Feb. 3, 1942. B. A. BENSON 2,272,030

WASHING MACHINE

Filed March 16, 1939 2 Sheets-Sheet 1

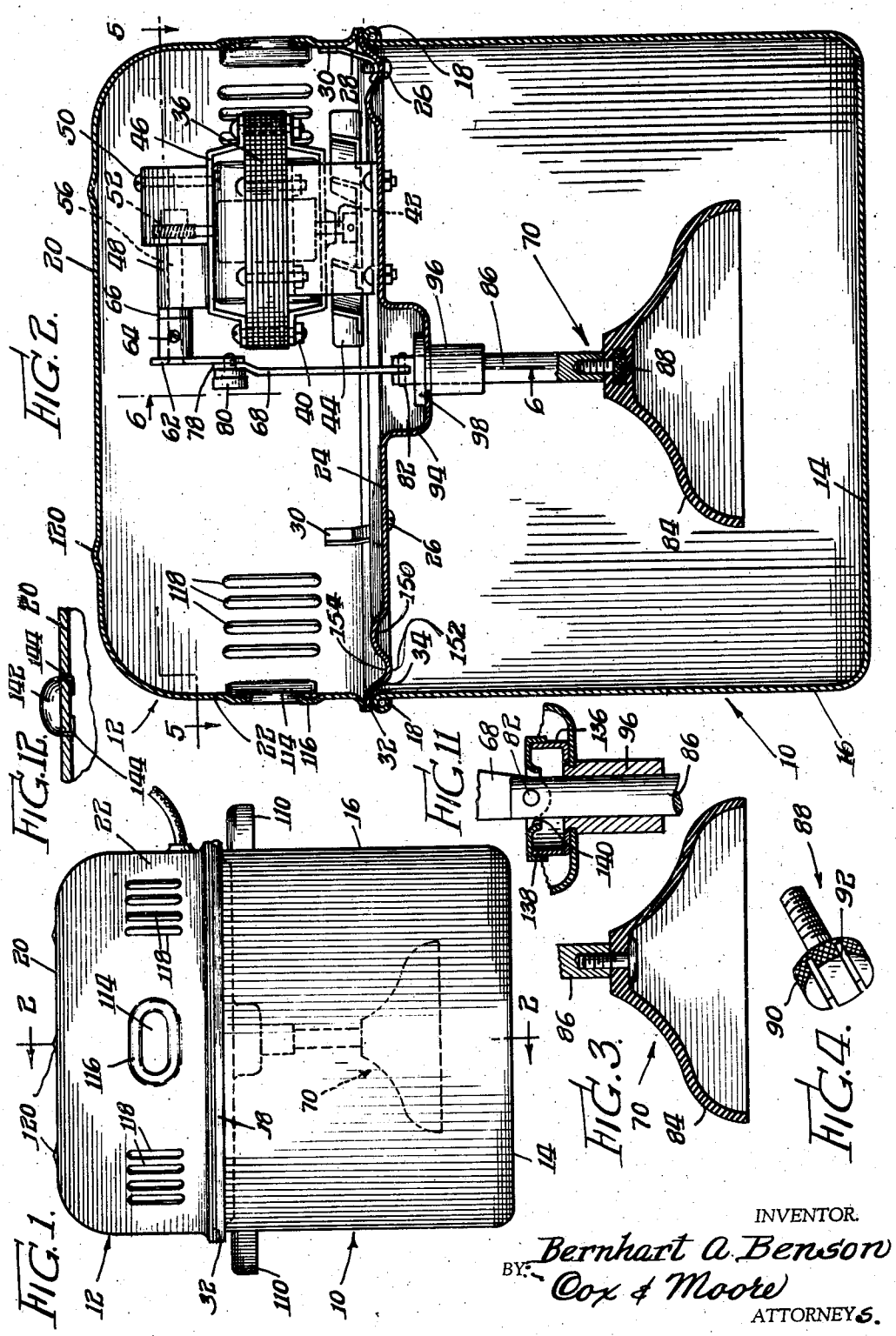


FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 11.

FIG. 12.

