Feb. 11, 1930. B. E. GETZ 1,746,250

WASHING MACHINE

Filed March 22, 1928 2 Sheets-Sheet 1

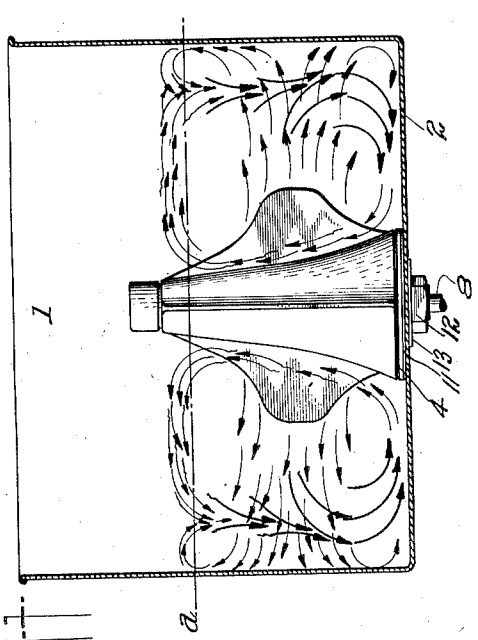


FIG. 1.

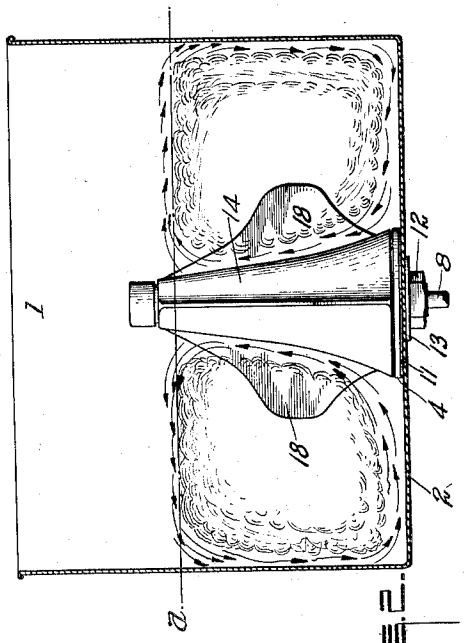


FIG. 2.

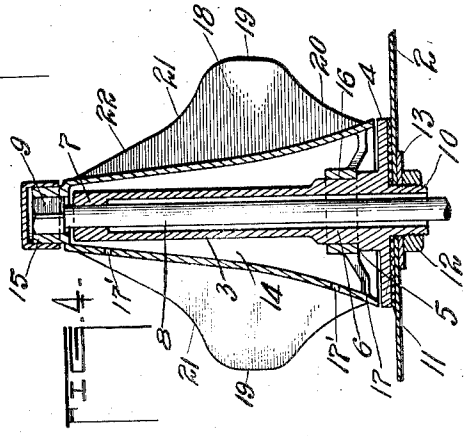


FIG. 4.

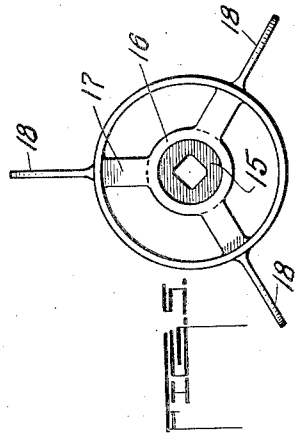


FIG. 5.

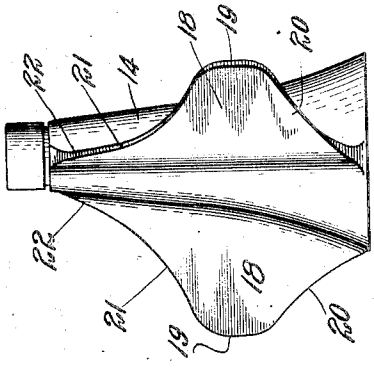


FIG. 3.

