Dec. 6, 1938. M. M. JACKSON 2,139,501

AGITATING MEANS FOR WASHING MACHINES

Filed Oct. 31, 1936 2 Sheets-Sheet 1

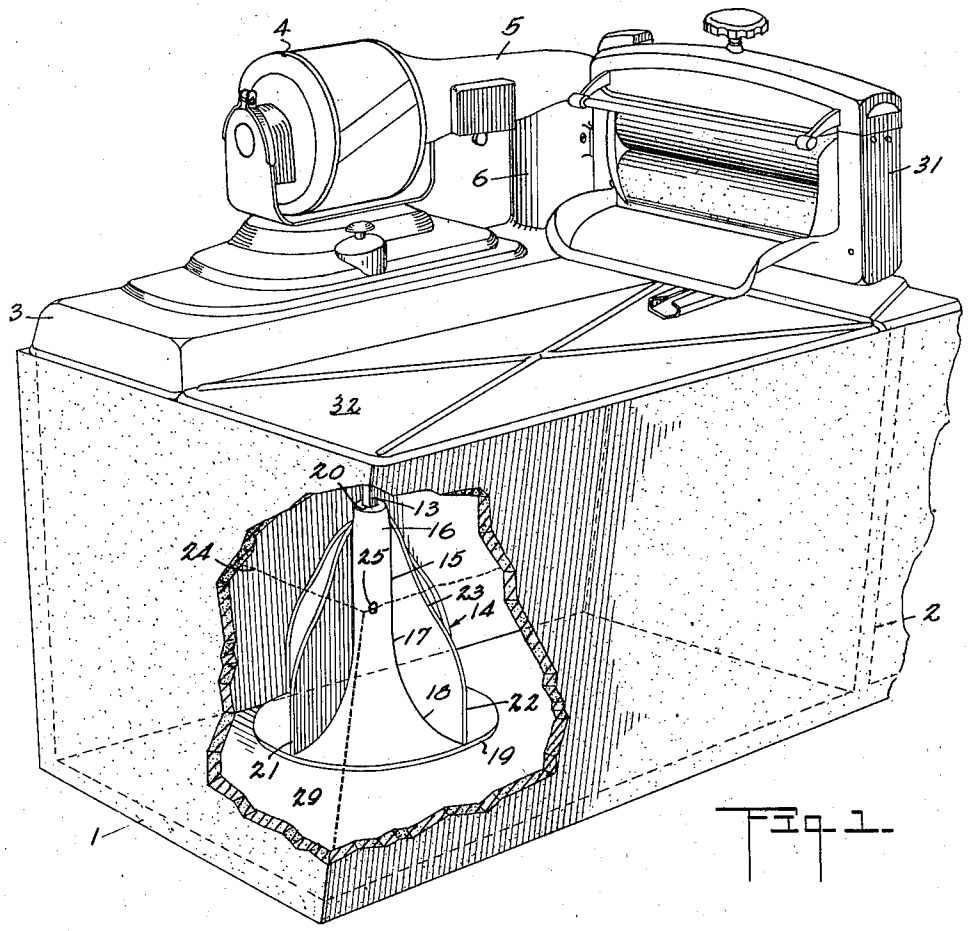

