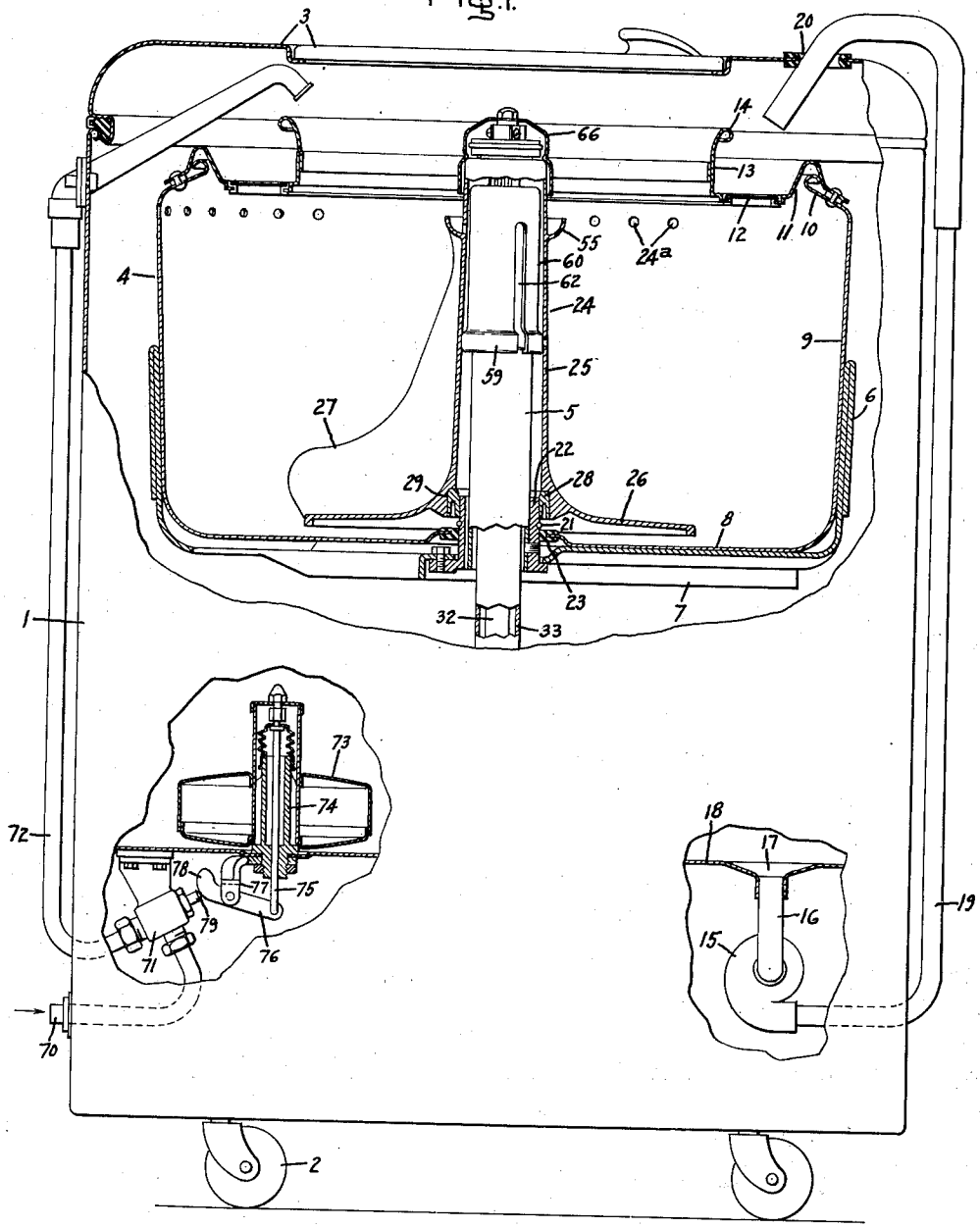
Oct. 7, 1941. C. K. SKINNER 2,258,227

WASHING MACHINE

Filed Dec. 10, 1940 2 Sheets-Sheet 1

Fig. 1.



