

March 8, 1960

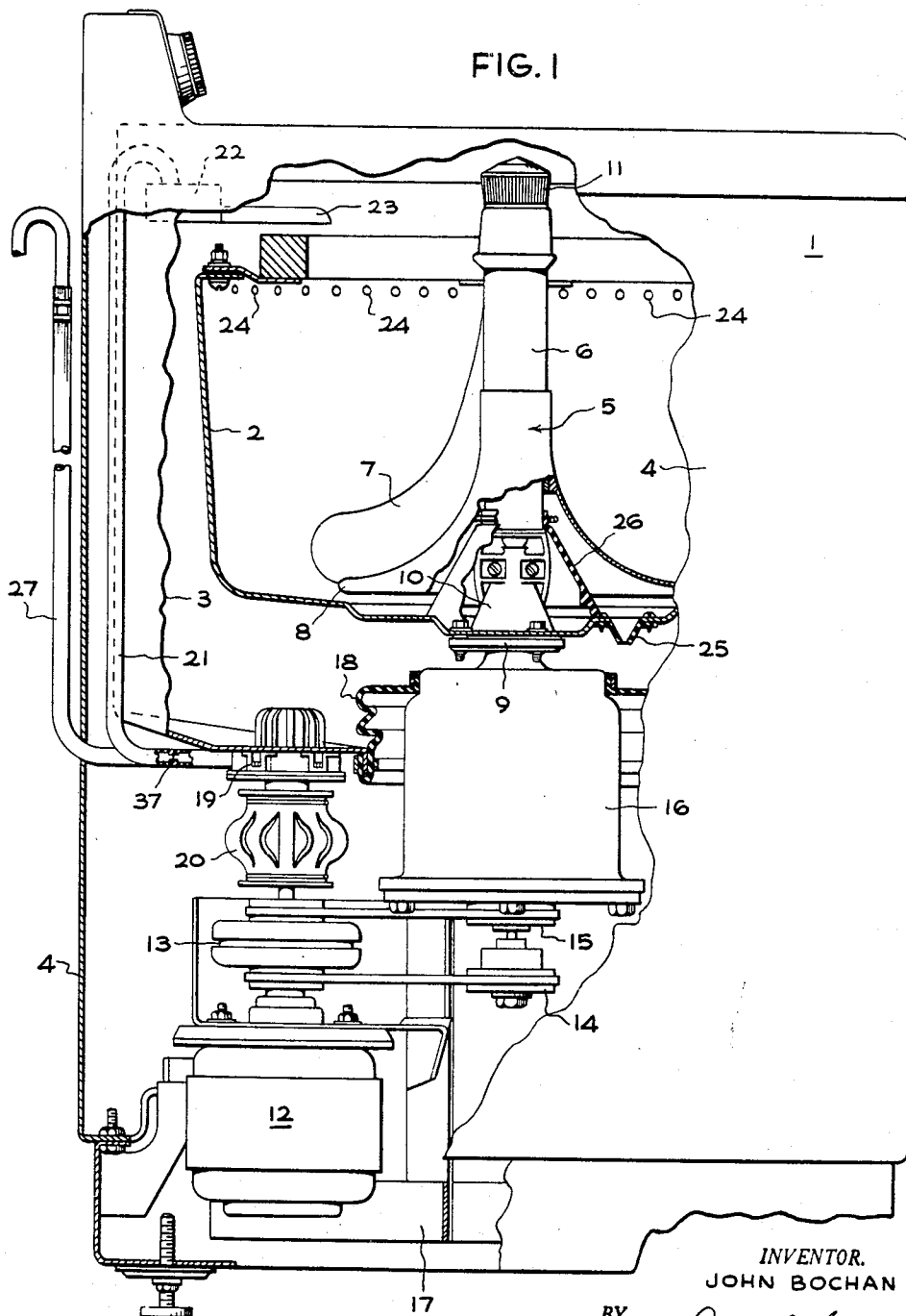
J. BOCHAN
RECIRCULATION AND FILTERING SYSTEM
FOR CLOTHES WASHING MACHINE

2,927,451

Filed Dec. 16, 1957

3 Sheets-Sheet 1

FIG. 1



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3 Sheets-Sheet 2

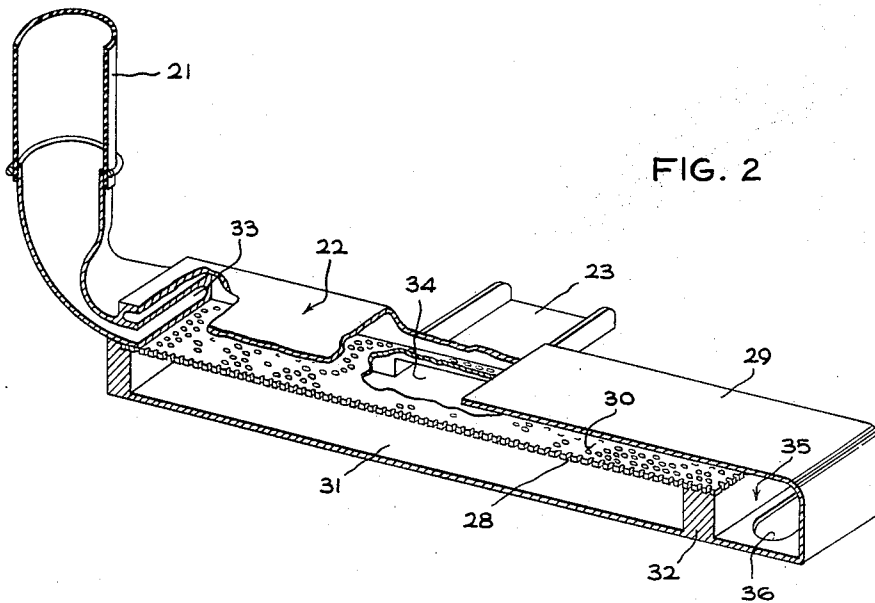
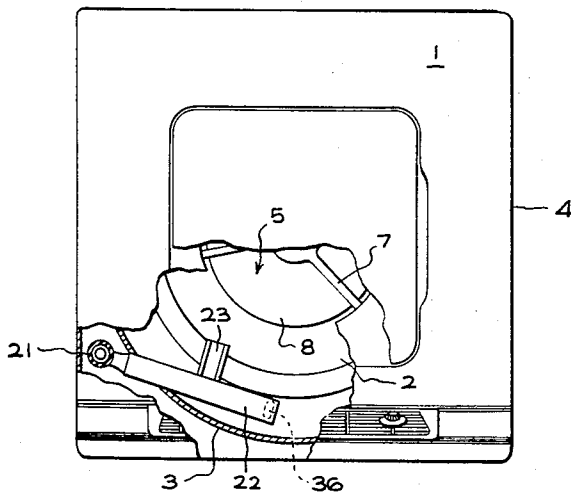


FIG. 2

FIG. 3



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3 Sheets-Sheet 3

FIG. 4

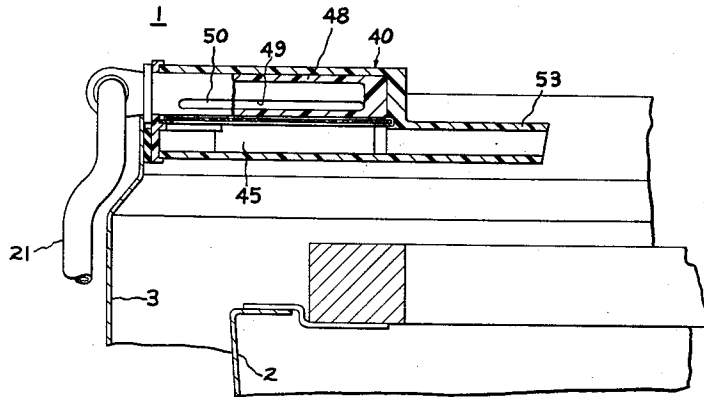


FIG. 5

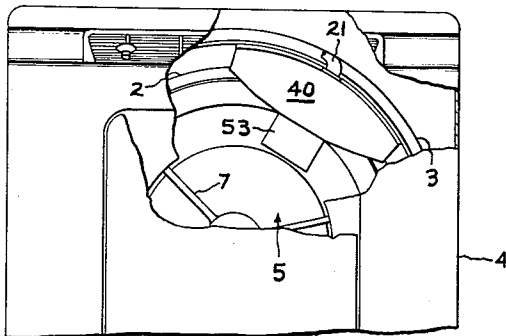
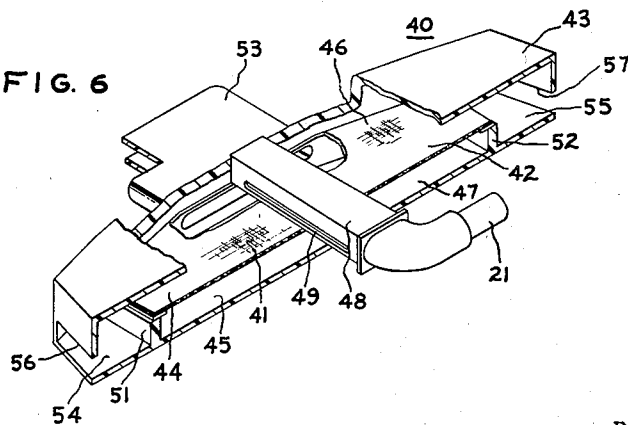


FIG. 6



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2,927,451

RECIRCULATION AND FILTERING SYSTEM FOR CLOTHES WASHING MACHINE

John Bochan, Louisville, Ky., assignor to General Electric Company, a corporation of New York

Application December 16, 1957, Serial No. 702,856

7 Claims. (Cl. 68—18)

This invention relates to clothes washing machines and more particularly to such machines including a recirculation system for circulating the washing liquid during the washing operation. This is a continuation in part of my application Serial No. 566,221 filed February 17, 1956, now abandoned.

