

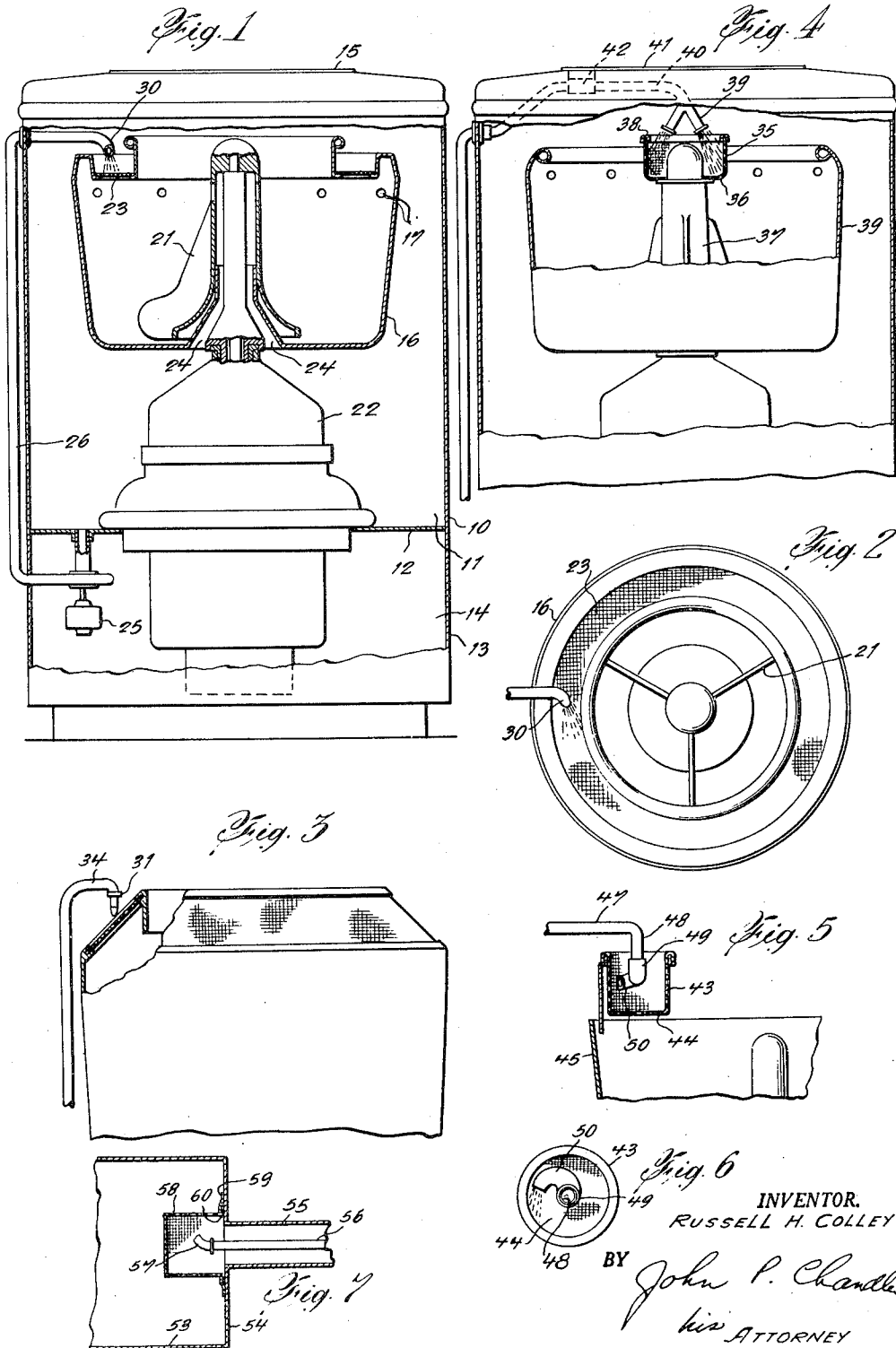
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R. H. COLLEY

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FILTERING DEVICE FOR CLOTHES WASHING MACHINES

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INVENTOR.

