Nov. 27, 1956 C. M. DUNLAP 2,771,766

WASHING APPARATUS

Filed Aug. 23, 1951

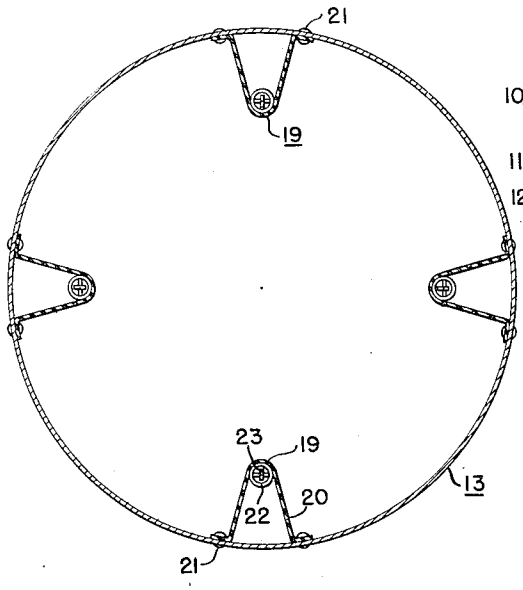


FIG. 2.

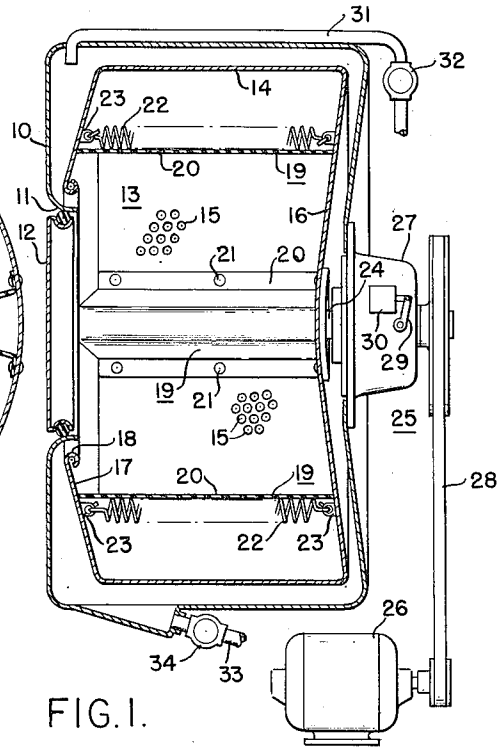


FIG. 1.

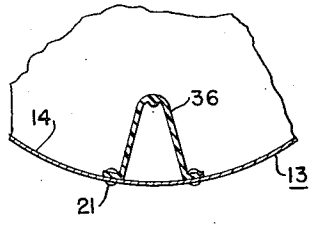


FIG. 3.

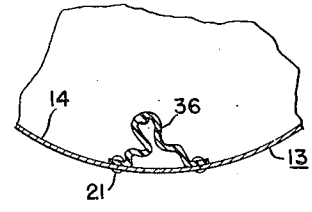


FIG. 4.

WITNESSES:

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WASHING APPARATUS

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3 Claims. (Cl. 68—24)

This invention relates to washing apparatus and, more particularly, to machines wherein washing fluid is extracted from fabrics by spinning at high speed.

In many present day domestic washing machines the fabrics, or the like, to be cleaned are agitated or tumbled in the washing fluid within a perforate basket which is thereafter rotated at high speed to centrifugally extract washing fluid from the fabrics. There is a tendency in this type of machine for the fabrics, after having been spun at high speed, to adhere to the inner surface of the basket sidewall since the centrifugal force of the fabrics has forced them tightly against the sidewall. This effect is particularly noticeable in centrifuges where the speed of rotation is even higher than the highest speed used in such domestic washing and spinning units.

It is accordingly an object of this invention to provide improved apparatus for centrifuging damp fabrics to remove washing fluid therefrom, wherein the adhesive bond between the fabrics and the spinning basket is broken after the basket has been rotated at high speed.

I propose to accomplish the above-mentioned object by providing resilient projections or vanes within the basket structure. These vanes will retain their original shape during the washing operation of the apparatus but will be deformed or folded toward the interior surface of the basket sidewall by the centrifugal force of the damp fabrics during the high speed, fluid extracting operation of the apparatus. Upon a reduction in the speed of rotation of the basket, the resilient vanes will regain their original shape and in so doing will break the adhesive bond between the fabrics and the basket.

This invention is particularly adaptable to washing machines wherein the basket is rotated about a generally horizontal axis, first at a relatively low speed to wash the fabrics in a suitable washing fluid, and, second, at a relatively high speed to extract washing fluid from the fabrics. Since these machines are generally provided with a plurality of circumferentially spaced vanes to tumble the fabrics during the low speed washing operation, these vanes may be constructed of resilient material in accordance with the teachings of this invention and thereby perform the double function of imparting a tumbling action to the fabrics during the washing operation and of breaking the adhesive bond between the fabrics and the basket established during the extracting operation. The vanes need only be made stiff enough to impart the tumbling motion to the fabrics during washing, and flexible enough to be deformed under the centrifugal force of the damp fabrics during extracting.