Recirculation systems are commonly used in washing machines in order to clean and filter the washing liquid. These systems provide for circulating liquid from the outer tub of the machine into the clothes basket during the washing operation. The liquid circulated into the basket flows therefrom back into the tub through suitable overflow and other discharge means, and thus a continuous recirculation of liquid through the tub and the basket is created. The liquid flowing back into the tub from the basket carries with it the lint and the insoluble soil particles which are removed from the clothes by the washing action effected within the basket. The insoluble soil particles tend to settle out of the liquid during its passage through the outer tub, but some sort of filtering means must be provided in order to remove the lint from the recirculation flow.

It is an object of my invention to provide a recirculation system for clothes washing machines, which includes a new and improved self cleaning filter arrangement for filtering lint from the recirculation flow.

Another object of my invention is to provide a recirculation system for clothes washing machines, including a self cleaning lint filter which simultaneously discharges filtered liquid to the clothes basket and the filtered-out lint into the outer tub.

A further object of my invention is to provide an improved recirculation system for clothes washing machines, including a stationary self cleaning lint filter which is mounted with the machine so as to be hidden from view.

In carrying out my invention, I provide a clothes washing machine having a clothes basket enclosed within an outer imperforate tub. Means including a pump are incorporated within the machine for circulating a flow of liquid from the tub into the basket during the washing operation, and a lint filter is provided for moving lint from this flow. By my invention the lint filter comprises a self-cleaning element which is effective to return the lint to the outer tub simultaneously as it passes the filter liquid to the clothes basket. The filter includes a lint filtering screen, a housing for the screen, and a nozzle which discharges the recirculation flow across the upper surface of the screen. Two outlets are provided from the filter, one connected to the region below the screen and the other connected to the region above the screen. As the flow passes across the screen from the nozzle, a considerable portion of it moves downwardly through the screen, being filtered thereby, and this filtered liquid is discharged to the basket through the outlet below the screen. The outlet connected to the region above the screen, however, does not discharge filtered liquid but rather is intended to pass the lint filtered out of the liquid back into the outer tub. This other outlet is displaced from the nozzle,

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and the filtered out lint is washed across the screen toward it by the action of the high velocity flow issuing from the nozzle. Due to the velocity of this flow the lint removed by the screen does not collect therein but rather is carried across the screen to the other outlet. Thus a self-cleaning action is provided within the filter which insures discharge of the filtered out lint into the tub simultaneously with the discharge of the filtered liquid into the basket.

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. The invention itself, however, both as to its organization and method of operation, may be best understood by reference to the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a side elevational view of a clothes washing machine including a recirculation system embodying my invention, the view being partially broken away and partially in section in order to illustrate details;

Fig. 2 is a perspective view, partially broken away and partially in section, of the novel lint filter included in the recirculation system of the machine of Fig. 1; and

Fig. 3 is a plan view of the machine of Fig. 1 with certain surfaces broken away in order to show the positioning of the filter within the machine;

Fig. 4 is a fragmentary side elevational view of a clothes washing machine, partly in section, illustrating a second embodiment of the novel lint filter of my invention;

Fig. 5 is a plan view, partly broken away, of a washing machine including the improved lint filter of Fig. 4; and

Fig. 6 is a perspective view, partially broken away and partially in section, of the novel lint filter of Fig. 4.

Referring now to Fig. 1, I have shown therein an agitator type clothes washing machine 1. The machine 1 includes a clothes basket 2 which is disposed within an outer imperforate tub or casing 3. The tub 3 is in turn mounted within an outer appearance cabinet 4. At the center of the wash basket 2 there is positioned a vertical axis agitator 5 which includes a center post 6 and a plurality of radially extending vanes 7. The agitator is further provided with an outwardly and downwardly flared skirt 8 to which the vanes 7 are joined at their lower ends. The skirt 8 extends to a position in proximity to the bottom of the basket 2 and covers a substantial portion thereof.

