

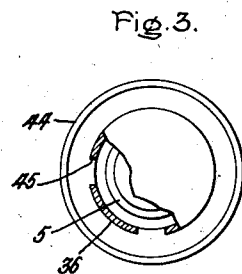
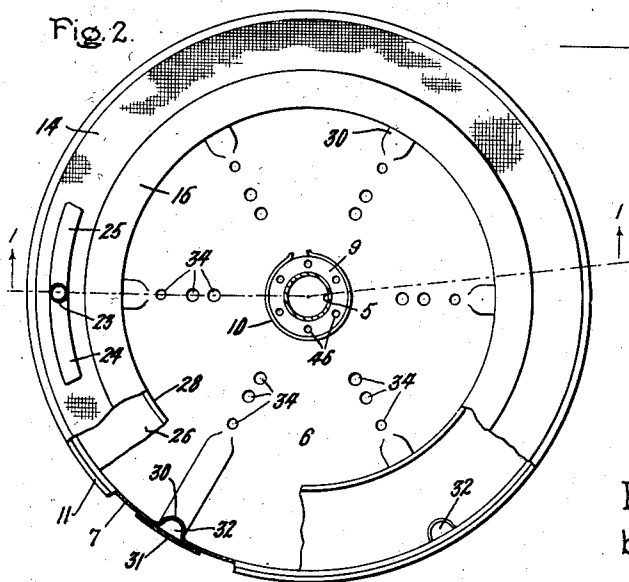
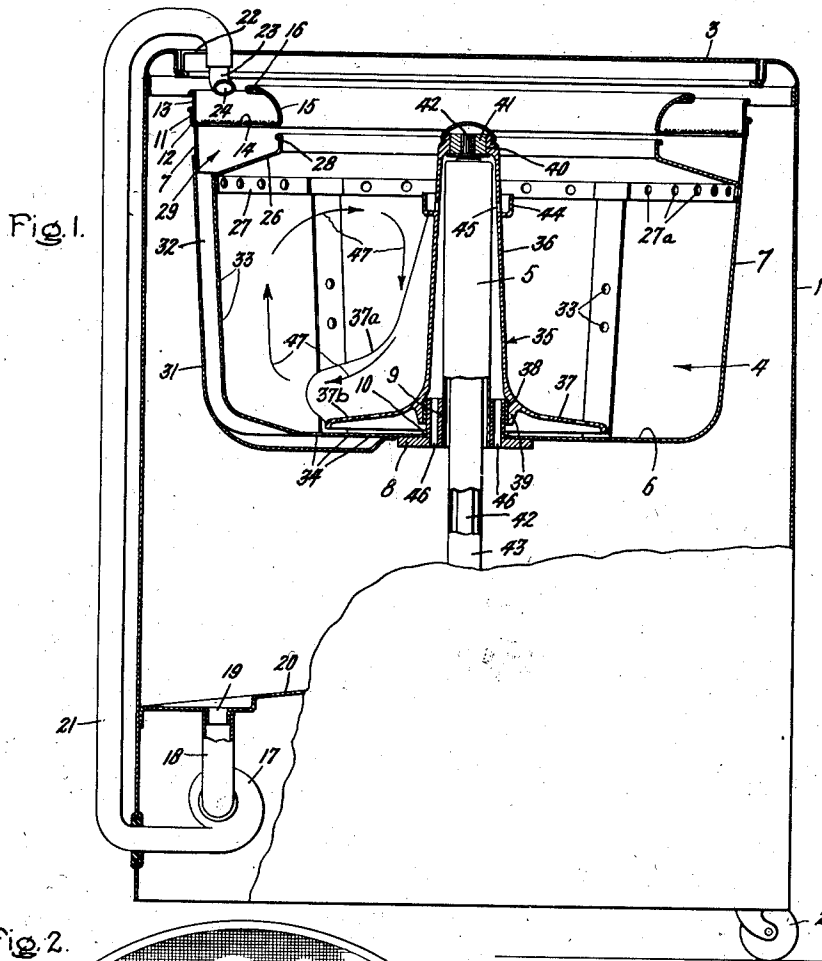
Jan. 20, 1942.