RUSSELL H. COLLEY

BY

John P. Chandler
his ATTORNEY

UNITED STATES PATENT OFFICE

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FILTERING DEVICE FOR CLOTHES-
WASHING MACHINES

Russell H. Colley, Westport, Conn.

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5 Claims. (Cl. '68—18)

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This invention relates to a filtering means, and has for its principal object the provision of a novel arrangement for removing finely-divided particles from fluids. The filtering apparatus of the present invention has general utility, and also has a special application in connection with automatic clothes washing machines.

Up to the advent of the instant invention, no satisfactory means has been devised for removing lint and scum from the water during the washing process. The problem was not serious in the older types of washers where the clothes were removed from the impeller chamber for rinsing. In the automatic type, however, the entire washing, rinsing, and drying operations are performed in the single spin basket, and when the spinning or drying operation starts, much of the water contained in the basket must pass through the clothes, the fabric acting as a filter which blocks the passage of the scum and lint and retains them on the surface of the garments.

If, during the washing period, the water is passed through a screen fine enough to remove the particles, the lint imbeds itself in the interstices. In accordance with the present invention as applied to an automatic washer, a small quantity of water is continuously withdrawn from the impeller chamber during the washing period, which water is filtered and returned to the chamber. In the filter there is provided relative movement between the nozzle which delivers the fluid and the screen against which it is directed. The fibrous particles tend to roll up into tiny balls and eventually form a cohesive mass instead of plugging up the openings.

Whether the screen, the nozzle or both move is not important, so long as there is relative movement between these elements. If the stream is directed against the screen at an acute angle, the results are better than if it strikes the screen at a right angle.

In the drawings:

Fig. 1 is a central vertical section taken through a washing machine equipped with the filtering device of the present invention.

Fig. 2 is a top plan view thereof.

Fig. 3 is a side elevation, partially in section, of a washing machine spin basket wherein the screen of the filtering device of the invention is inclined rather than horizontal.

Fig. 4 is a broken vertical section showing a modified form of the invention.

Fig. 5 is a broken vertical section showing another modified form.

Fig. 6 is a top plan view thereof.

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Fig. 7 is a broken section showing the filtering device of the present invention as applied to a washing machine wherein the spin basket rotates on a horizontal axis.

Referring now more particularly to Fig. 1, it will be noted that a generally cylindrical tub 10 provides a chamber 11 defined at its lower end by a wall 12. A lower extension 13 of the tub provides a second chamber 14. At its upper end the tub carries a removable cover 15. A spin basket 16 is arranged to receive the clothes to be washed, and adjacent its upper end it is provided with a plurality of spaced apertures 17 forming discharge ports for the water when the basket is rotated. Means for imparting oscillatory movement to the agitator 21 and rotary movement to the basket are enclosed within housing 22. All of the foregoing structure is conventional and forms no part of the present invention.

At its upper end the basket is provided with an annular filter 23 formed of fine wire mesh. During the washing operation a limited quantity of water flows from the spin basket through openings 24 to the lower wall 12 of the tub, and is pumped upwardly as by pump 25 through tube 26 to discharge nozzle 30 which delivers the water to filter 23. In order to avoid clogging of the openings in the filter by the entry of solid particles of scum and lint, the arrangement of the present invention provides means for moving the discharge nozzle or the filter relative to each other. In either instance, the nozzle is preferably disposed at less than a right angle to the surface of the screen, and by this means filtered material is kept in a state of agitation over the surface of the screen, and is therefore not permitted to clog up the openings. These particles tend to roll into tiny balls, and eventually form a cohesive mass which is readily removed after the washing operation.

In the arrangement of Fig. 1, the discharge nozzle is stationary and the screen moves. In washing machines of this general character a brake (not shown) restrains rotation of the basket resulting from action of the agitator. When the brake is released there is some movement, and this is sufficient for purposes of the present invention where the nozzle is fixed. Even if the basket, and hence the filter screen, is not moved due to some positive driving force, the action of the stream of water directed against the rotatable screen at an acute angle produces movement of the screen. A filtering device of this character, wherein the nozzle is fixed and the screen rotates due to action of the stream im-

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pinging thereon, has general utility apart from the clothes washing art.

