DRY DETERGENT DISPENSER

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ABSTRACT

A molded body has a crowned rectangularly shaped bottom and a water inlet and outlet positioned to establish a water flow longitudinally over the crowned surface and into a wash basket. A rectangularly shaped hopper is positioned above the crowned surface for storing and controllably dispensing dry detergent onto the crowned surface. An overflow is formed in a side wall of the body for limiting the level of the water flowing through the body. An opening in an inlet passage functions as an air break to prevent siphoning of water back into the potable water supply. A spill tray directs water from the overflow and the inlet passage opening onto the tub top and thence into the wash tub to prevent spillage. Baffle members formed on both the bottom and the hopper cooperate to form a longitudinal passage from inlet to outlet and to divert air turbulence from the dry detergent.

7 Claims, 4 Drawing Figures
DRY DETERGENT DISPENSER

BACKGROUND OF THE INVENTION

1. Field of the Invention
This invention relates to detergent dispensers for washing machines and more particularly to a dispenser for dry detergents.

2. Description of the Prior Art
Hereinafter dry detergent dispensers for washing machines were unsatisfactory because they did not controllably dispense dry detergent into the flushing water but rather exposed the entire contents of the dispenser to wetting. Because of the hygroscopic characteristics of most dry detergents, this often resulted in premature wetting of portions of the exposed detergent and caused extreme caking which interfered with proper flushing action and ultimately rendered the detergent dispenser inoperative. Such devices required more frequent removal and cleaning to eliminate caked detergent.

Many of the devices of the prior art did not provide an overflow to discharge incoming wash water in the event that the dispenser outlet became blocked for one reason or another. In such devices, the incoming wash water would quickly fill the dispenser and flow out of the top of the dispenser spilling into an undesired portion of the washing machine or onto the floor. In the prior art machines that did provide an overflow, difficulty was experienced as a result of air turbulence within the washing machine created by the spinning of the wash basket. The air turbulence established an air current between the overflow and the dispenser outlet which carried the dry detergent into the wash basket during the spin portion of a cycle which was most undesirable.

Plumbing code specifications require that an air break be provided at the water inlet of all washers to prevent the reverse siphoning of wash water or detergent back into the potable water supply line. Hereinafter, washing machines using detergent dispensers either had to recirculate water from the wash tub into the dispenser or had to provide a separate air break between the water inlet and the dispenser. Such an air break added to the cost, complexity, and assembly time of the washers.

SUMMARY OF THE INVENTION
The present invention contemplates a dry detergent dispenser having a body portion molded from a thermoplastic or other suitable material having non-wetting characteristics. The body has a bottom surface that is rectangularly shaped and crowned along a longitudinal axis. Disposed above the crowned surface is a hopper for storing and controllably dispensing dry detergent onto the crowned surface. The hopper limits the quantity (or area of contact) of detergent in contact with the dispenser floor and therefore exposed to the flushing liquid, thus minimizing the undesirable premature wetting of any portion of the detergent other than that in contact with the crowned surface while at the same time readily replacing, by gravity feed, that detergent which is flushed away by the incoming liquid. The controlled dispensing action of the hopper prevents the detergent from spreading over the entire area of the dispenser floor (crowned surface) and thus provides longitudinal passageways or either side of the exposed detergent. These passageways provide flowpaths for the detergents being flushed into the basket. A water inlet is formed at one end of the crowned surface and an outlet is formed at the opposite end to establish a water flow in a longitudinal direction over the crowned surface and into a wash basket. The water flow washes the detergent from the crowned surface into the wash basket so that a satisfactory mixture of detergent and wash water is achieved. The crowned surface provides for rapid run-off of water once the incoming water is shut off. This is desirable in the event the dispenser is reloaded immediately following a dispensing action so that the crowned surface is dry and the detergent does not have an opportunity to absorb residual water, which might otherwise be present, from the crowned surface and thereafter become caked and prevent the detergent from being dispensed onto or flushed from the crowned surface during a subsequent cycle.