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2,270,750

WASHING MACHINE

Filed Feb. 29, 1940



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UNITED STATES PATENT OFFICE

2,270,750

WASHING MACHINE

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Application February 29, 1940, Serial No. 321,505

9 Claims. (Cl. 68—18)

The present invention relates to washing machines in which the washing liquid is continuously filtered during washing.

The object of my invention is to provide an improved construction and arrangement for filtering the washing liquid, and for a consideration of what I believe to be 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 in section on line 1—1 of Fig. 2; Fig. 2 is a top plan view of the tub, partly broken away; and Fig. 3 is a top plan view of the agitator hub, partly broken away.

Referring to the drawing, 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 tub 4 having a hub 5 and bottom and side walls 6 and 7. The bottom wall 6 rests on a flange 8 integral with a sleeve 9 fixed to the hub 5 and is fixed to the sleeve 9 by a snap ring 10 fitting in a groove on the outside of the sleeve and clamping the bottom wall against the flange 8. The side walls 7 flare outward and upward from the bottom wall 6 and terminate at their upper edges in an offset rim 11, providing a shoulder 12 on which is seated a ring 13 carrying an annular filter 14 of cloth or wire mesh screen. At the inner edge of the filter is a ring 15 flaring upward and outward from the filter and terminating in a rounded edge 16 above the upper edge of the ring 13. The ring 15 provides an opening through which clothes may be inserted or removed from the tub. During washing, liquid is circulated from the bottom of the casing 1 by a pump 17 having its inlet connected by a conduit 18 to a drain opening 19 in the bottom wall 20 of the casing and having its discharge connected to a conduit 21 extending up along the outside of the casing 1 and in through a slot 22 in the edge of the cover 3. The discharge end of the conduit 21 is connected to a T-shaped coupling 23 terminating in oppositely facing nozzles 24 and 25. The nozzles discharge streams of liquid tangential to and directly against the upper surface of the filter 14, the streams being directed in opposite directions around the filter in the channel formed by the rings 13 and 15. Each of the streams discharged from the nozzles tends to move the liquid on the filter away from the point of impingement and in the direction of flow. However, since the nozzle streams dis-

charge in opposite directions and the side walls of the rings 13 and 15 direct the streams toward and in opposition to each other, there is no net circulation of liquid around the filter. If only one nozzle were provided, the discharge would cause the liquid on the filter to circulate in the direction of flow of the stream and the circulation of the liquid would decrease the rate of flow through the filter and would tend to keep particles of dirt entrained in the liquid on the filter. If the filter were partially clogged, liquid might spill over the upper edge of the ring 13 returning the liquid to the outer casing. Due to the absence of circulation around the filter in the present construction, the oppositely discharged streams have a scouring action on the filter at the region of impingement which cleans this portion of the filter. If only a single stream were discharged on the filter, the scouring or cleaning action would be less effective due to the induced circulation around the filter. This would lower the liquid level in the tub below the proper level for washing since liquid which splashed out of the tub would not be returned to the tub. In the present construction this circulation around the filter is absent and the flow through the filter is accordingly increased. Below the filter 14 is an annular guard ring 26 having a downwardly extending flange 27 at its outer edge fixed to the inner surface of the tub side walls 7 and an upwardly extending flange 28 at its inner edge directly below the inner edge of the ring 15. At or slightly above the liquid level in the tub are openings 29a extending through the flange 27 and the side walls 7. These openings, being in the region of greatest diameter, serve as discharge openings during centrifugal drying. The openings also serve to some extent as overflow openings for maintaining the liquid level in the tub. Intermediate the flanges 27 and 28 the guard ring 26 tapers inwardly and upwardly and cooperates with the tub side walls 7 to provide a trough 29 directly below the filter 14 to which the filter drains. At a plurality of points around the tub, the side and bottom walls are bent inward to form grooves 30 cooperating with strips 31 secured to the outside of the side and bottom walls to provide channels 32 communicating at their upper ends with the trough 29 and extending down along the side walls 7 and radially inward beneath the bottom wall 6. The channels 32 conduct liquid from the trough 29 to the inside of the tub 4 through openings 33 in the tub side walls and openings 34 in the tub bottom walls. The filtered liquid is accord-

ingly introduced below the liquid level in the tub.