Both the clothes basket 2 and the agitator 5 are rotatably mounted. Specifically, the basket 2 is mounted on a flange 9 of a rotatable hub 10, and the agitator 5 is mounted on a shaft (not shown) which extends upwardly through the hub 10 and the center post 6. The agitator is secured to this shaft by means of an internally threaded nut or cap 11 at the top of the center post. During the cycle of operation of the machine 1, the agitator 5 is first oscillated back and forth within the basket to wash the clothes therein. Then, after a predetermined period of this washing action, the basket 2 is rotated at high speed to extract centrifugally the washing liquid and discharge it into the outer tub 3. In my preferred cycle of operation a supply of clean liquid is then introduced into the wash basket for rinsing the clothes, and the agitator is again oscillated. Finally, the wash basket is once more rotated at high speed to extract the rinse water and discharge it into the outer tub.

The basket 2 and agitator 5 may be driven by any suitable means since their drive means form no part of the present invention. However, by way of example, I have shown them as driven from a reversible motor 12. The motor 12 drives the basket and the agitator through a drive including a bi-directional clutch 13 which is

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mounted on the motor shaft. The clutch 13 is direction responsive, and it is connected by suitable belts to drive selectively the input pulleys 14 and 15 of a transmission assembly 16 depending upon the direction of motor rotation. Specifically, upon one direction of motor rotation the clutch drives pulley 14 and upon the other direction of motor rotation it drives pulley 15.

The transmission 16 is arranged so that it supports and drives both the agitator drive shaft and the basket mounting hub 10. When the pulley 14 is driven by the bidirectional clutch 13, the transmission causes the agitator 5 to oscillate within the basket 2. Conversely, when the pulley 15 is driven, the transmission drives the wash basket 2 and the agitator 5 together at high speed for centrifugal extraction. Thus, the operation carried out, i.e. agitation or centrifugal extraction, is controlled by the direction of rotation of the drive motor, agitation occurring when the motor turns in one direction and centrifugal extraction occurring when it turns in the other direction. Although the drive mechanism does not form part of this invention, reference is made to Patents 2,639,618 and 2,639,794 to J. W. McNairy both issued May 26, 1953 and assigned to the assignee of the present invention. These patents disclose in detail the structural characteristics of the drive mechanism including the bidirectional clutch and transmission assembly.

The transmission assembly 16, and thus the basket 2 and the agitator 5 which are supported by it, are supported from the cabinet 4 by means of a resiliently mounted frame 17. This is done so that some gyratory motion or vibration of the basket may occur relative to the tub 3 during the spin or extraction operation, the tub itself being rigidly secured to the cabinet 4. A flexible boot 18 mounted between the transmission casing and the tub permits the relative movement while providing a water tight seal therebetween. Preferably, and as shown, the motor 12 and the clutch 13 are also mounted on the frame 17 so that they move with the basket.

In order to recirculate the washing liquid from the tub 3 into the basket 2 during the washing operation, the machine 1 is provided with a recirculation system including a pump 19 secured to the bottom wall of the tub. The pump 19 is driven by the motor 12 through a flexible coupling 20 between the motor shaft and the pump shaft and during the washing operation it discharges into a hose or conduit 21 which leads to a filter 22 mounted above the basket 2. The filter 22 acts to filter out any lint carried by the recirculation flow and it discharges the filtered liquid into the basket 2 through a spout or trough 23 extending over the top of the basket. The filter 22 is also effective to pass the filtered out lint back into the tub 3 at the same time as it discharges the filtered liquid into the basket, and its construction and operation whereby it effects this result form one important aspect of my invention. This construction and arrangement are described hereinafter in detail.

The liquid flowing into the basket from the filter causes a continuous overflowing from the basket through overflow apertures 24 provided near the upper edge of the basket side wall. The liquid overflowing through the apertures 24 falls into the tub 3 whereby there is provided a continuous supply of liquid for the pump 19 and thus a continuous flow of liquid through the recirculation system throughout the washing operation. The liquid overflowing through the apertures 24 tends to carry with it the lint removed from the clothes as a result of the washing operation. A portion of this lint then passes through the pump 19 with the water and is removed from the recirculation flow by means of the filter 22.

Besides flushing lint from the wash basket 2, the illustrated recirculation system is also effective to remove insoluble soil particles from the basket. During the operation of the agitator the insoluble soil particles removed from the clothes tend to sink to the bottom of the basket and then move into the quiescent zone existing

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under the skirt 8 of the agitator. In order to remove these soil particles from the region beneath the agitator skirt there is provided a nozzle 25 in the bottom of the basket. A controlled flow of liquid is discharged from the basket through this nozzle 25, and this flow carries with it the insoluble soil particles. A boot 26 extending outwardly from the top of the hub 10 to the bottom wall of the basket prevents the soil particles from entering the more or less stagnant area adjacent the hub. The soil particles discharged through the nozzle 25 tend to settle out in the tub during the passage of liquid therethrough to the pump 19 and are thereby not returned to the basket through the recirculation system. The soil particles and also the lint which is removed by the filter 22 are later discharged from the tub during a centrifugal extraction operation. The soil removal action whereby the insoluble soil particles are passed out of the bottom of the basket through the nozzle 25 is not my invention but rather is described and claimed in the copending application of William R. Molnar, S.N. 468,459 filed November 12, 1954 (now Patent 2,807,949 issued October 1, 1957) and assigned to the same assignee as the present application.