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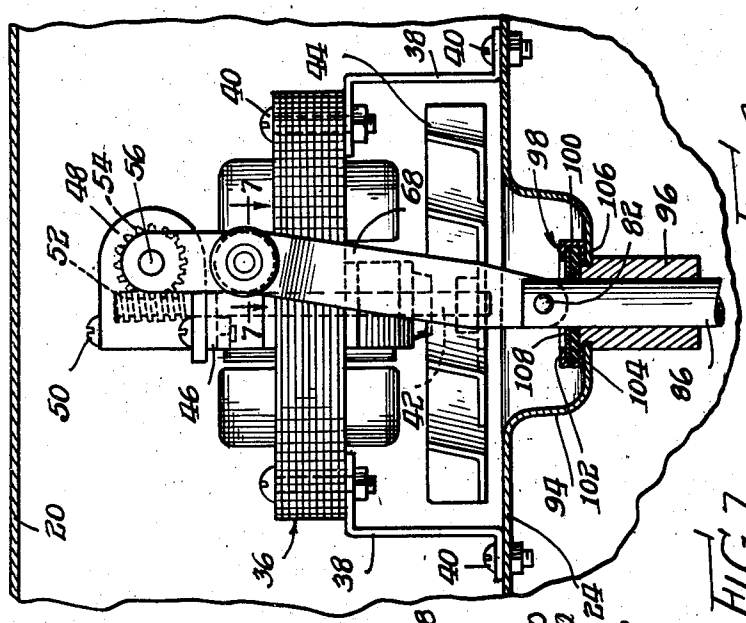


FIG. 6

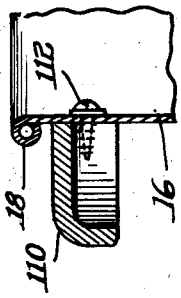


FIG. 8.

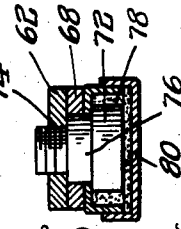


FIG. 7.

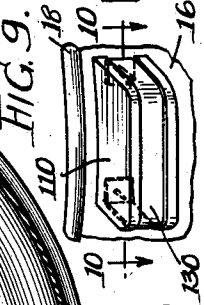


FIG. 9.

FIG. 5.

FIG. 10.

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UNITED STATES PATENT OFFICE

2,272,030

WASHING MACHINE

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Application March 16, 1939, Serial No. 262,195

6 Claims. (Cl. 68—122)

The present invention relates to a washing machine, and more particularly to a machine of the reciprocating agitating type.

The present invention is directed to and contemplates the provision of a washing machine construction which particularly lends itself to use in small, compact, and portable units. There is a present need for washing and cleansing devices adapted for handling only a few articles and capable of being stored in any relatively small storage space. The present invention relates to such a device, which may be readily set up to wash such articles as are preferably cleansed daily. The present invention, accordingly, contemplates the provision of a compact washing machine construction having a generally cylindrical configuration and including complete driving and transmission means for a surge-producing or agitator member of the vertically reciprocating type.

More particularly, it is an object of the present invention to provide a light and portable washing machine construction, as above, having the upper part of the cylindrical configuration devoted to a separable cover which is completely free from securement to the remainder of the washing device, and which forms a housing completely enclosing the entire drive mechanism as a unit.

The invention yet more specifically contemplates the provision of a washing machine construction, as above, providing a large, ventilated air space in the region of the enclosed drive mechanism so that the parts will be adequately ventilated and cooled at all times, permitting continuous operation.

A more specific object of the present invention is to provide a sliding seal between the washing chamber and the relatively elevated drive mechanism chamber, whereby the reciprocating plunger is enabled to act vertically within the washing zone, while preventing the settling of dirt and lubricant from the vicinity of the drive mechanism.

Among other objects of the present invention is contemplated the provision of an internal drive construction having self-oiled, relatively movable bearing portions at all points of juncture, wherein substantial rotation occurs under load; and to provide a construction wherein the freely removable top portion of the washer is devoid of projecting handles.

