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AGITATOR WITH CONTROLLED VANE FLEXURE

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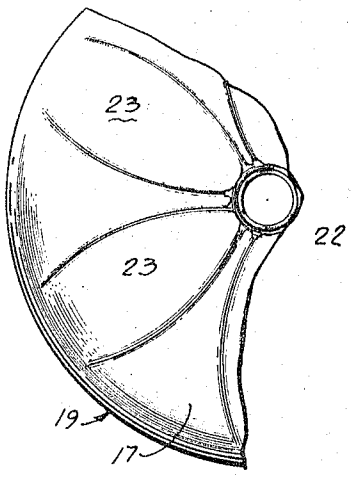


Fig. 3

Fig. 1

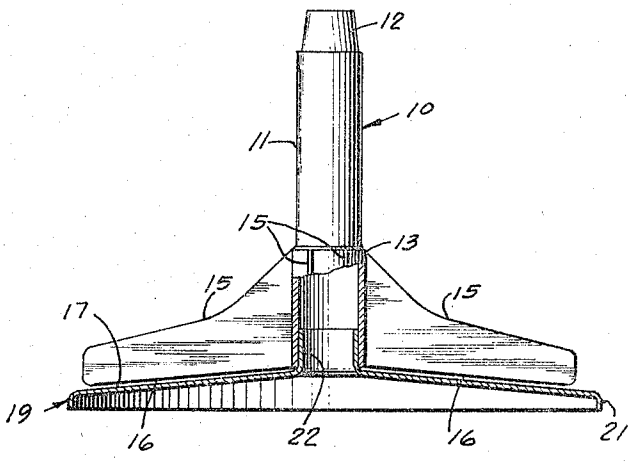


Fig. 2

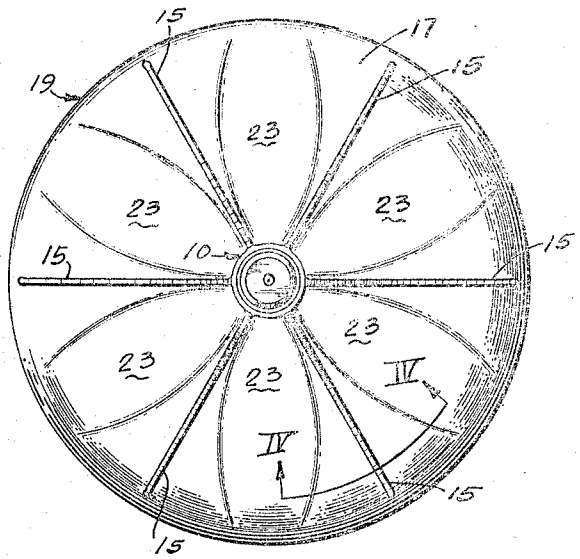
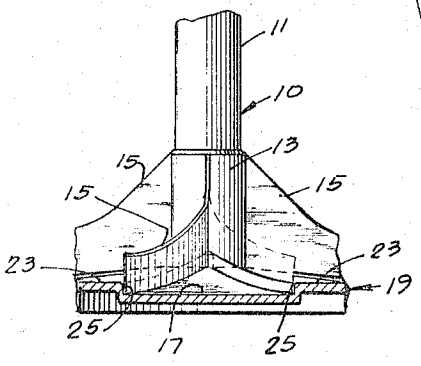


Fig. 4



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AGITATOR WITH CONTROLLED VANE FLEXURE

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This invention relates to improvements in clothes washing machines and more particularly relates to a novel and improved agitator for such machines.

Heretofore, agitators for clothes washing machines have been provided which oscillate about vertical axes and have generally radial vertical vanes extending from an upright center post of the agitator. These vanes have been sufficiently flexible to flex during oscillation of the agitator and circulation of the washing solution and the articles of clothing and the like in the tub.

With such agitators, however, the vanes are freely extending and spaced above the bottom of the machine tub so that some articles being washed may have a tendency to tangle and wrap around the vanes. The tangled articles are difficult to remove from the washing machine and in some cases may be damaged by abrasion caused as a result of rubbing against the bottom of the tub or basket in which the agitator is positioned.

A principal object of the present invention, therefore, is to provide an improved form of agitator having all of the advantages of flexible vanes and arranged to avoid the tangling of clothes or other articles being washed, on the vanes.

