

Oct. 6, 1942.

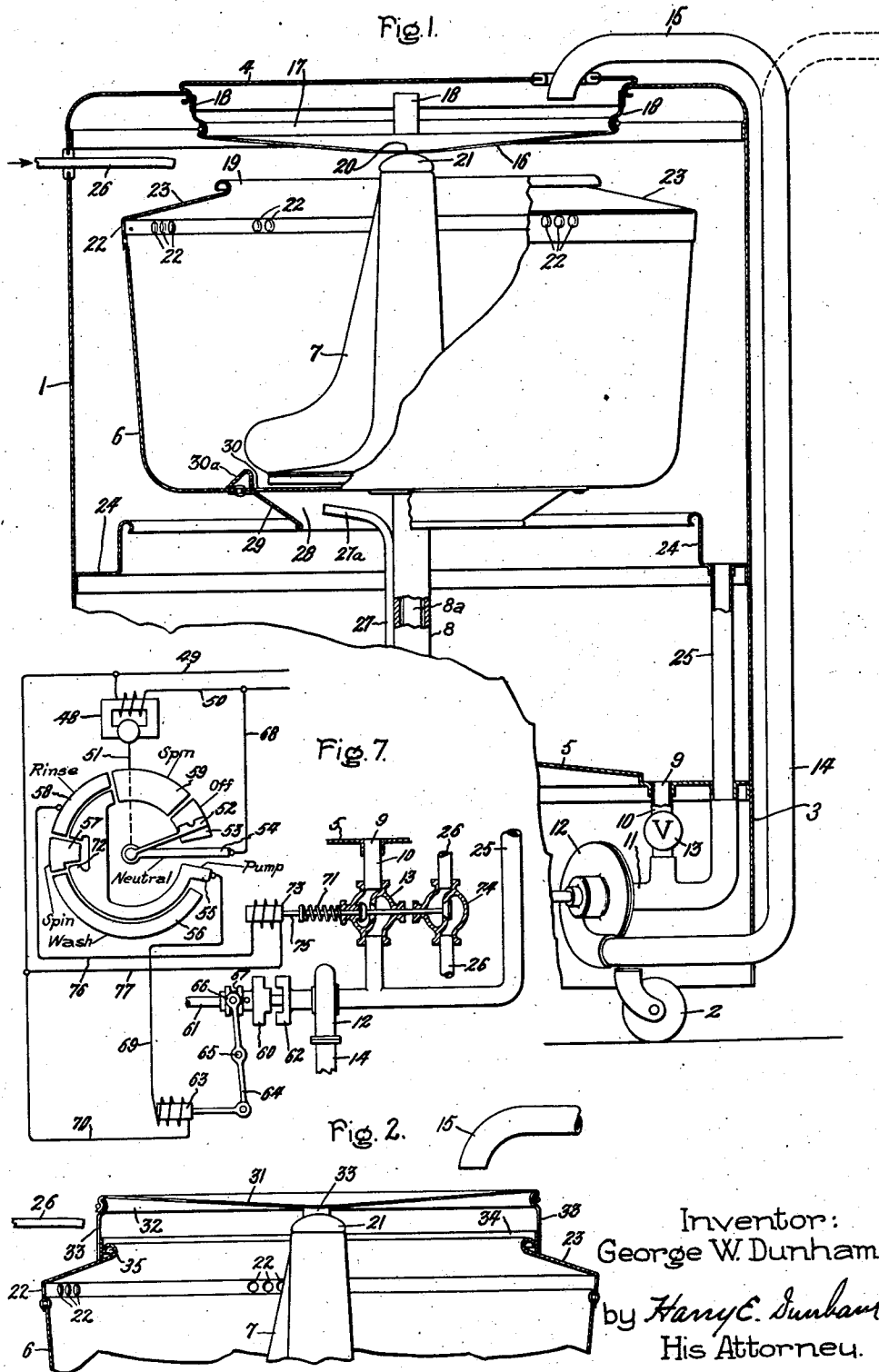
G. W. DUNHAM

2,298,096

WASHING MACHINE

Filed Feb. 20, 1942

2 Sheets-Sheet 1



Oct. 6, 1942.