Any suitable pump may be used to create the recirculation flow during the washing operation. However, in the machine 1 I have shown a pump of the type which discharges into one of two outlets depending upon the direction of the pump rotation. A directional pump of this type is disclosed in detail and claimed in my copending application S.N. 468,460 filed November 12, 1954 (now Patent 2,883,843 issued April 28, 1959) and assigned to the same assignee as the present invention. One of the two outlets of the illustrated directional pump is connected to the recirculation hose or conduit 21 for returning liquid to the basket 2 in the manner described above. The other pump outlet is connected to a hose 27 which is adapted to be connected or disposed for discharge to a stationary tub or drain line. The pump 19 is so arranged that upon one direction of motor rotation corresponding to the driving of agitator 5, the pump outlet is discharged through conduit 21 for return to basket 2 through the filter 22. Conversely, upon rotation of motor in reverse direction for spinning basket 2, the liquid is pumped through conduit 27 to the drain. It will be understood however that a conventional pump with suitable solenoid operated valve means may be used in place of the directional pump to effect this result, and that my invention is not limited to a machine having a directional pump.

The filter 22 included in the recirculation system is more fully shown in Fig. 2. The filter includes an elongated screen 28 which is enclosed within and mounted by a housing member 29. The screen is disposed within the housing in a generally horizontal plane. The top and bottom walls of the housing are displaced above and below the screen so as to define upper and lower chambers 30 and 31. The lower chamber 31 extends from the left hand side of the housing (as viewed in Fig. 2) to an upstanding rib or ledge 32 which mounts the right hand edge of the screen. The upper chamber 30 extends for the length of the housing from the left hand end to the right hand end beyond the rib 32.

The recirculation flow through the conduit 21 is introduced into the filter housing by means of a nozzle 33 which is positioned at the left hand end and above the filter screen 28. The nozzle 33 is generally flat in configuration and it discharges the recirculation flow in a relatively flat stream across the upper surface of the filter screen. The nozzle 33 is of approximately the same width as the screen so that the high velocity jet or stream discharged from it is also of approximately the same width as the screen. The nozzle is so directed that the jet leaves the nozzle in a direction generally parallel to the plane of the screen.

As the high velocity stream from the nozzle 33 moves across the screen 28, a considerable portion of it tends

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to fall onto the screen and pass therethrough into the lower chamber 31. As the liquid passes through the screen any lint which may be carried in it is removed by the screen. In other words the screen catches the lint as the flow passes downwardly into the chamber 31. From the chamber 31 the filtered liquid is then passed outwardly to the basket through an outlet 34 in the side wall of the chamber. This outlet 34 opens into the above mentioned spout 23 which discharges directly into the basket 2.

In accordance with my invention the filter 22 is self-cleaning so that the lint removed by the screen 28 is not retained within the filter but rather is discharged back into the tub 3. In order to effect this self-cleaning action the upper chamber 30 of the filter is extended outwardly beyond the end of the screen remote from the nozzle 33, i.e. beyond the right hand end of the screen as viewed in Fig. 2. In this region beyond the end of the screen the upper chamber includes a depending portion 35 behind the screen mounting rib 32, and in the bottom wall of this portion 35 there is provided a second outlet 36 from the filter. During the operation of the filter the lint which is removed by the screen 28 is washed across the top of the screen toward the outlet chamber by the action of the high velocity stream or jet leaving the nozzle 33. Any lint which might tend to go through or tend to clog the holes in the screen is washed onward by the high velocity jet before it can take the right angle turn necessary to pass through the screen. Also, any lint which tends to hang on the edges of the holes or interstices of the screen is subjected to the full impact of the jet and is also washed on toward the chamber outlet portion 35. The result is that substantially all the lint entering the filter is ultimately washed to the chamber portion 35 and passes outwardly through the outlet 36. As is best shown in Fig. 3 the outlet 36 is positioned outwardly of the side wall of the basket 2 so that any flow through it does not fall into the basket but rather is discharged into the outer tub 3. Thus the lint removed by the filter is not returned to the basket 2 but rather is passed into the outer tub 3. The lint is then removed from the outer tub during a centrifugal extraction operation as will be described hereinafter.

