

July 26, 1960

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AUTOMATIC SOAP DISPENSER FOR WASHING MACHINES

Filed Nov. 6, 1956

2 Sheets-Sheet 1

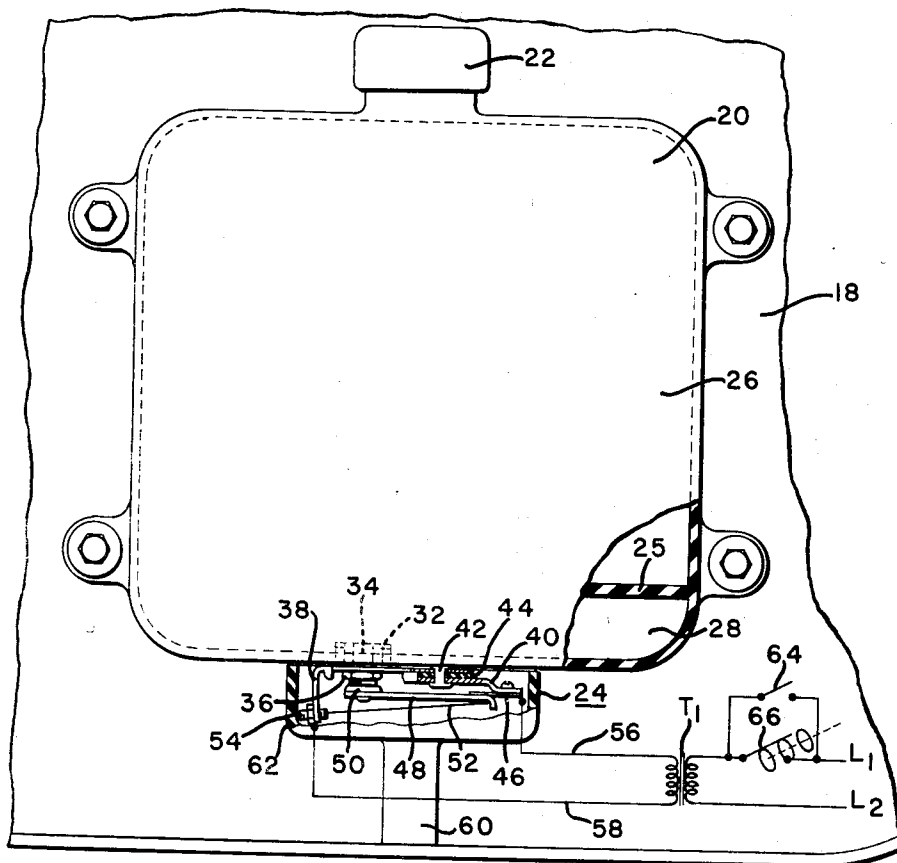


Fig. 2

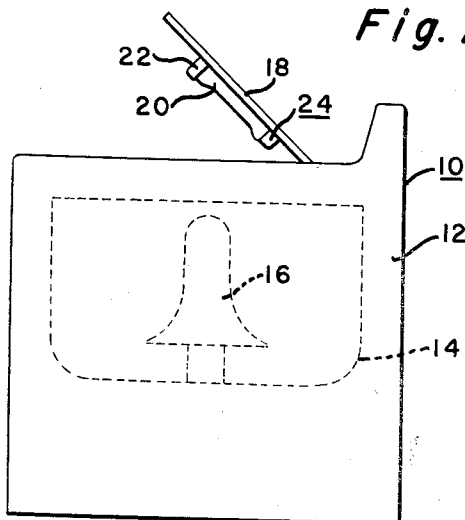


Fig. 1

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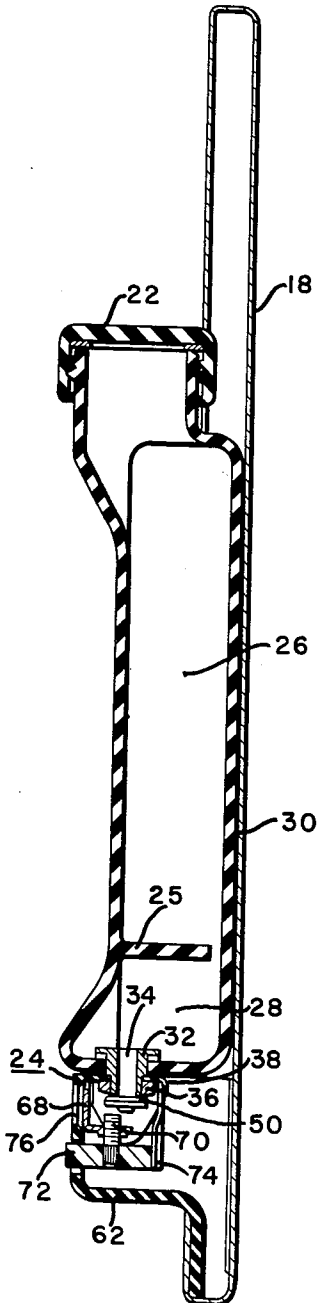


