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WASHING MACHINE HAVING SQUARE TUB AND OPPOSED IMPELLERS

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3 Claims. (Cl. 68—131)

1 The present invention relates to a novel washing machine and particularly to a novel washing principle and assembly in which two opposed agitators are rotatably mounted in two of the opposite sides of a substantially square or rectangular tub, and these agitators are continuously rotated in opposite directions whereby a novel washing action is produced.

The invention comprehends a novel assembly of a washing machine tub or container and a pair of agitators mounted in the tub in such manner that each agitator rotates on a horizontal axis and is semi-submerged in the wash water or washing solution. When operating in the opposite sides of a substantially square or rectangular tub and in a depth of washing solution extending to approximately the center of each agitator, the clothes to be washed and the washing solution are moved about the interior of the tub and as they enter the downward side of the agitator, they are sucked under and thrown up on the opposite side where the peripheral flow of the washing solution carries them over to the opposed agitator where they are sucked down and under and thrown up on the opposite side of this second agitator, thereby forming a complete circuit or cycle about the periphery of the tub and in which circuit or cycle the clothes are manipulated and washed in an efficient manner.

Another important object of the present invention is the provision of a novel method or principle of washing clothes by means of opposed agitators continuously rotated in opposite directions whereby a vigorous water and washing action is set up in the tub unlike that resulting from the operation of prior constructions of agitator types of washing machines.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

The invention further resides in the construction, combination and arrangement of parts illustrated in the accompanying drawing, and while there is shown therein a preferred embodiment, it is to be understood that the same is susceptible of modification and change, and comprehends other details, arrangements of parts, features and constructions without departing from the spirit of the invention.

In the drawing:

Fig. 1 is a view in horizontal cross-section

2 through the novel washing machine taken in a plane represented by the line 1—1 of Fig. 2.

Fig. 2 is a view in vertical cross-section thereof, the view being taken on the line 2—2 of Fig. 1.

Referring more particularly to the disclosure in the drawing, the novel embodiment selected to illustrate the invention comprises a substantially square or rectangular tub 1 provided with end and side walls 2, 3, 4 and 5, a top having an opening 6 adapted to be closed by means of a lid 7, and a bottom wall 8 forming the base of the tub. Rotatably mounted in the opposite end walls 2 and 4 of the tub are a pair of agitators 9 and 10 each mounted upon a stub shaft 11 journaled in a bushing or bearing 12. On the outer end of each stub shaft is mounted a pulley wheel 13 adapted to be rotated by means of a belt or the like 14 from a pulley wheel 15 disposed at each side of the tub and mounted upon a transverse counter shaft 16. One end of the counter shaft is journaled in a bearing sleeve 17 and has mounted on its outer end a pulley wheel 18 driven by means of a drive belt 19 from a pulley 20 on the shaft of a motor or other power unit 21. The other end of the counter shaft is journaled in bearing sleeve 22 with the adjacent pulleys 15 and 13 being connected by the drive belt 14 which is crossed in order to rotate the agitator 10 in the desired direction as shown by the arrow and move the clothes and wash water in a complete and continuous circuit or cycle.

The opposed agitators 9 and 10 each have their base 23 disposed adjacent an end wall and in such close proximity thereto as to eliminate any danger of clothes collecting or being wedged between these members and the interior of the tub. Upon the base is mounted a plurality of substantially equally spaced impelling blades or vanes 24 projecting outwardly into the washing solution.

Wash water or washing solution is introduced into the tub through the top and to a depth 25 reaching approximately the center line or axis of rotation of the aligned agitators. Although the depth of wash water may vary somewhat above or below the preferred and designated level, best results are obtained when the water extends to approximately the axis of rotation for the reason that tangling and twisting of the clothes is thereby avoided. Where the agitator is completely submerged, the clothes would be carried up over the agitator and have a tendency to become tangled or twisted thereon.

By employing two agitators disposed at the opposite ends of the tub and operating them in

3 the manner and direction shown, there are no dead washing areas or zones but the clothes are moved through a complete circuit in which a vigorous water and washing action is produced, the path of the wash water and contained clothes being shown generally by the arrows in Fig. 1.

Excellent results have been secured by rotating the agitators in opposite directions and at a speed of rotation of approximately 50 revolutions per minute, although such speed may vary in accordance with the dimensions of the tub. In the disclosed embodiment, the tub is shown as approximately 22 inches square, and requires approximately 20 gallons of water to bring the depth to the center line of the agitators.

In the operation of the novel machine, water is introduced to approximately the center line or axis of rotation of the agitators, after which the clothes are inserted. Upon rotation of the opposed agitators, the clothes to be washed and the washing fluid travel in a path about the inner periphery of the tub with the clothes and washing solution entering the downward side of an agitator, then being sucked or drawn under and thrown up on the opposite side of this agitator where the peripheral flow of the washing solution carries the clothes in suspension over to the opposed agitator where they are sucked or drawn down and under at one side of the second agitator and thrown up on the opposite side, thereby forming a complete and continuous circuit around the interior of the tub.