Fig. 1

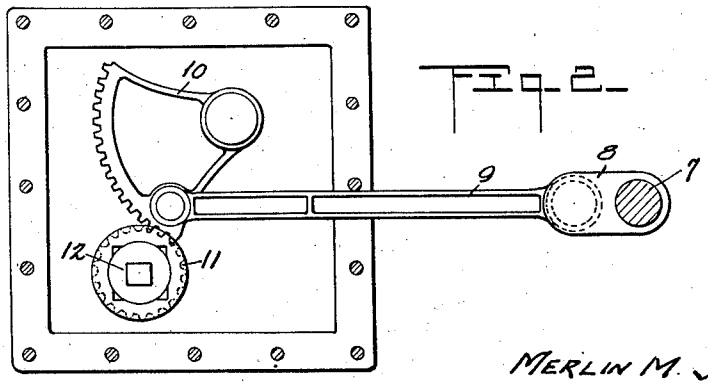

Fig. 2

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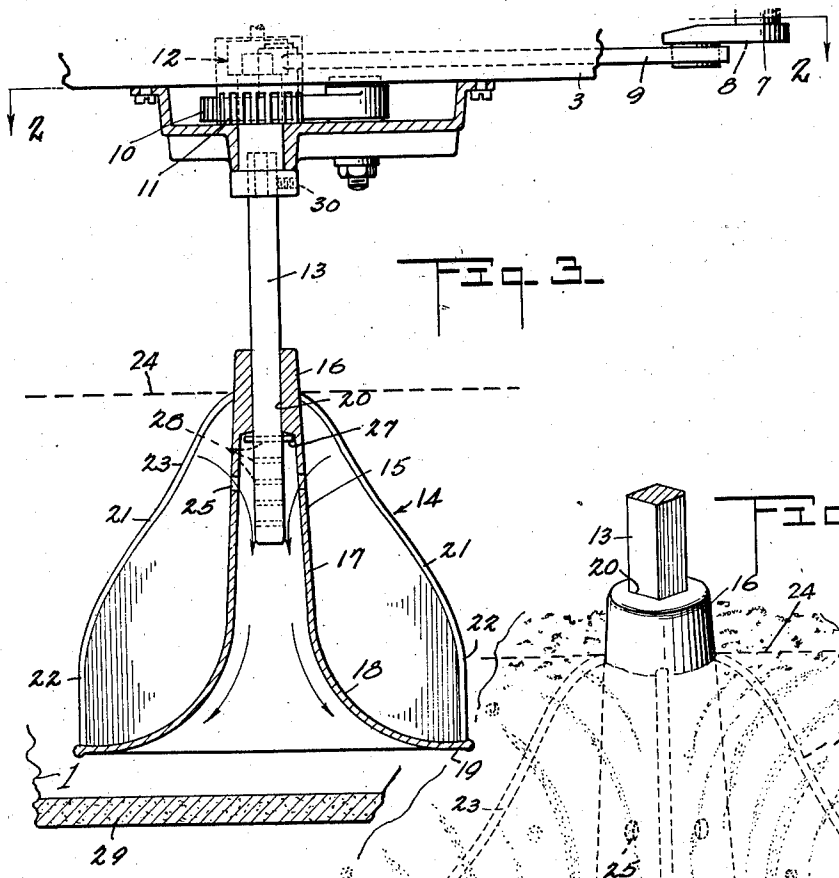

Fig. 3.