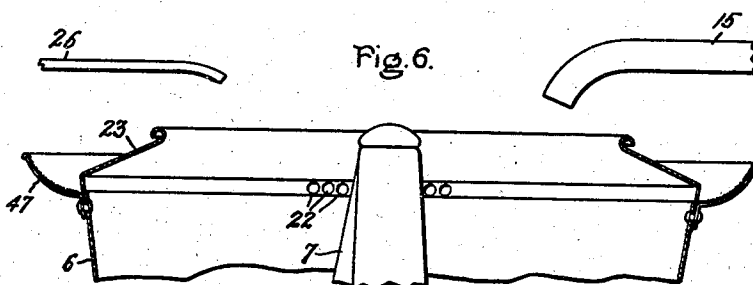
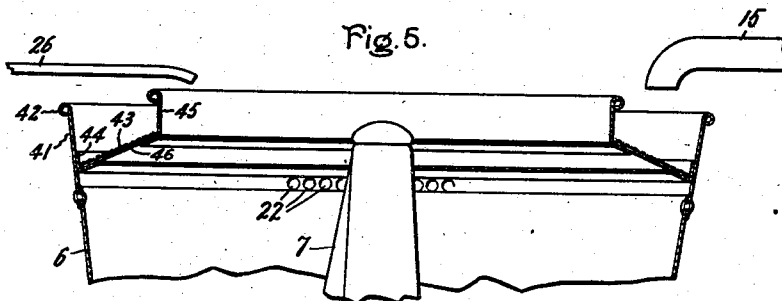
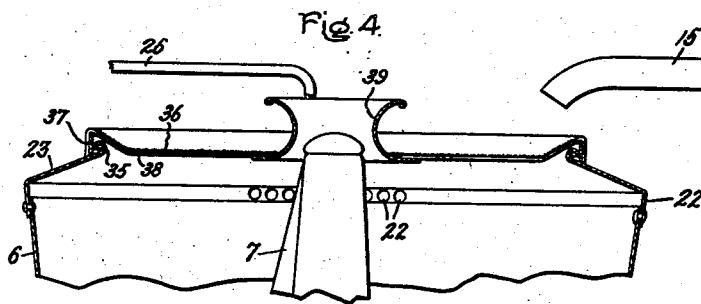
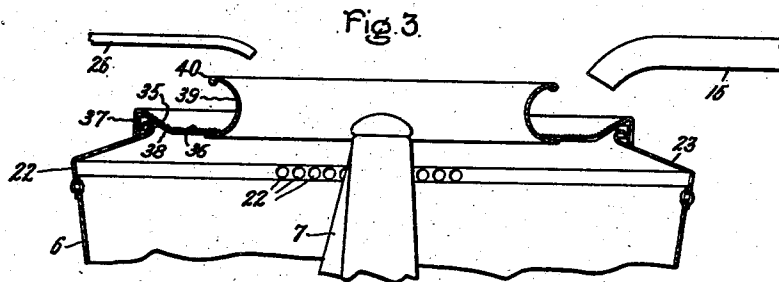
G. W. DUNHAM

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WASHING MACHINE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,298,096

WASHING MACHINE

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Application February 20, 1942, Serial No. 431,753

15 Claims. (Cl. 68-18)

This application is a continuation-in-part of my applications Serial No. 264,156, filed March 25, 1939, and Serial No. 238,636, filed November 3, 1938.

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

In such machines solid particles such as lint, dirt, and soap curd become dispersed or suspended throughout the washing solution during washing. During drying, the receptacle is rotated at high speed, and the resultant centrifugal force causes the clothes to be thrown against the side walls of the washing receptacle and the washing solution to be removed therefrom. The clothes, being at the outside of the receptacle, serve as a filter through which the washing solution passes, and the particles suspended in the washing solution tend to accumulate on the inner layer of clothes. These particles cannot be removed by introducing liquid into the receptacle during drying. Such rinsing liquid will, however, remove the soap or other soluble washing compound in the clothes.

The object of the present invention is to provide an improved construction and arrangement in washing machines of this type in which particles suspended in the washing solution are filtered prior to the centrifugal drying operation.

In the accompanying drawings, Fig. 1 is a sectional elevation of a washing machine embodying my invention, having the filter supported by the washing machine cover; Fig. 2 is a fragmentary view of a modification in which the filter is supported on top of the washing receptacle or compartment; Figs. 3, 4, and 5 are fragmentary views of modifications in which the filter is located within the rim of the receptacle; Fig. 6 is a fragmentary view of a modification in which the filter is supported on the outside of the receptacle; and Fig. 7 is a control diagram.