In order to secure best results from the filter 22 it is desirable that no surface tension film be allowed to form on the screen 28, since the surface tension would prevent the recirculation flow from passing freely through the screen. Thus is my preferred embodiment I prefer to keep the lower chamber 31 continuously full of liquid so that at least the lower side of the screen 28 is covered. By so covering the screen the formation of a surface tension film is prevented. The chamber 31 is maintained full of liquid by controlling flow rate of the recirculation flow, the flow capacity of the screen 28 and the size of the outlet opening 34. The flow rate of the recirculation flow is controlled by the joint action of the nozzle 33 and a restrictor 37 (Fig. 1) in the recirculation conduit 21. In my preferred embodiment, it is contemplated that this joint action will result in a flow through the recirculation hose of about eight gallons per minute. The screen in this preferred embodiment will pass approximately six gallons per minute and by providing the outlet 34 with a lower flow capacity than that of the screen the flow through it may be kept at a lower rate than the six gallons a minute, for example 5 gallons per minute, whereby there will always be a pool of liquid created behind it in the chamber 31. By positioning the screen the proper distance above the bottom of the chamber 31, the pool will continuously wet it and thereby prevent the formation of a surface tension film. It will be understood of course that the size of the outlet and the depth of the lower chamber 31 will vary from filter to filter depending upon the amount of liquid that it is desired to pass through the recirculation system.

To summarize briefly the operation of the machine 1,

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the clothes basket 2 is first filled with water by suitable water supply means (not shown). Preferably the basket is filled completely full to the overflow level defined by the apertures 24 near its upper edge, and then a quantity of water is overflowed into the outer tub through the apertures. A suitable soap or detergent is either supplied with the water or added after the filling operation is completed. Then the agitator 5 is oscillated to produce a churning motion of the liquid and a tumbling motion of the articles of clothing contained within the basket. This action results in the removal of dirt or soil from the clothes and also causes a quantity of lint to be separated from the clothes.

Simultaneously with the operation of the agitator the pump 19 creates a flow through the recirculation system comprising the pump itself, the hose 21, and the filter 22. This flow causes a continuous overflowing of the basket through the apertures 24 and also supplies make-up liquid for the liquid discharged from the basket through the soil removal nozzle 25. As the washing liquid overflows through the apertures 24, lint is flushed from the basket with it. Also, as liquid is discharged through the nozzle 25, insoluble soil particles are carried into the outer tub 3. As mentioned above, the insoluble soil particles tend to settle out of the liquid within the tub. A portion of the lint is however carried into the pump 19 and is passed upwardly through the hose 21 in the recirculation flow.

As the recirculation flow enters the filter 22, the nozzle 33 causes it to be ejected in a high velocity stream across the top of the screen 28. The greater portion of the flow ultimately passes through the screen into the chamber 31 and thence is discharged through the outlet 34 and the spout 23 into the basket 2. The screen 28 is, of course, effective to remove the lint from the flow whereby the liquid passing outwardly through the spout 23 is relatively lint free. The lint itself is flushed across the screen 28 due to the action of the jet stream leaving the nozzle and passes out through the outlet 36 into the tub. Thus as a result of the recirculation system both insoluble soil particles and lint are collected in the outer tub during the washing operation.

The soil particles and the lint so deposited in the tub by the recirculation system are removed from the tub during the centrifugal extraction or spin stages of the machine. During a centrifugal extraction stage the basket 2 is rotated at a high speed and the liquid contents of the basket are very rapidly discharged into the outer tub. This results in a high degree of turbulence in the tub which washes the soil particles and lint collected during the agitation stage into the pump 19 for discharge through hose 27 to the drain. Therefore, any serious or undesirable collection of insoluble soil particles and lint within the tub is prevented. Furthermore, as the centrifugal extraction period continues, all of the water is pumped from the outer tub, carrying with it the soil particles and lint which have not settled out of the water. In any event, the insoluble soil particles and lint are substantially removed from the outer tub during each centrifugal extraction period.

Referring now to Figs. 4, 5 and 6 of the drawings there is shown a second embodiment of the invention which, while using the same inventive principle as the first embodiment, includes modifications which permit a thoroughly symmetrical construction to be provided with, accordingly, a more effective use of space and fewer assembly problems. Like parts to those of the embodiment of Figs. 2 and 3 are provided with like numerals. As before, the washing machine 1 has a basket 2 and a tub 3 in a cabinet 4, with an agitator 5 having vanes 7 for producing washing action in basket 2. As before, the washing liquid is circulated from basket 2 to tub 3 and then is pumped back through conduit 21. In this case however, the conduit 21 is connected in cooperative relationship to a symmetrically formed filter 40 which in-

