ABSTRACT OF THE DISCLOSURE

A two part centrifugal dispenser for mounting on an agitator of a laundry machine for discharging liquid into the machine. The parts are attached removably to the agitator in nested relationship and are easily assembled without the use of special fasteners or adhesives. One of the parts has a lip seal which tightly engages a peripheral flange on the other member or part. A downwardly extending, annular wall surface or guard flange is formed outwardly of discharge outlet apertures to prevent liquid spillage.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates generally to a liquid dispenser for use with automatic washing machines and the like.

Description of the prior art

Vertical axis automatic washing machines generally include a cabinet within which is mounted a receptacle or basket for receiving articles to be laundered, and an agitator element is rotatably mounted within the basket coaxially of the vertical axis thereof.

Motor means and transmission means are usually provided to both oscillate the agitator and to rapidly rotate the basket according to a predetermined sequence program. The sequence of operation generally includes at least a washing cycle during which the agitator is oscillated and an extraction operation during which the tub is rapidly rotated to centrifugally remove laundry liquid.

It has been found desirable to supply certain additives at selected intervals during the laundry program. Such additives which are commercially available include bleach compounds, water softeners, starch, fresheners, fluffiness producing compounds, and the like. The majority of these additives are available in liquid form.

To retain the fully automatic features of most commercially available washing machines and to preclude the necessity of an attendant manually dispensing the liquid additives to the rinse water, various dispensers have been proposed heretofore which dispense contents thereof in response to centrifugal forces created during the extraction operation. One type of such a dispenser may include an annular container mounted concentrically of the axis of the tub and providing a pair of concentrically disposed, annular chambers or receptacles separated by a substantially vertical wall. The liquid to be dispensed is initially placed within the inner chamber, where it remains until the tub is rapidly rotated during the extraction operation. The centrifugal force created by rapidly rotating the tub and the agitator during the extraction operation causes the liquid to pass over the vertical wall and into the outer chamber, from which it will flow by gravity into the tub when rotation thereof ceases.

Over long periods of use interior wall surfaces of the dispenser which are contacted by the liquid additive may become caked with a dry residue of the additive in a manner to impede proper functioning of the dispenser. Also, dry additive residue may build up within inlet and outlet apertures of the dispenser and tend to impede or block proper flow through the apertures. Most prior art dispensers are formed of two or more parts permanently joined together in a manner preventing access to interior wall surfaces.

Various means have been proposed heretofore for attaching liquid additive dispensers to the agitator of the washing machine, and such means may include a single cap member captivating a portion of the dispenser between opposed surfaces of the cap member and a flat upper face of the agitator. Also, variously configured clips and other attachment members have been proposed heretofore for securing the liquid dispenser to an upper end portion of the agitator. Such additional elements or parts functioning as attachment members may complicate the dispenser structure and increase its cost.

As the rotation of the tub and the agitator decelerates from the maximum extraction speed to a rest position preceding the refilling of the tub with rinsing liquid and oscillatory action during the rinsing operation, the centrifugal forces tending to retain the liquid additive in the outer chamber or receptacle may decrease below a force necessary to retain the liquid within the outer chamber, and thus, permit the liquid to be gravitationally discharged from the dispenser prior to complete cessation of the rotational movement. The rotational speed of the agitator and the tub during this premature discharge of the liquid additive may be sufficient to fling the discharged liquid against upper portions of interior wall surfaces of the tub which are not normally contacted by the rinse water, thereby preventing proper mixing of this portion of the liquid additive with the rinse water.

SUMMARY OF THE INVENTION

In accordance with the principles of the present invention, a liquid dispenser for a washing machine is provided for attachment to an uppermost end portion of a vertical axis agitator coaxially disposed within a receptacle or basket adapted to accommodate laundry material and includes a pair of concentrically arranged annular members with the inner member secured at the uppermost end portion of the agitator and with the outer member demountably attached to the agitator in nested relationship to the inner member.