Referring to the drawings, I have shown my invention applied to the washing machine of my Patent No. 2,161,618, June 6, 1939. This washing machine comprises an outer casing or tub 1 supported by casters 2 suitably attached to a skirt 3 at the lower end and having an open top closed by a cover 4. Above the bottom 5 of the casing is supported a washing compartment or receptacle 6 for receiving liquid and material to be washed. The space between the bottom of the casing and the receptacle is sufficient to store the liquid contents of the receptacle.

Within the receptacle is a conventional bladed agitator 7 which is operated to effect washing by oscillation relative to the receptacle. The receptacle is supported in the casing by a tubular post 8 through which extends a shaft 8a for oscillating the agitator 7 and for rotating the receptacle 6 to centrifugally extract liquid from the material contained therein. The driving mechanism for the shaft is located within the skirt 3 and below the bottom 5 of the casing. Such driving mechanism, as well as arrangements for supporting and driving the agitator and the receptacle, are known and further illustration is not required for the purposes of the present invention. The arrangement for driving and supporting the receptacle and agitator may, for example, be that of my above referred to patent.

In the bottom of the casing is an outlet 9 connected by a conduit 10 to the inlet 11 of a pump 12. The flow of liquid through the conduit 10 is controlled by a valve 13. The pump is driven by suitable mechanism (not shown). During washing, the valve 13 is open and the pump is operating. The washing solution is therefore withdrawn from the bottom of the casing and is pumped through a conduit 14 and discharged through a gooseneck 15 at the upper end thereof on top of a filter 16. The gooseneck, as indicated by dotted lines, may be pivoted so as to discharge to a suitable drain. The filter 16 comprises a fine wire mesh screen or cloth which is clamped to a ring 17 suspended from the underside of the cover by spaced supporting strips 18. The filter is located directly over the top opening 19 of the receptacle 6. The filter is shown as sagging at the center so that its central point 20 rests on the upper end 21 of the agitator. This is not necessary but it does somewhat increase the flow of liquid through the filter. The particles suspended in the washing solution collect on top of the filter, and the filtered liquid drains into the receptacle 6. The washing solution in the receptacle overflows to the casing through openings 22 located at the upper edge of the receptacle. During washing, the washing solution, with the particles suspended therein, continually flows out to the casing through the openings 22 and is circulated by the pump 12 onto the top of the filter 16 which removes the suspended particles. As a result of this filtering operation the washing solution remains substantially free of suspended particles. If the filter becomes clogged the liquid discharged onto the top of the filter will overflow through the spaces between the supports 18, the overflow

falling on the rim 23 of the receptacle and returning to the casing. When the filter becomes clogged it should be cleaned so as to prevent this condition. Due to the large area of the filter, cleaning is necessary only at infrequent intervals.

At the conclusion of the washing operation the receptacle is rotated at high speed to centrifugally extract liquid from the material contained therein. Under the action of centrifugal force the clothes are thrown against the tapered side walls of the receptacle, and the liquid therein is forced up the side walls and discharged through the openings 22. During this operation the pump is not operating and the valve 13 is open. The centrifugally discharged liquid is thrown against the inner walls of the casing and runs down the walls into an annular trough 24 from which it is returned to the casing through a conduit 25 connected between the trough 24 and the conduit 10 and the pump inlet 11. The space below the receptacle is sufficient to store the washing solution.

After the clothes have been centrifugally dried and the washing solution partially removed therefrom, rinsing liquid consisting of clear water may be introduced to the rotating receptacle through a conduit 26 connected to a water supply (not shown). This conduit directs the stream of rinsing liquid through the passage between the upper edge of the receptacle and the filter against the upper end 21 of the agitator. Due to the high speed rotation of the agitator and the receptacle, this liquid is dispersed outward through the clothes which line the tapered side walls of the receptacle, and flows through the clothes and out through the openings 22, removing the washing solution remaining in the clothes at the end of the drying operation. This method of rinsing is known in the art as "spray rinsing." During rinsing, the valve 13 is closed, the pump 12 is operated, and the gooseneck 15 is moved to a position discharging to a suitable drain. The spray rinse liquid is therefore caught in the trough 24 and is discharged to the drain. The rinsing liquid does not dilute the washing solution. Due to the arrangement of the filter it is not necessary to remove the filter during rinsing.