cludes a pair of relatively elongated screen areas 41 and 42. As shown, screen areas 41 and 42, while used independently of each other, may be formed from a single screen for purposes of economy. The screen areas 41 and 42 are enclosed within and mounted by a housing member 43 in a generally horizontal plane, with the top and bottom walls of the housing displaced above and below the screen areas so as to define upper and lower chambers 44 and 45 connected with screen area 41 and upper and lower chambers 46 and 47 connected with screen area 42. Conduit 21 leads into a nozzle head member 48 which is centrally positioned in filter 40 between chambers 44 and 45 on the one hand and 46 and 47 on the other. Member 48 has a pair of nozzles 49 and 50 formed therein with nozzle 49 being associated with chambers 44 and 45 and nozzle 50 being associated with chambers 46 and 47. Lower chamber 45 extends from nozzle 49 to an upstanding rib 51 and similarly chamber 47 extends from nozzle 50 to an upstanding rib 52. Thus it can be seen that in both cases the chambers 45 and 47 terminate short of the ends of the filter. The upper chambers 44 and 46 extend from member 48 to the left and right ends of the filter housing 43 respectively, as viewed in Fig. 6.

It will be observed that each of the two nozzles 49 and 50 is generally flat in configuration, as in the first embodiment, so that recirculation flow from them is discharged in a relatively flat stream across the upper surface of the filter screen areas. As before, the nozzles are preferably of approximately the same width as the screens so that the high velocity jets discharged from them are of approximately the same width as the screens.

As before, a considerable portion of the streams issuing from nozzles 49 and 50 tends to fall onto the screens 41 and 42 respectively and pass through them, with any lint in the stream being removed. The liquid passing through the screen enters chambers 45 and 47 and then leaves these chambers through a spout 53 which services both chambers and which leads, as can be seen in Figs. 4 and 5, to a point overlying basket 2 so as to discharge the filtered liquid from the lower chambers into the basket. As before, the filter is made self-cleaning by the provision of depending portions 54 and 55 which are provided behind ribs 51 and 52 respectively and which have respectively outlets 56 and 57 provided therein. During the operation of the filter the lint which is removed by the screens is washed across the top of the screens toward the outlet chambers by the action of the high velocity streams. Again, the existence of a surface tension film on the screens can be prevented if so desired by keeping the lower chambers 45 and 47 continuously full of liquid, so that at least the lower sides of the screens are covered, by proportioning the inlet flow and outlet flow in the filter in the same manner as before. Thus the same beneficial effects are obtained as in the embodiment of Figs. 2 and 3 while at the same time a symmetrical arrangement has been provided which fits effectively and conveniently into the general scheme of the washing machine.

From the above it will be seen that the invention provides a recirculation system including a new and improved filter arrangement which is effective to separate lint from the recirculation flow and return it to the outer tub of the machine at the same time as it is passing filtered liquid to the wash basket. Due to the cleaning action of the filter there is never any need for the operator of the machine to remove the filter and clean it. Thus it may be hidden from view if so desired within the machine and mounted at any convenient spot above the clothes basket. Since the filter itself includes no moving parts it is relatively simple to fabricate and to assemble within the washing machine, and further it is relatively fool proof in operation.

While in accordance with the patent statutes I have described what at present are considered to be the preferred embodiments of my invention, it will be obvious

to those skilled in the arts that various changes and modifications may be made therein without departing from the invention; and I therefore aim in the appended claims to cover all such equivalent variations as fall within the true spirit and scope of the invention.

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

1. In a clothes washing machine, a clothes basket, an outer imperforate tub enclosing said basket, means including a pump for circulating a flow of liquid from said tub into said basket during the washing operation and a filter for removing lint from said flow between said tub and said basket, said filter comprising a screen secured in a position removed from the vertical, a housing for said screen, a nozzle formed to discharge said flow at high velocity generally parallel to said screen across the upper surface of said screen, a first outlet means from said filter connected to the region below said screen for discharging into said basket the filtered liquid passing through said screen, and second outlet means from said filter arranged to discharge into said tub for returning to said tub the line removed from said liquid by said screen, said second outlet means being connected to the region above said screen and displaced from said nozzle whereby the flow issuing from said nozzle washes said lint across said screen to said second outlet means.

2. In a clothes washing machine, a clothes basket, an outer imperforate tub enclosing said basket, means including a pump for circulating a flow of liquid from said tub into said basket during the washing operation, and a filter for removing lint from said flow between said tub and said basket, said filter comprising a screen secured in a position removed from the vertical, a housing for said screen, a nozzle formed to discharge said flow at high velocity across the upper surface of said screen and generally parallel thereto, first outlet means from said filter connected to the region below said screen for discharging into said basket the filtered liquid passing through said screen, and second outlet means from said filter connected to the region above said screen and arranged to discharge into said tub for returning to said tub the lint removed from said liquid by said screen, said second outlet means being positioned at the opposite end of said screen from said nozzle whereby said lint is washed across said screen to said second outlet means by the flow issuing from said nozzle.

