Dec. 20, 1932. R. J. WATERWORTH 1,891,339

WASHING MACHINE

Filed Oct. 8, 1930 2 Sheets-Sheet 1

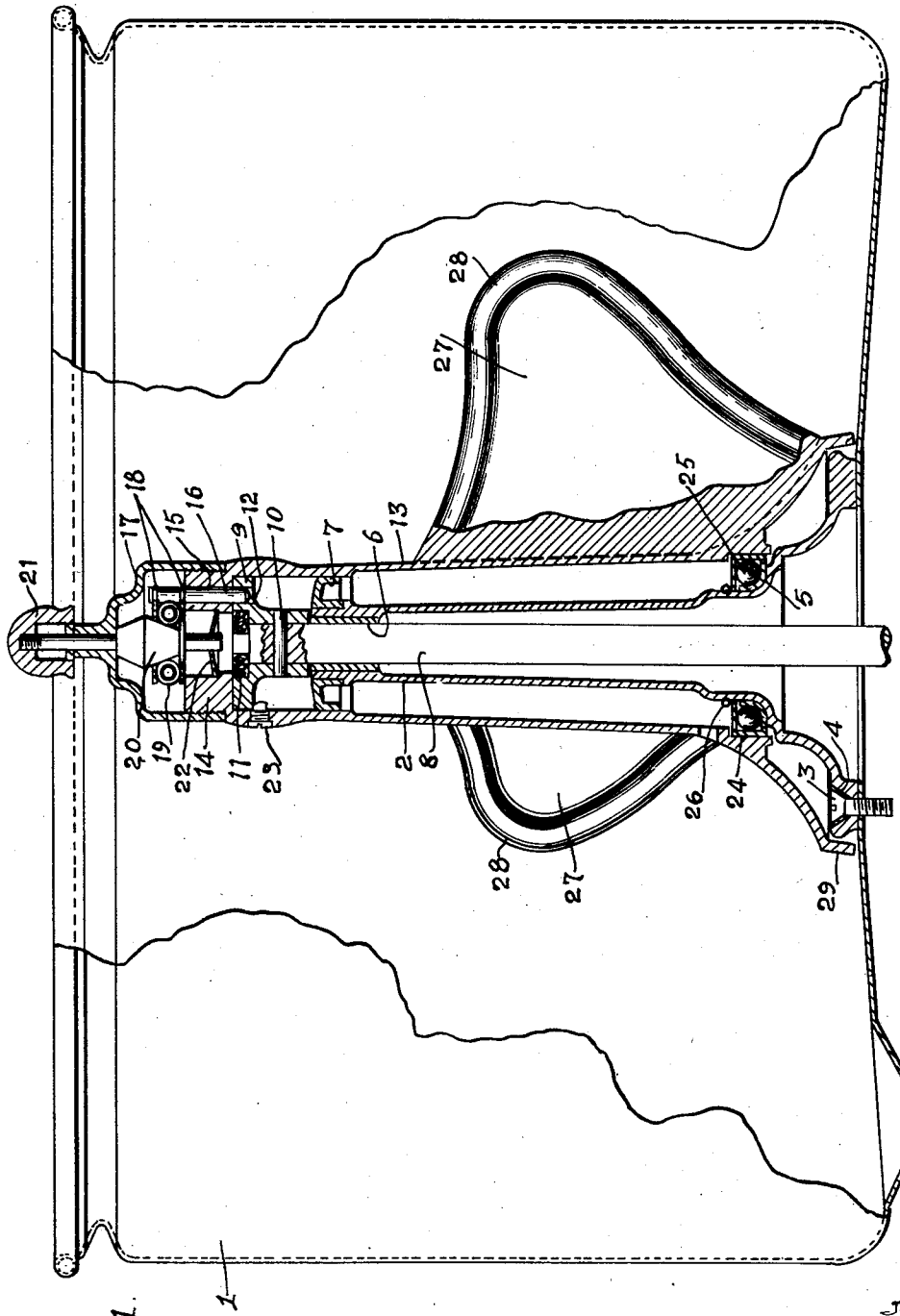


FIG. 1.