An upstanding baffle member is formed on the crowned bottom parallel to one side thereof and a depending baffle is formed from the hopper. The baffles cooperate to define a passage between the input and output and to protect the dry detergent from air turbulence which is diverted through the passage by the baffles. Thus, the dry detergent is not blown into the wash basket by air turbulence created during a spin cycle of the washer.

An overflow in the form of an opening in a side wall of the dispenser is provided to limit the level of the water flowing over the crowned surface and to prevent the water level from rising to a point where it would flow out of the top of the dispenser and onto the floor in the event the outlet of the dispenser becomes blocked.

The water inlet to the dispenser is in the form of a curved passageway which has an opening in a lower side thereof to provide an air gap and to prevent siphoning of the detergent and/or water into the potable water supply. A spill tray is integrally formed from the bottom of the dispenser and spans a space between the dispenser and the wash tub. The spill tray catches water discharged from the overflow and from the air gap and directs the water into the wash tub. Thus, the present invention provides an air break formed integrally with the dispenser and also protects against water spillage from the top of the dispenser should the dispenser become blocked for one reason or another.

One objective of the present invention is to provide a dry detergent dispenser wherein the detergent does not cake and block the discharge of detergent.

Another objective of the present invention is to provide a dry detergent dispenser that controllably discharges dry detergent into a stream of incoming wash water.

Another objective of the present invention is to provide a detergent dispenser that has an overflow to provide controlled spillage of water and/or detergent in the event that the water passage within the dispenser becomes blocked.

Another objective of the present invention is to provide dry detergent dispenser wherein the detergent is not blown into the wash basket by air turbulence occurring during a spin cycle.

Another objective of the present invention is to provide a dry detergent dispenser that utilizes fresh wash water and has formed integrally therewith an air break.

The foregoing objectives and advantages of the invention will appear more fully hereinafter from a con-
sideration of the detailed description which follows, taken together with the accompanying drawings wherein one embodiment of the invention is illustrated by way of example. It is to be expressly understood, however, that the drawings are for illustrative purposes only and are not to be considered as defining the limits of the invention.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a washer including a detergent dispenser constructed in accordance with the present invention.

FIG. 2 is a fragmentary view of a portion of the washer shown in FIG. 1.

FIG. 3 is a vertical section taken along line 3—3 of FIG. 2.

FIG. 4 is a vertical section taken along line 4—4 of FIG. 2.

DESCRIPTION OF THE INVENTION

Referring to FIG. 1, there is shown the cabinet top 10 of a washer having a lid 12 hingedly attached to cabinet top 10 by hinges 14. Cabinet top 10 has a square depression formed therein for receiving lid 12 so that the lid and the top are substantially flush when the lid is closed. Cabinet top 10 has an opening 16 formed therein and positioned beneath lid 12 to provide access to a wash basket 17 rotatably mounted within the washer. A detergent dispenser 18 is shown positioned to one side of cabinet top 10. Dispenser 18 has a water inlet 20 and an outlet 22. A bezel member 24 is mounted on cabinet top 10 and has a cover 26 hingedly attached thereto by hinge members 28 formed integrally with bezel 24. Bezel 24 is positioned above an opening 29, FIG. 2, in cabinet top 10 and has a downwardly extending portion that is in communication with a lower dispenser body 30 mounted beneath cabinet top 10. Cover 26 is provided with a lip 32 which functions as a handle for lifting the cover to gain access to the dispenser 18 for loading detergent into the dispenser. The bezel is held in place by spring clips 31 that engage the edge of opening 29 in cabinet top 10 as most clearly shown in FIG. 4.