Another object of the invention is to provide an improved form of agitator having freely flexing radially extending vanes in which tangling of the clothes on the vanes is avoided by protecting the vanes by a skirt along which the vanes flex.

Still another object of the invention is to improve upon the agitators heretofore used for the washing of articles of clothing and the like, by providing the agitator with generally radially extending vanes flexing about their supporting center post and by protecting the bottom surfaces of the vanes to prevent the passage of clothes thereunder, in which the protecting means limits flexing of the vanes along their lower boundaries, but accommodates continued flexing of the vanes in the upper regions thereof.

Still another object of the invention is to provide a novel and improved form of agitator having an oscillatable center post and flexible vanes extending generally radially therefrom and flexing along the top surface of a protecting skirt, in which the skirt is so formed as to limit flexing of the vanes and to elevate the articles being washed as they approach the vanes, to avoid passing of the articles beneath the vanes and wrapping thereabout.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

FIGURE 1 is a view in side elevation of an agitator constructed in accordance with the principles of the present invention with certain parts broken away and certain other parts shown in vertical section;

FIGURE 2 is a plan view of the agitator shown in FIGURE 1;

FIGURE 3 is a fragmentary plan view of the protecting skirt for the vanes; and

FIGURE 4 is a partial fragmentary diagrammatic sectional view of the agitator taken substantially along line IV—IV of FIGURE 2 and illustrating the flexing of the vanes during a washing operation.

In the embodiment of the invention illustrated in the drawing, there is shown an agitator **10** of a type adapted to wash articles of clothing and the like, by oscillatable movement in a laundry machine tub (not shown). The agitator **10** includes a vertical hollow center post **11** having a reduced diameter generally frusto-conical upper end portion **12** adapted to be mounted on the top of a vertical shaft (not shown), extending upwardly into the washing machine tub and oscillatably driven by the washing machine transmission (not shown) in a conventional manner.

The center post **11** is shown as being generally cylindrical in form and as having an enlarged diameter lower end portion **13** having a plurality of vanes **15** extending radially therefrom. The center post and vanes may be made from a suitable plastic material, resistant to the corrosive effects of the washing solution, although they need not necessarily be made from a plastic material. The vanes may be recessed within the enlarged diameter portion **13** at their inner ends to extend vertically therealong and may be bonded thereto by a suitable bonding material, such as an epoxy resin. The vanes, of course, may be molded integrally with said enlarged diameter portion of said center post.

As herein shown, each vane **15** extends for the height of the enlarged diameter portion **13** at its inner end and slopes downwardly to a reduced height outer end portion or tip.

The vanes are sufficiently thick and the flexibility or resiliency of the material from which the vanes are made is such as to bias the vanes to extend radially of the center post when the agitator is not in operation, or is operating under no load conditions. The vanes **15** have sloping bottom edges **16** conforming to and spaced closely adjacent a top surface **17** of a skirt **19**, extending beneath the vanes and shown as extending beyond the ends thereof. The skirt **19** may also be made from a plastic material, which may be like the material from which the agitator is made, and has a down turned outer cylindrical rim **21** terminating into the top surface **17**, shown as being generally frusto-conical in form and sloping from the center post towards the rim **21** at a relatively flat angle with respect to the horizontal. The frusto-conical top surface **17** of the skirt **19** terminates at its inner end into an integral formed vertically extending collar **22**, shown as extending within the enlarged diameter portion **13** of the hollow center post **11**. The collar **22** may be bonded to the center post as by a suitable cement, such as an epoxy resin or other cement.

The top surface **17** of the skirt **19** is so formed as to prevent the passage of clothes beneath the agitator vanes **15** during operation of the agitator and to limit flexible movement of the lower end portions of the vanes. As shown in FIGURES 2, 3 and 4, the top surface of the skirt **17** has a plurality of outwardly flaring ribs, which in the present disclosure are in the form of embossments **23** extending upwardly of the top frusto-conical surface **17** of the skirt **19**. The embossments **23** extend between the vanes **15** from the region of the center post **11** and diverge from the vanes as they extend to the outer edge portion of the skirt. The ribs or embossments **23** are shown in FIGURES 2 and 3 as curving as they diverge from the vanes in a uniform curve, conforming to the paths of flexure of the vanes during oscillatable movement of the agitator. Each embossment **23** has a stop face **25**, which may be generally vertical, to limit flexure of the vane **15** in each direction of movement of the agitator. The embossments **23** serve to maintain the articles of clothing during a washing operation above the level of the lower edges of the vanes, to thereby prevent the articles of clothing from passing beneath the lower edges of the vanes and becoming wedged or tangled therewith.