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WASHING MACHINE

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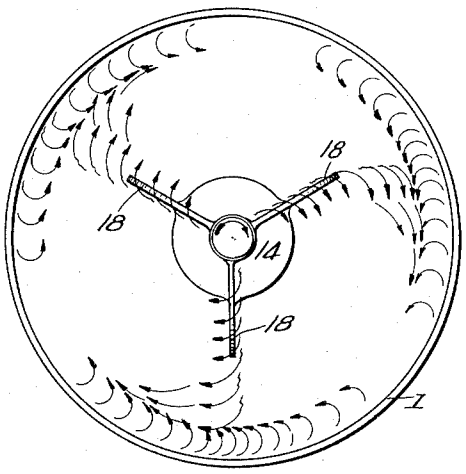


FIG. 6.

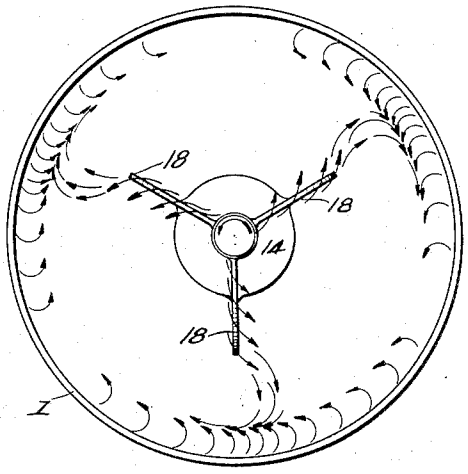


FIG. 7.

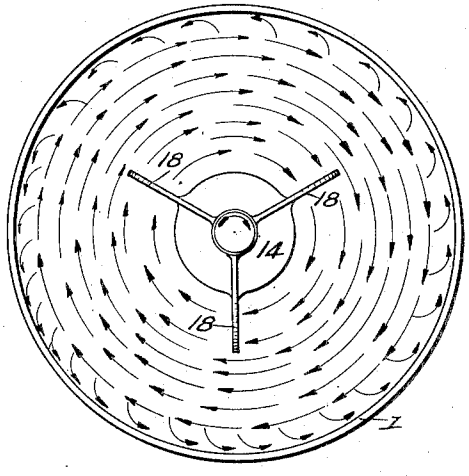


FIG. 8.

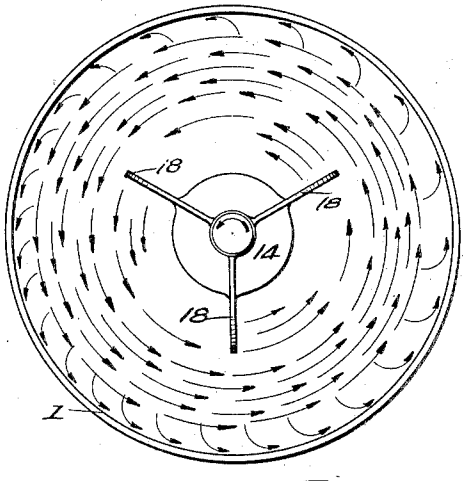


FIG. 9.

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UNITED STATES PATENT OFFICE

BENJAMIN E. GETZ, OF MORTON, ILLINOIS

WASHING MACHINE

Application filed March 22, 1928. Serial No. 263,609.

This invention has reference to washing machines, particularly that type intended for domestic use, and it has for its principal object to improve the agitator of such machines, whereby to accomplish a more efficient movement of the liquid within the tub and thereby a more effective cleansing of clothes or other materials placed therein.

The invention has for a further object to improve the construction of the agitator for such machines, and to the accomplishment of this purpose I provide an agitator unlike the "disk" agitator now so common in washing machines, in that it is without such "disk" or base and comprises a preferably bell-like member, the upper end of which will normally extend to a point above the normal water level in the tub and is provided with water impelling means, such as vanes or wings, which preferably extend throughout the length of the member and have their maximum radial widths approximately at or slightly below the mediate part thereof between the upper and lower ends of said member. Said member is adapted for receiving its power at its upper end, above the normal water level in the tub and its weight is carried by a bearing located within and near its lowermost end.

I have discovered, that by constructing an agitator of the form shown and described, I can produce a movement to the washing fluid or liquid different from any that I am now familiar with and which is of such a character that when the tub is filled with clothes or other materials the movement of such clothes or other materials will correspond substantially to the movement of the washing fluid or liquid and the clothes or other materials will be sustained in substantially suspended positions in the washing fluid or liquid, without massing, whereby the water and air will have free movement through the fabrics; furthermore, there are no surface projections, such as are usual in "disk-like" agitators for the clothes or other materials to get under and become torn or damaged, and the curved and elongated surface of the agitator member, and its impelling means, are so constructed that the washing fluid or liquid is forced upwardly and outwardly in arcs of circles so as to pass over the clothes or other materials at or above the normal water level and thence downwardly therethrough.