The lower dispenser body 30 has a top wall 34 having an opening formed therein substantially similar in shape to opening 29 formed in cabinet top 10. Wall 34 also has formed therein threaded receptacles 36 to facilitate mounting the lower member 30 beneath cabinet top 10. Screws 38 and washers 39 are utilized in conjunction with receptacles 36 for mounting the lower member 30 beneath cabinet top 10. Formed on the upper surface of top wall 34 are a pair of upwardly extending ridges 40 for engaging the lower surface of cabinet top 10. Ridges 40 in the preferred embodiment provide locating (positioning) surfaces for mounting the dispenser but also form a channel for positioning and retaining a gasket means in the event a positive seal is desired between the dispenser body 30 and cabinet top 10. Portions 42 of ridges 40 extend above ridges 40 and project into opening 29 for orienting the lower member 30 relative to opening 29. Lower portion 30 has a crowned bottom wall 44 as best shown in FIG. 3 and side walls 46 and 48. Side wall 48 connects top wall 34 and bottom 44 to form a continuous surface. Side wall 46 extends only partially to top wall 34 and has an inwardly directed flange 50 formed along the uppermost edge thereof.

Associated with the outlet 22 of dispenser 18 is a curved conduit portion 52 having a top, bottom and side walls for connecting lower portion 30 with outlet 22. Outlet 22 is disposed at approximately 90° to the longitudinal direction of bottom portion 30.

An end wall 54 as shown in FIGS. 3 and 4 is formed between top wall 34 and bottom wall 44 on the inlet end of bottom portion 30 and has an opening 56 formed therein having a length approximately equal to the width of opening 29 in cabinet top 10 and a height equal to approximately one-third the distance between top wall 34 and bottom wall 44. Opening 56 forms a nozzle for directing water over the bottom wall.

Opening 56 is in fluid flow communication with inlet 20 through a curved passageway 58. Passageway 58 has an opening in a lower side thereof that is in communication with a well 60 defined by side wall 62 and a Bottom 64. The side wall 62 positioned closest to wash basket 17 has a rectangular opening 66 formed therein. A spill tray 68 is formed as an extension of bottom 64 and extends toward and overlays tab 59 19 an arc from a position adjacent to inlet 20 to the conduit portion 52 and terminates in a curved edge 70 lying in a circle concentric with the periphery of tab 19. An upstanding wall 72 is formed along an edge of spill tray 68 between inlet 20 and edge 70.

An upstanding baffle member 74 is formed on the rounded bottom 74 and positioned parallel to side wall 76 and extends substantially the length of bottom 44. Baffle 74 is spaced from wall 46 so as to be positioned substantially beneath the edge of opening 29 in cabinet top 10.

Bezel 24 has side walls 76 and 78 that rest on cabinet top 10 to support the bezel. Bezel 24 has inner side walls 80 and 82 that are disposed at a slight angle from a vertical and are inclined toward the center of bottom 44. At a height slightly above cabinet top 10, inner side walls 80 and 82 converge at a shallower angle toward the center of bottom 44 to form sloped walls 84 and 86. Wall 84 terminates at a distance approximately one-fourth inch above sloped bottom 44 and sloped wall 86 terminates at a distance approximately one-half inch from wall 44. A depending baffle member 88 extends downwardly from side inner wall 80 and has a lower edge juxtaposed with baffle 74.

An inner end wall 90 connects inner side walls 80 and 82 and sloped members 84 and 86. End wall 90 has two substantially vertical sections 92 and 93 connected by a sloped portion 94 and has a bottom edge 96 positioned approximately one-half inch above bottom 44.

An end wall 98 connects side inner walls 80 and 82, sloped walls 84 and 86 and baffle 88. End wall 98 comprises two substantially vertical portions 102 and 103, a sloped portion 104 therebetween and a bottom edge 100 that is disposed approximately one-fourth inch above bottom 44.

As can be seen from the drawing, sloped walls 84 and 86 of bezel 24 form a hopper arrangement into which detergent 106 is poured when cover 26 is in an open position. The detergent is controllably dispensed from the hopper onto the crowned bottom 44 of dispenser 18.