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FIG. 2.

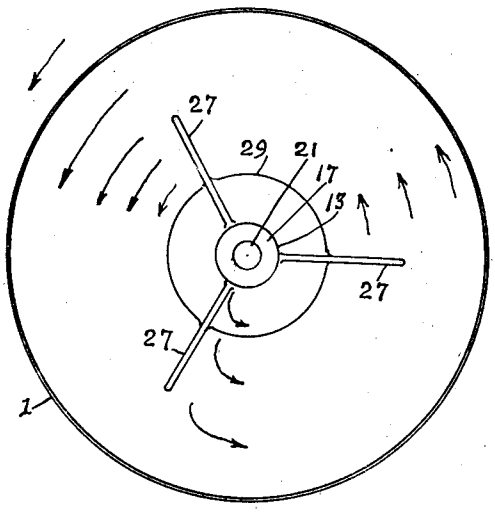


FIG. 4.

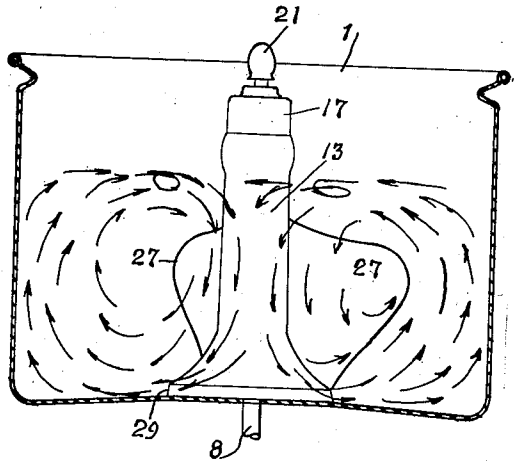


FIG. 3.

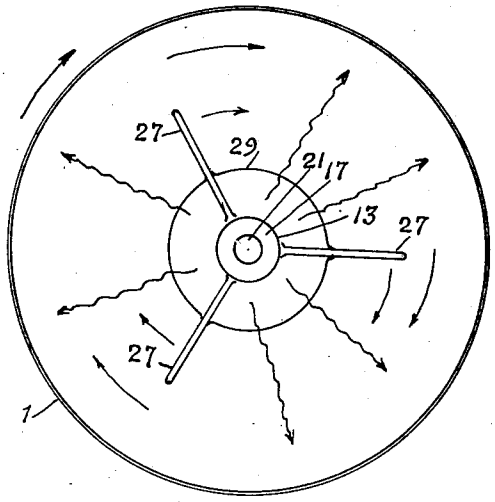
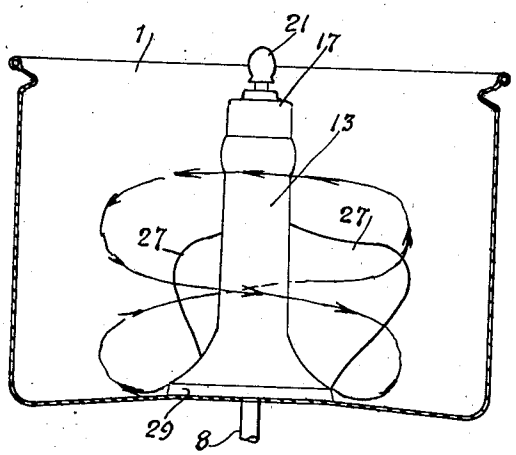


FIG. 5.



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UNITED STATES PATENT OFFICE

ROBERT J. WATERWORTH, OF SIDNEY, OHIO, ASSIGNOR TO PRIMA MANUFACTURING COMPANY, INC., OF SIDNEY, OHIO, A CORPORATION OF OHIO

WASHING MACHINE

Application filed October 8, 1930. Serial No. 487,159.