The inner member includes a central disc portion supported on a flat upper face of the agitator and an upwardly opening annular receptive or cup formed to retain the liquid additive during a washing operation. The cup portion of the inner member provides an annular outer wall terminating in a flared lip.

The outer member generally includes a central disc portion overlying the inner member and extending therebeyond. The central disc portion of the outer member is formed to provide integral means for demountably attaching the outer member to the agitator and inlet means through which the liquid additive is introduced into the cup portion of the inner member.

The central disc portion of the inner member includes an aperture receiving a stud threaded into the agitator. The stud is characterized by a nut portion formed intermediate its end portions for cooperating with the flat upper face of the agitator to captivate the inner member between opposed surfaces. Also, the central disc portion of the outer member includes an integrally formed, threaded nut portion for engaging an uppermost end portion of the stud, thereby to provide an integral means permitting rapid assembly and disassembly of the outer member of the dispenser relative to the inner member and eliminating any additional attachment elements.

A substantially cylindrical flange depends from the disc portion of the outer member and is concentrically arranged outwardly of the outer wall of the cup when the outer member is properly attached to the agitator, there-
3,620,054

by forming an annular space radially outwardly of the annular cup. A flange extends substantially radially outwardly of a lower end portion of the inner member and has a circular lip terminating adjacent the outer wall of the outer member. The terminal edge portion of the flange is formed with a flexible lip which is compressed by a portion of the outer wall of the outer member when the parts are properly assembled in nested relationship, thereby to form a seal and provide an annular chamber into which the liquid additive is forced by the centrifugal action of the agitator during an extraction operation.

The radially extending flange includes discharge openings disposed adjacent the cup to permit the liquid additive to be gravitationally discharged upon completion of the extraction operation.

The two part construction including a fixed inner member forming a retaining cup and the demountable outer member cooperating with the inner member to form the outer annular chamber provides a dispenser which may be readily disassembled and which includes normally interior wall surfaces contacted by the liquid additive formers to be readily accessible when the dispenser is disassembled to facilitate cleaning of the dispenser.

Means for preventing premature discharge of the liquid additive and for assuring proper mixing of the additive with the rinse water include an annular flange depending from the radially extending terminal edge portion of the flange and disposed radially outwardly of the discharge openings. If the liquid additive is discharged prior to cessation of rotational movement of the agitator, the depending annular flange provides a wall surface forming a baffle for directing the discharge liquid downwardly into a central portion of the tub, thereby to prevent fingering of the discharged liquid outwardly onto upper portions of an interior surface of the tub.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings forming a part of this specification and in which like reference characters are employed to designate like parts throughout the same:

FIG. 1 is an elevational view partly in section of an automatic washing machine, illustrating a preferred embodiment of the invention mounted upon an agitator thereof;

FIG. 2 is an enlarged sectional view with some parts shown in elevation for clarity, illustrating a dispenser embodying the features of the present invention and mounted upon the agitator;

FIG. 3 is an enlarged top plan view of the dispenser illustrated in FIG. 2;

FIG. 4 is an enlarged bottom plan view of the dispenser illustrated in FIG. 2; and

FIG. 5 is a fragmentary sectional view of the dispenser, illustrating the portion enclosed within the circle designated as V in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, a washing machine is indicated generally at 10 and includes a cabinet 11 having a plurality of feet 12 thereon resting upon a floor surface or other structure. The cabinet 11 of the machine 10 has a hinged lid 13 in a top portion thereof, and a receptacle or basket 14 is mounted within the cabinet beneath an access opening 15 normally closed by the lid. An agitator 16 having a body 17 therein mounted within the basket 14 for oscillatory and rotary motion. A motor and transmission unit 18 is disposed within a lower portion of the cabinet 11 and is connected to both rotate the basket 14 and to oscillate the agitator 16, according to a predetermined operating cycle.

