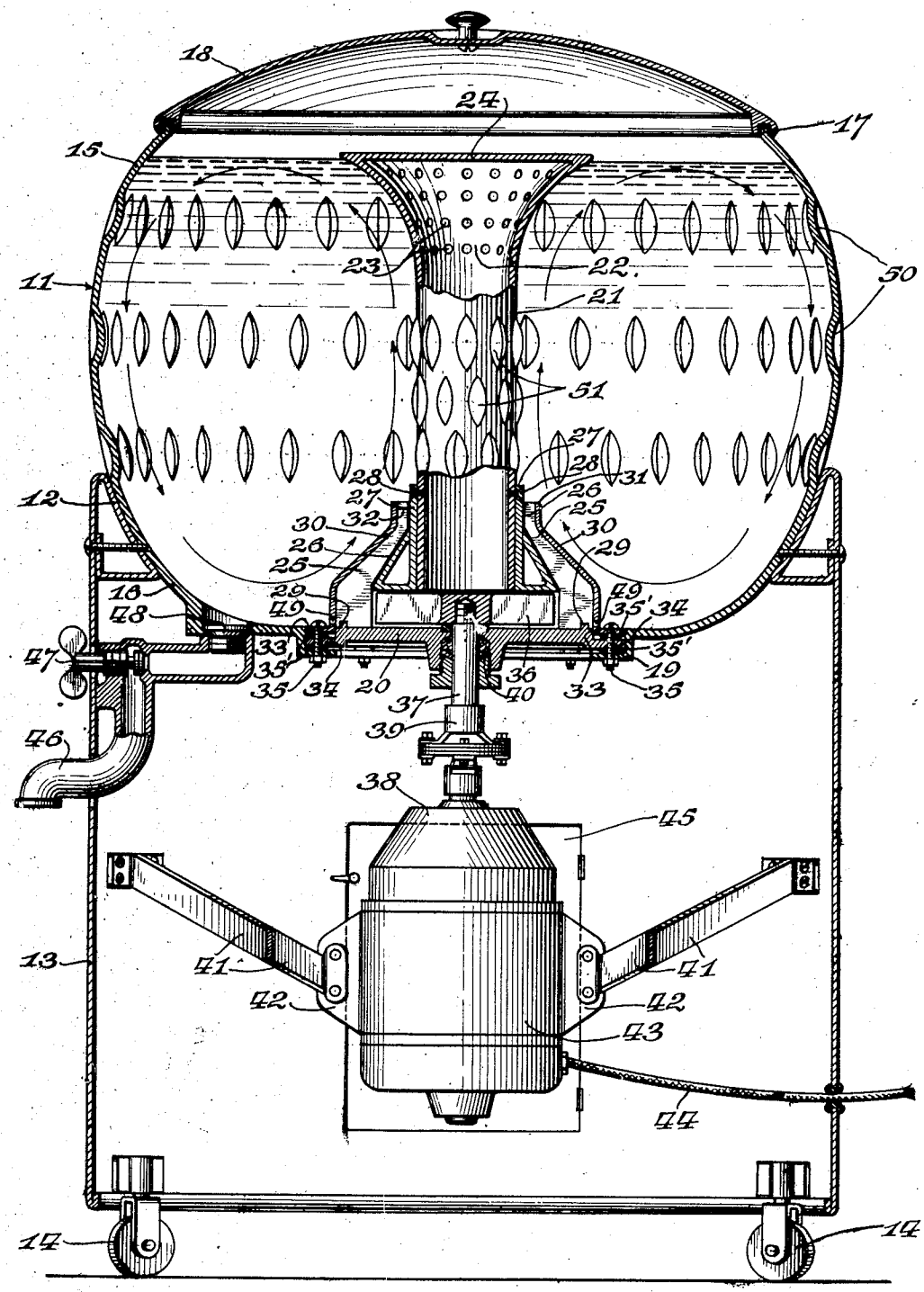
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WASHING MACHINE

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WASHING MACHINE

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The present invention relates to improvements in a washing machine of the type in which the desired scrubbing of textiles is accomplished by propelling them by liquid currents rather than by a mechanical agitator.

The agitator type of washing machine, containing a central post with radial blades that oscillate about a vertical axis, has certain disadvantages, among which may be mentioned the excessive wear of textiles caused by the agitator, and the non-uniformity of the scrubbing action in the washing of a load of ordinary size, caused by the slowness with which the textiles are moved about and mixed with one another in the tub. Each of the articles in the tub of an agitator machine is scrubbed violently at intervals instead of being subjected to a more gentle and continuous scrubbing as in machines of the type to which this invention relates. The latter type of scrubbing removes soil from the textiles with less wear and fraying than the scrubbing that occurs in an agitator machine.

