hence, actuation of the solenoid in the manner previously described will cause the pin 5 to drop below the first lip 41, at which point the spring tension will rotate the cover shaft 3-armature 4-cap 12 assembly in the clockwise direction whereby the pin 5 traverses the camming surface 43 until the pin 5 abuts the second lip 42 defining a stop.

It is to be understood that various modifications are capable of being made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A cleansing agent dispenser for washers having a programmer-timer control unit comprising:
- a housing having at least one cavity therein for retaining said cleansing agent;
- a cover for overlying said at least one cavity;
- a shaft coupled to said cover and being axially and rotatably movable with respect to said housing;
- spring means coupled to said cover, said spring means being in a tensioned condition when said cover is in overlying relationship with said at least one cavity;
- latch means interconnecting said shaft and said housing retaining said cover in an overlying relationship with said at least one cavity; and
- a solenoid assembly disposed within said housing for releasing said latch means in response to a signal from said programmer-timer control unit, said solenoid assembly comprising a coil disposed within said housing, an armature in surrounding relationship to said shaft and coupled thereto within said coil and axially movable to a limited extent along said shaft, the shaft diameter being of lesser dimension than the surrounding central bore diameter of said armature to permit limited axial and radial misalignment of said armature and said shaft when said armature becomes aligned with the magnetic field generated by said coil.

2. A cleansing agent dispenser for utilization with washers having a programmer-timer control unit comprising:
- a substantially cup-shaped housing having at least one cavity therein for retaining said cleansing agent, said housing including a central core having a passageway therethrough;
- a cover for overlying said at least one cavity;
- a shaft connected to said cover having a central axis around which said cover rotates, said shaft being directly rotatable with said cover and translatable with respect to said cover along said central axis;
- spring means interconnecting said cover and said housing, said spring means normally biasing said cover to a position uncovering said at least one cavity;
- releasable latch means interconnecting said shaft and said housing for positioning said cover in an overlying relationship with said at least one cavity in response to positive latching engagement thereof, said latch means being released by said axial translation of said shaft; and
- a solenoid assembly disposed within said housing for releasing said latch means in response to a signal from said programmer-timer control unit, said solenoid assembly comprising a coil disposed within said housing, an armature in surrounding relationship to said shaft and coupled thereto within said coil and axially movable to a limited extend along said shaft, the shaft diameter being of lesser dimension than the surrounding central bore diameter of said armature to permit limited axial and radial misalignment of said armature and said shaft when said armature becomes aligned with the magnetic field generated by said coil.

3. A cleansing agent dispenser according to claim 1 further comprising a second spring for biasing said armature to a position remote from said coil.

4. A cleansing agent dispenser according to claim 1 further comprising a second spring means interconnecting said shaft and said housing for biasing said armature to a position remote from said coil, whereas said latch means comprises a first element on said shaft and a second element on said housing, and said second spring means biases said first and second elements into latching engagement in response to positioning said cover in overlying relationship to said at least one cavity.

5. A cleansing agent dispenser according to claim 1 further comprising stop means for defining a position where said at least one cavity is totally exposed, and wherein said spring means normally biases said cover into the position defined by said stop means.