If desired, the rinsing liquid may be introduced to the receptacle through a conduit 27 connected to a suitable water supply (not shown). The conduit 27 extends up through the casing bottom 5 adjacent the tubular post 8 and terminates in a nozzle 27a which discharges radially to an annular trough 28 formed by a wall 29 fixed to the bottom of the receptacle. The wall 29 tapers radially upward and outward so that the rinsing liquid will move up its inclined surface due to centrifugal force. The liquid enters the receptacle through openings 30 in the bottom thereof, strikes projections 30a, and is dispersed and centrifugally forced through the clothes which line the tapered side walls of the receptacle, removing the washing solution therefrom. This rinsing liquid is discharged to the drain in the manner described above. The openings 30 are small enough so that the liquid draining through these openings during washing is insufficient to lower the liquid level in the receptacle. With this arrangement for introducing the rinsing liquid it is unnecessary to remove the filter.

At the conclusion of the rinsing operation, the high speed rotation of the receptacle is continued so as to dry the clothes thoroughly. During this drying, the liquid remaining in the

clothes is caught in the trough 24 and discharged to the drain as described above.

At the conclusion of the drying operation the clothes are removed from the receptacle and the washing solution in the bottom of the casing is pumped back to the receptacle, which is then ready for receiving another load of clothes.

Since the filter is located on the cover it is out of the way during the emptying and loading of the receptacle.

In Fig. 2 is shown a modification of the filter construction applied to the washing machine shown in Fig. 1. Only the upper end of the receptacle 6 is shown since the remaining parts of the machine are of the same construction.

In this arrangement the filter is mounted on the upper end of the receptacle. It comprises a wire mesh screen or cloth filter 31 clamped to a ring 32 supported by spaced supports 33 which are attached at their lower ends to a ring 34 having a friction fit over the rim 35 of the receptacle. During washing, the washing solution is discharged through the gooseneck 15 onto the top of the filter. The filtered liquid flows through the filter to the receptacle, and the solid particles remain on top of the filter. If the filter becomes clogged the washing solution flows over the edges of the filter onto the walls 23 of the receptacle and drains to the casing.

The washing operation is effected in the same manner as in the machine shown in Fig. 1, and during the washing operation liquid is circulated from the casing onto the top of the filter and the solution in the receptacle continuously overflows to the casing through openings 22. The continuous circulation and filtering of the washing solution maintain it free from suspended particles.

At the conclusion of the washing operation the clothes are dried by high speed rotation of the receptacle, the washing solution being discharged from the receptacle by centrifugal force and being caught in the trough 24 and returned to the casing through conduits 25 and 10. The valve 13 is open and the pump is not operating.

During drying, the solid particles on the upper surface of the filter may be flushed from the filter by discharging liquid onto the filter. This may be accomplished by running the pump with the valve 13 open for a short time at the start of the drying operation. This will discharge washing solution through the gooseneck 15 onto the filter. During the initial part of the drying operation while the receptacle is coming up to speed, the major portion of the washing liquid is thrown out of the receptacle and is caught in the trough 24 and returned to the casing. During this time the washing solution discharged from the gooseneck 15 passes through the filter. Upon an increase in receptacle speed, the washing solution is thrown out over the upper surface of the filter, flushing sediment therefrom, the liquid and sediment being caught in the trough 24. Only a small amount of liquid is required for flushing, the amount being such that the sediment flushed off the filter for the most part remains in the trough. After flushing, the pump is stopped. This arrangement has the additional advantage that the filter is kept wet prior to the flushing.

After the filter flushing operation, rinsing liquid is introduced through the conduit 26 which is connected to a suitable water supply (not shown). This liquid enters the receptacle through the spaces between the supports 33 and

strikes the agitator, and is thereafter dispersed through the clothes lining the side wall of the receptacle. The rinsing liquid removes any washing solution remaining in the clothes. During the spray rinse operation the valve 13 is closed, pump 12 is operating and the gooseneck 15 is moved to a position discharging to a drain. The spray rinse liquid together with the washing liquid and any filter sediment collected in the trough 24 is removed from the trough through conduit 25 and is pumped to the drain through the conduit 14 and gooseneck 15.

At the conclusion of the rinsing operation the rotation of the receptacle 6 is continued to thoroughly dry the clothes. When the clothes are dry the rotation of the receptacle 6 is stopped and the clothes are removed from the receptacle. To remove the clothes it is necessary that the filter be lifted off the rim of the receptacle. This is easily done due to the friction fit between the ring 34 of the filter support and the rim 35 of the receptacle. While it is necessary to remove the filter to load and unload the receptacle, it is unnecessary to remove the filter during the washing, rinsing, drying and filter flushing operations.