3. In a clothes washing machine, a clothes basket, an outer imperforate tub enclosing said basket, means including a pump for circulating a flow of liquid from said tub into said basket during the washing operation, and a filter for removing lint from said flow between said tub and said basket, said filter comprising a screen disposed in a generally horizontal plane, a housing enclosing said screen and forming upper and lower chambers respectively above and below said screen, a nozzle formed to discharge said flow at high velocity across the upper surface of said screen and generally parallel thereto, first outlet means from said lower chamber for discharging into said basket the filtered liquid passing through said screen, said first outlet means having a lower flow capacity than said screen thereby to maintain said lower chamber full of liquid and prevent a surface tension film from forming on said screen, and second outlet means from said filter connected to said upper chamber and arranged to discharge into said tub for returning to said tub the line removed from said liquid by said screen, said second outlet being positioned at the opposite end of said screen from said nozzle whereby said lint is washed across said screen to said second outlet means by the flow issuing from said nozzle.

4. In a clothes washing machine, a clothes basket, an outer imperforate tub enclosing said basket, means including a pump for circulating a flow of liquid from said tub into said basket during the washing operation,

and a filter for removing lint from said flow between said basket and said tub, said filter comprising an elongated screen disposed in a generally horizontal plane, a housing enclosing said screen and forming upper and lower chambers respectively above and below said screen, a relatively flat nozzle for discharging said flow at high velocity across the upper surface of said screen in a flat stream, said stream being discharged generally parallel to said screen and being approximately as wide as said screen, and first outlet means from said lower chamber for discharging into said basket the filtered liquid passed through said screen, said first outlet means having a lower flow capacity than said screen thereby to maintain said lower chamber full of liquid and prevent a surface tension film from forming on said screen, and second outlet means from said filter connected to said upper chamber and arranged to discharge into said tub for returning to said tub the lint removed from said liquid by said screen, said second outlet means being positioned at the opposite end of said screen from said nozzle whereby said lint is washed across said screen to said second outlet means by the flow issuing from said nozzle.

5. In a clothes washing machine, a clothes basket, an outer imperforate tub enclosing said basket, means including a pump for circulating a flow of liquid from said tub into said basket during the washing operation, and a filter for removing lint from said flow between said tub and said basket, said filter comprising a screen disposed in a generally horizontal plane, a housing enclosing said screen and forming an outlet chamber below said screen, a nozzle formed to discharge said flow at high velocity across the upper surface of said screen and generally parallel thereto, first outlet means from said outlet chamber for discharging into said basket the filtered liquid passing through said screen, said first outlet means having a lower flow capacity than said screen thereby to maintain said lower chamber full of liquid and prevent a surface tension film from forming on said screen, and second outlet means from said filter arranged to discharge into said tub for returning to said tub the lint removed from said liquid by said screen, said second outlet means being connected to the region above said screen and displaced from said nozzle whereby the flow issuing from said nozzle washes said lint across said screen to said second outlet means.

6. In a clothes washing machine, a clothes basket, an outer imperforate tub enclosing said basket, means including a pump for circulating a flow of liquid from said tub into said basket during the washing operation, and a filter for removing lint from said flow between said tub and said basket, said filter comprising a pair of screen areas secured in a position removed from the

vertical, a housing for said screen areas, nozzle means extending into said housing intermediate said screen areas, a pair of nozzles formed in said nozzle means to discharge said flow at high velocity in two opposite directions across the upper surfaces of said screen areas respectively and generally parallel thereto, first outlet means from said filter connected to the region below said screen areas for discharging into said basket the filtered liquid passing through said screen areas, and second and third outlet means from said filter arranged to discharge into said tub for returning to said tub the lint removed from said liquid by said screen, said second and third outlet means being connected to the region above said screen areas and being respectively displaced across said screen areas from said nozzles whereby the flow issuing from said nozzles washes said lint across said screen areas to said second and third outlet means.

7. In a clothes washing machine, a clothes basket, an outer imperforate tub enclosing said basket, means including a pump for circulating a flow of liquid from said tub into said basket during the washing operation, and a filter for removing lint from said flow between said tub and said basket, said filter comprising a pair of screen areas disposed in a generally horizontal plane, a housing enclosing said screen areas and forming upper and lower chambers respectively above and below each of said screen areas, nozzle means extending into said housing intermediate said screen areas, a pair of nozzles formed in said nozzle means to discharge said flow at high velocity in two opposite directions across the upper surfaces of said screen areas respectively and generally parallel thereto, common outlet from said lower chambers for discharging into said basket the filtered liquid passing through said screen areas, and second and third outlet means from said filter connected respectively to said upper chambers and arranged to discharge into said tub for returning to said tub the lint removed from said liquid by said screen areas, said second and third outlet means being positioned at opposite ends of said housing across said screen areas from said nozzles respectively whereby said lint is washed across said screen areas to said second and third outlet means by the flow issuing from said nozzles.

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