Fresh water enters inlet 20, flows through passageway 58, along bottom wall 44, through conduit 52, and out of outlet 22 as indicated by arrows 25. As the fresh water flows along bottom 44, it flushes detergent 106 in contact with bottom 44 into basket 17 so that additional
detergent 106 will flow down onto bottom 44 to be washed away by the incoming water.

The opening in the bottom of passage 58 is provided to supply an air break as required by plumbing code specifications to prevent detergent or soap water from being sucked back into the potable water supply should the water supply lose pressure. Opening 66 and spill tray 68 provide for the discharge of water onto tub 19 and thence into tub 21 through drain holes 23 should the normal flow path of water through the dispenser become blocked by caked detergent or other foreign material. Opening 66 and spill tray 68 also provide for the similar disposition of incoming water should the pressure be insufficient to bridge the air break provided in the bottom wall of passage 58.

As previously mentioned, side wall 46 does not connect with top 34 and thus provides an overflow opening for excessive water should outlet 22 become blocked. Thus, the opening provides an overflow so that the incoming water will not rise up through the interior of the bezel and out of the opening in the top portion thereof if the outlet becomes blocked.

During operation of the washer and especially during the spin portion of a cycle, air turbulence is established inside the washer as a result of differential pressures at various portions of the interior of the washer. The space between wall 46 and baffles 74 and 88 is provided to short circuit and/or restrict air turbulence and prevent it from acting upon detergent 106 which is stored on the opposite side of baffles 74 and 88. Dispenser bottom 30 is molded from a thermo plastic or other suitable material having non-wetting characteristics and bottom wall 44 is crowned to provide rapid run off and drying of the surface of bottom wall 44. Because of the crowned shape and the non-wetting characteristic of the plastic from which the member is molded, water quickly runs off of the surface of bottom 44 immediately below the hopper when the water supply is turned off so that excessive absorption of moisture into subsequent loads of detergent 106 is prevented. The crowned shape of bottom 44 also tends to establish two water flow paths through the dispenser, one on each side of a longitudinal line running through the center of bottom wall 44. The two flow paths promote controlled dispensation of detergent 106 by the hopper formation in bezel 24.

The present invention by the unique use of a crowned bottom wall and of plastic materials of non-wetting characteristics provides for the rapid drying of the surface of the bottom wall and thereby prevents absorption of moisture by the detergent placed in the dispenser for a subsequent washing cycle, thereby overcoming the problems associated with caking of damp detergent. Baffle members 74 and 88 retain the detergent at a position centrally located along bottom 44 and also provides an air passage through the dispenser to short circuit air current caused by turbulence during a spin operation of the washer. An overflow is provided to control the level of water in the dispenser and prevent the discharge of water through the opening in the top of the dispenser. Means are also provided for the discharge of low pressure water that cannot bridge the air gap provided integrally with the detergent dispenser.

Thus, the present invention overcomes the major difficulties of detergent dispensers heretofore provided by providing an overflow for water should an outlet block-age occur, and by providing a short circuit for air turbulence to prevent the dry detergent from being blown out of the washing machine or into the basket during a spin operation. The present invention also overcomes the problem of the caking of damp detergent associated with detergent dispensers heretofore provided.

What is claimed is:

1. A dry detergent dispenser for a washer, comprising:
   a body member having side walls and a bottom wall, said bottom wall having non-wetting characteristics and being crowned with a raised central portion sloped downwardly towards two opposite side walls;
   a hopper means disposed above the bottom wall for storing dry detergent and for dispensing detergent onto the bottom wall;
   an inlet for receiving water and establishing a flow of said water over the bottom wall; and
   an outlet for discharging the water into a wash basket, whereby the water flow flushes detergent into the wash basket during a wash fill cycle to ensure a proper mixing of detergent and water and to ensure that the detergent in the hopper is maintained dry.

2. A detergent dispenser as described in claim 1, wherein the hopper means is positioned for dispensing detergent onto the raised central portion of the bottom wall.

