L I Q U I D D E S P E N S E R F O R W A S H I N G M A C H I N E S

Neiland H. Ballard, Maple Grove, Minn., assignor to
Sindebaker Corporation, a corporation of Michigan
Filed Aug. 26, 1963, Ser. No. 304,320

5 Claims. (Cl. 68—23)

This invention relates to automatic washing machines of the vertical axis, centrifugal extraction type, wherein clothes are washed in a single tub-like receptacle, the wash water is removed by centrifugal extraction, the clothes are rinsed, and then the rinse water is removed by centrifugal extraction and, more particularly, is concerned with dispensing a liquid rinse additive or conditioner into the tub-like receptacle or spin tub at the conclusion of centrifugal extraction and prior to the rinse operation.

Heretofore, it has been proposed that liquid rinse additive be added to the spin tub by means comprising reservoirs and timer-controlled valves. Such mechanisms have been relatively complex and have been difficult to locate within the confines of the cabinet so as to afford gravity flow. Furthermore, such structures are often relatively inaccessible for filling and required rather frequent cleaning and maintenance.

Another proposal for appropriately discharging liquid rinse additive into the spin tub was to mount a liquid dispenser on the agitator shaft, such dispenser comprising a hollow receptacle having a baffle wall therein defining a first compartment for initially receiving a liquid rinse additive and a second compartment for receiving and retaining the rinse additive by centrifugal force upon rotation of the dispenser during the extraction operation. A discharge opening was provided in the bottom of the dispenser for gravity discharge of the liquid rinse additive. A liquid dispenser of this type is disclosed in Tingley Patent No. 2,868,006. This dispenser was not entirely satisfactory, for if the first compartment were overfilled, the liquid rinse additive would discharge directly into the spin tub through the discharge opening in the bottom of the receptacle into the wash water, resulting in an unnecessary loss of rinse agent and perhaps hindrance of the washing action. As no valve means were provided in the discharge opening in the hollow receptacle, a portion of the rinse additive might be lost in the operation of being transferred from one compartment to the other during centrifugal extraction. The construction was rather bulky due to the design requirement of separate, radially spaced compartments and the necessity for spacing the discharge opening inwardly from the outer edge of the receptacle a sufficient distance to avoid undesirable loss of the rinse additive.

An object of the present invention is to provide an automatic washing machine having an improved liquid rinse additive dispenser including a valve-controlled discharge opening.

Another object of this invention is to provide an improved compact liquid dispenser for use in automatic clothes washing machines, such dispenser defining a single compartment and having a centrifugally-actuated ball valve for controlling the discharge of liquid from said compartment.

Still another object of the present invention is to provide an improved liquid rinse additive dispenser adapted to be mounted on the oscillatory agitator member in a vertical axis, centrifugal extraction washing machine and adapted to deliver a charge of liquid rinse additive into the spin tub following a sequence of operations which includes a washing operation and a high-speed centrifugal extraction of the wash water, which extraction immediately precedes the operation in which the liquid rinse additive is to be utilized.

Other objects and advantages of the invention will be more fully understood from a consideration of the following specification, taken in conjunction with the accompanying drawing, in which:

FIGURE 1 is a fragmentary cross-sectional view of an automatic vertical axis, centrifugal extraction washing machine in which the liquid rinse additive dispenser of the present invention is embodied.

FIGURE 2 is a cross-sectional view on an enlarged scale of the liquid rinse additive dispenser of the present invention illustrating the mounting of the dispenser on the agitator of the washing machine.

FIGURE 3 is a top plan view of the liquid rinse additive dispenser of the present invention, with a part being broken away to more clearly show the guiding means for retaining a ball valve in position adjacent the discharge opening in the liquid rinse additive dispenser; and FIGURE 4 is a cross-sectional view of a modified liquid rinse additive dispenser, showing the dispenser mounted upon the agitator of an automatic clothes washing machine.

