

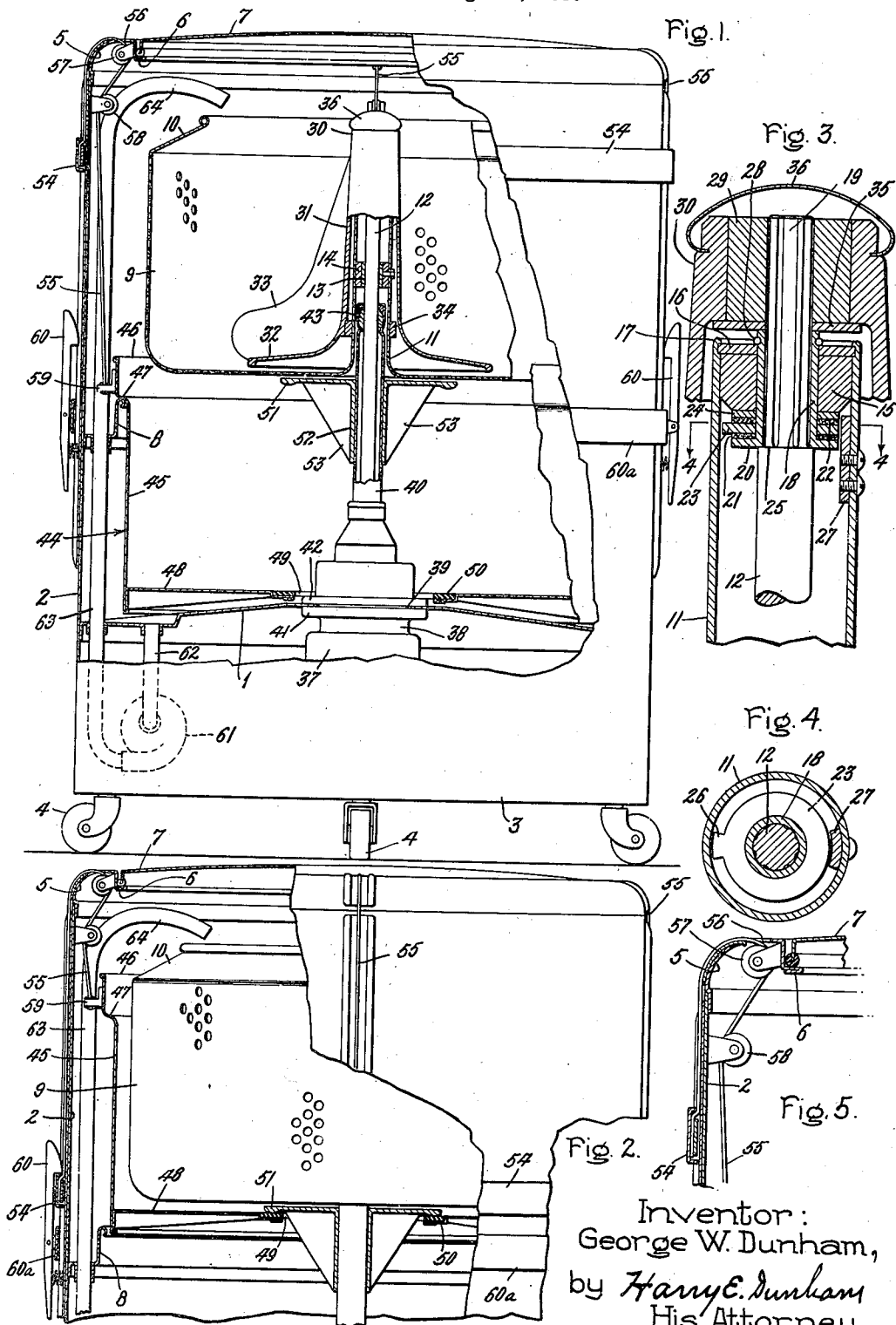
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WASHING MACHINE

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2,264,831

WASHING MACHINE

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The present invention relates to washing machines of the type in which clothes are washed and centrifugally dried in a single receptacle.