By having the water level at approximately the center or axis of rotation of the agitators, the clothes are prevented from being carried over the top of these agitators and becoming tangled or wound thereon. As the tub is substantially square or rectangular, the currents of the washing solution are broken up to all four corners, thereby resulting in a vigorous washing action at each corner. Furthermore, by reason of the contour of the tub, the clothes do not circulate freely around the inner periphery, but are retarded in their path of movement sufficiently to permit the vanes or blades of the agitators to manipulate the fabric and give the clothes a vigorous washing action. The maximum quantity of clothes to be washed should be no more than sufficient to permit a vigorous washing action in which the mass of clothes remains fluid in the washing solution and is circulated about the interior of the tub by the opposed agitators.

Having thus disclosed my invention, I claim:

1. A washing machine comprising a substantially square tub provided with flat bottom, side and end walls, a pair of opposed agitators each mounted in an end wall in said tub, each agitator having a solid imperforate conically flaring base disposed closely adjacent an end wall and having an outer peripheral portion disposed a substantial distance from the bottom and opposite side walls of said tub and being further provided with a plurality of flat sided vanes extending perpendicularly from the base and radially outward from their center of rotation and terminating at the outer periphery of the base to provide substantial clearance between them and the side and bottom walls, said tub receiving materials to be washed and wash water to a level so as to submerge approximately the lower half only of the agitators, and means for rapidly rotating said agitators continuously but in opposite directions to cause the water and materials to flow continuously in one direction about the inner periphery of the lower portion of the walls of said

4 tub, and said water and materials therein being engaged by the radial projecting vanes on each agitator in such manner as to abruptly change their direction as they flow turbulently along one of said side walls to the end wall and whereat the materials are engaged by said vanes and directed thereby downwardly and then upwardly at an increased velocity between the center of the drive shaft and bottom of the tub and discharged therefrom on the opposite side thereof parallel to the end wall, and said direction of flow being abruptly changed approximately 90° when the materials and water forcibly contact the side wall directly opposite the discharge side of the agitator, whereupon the materials then flow in a turbulent manner along that side wall by means of the velocity imparted thereto to the opposite end wall where the suction created at the inlet side of the oppositely disposed and rotating agitator causes the materials thereat to be engaged by the last mentioned agitator and accomplish the above mentioned washing action.

2. A machine for washing clothes consisting of a substantially square tub provided with a flat bottom and vertical end and side walls all smooth and unobstructed, a pair of opposed agitators each mounted for rotation in an end wall and said tub being adapted to contain wash water to a level reaching approximately the axis of rotation of the agitators, each agitator having a domed base and a plurality of spaced flat vanes of substantial depth projecting perpendicular to the base and radially outward to the periphery of the base so as to impel clothes and wash water outwardly from the ends of the vanes and parallel to the end wall in which the agitator is mounted, said agitators being spaced a substantial amount from the adjacent side walls and bottom of the tub whereby the vanes during rotation forcibly eject and project the clothes and water outwardly parallel to the end walls and forcibly against the adjacent vertical side wall of the tub at the discharge side of each agitator, and means for rapidly rotating the agitators in opposite directions whereby the clothes and wash water upon being discharged from beneath each agitator by the upward travel of each vane and forcibly projected against the adjacent vertical side wall are then caused to abruptly change their direction of movement and flow along and parallel to that side wall until drawn into the opposed agitator at its lower suction side and then discharged and forcibly projected against its adjacent side wall by the vanes of that agitator in their upward travel so as to cause a continuous movement and flexing of the clothes in the wash water about the interior of the tub and to and from each agitator.

3. A machine for washing clothes comprising a substantially square tub having a flat bottom and vertical side and end walls, an agitator journaled for rotation in each end wall substantially equidistant from the bottom and opposite side walls, said agitators being mounted in opposed relation and each provided with a base mounted in closely spaced relation with its adjacent end wall and having a domed central portion and a plurality of equally spaced and outwardly projecting flat radial vanes extending perpendicular to the base, the periphery of the base and the ends of the vanes being spaced a substantial distance from the opposite side walls and the bottom of the tub, said tub being filled with water to a level to submerge the lower half of said agitators, and means for rapidly and uniformly rotating the

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agitators in opposite directions whereby the clothes and water are drawn downwardly by the vanes at the suction side and then discharged outwardly from the outer ends of the vanes parallel to the adjacent end wall and forcibly against the adjacent side wall whereby a turbulent water action is produced at the corner of the end and adjoining side wall, and the clothes are then impelled along this side wall to the agitator at the other end wall where the operation is repeated.

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