This invention relates to improvements in washing machines, and has for its object the provision of an agitator adapted to create a high pressure current at the bottom of the tub so that the current will pass from the center outwards and upward, and return to the center of the agitator at the top of the water line. And at the same time the water is thus being forced to travel currents are formed in the shape of a twisted figure eight, alternating from one side to the other as the water ascends from the bottom to the top and from the top back to the bottom. This movement of the water within the tub is accomplished by means of compound curved blades or fins cast integral with the central pillar.

It is particularly the object of this invention to provide, in connection with an oscillating pillar, a plurality of integral vanes or fins so shaped that the water within the tub agitated by the pillar and the fins, is given a peculiar circulatory path in such a manner that the clothes within the tub are thoroughly agitated and the water driven back and forth through the clothes and the clothes through the water.

It is also an object of this invention to provide, in connection with a washing machine, a pillar or dolly so constructed that the clothes will not become entangled between the dolly and a part of the tub.

It is also an object of this invention to provide a dolly or agitator so constructed that the clothes will be prevented from forming piles or knots, but will be spread apart and kept open so that the water may be easily forced therethrough for cleansing purposes.

These and other advantages will appear from the following description taken in connection with the drawings.

Referring to the drawings:

Figure 1 is a vertical section through the agitator and the support therefor, showing the tub partly in section.

Figure 2 is a top plan view of the tub showing by arrows the movement of the water in the initial stage of operation. In this figure the dolly is shown to be turning anticlockwise.

In Figure 3 a view is shown similar to that of Figure 2 with the exception that the dolly is moving clockwise, and showing the manner in which the water is agitated.

Figure 4 is a section through the washing machine as shown in Figure 2.

Figure 5 is a section through the washing machine as shown in Figure 3.

In this machine there is the usual tub 1, which has the usual opening in the center of the bottom for an operating shaft. Around this opening and extending upwardly from the bottom of the tub is an agitator support 2, tubular in shape having a base attached to the bottom of the tub by means of screws 3. The heads of these screws have lead washers 4 between them and the agitator support.

Near the lower end of the agitator support there is formed a ball race 5 used for supporting the dolly for easy and free rotation or oscillation about the agitator support. At the upper end of the agitator support and within the walls thereof is a bearing 6, while on the outside of the upper end of the agitator support and adjacent the bearing 6 is a raised or steadying member 7. Extending upwardly through the agitator support is an operating shaft 8 which has on the upper end thereof a coupling 9 fastened thereto by means of a pin 10 passing through suitable holes in these two members.

On the upper end of the coupling 9 is a cavity in which there is a felt washer 11. The upper surface of this washer is flush with the upper surface of the coupling. The coupling is circular in shape and has extending downwardly therethrough a plurality of holes 12 adapted to receive clutch pins. Mounted upon the coupling is an agitator pillar or dolly 13, which is hollow and substantially cone-shaped, fitting over the agitator support and resting upon the coupling. For the purpose of supporting the agitator or dolly upon the coupling the support end thereof is provided with a head 14. This head is hollow to receive clutch mechanism, to be described later. Around the periphery of the head there are holes 15 adapted to receive clutch pins 16.

Fitting on top of the dolly or agitator is

an agitator cap 17 screw threaded thereto to form a housing in which there is located the clutch mechanism for connecting the operating shaft to the dolly. On the upper end of each of the clutch pins are two plates 18 spaced vertically from each other. These plates are of any suitable shape, substantially round, and have around the periphery thereof, between them, a cluth ring 19 in the form of a coil spring which bears against one of a pair of conical faces of the cone member 20. This clutch ring engages either one of these two cone members. As shown in Figure 1, the clutch ring is in engagement with the lower cone part, and while in this position the clutch pins extend downwardly into the holes in the coupling 9. The holes 12 in the coupling 9 align with the holes 15 in the head 14, and when these holes are in proper alignment with each other the pins may be pushed downward so that they will pass below the head 14 and project into the holes 12 in the coupling member. When the pins are thus positioned the rotation of the shaft 8 will cause a rotation of the dolly.

