Oct. 3, 1967 T. W. DUNCAN ET AL 3,344,957

DISPENSING MECHANISM

Filed March 4, 1966 2 Sheets-Sheet 1

Fig. 1

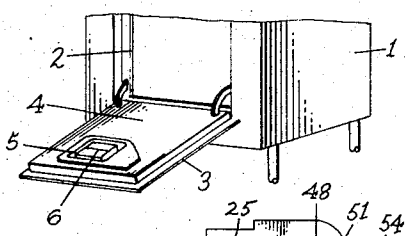
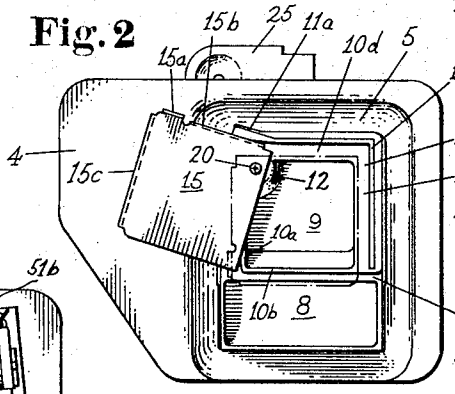



Fig. 2



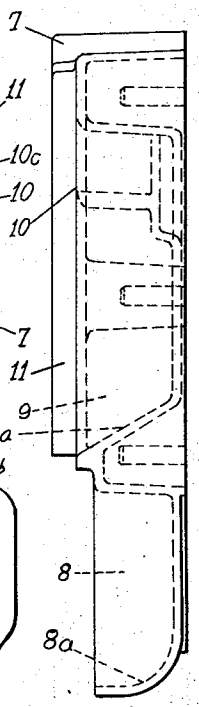




Fig. 3

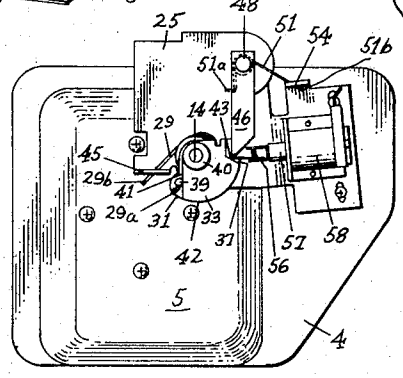



Fig. 4

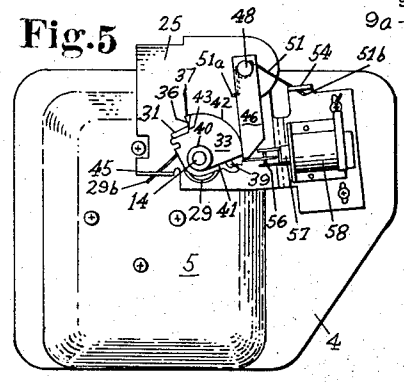



Fig. 5

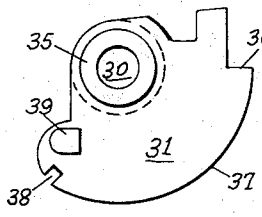



Fig. 7

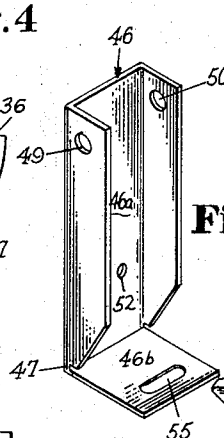



Fig. 8

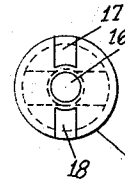



Fig. 9

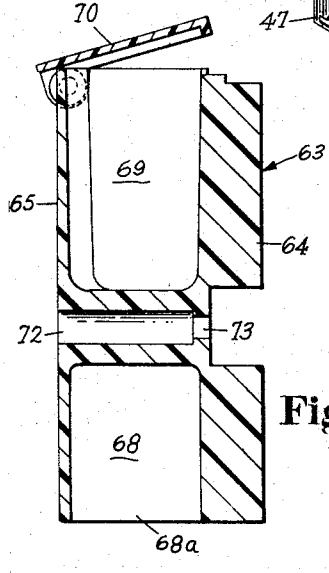



Fig. 12

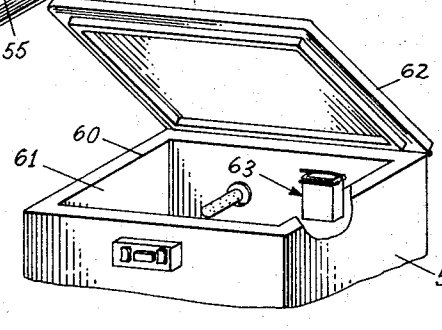



Fig. 10

INVENTOR
THOMAS W. DUNCAN AND
CHARLES N. PERIN,

BY Yungblut, Melville, Strasser and Foster
ATTORNEYS

Oct. 3, 1967 T. W. DUNCAN ETAL 3,344,957

DISPENSING MECHANISM

Filed March 4, 1966 2 Sheets-Sheet 2

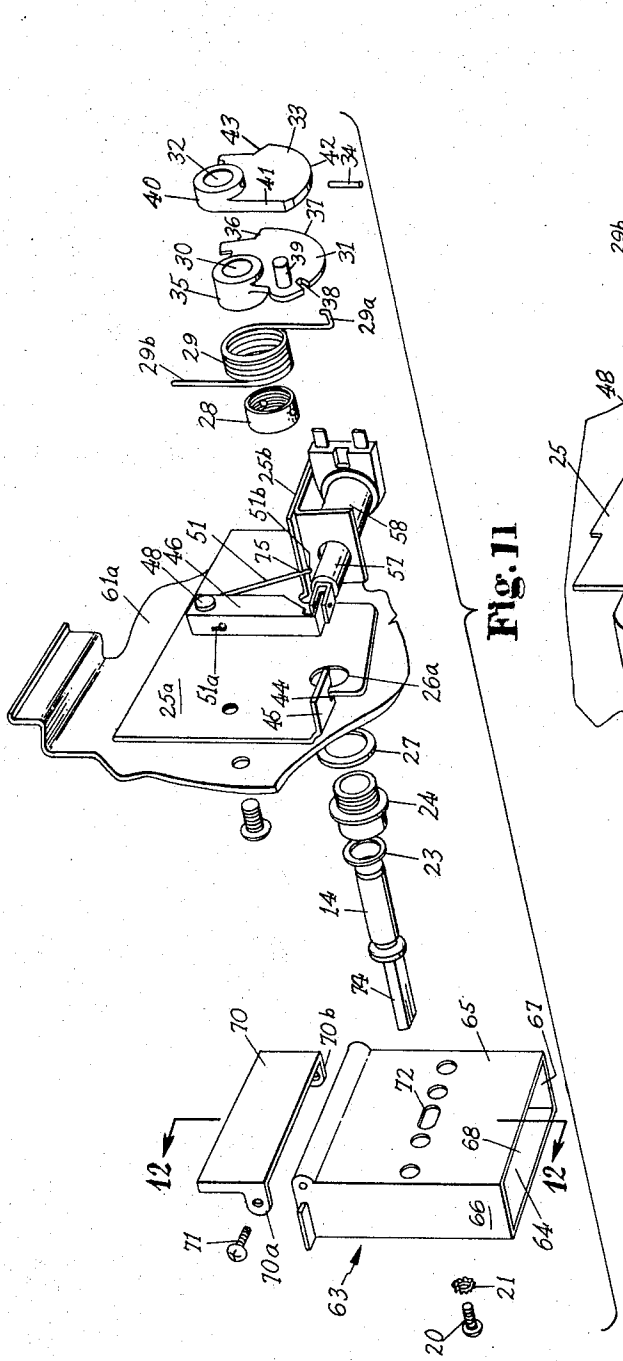


Fig. 11

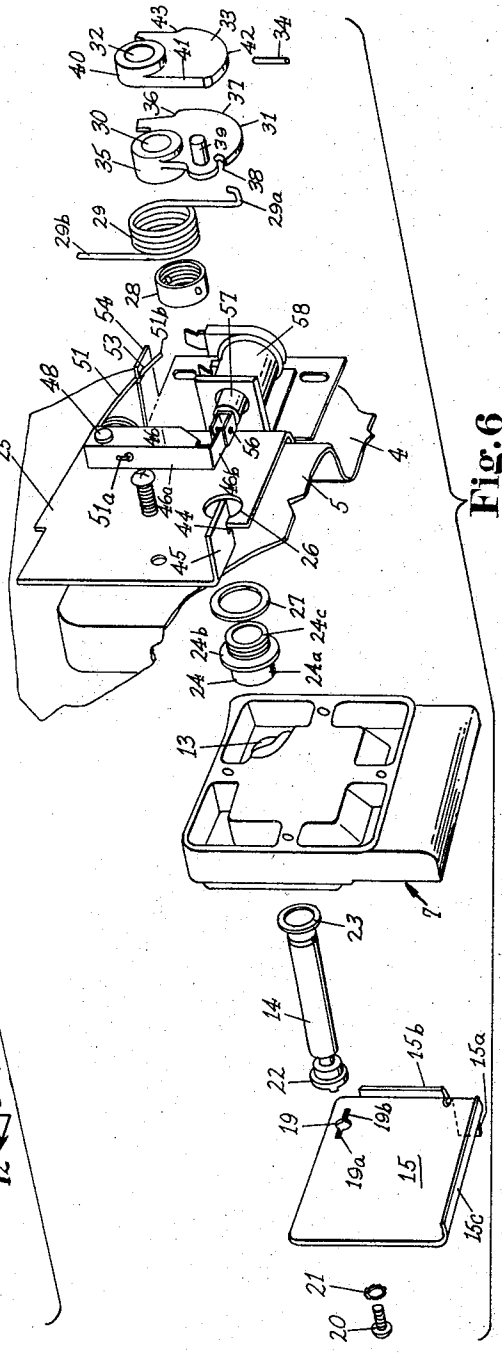


Fig. 6

INVENTOR

THOMAS W. DUNCAN &
CHARLES N. PERIN,

BY Yungblut, Melville, Strasser and Foster
ATTORNEYS

United States Patent Office 3,344,957
Patented Oct. 3, 1967



3,344,957

# DISPENSING MECHANISM

Thomas W. Duncan and Charles N. Perin, Connersville, Ind., assignors to Design and Manufacturing Corporation, Connersville, Ind., a corporation of Indiana.

Filed Mar. 4, 1966, Ser. No. 531,697
7 Claims. (Cl. 222—70)

## ABSTRACT OF THE DISCLOSURE

A detergent dispensing mechanism for dishwashing machines, clothes washing machines and the like comprising a detergent dispenser, a portion at least of which is affixed to a shaft and rotatable with the shaft between a detergent retaining and a detergent dispensing position. The free end of the shaft is provided with a pair of cam means. The first cam means cooperates with a timer-actuated release means to maintain the shaft and the dispenser portion in their detergent retaining position until actuation of the release means by the timer. The second cam serves to disengage the release means from the first cam upon manual rotation of the shaft and dispenser portion from their detergent retaining to their detergent dispensing positions.