Referring now to FIGURE 1, there is shown an automatic clothes washing machine 10 having an outer cabinet which includes walls 11 and a top panel 12. Pivotedly supported on the top panel 12 for closing the access opening therein is a lid 9. Connected to the outer cabinet and suitably supported therewithin is an outer stationary tub 13. Vertically supported in the washing machine 10 is an agitator shaft 18 which is adapted to be connected at its lower end to a suitable drive mechanism (not shown) in a conventional manner. Fixedly connected to the agitator shaft 18 for rotation therewith is a tubular spin tube member 16 to which the spin tub or clothes basket 14 is connected. Also carried on the agitator shaft 18 for rotation therewith is an agitator member 22, which is suitably affixed for rotation to the agitator shaft 18 through a drive lug 20. The drive lug 20 has a polygonal outer configuration, preferably a hexagon, which is adapted to cooperate with the internal polygonal mating surface of the agitator.

Closing the upper end of the tubular spin tube 16 is a water seal 23 for preventing the entrance of water into the annular space defined between the spin tube 16 and the agitator shaft 18. A suitable protective tube or shell 17 made from metal or plastic may be provided on spin tube 16 to prevent scum from adhering to the spin tube.

The liquid rinse additive dispenser 24 of the present invention is mounted adjacent the top of agitator 22 for movement therewith. Depending downwardly from beneath the liquid rinse additive dispenser 24 is a liquid collector 25.

A cap member 26 is threaded upon or otherwise affixed to the stud 27 extending from the upper end of the agitator shaft 18 to secure the agitator in position upon the spin tube 16 and also to secure the dispenser in place on the agitator. Additionally, the cap 26 bears down upon a resilient O-ring 28 for providing a seal between the interior of the cap 26 and the exterior of the agitator 22.

Disposed about the upper end of the spin tube 14 is a clothes guard 30 for preventing clothes from moving above the top level of the spin tub during operation. The clothes guard is suitably connected by fastening means 34 to a balancing ring 31, affixed to the upper end of the spin tube 14 by means of fastening means 36.

Also provided in the automatic washing machine 10 is a water inlet or nozzle 32 for introducing water into the spin tub when required during operation. Secured on the spin tub 14 is a sediment ejector tube 33 which communicates at one end with the bottom of the spin tub and opens at the other end at a position adjacent the top
of the spin tub whereby sediment may be removed from the bottom of the spin tub during centrifugal extraction operation.

Referring now to FIGURES 2 and 3, it is seen that the liquid rinse additive dispenser 24 of the present invention comprises a housing 40 which defines therein a single annular portion 42. The housing 40 may comprise a upper portion 42 having a plurality of fill openings 43 therein and a lower portion 44 having a discharge opening 45 in the bottom thereof. The sections of the housing 40 are adapted to be connected to one another, as for example, by providing telescoping flanges on each of the sections 42, 44, as best seen in FIGURE 2 or by utilizing a suitable bonding agent or adhesive, depending upon the material from which the housing is fabricated. The bottom 46 of the lower member 44 slopes toward the discharge opening 45 so as to provide for drainage of all of the liquid rinse additive toward the discharge opening and then outwardly from the liquid dispenser.

The housing 40 is preferably made from material which is relatively inexpensive, durable and easily molded to the desired configuration. Suitable plastic materials which can be used are "C-11" made by The Union Carbide Corporation and "Tyrol" made by the Dow Chemical Company.

The discharge opening 45 is adapted to be closed by ball valve means 48, comprising a weighted ball valve. The ball valve, which may be made from stainless steel, is retained in position adjacent to the discharge opening by means 50. The guide means comprise a pair of spaced, generally radially extending wall members 52 disposed on either side of the ball valve 48 to prevent the ball valve from migrating about the bottom of the housing 40 during rotation thereof. The wall members 52 are constructed and arranged so as to provide a substantially unimpeded flow path for liquid along the bottom 46 of the housing member 40.

Defined within the dispenser 24 is a unitary annular chamber 41. The bottom portion of housing member 40 defines a generally U-shaped or trough-shaped retainer for normally holding liquid rinse additive. The outer wall of housing member 40 cooperates with a radially outer portion of upper member 42 and a radially outer portion of lower member 44 to define a generally C-shaped cross-sectional configuration. Liquid additive may be confined in such C-shaped portion of compartment 41 during centrifugal extraction operation as will be more clearly made apparent hereafter. It will be noted that the wall portion 54 of the lower housing member 44 is of stepped configuration adjacent to the discharge opening 45 and has a slight recess defined therein as indicated at 55 for retaining the ball valve during centrifugal extraction operation.