In Fig. 3 is shown a filter construction for the machine of Fig. 1 in which the filter is permanently mounted on the receptacle and need not be removed at any time. This filter comprises a wire mesh screen or cloth 36 supported on top of a frame which comprises a ring 37 fixed to the rim 35 of the receptacle, spaced supports 38 fixed at one end of the ring 37 and extending radially inward within the receptacle rim 35 and fixed at the other end to a ring 39. The ring 39 is of curved section and presents a smooth opening of sufficient diameter for ready insertion and removal of clothes. The upper edge 40 of the ring 39 is higher than the upper edge of the ring 37 providing a trough for receiving liquid from the gooseneck 15. If the filter becomes clogged the liquid will overflow onto the walls 23 of the receptacle and be returned to the casing. The filter 36 may be permanently fixed to its frame. The spacing between the supports 38 is sufficient to provide ample drainage space for the filter. The supports 38 are strong enough so that the receptacle may be lifted by the ring 39.

During washing, the washing solution is circulated from the casing through the gooseneck 15 onto the top of the filter 36, and the filtered liquid drains into the receptacle through the spaces between the supports 38. At the conclusion of the washing operation the clothes are centrifugally dried by high speed rotation of the receptacle 6. During this drying operation the pump 12 is not operating and the valve 13 is open. The washing solution is therefore collected in the bottom of the casing.

While the receptacle is rotating, solid particles may be flushed off the filter by discharging liquid onto the top of the filter. The flushing operation may be carried out as in the construction shown in Fig. 2.

When the flushing operation is completed, spray rinse liquid is introduced through the conduit 26 through the opening defined by the ring 39. At this time the valve 13 is closed and the gooseneck is moved to discharge to the drain. This liquid is caught in the trough 26 and is pumped to the drain. As in the previously described constructions, the final drying is effected by rotation of the receptacle 6 after the rinsing operation. During this time the gooseneck 15

discharges to the drain and the pump 12 is operating so that any liquid remaining in the clothes at the end of the rinsing operation is not mixed with the washing solution.

At the completion of the drying operation the clothes are removed through the opening provided by the ring 39. With this construction it is unnecessary to remove the filter at any time and the filter is maintained in a clean condition.

The construction of Fig. 4 is the same as the construction of Fig. 3 except that the ring 39 is of smaller diameter and the ring 37 has a friction fit on the receptacle rim 35. Due to the small diameter of the opening provided by the ring 39, it will be necessary to remove the filter during the loading and unloading of the receptacle. In all other respects the operation is identical with the construction of Fig. 3.

In Fig. 5 is shown a modification in which the filter is permanently mounted in the receptacle and need not be removed at any time. In this construction the tapered side walls of the receptacle 6 are provided with an extension 41 terminating in a rounded edge 42. To the inside of the walls 41 is fixed a filter 43 which is supported between a ring 44 fixed to the walls 41 and a ring 45 fixed to the inner edge of the filter. Spaced supports 46 may be provided between the ring 44 and the ring 45 if the filter is made of material such that it is not self-supporting. The walls 41 and the filter 43 are inclined and provide a trough for receiving the washing solution circulated from the casing through the gooseneck 15. If the filter becomes clogged, the filter will overflow to the casing, since the ring 45 is higher than the upper edge of the walls 41. During normal operation the filter will not overflow.

The washing operation is effected in the same manner as the machine shown in Fig. 1, and the washing solution is filtered by the continuous circulation of the washing solution onto the top of the filter 43. At the conclusion of the washing operation the receptacle is rotated to centrifugally dry the clothes. During the initial part of the drying operation the liquid is discharged in large quantities over the upper edge of the receptacle. Some of the liquid will pass through the openings 22. The remainder of the liquid will flow through the filter 43 and out over the edge 42. This latter portion of the liquid, since it flows through the filter in a direction opposite the normal direction, will effectively flush the sediment collected on the top of the filter.

At the conclusion of the drying operation the clothes may be rinsed by the introduction of spray rinse liquid from the conduit 26, and the clothes may thereafter be given a final drying as described above.

Due to the large diameter of the ring 45, the filter need not be removed during loading and unloading of the receptacle. Due to the reverse flushing of the filter at the initial part of the drying operation, the filter will be maintained in a clean condition.