I have further discovered, that by the use of an agitator, as shown and described, the washing fluid or liquid, during the reciprocation of the agitator is caused to alternately flow in reverse directions concentric to the axis of the agitator and to describe radial movement away from the axis of the agitator and toward the side of the tub, at or above the normal water level in the tub, and from the side of the tub toward the agitator at its lowermost portion, thence upwardly along the bell shaped surface of said agitator, moving outwardly therefrom at a point approximate the normal water level in the tub and breaking over the upper portions of the impelling means in arcs of circles. The currents so created through and by the action of the impelling means is further supplemental by radial movements of the washing fluid or liquid at a point approximately midway the depth of such washing fluid or liquid, which will result, when the washing fluid or liquid is acting on clothes or other materials placed therein to cause a somewhat corresponding movement thereto, to-wit—a suspension of the clothes or other materials in the washing fluid or liquid, the articles being caused to assume a loose relation with respect to each other and to circulate in alternate reverse paths concentric to the axis of the agitator and radially outwardly, thence downwardly and thence inwardly and upwardly; the washing fluid or liquid and air being forcibly impelled through the clothes in directions similar to that which said washing fluid or liquid is caused to be taken by the impelling means, as if no clothes or other materials were in the tub.

Other and further objects will more fully appear from the following description.

That the invention may be more fully understood, reference is had to the accompanying drawings forming part of this description, illustrating a preferred embodiment of the invention, in which:—

Fig. 1 is a vertical sectional view showing

the interior of a tub with my improved agitator and impelling means, in full lines, in operative position therein, the arrows showing the direction of movement of the body of the washing fluid or liquid, without clothes or other materials therein;

Fig. 2 is a view similar to Fig. 1, except that clothing or other materials are indicated by lines to be suspended within the washing fluid or liquid, and the arrows show the movement of the washing fluid or liquid, as well as the clothes or other materials, with the washing fluid or liquid breaking over the top of the bulk of clothes or other materials, at or above the normal water level to pass downwardly therethrough;

Fig. 3 is a side elevation of the agitator, with the rear impeller shown in perspective;

Fig. 4 is a vertical sectional view of the agitator and its supporting and driving means;

Fig. 5 is a bottom end view of the agitator and impelling means;

Figs. 6 and 7 are companion views, in plan, of a tub and agitator therein; the arrows of Fig. 6 showing the course of the washing fluid or liquid resulting from the reciprocation of the agitator in one direction, and Fig. 7 showing the course of the washing fluid or liquid resulting from the reciprocation of the agitator in an opposite direction, and

Figs. 8 and 9 are companion views, in plan, of a tub and agitator therein and assuming that a normal wash is within the washing fluid or liquid; the arrows of Fig. 8 showing the course of the washing fluid or liquid and clothes or other materials resulting from the reciprocation of the agitator in one direction, and Fig. 9 showing the course of the washing fluid or liquid and clothes or other materials resulting from the reciprocation of the agitator in the opposite direction.

Like characters of reference denote corresponding parts throughout the several figures.

For purposes of illustration I have shown the tub 1 round, but it is to be understood that the tub may be square or any other suitable or desired shape, the shape of the tub in no way modifying or changing the movement or course of action of either the washing fluid or liquid or materials, being washed, therein or therewith.

