Feb. 13, 1934. L. G. KNAPP 1,946,535

WASHING MACHINE

Filed Jan. 30, 1930

Fig. 1.

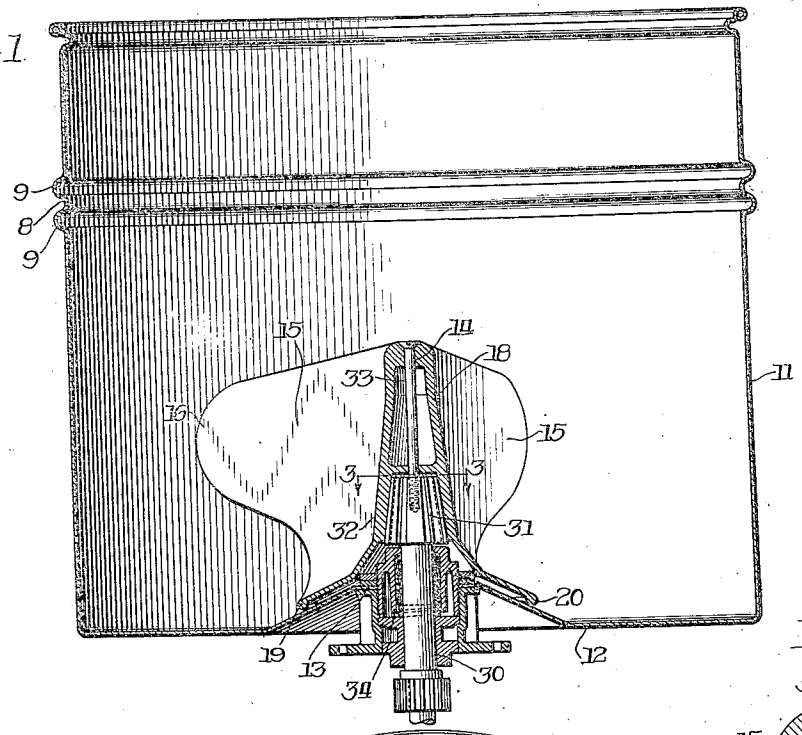


Fig. 3.

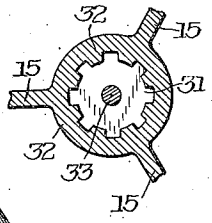
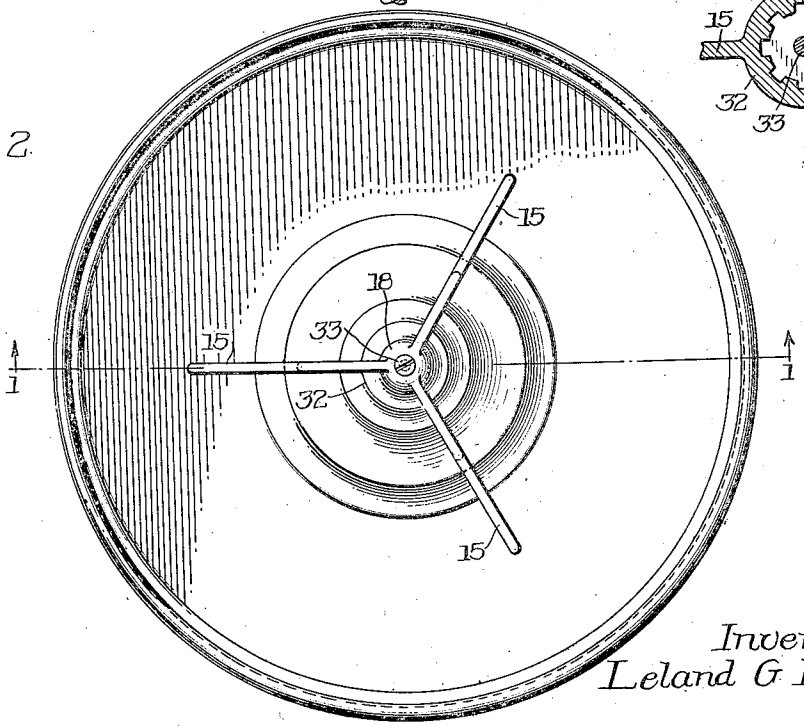


Fig. 2.