The object of my invention is to provide an improved construction and arrangement in this type of machine, and for a consideration of what I believe novel and my invention attention is directed to the following description and the claims appended thereto.

In the accompanying drawing, Fig. 1 is a sectional elevation of a washing machine embodying my invention, the parts being in position for centrifugal drying; Fig. 2 is a sectional elevation of the upper end of the washing machine, the parts being in position for washing; Fig. 3 is a sectional view of the upper end of the agitator and of the receptacle hub; Fig. 4 is a sectional view taken on line 4—4 of Fig. 3; and Fig. 5 is a fragmentary view of the upper end of the casing.

Referring to the drawing, there is shown a washing machine having a casing consisting of a bottom wall 1 and cylindrical side walls 2. The side walls terminate at the lower end in a skirt 3 to which are attached casters 4. Telescoped within the upper end of the side walls 2 is a rim 5 having an inwardly extending flange 6 at its inner edge on which rests a cover 7. Above the water level in the casing and fixed to the inner surface thereof is an annular trough 8 arranged to catch liquid centrifugally discharged from the clothes during drying. The liquid caught in the trough may, in accordance with the practice of the art, be returned to the casing or directed to a drain in a manner not shown.

The washing is effected in a receptacle 9 having perforated side and bottom walls. At the upper edge of the side walls is an inwardly extending rim 10 which keeps the clothes within the receptacle during washing and drying. Integral with the bottom walls of the receptacle is an upwardly extending hub 11 surrounding a vertical shaft 12. The lower end of the receptacle hub is guided on the shaft by a sleeve bearing 13 fixed to a ring 14 secured to the inner surface of the hub. In the upper end of the hub 11 is a combined sleeve and thrust bearing 15 which is held therein by a washer 16 fixed in a spun-over portion 17 of the hub. The bearing 15 is rotatable on a sleeve 18 splined on the upper end 19 of the shaft 12. At the lower end of the sleeve 18 is an outwardly extending flange 20 above which are arranged disks 21 and 22 of friction material and metal disks 23 and 24.

The weight of the receptacle is transmitted to the shaft 12 through the disks 21 to 24 inclusive to the flange 20, and from the flange 20 to a shoulder 25 on the shaft. The disk 23, which is arranged between the friction disks 21 and 22, is provided with a projection 26 which cooperates with a stop 27 secured to the inner surface of the receptacle hub 11. Due to the weight of the receptacle the disks 21 to 24 inclusive are pressed together and held against the flange 20. The friction therebetween normally holds the disks in fixed relation. As is apparent from Fig. 4, the shaft 12 and the sleeve 18 splined thereto may have an angular movement of somewhat less than 360 degrees without bringing the projection 26 into contact with the stop 27. During this angular movement of the shaft the receptacle 9 remains substantially stationary. When the shaft rotates continuously in one direction the projection 26 engages the stop 27 and establishes a friction drive between the shaft and the receptacle through the friction disks 21 and 22. The receptacle hub and the sleeve 18 are held in fixed relation by a snap ring 28 arranged in a groove in the sleeve above the washer 16. When the receptacle is lifted off the shaft the sleeve and the disks 21 to 24 inclusive are accordingly held in assembled relation in the receptacle hub.

The splined end 19 of the shaft 12 projects above the receptacle hub into a nut 29 fixed in the upper end 30 of an agitator. The agitator has a tubular body 31 extending downwardly around the receptacle hub 11 and terminating in a bottom disk 32 adjacent the bottom wall of the receptacle. Integral with the body of the agitator are vanes 33. The lower end of the agitator is guided on the receptacle hub 11 by a bearing 34 fixed to the inner surface of the agitator. The agitator is supported by a thrust washer 35 arranged between the lower surface of the nut 29 and the upper edge of the sleeve 18. A cap 36 snapped over the upper end of the agitator keeps water, which may be splashed over the upper end of the agitator, from leaking around the shaft 12.

