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AGITATOR FOR WASHING MACHINES

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2 Sheets-Sheet 1

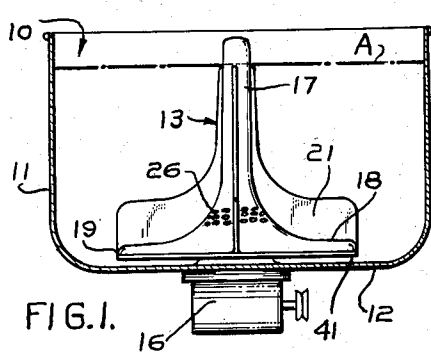


FIG. 1.

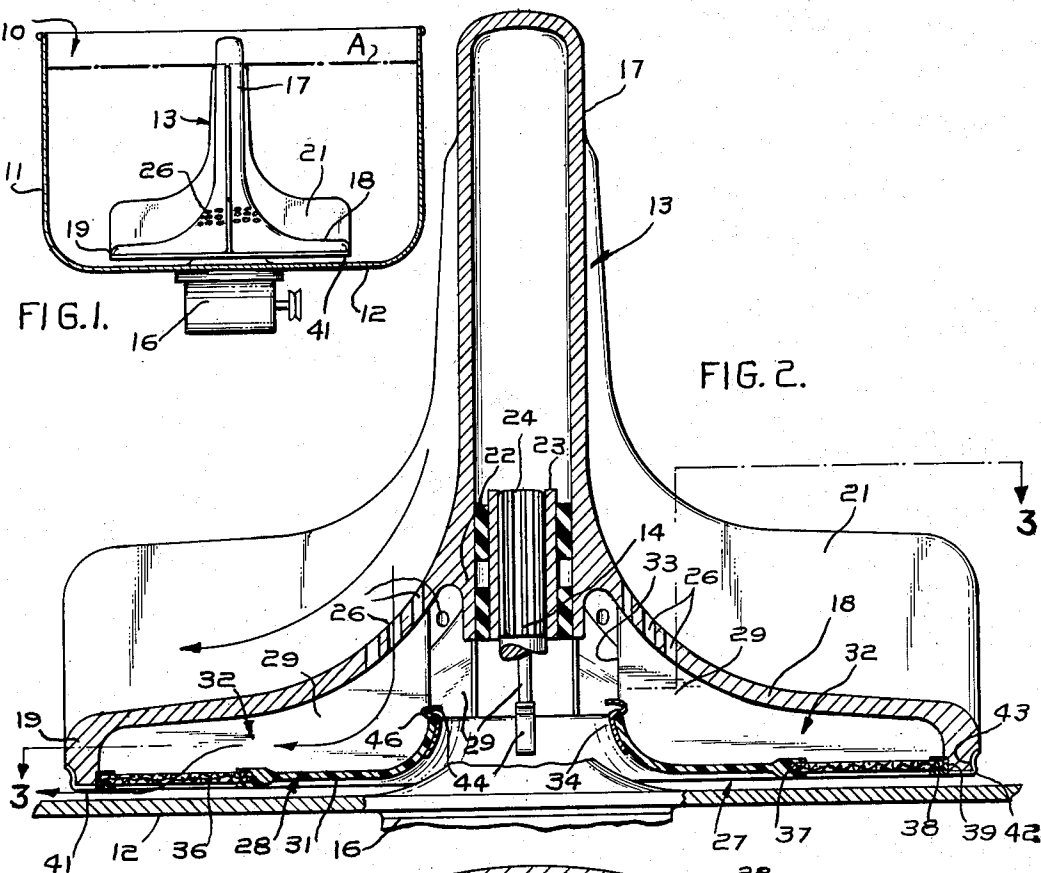


FIG. 2.