Within the tub is an agitator 35 having a hub 36 depending around the hub 5 and terminating at its lower end in a disk 37 adjacent the bottom of the tub and overlying some of the openings 34. The liquid entering the tub through the openings 34 beneath the disk 37 flows partly through openings 37b in the disk 37 and partly through the space between the disk 37 and the bottom walls 6. A plurality of radial vanes 37a project from the hub and disk. The lower end of the agitator hub 36 is journaled on the sleeve 9 by means of a bearing 38 fixed to a flange 39 within the agitator hub. The upper end of the agitator hub is provided with a socket 40 for a drive nut 41 splined on the upper end of a shaft 42. The shaft 42 extends upward from the bottom wall 20 of the outer casing through a sleeve 43 and through the hub 5. The upper end of the agitator hub 36 is provided with a trough 44, the upper end of which is adjacent or slightly below the liquid level in the tub. Liquid flowing into the trough 44 flows through openings 45 in the agitator hub 36 into the space between the agitator hub and the hub 5. From here the liquid drains to the outer casing 1 through openings 46 in the sleeve 9. The agitator 35 is oscillated at washing speed or the tub is rotated at centrifugal drying speed by the shaft 42 through suitable mechanism associated therewith. Such mechanism is known and need not be illustrated. It may, for example, be that shown in Patent 2,161,618, G. W. Dunham.

In the use of the washing machine the outer casing 1 is filled with an amount of liquid slightly greater than the capacity of the tub 4 and the tub is filled by starting the pump 17 to pump liquid from the outer casing into the tub. When the tub is filled, the agitator is oscillated at its washing speed by the shaft 42, and the clothes and washing compound are put into the tub. The oscillation of the agitator causes a circulation of the liquid in the tub in the general direction of the arrows 47, and the particles of lint or foreign matter floating on the liquid are therefore directed radially inward toward the trough 44. The liquid flowing into the trough 44 therefore contains the greatest proportion of foreign matter. This liquid flows through the openings 45 in the agitator hub 36 into the space between the agitator hub and the hub 5 and through openings 46 in the sleeve 9 to the outer casing. From here the liquid is pumped by the pump 17 through the oppositely directed nozzles 24 and 25 onto the filter 14 which removes the solid particles. The liquid flowing through the filter 14 drains to the trough 29 and from the trough 29 is returned to the tub through openings 33 and 34 beneath the liquid level in the tub. Introducing the filtered liquid beneath the liquid level in the tub tends to bring the solid particles suspended in the liquid to the surface of the liquid in the tub where the particles— are directed into the trough 44 by the currents set up by the oscillation of the agitator. The discharge of the filtered liquid beneath the liquid level in the tub eliminates any tendency of the filtered liquid to flow directly into the trough 44, as would be the case if the filtered liquid were discharged onto the surface of the liquid in the tub. At the conclusion of the washing operation the tub 4 is rotated by the shaft 42 at centrifugal drying speed. At the start of the centrifugal drying the pump 17 is operated to discharge liquid

onto the filter 14 through the oppositely directed nozzles 24 and 25. The streams discharged from the nozzles flush solid particles off the top of the filter. The streams have a scouring action on the filter, which is particularly pronounced in the case of the stream which is directed opposite the direction of rotation of the tub. It is necessary to run the pump 17 only during the first part of the centrifugal drying. During the rotation of the tub the liquid therein is centrifugally discharged through openings 27a beneath the guard ring 26. The liquid discharged through these openings is stored in the outer casing 1, whence it may be returned to the tub for a succeeding washing operation after the centrifugally dried clothes are removed from the tub.