Other and further objects and advantages of the present invention will more fully appear during the course and progress of the following specification, when taken in connection with the accompanying drawings, wherein:

Fig. 1 is an elevational view of a washer constructed in accordance with the present invention;

Fig. 2 is a sectional view taken centrally through the washer of Fig. 1, on the line 2—2 thereof;

Fig. 3 is a detail sectional view taken through an alternative type of agitating plunger;

Fig. 4 is a perspective detail view of a plunger fastening means;

Fig. 5 is a sectional view taken on the plane 5—5 of Fig. 2;

Fig. 6 is a detail sectional view taken on the line 6—6 in Fig. 2;

Fig. 7 is a sectional detail of the crank construction, taken on the line 7—7 in Fig. 6;

Fig. 8 is a detail section through the handle, taken on the plane 8—8 of Fig. 5;

Fig. 9 is a detail perspective view of a modified preferred form of handle construction;

Fig. 10 is a sectional view taken on the line 10—10 in Fig. 9;

Fig. 11 is a fragmentary view taken centrally through an alternative modified form of plunger shaft guide bearing; and

Fig. 12 is a fragmentary sectional view showing an alternative modified form of support or buffer for the cover portion of the machine.

Referring to the drawings, wherein one preferred embodiment of the invention is disclosed more in detail, Figs. 1 and 2 show a washing machine of substantially cylindrical form and comprising a lower washing vessel 10 and an upper cylindrical cover portion 12. The washing vessel 10 has a circular bottom wall 14 and an integral, upstanding, cylindrical side wall 16 terminating in a roller bead 18, upon which the cover 12 rests.

The cover unit 12 has a circular top wall 20, with an integral, cylindrical, downwardly projecting side wall 22 in alinement with the aforementioned wall 16 when the parts are operatively assembled. The cover construction forms a closed housing through the cooperative positioning of a lower transverse wall 24, which extends transversely to the lower edges of the walls 22 and is secured in position through the agency of machine screws 26 threadedly engaging in a plurality of brackets 28, welded to the side wall 22, as at 30. It should be noted that the transverse wall 24 has a peripheral portion 32 extending horizontally so that it can rest upon the bead 18 of the lower washing vessel, the material of

the wall interiorly of the rim portion 32 being formed downwardly, as at 34, to center the cover in operative position.

An electric drive motor 36 is mounted interiorly of the cover unit and upon the lower transverse wall 24 through the agency of a pair of brackets 38 (see Fig. 6), which brackets are fastened to the supporting wall and the magnetic core of the motor by fastenings 40. The motor is so arranged that its armature drive shaft 42 normally extends vertically. The lower end of the drive shaft 42 mounts a fan construction 44, directing a continual draft of air upwardly against the motor, in cooling relationship. The present motor construction comprises an upper bearing supporting bracket 46, upon which is mounted an upstanding housing 48 through the agency of machine bolts 50. The housing accommodates the upper end of the motor drive shaft, upon which is secured a worm gear 52 (see Figs. 2, 5 and 6). The worm gear, as clearly indicated in the figures, meshes with a mating worm wheel 54 fixed to a horizontal shaft 56. The shaft 56 is rotatably journalled in the housing 48, as clearly shown in Fig. 5.

Attention is particularly directed to the fact that the housing is bored to accommodate the worm wheel 54 and provides a considerable space adjacent the worm wheel, as at 58, which space is provided with a supply of lubricant. The space is sealed by means of a cap 60 pressed into place in the end of the bore. It will be accordingly understood that the worm gearing, as well as the adjacent journals, are supplied with lubricant from a source adequate to provide an indefinite supply so that the parts are not subject to the necessity of periodic servicing.

The opposite end of the shaft 56 has secured thereto a crank unit 62, rigidly fixed to the shaft by means of a fastening 64. A resilient washer of felt or oil-resistant artificial rubber, indicated by the reference numeral 66, and engaged between the crank unit 62 and the housing 48 (Figs. 2 and 5), spaces the parts and prevents loss of lubricant.

Attention is particularly directed to the fact that the crank member is located almost in alinement with the central axis of the cover, but slightly offset. The crank drives through the medium of a link 68, a vertically reciprocating plunger or agitator 70 extending below the cover construction and in operative position into the washing zone of the lower vessel 10. The journal between the crank and the link 68 is similarly provided with self-oiling means.