In the arrangement of Fig. 1, the annular filter screen is substantially horizontal, but in Fig. 3 the annular screen 31 is disposed at an angle of substantially 45°. The nozzle 34 is again preferably disposed at less than a right angle to the surface of the screen.

In the modified arrangement of Fig. 4, the filter 35 is generally cup shaped and has a lower wall 36 which is mounted at the upper end of the agitator 37, and has a reinforcing ring 38 at its upper end. The nozzle 39 has a plurality of openings and is arranged in inverted Y shape, and discharges the streams of water at less than a right angle to the surface of the filter screen. The water is fed to the nozzle by pipe 40 carried by the cover 41, and has a flexible fitting at 42. Thus, the filter is disposed substantially centrally of the basket 39, and this arrangement is particularly well suited to machines wherein there is substantially no movement of the basket during the washing portion of the cycle. Due to the oscillatory movement of the agitator, the filter is, however, in constant movement relative to the stream from the nozzle. This form of the invention has the added advantage that the stream, or at least a major portion of it, is directed against the side walls 35 of the filter, and the lower wall, which if desired may be imperforate, collects the solid particles.

An arrangement generally similar to that shown in Fig. 4 is illustrated in Fig. 7 for use in connection with a clothes washing machine wherein the spin basket is mounted on a horizontal axis. The spin basket 53 has a rear wall 54 and a shaft 55 which is journaled in bearings (not shown). The shaft has a central opening 56 for the return of the water to the basket. A nozzle 57 directs the stream of water at an acute angle against the annular side walls 58 of the cup shaped filter. This filter is suitably mounted on the inner surface of end wall 54, such as by means of spring clips 59 which engage an annular flange 60 at the open end of the filter. Thus, the filter cup may be readily removed to remove the accumulation of filtered particles at the close of the washing cycle.

In the arrangement of Fig. 5, the filter is again generally cup-shaped and has annular side walls 43 and a lower wall 44. In this instance it may be suitably mounted in relation to the spin basket 45 so as to discharge water from the filter directly into the basket. Delivery tube 47 has an angular extension 48, at the lower end of which the hub 49 of nozzle 50 is pivotally mounted. As shown in the plan view of Fig. 6, the nozzle is curved in order that the stream of water will strike the side walls tangentially, and also such stream will impart rotary movement to the nozzle due to the reaction of the stream issuing therefrom.

The arrangement of Figs. 4 and 5 has the further advantage that the soap powder normally used in the washing operation may be deposited in the filter cup and is dissolved by action of the wash water issuing from the nozzle. When soap powder is placed in the spin basket at the beginning of the washing operation, there is a tendency not only for a fair proportion of the soap particles to remain undissolved at the end of the washing operation, but also for the undissolved particles to get into the folds of the clothes, where they remain. The presence of these undissolved soap particles at the end of the complete cycle

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is quite as objectionable as is the accumulation of lint and scum. By placing the soap powder in the perforated cup of the structure shown in Figs. 4 and 5, this possibility is definitely eliminated.

Many automatic clothes washing machines provide for a "soak cycle" just preceding the washing cycle. During this soak cycle, the clothes are agitated in the spin basket in the absence of the soap powder. If the pump of the present invention is associated with the automatic controls in such a manner as to commence operation at the end of the soaking cycle and the beginning of the washing cycle, the soap does not enter the spin basket until it commences to be dissolved by the issuance of the water from the nozzle. By this arrangement the automatic washing machine may remain unattended throughout the entire cycle of operation. Under the prior arrangements, however, in the event that the user wished to introduce the soap only at the commencement of the washing cycle, it was necessary to be physically present to introduce the soap when this cycle commenced. The improved arrangement of the present invention eliminates this intermediate attendance.