Fig. 3

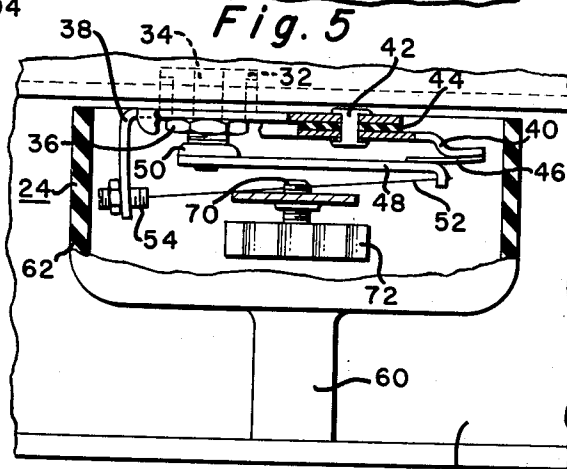
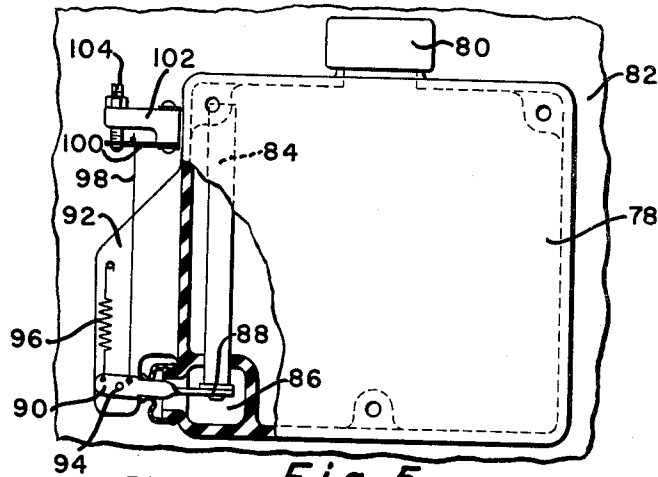


Fig. 4

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AUTOMATIC SOAP DISPENSER FOR WASHING MACHINES

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2 Claims. (Cl. 222-160)

This invention relates to a domestic appliance and more particularly to detergent dispensing mechanism for washing apparatus.

The dispensing arrangement of this invention contemplates providing a washing machine with a detergent containing receptacle, and with means for predetermining the amount of detergent dispensed from the receptacle in a given period of time. The receptacle is preferably of sufficient size to contain enough detergent for several wash loads, whereby there is no need for refilling the receptacle before each wash load. The receptacle is provided with means for predetermining the amount of detergent dispensed in a simple and accurate manner, and with means for varying the amount of detergent dispensed for any given wash load.

It is an object of this invention to provide dispensing mechanism for use with washing apparatus including a receptacle having an outlet orifice, the orifice being controlled by a valve member that is actuated in response to an electrical voltage being applied to a valve actuating mechanism.

Still another object is to provide a detergent containing receptacle that is adapted to be associated with washing apparatus, the receptacle having an outer passage that is normally closed by a valve member and wherein the valve member is movable to an open position in response to the elongation of a member that elongates upon being heated.

A further object is to provide a detergent receptacle that includes a dispensing chamber and a storage chamber, the dispensing chamber trapping a predetermined amount of detergent therein when the receptacle is tilted, there being means for dispensing the predetermined amount of detergent into the tub of a washing machine subsequent to the tilting and filling of the dispensing chamber of the receptacle.

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

In the drawings:

Figure 1 is a side view of a washing machine showing a preferred location of the detergent receptacle and dispenser of this invention;

Figure 2 is a plan view of the receptacle and valve actuating mechanism of this invention;

Figure 3 is a sectional view of a modified detergent receptacle valve actuating mechanism;

Figure 4 is an enlarged view with parts broken away of the valve actuating mechanism shown in Figure 3; and

Figure 5 is a modified detergent dispenser made in accordance with this invention.