As shown more clearly in Fig. 7, a pivot member 72 is threadedly engaged in the end of the crank arm, as at 74, and has an enlarged pivot portion 76 extending through the end of the link 68. It should be noted that the pivot portion 76 is embraced by a cup-like grease retaining member 78. A second reversely extending cup-like member 80 is forced over the flange of the first cup-like member, providing a housing for a predetermined supply of lubricant. Therefore, the relatively rotatable parts are continually and indefinitely furnished with the necessary lubrication.

The lower end of the crank member 68 extends into a bifurcation in the upper end of the plunger assembly to embrace a pivot 82 mounted in the plunger. The agitator or plunger in the present embodiment comprises a bell-shaped resilient member 84 and a plunger rod or shaft 86, junctured as indicated in Figs. 2 and 3. According to one method of joining the parts, the resilient bell-shaped agitator 84 is originally molded about a fastening 88 which, as shown in Fig. 4, possesses somewhat the configuration of a machine screw but having a head portion which is deeply knurled, as at 90, and provided with a plurality of slots 92 for positive engagement with the resilient casing. As clearly shown in the figures, the fastening threadedly engages a threaded recess in the lower end of the plunger shaft 86.

The shaft 86 passes through the transverse lower wall 24 of the cover in the region of a central well or recess 94 (Fig. 2), wherein is mounted an elongated journal or bushing 96. Attention is particularly directed to the fact that the bushing 96, as clearly shown in Figs. 2 and 6, cooperates with a sealing construction 98. The sealing construction comprises an annular ring 100 having upper and lower inwardly extending flanges 102 and 104 providing an inwardly facing annular recess. The recess embraces a sealing washer 106 and a retaining washer 108. The sealing washer preferably comprises a resilient sealing material such as rubber or felt. Preferably, there is employed an oil-resistant material of the class known as "Lastics," and having the general properties of resilient rubber combined with that of oil resistance. The upper washer 108 merely retains the resilient member 106 in sealing position about the shaft 86.

It should be noted that during assembly the bushing 96 is passed through a central aperture in the well 94 and in the lower flange 104 of the retaining ring, and the upper portion of the bushing is upset or headed over to retain both the ring 98 and the bushing rigidly in place upon the supporting wall. According to one method of procedure the washers 106 and 108 may be then placed in position, but before the final formation of the flange portion 102.

To facilitate assembly in this manner the retaining ring 98, accordingly, originally is devoid of the flange 102, while being provided with an axial extension of the cylindrical wall 100 adapted to be later folded inwardly to provide the necessary flange. Pursuant to this construction, the resilient washer 106 resiliently embraces the cylindrical shaft 86, whereby lubricant or grime accumulating in the region of the bushing is prevented from passing into the lower chamber.

Manual control of the parts is facilitated by handle constructions on each of the units. The lower washing vessel 10 is provided with opposed handles 110 (Figs. 5 and 8), mounted upon the vessel by screws 112. The cover unit, in place of projecting handles, is provided with opposed, elongated apertures 114 formed in outwardly embossed or offset portions 116 of the side wall 22. It is very important in this construction that the edges of the aperture be rounded since the fingers of the user are inserted into these apertures to grasp the unit.

A plurality of upstanding slots 118 arranged about the periphery of the cover provides ventilation to the interior. When the cover is removed bodily from the washing vessel it is preferably rested in inverted position, and to facilitate such arrangement it should be noted that the top surface of the cover 20 is provided with four annularly arranged, convex embossments or deformations 120.

From the foregoing it will be apparent that in operation the motor 36 drives the shaft 56 at a reduced rate through the worm gearing. The resulting rotation of the crank 62 vertically re-

ciprocates the plunger or agitator 84. Accordingly, a mass of wash, together with soapy water, placed in the container 10 is sufficiently subjected to agitation to produce a washing action. The resilient character of the rubber plunger 84 prevents harmful effect on the materials being washed, while the form of the plunger is such as to produce an alternate suction and compression of the entrapped air, so that the resultant surging of the fluid is resiliently effected.

The cover unit, comprising all the movable parts, may be lifted from the vessel 10 and rested at a remote point while the vessel is being charged, emptied, or cleansed.