This invention is likewise particularly adaptable to machines of the so-called, combined washer and dryer variety. In this type of machine the fabrics are first washed in any conventional manner, then damp dried by spinning at high speed and thereafter fully dried by circulating warm dry air through the fabrics while they are being tumbled at low speed. It is essential to the proper operation of this type of machine that the fabrics tumble freely during the drying operation to permit free

circulation of drying air through and over the fabrics. In the conventional machine, the fabrics tend to adhere to the inner surface of the basket after the spinning operation and hence do not always tumble freely during the subsequent drying operation. This invention, accordingly, has as another object thereof to provide an improved washing-drying machine of this type wherein the fabrics are loosened from the inner periphery of the basket after the spinning operation to insure tumbling of the fabrics and proper air circulation therethrough during the subsequent drying operation.

These and other objects are effected by my 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 vertical sectional view of a washing machine constructed in accordance with my invention;

Fig. 2 is a transverse sectional view of the basket structure of the machine shown in Fig. 1;

Fig. 3 is a section of a detail of a modified form of basket structure which may be employed; and

Fig. 4 is a view of the modification shown in Fig. 3 in a different operating position.

Referring to the drawing, I have shown my invention applied to a washing machine of the domestic type and including a tub or fluid container **10** having an access opening **11** in the front thereof which is closed by a watertight door **12**.

Disposed within the tub structure **10** is a perforate rotatable basket, generally indicated at **13**. The basket **13** includes a side wall **14** having perforations **15** therein, and end walls **16** and **17**. The end wall **17** is formed with an access opening **18** in registry with the opening **11** in the tub structure **10**.

Disposed within the basket **13** are a plurality of circumferentially spaced, flexible vanes **19**, the purpose of which will hereinafter be described. As shown in Figs. 1 and 2, the vanes **19** are constructed of flexible sheets **20** of rubber, canvas or other suitable material which are secured at their ends to the inner surface of the basket side wall **14** by means of fasteners **21**. The sheets **20** are maintained in their vane-like shape by resilient means, such as the spring **22** which is supported within the basket **13** by eyelets **23** secured to the end walls **16** and **17** of the basket **13**.

The basket **13** is supported for rotation about a generally horizontal axis by means of shaft **24** connected to a driving mechanism indicated generally at **25**. The basket **13** is rotated by the driving mechanism **25** at a relatively low speed of, for example, 55 R. P. M. during washing periods and at a relatively high speed of, for example, 500 R. P. M during water-extracting periods. The driving mechanism **25** includes a motor **26** and a two-speed transmission **27** driven thereby through a belt **28**. As the specific form of the two-speed transmission **27** forms no part of the present invention, it has not been shown in detail for the sake of brevity. Although any of the commercially available two-speed transmissions could be suitably employed in practicing this invention, a preferable type is more adequately described and claimed in Patent No. 2,284,047, issued May 26, 1942, to H. E. Edwards, and assigned to the assignee of the present invention. The transmission **27** is adjusted to impart the several driving speeds to its driven shaft **24** by means of the linkage **29** which may be actuated manually, or automatically, such as, for example, by means of the solenoid **30**.

Water is supplied to the tub structure **10** through a conduit **31** under control of a suitable electrically operated valve **32**. The conduit **31** is connected to hot and cold water sources through valves, not shown, so that water of suitable temperature may be admitted to the tub.

Washing fluid is discharged from the tub **10** through a water discharge conduit **33** to a suitable drain, not shown, under control of electrically operated valve **34**.

It is to be understood that in the sequence of operations which will hereinafter be described, the various elements of the washing machine such as the motor **26**, the two-speed transmission **27**, the water inlet valve **32**, and the washing fluid discharge valve **34** may be automatically controlled from a single source, as by means of an electric timer actuated switch mechanism (not shown). Such control systems are well known in the art and further description thereof is deemed unnecessary since they form no part of the instant invention.

Operation

In the operation of the washing apparatus, the fabrics to be washed and a detergent such as, for example, soap, are first deposited in the basket structure **13** through the access opening **11** and water is admitted to the tub **10** through the conduit **31**. The two-speed transmission **27** is adjusted to effect low speed rotation of the shaft **24** and basket **13** as the motor **26** is energized.

As the basket **13** is rotated, the submerged fabrics are engaged by and carried upwardly into the upper portion of the basket **13** by the vanes **19** and are tumbled back into the washing fluid in the lower portion of the basket **13**. This cycle continues during low speed rotation of the basket. The springs **22** are strong enough to retain the vanes **19** in substantially their original shape throughout this tumbling and washing operation.

After the washing operation is completed, the valve **34** is opened and the washing fluid allowed to drain out of the tub structure **10**. The fabrics in a wet condition are tumbled in the basket **13** for a short period and are distributed around the basket **13** during its acceleration to centrifuging speed.