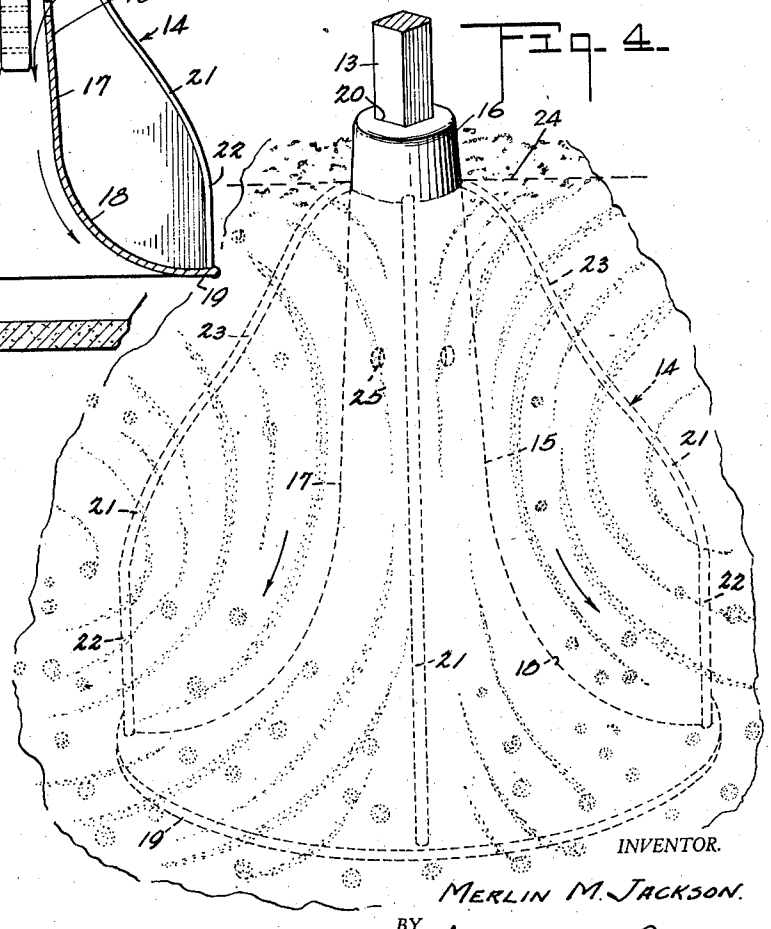

Fig. 4.

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UNITED STATES PATENT OFFICE

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AGITATING MEANS FOR WASHING MACHINES

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Application October 31, 1936, Serial No. 108,634

2 Claims. (Cl. 68—132)

The present invention relates to improvements in washing machines and has particular reference to the agitating means for washing machines.

The principal object of the invention is to provide an agitating means for a washing machine that will be particularly adapted to efficiently and economically wash clothes disposed in the machine.

With this object in view it is proposed in the present invention to provide an agitator that not only imparts reciprocating rotary motion for drawing the clothes through the water, but also imparts circulating movement in a vertical plane and besides delivers air to the body of water contained in the machine to cause circulation to be intensified by the rising air bubbles.

It is further proposed to provide certain improvements in the shape and action of the agitator whereby the operation of the machine as a whole is rendered more efficient.

It is further proposed to provide certain improvements in the mounting means for the agitator whereby the assembling is facilitated and at the same time vertical movement of the agitator within the body of water is permitted.

Further objects and advantages of the invention will appear as the specification proceeds.

The preferred form of the invention is illustrated in the accompanying drawings, in which

Figure 1 shows a perspective view of the washing machine, with a portion broken away to show the agitator,

Figure 2, a plan view of the drive for the agitator, substantially as seen from line 2—2 of Figure 3, with certain portions omitted,

Figure 3 a vertical section through the agitator and its operating means, and

Figure 4 a perspective view of the agitator illustrating the circulation of the fluid washing means.

While only the preferred form of the invention is shown in the drawings and described in the specification it should be understood that various changes or modifications may be made within the scope of the claims hereto attached without departing from the spirit of the invention.

Referring to the drawings in detail it will be seen that the invention is illustrated in connection with one of the washing machines in which a stationary standard tub is used and in which the washing machine is placed on top of the tub and has an agitating means projecting into the tub. While some of the features of the invention may be confined to an overhead drive as illustrated in the drawings and necessitated by the type of washing shown there are other features which apply to any kind of an agitator and it is not intended to confine those features to the type shown.

The tub 1, which is of conventional construction usually consists of two compartments separated by a partition wall 2, one of the compartments being used for washing and the other for rinsing of the clothes.

The first compartment has resting on the top thereof a base 3 supporting the motor 4 which through a suitable drive confined in the shield 5, and the gear housing 6, imparts rotary motion to a vertical shaft 7 confined in the latter housing. The latter shaft, through the crank 8 and the connecting link 9 imparts reciprocating rotary motion to the toothed sector 10 and this sector meshes with the gear wheel 11, which through a clutch mechanism 12 (not disclosed in detail), imparts similar reciprocating motion to the shaft 13 on which the agitator 14 is supported.

The clutch mechanism is illustrated in my copending application, Serial Number 108,635, filed October 31, 1936. The clutch permits the motor 4 to be operated continuously, while allowing the agitator 14 to be reciprocated as desired under control of the operator.

The agitator may be described as being substantially horn-shaped and it includes a hollow stem 15 forming a hub 16 at its upper end, expanding downwardly from the hub frusto-conically as at 17 and finally flaring outward in a smooth curve as at 18 so as to terminate in a horizontal rim section 19. The opening 20 in the hub is preferably square in cross-section and makes a sliding fit on the square shaft 13.

A plurality of radial vanes 21 are secured to the outer face of the stem of the agitator and they are preferably shaped in such a manner that the outer edges 22 first rise in substantially vertical direction from the rim of the stem and then taper toward the top as shown at 23, so that the greatest displacement of water takes place about the lower section of the agitator.