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WASHING MACHINE

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Fig. 2.

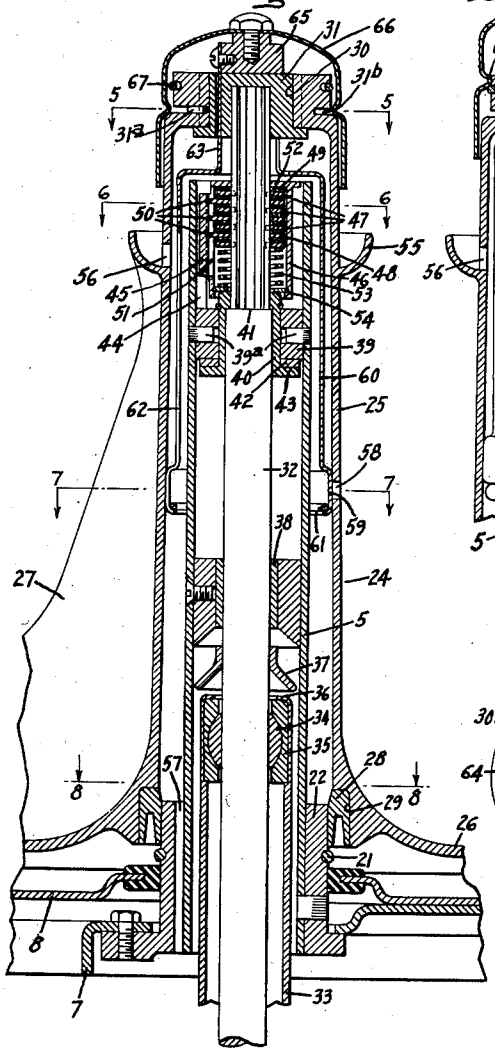


Fig. 3.

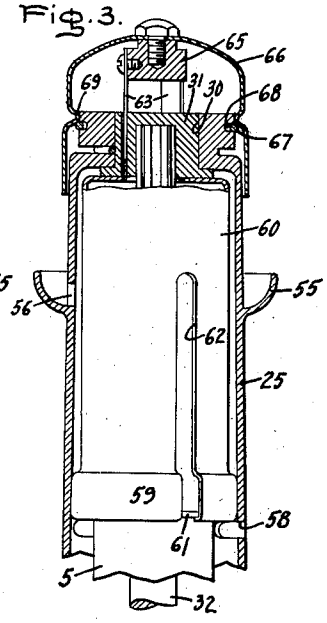


Fig. 4.

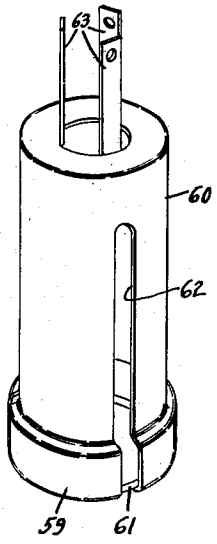


Fig. 5.

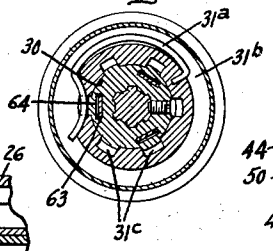


Fig. 6.

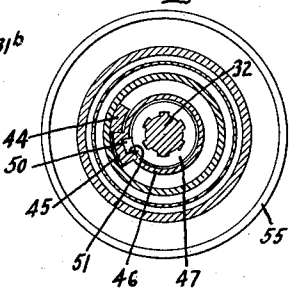


Fig. 7.

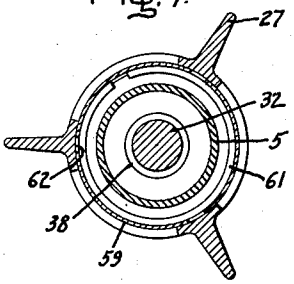
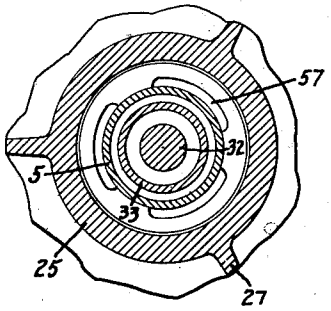


Fig. 8.