The invention relates to a dispensing mechanism, and more particularly to a timer-controlled means for releasing measured quantities of detergent into the tub or vat of a washing machine or dishwashing machine, at intervals coinciding with desired parts of the cycle of operations of the machine. While the teachings of the present invention are equally applicable to a clothes washing machine, for purposes of an exemplary showing, the invention will be described in connection with detergent dispensing means for dishwashing machines.

Heretofore, dishwashing machines either of the front loading or the top loading types have been provided with sequential detergent dispensers. These sequential detergent dispensers are often actuated by a rotating shaft. The detergent dispensers are generally divided into two or more compartments or chambers. One or more of the chambers may be provided with door means actuated sequentially by the rotating shaft. On the other hand, the compartments themselves may be sequentially rotated by the shaft.

It is a primary object of the present invention to provide an improved actuating mechanism for a sequential detergent dispenser of the type utilizing a rotating shaft.

It is a primary object of the present invention to provide such a detergent dispenser actuating means utilizing two coacting cams, a first cam acting as a stop to prevent rotation of the shaft except in the proper timed sequence, a second cam adapted to overcome the action of the first cam so that the shaft may be rotated to set the dispenser or the dispenser lid in the proper position.

It is an object of the present invention to provide an improved form of detergent dispenser having rotating door means.

It is an object of the present invention to provide an improved detergent dispenser of the type wherein the dispenser itself rotates sequentially.

It is an object of the present invention to provide a sequential detergent dispenser actuating mechanism characterized by simplicity and compactness, and which may be easily and inexpensively manufactured or repaired.

These and other objects of the invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, are accomplished by that structure and arrangement of parts of which certain exemplary embodiments will now be described. Reference is made to the accompanying drawings wherein:



FIG. 1 is a partial perspective view of a front opening dishwashing machine with the door lowered.

FIG. 2 is a front elevational view of a sequential detergent dispenser of the present invention.

FIG. 3 is an end view of the dispenser as seen from the right in FIG. 2.

FIG. 4 is a rear elevational view of the detergent dispenser of FIG. 2 illustrating the operating mechanism in unactuated position.

FIG. 5 is a rear elevational view of the dispenser of FIG. 2 illustrating the operating mechanism in actuated position.

FIG. 6 is an exploded view of the detergent dispenser and operating mechanism of FIGS. 2, 4 and 5.

FIG. 7 is an elevational view of the stop cam of the present invention.

FIG. 8 is a perspective view of the trigger release of the present invention.

FIG. 9 is an end elevation of the actuating shaft of the present invention.

FIG. 10 is a fragmentary perspective view of a top loading dishwasher, showing the top in open position.

FIG. 11 is an exploded view of a detergent dispenser and operating mechanism for use in a top loading dishwasher.

FIG. 12 is a cross sectional view of the dispenser taken along the section line **12—12** of FIG. 11.