Rotation of the basket **13** at high speed is effected by the two-speed transmission **27** for centrifugally extracting fluid from the fabrics as is well understood. During this period of high speed rotation, the centrifugal force of the damp fabrics is sufficient to stress the springs **22** and deform or fold the vanes **19** toward the inner periphery of the basket **13**.

After rotation at high speed for a period sufficient to remove the major portion of the liquid from the fabrics, the speed of the basket **13** is reduced by means of the two-speed transmission **27** to the washing value to permit the clothes to tumble freely within the basket **13**. There is, however, a tendency for the damp clothes to adhere to the inner periphery of the basket **13** even after the speed of the basket has been reduced, and it is with this phenomena that the present invention is concerned. With a reduction in the speed of rotation of the basket **13**, there is a corresponding reduction in the centrifugal force of the fabrics acting on the resilient vanes **19** which, under the action of the springs **22** regain their original shape, forcing the clothes away from the basket wall **14** and breaking the adhesive bond between the fabrics and the basket established during high speed rotation. The basket is then rotated for a short time at low speed to insure that all of the fabrics are tumbled loosely within the basket **13** in order that they may be easily removed after the machine has stopped.

While I have shown four flexible vanes **19** positioned within the basket **13**, it is understood that a greater or lesser number may be provided to effectively practice my invention. It is, of course, possible to provide the basket **13** with a single flexible vane **19**, or a flexible area in the sidewall to break the adhesive bond between a portion of the bundle of fabrics and the basket side wall when the speed of the basket is reduced. This loosened portion of the fabric will then separate the remaining portion of the bundle from the basket side wall and tumbling of the bundle will be effected during low speed rotation of the basket.

Furthermore, suitable means (not shown) may be associated with the tub structure **10** for blowing heated air through the perforated basket **13** and the fabrics therein after the washing and spinning operations have been completed to completely dry the clothes prior to their removal from the machine. The resilient vanes **19**, or flexible wall areas, the action of which has been hereinbefore described, would in such case insure free tumbling of the fabrics within the basket **13** during this drying operation.

Figs. 3 and 4 illustrate a modification of my invention in which the vanes **36** are made of a flexible resilient material, such as rubber or plastic, which tends to regain its original shape after deformation without additional resilient supporting means. Fig. 3 shows one such vane **36** in its extended position while Fig. 4 illustrates the shape which the vane **36** might assume when deformed by the centrifugal force of the damp fabrics during high speed rotation.

While I have shown my invention in two forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof.

What I claim is:

1. In apparatus for centrifuging fluid from fabrics, the combination of a perforate, generally cylindrical basket for containing the fabrics to be treated, means for rotating the basket at relatively high speed for centrifuging fluid from the fabrics, a member extending radially inwardly of the side wall of the basket and engaging the body of fabrics during a centrifuging operation, said member being of deformable construction, and means associated with the member for biasing the member to an extended position inwardly of the side wall of the basket when the basket is substantially inactive, said body of fabrics collapsing the member in opposition to the biasing means by centrifugal force during high speed rotation of the basket, the construction and arrangement being such that the member is returned to its extended position by said biasing means when high speed rotation of the fabrics is terminated for breaking the adhesive bond between the fabrics and the sidewall of the basket.

2. In apparatus for centrifuging fluid from fabrics, the combination of a perforate, generally cylindrical basket for containing the fabrics to be treated, means for rotating the basket at relatively high speed for centrifuging fluid from the fabrics, a hollow member extending radially inwardly of the sidewall of the basket and engaging the body of fabrics during a centrifuging operation, said member being of deformable construction, and a spring carried by the basket and arranged interiorly of the member for biasing the member to an extended position inwardly of the sidewall of the basket when the basket is substantially inactive, said body of fabrics collapsing the member in opposition to the bias of the spring by centrifugal force during high speed rotation of the basket, the construction and arrangement being such that the member is returned to its extended position by said spring when high speed rotation of the fabrics is terminated for breaking the adhesive bond between the fabrics and the sidewall of the basket.

3. In apparatus for tumbling fabrics and centrifuging cleaning fluid therefrom, the combination of a generally cylindrical basket having a perforate sidewall for enclosing fabrics to be treated, means for rotating the basket at low speed for tumbling the fabrics and at higher speed for centrifuging fluid from the fabrics, a hollow vane extending inwardly of said sidewall and engaging the fabrics, said vane being of flexible, deformable construction and a spring carried by the basket and arranged interiorly of the vane for biasing the vane inwardly of the basket to an extended position wherein the vane is effective to lift

and tumble the fabrics during low speed operation of the basket, said vane being deformed by centrifugal force of the vane and fabrics to a collapsed position in opposition to the bias of the spring during high speed operation of the basket, the construction and arrangement being such that the vane is returned to said extended position by the spring when high speed operation of the basket is terminated for breaking the adhesive bond between the body of fabrics and the sidewall of the basket.

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