3. A dry detergent dispenser for a washer, comprising:
   a substantially rectangular hollow body member having a top with a rectangular shaped opening formed therein, two side walls, two end walls and a bottom wall crowned in the center and sloping downwardly toward the two side walls;
   an inlet connected to a water supply for receiving fresh water, said inlet including a water passage and an opening communicating the water passage with the exterior of the dispenser to provide an air break, thereby preventing siphoning of water back into the potable water supply;
   nozzle means disposed between the inlet and one end of the body member for receiving the water from the inlet and for establishing a flow of water over the entire bottom wall;
   output means in fluid flow communication with the interior of the body member and a wash basket for discharging the water from the body member into the wash basket;
   hopper means supported above the body member and having depending walls extending into the body member and disposed above the bottom wall for storing dry detergent and for dispensing dry detergent on the bottom wall, whereby the water flow controllably flushes detergent into the wash basket to ensure a proper mixing of detergent and water during a wash fill cycle of the washer;
   overflow means formed in a side wall of the body for limiting the level of water flowing over the bottom wall and for discharging excess water from the body;
   means for collecting water discharged from the overflow means and from the opening in the inlet and for directing and discharging said water into a wash tub; and
haffle means in said body member forming a passage in communication with the inlet, outlet and overflow means for by-passing air turbulence created during a spin cycle, whereby the dry detergent is not blown into the wash basket by the air turbulence.

4. A dry detergent dispenser for a washer, comprising:
   a body member having side walls and a bottom wall inclined towards at least one side wall;
   a hopper disposed above the bottom wall for storing dry detergent and for dispensing detergent onto the bottom wall;
   an inlet for receiving water and establishing a flow of said water over the bottom wall;
   an outlet for discharging the water into a wash tub; overflow means formed in at least one side wall for limiting the level of water flowing over the bottom wall and for discharging excess water; and
   baffle means associated with the body member for protecting the dry detergent from air turbulence created during a spin operation, whereby the dry detergent remains in the dispenser during the spin portion of a cycle and water flow flushes detergent into the wash tub during a wash fill cycle to ensure proper mixing of detergent and water and to ensure that the detergent in the hopper remains dry.

5. A dry detergent dispenser for a washer, comprising:
   a body member having side walls and a bottom wall inclined towards at least one side wall;
   a hopper disposed above the bottom wall for storing dry detergent and for dispensing detergent onto the bottom wall;
   an inlet for receiving water and establishing a flow of said water over the bottom wall;
   an outlet for discharging the water into a wash tub; overflow means formed in at least one side wall for limiting the level of water flowing over the bottom wall and for discharging excess water; and a passageway in communication with the inlet, the outlet and the overflow means for by-passing air turbulence around the dry detergent deposited on the bottom wall, so that the dry detergent remains in the dispenser and is not affected by air turbulence in the wash tub but is flushed into the wash tub during a wash fill cycle to ensure proper mixing of detergent and water and to ensure that the detergent in the hopper is maintained dry.

6. A detergent dispenser as described in claim 5, wherein the passageway is formed by a first baffle upstanding from the bottom wall and a second baffle depending from the hopper means, said baffles cooperating to form one side of the passageway.

7. A dry detergent dispenser for a washer, comprising:
   a body member including side walls, end walls and a crowned bottom wall said bottom wall having a raised central portion and portions sloped downwardly towards two opposite side walls;
   a hopper means disposed above the bottom wall for storing dry detergent and for dispensing detergent onto the raised central portion of the bottom wall; an inlet formed in one of said end walls for receiving water;
   a nozzle for directing water through the inlet and for establishing a flow of water over the bottom wall; and an outlet for discharging the water into a wash tub, whereby the water directed over the bottom wall erodes the detergent dispensed on the raised central portion and forms two flow paths along the opposite side walls for flushing the detergent into the wash tub during a wash fill cycle to ensure a proper mixing of detergent and water and to ensure that the detergent in the hopper is maintained dry.