The term "detergent" as used herein is intended to embrace any material which will be employed in water solution or suspension during a washing cycle of the apparatus, whether this material consists essentially of inorganic salts having water softening and other functions, or whether it contains or consists of surface-active materials having a detergent function, such as soap or non-soap synthetics, or of substances containing both inorganic salts and surface-active materials. The detergents for use in connection with the apparatus of this invention will be water-soluble substances in powdered or granular form.

It will be understood by the skilled worker in the art that the operations of dishwashing machines include various washing cycles, rinsing cycles, and drying cycles. The specific steps performed by the machine may be selectable by an operator by means of control devices; but the timing is accomplished and the order of performance of the steps is determined by one or more timing devices which are mechanical or electrical in nature. Many dishwashing machines are arranged so that they can perform a plurality of separate washing operations with intermediate rinsings. Since a washing cycle requires the presence of a detergent, the apparatus of this invention is preferably arranged so that it can dispense a plurality of increments of detergent substance at different selected times.

One embodiment of this invention is, for purposes of an exemplary showing, described in connection with "under-counter" or "front-opening" dishwashers. Such dishwashers are generally located under a sink counter or the like in a household kitchen, and are characterized by a downwardly opening front door. In FIG. 1 there is shown a dishwashing machine having a body or casing **1**, a front opening **2**, and a downwardly opening door **3**, shown in its open and substantially horizontal position. The dishwashing machine will be provided with various operating instrumentalities (not shown) including one or more timing devices for controlling the cycles of operation of the machine. No attempt has been made to outline the operating instrumentalities of the dishwashing machine, since these are well known in the art as comprising a motor, various valves, heating means, and others.

It will be understood that the timing devices will be connected to these apparatus elements and to a source of power by flexible cables lying between the inner and outer liners of the door and not shown in the drawing. The door **3** may also contain other instrumentalities such as a latch for holding the door in closed position, a safety switch for de-energizing the apparatus when the door is open, and the like. The door **3** is provided with an inner lining generally indicated at **4**, which in turn is provided with a substantially rectangular depressed area **5**. The door lining may be of plastic material, or it may be a lining of metal, in which case it will normally be covered with a protective coating of enamel of some kind, unless the door lining is made of non-staining metal such as stainless steel. The visible parts of a detergent dispenser are indicated generally at **6**, and are shown as mounted in the depressed area **5**.

FIG. 2 is a fragmentary elevational view of the door liner **4**, showing the depressed portion **5** with the dispenser **7** mounted therein. The dispenser itself (see also FIG. 3) may be made of any suitable material which is durable and heat and water resistant. For example, the dispenser may be made of plastic or the like. The dispenser is divided into a first chamber **8**, and a second chamber **9** thereabove. The first chamber **8** is provided with a downwardly and outwardly sloping lower surface **8***a*, and the second chamber **9** is also provided with a downwardly and outwardly sloping surface **9***a*. That portion of the front surface of the dispenser surrounding the second chamber **9** is in the form of a peripheral raised shelf **10**. It will be noted in FIG. 2 that the sides **10***a* and **10***b* of the shelf are narrow, while the sides **10***c* and **10***d* are considerably wider. The sides **10***c* and **10***d* are provided with a raised wall **11**.

The upper left hand corner of the second chamber **9** (as seen in FIG. 2) has an arcuate shoulder **12**. The shoulder **12** has a perforation **13** through which the forward end of a shaft **14** extends (see FIG. 6).

As will be most clear from FIGS. 2, 6 and 9, a door **15**, adapted to close the second chamber **9**, is non-rotatively affixed to the forward end of the shaft. The forward end of the shaft is provided with a threaded perforation **16** and a pair of diametrically opposed lugs **17** and **18**. One corner of the door **15** has a perforation **19** with a pair of diametrically opposed extensions **19***a* and **19***b*. The extension **19***a* and **19***b* are adapted to receive the lugs **17** and **18** so that the door is non-rotatable with respect to the shaft **14**. The door is secured to the shaft end by any suitable means such as a screw **20** and lock washer **21**.

The door **15** is provided with an outwardly extending flange or handle **15***a*, as seen in FIG. 2, and inwardly extending flanges **15***b* and **15***c*, best seen in FIG. 6. The door and shaft assembly is rotatable between an open position shown in solid lines in FIG. 2, and a closed position indicated in dotted lines. When the door is in its open position, the interior of the second chamber **9** is exposed. The open position of the door is limited by contact of the door flange **15***b* with an upturned end portion **11***a* of the wall **11**. When the door **15** is in its closed position, it overlies all four sides of the raised surface **10**. The door flanges **15***b* and **15***c* contact the outer edges of the raised surface portions **10***a* and **10***b*, thereby defining the closed position of the door and assuring retention of detergent material in the chamber **9** when the dishwasher door **3** is in its vertical closed position.