Referring now to Fig. 1, a washing machine generally denoted by reference numeral 10 is shown. The washing machine includes a cabinet 12, a tub 14 and an agitator 16 disposed therein. The washing machine is shown somewhat diagrammatically and may be of the type shown and described in the patent to Clark 2,366,236.

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As disclosed in the Clark patent, the washing machine is provided with an electric motor that vertically reciprocates the agitator 16 during certain periods of energization. The tub and agitator, during other periods of energization of the electric motor are rotated at high speed, as also taught in the Clark patent. It is to be understood that the washing machine is further arranged with water supply and drain means together with timing means for controlling the energization of an electric motor that drives agitator 16 and for controlling the supply of water and drain of water from tub 14. The timer and water supply means may be as disclosed in the above-mentioned Clark patent. With this arrangement the time controls the operation of the washing machine so that the tub is first filled with hot water to a predetermined level. The timer then operates to start the agitation cycle wherein the agitator 16 is vertically reciprocated upwardly and downwardly for a predetermined period. When the agitation or washing cycle is finished, the detergent and tub are rotated at high speed whereupon the water is spun out of the tub and carried away by suitable drain means (not shown). The cycle of operation after the water is spun out of the tub may include one or more rinse periods and a spin-drying period where the tub and detergent are spun at high speed.

The door 18 of the washing machine normally closes a top access opening formed in the cabinet 12 and is provided with a detergent receptacle 20 that is secured to the under side of the door. The detergent receptacle, as more particularly shown in Fig. 2, may be bolted to the under side of the door, as shown, and is provided with a filler cap 22 and with suitable valve actuating means generally denoted by reference numeral 24. The receptacle or bottle 20 is preferably made of a plastic material such as rubber and is formed with a laterally extending baffle 25 that extends across the bottle. The baffle 25, as shown in Figs. 2 and 3, divides the receptacle into a storage chamber 26 and a dispensing chamber 28. The top edge of the baffle 25 as shown in Fig. 3 is spaced away from the rear wall 30 of the bottle, the purpose of which will be more fully described hereinafter.

The lower wall of receptacle 20 is provided with a drain fitting 32 having a central drain aperture or passage 34 of a predetermined size. A nut 36 engages a lower threaded portion of the fitting to hold it tightly in place in the receptacle. The fitting 32 passes through an L-shaped valve actuating support 38, the support being held fixed with respect to the receptacle 26 by means of the nut 36. Suitable gasket material is interposed between the upper flanged edge of the fitting 32 and an inner wall of the bottle and between the support 38 and the outside wall of the bottle, as shown. The valve actuating support 38 supports an arm 40 by means of a rivet 42 that passes through the support 38, the arm 40 and through a sheet of insulating material 44. The rivet is made of some material that will not conduct an electrical current. A spring steel member 46 is welded or otherwise secured to the arm 40 and supports a valve actuating arm 48. The valve actuating arm carries a valve member 50 that may be made of rubber or other suitable material and which normally abuts the end of fitting 32 to close passage 34.

The spring steel member 46 is so designed as to tend to move the valve member 50 away from the aperture 34 in the fitting 32. This movement is counteracted by a Nichrome wire 52 that is interposed between valve actuating arm 48 and a leg of the L-shaped member 38. The tension of the Nichrome wire 52 may be adjusted by an adjusting screw 54. With this arrangement the Nichrome wire 52 normally holds the valve member 50 tightly against the aperture 34 while the spring steel member 46 attempts to move the valve member 50 away

from aperture 34. When no heat is supplied to Nichrome wire 52, the wire is capable of holding valve member 50 in a closed position. When heat is supplied to the Nichrome wire 52 such as by passing an electric current therethrough, the Nichrome wire 52 elongates thereby permitting the spring steel member 46 to move the valve member 50 to an open position.

The Nichrome wire 52 is preferably connected with a voltage source by a pair of leads 56 and 58 connected respectively with the arm 40 and with the L-shaped supporting member 38. The electrical connections are shown somewhat schematically in Fig. 2. In practice, the lines 56 and 58 may be brought out through a guide passage 60 that is formed integrally with the flexible cover 62 that covers the valve actuating mechanism. The flexible cover 62 is preferably made of rubber or other plastic material and protects the valve actuating mechanism and the electrical lines leading thereto. The flexible cover 62 is also provided with passage 76 (see Fig. 3) in a front wall thereof in order that detergent passing through the orifice 34 may pass into the tub 12 of the machine. The lines 56 and 58 are connected to the output winding of a step-down transformer T₁. The primary of the transformer is preferably connected with power lines L₁ and L₂ through a manually operated switch 64 that is connected in parallel with a timer operated switch 66. The timer operated switch 66 is so arranged that it will close the circuit to the transformer T₁ when the agitation cycle of the washer begins. The switch 64 is preferably of the manually operated type and will be closed upon manual actuation thereof by the operator of the washing machine.