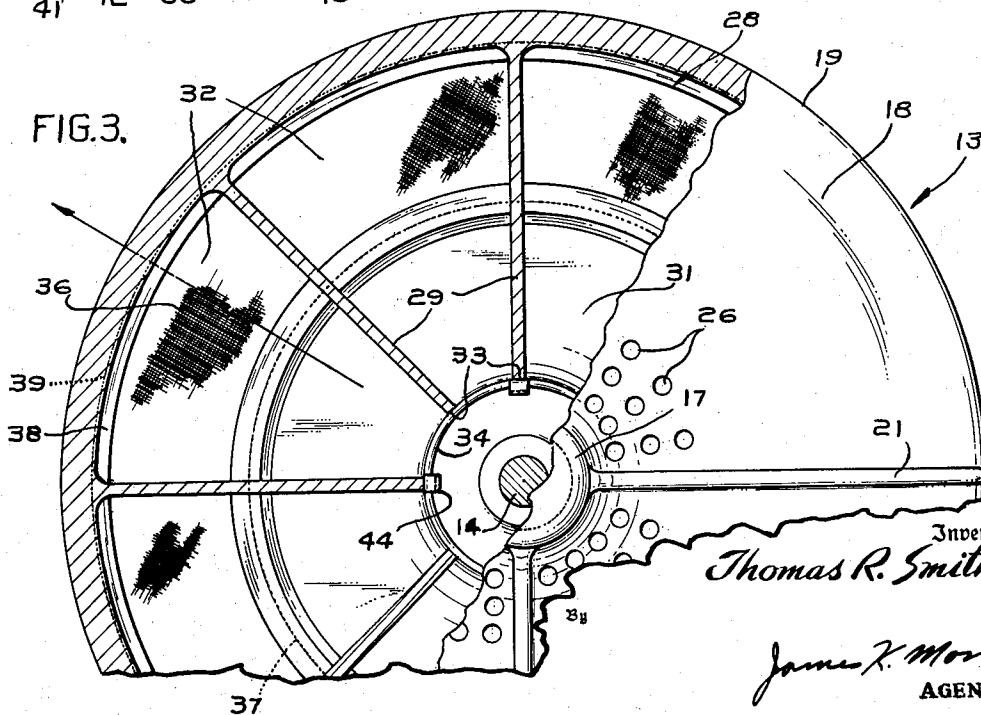


FIG. 3.