The assembly of the dispenser and its actuating mechanism is most clearly shown in FIGS. 4, 5 and 6. The forward end of the shaft **14** is of increased diameter as at **22**. An annular bearing means **23** lies between the shaft portion **22** and the shoulder **12** (see FIG. 2) of the dispenser at the perforation **13**. The shaft **14** extends through the perforation **13** and through a bushing **24**. The bushing **24** comprises a cylindrical portion **24***a*, an outwardly extending peripheral flange **24***b* and a cylindrical exteriorly threaded portion **24***c*. The forward end of the cylindrical portion **24***a* abuts the inside surface of the dispenser shoulder **12** at the perforation **13**.

A bracket means **25** is suitably affixed to the inside surface of the door liner **4**. The bracket **25** is so configured as to accommodate the depressed portion **5** of the door liner. The depressed portion **5** and the bracket are provided with coaxial and matching perforations, generally indicated at **26**. The shaft **14** and the threaded portion **24***c* of the bushing **24** extend through the perforation **26**. An annular sealing means **27** lies between the flange **24***b* of the bushing **24** and the outside surface of the depressed portion **5** of the door liner, insuring that no water enters through the perforation **26**. The threaded portion **24***c* of the bushing, extending through the perforation **26**, is engaged by an annular internally threaded ring **28**. The rearward end of the shaft **14** extends through the convolutions of a cam spring **29**, a perforation **30** in a stop cam **31**, and a perforation **32** in a release cam **33**. As will be more fully described hereinafter, the stop cam **31** is rotatable with respect to the shaft **14**, while the release cam **33** is non-rotatable with respect to the shaft. The non-rotatable engagement of the shaft by the cam **33** may be accomplished by means of a pin **34** passing through a perforation in the cam **33** and a perforation in the shaft.

As shown in FIGS. 6 and 7, the stop cam **31** is provided with a cylindrical shoulder **35** through which the perforation **30** extends. The cam **31** has a stop surface **36**, a camming surface **37**, a notch **38**, and a rearwardly extending lug **39**.

As shown in FIGS. 4 and 6, the release cam is provided with a cylindrical shoulder **40** through which the perforation **32** extends. The cam **33** also has a surface **41** adapted to cooperate with the lug **39** of the stop cam, a first cam surface **42** corresponding to the cam surface **37** on the stop cam, and a second cam surface or releasing surface **43**.

It will be noted in FIGS. 4 and 5 that when the elements thus far described are in assembly, a hooked end **29***a* of the cam spring **29** engages the stop cam in the notch **38** (see FIGS. 4 and 6). The other end **29***b* of the cam spring is engaged in a notch **44** in a rearwardly extending portion **45** of the bracket **25**. Thus, as viewed in FIGS. 4 and 5 the camming spring **29** tends to urge the stop cam **31** in a counterclockwise direction. By virtue of the interaction of the lug **39** of the stop cam **31** and the surface **41** of the release cam **33**, it will be understood that if the stop cam is caused to rotate in a counterclockwise direction, it will cause the release cam to rotate in the same direction. Similarly, if the release cam is rotated in a clockwise direction (as viewed in FIGS. 4 and 5) it will cause the stop cam to rotate in the same direction.

A trigger release, generally indicated at **46** in FIG. 8, has a channel-shaped body portion **46***a* and a bent over end **46***b*. The body portion **46***a* and the end **46***b* form a right angle corner **47**. The trigger release is pivotally affixed to the bracket **25** by means of a pivot pin **48** passing through a pair of coaxial perforations **49** and **50** in the trigger release body. The pivot pin **48** also passes through the convolutions of a trigger release spring **51**. One end **51***a* of the spring is engaged in a perforation **52** in the trigger release body, while the other end **51***b* is engaged in a notch **53** in a rearwardly extending portion **54** of the bracket **25**. The trigger release spring **51** tends to urge the trigger release **46** in a clockwise direction as viewed in FIGS. 4 and 5.

The trigger release end **46***b* is provided with a perforation **55** which is engaged by a pin **56** mounted on the end of the core element **57** of a solenoid **58**. The solenoid **58** is, in turn, suitably mounted on the bracket **25**. It will be understood by one skilled in the art that the solenoid is connected to and actuated by one of the above mentioned timing devices, so that the solenoid is actuated at the proper time in the dishwashing cycle.

The operation of the embodiment of FIGS. 1 through

9 may be described as follows. The dishwasher **1** is loaded with tableware to be washed, and the door **3** will be in its substantially horizontal open position. The operator then fills the first chamber **8** and the second chamber **9** of the dispenser **7**. The second chamber **9** is closed by rotation of the door **15** to its closed position.

When the door **15** is in its open position, the actuating mechanism is in the position shown in FIG. 5. The trigger release **46** lies against the corresponding cam surfaces **37** and **42** of the cams **31** and **33** respectively.