Fig. 6 shows a construction in which the filter is located on the outside of the receptacle. This filter construction comprises a wire mesh screen 47 fixed at one end to the outer walls of the receptacle below the opening 22 and extending outward therefrom to provide a trough for receiving the liquid overflowing the receptacle through openings 22. Since the filter is constructed of wire mesh screen, it is self-supporting. It may, however, be suitably braced. In

this construction the washing solution is continuously circulated from the casing through the gooseneck 15 into the receptacle opening 19. The liquid overflows through the openings 22 onto the filter 47 which removes particles suspended in the washing solution. If the filter becomes clogged it overflows directly to the casing. During the centrifugal drying operation which follows the washing, the liquid discharged through the openings 22 flows across the upper surface of the filter 47 and flushes the sediment off the filter.

The rinsing and final drying operations are the same as in the previously described constructions.

In the filter constructions of Figs. 2 to 6 inclusive, it is obvious that the spray rinse liquid may be introduced to the receptacle by a conduit and trough arrangement such as shown at 27, 28, 29, and 30 in Fig. 1.

In Fig. 7 is shown a control diagram which is designed for use with the washing machine of Fig. 1 equipped with the filter constructions shown in Figs. 2, 3, 4, and 5. Further details of the control are shown in application Serial No. 264,156. The control has a timer motor 48 connected to power lines 49 and 50 which drives a shaft 51 carrying a brush 52 arranged to cooperate with segments 53, 54, 55, 56, 57, 58, and 59, the functions performed being indicated by legends on the segments, as disclosed in greater detail in the above application. When the brush 52 contacts the "off" segment, as illustrated, the machine is at rest and the power circuit to the timer motor is interrupted by suitable arrangements (not shown) associated with this segment. Prior to starting the machine, the outer casing is filled with the amount of washing solution necessary to fill the receptacle 6 to overflowing and the brush is manually moved into contact with the pump segment 55. When the brush 52 contacts the segment 55, the pump 12 is started in operation to pump washing solution from the bottom of the outer casing 1 into the receptacle 6, and the timing motor is started so as to rotate the brush in a clockwise direction at a speed of the order of one revolution an hour. The operation of the pump is controlled by a clutch member 60 splined on a power shaft 61 and arranged to cooperate with a clutch member 62 fixed to the pump shaft. The clutch member 60 is moved to the engaged position by a solenoid 63 connected to a shifting lever 64 pivoted at 65 and having a forked end 66 fitting in a groove 67 in the clutch member 60. When the solenoid 63 is deenergized, the clutch member 60 is biased out of engagement with the clutch member 62. The circuit to the solenoid 63 extends from line conductor 50 through conductor 68, neutral segment 54, brush 52, pump segment 55, and conductor 69 to the solenoid, and from the solenoid through conductor 70 to the line conductor 49. The inlet of the pump is connected to the bottom of the casing through the valve 13 which is biased to the open position by a spring 71, and the discharge of the pump is directed through the conduit 14 and gooseneck 15 into the receptacle 6. After the receptacle is filled, the brush 52 contacts the wash segment 56 which, through suitable arrangements shown in my above application, starts the oscillation of the agitator shaft 8a to wash the clothes in the receptacle. It will be noted that the brush 52 during washing contacts both the pump and wash segments so that the pump runs continuously during the washing