In operation, the bottle or receptacle 20 is filled by moving door 18 to a substantially vertical position and then pouring a liquid detergent, softening agent, or other suitable washing agent into the bottle. The liquid detergent will flow over the end of baffle 25 to fill the chamber 28. When the door 18 is moved to a horizontal position, a certain predetermined amount of liquid detergent will be trapped within the dispensing chamber 28. By the provision of a laterally extending baffle 25 a constant head pressure at the orifice plug 32 is assured, as the chamber 28 will always fill up to the same amount. It will thus be apparent that a predetermined amount of detergent will flow through the drain aperture 34 when the valve member 50 is moved away from the drain aperture 34, in a given period of time. The valve member 50 is held in an open position for a predetermined period of time by the closure of timer actuated switch 66 which will keep the Nichrome wire 52 energized for some certain predetermined period of time. The baffle 25 of dispenser 30 also performs another function in that it traps a predetermined amount of detergent in the chamber 28 when the door is moved from a vertical to a horizontal position. In certain arrangements it may be desirable to make the chamber 28 just large enough to contain enough detergent for one clothes load. If this were done, the size of passage 34 in fitting 32 and the period of time in which the valve member 50 is in an open position would be immaterial as long as the valve member was open long enough to empty the chamber 28.

A modified valve actuating mechanism is shown in Figs. 3 and 4 wherein like reference numerals denote the same parts as those disclosed in Figs. 1 and 2. In Figs. 3 and 4 the L-shaped support 38 is provided with a second L-shaped bracket 68 that is welded or otherwise secured thereto. The lower portion of bracket 68 is formed with a threaded aperture that receives an adjusting bolt 70. An adjusting knob 72 is splined or otherwise secured to the adjusting bolt 70 and is engaged by a spring abutment arm 74 that holds the adjusting knob in position once the knob has been shifted. The top edge of the adjusting bolt 70 acts as a stop to limit the downward opening movement of the valve supporting arm 48. Thus, as the valve actuating arm 48 moves

downwardly it will be stopped in its movement by the top end of the bolt 70, the position of the bolt being adjustable by rotation of knob 72. It is well known that the hardness of water varies throughout the country and for this reason it is necessary to vary the amount of detergent being dispensed without changing the period of time that the timer switch 66 is closed. In other words, the timer switch 66 is normally closed for a period of time that will dispense sufficient soap for average water conditions. However, the amount of detergent dispensed may be further varied by an adjustment of knob 72 which, in turn, pre-sets the distance of the valve member 50 may move away from drain fitting 32. The liquid detergent will, of course, flow faster or slower through the drain fitting 32, depending on how far away the valve member 50 is from the fitting 32.

It should be noted that the flexible cover 62 as shown in Fig. 3 is provided with an outlet port 76 through which liquid detergent may flow after passing through the drain fitting 32. The L-shaped bracket 68 may also be provided with passage means connecting with passage 76 or may be disposed offset from passage 76 in order that liquid detergent may pass from within the flexible cover 62 into the tub of the washing machine. The Nichrome wire 52 shown in Figs. 3 and 4 is connected in a circuit that is identical with the circuit shown in Fig. 2.

A modified detergent dispenser that is adapted for use with washing apparatus is shown in Fig. 5. In this figure a plastic bottle 78 is provided with a filler cap 80 and is suitably secured to the inner face of a door 82. This dispenser is used on washing apparatus having a door that is pivoted at the bottom and which moves from a vertical closed position to a horizontally disposed open position. The dispenser could be used on a washing machine or on a dishwasher and may be used to dispense soap, a softening agent or any other type of liquid washing agent. The dispenser shown in Fig. 5 comprises a tube 84 that communicates with a chamber 86 located within the bottle 78. The lower end of tube 84 is closed by a valve member 88 that is supported by a valve actuating arm 90 pivoted to an integral extension of the bottle 92 at 94. A spring 96 is interposed between a fixed point on the extension 92 and one end of the valve actuating arm 90. This spring tends to move the valve 88 away from the lower open end of tube 84. The valve 88 is held tightly against the tube 84 by means of a Nichrome wire 98 interposed between the valve actuating arm 90 and a flat spring 100 that is secured to a second integral extension 102 of the bottle 78. An adjusting screw 104 is provided in order that the tension of the Nichrome wire 98 may be adjusted. The flat spring 100 will bow to a certain extent when the Nichrome wire 98 shortens in a closing movement of valve 88.