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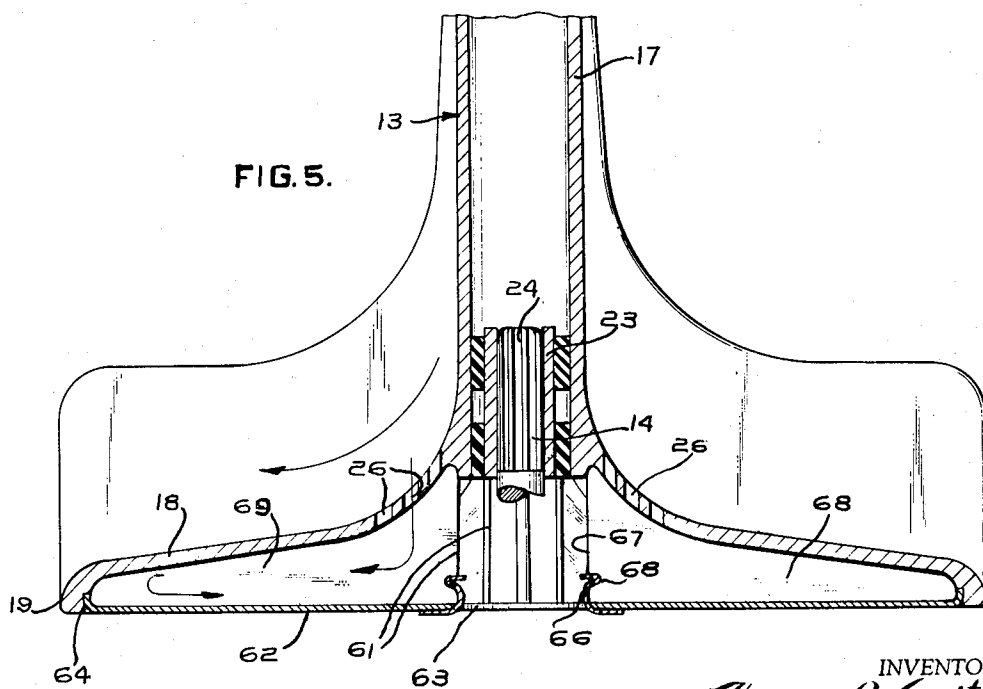
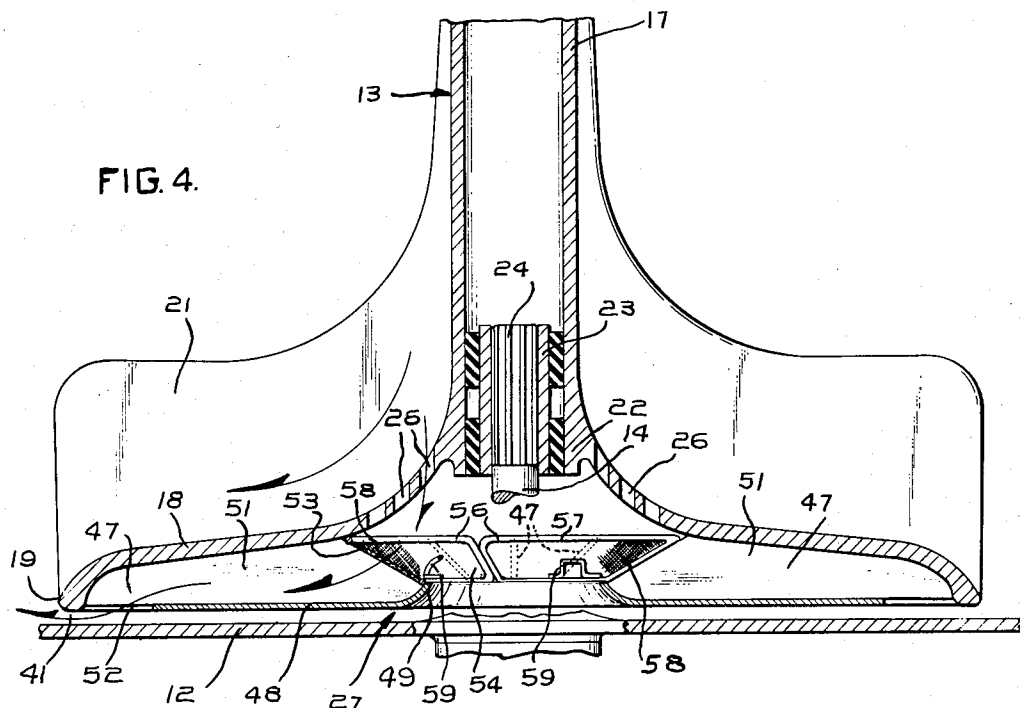
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2 Sheets-Sheet 2



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AGITATOR FOR WASHING MACHINES

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6 Claims. (Cl. 68—133)

The invention relates to liquid filters for oscillating agitator type washing machines and more particularly to liquid filters mounted in the washing machine agitator.

In washing clothes, it is well known that in the initial portion of the washing period the major portion of the dirt or soil is removed from the clothing and, after a definite time interval, depending upon the clothing and type of soil, a portion of the dirt in the washing liquid or solution is actually redeposited in or on the clothing. Also, that heavy dirt and lint may be recirculated along with the washing liquid and re-soil the washed clothing. This latter problem is primarily due to the fact that the heavy dirt and lint do not have a definite location in a washing machine tub whereat it can settle out of the liquid and remain in a relatively quiet area. Although settling chambers or pockets have been suggested to accomplish this, they have not been too successful because there is a tendency for the dirt to break loose and re-enter the main body of the washing liquid.