A liquid dispenser 20, constructed in accordance with the principles of the present invention, is received on the agitator 16 at an uppermost end portion thereof. A liquid additive to be dispensed into the basket 14 at a preselected time during the operating cycle of the machine is initially introduced into the dispenser 20 at the time the basket of the washing machine is loaded with articles to be washed. After completion of the washing operation, the agitator 16 and the basket 14 are rapidly rotated to extract water from the clothes. Concurrently, the additive is moved within the dispenser 20 by centrifugal force from an inner annular receptacle into an annular chamber encircling the receptacle and is held against a cylindrical side wall of the chamber. Upon completion of the operating cycle, the liquid additive gravitationally flows out of the encircling, outer chamber and into the basket 14 to be mixed with rinse water.

In accordance with the principles of the present invention, the dispenser 20 includes an inner annular member 21 secured to a tapered, uppermost end portion 22 of the agitator 16, and an outer annular member 23 demountably attached to the agitator 16 and normally disposed in nested relationship to the inner annular member. The inner annular member has a central disc portion 24 characterized by a centrally disposed aperture 26. A pair of circumferentially spaced, annular embossments as at 27 depend from a lowermost surface of the disc portion 24. The inner annular member 21 is secured to the tapered end portion 22 of the agitator 16 by a threaded stud 28 which has an integrally formed nut portion 29 interposed in a central disc portion 24 of the inner annular member 21. The stud 28 threads into a threaded aperture 37 formed centrally of the agitator 16, and the nut portion 29 of the stud engages the washer 36 thereby to secure the inner annular member 21 to the agitator 16.

The outer annular member 23 includes a central, substantially disc-shaped portion 38 characterized by a depending cylindrical flange 39 sized to engage an outer peripheral edge as at 41 of the central disc portion 24 of the inner annular member 21. A second cylindrical flange 42 depends from the central disc portion 39 and is concentrically spaced inwardly of the flange 39.

In accordance with the principles of the present invention, the inner cylindrical flange 42 is molded in a manner to capitate a nut 43 composed preferably of brass or steel. The integrally molded nut 43 has a threaded aperture 44 positioned concentrically of the disc portion 38 of the outer annular member 23. By threading the nut 43 into the aperture 44 onto the upper threaded end portion 32 of the stud 28, the outer annular member 23 is demountably attached to the agitator 16 in concentric, nested relationship to the inner annular member 21. The inner cylindrical flange 42 and the capitated nut 43 extend downwardly a distance relative to the extent of the outer annular flange 39 to permit the outer annular flange to engage the disc portion 24 of the inner annular member when the nut is completely threaded onto the stud 28.

With this construction, the inner annular member is normally secured to the agitator 16 and the outer annular member includes integrally molded attachment means, thereby eliminating separate, individual parts.

The inner annular member 21 forms an annular cup portion 46 arranged to retain the liquid additive during a washing operation. The cup portion 46 comprises an inner wall 47 depending from the outer peripheral edge 41 of the central disc portion 24 and having a truncated conical configuration complementary to the taper of the upper end portion 22 of the agitator 16. The cup portion 46 also has an arcuate bottom portion 48 connecting the inner wall 47 to an outer wall 49 of the cup. The outer wall 49 extends upwardly and radially outwardly of the web portion 48 and terminates in a flared lip as at 51.

An annular recess 52 is formed in a central disc portion
3,620,054

of the outlet apertures 64 to prevent premature discharge of the liquid additive from the annular chamber 62. If the liquid additive is discharged from the annular chamber 62 prior to the agitator 16 coming to a rest position subsequent to the extraction operation, the liquid additive may be sprayed radially outwardly against uppermost end portions of the tub 14, thereby preventing proper mixture of the additive with the rinse water. The baffle means include a cylindrical flange 71 depending from the annular radially extending flange 58 and disposed radially outwardly of the arcuate apertures 64 forming the outer member. As the agitator 16 decelerates subsequent to the extraction operation, the liquid additive gravitationally flows downwardly through the arcuate outlet apertures 64 and is directed against the cylindrical wall surface 72 provided by the baffle flange 71. With this construction, the liquid additive is not thrown outwardly by the centrifugal force, but instead runs down the inside wall surface 72 and into the tub 14 to be properly mixed with the rinse water. The baffle flange 71 also reinforces and stiffens the radially extending flange 58, thereby to provide a better seal between the flexible lip 66 and the cylindrical outer flange 57.