From the above described construction it is apparent that upon oscillation of the shaft 12 the agitator will be oscillated relative to the receptacle and that upon rotation of the shaft 12 the receptacle will be rotated. This construction is being claimed in application Serial No. 339,972, filed June 11, 1940, now patent No. 2,258,244, issued October 7, 1941.

The shaft 12 is selectively oscillated through

an angle of approximately 200 degrees at a rate of 60 complete oscillations a minute or rotated at a high speed by suitable driving mechanism contained within a casing 37 supported on the skirt 3 below the bottom wall 1 of the casing. This driving mechanism may, for example, be that shown in my Patent 2,161,618. The casing 37 has a tubular portion 38 extending through an opening 39 in the bottom wall of the casing and connected to a sleeve 40 surrounding the shaft 12. The bottom wall of the casing is clamped between a flange 41 and a ring 42, providing a liquid-tight joint. The upper end of the sleeve 40 extends above the normal water level in the casing and, at its upper end, is provided with a self-aligning bearing 43 in which the shaft 12 is journaled.

Slidably mounted in the casing is a tub 44 having side walls 45 telescoped within the trough 8. At the upper edge of the side walls 45 is an enlarged rim 46 connected to the side walls by a shoulder 47 which rests on the upper edge of the trough when the tub 44 is in the lowered position shown in Fig. 1. The bottom wall 48 of the tub is provided with an enlarged opening 49 surrounding the sleeve 40. Around the opening 49 and on the upper surface thereof is fixed a rubber ring 50 which is adapted to engage the outer edges of a disk 51 when the tub is in the raised position shown in Fig. 2. The disk 51 is integral with a sleeve 52 fixed to the sleeve 40. Suitable stiffening ribs 53 are arranged between the disk 51 and the sleeve 52. The opening 49 and disk 51 constitute a valve closure for the bottom of the tub 44.

The tub 44 is raised and lowered by a ring 54 vertically slidable on the outside of the casing. The ring 54 has attached thereto four flexible cables 55 which extend from the ring up over the rim 5 of the casing, down through openings 56 in the rim, and over pulleys 57 and 58 to lugs 59 attached to the rim 46 of the tub. Upon pushing the ring 54 downward from the position shown in Fig. 1 it is obvious that the tub 44 will be raised. The tub is held in the raised position by spring pressed catches 60 carried by a band 60a fixed to the outside of the casing and arranged to engage the ring 54 and hold it in the position shown in Fig. 2.

When the tub 44 is in the position shown in Fig. 2 the rubber ring 50 engages the disk 51 and seals the opening in the bottom wall of the tub. The perforate receptacle 9 is therefore surrounded by the tub. The upper edge of the tub is slightly below the rim 10 of the receptacle so that the water level in the receptacle is kept below its upper edge.

To start the washing the tub 44 is moved to the raised position and is then filled with water. This also fills the receptacle, since the walls of the receptacle are perforated. The agitator is then oscillated by the driving mechanism in the casing 37, the receptacle remaining substantially stationary, as described above. The clothes are preferably loaded in the receptacle while the agitator is oscillating. During washing it is advantageous to continuously withdraw liquid from the receptacle and allow it to fall into the lower part of the casing. This allows the scum which accumulates on top the washing solution to settle in the bottom of the casing. This is accomplished by a pump 61 connected by a conduit 62 to the bottom of the casing and having a discharge conduit 63 extending up through the bottom wall of the casing and through the trough 8, terminating

in a goose neck 64 discharging to the receptacle. During washing the pump 61 is operated continuously, pumping liquid from the bottom of the casing to the receptacle. This liquid overflows over the upper edge of the tub 44 and returns to the casing. The overflowing liquid carries with it most of the scum and lint, and a considerable portion of this matter remains in the bottom of the casing. The heavier particles settle through the perforated bottom walls of the receptacle and collect in the bottom of the tub 44. From one aspect the tub 44 constitutes an upper washing compartment and the space in the casing therebelow constitutes a storage compartment.