In order to move the clutch cone up and down to operate the clutch pins there is provided on the upper end thereof a clutch knob 21. By pressing down on this knob the clutch cone is caused to snap by the clutch ring and thereby shift the position of the pins. By pushing down on the knob 21 the spring, after it passes beyond the bulge of the clutch cone, causes the plates 18 to rise and carry with them the pins so that the parts are unclutched and the shaft can rotate or oscillate without operating the dolly or agitator.

Within the head 14 and properly supported thereby is a guide washer 22. This washer has a hole in the center thereof to receive the lower end of an operating rod for the clutch cone so that as the clutch is operated up and down the lower end is guided and held in proper position by the guide washer. The support end of this rod is held by the agitator cap.

In order to prevent the removal of the dolly or agitator from the agitator support there is provided a pilot screw 23. This screw passes through the wall of the agitator and fits beneath the head part of the coupling. When the screw is in the position shown in Figure 1 the dolly cannot be removed from the coupling and the shaft. Cooperating with the ball race 5 is a second ball race 24 attached to the lower part of the dolly. These two sections form a ball race in which are balls 25. These balls provide anti-friction means so the dolly will oscillate freely on the dolly support and at the same time the upper part of the dolly will be guided by the part 7 so that there is no wobbling. 26 is a retaining ring for holding the ball race 24 in place. Extending laterally from the dolly are blades or vanes or fins 27. These blades extend upwardly and outwardly from the side of the dolly and have on their peripheries beads 28.

It is the design of this agitator to create a high pressure current at the bottom of the tub from the center outwards and upwards, and return to the center of the agitator at the top of the water line. At the same time, in traveling from the bottom to the top, the water assumes a twisted figure eight, alternating from the right and to the left as the water descends from the top to the bottom. This is accomplished by means of the compound curved blades or fins cast integral with the center pillar or body of the dolly. The pillar is formed into a bell-shaped formation from which the blades or fins extend. The lower end of the pillar has extending therefrom the lower edges of the agitator blades or fins from which they extend outwardly and upwardly, as shown in Figure 1.

It will be observed from an examination of Figure 1 that the upper edges of the blades are more nearly horizontal than the lower edges are. In fact, the lower edges of the blades or the bead thereon extend from the lower edge of the pillar upwardly at substantially an angle of forty-five degrees. By this means whenever the dolly is caused to oscillate the vanes or fins produce an agitation within the water in the tub. The agitator thus operated creates a high pressure current at the bottom of the agitator, passing from the center outwardly and upwardly, and returning to the center of the agitator at the top of the water line. The peculiar shape of the lower parts of the fins causes the thorough agitation of the water within the bottom of the tub so that as the fins oscillate the water is driven downwardly and outwardly through the top of the water within the tub and back toward the center of the oscillation.

In Figure 2 there is shown, by means of arrows, the direction of movement of the water in the tub on the initial operation of the dolly. As the dolly begins to rotate the water is directed substantially in one direction, with a movement of the water downward, up the sides and back toward the center at the top of the water line, as shown in Figure 4. The movement here is anti-clockwise. When the dolly is given a second motion, in an opposite direction or clockwise, the water is agitated substantially as shown in Figure 3. In this operation the water is given a circulatory motion, similar to a roughly formed or distorted figure eight. This direction of movement of the water is indicated by lines and arrows in Figure 5. This continued operation, the repeating of the clockwise and anti-clockwise movements, repeats one after another these successive movements, so that the water is thoroughly agitated and driven through the clothes, and the clothes through the water.