Inventor:
Leland G Knapp

By Cromwell Greist & Warden
Attys

Patented Feb. 13, 1934

1,946,535

UNITED STATES PATENT OFFICE

1,946,535

WASHING MACHINE

Leland G. Knapp, Chicago, Ill., assignor to Montgomery Ward & Co., Incorporated, Chicago, Ill., a corporation of Illinois

Application January 30, 1930. Serial No. 424,480

4 Claims. (Cl. 259—101)

The present invention relates to an improvement in clothes washing machines provided with deep washing chambers, and it particularly relates to an improvement in the paddles or agitators for such machines and in the methods of circulating the cleansing liquids therein. Much difficulty has been experienced in clothes washing machines in obtaining a satisfactory agitation of the liquid in these deep washing chambers, which will result in efficient cleansing of the clothes and other articles which may be placed therein. The usual agitating mechanisms employed either did not agitate the cleansing liquid sufficiently to cause a satisfactory suds-formation or they agitated it in such a manner that the clothes became entangled and were insufficiently washed. In addition it was necessary to consume excessive quantities of power in order to obtain a satisfactory washing or cleansing of the clothes.

One of the objects of the present invention is to provide an improved deep-tub clothes washing machine structure which will do a more satisfactory job than hitherto possible with a reasonable current consumption.

Another object of the present invention is to provide an improved clothes washing machine agitator or paddle which will more satisfactorily agitate the body of liquid and which will also produce a movement of cleansing liquid through the washing chamber in a more desirable manner.

A further object of the present invention is to proportion and position an agitator within the washing chamber of a clothes washing machine in such a manner that a more satisfactory combination is produced.

Other objects will appear during the course of the following specification.

In one embodiment of the present invention a clothes washing machine is provided with a vertical tank forming a washing chamber. A paddle or agitator is placed within the tank or tub in such a manner that maximum agitation will be produced at a level which is about equally distant from the top and bottom of the washing chamber of the tub, say within the middle third of the washing chamber. The apparatus and the agitator are also so designed and proportioned that water will be sucked down through the middle portion of the tank until it reaches the bottom, whereupon it is thrown outwardly toward the edge of the tub, producing more or less of a rolling action. It has been found very satisfactory to move the liquid body in such a way that the water will go downwardly in the center of the tub, outwardly at the bottom of the tub, upwardly in the outside portions of the tub and inwardly at the top of the tub.

On the accompanying drawing is shown one embodiment of the invention, to which it is by no means restricted. In the drawing:

Fig. 1 represents a side-sectional view of a clothes washing machine upon the line 1—1 of Fig. 2;

Fig. 2 represents a top view of the machine; and

Fig. 3 represents a sectional view upon the line 3—3 of Fig. 1.

The tank or tub 11 in the present embodiment is cylindrical, but if desired may be made of other shapes. The tub 11 is provided with a draining bottom 12, the central portion of which is removed, as indicated at 13, so as to permit the passage of suitable driving mechanism for the agitator or paddle 14. The tank 11 is usually filled with liquid up to the level of the depression 8 between the double beading 9, and this space forms the washing chamber. The agitator or paddle 14 is provided with a series of symmetrically positioned vertical vanes or fins 15. In the present embodiment of the invention, these vanes 15 are three in number and are proportioned so that each fin or vane will have a maximum width 16 which is approximately one-half to three quarters of the tub radius. The maximum area or maximum extension 16 of the vertical vanes 15 is preferably positioned about equally distant from the top and bottom of the washing chamber, or at least one-quarter of the total depth of the washing chamber from either the top or bottom thereof. In the embodiment of the invention shown, this place of maximum width is also positioned closely adjacent the top of the agitator. The area or extension of the vanes 15 decreases rather rapidly as they approach the bottom 12 of the tank 11, and in the present embodiment of the invention, the vane area is caused to cease and terminate at a position 17 adjacent to the bottom of the tank.