In accordance with the invention, an oscillatable agitator having the usual flaring base with upwardly directed water impelling vanes is positioned at the bottom of the tub in the usual manner and is oscillated about its vertical axis by suitable oscillating mechanism. A plurality of openings or passages are provided in the base which permit the washing liquid to enter into a cavity provided by the lower flaring base portion of the agitator and the bottom of the tub. Within the cavity and at the bottom of the agitator there is an annular generally horizontal cover having a central opening surrounding the agitator shaft and extending outwardly to the outer periphery of the agitator. Between the base and cover is a series of radially projecting vertical vanes which divide the cavity into a plurality of chambers or pockets disposed below the passages in the base of the agitator, and as heavy dirt and lint pass through these passages it is trapped in the pockets and retained so that it cannot re-enter the washing liquid in the main body of the tub and re-soil the clothing. After the washing operation, the operator may withdraw the agitator and clean the same in any convenient manner.

In still another form, the base of the agitator carries a filter in the cavity and as the washing liquid and heavy dirt pass through the passages the lower vanes on the agitator, acting as centrifugal pump sections, force or draw the washing liquid through the filter and discharge the same back into the tub, at which time the filter intercepts and retains the heavy dirt and lint. By using a proper type filter, a portion of dirt in the solution may be also retained to thereby improve the washing efficiency of the washing liquid.

In accordance with the above, it is an object of the invention to provide an agitator type washing machine with a filter element which is carried by the agitator.

It is another object of the invention to provide an agitator type washing machine with a dirt and lint trap which is carried by the agitator at the lower portion thereof.

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It is yet another object of the invention to provide an oscillatable agitator type washing machine with a washing liquid filter which is carried at the bottom of the agitator adjacent the bottom of the tub and is effective in continuously filtering a portion of the washing liquid to remove foreign matter.

It is another object of the invention to provide an oscillatable agitator carrying a filter element at the bottom thereof with a plurality of vanes which force the washing liquid through the filter.

It is still another object of the invention to provide an oscillatable agitator with a plurality of pockets for collecting heavy dirt and lint.

It is another object of the invention to provide an oscillatable agitator with a plurality of vanes on its underside whose discharge ends are covered by a removable element for filtering dirt from the washing liquid.

It is yet another object of the invention to provide an oscillatable agitator with a plurality of radial vanes with passages therebetween for circulating washing liquid therethrough which has a filter element at the entrance of the passages to remove foreign matter from the washing liquid.

Other objects, features, capabilities and advantages are comprehended by the invention as will later appear and as are inherently possessed thereby.

Referring to the drawings:

Figure 1 is a diagrammatic partial vertical sectional view of an oscillatable agitator type washing machine incorporating the features of the invention;

Figure 2 is an enlarged vertical sectional view of an oscillatable washing machine agitator with the improved filter and lint collector applied thereto;

Figure 3 is a partial horizontal sectional view of the sediment collecting chamber and filter taken along the line 3—3 of Figure 2;

Figure 4 is a vertical sectional view of an oscillatable agitator with a modified filter arrangement; and,

Figure 5 is a vertical sectional view of an agitator showing a still further modification of a heavy dirt and lint collector combined with an agitator.

Referring now to the drawings for a detailed description of the improved filter arrangement, there is shown in Figure 1 a liquid containing tub construction 10 having a sidewall 11 and a bottom wall 12 with an agitator 13 disposed adjacent the bottom of the tub and substantially centrally located with respect to the sidewalls 11. The agitator is adapted to be rapidly oscillated about its vertical axis by means of an oscillatable shaft 14 extending upwardly from suitable gear reduction and oscillating mechanism 16 mounted below the bottom of the tub which is driven by any suitable drive mechanism, such as, for example, an electric motor (not shown).