The Nichrome wire 98 may be connected with a suitable voltage supply as shown in Fig. 2 and elongates when electrical current is passed therethrough, thereby permitting the spring 96 to open valve 88. As noted hereinbefore, the bottle 78 is attached to the inner face of a door 82 of a washing machine of the type wherein the door moves from a vertical closed position and pivots downwardly to a horizontally disposed open position. A suitable spout (not shown) may be connected with chamber 86 in order to connect the chamber with the tub or washing area of suitable washing apparatus. When the door 82 of a suitable washing apparatus is moved to a substantially horizontally disposed position, the tube 84 fills up with detergent from within bottle 78. The tube 84 is located preferably within the bottle at a point closely adjacent the wall of the bottle that is lowermost when the door 82 is moved to a horizontal position. The tube 84 preferably holds just enough detergent or softening agent for one wash load. Thus, when the door 82 is moved to a vertical position and the valve 88 moved to an open position, the detergent flows by gravity into

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chamber 86 and outwardly into the washing tub or washing area of the washing apparatus. The tube 84, in effect, thus meters the amount of detergent or washing agent dispensed into the washing apparatus.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A liquid detergent dispensing arrangement for a washing machine of the top loading type having a top access opening in the cabinet of said machine closable by a door that is movable from a horizontally disposed closed position to a substantially vertically disposed open position comprising, a receptacle having a filler opening and an outlet secured to the inner side of said door, said receptacle being so positioned on said door that said filler opening takes a position above at least a portion of said receptacle when said door is moved to a vertical position, a baffle extending across said receptacle and dividing said receptacle into a storage chamber and into a dispensing chamber, said dispensing chamber being connected with said outlet and being disposed below said storage chamber when said door is in a substantially vertical position, said baffle trapping liquid in said dispensing chamber when said door is moved from its vertical to its horizontal position, and means for controlling the rate of continuous flow through said outlet from said dispensing chamber into said washing machine, said flow controlling means comprising a valve member opening and closing said outlet, means directly attached to said valve member for biasing said valve member to an open position and a wire member connected between said valve member and a relatively fixed point for pulling said valve member in a closed position against the force of said biasing means, said wire member elongating upon the passage of an electric current therethrough thereby permitting said biasing means to move said valve member to an open position, and a threaded bolt member selectively movable into engagement with said valve member for limiting the biasing effect of said biasing means on said valve member.

2. A liquid detergent dispensing arrangement for a washing machine of the top loading type having a top access opening in the cabinet of said machine closable by a door that is movable from a horizontally disposed closed position to a substantially vertically disposed open position comprising, a receptacle having a filler opening and an outlet secured to the inner side of said door, said

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receptacle being so positioned on said door that said filler opening takes a position above at least a portion of said receptacle when said door is moved to a vertical position, a baffle extending across said receptacle and dividing said receptacle into a storage chamber and into a dispensing chamber, said dispensing chamber being connected with said outlet and being disposed below said storage chamber when said door is in a vertical position, means permitting flow of detergent from said storage chamber into said dispensing chamber when said door is in a substantially vertical position, said baffle trapping liquid in said dispensing chamber when said door is moved from its vertical to its horizontal position, liquid flow controlling means comprising a valve actuating support fixed relative to said receptacle adjacent said outlet and having an extension, an arm connected to said support opposite said extension and electrically insulated from said extension, a leaf spring member joined to said arm, a valve member for opening and closing said outlet and supported on said leaf spring member, said valve member normally biased by said leaf spring member away from said outlet, a Nichrome wire having one end connected to said valve member at the jointure of said valve member with said leaf spring member and the other end thereof threadedly connected to said extension whereby the tension of said wire between said jointure and said extension is made adjustable, said wire when cold adapted to pull said valve member to a position closing said outlet, a first conductor connected to said one end of said wire, a second conductor connected to said other end of said wire, means for selectively electrically energizing said first and second conductors whereby said wire is heated and elongated to move said valve member away from said outlet, and an adjusting bolt means fixed relative to said support and threadedly movable into the path of said valve member for limiting the movement of said valve member away from said outlet for controlling the rate of continuous flow through said outlet from said dispensing chamber into said washing machine.

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