As the door **15** is rotated to its closed position, the shaft **14** will be rotated in a clockwise direction, as seen in FIGS. 4 and 5. Since the release cam **33** is non-rotatively affixed to the shaft **14**, it will rotate with it in a clockwise direction. The clockwise rotation of the release cam **33** will cause a clockwise rotation of the stop cam **31** against the action of the stop cam spring **29**, by virtue of the interengagement of the surface **41** on the cam **33** and the lug **39** on the cam **31**. When the door **15** is in its fully closed position, the right angle corner **47** and the end **46***b* of the trigger release will engage the stop surface **36** of the cam **31**. This is true by virtue of the fact that the trigger release spring **51** tends to urge the trigger release **46** in a clockwise direction. When the door **15** is in its closed position, the dispenser actuating mechanism is in the position shown in FIG. 4.

The operator then closes the dishwasher door **3**. When the door attains its vertical closed position, the detergent material in the chamber **8** is free to fall into the tub or vat of the dishwasher, ready for use in the first washing cycle. Complete discharge of the detergent material from the chamber **8** is assured by the sloping surface **8***a*. During the first washing cycle and any additional cycle or cycles such as a rinsing cycle, the detergent in chamber B is retained in the dispenser by virtue of the door **15**.

At an appropriate time in the dishwashing cycle, the second wash operation will be initiated. A timer device will actuate the solenoid **58** causing the trigger release **46** to be rotated in a counterclockwise direction against the action of the spring **51**. Counterclockwise rotation of the trigger **46** will cause it to be disengaged with the stop surface **36** of the cam **31**. Thus released, the cam **31** will be free to rotate in a counterclockwise direction under the influence of the cam spring **29**. By virtue of the interaction of the lug **39** on the cam **31** and the surface **41** on the cam **33**, the cam **31** will cause the cam **33** to rotate in a counterclockwise direction. Since the cam **33** is non-rotatively affixed to the shaft **14**, rotation of the cam **33** will cause rotation of the shaft **14** and, in turn, rotation of the door **15** to its open position. When the door **15** is in its open position, the detergent material in the chamber **9** is free to fall into the vat for use in the second washing cycle. The detergent material will be completely discharged from the chamber **9** by virtue of the sloping surface **9***a*.

When the door **15** is again in its open position, the door actuating means will again be in the position shown in FIG. 5. When the dishwashing machine has completed its various washing, rinsing and drying cycles, the door **3** may be opened and the tableware removed from the vat. It will be noted that, when the dishwashing machine has completed its operation, the dispenser will be ready to receive additional amounts of detergent material when the dishwasher is to be used again.

Should it be desired to manually rotate the door **15** from a closed to an open position, this is made possible by the action of the release cam **33**. Attention is directed to FIG. 4 wherein the door actuating assembly is shown in the door-closed position. Since the stop cam, engaged by the trigger release **46**, is not fixedly mounted on the shaft **14**, the shaft **14** and the release cam **33** are rotatable independently of the stop cam. Thus, as the door **15** is manually rotated from a closed position toward an open position, the release surface **43** of the cam **33** will contact the right angle corner **47** of the trigger release and cause it to rotate in a counterclockwise direction out of engagement with the stop surface **36** on the cam **31**. With the stop cam **31** thus released from the trigger **46**, it will tend to rotate in a counterclockwise direction by virtue of the action of the cam spring **29**. The interaction of the lug **39** on the cam **31** and the surface **41** on the cam **33** will cause the cam **31** to rotate the cam **33** in a counterclockwise direction, and this in turn will rotate the shaft **14** and the door **15** to the door-open position. It will be seen that when the door **15** is to be opened, it is only necessary to rotate it manually by an amount sufficient to cause the release surface **43** to rotate the trigger **46**. After this has been accomplished, the cam spring **29** will cause the door to snap to its open position.

FIGS. 10, 11 and 12 illustrate another embodiment of the detergent dispenser of the present invention. FIG. 10 illustrates a top loading diswashing machine, having a body or casing **59**, a top opening **60**, an interior vat **61**, and a door **62** which is shown in its open position. Again, no attempt has been made to outline the operating instrumentalities of the dishwashing machine, such as the controls, timing devices, motor, valves, heating means, and the like, since these are well known in the art.