The two part construction characterized by the integrally formed attachment means and the lip seal eliminates the necessity for roll bonding or welding the parts together to form the concentric annular chambers or receptacles, and provides a dispenser which may be readily disassembled in a manner to expose all interior surfaces, thereby to facilitate cleaning of the interior surfaces to remove any buildup of liquid additive residue. Furthermore, the dispenser 20 eliminates the necessity for a separate agitator cap since the outer member 23 directly attaches to the stud 28 projecting upwardly from the agitator 16.

Although minor modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranty hereon all such modifications as reasonably and properly come within the scope of our contribution to the art.

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

1. A dispenser mountable upon an agitator of a clothes washing machine for discharging a liquid after an extraction operation, comprising:
   a first annular member secured to an upper end portion of the agitator and forming an inner, annular receptacle adapted to contain the liquid and having an outer wall with an upper edge;
   a second annular member demountably attached to the agitator and forming a substantially cylindrical wall portion disposed concentrically of said receptacle wall portion and spaced outwardly therefrom; an annular flange extending outwardly of said first member toward said cylindrical wall portion and arranged to form a bottom wall portion of a chamber communicating with said receptacle for receiving and retaining liquid centrifugally discharged from said receptacle over upper edge of said outer wall upon rotation of said agitator during an extraction operation, said annular flange having outlet aperture means therein through which the liquid gravitationally flows; and
   seal means forming a seal between said flange and said cylindrical wall portion, said seal means including a flexible lip extending substantially radially outwardly and downwardly from a peripheral edge portion of said annular flange and arranged to form a tight seal between said first member and said second member.

Furthermore, in accordance with the principles of the present invention, baffle means are provided outwardly
2. A dispenser as defined in claim 1 and further characterized by:
said outer cylindrical wall portion being reinforced by a thickened portion in an area contacted by said lip.

3. A dispenser as defined in claim 1 and further characterized by:
means forming a depending cylindrical wall portion carried by said annular flange and arranged outwardly of said discharge aperture means for downwardly directing discharged liquid.

4. A dispenser mountable upon an agitator of a clothes washing machine for discharging a liquid after an extraction operation, comprising:
a first annular member secured to an upper end portion of the agitator and forming an inner, annular receptacle adapted to contain the liquid and having an outer wall with an upper edge;
a second annular member demountably attached to the agitator and forming a substantially cylindrical wall portion disposed concentrically of said receptacle wall portion and spaced outwardly therefrom, said second annular member having a central disc portion overlying an upper face of the agitator and secured thereto;
a threaded stud extending upwardly from the upper face of the agitator;
a threaded nut formed integrally of said central disc portion and attachable to said stud for demountably attaching said outer annular member to the agitator;
an annular flange extending outwardly of said first member toward said cylindrical wall portion and arranged to form a bottom wall portion of a chamber communicating with said receptacle for receiving and retaining liquid centrifugally discharged from said receptacle over said upper edge of said outer wall upon rotation of said agitator during an extraction operation.

5. A dispenser as defined in claim 4 and further characterized by:
said central disc portion having an annular recess formed therein and opening upwardly; and
said central disc portion having inlet aperture means formed in a bottom wall portion of said annular recess and arranged to direct a liquid into the receptacle formed by the first annular member.

6. A dispenser as defined in claim 4 and further characterized by:
said central disc portion having a centrally disposed aperture therethrough receiving said stud;
a nut intermediate threaded end portions of said stud and clamping said central disc portion of said inner member to the upper face of the agitator;
said central disc portion of said outer member overlying said central disc portion of said inner member.

References Cited
UNITED STATES PATENTS
2,973,636 3/1961 Devry et al. ......... 68—17
2,982,120 5/1961 Pelensky ........... 68—17 X
3,091,108 5/1963 Martin et al. ........ 68—17

WILLIAM I. PRICE, Primary Examiner
P. R. COE, Assistant Examiner