Reverting to the construction of the lower part of the cover, attention is called to the fact that the transverse lower wall of the cover 24 radially beyond the central well or recess 94 extends in a flat horizontal plane. However, it is to be particularly noted that just inwardly of its peripheral marginal portion, this wall 24 is curved in transverse section to provide a downwardly facing annular groove or recess 150 bounded peripherally by a downwardly projecting rib portion 152. All this, as clearly shown in Figure 2, results from laterally curving the material of the wall 24 to provide radially disposed merging upwardly and downwardly curved annular grooves 152 and 154. Attention is particularly directed to the fact that this construction is of great importance in preventing water or other washing fluid from passing outwardly along the undersurface of the cover through the juncture between the cover and the upper rim of the washing vessel. It has long been observed that water splashed upon a cover in this manner tends to escape between the cover and the tub by falling or flowing along the upper horizontal surface against which it is splashed by the action of the washer. In accordance with the present invention, however, this difficulty is substantially obviated by virtue of the foregoing construction which results in complete release of water by the upper surface at a point radially inwardly disposed from the periphery of the wall 24. In other words, it has been found that the water thrown upwardly against the undersurface of the wall 24 tends to flow outwardly into the groove or downwardly facing recess 150 and is then directed downwardly by the rib or downward projection 152 which forms the outer margin of the recess so that it is released from adherence to the wall and flows back into the tub. The foregoing accordingly prevents washing fluid from reaching the outer rim flange.

I have shown in Figs. 9 and 10 a modified form of handle construction for the washing vessel 10, and which is adapted to be substituted for the handle construction heretofore described. The main body 110 of the instant handle construction is adapted to receive screws 112, as before, but is additionally strengthened by virtue of a band 130, peripherally enclosing the outer portions of the handle and residing in a suitable receiving channel or groove 132 (see Figs. 9 and 10). The strip 130 is secured in place by virtue of the opposed lateral flanges 134 at its extremities and which are engaged by the fastening means 112. It will be apparent that the strip 130, which may be of some suitable sheet metal, for example, functions to bind the handle together for conferring additional structural strength.

There is shown in Fig. 11 a modified form of plunger shaft journal, in which the journal or bushing sleeve 96 cooperates with a cup-shaped retaining member 136 adjacent its upper end for preventing access of moisture to the region of the driving motor. Thus, it will be noted that the cup-shaped member 136 is an annular ring of generally L-shaped section secured to the cover by the flange on the end of the sleeve, as in the foregoing alternative embodiment. An annular cover 138 is provided, the periphery of which clampingly engages the cup, as clearly shown in Fig. 11.

The inner peripheral edge of the cover or ring 138 is defined by an aperture accommodating the plunger shaft 86, and attention is particularly directed to the fact that these inner peripheral portions, which are designated by the reference numeral 140, are not only spaced from the shaft 86, but are curved axially downwardly about the shaft. It will be evident that the cover 138 provides with a cap 136 an enclosure adapted to retain any small amount of moisture which may follow upwardly along the shaft 86 and into the cover portion. If the cover is inverted, as when it is removed from operative position and rested on any suitable support, the liquid contained in this enclosure will be prevented from running out by virtue of the curved flange 140.

It should be particularly noted that the sleeve or bushing 96 provides a journal or guide for the shaft 86 which does not require oiling or artificial lubrication. That is to say, the normal operation of the shaft or bar 86 in a soapy washing fluid provides a film of the said fluid between the sleeve 96 and the shaft 86 which in operation serves as a lubricant. In the embodiment shown in Figs. 2 and 6, the sealing washer 106 restricts the upward travel of the washing liquid, thus retaining it below the washer as it accumulates and assuring at all times an adequate supply on the inner or journalled surfaces 96.

The same result is achieved in the modification shown in Fig. 11, wherein the cup-shaped reservoir 136 may accumulate a limited quantity of washing fluid supplied by the normal agitation going on within the washer as well as capillary attraction. The reservoir 136 thus not only insures against passage of an excess of the washing liquid upwardly along the shaft, but similarly provides a supply of lubricant fluid to the lower portions of the shaft at all times. It will be obvious that this construction is of considerable importance since it eliminates the necessity for the use of objectionable lubricants in the region of the washing zone.