The tub 1 is also shown having a preferably flat bottom 2, although this is not intended to imply that the bottom of the tub must be flat, as it may have other shape to meet the wishes or desires of the manufacturer. 3 designates a tubular post, normally positioned axially of the tub and rising from the bottom 2 to a point, preferably above the normal water level in the tub; such level being designated by the water level line *a*, Figs. 1 and 2. This post is formed or provided with a rather thin annulus base 4, preferably having a diameter equalling or corresponding to the normal diameter of the lowermost end portion of the agitator proper, see Figs. 1, 2 and 4. The base portion of the post, where it merges into or from the annulus base 4 has a diameter somewhat larger than the diameter of the post proper and is shouldered at 5 to provide the bearing portion 6. The tubular diameter of the post is preferably uniform throughout, from end to end, except at its upper end where it is reduced to provide a journal bearing at 7 for the upper end portion of the vertically disposed operating shaft 8, which is disposed axially within the post, receiving its power from any suitable actuating mechanism, not shown, arranged beneath the tub, but so designed as to impart alternate reciprocal movement to said shaft 8. The upper end of said shaft, above the journal bearing end 7 of the post 3 is formed with or is provided with a knob or preferably squared end portion 9, functioning as a clutch means for connection of the agitator therewith, whereby to impart alternate reciprocation to the agitator. From the annulus base 4 depends the threaded end 10 of the post and such thread end extends down through an opening in the tub bottom 2. To provide a water seal about the post 3 at the tub bottom, and to secure the post in position, there is provided a suitable packing 11 between the annulus base portion 4 of the post 3 and the bottom 2 of the tub and screwed onto the threaded end 10 of the post 3 is a locking nut 12 and between the nut and the bottom of the tub and encircling the end 10 of the post 3 is a plate 13, or packing, if desired.

Referring now to the agitator it is shown as a preferably elongated bell-shaped member 14, the flared lowermost end portion of which has a diameter substantially to that of the annulus base portion 4 of the post 3 and supported in operative position is immediately above or next adjacent the upper surface of the annulus base 4, sufficient clearance being maintained to prevent rubbing of the adjacent surfaces when the agitator is reciprocated. The surface of the agitator slopes gradually upward, as shown, to a point approximately the upper end of the post 3, where it is reduced, providing an off-set tubular portion 15 which has an opening therein corresponding to the knob or squared end 9 on the shaft, to provide a slip-clutch connection of the upper end of the agitator with the upper end of the shaft 8, whereby, when the shaft 8 is reciprocated the agitator will be reciprocated therewith. The support for the agitator is at or near its lowermost end portion and this is provided, preferably in the form of the ring-like member 16 connected by radial arms 17 with the body of the agitator and said member 16 has a journal bearing on the bearing portion 6 of the

post 3, riding on the shoulder 5, see Fig. 4. With this arrangement there is no need of a supporting connection for the upper end of the agitator with the post 3. The wall of the agitator may have openings, as at 17, to prevent a vacuum within the bell-like structure of the agitator. The washing fluid or liquid impelling means on the agitator take the form of wings or vanes 18, of which I provide, preferably three, spaced equidistant about the agitator body and extending radially therefrom. These impellers, preferably extend throughout the length of the agitator body and have their maximum radial widths approximately at or slightly below the mediate part of the agitator body between its lower and upper ends. The impellers 18, where their radial widths are the greatest present sufficiently extended vertical surfaces to act as paddles during the reciprocation of the agitator to act on the body of the washing fluid or liquid to agitate it for washing purposes. The impellers at such point have preferably vertically disposed peripheral edges 19 which curve downwardly and inwardly, at 20, and merge into the lowermost end portion of the bell shaped body of the agitator, and which also curve inwardly and upwardly as at 21 with inwardly inclined portions 22 merging into the upper end portion of the bell-shaped body of the agitator. Such impellers, together with the surface formation of the bell-shaped body of the agitator effect the movement of the washing fluid or liquid and clothes or other materials, as I have previously pointed out and as illustrated, first by the arrows in Figs. 1, 6 and 7 showing the directions of movement of the washing fluid or liquid, and then in Figs. 2, 8 and 9 showing the directions of movement of both the washing fluid or liquid and the clothes or other materials.

What I claim is:—

1. The method of cleansing fabrics in a tub which consists in agitating a washing fluid in such a way as to cause the body of the fluid to be moved alternately in opposite directions about a substantially central zone and away from such central zone at approximately the water level in the tub and towards such central zone near the lower fluid level in the tub, and during each reverse movement of the body of such fluid to create violently flowing currents of the fluid rising in the central zone to and above the fluid level travelling in arcs of circles outwardly from the central zone and in the direction of the reverse movements of the body of the fluid about such central zone, the movement of the body of the fluid thus created by such agitation causing the fabrics to be suspended in loose relation in the body of the fluid and to travel in substantially the same paths as the body of the fluid, whereby the said violently flowing currents will rise from within the central zone and flow outwardly over and downwardly into the body of the fluid and the fabrics at the normal water level in the tub.