It may here be seen that during oscillation of the agitator **10** the vanes **15** may freely move back and forth along the top surface **17** of the skirt **19** between the embossments **23** under the influence of the washing liquid and the articles being washed.

The embossments **23** while limiting movement of the lower edges of the vanes **15** still accommodate the free upper edges to curl and accommodate articles of clothing to readily pass thereover.

It may also be seen that the bottom edges of the vanes **15** are sufficiently close to the top surface **17** of the skirt **19**, to restrain articles of clothing from becoming wedged beneath the vanes and that the raised surfaces of the embossments **23** further assure that the articles being washed will neither pass beneath nor wrap around the vanes, by maintaining the articles above the bottom edges of the vanes during the entire washing operation.

While there is herein shown and described one form in which the invention may be embodied, it will be understood modifications and variations in the invention may be effected without departing from the spirit and scope of the novel concepts of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An agitator for use in a vertical axis washing machine comprising: an upright center post, a plurality of flexible vanes connected to said center post and having radially extending free ends, and a skirt coextensively underlying and spaced closely subjacent said flexible vanes.

2. The agitator of claim **1**, wherein said skirt is provided with means thereon for limiting circumferential flexing movement of said radially extending free ends of said vanes.

3. The agitator of claim **1**, wherein the said skirt is provided with ribs extending along said vanes and flaring outwardly with respect to said vanes in the paths of flexure thereof, for limiting movement of said radially extending free ends of said vanes.

4. In an agitator particularly adapted for clothes washing machines, an oscillatably driven vertically extending center post, a plurality of spaced flexible agitator vanes extending vertically along said post for a portion of the height thereof, and projecting radially therefrom, said vanes having bottom edges inclined downwardly with respect to said post, a skirt connected with the bottom of said post and having a top surface extending coextensively with and parallel to the bottom edges of said vanes and closely subjacent said vanes whereby said vanes may flex laterally along said skirt upon oscillatable movement of said agitator.

5. In an agitator particularly adapted for clothes washing machines, an oscillatably driven vertically extending center post, a plurality of spaced flexible agitator vanes extending vertically along said post for a portion of the height thereof, and projecting radially therefrom, said vanes having bottom edges inclined downwardly with respect to said post, a skirt connected with the bottom of said post and having a top surface extending parallel to the bottom edges of said vanes and closely subjacent said vanes whereby said vanes may flex laterally along said skirt upon oscillatable movement of said agitator, said skirt being provided with embossments thereon for maintaining the clothes upwardly above the bottom edges of said vanes, and wherein said embossments terminate into stops limiting flexible movement of the bottom portions of said agitator vanes.

6. In an agitator particularly adapted for clothes washing machines, an oscillatably driven vertically extending center post, a plurality of spaced flexible agitator vanes extending vertically along said post for a portion of the height thereof, and projecting radially therefrom, said vanes having bottom edges inclined downwardly with respect to said post, a skirt connected with the bottom of said post and having a top surface extending parallel to the bottom edges of said vanes and closely subjacent said vanes whereby said vanes may flex laterally along said skirt upon oscillatable movement of said agitator, said skirt having embossments extending upwardly therefrom along opposite sides of said vanes and diverging arcuately from said vanes toward the periphery of said skirt, and wherein said embossments have stop surfaces facing said vanes for limiting lateral flexible movement of said vanes.

7. For use with a laundry machine, an agitator construction comprising: a center post having a radially outwardly extending skirt at one end, and a plurality of circumferentially spaced radially outwardly extending vanes on said center post, each vane having an edge conformably shaped and closely spaced adjacent the coextensively adjoining surface portions of said skirt, said vanes being made of a flexible material, whereby said vanes can flex relative to said skirt without entangling materials therebetween.

8. For use with a laundry machine, an agitator construction as defined in claim **7** and further characterized by said skirt having circumferentially spaced abutment stops engageable with a corresponding edge of each vane to limit the degree of flexure thereof.

9. For use with a laundry machine, an agitator construction as defined in claim **8** wherein said skirt has embossed thereon a raised portion for each corresponding vane and the radial walls of said raised portions form said abutment stops.

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