There is disclosed in Fig. 12 a modified form of rest or buffer support which may be substituted for the convex formations 120 on the top surface 20 of the cover. In accordance with this construction a generally hemispherical member 142 is secured on the outer flat surface of the top wall 20 by means of a pair of lugs 144 extending through suitable slits in the cover and bent over, as clearly shown in this figure. This construction is of advantage where the present machine is provided with an exterior finish susceptible to wear, and wherein the constant abrasion of supporting projections 120 on the supporting surface would destroy the surface coating. Thus, the supporting buffers 142 may be made of any suitable wear-resisting material for improving the durability of the construction.

The present invention provides a very simple construction which may be furnished in small units for washing stockings and the like, and is of value in obviating the accumulation of un-

washed articles by permitting regular cleansing thereof as they are used.

Numerous changes may be made in the form, construction and arrangement of the several parts without departing from the spirit or scope of the invention, or sacrificing any of its attendant advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is claimed as follows:

1. A washing machine construction of the vertically reciprocating plunger type having a cover member comprising a reciprocating plunger and motor drive therefor, means on said cover for journaling said plunger comprising a guide sleeve extending a substantial distance axially of the plunger, means to permanently lubricate said sleeve comprising a relatively rigid means at the upper end of said sleeve for maintaining a film of liquid within the sleeve by redirecting liquid on said shaft relatively downwardly along said shaft during upward movement thereof, said last mentioned means comprising an annular chamber about the plunger, said chamber being relatively short in vertical extent and having its upper portion disposed below the upper extremity of the plunger in all positions thereof, a layer of resilient elastic material supported by said chamber embracing and resiliently bearing against the surface of said plunger for sealing the surface of the plunger and retaining washing liquid in the guide sleeve therebelow and a cover portion for said chamber engaging said layer of resilient elastic material for holding said material in predetermined plunger engaging relation.

2. A washing machine construction of the vertically reciprocating plunger type having a cover member comprising a reciprocating plunger and motor drive means therefor, means on said cover for journaling said plunger and comprising a guide sleeve, means to permanently lubricate said sleeve comprising a cup-shaped retaining means at the upper end of said sleeve and forming an annular chamber about the plunger, said chamber being relatively short in vertical extent and having its upper portion disposed below the upper extremity of the plunger in all positions thereof, said upper portion of the cup-shaped retaining means providing a cover extending inwardly to a point radially spaced from said plunger surface and including means for retaining washing liquid when the construction is tilted.

3. A washing machine construction as defined in claim 2 wherein said chamber includes therein a sliding seal means comprising a layer of resilient elastic material embracing and bearing against the surface of the plunger.

4. A washing machine construction of the vertically reciprocating plunger type having a cover member comprising a reciprocating plunger and motor drive means therefor, means on said cover for journalling said plunger and comprising a guide sleeve, means to permanently lubricate said sleeve comprising a cup-shaped hollow liquid retaining means at the upper end of said sleeve and forming an annular open chamber about said plunger, and a cover for said cup-shaped retaining means, said cover extending radially inwardly to a point spaced radially from said plunger surface and projecting axially downwardly to retain washing liquid therein when the construction is tilted.

5. In a cover for a washing machine of the reciprocating agitator type, said cover having central horizontal portions and an outer peripheral margin adapted to rest upon the upper rim of a washing tub, means to prevent washing fluid adhering to the interior side of said cover from reaching the vicinity of said margin, said last named means comprising a downwardly facing annular recess formed in said cover at a point inwardly spaced from said margin, said recess being bounded peripherally by a downwardly extending annular rib projection located between said margin and said recess, said annular rib projection being adapted to direct liquid accumulating in said annular groove downwardly in drops for breaking adherence with the cover.

6. In a cover for a washing machine of the reciprocating agitator type, said cover having central horizontal portions and an outer peripheral margin adapted to rest upon the upper rim of a washing tub, means to prevent washing fluid adhering to the interior side of said cover from reaching the vicinity of said margin, said last named means comprising a downwardly facing annular recess formed in said cover at a point inwardly spaced from said margin, said recess being bounded peripherally by a downwardly extending annular rib projection, said annular rib projection being adapted to direct liquid accumulating in said annular groove downwardly in drops for breaking adherence with the cover.

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