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Patented Oct. 7, 1941

2,258,227

UNITED STATES PATENT OFFICE

2,258,227

WASHING MACHINE

Charles K. Skinner, Southport, Conn., assignor to General Electric Company, a corporation of New York

Application December 10, 1940, Serial No. 369,418

5 Claims. (Cl. 68—133)

The present invention relates to clothes washing machines.

The object of my invention is to provide an improved construction and arrangement for varying the liquid level in the machine so that smaller than normal loads of clothes may be washed in less than the normal amount of water. 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 drawings, Fig. 1 is a sectional elevation of a washing machine embodying my invention; Fig. 2 is an enlarged sectional elevation of the agitator and associated liquid level controlling device, the device being in the position for maintaining the normal or maximum liquid level; Fig. 3 is a sectional view of the upper end of the agitator showing the liquid level controlling device in the position for maintaining the minimum liquid level; Fig. 4 is a perspective view of the liquid level controlling device; and Figs. 5, 6, 7, and 8 are respectively sectional views taken on lines 5—5, 6—6, 7—7, and 8—8 of Fig. 2.

Referring to the drawings, there is shown a washing machine having an outer casing 1 provided with supporting casters 2 and a cover 3. Within the upper part of the casing and above the normal liquid level therein is a rotatable receptacle 4 seated in a carrier comprising a hub 5, a balance ring 6, and spaced radial arms 7 connecting the hub and balance ring below the bottom wall 8 of the clothes receptacle. The clothes receptacle has side walls 9, fitting tightly within the balance ring 6, which flare outward and upward from the bottom wall 8 and terminate at their upper edges in an inwardly offset rim 10 on which is seated a ring 11 carrying an annular filter 12 of cloth or wire mesh screen. The friction between the balance ring and the receptacle side walls is such that the carrier and receptacle rotate as a unit. At the inner edge of the filter is a ring 13 flaring upward and outward from the inner edge of the filter and terminating in a rounded edge 14 above the upper edge of the ring 11. The ring 13 provides an opening through which clothes may be inserted or removed from the clothes receptacle 4. During washing, liquid is circulated from the bottom of the casing 1 by a pump 15 having its inlet connected by a conduit 16 to a drain opening 17 in the bottom wall 18 of the casing and having its discharge connected to a conduit 19 extending up along the outside of the casing 1 and in through an opening 20 in the cover 3. The conduit 19 discharges onto the upper surface of the annular filter 12 which removes suspended particles from the liquid. The receptacle 4 is removably fastened to the carrier by a snap ring 21 in an enlarged sleeve 22 fixed at the lower end of the carrier hub 5. A rubber grommet 23 fixed to the bottom wall of the clothes receptacle 4 seals the joint between the receptacle and the carrier hub. At or slightly above the liquid level in the clothes receptacle are openings 24a in the receptacle side walls. These openings, being in the region of greatest diameter, serve as discharge openings during centrifugal drying and also serve to some extent as overflow openings for limiting the liquid level in the clothes receptacle.

Within the clothes receptacle is an agitator 24 having a hub 25 depending around the carrier hub 5 and terminating at its lower end in a disk 26 adjacent the bottom wall 8 of the receptacle. A plurality of radial vanes 27 project from the agitator hub and disk. The lower end of the agitator hub is journaled on the sleeve 22 on the carrier hub 5 by means of a bearing 28 fixed in a recess 29 in the under side of the agitator. The upper end of the agitator hub is provided with a socket 30 for a drive nut 31 fixed on the upper end of a vertical shaft 32. The agitator is held on the drive nut 31 by a spring 31a mounted in a groove 31b in the agitator hub and cooperating with a groove 31c in the drive nut. The shaft 32 extends upward from the bottom wall 18 of the outer casing through a sleeve 33 and through the carrier hub 5. The shaft 32 is journaled in the upper end of the sleeve 33 by means of a self-aligning bearing 34 carried in a seat 35 held in the upper end of the sleeve 33 by a spun-over portion 36. The upper end of the sleeve 33 is substantially above the normal water level in the outer casing. A deflector 37 fixed to the shaft 32 above the bearing 34 protects the bearing from water which might leak down around the shaft 32.