The top loading dishwasher of FIG. 10 has a detergent dispensing device generally indicated at **63**. For purposes of an exemplary showing, the dispensing device is illustrated as mounted on the rear wall **61***a* of the vat. The dispenser **63** is illustrated in FIGS. 11 and 12, and comprises a container having a front wall **64**, a rear wall **65**, and side walls **66** and **67**. The dispenser is divided into a lower chamber **68** and an upper chamber **69**. The lower chamber is open as at **68***a*, and upper chamber **69** is provided with a lid **70**. The lid **70** is provided with downwardly depending lugs **70***a* and **70***b*, by which it is hinged to the container through the use of screws **71** passing through perforations in the lugs and into the dispenser sides **66** and **67**. That portion of the dispenser lying between the containers **68** and **69** has a shaft receiving perforation **72**. The perforation **72** has a non-circular cross section, and terminates in a smaller coaxial perforation **73**.

It will be noted from FIG. 11 that the operating mechanism for the embodiment of FIGS. 10 through 12 is similar to that for the embodiment of FIGS. 1 through 9 and like parts have been given like index numerals. In this instance, the shaft **14** is provided with an elongated forward end **74** of noncircular cross section. The forward end **74** is adapted to be received in the dispenser perforation **72** and to be held in place therein by means of the screw **20** which passes through a lock washer **21**, the dispenser perforation **73** and into a threaded hole (not shown) in the end of the shaft portion **74**. It will be evident that when the shaft **14** is rotated, the entire dispenser **63** will rotate with it.

The shaft **14** passes through an annular sealing means **23**, a bushing **24**, a second annular sealing means **27** and coaxial perforations generally indicated at **26***a* in the rear vat wall **61***a* and the bracket **25***a*. As described with respect to FIG. 6, that portion of the shaft in FIG. 11 which extends beyond the bracket **25***a* passes through the annular ring **28**, the convolutions of the cam spring **29**, and the perforations **30** and **32** in the stop cam **31** and the release cam **33** respectively. The ring **28**, cam spring **29**, stop cam **31** and release cam **33** are identical to those described with respect to FIG. 6. The hooked end **29***a* of the cam spring is adapted to engage the notch **38** on the stop cam, and the spring end **29**b is adapted to engage the notch **44** in a bent over portion **45** of the bracket **25***a*.

The bracket **25***a* is similar to the bracket **25** of FIG. 6, except that since the vat wall **61***a* is planar (there being no depression **5** therein) the bracket **25***a* is also planar. In this instance, the bracket **25***a* is provided with a bent over portion **25***b* upon which the solenoid **58** is mounted.

A trigger release **46**, identical to the trigger release of FIG. 6, is pivotally affixed to the bracket **25***a* by means

of a pivot pin **48** or the like. The bent over end **46***b* of the trigger release is attached to the core element **57** of the solenoid **58**. A trigger release spring **51** has its convolutions passing around the pivot pin **48**, and the spring end **51***a* passes through the perforation **52** in the trigger release. In this instance, however, the other end **51***b* of the spring **51** is adapted to be received in a notch **75** in the bent over portion **25***b* of the bracket **25***a*.

The operation of the embodiment of FIGS. 10 through 12 is similar to that of the embodiment of FIGS. 1 through 9, and may be described as follows. At the beginning of the dishwashing operation, the dishwashing lid **62** will be raised and the vat **61** (having racks of any well known type) will be loaded with tableware to be washed. The dispenser **63** will be oriented with the opening **68***a* of the chamber **68** being uppermost. With the dispenser **63** in this position, the cams **31** and **33** and the trigger release **46** will be in substantially the same positions shown in FIG. 5. The chamber **68** is filled with detergent material, and the entire dispenser **63** is then rotated in a counterclockwise direction through a 180°. Such rotation of the dispenser **63** and consequently the shaft **14** will cause the cams **31** and **33** and the trigger release **46** to assume the positions shown in FIG. 4. Furthermore, since the chamber **68** is open as at **68***a*, the detergent contents therein are discharged into the vat **61** ready for the first washing operation. The dispenser chamber **69** is now in an upright position, and the lid **70** can be raised and the chamber **69** filled with detergent material. The dishwasher lid **62** is closed and the washing operation is begun. At an appropriate time in the washing cycle, a timer device actuates the solenoid **58**, and the trigger release **46** is disengaged from the stop cam **31**. The cam spring **29** causes the cam **31** to rotate. This in turn causes the cam **33**, the shaft **14** and the dispenser **63** to rotate through a 180°. The dispenser chamber **69** is now in its lowermost position, and the lid **70** will assume an open position by gravity. Thus the detergent material in the chamber **69** is discharged into the vat **61** ready for the second washing cycle. When the dispenser **63** is in this position, the cams **31** and **33** and the trigger release **46** again assume substantially the same positions shown in FIG. 5. After the washing operation is over, it will be noted that the dispenser **63** is in the proper position for the preparation of another washing operation, i.e. the chamber **68** will be in its uppermost position.

If, for any reason, at the beginning of a washing cycle the chamber **68** is not in its uppermost position (as for example when a second wash has been omitted from the cycle in a previous washing operation) the dispenser **63** may be manually rotated 180° in a clockwise direction by virtue of the action of the release cam **33**. In such an instance, the release cam **33** operates in precisely the same manner as described above in connection with the manual opening of the door **15**.