In the illustration shown in Figure 2, the movement of the water viewed from above when the agitator makes its first movement counterclockwise, the water is all thrown counterclockwise for the duration of that stroke. On the surface it is flowing counterclockwise. At the bottom it is tending to be forced upwardly by the peculiar shape of the blades or vanes.

In Figure 3 there is shown in plan view the position the water assumes when the agitator reverses and oscillates clockwise. A part of the water assumes a curved clockwise direction. Part of it is thrown into turbulence, as shown by the arrow lines. At this time an upward movement has been produced at the base end of the agitator in the bottom of the tub, and as the water ascends towards and reaches the top it is then carried inward, due to the vortex formed. The water leaves the bottom at the righthand blade, as shown in Figures 1, 4 and 5, and passes upwardly across the tub and into the vortex at the center.

While this has been happening this stroke has been completed and the lefthand blade impinges the water, and the same action is carried on with the exception that the water while traveling outwardly, upwardly and inwardly is also forced to describe a helical path. This action turns the garments around, end for end and over, causing them to float out flat, then collapse again, and float out flat again, and the high pressure of the current is swept through the fabric openings cleansing said garments very efficiently.

The extreme lower end of the pillar or dolly is formed into a substantially vertical apron member 29 which loosely fits around the base of the agitator support and extends to the bottom of the tub, so that clothes being washed cannot get between the apron and the bottom of the tub. A clearance is left between the lower end of the pillar or dolly and the apron 29.

I desire to comprehend within my invention such modifications as may be clearly embraced within my claims and the scope of my invention.

Having thus fully described my invention, what I claim is new and desire to secure by Letters Patent, is:

1. In a washing machine in combination with a tub, a bell-shaped agitator extending to the bottom of the tub adapted to oscillate in the tub and consisting of a dolly stem having a plurality of triangularly shaped radiating vanes extending therefrom and the upper edge of each vane being substantially parallel to the bottom of the tub, the lower edge of each vane being at substantially forty-five degrees to the bottom of the tub, the outer periphery of each vane having a bead thereon.

2. In a washing machine in combination with a tub, a bell-shaped agitator extending to the bottom of the tub adapted to oscillate in the tub and consisting of a dolly stem having a plurality of triangularly shaped radiating vanes extending therefrom, the outer periphery of each vane having a bead thereon, the surface of which gradually merges into the surface of the vane.

3. In a washing machine in combination with a tub, a bell-shaped agitator extending to the bottom of the tub adapted to oscillate in the tub and consisting of a dolly stem having a plurality of triangularly shaped vanes extending therefrom, the outer periphery of each vane having a bead thereon and one side of each vane extending from the lower periphery of the dolly stem.

4. In a washing machine in combination with a tub, a bell-shaped agitator extending to the bottom of the tub adapted to oscillate in the tub and consisting of a dolly stem having a plurality of triangularly shaped vanes extending therefrom, the outer periphery of each vane having a bead thereon and one side of each vane extending from the lower periphery of the dolly stem and at an oblique angle to the bottom of the tub.

5. In a washing machine in combination with a tub, an agitator adapted to oscillate in the tub and consisting of a bell-shaped dolly stem having a plurality of triangularly shaped vanes extending therefrom with the upper edges substantially horizontal, the outer periphery of each vane having a bead thereon and one side of each vane extending from the lower periphery of the dolly stem and at an angle of substantially forty-five degrees to the bottom of the tub.

6. In a washing machine, a tub adapted to contain a washing fluid, a stem gradually sloping at its top and more rapidly sloping at its bottom from the vertical to form a bell-shaped base pivotally mounted in said tub for vertical rotation adjacent the bottom of the tub, beaded vanes having substantially horizontal upper edges on said stem, the lower edge of each vane extending from adjacent the bottom of the tub upward toward the sides of the tub at an angle of about forty-five degrees and adapted, in cooperation with the bell-shaped part of the stem, to give a downward and upward movement to the fluid.

In testimony whereof, I affix my signature.

ROBERT J. WATERWORTH.