By moving the bulge or maximum extension in the vanes to a position within the washing chamber so that it stands about half the height thereof, a maximum agitation is produced at such level, and this enables the satisfactory utilization of much deeper washing machine tubs than hitherto employed. In addition, it produces a much more satisfactory washing agitation of the mixture of cleansing liquid and clothes than would be obtained by placing the agitator or

paddle at the extreme bottom. The vanes 15 are attached to a tapered conical supporting standard or center 18 which gradually widens as it approaches the bottom of the tank. To the lower part of this supporting standard or center is attached an outwardly-flaring sharply-inclined skirt 19, which is adapted to fit over the conical rise in the central portion of the tank. The outer under edge of this skirt is provided with a bead 20. This combination of elements prevents the clothes from working upwardly underneath the agitator.

The top of the driving shaft 30 is provided with a spline head 31 (see also Fig. 3) which spline head 31 is adapted to fit into and cooperate with a similarly shaped portion 32 on the interior side of the conical center 18. The agitator 14 is held onto the shaft 30 by a draw bolt 33, which screws into a tapped hole in the top of the agitator shaft. The bearing 34 is rigidly attached to the bottom 12 of the tank 11. The agitator or paddle 14 may be made or cast of aluminum, or it may be constructed of any other metallic or non-metallic material suitable for washing machine paddles which will not readily deteriorate or corrode when subjected to the action of warm and hot detergent liquid mixtures. The present paddle produces a violent action without an excessive use of power and with a minimum tangling of clothes.

The throw of the paddle in the present embodiment of the invention is preferably about 180°. By constructing the paddle with three vanes and operating it in this manner it is made certain that no dead spaces are left in the liquid body in the tub, since all portions of the body will be thoroughly agitated.

It is obvious that many variations may be made in the present invention without substantially avoiding the scope thereof. It is intended to include all such variations within the purview of the appended claims.

What is claimed is:

1. An agitator for a clothes washing machine, provided with a series of vertical vanes, the area of which reaches a maximum at a distance substantially above the bottom of the agitator, the edges of said vanes first being straight and sloping outwardly and downwardly and then being curved, and extending downwardly and outwardly to reach a maximum radial extension, then inwardly and downwardly to reach a minimum radial extension and finally outwardly and downwardly to reach another maximum radial extension.

2. An agitator for clothes washing machines, comprising a centrally-disposed vertical supporting standard having at its base an outwardly-flaring sharply-inclined skirt of relatively greater diameter than that of the standard, and a series of vertical vanes extending radially from said standard and including an upper maximum area and a lower minimum area, the upper maximum area being in the plane of the top of the supporting standard and of greater diameter than the diameter of the skirt, and the lower minimum area being of less diameter than that of the maximum area and substantially coextensive with that of the skirt.

3. An agitator for clothes washing machines, comprising a centrally-disposed vertical supporting standard having at its base an outwardly-flaring sharply-inclined skirt of relatively greater diameter than that of the standard, and a series of vertical vanes extending radially from said standard and including an upper maximum area and a lower minimum area, the upper maximum area being in the plane of the top of the supporting standard and of greater diameter than the diameter of the skirt to project the outer edge of the upper maximum area beyond the edge of the skirt, and the lower minimum area being of less diameter than that of the maximum area and substantially coextensive with that of the skirt, the outer edges of the upper maximum and lower minimum areas merging with each other and defining a continuous compound curve.

4. An agitator for clothes washing machines, comprising a centrally-disposed vertical supporting standard having at its base an outwardly-flaring sharply-inclined skirt of relatively greater diameter than that of the standard, and a series of vertical vanes extending radially from said standard and including an upper maximum area and a lower minimum area, the upper maximum area being in the plane of the top of the supporting standard and of greater diameter than the diameter of the skirt, and the lower minimum area being of less diameter than that of the maximum area and substantially co-extensive with that of the skirt, the upper maximum area and the lower minimum area forming a continuous web from said skirt to a point approximately coincident with the top of said standard, the outer edges of the upper maximum and the lower minimum areas merging with each other and defining a continuous compound curve.

LELAND G. KNAPP.