2. An agitator for a washing machine comprising a casting bell-like in shape and provided on its surface with a plurality of radially arranged and equidistantly disposed impellers, the greatest radial dimension of said impellers being disposed at a point approximately mediate the length of said casting and having approximately vertical peripheral edges which at their lowermost points curve downwardly and inwardly and merge into the surface of said casting at the lower edge thereof and at their uppermost points curve upwardly and inwardly and then incline to and merge into the casting at the upper edge thereof.

3. An agitator for a washing machine comprising a casting bell-like in shape having a neck portion at its upper end arranged for connection with a driving part, and provided on its surface with a plurality of radially arranged and equidistantly disposed impellers, the greatest radial dimension of said impellers being disposed at a point approximately mediate the length of said casting and having approximately vertical peripheral edges which at their lowermost points curve downwardly and inwardly and merge into the surface of said casting at the lower edge thereof and at their uppermost points curve upwardly and inwardly and then incline to and merge into the casting at the upper edge of the bell-shape portion of said casting.

4. An agitator for a washing machine comprising a casting bell-like in shape having a neck portion at its upper end arranged for connection with a driving part, and provided on its surface with a plurality of radially arranged and equidistantly disposed impellers, the greatest radial dimension of said impellers being disposed at a point approximately mediate the length of said casting and having approximately vertical peripheral edges which at their lowermost points curve downwardly and inwardly and merge into the surface of said casting at the lower edge thereof and at their uppermost points curve upwardly and inwardly and then incline to and merge into the casting at the upper edge of the bell-shape portion of said casting, and a bearing means within said casting at the lower portion thereof.

5. An agitator for a washing machine comprising a casting bell-like in shape and provided on its surface with a plurality of radially arranged plate-like impellers, each impeller having its greatest radial dimension projecting beyond the lowermost edge of said casting and merging into the lower portion of the casting with an inwardly and downwardly curved part and merging into the upper portion of the casting with an inwardly and upwardly curved part.

6. In a washing machine, in combination, a tub, a tubular part upstanding axially therein to a point above the normal water level in the tub, said post including an annulus plate like portion next adjacent the upper surface of the bottom of the tub, a driving shaft extending axially through said post provided with a driving part above the top of the post, an agitator having a body bell-like in shape having a neck portion at its upper end arranged for connection with the driving part of said shaft and having a diameter at its lower end corresponding approximately to the diameter of said annulus plate, and a plurality of radially arranged plate-like impellers on said agitator body, each impeller having its greatest radial dimension projecting beyond the lowermost edge of said agitator body and said annulus plate and merging into the lower portion of the agitator body with an inwardly and downwardly curved part and merging into the upper portion of the agitator body with an inwardly and upwardly curved part.

7. In a washing machine, in combination, a tub, a tubular part upstanding axially therein to a point above the normal water level in the tub, said post including an annulus plate like portion next adjacent the upper surface of the bottom of the tub and having a shouldered portion between said plate and the body of the post, a driving shaft extending axially through said post provided with a driving part above the top of the post, an agitator body bell-like in shape having a neck portion at its upper end arranged for connection with the driving part of said shaft and having a bearing member arranged for seating relation with the shouldered portion of said annulus plate and having a diameter at its lower end corresponding approximately to the diameter of said annulus plate, and a plurality of radially arranged plate-like impellers on said agitator body, each impeller having its greatest radial dimension projecting beyond the lowermost edge of said agitator body and said annulus plate and merging into the lower portion of the agitator body with an inwardly and downwardly curved part and merging into the upper portion of the agitator body with an inwardly and upwardly curved part.

8. An agitator for a washing machine comprising a hollow body having a bell-like shape presenting a downwardly and outwardly tapered and curved surface from the top of the body to the lower edge thereof, and a plurality of radially arranged impellers projecting from the surface of said body and extending throughout the length thereof, each of said impellers having their greatest radial dimensions and heights at radial points beyond the lower outer edge of said body.

9. An agitator for a washing machine comprising an elongated tubular body conical in shape having a plurality of radially arranged imperforate impellers projecting therefrom and extending throughout the length thereof, the greatest radial dimensions of said impellers being substantially at points mediate the distance between the upper and lower ends of said tubular body, each of said impellers having their greatest radial dimensions and heights at radial points beyond the upper and lower edges of said body.

In witness whereof, I have hereunto affixed my hand this 16th day of March, 1928.

BENJAMIN E. GETZ.