The normal water level is indicated at 24 in Figures 1 and 3. Approximately at the water level there are provided a plurality of apertures 25 in the stem, preferably one between each two blades or vanes.

The agitator is secured to the shaft 13 by guiding the upper end of the shaft through the hub from the bottom of the agitator and using a pin 27 for limiting the upward movement of said

shaft. For this purpose the lower end of the shaft is formed with a plurality of transverse perforations 28, arranged in spaced relation one above the other, and the pin is freely slidable in any one of them.

By proper selection between the perforations the agitator may be adjusted to the proper normal height above the floor 29 of the tub. The pin, no matter how inserted, adjusts itself to a central position while riding into the frusto-conical stem and bears against the shoulders formed by the hub. The agitator is free to slide upward on the shaft 13 and to float in the water.

The operation of the invention is as follows:

The base plate supporting the motor is suitably fastened to the tub. The shaft 13 is guided, top end first, through the agitator from the bottom, with the pin 27 in one of the apertures until the pin is stopped by the shoulder of the hub. The projecting end of the shaft is then secured to clutch mechanism 12 by means of the set screw 30. The pin adjustment is preferably made so as to space the bottom of the agitator from the floor of the tub by a short distance, say an inch or two.

Now the clothes are placed in the tub so as to overlie the agitator and the tub is filled with water to the required height, soap being added as desired. The motor is now set in motion and the agitator is made to turn, first in one direction and then in the opposite direction.

The turning movement of the agitator imparts a similar turning movement to the clothes whereby the water and the soap are forced through the fabrics displacing and absorbing the dirt in the clothes. At the same time, however, there is centrifugal action, which, due to the shape of the agitator, is most intense near the bottom of the tub so that the water tends to move downward along the curved face of the agitator, thence outward toward the wall of the tub, then upward along the wall and back again toward the agitator, a circulation, which is shown in Figure 4.

This circulation creates a vortex around the upper end of the agitator and produces a corresponding downward draft on the inside of the agitator so that there is general downward flow of fluid through the apertures 25 and the stem of the agitator. The fluid is caused to follow the curve of the agitator toward the rim and to then join the general circulation.

Since the fluid originates at the vortex it consists of water and air, the air being entrained in the water and following its downward course until it reaches the main body of water whereupon it will rise in the form of bubbles and thereby cause additional agitation of the water and a more thorough washing effect.

The clothes normally lie on top of the agitator. If any part thereof should accidentally work beneath the agitator, the latter is free to rise and float so as to facilitate the freeing of the clothes. The general centrifugal action of the agitator has a tendency to throw the clothes outward and this general tendency is particularly supported by the outward flow of the water and the air from the inside of the agitator. Thus the freedom of the agitator to float, the general centrifugal action and the specific outward flow of the water and the air within the agitator combine in working the clothes away from the bottom of the agitator.

Since the agitator is spaced from the floor of the tub and the clothes are arranged on top of the agitator and are dispersed centrifugally therefrom, there is a general tendency of the clothes to remain away from the bottom of the tub and to float in the water. This permits the water and air emanating centrifugally from the bottom of the agitator to enter underneath the clothes and to rise upwardly through the clothes. The rising water again has a tendency to lift the clothes and to retain the same in a floating position and this tendency is augmented by the rising air bubbles which increase the buoyancy of the water and tend, in percolating through the clothes to keep the individual thicknesses of the clothes separated so as to expose each of them individually to the washing action.

A wringer 31 is shown as being disposed over the partition 2 of the tub and a plate 32 as covering that portion of the tub not occupied by the base 3.

I claim:

1. In combination, an agitator for a washing machine having a hub section and a hollow tapered section projecting therefrom, a shaft adapted to be inserted into the hub section through the hollow section and a pin slidable transversely in the shaft and engageable with abutment means in said hub section for limiting the movement through the hub, the pin being centered in the shaft by the taper of the hollow section.

2. In combination, an agitator for a washing machine having a hub section and a hollow section projecting therefrom, a shaft adapted to be inserted into the hub section through the hollow section, and a pin slidable transversely in the shaft and engageable with abutment means in said hub section for limiting the movement through the hub, the pin being retained in the shaft by the wall of the hollow section.

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