Among the important parameters to consider in the design of the liquid dispenser are the radius of the discharge opening from the center of the axis of rotation of agitator shaft 18 and the speed of rotation of the agitator shaft 18. In a preferred form of the present invention, the agitator shaft, as well as the agitator and the dispenser parts which are affixed thereto, are adapted to rotate at either a high speed of 610 revolutions per minute or a low speed of 450 revolutions per minute. The discharge opening in the dispenser is approximately 1/4 inches radially from the axis of the vertical agitator shaft 18. As will be apparent to those persons having ordinary skill in the art, these parameters can be varied for different washing machines and for differing operations. It will be understood that during normal washing operation, the agitator shaft 18 oscillates through about 170 degrees.

Turning now to FIGURE 4, there is illustrated a modification of the liquid rinse additive dispenser of the present invention. The essential difference is that the rinse additive dispenser 60 is formed integrally with the cap portion thereof. The cap portion of the dispenser 60 may be provided with an insert 29 which is internally threaded or self-threading and thereby adapted to engage the stud 27 extending from the shaft of the agitator. The details of construction of the liquid rinse additive dispenser are in all particulars the same as the dispenser illustrated in FIGURES 1–3 and differ only in the configuration of the cap and the dispenser housing member. Accordingly, the components 40 may comprise a upper portion 42 having a plurality of fill openings 43 therein and a lower portion 44 having a discharge opening 45 in the bottom thereof. The sections of the housing 40 are adapted to be connected to one another, as for example, by providing telescoping flanges on each of the sections 42, 44, as best seen in FIGURE 2 or by utilizing a suitable bonding agent or adhesive, depending upon the material from which the housing is fabricated. The bottom 46 of the lower member 44 slopes toward the discharge opening 45 so as to provide for drainage of all of the liquid rinse additive toward the discharge opening and then outwardly from the liquid dispenser.

In practical operation, the cap 26 is removed and the liquid dispenser 24 and lint collector 25 are secured to the agitator 22 concentric with the vertical axis of the agitator. Then the cap 26 is affixed to the stud 27 extending upwardly from the top of the agitator shaft 18 to affix both the agitator and the liquid rinse additive dispenser to the agitator shaft 18. Prior to starting the washing cycle of operation, the ball valve 48 is seated in the discharge opening 45 as indicated in FIGURE 2, for example. The liquid rinse additive is added to the clothes during the rinsing operation and is then discharged into the dispenser 24 through the fill openings 43 in the top thereof and is confined in the U-shaped bottom portion 45 of housing 40. The washing machine may then be actuated.

During the clothes washing operation, the ball valve 48 will remain seated in the discharge opening 45 as the agitator rotates to and fro to wash the clothes contained in the spin tub 14. At this time, the liquid additive will be retained in the U-shaped bottom portion of the housing 40.

At the completion of the clothes washing operation, the washing machine will automatically commence to centrifugally extract the rinse water from the spin tub 14. As the rotational speed of the agitator shaft increases, the liquid contained in the bottom of the dispenser 24 will be acted upon by centrifugal force and be moved into position in the generally C-shaped portion of the annular chamber 41 defined by radially outward portions of the top and bottom walls of the dispenser and by the outer side wall of the dispenser. At a predetermined speed, the ball valve 48 will be centrifugally urged from its valve seating position. As the ball is moved from its seat and urged upwardly onto a holding position on the stepped portion 54 of the housing 40 during centrifugal extraction, the liquid additive contained within the dispenser will be retained in the C-shaped portion of the dispenser by centrifugal force and thus no liquid rinse additive will be discharged through the open discharge opening 45.

As the speed of rotation of the agitator shaft 18 diminishes at the completion of the centrifugal extraction operation and upon attainment of a predetermined reduced speed, liquid will discharge downwardly by gravity through the discharge opening 45. During this time, the ball valve 48 is retained on the stepped portion 54 of the housing 40 of dispenser 24. At the conclusion of the extraction operation, the agitator shaft will stop and the ball valve 48 will drop back on to its valve seat, closing the discharge opening 45.