operation. This means that the washing solution overflowing the receptacle during washing, together with any suspended particles, falls into the bottom of the outer casing whence it is pumped onto the filter 31, 36, or 43. At the conclusion of the washing operation, the brush 52 contacts the spin segment 57 which, as shown in my above application, causes the rotation of the shaft 8a, and of the receptacle 6 at centrifugal extracting speed so as to centrifugally dry the clothes in the receptacle. At the beginning of the centrifugal drying or spinning operation, the brush 52 remains in contact with an extension 72 on the pump segment, which keeps the pump in operation during the initial part of the centrifugal drying operation. This causes the discharge of washing solution onto the filter while it is being rotated and thereby flushes the sediment off the filter as described above. When the brush falls off the extension 72 on the pump segment, the pump stops. The rotation or spinning of the receptacle continues until the brush 52 reaches the "off" segment. Following the first spinning operation, while the brush contacts segment 57, the brush contacts the rinse segment 58 which energizes a solenoid 73 jointly controlling the pump inlet valve 13 and a valve 74 in the rinse water supply conduit 26. These valves have a common operating plunger 75 which is biased by the spring 71 to the position illustrated in which the valve 13 is open and the valve 74 is closed. Upon energizing the solenoid 73, the valve 13 is closed and the valve 74 is opened. At the same time the pump discharge is by suitable means (not shown) connected to a drain. The circuit for the rinse solenoid extends from line conductor 50 through conductor 68, neutral segment 54, brush 52, rinse segment 58, and conductor 76 to the solenoid, and from the solenoid through conductors 77 and 78 to line conductor 49. The pump solenoid 63 is energized at the same time as the rinse solenoid 73 so that the operation of the pump 12 starts simultaneously with the closing of the pump inlet valve 13 and the opening of the rinse valve 74. During the rinsing operation fresh water is discharged through the conduit 26 into the receptacle 6 and is dispersed through the clothes and centrifugally discharged from the receptacle against the side walls of the outer casing 1. This liquid is caught in the trough 24 and conducted to the pump inlet through conduit 25 and pumped to the drain. The rinse water removes the washing solution remaining in the clothes at the end of the first centrifugal drying operation. Following the rinsing operation the brush 52 contacts the spin segment 59, continuing the centrifugal drying operation until the brush contacts the "off" segment 52. The circuit to the pump solenoid 63 is broken at the same time as the circuit to the rinse solenoid 73, so that any liquid remaining in the clothes at the end of the rinsing operation is centrifugally discharged to the outer casing.

With the above described control, it is apparent that the washing solution is discharged onto the filter throughout the washing operation and during part of the centrifugal drying operation. During washing the washing solution is accordingly continuously filtered and the suspended particles collect on the filter. These particles are flushed off the filter by the discharge of washing solution onto the filter during the centrifugal drying.

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

1. In a washing machine, a receptacle for receiving clothes to be washed, means for agitating the clothes in the receptacle for washing and for centrifugally drying the clothes by rotating the receptacle at high speed, a filter on the receptacle draining thereto, provisions for withdrawing washing liquid from the receptacle beneath the filter and discharging the withdrawn liquid onto the filter during washing, a passage to the receptacle independent of the filter, and provisions for admitting rinsing liquid to the receptacle through said passage during drying.

2. In a washing machine, a receptacle for receiving clothes to be washed, means for agitating the clothes in the receptacle for washing, top walls in the receptacle defining an opening through which clothes may be inserted and removed and a second opening spaced from said first opening, a filter on the receptacle above the liquid level in the receptacle and draining to the receptacle through said second opening, and provisions for withdrawing washing liquid from the receptacle beneath the filter and discharging the withdrawn liquid onto the filter during washing.

3. In a washing machine, a receptacle for receiving clothes to be washed, means for agitating the clothes in the receptacle for washing and for centrifugally drying the clothes by rotating the receptacle at high speed, a filter on the top of the receptacle, provisions for withdrawing washing liquid from the receptacle beneath the filter and discharging the withdrawn liquid onto the filter during washing, and an opening in the filter through which liquid may be admitted directly to the receptacle.

4. In a washing machine, a casing, a receptacle for receiving clothes to be washed, means for agitating the clothes in the receptacle for washing and for centrifugally drying the clothes by rotating the receptacle at high speed, means for circulating washing liquid from the casing to the receptacle during washing, said receptacle being arranged to overflow to the casing, and a filter carried by the receptacle on the outside of the receptacle for intercepting and filtering the liquid overflowing from the receptacle.

5. In a washing machine, a casing, a receptacle for receiving clothes to be washed, means for agitating the clothes in the receptacle for washing and for centrifugally drying the clothes by rotating the receptacle at high speed, said receptacle being constructed so that the liquid therein is discharged at the top thereof during drying, means for circulating washing liquid from the casing to the receptacle during washing, a filter carried by the receptacle for filtering the washing liquid, said filter being arranged in the path of the liquid discharged from the receptacle during drying whereby sediment will be flushed from the filter.

6. In a washing machine, a casing, a receptacle for receiving clothes to be washed, means for agitating the clothes in the receptacle for washing and for centrifugally drying the clothes by rotating the receptacle at high speed, said receptacle being constructed so that the liquid therein is discharged at the top during drying, a filter on the outside of the receptacle arranged so that the liquid discharged from the receptacle during drying flows across the upper surface of the filter, and means for circulating washing liquid from the casing to the receptacle during

washing, said receptacle overflowing to the filter whereby the washing liquid is filtered.

