WASHING APPARATUS HAVING FILTERING MEANS

Leslie A. Johnson, Mansfield, Ohio, assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Filed Dec. 12, 1958, Ser. No. 779,939

3 Claims. (Cl. 68—18)

This invention relates to apparatus for washing fabrics including a filter for the washing fluid, and has it an object to provide improved apparatus of this kind.

A further object of the invention is to provide improved means for filtering cleaning fluid in a washer for fabrics.

In practicing the invention, advantage is taken of the differential head of water produced in a washing machine, particularly of the horizontal axis, rotating basket type, during a washing operation. At this time, the rotating basket and the load of fabrics therein move the body of fluid in the direction of rotation of the basket so that the level of the fluid in the region of the tub where the basket emerges from the fluid body is elevated with respect to the fluid level at the opposite side of the basket or the region wherein the basket becomes immersed in the fluid. In other words, the rotating basket with its vases and the load of fabrics drag the fluid along, piling it up at one side of the basket and producing an increased head of fluid at this side when compared to the head of fluid at other regions of the body of fluid. A trough is employed for collecting fluid at this high level and a conduit conveys the fluid gravitationally to a filter, where suspended matter, such as lint and soap curds, is removed. The filtered fluid then returns to a region of the body of fluid of relatively low head.

Accordingly, a continuous flow of cleaning fluid is provided, by gravity, for filtering the fluid, obviating the use of pumping mechanisms or other complications. Filtering of substantial quantities of fluid is carried out as the basket and its load are capable, in a cylinder type of washer, of moving large volumes of fluid to the region of the body of relatively high head. The filter is disposed in a recess or pocket formed within the tub structure in a location readily accessible to the operator. It may be easily detached from the tub for cleaning and inspection. Where a transparent door is provided for the tub, the filtering mechanism may be formed at least in part of transparent material, so that the operator may view the filter as a check on its operation.

The foregoing and other objects are effected by the invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a side elevation of a clothes washing machine constructed and arranged in accordance with the invention and having portions broken away for clearness;

Fig. 2 is a transverse section taken along the line II—II of the washing machine shown in Fig. 1;

Fig. 3 is an enlarged section of the filtering mechanism shown in Fig. 1;

Fig. 4 is a section taken along the line IV—IV of Fig. 3; and

Fig. 5 is a perspective of the removable filtering mechanism shown in Figs. 3 and 4 with its cover moved to open position.

Referring to the drawings, the invention is disclosed applied to a domestic type clothes washer having an outer casing 10, the front wall of which has its upper portion inclined rearwardly and upwardly, as shown at 11, and provided with an access opening 12. A door 13, hinged in a suitable manner to the casing 10, closes the opening 12 and preferably has a transparent center panel 14.

Suitably supported within the casing 10 is a washing unit 15, preferably of the type having a tub 16 for containing a body of cleaning fluid and supporting a clothes basket 17 that is journaled in the rear of the tub for rotation about a generally horizontal axis. A sheave 18, fixed to the basket and belted, as shown at 19, to a suitable drive mechanism 21, rotates the basket during washing periods at a speed of the order of 50 r.p.m. for the tumbling of the fabrics in the washing fluid. The means for supporting the unit 15 in the casing 10 is not shown as it forms no part of the present invention.

The tub structure 16 has a front throat portion 22 enclosing an access passage 23 aligned substantially with the access opening 12, which throat portion 22 terminates in spaced relation with the wall 11 of the casing. A wall, preferably resilient and indicated at 24, connects the throat 22 of the tub 16 and the front wall 11 peripherally of the access opening 12. The resilient wall structure 24 may define a gasket which engages the transparent panel 14 of the door. It will be understood that the wall 24 prevents spillage of water within the casing 10 and also allows vibratory movement of the washing unit 15 relative the casing.

The basket 17 preferably includes a plurality of vanes 25 for tumbling the fabrics as the basket is rotated and has its cylindrical side wall perforated substantially its entire extent for the free flow of water into and out of the basket. The front end of the basket is provided with an access opening 26 registering with the access passage 23 of the tub. It will be understood that the basket is rotated clockwise during washing, as viewed in Fig. 2, and that the fabrics are elevated to the uppermost region of the basket from which they gravitate across the basket into the washing water, substantially as shown in Fig. 2. The means for admitting water to the tub and for discharging vitiated fluid therefrom is not shown for the sake of brevity and since they form no part of the present invention.