Modifications may be made in the invention without departing from the spirit of it. For example, it will be understood by one skilled in the art that the actuating mechanism of the present invention may be used with any suitable type of dispenser means, for either a top loading or a front loading dishwashing machine, wherein the actuation of the dispenser depends upon the rotation of a shaft. The actuating mechanism is simple and compact, and depending upon the type of dispenser used, may be located substantially anywhere in the dishwashing vat between the vat wall and the casing.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

**1.** For use in a dishwashing machine having a timing device, a detergent dispenser, a portion at least of said dispenser being affixed to a shaft, said dispenser portion and said shaft being rotatable between a detergent retaining position and a detergent dispensing position, means for rotating said shaft, said shaft rotating means comprising a first cam and a second cam, said first cam being rotatively mounted on said shaft and having an actuated and an unactuated position corresponding respectively to said retaining and dispensing positions of said shaft and said dispenser portion, means for urging said first cam from said unactuated to said actuated position, said second cam being fixedly secured to said shaft, means on said first cam for engaging and rotating said second cam and said shaft when said first cam is rotated from said unactuated to said actuated position, releasable means for retaining said first cam in said unactuated position, means controlled by said timing device for releasing said retaining means, and additional means on said second cam for releasing said retaining means when said dispenser portion and said shaft are manually rotated from said detergent retaining position to said detergent dispensing position.

**2.** For use in a dishwashing machine having walls comprising a vat, a door in association with said vat, and a timing device, a detergent dispenser comprising a detergent receiving means, a shaft having a forward end and a rearward end, the forward end of said shaft being affixed to a portion at least of said detergent receiving means, said portion at least of said detergent receiving means and said shaft being rotatable in a first direction to a detergent retaining position and in a second direction to a detergent dispensing position, means for rotating said shaft, said shaft rotating means comprising a first cam having a stop surface and being rotatively mounted on said rearward end of said shaft, means for urging rotation of said first cam in said second direction, a second cam having a release surface and being non-rotatively mounted on said rearward end of said shaft, said first and second cams having an actuated and an unactuated position corresponding respectively to said dispensing and releasing positions of said shaft, means on said first cam for engaging and rotating said second cam to said actuated position when said first cam is rotated to said actuated position, means on said second cam for engaging and rotating said first cam to said unactuated position when said shaft is rotated to said retaining position, trigger means releasably engaging said stop surface of said first cam when said first cam is in said unactuated position, means for releasing said trigger means from said stop surface, said last mentioned means comprising a solenoid actuable by said timer means and connected to said trigger means, said release surface on said second cam engageable with said trigger means to disengage said trigger means from said stop surface when said portion at least of said detergent receiving means and said shaft are rotated in said second direction toward said dispensing position.

**3.** The structure claimed in claim **2** including a bracket, said shaft extending through a perforation in said bracket, said solenoid mounted on said bracket, said trigger means pivotally affixed to said bracket, spring means in association with said trigger for urging said trigger into engagement with said first cam stop surface, said means for urging rotation of said first cam comprising a spring, one end of said spring engaging said bracket, the other end of said spring engaging said first cam.

**4.** The structure claimed in claim **2** wherein said detergent receiving means comprises a housing having a first and a second detergent retaining chamber, said portion at least of said detergent receiving means comprising a door for said second chamber.

**5.** The structure claimed in claim **2** wherein said detergent receiving means comprises a housing having a first and a second detergent retaining chamber, said first and second chamber having open tops, said tops of said chambers being located at opposite ends of said housing, said housing affixed to said forward end of said shaft, said second chamber having a hinged lid member operable by gravity.

**6.** The structure claimed in claim **4** in combination with a dishwashing machine having a door located in an ex-

terior wall and the adjacent one of its interior walls, a portion of said exterior wall comprising the outside surface of said door, a portion of said interior wall comprising the inside surface of said door, said door being swingable between a horizontal open position and a vertical closed position, said housing affixed to said inside surface of said door, said shaft passing through a perforation in said inside surface, said means for rotating said shaft being located within said door between said inside and said outside surfaces.

7. The structure claimed in claim 5 in combination with a dishwashing machine having walls defining a vat, said shaft passing through a perforation in one of said walls



of said dishwashing machine into said vat, said means for rotating said shaft being located outside of said vat of said dishwashing machine, said housing affixed to said forward shaft end adjacent said interior wall.


**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,012,565 | 12/1961 | Lines | 134—93 |
| 3,062,412 | 11/1962 | Cushing | 222—70 |


ROBERT B. REEVES, *Primary Examiner.*

HADD S. LANE, *Examiner.*