In the washing of soiled clothing, the clothing is placed in the tub along with the proper quantity of hot water and detergent and the gear reduction mechanism 16 is operated to oscillate the agitator 13 about its vertical axis. Such action quickly removes the major portion of the soil or dirt from the clothing and it passes into the washing solution or liquid, and under some conditions the washing liquid actually contains more soil in proportion than remaining in the clothing. However, after a relatively short interval of time, the unbalance of soil in the washing liquid is redeposited in the clothing until a balance is obtained, after which continued washing is of no value. Therefore, by removing a portion of the soil in the washing liquid, when the balance is obtained the clothing will be proportionately cleaner, and it is to improve the washing efficiency of the washing liquid that this invention is particularly directed.

Referring now more particularly to Figures 2 and 3, the agitator 13 is provided with an upstanding center post

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17 which merges into a symmetrical downwardly and outwardly flaring base 18 terminating in a peripheral bead 19 spaced relatively close to the bottom wall 12 of the tub. The base covers a major portion of the bottom of the tub and is adapted to underlie the clothing. In this instance the agitator is provided with upwardly and radially outwardly projecting water impelling vanes or blades 21 formed integral with the base 18 and a suitable hub 22 for holding a splined sleeve 23 which fits over the upper splined end 24 of the oscillatable shaft 14. The foregoing is more or less standard construction for the major portion of all agitators.

In the disclosed construction, a plurality of openings or passages 26 are provided in the base 18 of the agitator between the center post 17 and outer periphery 19 and preferably they are nested in an area closer to the center post. These passages provide the means to permit a portion of the washing liquid carrying dirt or soil therewith, either in solution or suspension, to pass from the main body of liquid A above the base of the agitator to below the base and enter a chamber or cavity 27 provided by the flaring base 18 and bottom 12 of the tub.

Within the cavity 27 there is provided a combination oscillatable heavy dirt, lint trap and filter element or mechanism 28 which is adapted to retain the heavy dirt and lint carried in suspension by the washing liquid passing through the passages 26 into the cavity and to discharge the filtered washing liquid back into the main body of the tub to continue the cleaning or washing operation. This oscillatable trap mechanism is carried by the agitator beneath its base 18 and includes a plurality of integral downwardly and radially projecting impellers or vanes 29 whose lower edges are spaced from and substantially parallel to the bottom wall 12 of the tub and an annular cover or wall 31 carried at the lower edges which cooperates with the vanes to provide a plurality of radially projecting open ended pockets or channels 32. The inner edges 33 of the vanes and the inner opening 34 in the cover 31 define the entrance to the channels 32 and they are spaced from the axis of the agitator to provide room for the oscillatable shaft 14 and ample space for free circulation of the washing liquid.

As shown in the drawings, the openings 26 in the base of the agitator for the most part extend outwardly beyond the inlet to the channels 32. This reduces the tendency for the heavy dirt to pass through the open central portion about the agitator shaft 14 and settle on the bottom wall 12 of the tub, or to work outwardly between the cover 31 and bottom wall and re-enter the main body of washing liquid in the tub.

Adjacent the outer periphery of the base of the agitator and opposite the outer open ends of the channels 32 the cover 31 is provided with an annular opening, and an annular strainer or filter element 36 is mounted across this opening. In the modification shown, the inner periphery of the filter element 36 fits within a groove 37 in the cover 31 and its outer periphery is disposed in a groove formed in an annular channel or support 38 which forms part of the cover. The support 38 is carried in a recess 39 provided in the peripheral bead 19 in the base of the agitator.

It is to be understood that the means for securing or carrying the filter element 36 is shown only by way of example and that other satisfactory arrangements may be used without departing from the spirit of the invention.

With the assembly in position, as shown, a slight circumferential clearance or restricted area 41 is provided between the periphery 19 of the agitator and bottom wall 12 of the tub for a purpose to be hereinafter described.