It will be apparent that the filtering device of the present invention may be employed in connection with "dry cleaning" machines and processes wherein the accumulation of lint has always been a serious problem. In fact, by employing the device of the present invention in connection with conventional washing machines of the fully automatic type or otherwise, such machines may be used for cleaning clothes with the use of a suitable liquid solvent of the type used in dry cleaning establishments.

While four forms or embodiments of the invention have been shown and described herein for illustrative purposes, and the construction and arrangement incidental to four specific applications thereof have been disclosed and discussed in detail, it is to be understood that the invention is limited neither to the mere details or relative arrangement of parts, nor to its specific embodiments shown herein, but that extensive deviations from the illustrated forms or embodiments of the invention may be made without departing from the principles thereof.

What I claim is:

1. The combination with a machine for cleaning articles with a fluid and provided with a receptacle for the articles to be cleaned and an agitator arranged to oscillate within the receptacle, of a filter mounted adjacent the upper end of the agitator and secured thereto so as to move with the agitator as the latter oscillates, said filter comprising a generally cup-shaped member of perforated construction and including a lower wall and a continuous side wall which extends upwardly from the lower wall, means comprising a conduit for withdrawing a stream of fluid from the receptacle during the cleaning operation, and means for supporting the exit end of the conduit so as to direct the stream of fluid against the inner surface of the side wall at less than a right angle to such wall.

2. The combination with a clothes washing machine which is provided with a receptacle for the clothes to be washed and an agitator arranged to oscillate on a vertical axis in the center of the receptacle, of a self-cleaning filter mounted adjacent the upper end of the agitator and secured thereto so as to move with the agitator as the latter oscillates, said filter comprising a

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cup-shaped member including a lower wall and a perforated annular side wall which extends upwardly generally vertically from the marginal edges of the lower wall, means comprising a conduit for withdrawing a stream of water from the receptacle during the washing operation and a nozzle connected with the exit end of the conduit and so disposed relative to such annular side wall of the filter as to direct the stream of water on the inner surface of the side wall at an acute angle thereto.

3. The combination with a machine for cleaning articles with a fluid and provided with a receptacle for the article to be cleaned and an agitator arranged to oscillate within the receptacle, of a filter mounted adjacent the upper end of the agitator and secured thereto so as to move with the agitator as the latter oscillates, said filter comprising a lower wall and a perforated annular side wall which extends upwardly from the lower wall, the filter being open at its upper end, means comprising a conduit for withdrawing a stream of fluid from the receptacle during the cleaning operation, plural nozzles connected with the exit end of the conduit, and means for supporting such nozzles in fixed relation so as to direct the streams of fluid on the inner surface of the side wall at less than a right angle to such side wall.

4. The combination with a machine for cleaning articles with a fluid and provided with a receptacle which is open at its upper end to receive the articles to be cleaned and an agitator arranged to move within the receptacle, of a filter structure mounted adjacent the upper end of the agitator and secured thereto so as to move with the agitator as the latter moves, said filter structure comprising a generally circular lower wall and a perforated annular filter screen which extends vertically upwardly from the periphery of

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the lower wall, means comprising a conduit for withdrawing a stream of fluid from the receptacle during the cleaning operation and delivering the stream at the upper end of the receptacle, and plural nozzles connected with the exit end of the conduit and so disposed relative to the annular filter screen as to direct the streams of fluid on the inner surface thereof at less than a right angle thereto.

5. The combination with a machine for cleaning articles with a fluid and provided with a receptacle for the articles to be cleaned and a movable agitator within the receptacle, arranged to impart motion to the articles during the cleaning operation of a perforated, generally cup-shaped filter mounted adjacent the upper end of the agitator and secured thereto so as to move with the agitator, said filter comprising a lower wall and a continuous side wall which extends upwardly from the lower wall, a conduit for withdrawing a stream of fluid from the receptacle during the cleaning operation and a pump for delivering the fluid to the upper end of the receptacle, the exit end of the conduit being so disposed relative to the side wall of the filter as to direct the stream of fluid on the inner surface of the side wall at less than a right angle thereto.

RUSSELL H. COLLEY.

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