It will be understood that the wall members 52 positioned on either side of the ball 48 retain the ball in position adjacent to the discharge opening during the centrifugal extraction operation.

The slot-like fill openings 43 are spaced radially inwardly from the outer wall of housing 40 to prevent loss of liquid rinse additive through the fill openings as the liquid is moved by centrifugal force from the U-shaped portion of dispenser 24 to the C-shaped portion of dispenser 24 during centrifugal extraction operation. Further, the openings are of sufficient size to permit ready filling of the dispenser.
The present invention provides a reliable liquid dispenser for a centrifugal type vertical axis clothes washing machine, such dispenser having a centrifugally-actuated valve member for controlling the flow of liquid rinse additive from the discharge opening in the bottom of the dispenser.

While I have described presently preferred embodiments of the invention, it will be understood that the invention is not limited thereto since it may be otherwise embodied within the scope of the following claims.

I claim:

1. In an automatic washer of the vertical shaft, centrifugal extraction and oscillatory agitation type which is adapted to proceed through a sequence of operations including a washing operation, an extraction operation and a rinsing operation, an improved liquid rinse additive dispenser comprising a housing member adapted to be supported on said vertical shaft for movement therewith, said housing member defining a single annular chamber therein having an upwardly facing portion and an inwardly facing portion, said housing member having at least one fill opening in the top thereof and a discharge opening in the bottom thereof, ball valve means for closing said discharge opening, and guide means for retaining said ball valve means adjacent said discharge opening, whereupon during washing operation, the ball valve means is seated in the discharge opening preventing discharge of rinse additive from the upwardly facing portion of the chamber into the wash water, during extraction operation the rinse additive is centrifugally retained in the inwardly facing portion of the chamber and the ball valve means is moved from a position closing the discharge opening, and at the end of the extraction operation, the rinse additive is discharged from the dispenser prior to closure of the discharge opening by the ball valve means, said housing member having a stepped wall portion adjacent said discharge opening and between said guide means for cooperation therewith to retain said ball valve means during extraction operation.

2. A liquid rinse additive dispenser as in claim 2 wherein the bottom of the housing member slopes toward said discharge opening so as to facilitate discharge of the rinse additive from the dispenser.

3. A liquid rinse additive dispenser for use in an automatic clothes washer of the vertical type, comprising a housing having an upper housing member with a fill opening therein, a lower housing member having a discharge opening therein, said housing members being affixed to one another to define an annular chamber therebetween, a ball valve for closing said discharge opening, said housing defining a first upwardly facing U-shaped portion including the discharge opening in the lowermost portion thereof for retaining liquid rinse additive during the washing operation, when the ball valve means is seated to close the discharge opening, and a second G-shaped portion for containing the liquid rinse additive during the centrifugal extraction, and guide means for retaining said ball valve adjacent said discharge opening, said guide means constructed and arranged to provide substantially unimpeded flow of liquid along the bottom of said housing to said discharge opening.

4. A liquid rinse additive dispenser for use in a centrifugal extractor and oscillatory agitator type washing machine, said dispenser comprising a hollow housing defining a unitary chamber therein, said chamber having an upwardly facing trough-shaped bottom and an inwardly facing G-shaped wall portion, said housing having a fill opening in the top thereof and a discharge opening in the bottom thereof, a ball valve for closing the discharge opening, guide means for retaining the ball valve adjacent the discharge opening, and support means formed on the housing adjacent to the discharge opening and radially outwardly therefrom for supporting the ball valve during centrifugal extraction upon attainment of a predetermined rotational speed, whereby during washing operation, the ball valve is seated preventing discharge of liquid from the annular chamber, during extraction operation, the liquid is centrifugally retained in the G-shaped wall portion of the dispenser and the ball valve is unseated and supported on the support means, and at the termination of the extraction operation, liquid is discharged from the annular chamber by gravity prior to seating of the ball valve.

References Cited in the file of this patent

UNITED STATES PATENTS

2,933,912 Billings ------------------ Apr. 26, 1960
3,068,679 Knerr et al. ------------------ Dec. 18, 1962
3,079,783 Stanger ------------------ Mar. 5, 1963