In operation, with the washing liquid, detergent and soiled or dirty clothing in the tub 10 and the agitator 13 being oscillated about its vertical axis by means of the oscillating mechanism 16, the radial vanes 21 on the

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upper portion of the base 18 of the agitator agitates the liquid and clothing to provide a cleaning operation to remove the soil or dirt from the clothing. This action transfers a major portion of the dirt and foreign matter to the washing liquid which is carried in the liquid either in suspension or solution. As the heavy dirt and lint move downwardly, a relatively large portion is eventually drawn through the passages 26 in the base 18 of the agitator by the action of the lower oscillating radial vanes 29 defining the channels 32 in the cavity 27 beneath the agitator. The washing liquid, heavy dirt and lint passing through the passages 26 enter the channels and are moved radially outwardly toward the outer annular opening. Since the oscillating vanes 29 tend to restrict eddy or cross currents within the cavity and act as centrifugal impellers, the washing liquid is forced through the annular filter 36 and radially outwardly back into the main body of liquid in the tub through the restricted circumferential passage 41 between the bottom 12 of the tub and outer periphery 19 of the base of the agitator to continue in the washing operation. As the washing liquid passes through the filter element 36, the heavy dirt and lint are retained in the pockets 32 by the filter element to prevent their recirculation and in this manner redeposition of the large particles of dirt and lint in the clothing is eliminated.

At the same time, since the large particles of dirt are removed from circulation, the tendency for them to be reduced in size so that they go into solution in the washing liquid is also practically eliminated. Also, by making the filter 36 of the proper material, a portion of the soil carried in solution may be removed from the washing liquid to thus enable the liquid to remove a greater portion of the soil from the clothing. This generally constant radial discharge of liquid at the periphery of the agitator also acts to prevent articles of clothing from entering into the cavity through the circumferential passage.

From the above it can be seen that a portion of the washing liquid is continuously being bypassed from the main body of the liquid and passed through the oscillating trap and filter element 36 which, of course, reduces the overall concentration of dirt in the washing liquid to thus improve the washing efficiency of the washing machine.

With a trap and filter arrangement of this type, means should be provided to permit cleaning of the filter element 36 and pockets 32. Therefore, in the embodiment shown, the outer edge of the cover 31 carries a clip or rim 42 adapted to be snapped into a groove or notch 43 adjacent the periphery of the base 18 of the agitator and the inner circular edge 34 of the cover 31 is detachably secured to two or more of the inner edges 33 of the vanes 29 through suitable clips or the like 44 which engage in notches or recesses 46.

At the end of the washing operation, the operator may clean the filter element 36 and sediment collecting channels or pockets 32 by grasping the agitator 13 and removing the same from the splined shaft 14 and withdrawing it from the tub, at which time the filter and pockets may be cleaned by forcing water through the filter in a reverse direction or it may be removed from the base 18 of the agitator and cleaned separately.

Referring now to Figure 4, there is shown a modified trap and filter arrangement. In this instance the base 18 of the agitator 13 is provided with the openings or passages 26 around the center post 17 to permit entrance of a portion of the washing liquid and dirt into the cavity 27 between the base 18 and bottom wall 12 of the tub and a plurality of spaced radial and downwardly projecting vanes 47 are formed integral with the base about the axis of the agitator. An annular cover 48 having a central opening 49 cooperates with the lower ends of the vanes 47 to define open-ended pockets or channels 51 whose outermost ends terminate adjacent the outer periph-

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ery. 19 of the base 18 in an annular discharge port or opening 52. The innermost ends 53 of the vanes 47 defining the inlet to the channels 51 are inclined upwardly and outwardly from the central opening 49 in the cover 48 to support an annular or frusto-conical filter element 54 which preferably underlies the passages 26 in the base 18. This filter element comprises a plurality of sector shaped removable sections 56 having a suitable frame construction 57 for supporting filtering material 58, and handle or grip members 59 are secured to the frame to provide means for removing the filter from and inserting it into position through the opening 49 in the cover 48.