The carrier hub 5 is rotatably supported and guided on the shaft 32 by means of a sleeve bearing 38 fixed to the lower part of the carrier hub 5 and by means of a combined sleeve and thrust bearing 39 fixed to the upper part of the hub by pins 39a. The inner surface of the bearing 39 bears on a sleeve 40 splined on the upper end of the shaft 32 and resting on a shoulder 41. The lower edge of the bearing 39 rests on a thrust washer 42 on an outwardly projecting flange 43 on the sleeve 40. The weight of the clothes receptacle 4 and its contents is accordingly transmitted to the vertical shaft 32 through the carrier to the bearing 39, and from the bearing 39

through the flange 43 to the shoulder 41. The driving connection between the vertical shaft 32 and the clothes receptacle 4 is effected by means of a lost motion clutch comprising a stop 44 fixed to the carrier hub 5 and a projection 45 on a sleeve 46 having a friction connection with the shaft 32. As is apparent from Fig. 6, the projection 45 will engage the stop 44 upon continuous rotation, but will not engage the stop while the shaft 32 is being oscillated through an angle somewhat greater than 180°, which is the normal angle of oscillation for the agitator. The friction connection between the sleeve 46 and the shaft comprises a series of metal disks 47 and 48 with disks 49 of friction material arranged therebetween. The disks 47 are splined to the shaft 32. The disks 48 which are arranged intermediate the disks 47 are loose on the shaft 32 but have integral tongues 50 (Fig. 6) fitting in a groove 51 in the inner surface of the projection 45. The upper end of the sleeve 46 is closed by an integral wall 52 loosely surrounding the shaft 32. The disks 47 and 48 are pressed into frictional engagement with the friction disks 49 by a spring 53 arranged between the lowermost disk 47 and a washer 54 fixed within the lower end of the sleeve 46.

The shaft 32 may be oscillated at washing speed or rotated at centrifugal drying speed by any suitable mechanism, for example that shown in Patent 2,161,618 G. W. Dunham.

At the upper end of the agitator hub 25 is a trough 55, the upper edge of which is at or slightly below the centrifugal discharge opening 24a. During washing, when the agitator is oscillated, water currents are produced in the clothes receptacle which flow generally radially outward from the agitator along the botom wall of the clothes receptacle, upward along the receptacle side walls, and radially inward toward the trough 55. Solid particles suspended in the wash water, such as lint and the reaction products of soap, tend to rise to the surface of the water and be carried by the water currents into the trough 55. From one aspect the trough 55 acts to "skim" the surface of the wash water. The water entering the trough 55 flows therefrom through openings 56 in the agitator hub to the space between the agitator hub and the carrier hub 5. From this space the water flows through openings 57 in the enlarged portion 22 at the lower end of the hub 5 into the bottom of the outer casing, whence it is pumped through the conduit 20 onto the filter 12. During washing, water from the region containing the greatest proportion of suspended particles is accordingly continuously withdrawn from the receptacle, filtered so as to remove the suspended particles, and returned to the receptacle.