7. In a washing machine, a casing, a receptacle for receiving clothes to be washed, means for agitating the clothes in the receptacle for washing and for centrifugally drying the clothes by rotating the receptacle at high speed, a filter on the receptacle and above the liquid level in the receptacle partially closing the top of the receptacle providing a passage through which clothes may be inserted and removed from the receptacle, and provisions for circulating washing liquid from the casing onto the filter during washing.

8. In a washing machine, a casing, a receptacle in the casing for receiving clothes to be washed, means for agitating the clothes in the receptacle for washing and for centrifugally drying the clothes by rotating the receptacle at high speed, means for pumping washing liquid from the casing to the receptacle during washing, said receptacle being arranged to overflow to the casing whereby the washing liquid is circulated from the receptacle to the casing and back to the receptacle during washing, and a filter within the casing at the top of the receptacle arranged in the path of the washing liquid, said filter comprising a screen-like surface on which the washing liquid is discharged and having an overflow passage to the casing independent of the receptacle for liquid discharged onto the filter in excess of the filtering capacity of the filter, and a passage to the top of the receptacle independent of the filter through which rinsing liquid may be introduced.

9. In a washing machine having a receptacle for receiving clothes to be washed, means for agitating the clothes in the receptacle for washing, a cover for the machine, a filter supported on the cover draining to the receptacle, said cover and filter constituting a readily removable unit, and means for withdrawing washing liquid from the receptacle beneath the filter and discharging the withdrawn liquid onto the filter during washing, said filter having an overflow passage for liquid discharged thereon in excess of the filtering capacity of the filter.

10. The method of flushing a filter arranged to receive on its upper surface the liquid to be filtered which comprises discharging liquid onto the filter while rotating the filter at such speed that the liquid centrifugally flows across the upper surface of the filter.

11. In a washing machine, a receptacle for receiving clothes to be washed, means for agitating the clothes in the receptacle for washing and for centrifugally drying the clothes by rotating the receptacle at high speed, top walls on the receptacle defining a central opening through which clothes may be inserted and removed and a second opening radially outside said first opening, a filter on the receptacle above the liquid level in the receptacle and draining to the receptacle through said second opening, and means for withdrawing washing liquid from the receptacle beneath the filter and discharging the withdrawn liquid onto the filter and returning the filtered liquid to the receptacle during washing.

12. In a combined washing and drying machine, a casing, a rotatable receptacle therein in which the clothes are washed and centrifugally dried, a filter on the receptacle, means for pumping washing solution from the casing onto the filter, and a control for said pumping means ar-

ranged to cause pumping washing solution from the casing onto the filter during washing whereby sediment is caught on the filter and during centrifugal drying whereby sediment is flushed off the filter.

13. In a combined washing and drying machine, a casing, a rotatable receptacle therein in which the clothes are washed and centrifugally dried, a filter on the receptacle, means for discharging liquid onto the filter, and a control for said means arranged to cause the discharge of liquid onto the filter during washing whereby sediment is caught on the filter and during centrifugal extracting whereby sediment is flushed off the filter.

14. In a combined washing and drying machine, a rotatable receptacle for receiving clothes to be washed and centrifugally dried, a filter on the receptacle, means for circulating washing liquid from the receptacle onto the filter, and mechanism for effecting washing in the receptacle and for rotating the receptacle for centrifugal drying, a control therefor including means controlling said mechanism to cause the washing and drying to take place in timed sequence, and means controlling said circulating means to cause the circulation to take place

during washing whereby the washing solution is filtered and during the initial part of drying whereby the sediment on the filter is centrifugally flushed therefrom.

5 15. In a combined washing and drying machine of the type having a receptacle in which clothes are washed and centrifugally dried, a casing surrounding the receptacle having sufficient space below the receptacle during drying
10 for storage of the washing solution, means for selectively effecting washing in the receptacle and rotating the receptacle for extracting, a filter carried by the receptacle and draining thereto, means for pumping liquid from the
15 casing to the filter, the improvement which comprises control means movable to positions controlling the washing and centrifugal drying operations, timing means for moving the control
20 means to the washing and extracting positions in timed sequence, and means effective while the control means is in the washing position and during the first part of the interval in which the control means is in the extracting position
25 for rendering said pumping means effective to pump liquid from the casing onto the filter.

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