From the foregoing it can be seen that with the filter mounted to underlie the passages 26, as the agitator is oscillated a portion of the washing liquid is continuously drawn through the passages 26 into the cavity below the base 18 by the pumping action of the vanes 47, and the liquid is drawn through the filtering material 58 whereon the heavy dirt and lint carried in suspension is deposited. After passing through the filter, the filtered washing liquid is discharged from the channels 51 radially outwardly through the annular opening 52 and circumferential area 41 between the periphery 19 of the base and bottom wall 12 of the tub to re-enter the main body of the washing liquid, to continue in the washing operation.

In this construction, the filter performs the same function as described in the previously mentioned modification. Also, the filter may be cleaned by following the same steps as described.

In Figure 5 there is disclosed a modified heavy dirt and lint trap not dependent upon the recirculation of the washing liquid. In this instance, the openings 26 in the flaring base 18 of the agitator are grouped about the center post 17 in the usual manner and a plurality of radial downwardly directed vanes 61 are secured to or formed integral with the underside of the base 18 and terminate generally at a horizontal annular cover 62. This cover has a central opening 63 to permit free movement of the liquid about the agitator shaft 14 and extends outwardly and fits within a recess 64 adjacent the lower edge of the periphery 19 of the agitator.

If desired, the cover 62 may be detachably secured to the base by any suitable means such as having the outer periphery closely fit within the recess 64 and providing suitable clips 66 adjacent the inner edge 67 of the vanes to engage notches 68 therein. With the cover in place, the vanes 61 cooperate to provide a plurality of closed pockets 69 and also to limit lateral movement of the collected dirt and liquid therein during the washing operation. In addition, the cover 62 preferably underlies the passages 26 in the base 18 to restrict the passage of heavy dirt through the central opening 63 in the cover.

In operation, as the clothing and liquid are agitated during the washing operation, the heavy dirt and lint tend to fall or pass through the passages 26 in the base 18 of the agitator and enter the cavity therebelow into one of the pockets 69. As the agitator is oscillated about its vertical axis, the heavy dirt is moved outwardly into the pockets by the vanes and is forced into the outer corner whereat it is deposited, and in view of the spaced radial vanes 61 limiting or restricting unobstructed lateral movement of the liquid, relatively quiet or quiescent areas are provided. Thus, this heavy dirt is removed from the active portion of the washing liquid and prevents the redeposition of the dirt in the clothing. This, of course, improves the washing efficiency of the liquid.

At the end of the washing operation, the operator may remove the agitator 13 and clean the sediment or dirt from the pockets 69 by either flushing water into them or by first removing the cover 62, depending upon the particular design.

From the foregoing it can be seen that a trap and filter mechanism has been provided for trapping a large portion of dirt and lint in the washing liquid which is carried by the oscillatable agitator utilized for the washing operation, and it is disposed beneath the base of the agitator

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so as not to occupy any of the space required for washing nor are special recesses and the like required in the tub. Also, that the oscillating action of the agitator for washing the clothing not only filters the liquid but causes the washing liquid to deposit dirt in the filter trap, and that the filter may be readily removed for cleaning and inspection at any time by merely removing the agitator from the splined agitator shaft.

While I have herein described and upon the drawings shown illustrative embodiments of the invention, it is to be understood that the invention is not limited thereto but may comprehend other constructions, arrangements of parts, details and features without departing from the spirit of the invention.