At the conclusion of the washing operation the oscillation of the agitator is stopped and the tub 44 is lowered by releasing the catches 60 and permitting the ring 54 to move upwardly. This lowers the tub 44 to the position shown in Fig. 2 in which it is supported slightly above the bottom of the casing on the trough 8. The movement of the rubber ring 50 away from the disk 51 permits liquid to flow out of the receptacle. The receptacle therefore starts to drain as soon as the tub 44 is moved slightly below its upper position. The tub 44 need not be completely lowered to drain the receptacle and place the machine in condition for extracting. By the time the tub 44 reaches its lowered position the receptacle is substantially drained. This is advantageous since the drainage of the water from the receptacle carries with it most of the remaining particles of lint and other solid particles. The particles remaining are evenly distributed throughout the clothes. When the tub 44 reaches the lowered position the clothes may be centrifugally dried by high speed rotation of the shaft 12. During the drying operation the clothes may be rinsed by the introduction of fresh water. This water will be centrifugally discharged from the receptacle and will be caught in the trough 8, from which it may be directed to a drain.

After centrifugal drying the clothes are removed from the receptacle. The machine is placed in condition for washing another load of clothes by raising the tub 44 to the position of Fig. 1 and filling the receptacle by pumping liquid from the bottom of the casing into the receptacle. The tub 44 may be easily raised due to the large opening 49 in its bottom wall. This makes it unnecessary for the operator to lift the entire weight of the liquid within the tub 44.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a washing machine, a perforate receptacle for receiving clothes to be washed, means for effecting washing in the receptacle and for rotating the receptacle to centrifugally extract liquid from the material therein, an outer casing for receiving the liquid contents of the receptacle and having sufficient space for storing the same below the receptacle during extracting, a tub within the outer casing having a bottom wall provided with a drain opening, said tub being movable between a raised position surrounding the receptacle and a lowered position below the receptacle, valve means for closing said drain opening in the raised position of the tub whereby the tub is effective to hold liquid therein and for opening said drain opening upon movement of the tub to the lowered position, said tub in its raised position overflowing to the casing and defining the liquid level in the receptacle, and means for pumping liquid from the casing to the receptacle during washing.

2. In a washing machine, a perforate receptacle for receiving clothes to be washed, means for effecting washing in the receptacle and for rotating the receptacle to centrifugally extract liquid from the material therein, an outer casing for receiving the liquid contents of the receptacle and having sufficient space for storing the same below the receptacle, a trough surrounding the receptacle for receiving liquid centrifugally discharged from the receptacle, a tub having side walls telescoped within the trough, said tub being movable between a raised position surrounding the receptacle and holding the liquid therein and a lowered position below the receptacle, and provisions for supporting the tub on said trough in the lowered position.

3. In a washing machine, a perforate receptacle for receiving clothes to be washed, means for effecting washing in the receptacle, means including a shaft extending upward from below the receptacle for rotating the receptacle to centrifugally extract liquid from the material therein, an outer casing for receiving the liquid contents of the receptacle and having sufficient space for storing the same below the receptacle, a tub within the casing having a bottom wall provided with an opening through which said shaft extends and side walls extending upward from the bottom wall, said tub being movable between a raised position surrounding the receptacle and

a lowered position below the receptacle, means for sealing the opening in the bottom wall of the tub whereby it is effective to hold liquid in the raised position, said tub in its raised position overflowing to the casing and defining the liquid level in the receptacle, and means for pumping liquid from the casing to the receptacle during washing.

4. In a washing machine, a perforate receptacle for receiving clothes to be washed, means for effecting washing in the receptacle, means including a shaft extending upward from below the receptacle for rotating the receptacle to centrifugally extract liquid from the material therein, an outer casing for receiving the liquid contents of the receptacle and having sufficient space for storing the same below the receptacle, a tub within the casing having a bottom wall provided with an opening through which said shaft extends and side walls extending upward from the bottom wall, a disc surrounding the shaft, said tub being movable between a raised position in which the side walls of the tub surround the receptacle and the bottom walls engage said disc and seal said opening and a lowered position in which the bottom walls are moved away from said disc permitting liquid to flow out through said opening.

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