The primary object of the present invention is to provide a new and improved washing machine of the above described liquid-current type.

Another object of the invention is to provide an improved construction of the machine whereby it may be built and assembled more economically, as well as readily disassembled in case repairing or cleaning thereof is necessary after use by the purchaser.

A more specific object of this invention is to provide the machine with means for both withdrawing the liquid and injecting it back into the washing chamber centrally thereof whereby the liquid withdrawing, injecting and directing means may be constructed as a single unit that may be readily removed from the machine whenever desired.

Other objects and advantages of the present invention will become apparent from the ensuing description of an embodiment thereof.

The single figure of the drawing is a vertical section of a washing machine embodying the invention.

In the illustrated device a substantially circular tub 11 adapted to contain soap suds or other liquid detergent is mounted upon and suitably secured to an annular inturned flange 12 formed at the upper edge of an upright cylindrical supporting shell 13. To facilitate movement of the machine, the shell 13 is mounted upon casters 14. The tub 11 is formed somewhat in the shape of an open ended oblate-spheroid in order better to secure proper circulation of liquid therein. This construction is obtained by curving inwardly the top and bottom portions 15 and 16, respectively, of the tub.

The uppermost end of the tub is provided with an upturned peripheral flange 17 defining an opening adapted to be closed by a cover 18 during the washing process. The inner end of the lower curved portion 16 is provided with a downwardly and inwardly extending peripheral shoulder 19 defining an opening, having a lesser diameter than the upper opening for a reason that will appear hereinafter.

An annular washing chamber is obtained by closing the lower opening by a circular bottom plate 20 and mounting a centrally located hollow upright post 21 within the tub. The post is constructed with an upper outwardly flared portion 22 provided with perforations 23 and a closed top 24 extending substantially to the upper level of liquid contained within the chamber. The post 21 is supported upon the bottom plate in spaced relation thereto by a plurality of liquid flow directing vanes 25 (only two of which are shown) secured, as by welding 26, to a sleeve 27 suitably secured, as by screws 28, to the post and formed with an outwardly extending reverse flange. The vanes are prevented from rotating by a pair of lugs or projections 29 formed on the bottom plate and by a frusto-conical deflecting plate 30 surrounding but not fastened to the vanes.

The deflecting plate is provided with an upwardly extending peripheral flange 31 defining with the sleeve 27 an annular outlet 32 through which liquid is injected into the washing chamber tangentially to the wall formed by post 21, thereby to create rotary circulation of the liquid in a vertical plane within the vessel. The deflecting plate is also formed with a horizontal peripheral flange 33 adapted to rest on a downwardly and outwardly extending peripheral shoulder 34 formed on the bottom plate 20 whereby both plates may be secured to shoulder 19 by a plurality of bolts 35. The washing chamber is made fluid-tight by gaskets 35' placed between the shoulders 19, 34, and flange 33.

Fluid circulation is secured by an impeller 36 located centrally of the tub and positioned directly below the hollow post 21 so that a stream of liquid withdrawn from the chamber through perforations 23 flows directly to the impeller and is forced by the latter through the annular outlet 32. The impeller is removably mounted upon a shaft 37 driven by a motor 38 suitably connected thereto by coupling means 39. Leakage of fluid

along the motor shaft is prevented by suitable sealing means 40.

The motor is mounted upon four radially extending brackets 41 whose inner ends are bolted to lateral supporting flanges 42 formed on a pair of semi-circular bands 43 adapted to support the motor when the bolts are tightened. The motor is supplied with energy through a conductor 44 and is easily accessible from outside the cylindrical shell 13 through a door or the like 45 formed thereon.

The liquid within the washing chamber may be drained through a conduit 46 provided with a valve 47 manually operable by a handle extending outside the casing and leading to a drain opening 48 formed at the bottom of the tub. Liquid contained within the impeller chamber is drained therefrom through small sized openings 49 on the lower part of the deflector plate 30 providing communication between the impeller chamber and the washing chamber, but not interfering with the washing action.

To facilitate scrubbing of the textiles as they are carried along by liquid currents within the vessel, ribs 50 and 51 are provided on the lateral walls of the tub 11 and post 21.

In operation the tub 11 is filled with soap suds and textiles to approximately the level indicated and the motor 38 supplied with energy thereby to rotate impeller 36. The latter, which is supplied with liquid withdrawn from the vessel through perforations 23 and the hollow post 21, injects water into the washing chamber through the annular outlet 32 surrounding and concentric with respect to the post.