It is claimed:

1. A washing machine comprising a tub having a bottom portion and side portions for retaining fabrics and washing fluid therein, an agitator supported in spaced relation to said bottom portion for relative movement thereto, said agitator comprising a central portion and a base member attached to said central portion, a cavity formed on the underside of said base member adjacent said bottom portion, upstanding agitating vanes carried on said base member, apertures in said base member between said upstanding vanes for passage of fluid into said cavity, a cover plate removably attached to said base member on the underside thereof, means within said cavity to restrict movement of fluid entering said cavity through said apertures, an opening in said cover plate for exit of said fluid from said cavity, and filter means within said cavity for arresting movement of foreign particles carried by fluid entering said cavity through said apertures.

2. A washing machine comprising a tub having a bottom portion and side portions for retaining fabrics and washing fluid therein, an agitator supported in spaced relation to said bottom portion for relative movement thereto, said agitator having an upstanding central portion and a hollow base portion including a top wall and a bottom wall, a plurality of apertures in said top wall for entry of said fluid into said hollow base portion, an opening in said bottom wall for exit of said fluid from said hollow base portion, and filter means within said hollow base portion for arresting movement of foreign particles carried by fluid entering said apertures.

3. A washing machine comprising a tub having a bottom portion and side portions for retaining fabrics and washing fluid therein, an agitator supported in spaced relation to said bottom portion for relative movement thereto, said agitator comprising a center post, a hollow base member attached to said center post and a plurality of upstanding agitating vanes carried by said base member, a plurality of holes in said base member between said upstanding vanes for passage of fluid into said hollow base member, an opening in the bottom of said hollow base member for exit of fluid from said base member, and a sediment filter carried by said base member between said holes and said opening to arrest movement of foreign particles carried by fluid passing through said holes upon movement of said agitator.

4. A washing machine comprising a tub having a bottom portion and side portions for retaining fabrics and washing fluid therein, an agitator supported in spaced relation to said bottom portion for relative movement thereto, said agitator comprising a center post, a hollow flaring base member attached to said center post, a plurality of agitating vanes carried by and upstanding on said base member for agitating said fluid and said fabrics to loosen foreign particles carried by said fabrics, a plurality of holes in said base member between said upstanding vanes for passage of said fluid and said particles therethrough, a plurality of vanes attached to said base member and depending from said base member towards said bottom portion, a cover member abutting said depending vanes to form cavity portions in said agitator

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with said depending vanes and said base member, discharge openings in said cover member for exit of fluid from said cavity portions, and filter means within said cavity portions for arresting movement of said particles suspended in fluid passing through said cavity portions.

5 5. A washing machine comprising a tub having a bottom portion and side portions for retaining fluid and fabrics therein, an agitator supported in spaced relation to said bottom portion for relative movement thereto, said agitator comprising a center portion and an outwardly
10 extending flanged portion attached to said center portion, a plurality of groupings of apertures in said flanged portion adjacent said center portion for passage of fluid therethrough, an upstanding agitating vane carried by said flanged portion between each of said groupings, a
15 plurality of vanes attached to said flanged portion and depending therefrom towards said bottom portion, a cover member abutting said depending vanes to form channels with said flanged member and said depending vanes for
20 passage of fluid therethrough, discharge openings in said cover member for exit of fluid from said channels, and a filter abutting said depending vanes for arresting movement of foreign particles carried by fluid passing through said apertures and into said channels upon movement of
25 said agitator.

6. A washing machine comprising a tub having a bottom portion and side portions for retaining fabrics and

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washing fluid therein, an agitator supported in spaced relation to said bottom portion for relative movement thereto, said agitator comprising a center post, a base member attached to said center post, a plurality of upstanding agitating vanes carried by said base member for agitating said fluid and said fabrics to loosen particles from said fabrics upon movement of said agitator, a series of holes in said base member between said upstanding vanes for passage of fluid therethrough, a plurality
10 of vanes attached to said base member and depending from said base member towards said bottom portion, a cover plate fitted to said depending vanes to form channels with said depending vanes and said base member, discharge openings in said cover member for exit of fluid from said
15 base member, and filter means abutting said depending vanes to arrest the movement of particles carried by said fluid through said holes upon movement of said agitator.

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