The trough 55 is located so as to function most efficiently when the machine is filled to the level required to wash a normal load of clothes. It is occasionally desirable that the machine be used to wash a smaller than normal load of clothes, in which case a smaller amount of water is required. If the clothes receptacle is only partly filled with water, the trough 55 would be ineffective and the beneficial results of continuous filtering of the wash water would not be available. In the present construction this problem is solved by the provision of openings 58 in the agitator hub at a lower level than the trough 55. The openings 58 are normally closed by valve members 59 at the lower end of a sleeve 60 slidable between the agitator hub 25 and the carrier hub 5. The valve members are pressed outward into engagement with the inner surface of the agitator hub around the openings 58 by a resilient ring 61. The outward movement of the valve members 59 is made possible by slots 62 in the lower end of the sleeve 60. The sleeve 60 is provided with upwardly extending tabs 63 slidably extending through slots 64 in the agitator drive nut 31. The upper ends of the tabs 63 are fixed to a nut 65 clamped to the under side of a cap 66. The cap 66 depends around the upper end of the agitator hub 25 and serves as a splash guard. When the cap 66 is in the lowered position illustrated in Fig. 2, the openings 58 are closed by the valve members 59. By lifting the cap 66 to the position shown in Fig. 3, the sleeve 60 is raised to a position in which the valve members 59 uncover the openings 58. The cap 66 is held in the raised position by a resilient ring 67 arranged in a groove 68 in the agitator hub and cooperating with a bead 69 on the cap 66. When the openings or ports 58 are open the water in the clothes receptacle flows through the openings in the same manner as through the openings 56 from the trough 55 to the space between the agitator and carrier hubs and out through the passages 57 to the bottom of the outer casing 1. This permits the continuous filtering of the water in the clothes receptacle when the clothes receptacle is filled to the level of the openings 58 so that the machine can efficiently wash a smaller than normal load of clothes.

Water is supplied to the machine from a conduit 70 connected to a suitable water supply through a valve 71 and a conduit 72 discharging into the upper end of the clothes receptacle. When the clothes receptacle is filled to the desired level, i. e. the level of the upper edge of the trough 55 or the level of the openings 58, the water flows out of the receptacle to the bottom of the outer casing and actuates an annular float 73 surrounding a sleeve 74 fixed to the bottom wall 18 of the outer casing. The float has an operating rod 75 slidable through the sleeve 74 and connected to a lever 76 pivoted on a bracket 77 fixed to the lower end of the sleeve. Leakage around the operating rod is prevented by a bellows seal arranged between the rod and the sleeve. Upon raising of the float 73, a cam 78 on the lever 76 cooperates with a plunger 79 on the valve to close the same. By this arrangement, the water supplied to the machine is automatically shut off by the float when the receptacle has been filled to the desired level.

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

1. In a washing machine having a clothes receptacle to be filled to a plurality of liquid levels, an agitator therein having a tubular body, drain passages leading from within said body to the outside of the receptacle, openings in the side walls of the body at a plurality of liquid levels in the receptacle, and a valve within said body for selectively closing the openings below the desired liquid level.

2. In a washing machine, a casing, a clothes receptacle therein, means for pumping liquid from the casing to the receptacle, an agitator in the receptacle having a tubular body, drain passages from the interior of said body through the bottom of the receptacle to the casing, overflow passages in the side walls of said body at a plurality of liquid levels in the receptacle, and valve means for selectively closing the overflow passages below the desired liquid level.

3. In a washing machine, a clothes receptacle, an agitator having a tubular body therein, passages through the side walls of said body at a plurality of liquid levels in the receptacle, valve means for selectively closing the passages below the desired liquid level, and means for circulating liquid from the receptacle into said tubular body through the passages at the liquid level in the receptacle and from said tubular body back to the receptacle.

4. In a washing machine, an agitator having a tubular body, passages to the interior of said body at a plurality of liquid levels in the receptacle, a valve within said agitator body for selectively closing the passages below the desired liquid level, and an operating member for said valve having a handle at the top of said agitator body.

5. In a washing machine, a casing, a clothes receptacle therein, means for pumping liquid from the casing to the receptacle, a hollow body in the receptacle, agitating means surrounding said body, drain passages from the interior of said body through the bottom of the receptacle to the casing, overflow passages in the side walls of said body at a plurality of liquid levels in the receptacle, and valve means for selectively closing the overflow passages below the desired liquid level.

CHARLES K. SKINNER.