During a washing operation, the rotating vanes 25 and the load of fabrics tend to rotate the body of fluid as they pass therethrough. This action causes the level of the fluid to rise substantially in the region of the tub wherein the basket emerges from the fluid, as indicated at A. The level, of course, drops in other regions of the body of fluid, as shown at B. The broken line in Fig. 2 indicates, approximately, the surface of the body of fluid during a washing operation. Advantage is taken of the increased head of fluid in the region A of the tub 16 to carry out a filtering operation, whereby lint, soap and/or other matter carried in suspension in the body of fluid are removed.

As shown, an elongated trough 27 is provided in the sidewall of the tub 16 for receiving fluid adjacent the elevated level in region A. Preferably, the trough 27 is formed in a resilient body of rubber or the like that grips the edges of an opening in the tub wall to provide a fluid-tight joint, as best seen in Fig. 2. The collected fluid and suspended matter flows from the trough 27 into a hose 28, also preferably formed of resilient material and terminating in a hole 29 formed in the bottom of the throat 22, as best seen in Fig. 4. The end of the hose 28 forms a grooved connection with the edge of the hole 29, which connection is fluid-tight. As shown, the end portion of the hose within the throat 22 forms an annular resilient seat 31 to be referred to hereinafter.
A filtering structure for the washing fluid, generally indicated at 32, is provided in the lower portion of the throat 22 and includes an arcuate, perforate, filter element 33 overlying and engaging the seat 31 to form a fluid-tight connection. An opening 34 is provided in the element 33 for passage of fluid from the hose 28 to the upper side of the element 33. The element 33 has an upwardly-extending peripheral wall 35 enclosing a filtering chamber 36, and the latter is closed by an associated lid 37 which is preferably transparent. The lid 37 may be supported by ledges 38 extending inwardly from the wall 35 and retained in place by a shoulder 39 at one end of wall 35 and a spring clip 40 at the opposite end. The filter structure 32 is retained in position within the throat 22 by a pair of strips 41 and 42 which are recessed, as shown in Fig. 4, to receive respective end flanges 43 and 44 formed on the filter element 33. A flat spring 45 is suitably secured within the recesses of strip 42 and biases the flange 43 into the recess of the strip 41.

The filter structure 32 may be readily removed from the throat 22 by moving it to the right against the bias of the spring 45 sufficiently to withdraw the flange 43 from strip 41, after which the filter may be tilted upwardly and withdrawn from strip 42. The operator may then lift off the lid 37 by use of the gripping lugs 38 and pull the filter chamber 36 and the lid 37 may then be carried out. The filter 33 and lid 37 are assembled and locked in the strips 42 in a reverse manner. Under some conditions of use satisfactory cleaning of the filter may be obtained by merely removing the lid 37 and wiping out the lint collected in the filter element 33. A water-tight connection is always provided between the filter 33 and the resilient seat 31 when the filter structure 32 is in operating position in the throat 22.

During a washing operation, washing fluid and matter suspended therein enter the throat 27 from the elevated zone of the body of fluid, as indicated at A. This fluid gravitates through the hose 28 and opening 34 into the filter chamber 36. As the fluid gravitates through the numerous perforations in the filter 33, lint, soap curds and other suspended matter are separated from the fluid and retained in the filter 33. The filtered fluid passes through the perforations to the throat 22 and thence to a low level zone of the body of fluid. Accordingly, a cleaner body of washing fluid is maintained and, therefore, less foreign matter is retained by the fabrics after a washing process. A concomitant of this is, of course, cleaner fabrics with less discoloration.

From the foregoing, it will be apparent that an improved circulating filtering system is provided for a washing machine without the use of pumps or other complications. The filter is readily cleaned and where a transparent door for the washer is provided, the circulation of fluid through the filter may be observed. This circulating system may, of course, be employed in any washer where a high level zone of washing fluid is available, but it is particularly adaptable to the type of washer shown where a substantial difference in head obtains during a washing or a deep rinse step in the program. The filtering structure is disclosed in the access passage of the machine where it is readily accessible for inspection or removal, but it will be understood that it may be disposed in another location wherein a gravitational flow of fluid may be effected.