The discharge of liquid by the impeller creates a primary and secondary circulation of liquid within the machine, the primary circulation being within the washing chamber and circular in planes lying on the axis of the annular chamber, as indicated by the solid arrows, and the secondary circulation being one from the impeller into the chamber and thence back to the impeller through perforations 23 and the hollow post. The primary circulation, as indicated by the arrows, is through outlet 32 upward along the sides of the post 21, upward and outward along the flared portion of the post, radially outward at a level above the bottom of the chamber, downward along the sides of the chamber and thence radially inward toward the post and again upward along the post. The primary flow of liquid is such that the textiles within the vessel are continuously circulated in the vessel and gently scrubbed by the liquid currents therein. The textiles are prevented from clogging the perforations 23 by the force of the liquid stream issuing from the annular outlet 32 and are thus kept in continuous circulation.

In case it is desirable to either cleanse or repair the tub or other parts of the machine, the motor 38, fluid flow directing vanes 25, and central post 21, all of which are located centrally of the tub, may be removed as a single unit through the upper opening of the tub. The bolts securing the motor to the supporting bands 43 surrounding the motor may be unloosened through door 45 and the bottom plate and annular deflecting plate may be unfastened by loosening the screw headed bolts 35, which are accessible through the top. After so loosening the bolts, the post, fluid flow directing vanes, and motor may be removed as a single unit, since, as previously described, plates 20 and 30 are smaller in diameter than the top opening.

In case it is desired only to remove the post and vanes, then bolts 35 alone are loosened and the post, directing vanes 25 and the annular plate 30 are removed in obvious fashion through the opening at the top of the tub. Once removed, the removed parts and the inside of the tub may be readily cleaned. The impeller 36 may likewise be either cleaned or repaired, as the removal of the post and deflecting plate places it in the open where it is readily accessible.

The post alone may be removed by loosening of screws 28 by means of which it is attached to the sleeve 27.

The above described embodiment of the invention may be modified and various modifications embodying the substance of the invention may be devised to meet various requirements.

We claim:

1. In a washing machine, in combination, a tub, a liquid-circulating device having a deflector cooperating therewith and directing an annular flow of liquid upwardly of the tub substantially at its center and means arranged to direct liquid therein outwardly across the top of the tub to create a circulation of liquid in opposite vertical directions at the center and side walls of said tub and radially at the bottom and at a higher level, and means located substantially centrally of said tub adjacent the top thereof for withdrawing liquid from the top of the tub and directing it to said circulating device.

2. In a washing machine, in combination, a tub, a central vertical hollow post in said tub, means at the bottom of the tub through which liquid may be injected into said tub vertically upward in an annular flow about said post to create therein a circulation of liquid in opposite vertical directions at the center and side walls of said tub and radially at the bottom and at a higher level, and liquid circulating means for forcibly injecting liquid into said tub through said first means, said post being formed with an opening in its upper portion only continuously to supply said circulating means with liquid from a point near the upper level of liquid in said tub.

3. In a washing machine, in combination, a vessel adapted to contain liquid, a hollow upright post located centrally of said vessel and having a perforated outwardly-flaring portion at its upper end, said vessel and post defining a substantially annular washing chamber, an impeller below said post receiving liquid from within said post, and means cooperating with the lower part of said post to define an upwardly-directed annular outlet for said impeller for returning the liquid directly to the chamber in an upwardly directed annular stream around the post.

4. In a washing machine, in combination, a vessel adapted to contain a body of liquid, a hollow cylindrical upright post located substantially centrally of said vessel and defining with said vessel a substantially annular washing chamber, said post having its upper end flared out conically and perforated, liquid circulating means below said post and in communication with the interior of said chamber through said hollow post and perforations, and means for directing the discharge from said circulating means upward into said chamber in an annular stream around said post, whereby there is created in said machine a primary and secondary circulation of liquid, the primary circulation consisting in the flow of liquid upward along the sides of the post, upward and outward along the flared portion thereof, radially outward to the sides of said chamber,

downward to the bottom, radially inward and thence upward again, and the secondary circulation consisting in the flow of liquid upward along the sides of the post, upward and outward along the flared portion and through said perforations into said hollow post, downward through the post to the fluid circulating means, and thence upward again along said post.

5. In a washing machine, in combination, a vessel adapted to contain liquid, means through which liquid may be injected into said vessel in an annular flow directed vertically upwardly to create a circulation of liquid in opposite vertical directions at the center and side walls of said vessel and radially at the bottom and at a higher level, liquid circulating means located substantially centrally of said vessel for injecting fluid into said vessel through said last mentioned means, and means also located substantially centrally of said vessel adjacent the top thereof for withdrawing liquid from the upper part of said vessel and directing it downwardly within said upwardly-directed annular flow and supplying it to said circulating means, said two last mentioned means being constructed as a unit and removably mounted upon said vessel.

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