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

1. In a washing machine, a tub for receiving liquid and clothes to be washed, overflow passages in the tub defining the liquid level therein, a trough above the liquid level in the tub, means providing a passage from said trough to the inside of the tub below the overflow passages, washing means for agitating the liquid and clothes in the tub, a filter above and draining to said trough, and means for collecting liquid overflowing through said overflow passages during washing and discharging said liquid onto the filter.

2. In a washing machine, a tub for receiving liquid and clothes to be washed, a filter draining to the tub, a nozzle directing a stream of liquid directly onto the upper surface of the filter and around the filter in one direction, another nozzle directing a stream of liquid directly onto the upper surface of the filter and around the filter in the opposite direction, washing means for agitating the liquid and clothes in the tub, and means for withdrawing liquid from the tub during washing and discharging the withdrawn liquid through said nozzles.

3. In a washing machine, a tub for receiving liquid and clothes to be washed, a filter draining to the tub, nozzles discharging streams of liquid in opposite directions tangential to and directly against the upper surface of the filter, washing means for agitating the liquid and clothes in the tub, and means for withdrawing liquid from the tub during washing and discharging the withdrawn liquid through said nozzles.

4. In a washing machine, a tub for receiving liquid and clothes to be washed, a filter draining to the tub, a pair of nozzles discharging streams of liquid tangential to and directly against the upper surface of the filter, walls conducting said streams toward and in opposition to each other, washing means for agitating the liquid and clothes in the tub, and means for withdrawing liquid from the tub during washing and discharging the withdrawn liquid through said nozzles.

5. In a washing machine, a rotatable tub for receiving clothes to be washed and centrifugally dried, said tub being mounted on a vertical axis and having liquid retaining side walls, a guard ring within the side walls and cooperating therewith to provide a trough, a filter on the tub draining to the trough, overflow openings in the tub side walls below the trough, washing means for agitating the liquid and clothes in the tub, means for withdrawing liquid from adjacent the surface of the liquid in the tub during washing and discharging the withdrawn liquid onto the

filter, and means providing a passage from said trough to the inside of the tub below said openings.

6. In a washing machine, a tub for receiving liquid and clothes to be washed, overflow passages in the tub defining the liquid level therein, a filter above the tub, a trough below the filter for receiving liquid flowing through the filter, means providing a passage for conducting liquid from the trough to the inside of the tub below the overflow passages, washing means for agitating the liquid and clothes in the tub, and means for collecting liquid overflowing through said overflow passages during washing and discharging said liquid onto the filter.

7. In a washing machine, a rotatable tub for receiving clothes to be washed and centrifugally dried, said tub being mounted on a vertical axis and having liquid retaining side walls, a filter seated on the side walls, centrifugal discharge openings in said side walls below the filter, a guard within the side walls between said openings and said filter and cooperating with said side walls to define a trough to which the filter drains, washing means for agitating the liquid and clothes in the tub, means for withdrawing liquid from the tub during washing and discharging the withdrawn liquid onto the filter, and means providing passages in said side walls leading from said trough to the inside of the tub below said openings.

8. In a washing machine, a tub for receiving liquid and clothes to be washed, overflow passages in the tub defining the liquid level therein, a filter above the tub, a trough below the filter for receiving liquid flowing through the filter, means for agitating the liquid and clothes in the tub, drain passages from the trough to the inside of and below the overflow passages in the tub, and means for collecting liquid overflowing through said passages during washing and discharging said liquid onto the filter.

9. In a washing machine, a tub for receiving liquid and clothes to be washed, a filter above the tub, a trough below the filter for receiving liquid flowing through the filter, an agitator having a hollow hub at the center of the tub and provisions for producing a circulation radially outward at the bottom of the tub, upwardly along the side walls and radially inward at the top of the tub, means for oscillating the agitator for washing, passages for conducting liquid from the surface thereof to within the agitator hub and out of the tub, means for collecting the liquid flowing through said passages and for discharging said liquid onto the filter during washing, and drain passages from the trough to the inside of the tub below said first passages.

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