While the invention has been shown in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What is claimed is:

1. In a machine for cleaning fabrics or the like, a tub for containing a body of cleaning fluid, a perforate basket for containing fabrics to be cleaned mounted within the tub for rotation about an axis disposed at an angle to the vertical which is greater than 45 degrees, means for rotating the basket for tumbling the fabrics in the body cleaning fluid, said basket during rotation forcing cleaning fluid to a region between the tub and basket which is elevated with respect to the level of the remaining fluid, a casing enclosing the tub and including a front wall spaced from the front wall of the tub, said tub and casing having aligned access openings in their front walls, a throat construction connected to the tub and casing in surrounding relation to said access openings and bridging the space between the latter, a filter carried by said throat construction at a level intermediate that of said elevated region and that of said remaining fluid, said filter for removal of matter carried in suspension in the conveyed fluid, and means for gravitational return of filtered fluid from the filter to said remaining fluid in the tub.

2. In a machine for cleaning fabrics or the like, a tub for containing a body of cleaning fluid, a perforate basket for containing fabrics to be cleaned mounted within the tub for rotation about an axis disposed at an angle to the vertical which is greater than 45 degrees, means for rotating the basket for tumbling the fabrics in the body of cleaning fluid, said basket during rotation forcing cleaning fluid to a region between the tub and basket which is elevated with respect to the level of the remaining fluid, a casing enclosing the tub and including a front wall spaced from the front wall of the tub, said tub and casing having aligned access openings in their front walls, a throat construction connected to the tub and casing in surrounding relation to said access openings and bridging the space between the latter, a filter carried by said throat construction at a level intermediate that of said elevated region and that of said remaining fluid, said filter for removal of matter carried in suspension in the conveyed fluid, and means for gravitational return of filtered fluid from the filter to said remaining fluid in the tub.

3. In a machine for cleaning fabrics or the like, a tub for containing a body of cleaning fluid, a perforate basket for containing fabrics to be cleaned mounted within the tub for rotation about a general horizontal axis, means for rotating the basket for tumbling the fabrics in the body of cleaning fluid, said basket during rotation forcing cleaning fluid to a region between the tub and basket which is elevated with respect to the level of the remaining fluid, a casing enclosing the tub and including a front wall spaced from the front wall of the tub, said tub and casing having aligned access openings in their front walls, a throat construction connected to the tub and casing in surrounding relation to said access openings and bridging the space between the latter, a filter carried by said throat construction at a level intermediate that of said elevated region and that of said remaining fluid, a trough in communication with said elevated region for receiving fluid from said region, means for conveying fluid gravitationally from said trough to said filter for removal of matter carried in suspension in the conveyed fluid, and means for gravitational return of filtered fluid from the filter to said remaining fluid in the tub.

4. In a machine for cleaning fabrics or the like, a tub for containing a body of cleaning fluid, a perforate basket for containing fabrics to be cleaned mounted within the tub for rotation about a general horizontal axis, means for rotating the basket for tumbling the fabrics in the body of cleaning fluid, said basket during rotation forcing cleaning fluid to a region between the tub and basket which is elevated with respect to the level of the remaining fluid, a casing enclosing the tub and including a front wall spaced from the front wall of the tub, said tub and casing having aligned access openings in their front walls, a throat construction connected to the tub and casing in surrounding relation to said access openings and bridging the space between the latter, a filter carried by said throat construction at a level intermediate that of said elevated region and that of said remaining fluid, a trough in communication with said elevated region for receiving fluid from said region, conduit means for conveying fluid gravitationally from said trough to said filter for removal of matter carried in suspension in the conveyed fluid, and means for gravitational return of filtered fluid from the filter to said remaining fluid in the tub.

References Cited in the file of this patent

UNITED STATES PATENTS

1,183,724 Connor May 16, 1916
1,532,048 Dorland Mar. 31, 1925
2,307,254 Basset Jan. 5, 1943
2,360,278 Robertson Oct. 10, 1944