Jan. 25, 1955 W. WISSING 2,700,288

AGITATING APPARATUS

Filed Jan. 30, 1952 4 Sheets-Sheet 1

Fig. 1

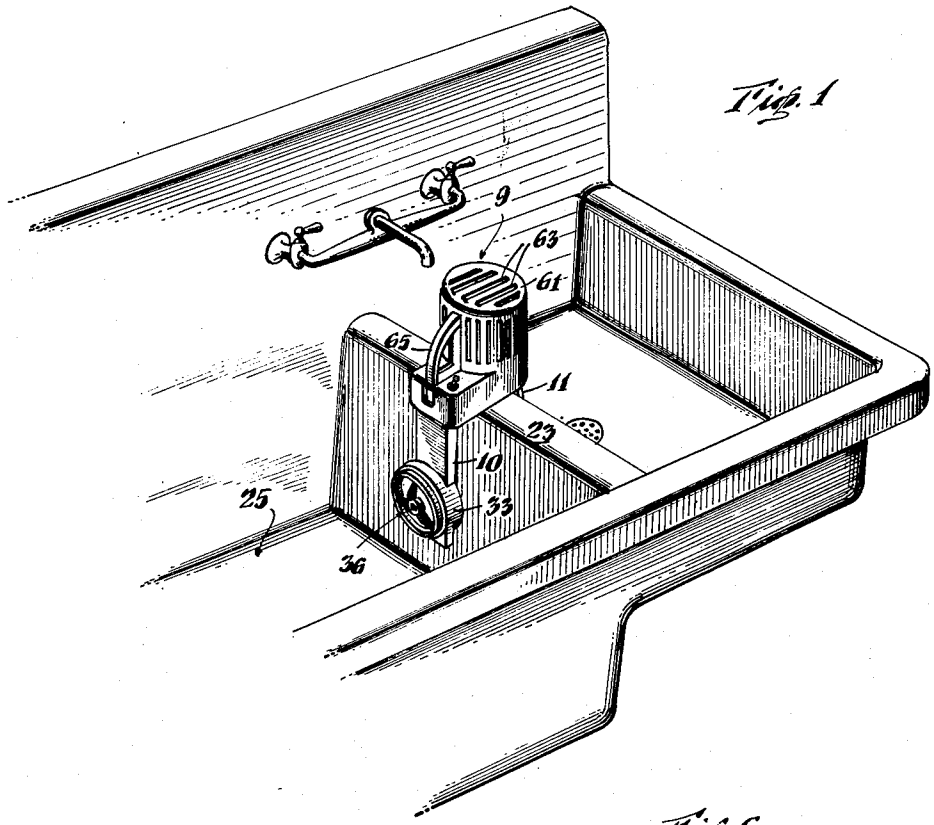


Fig. 6

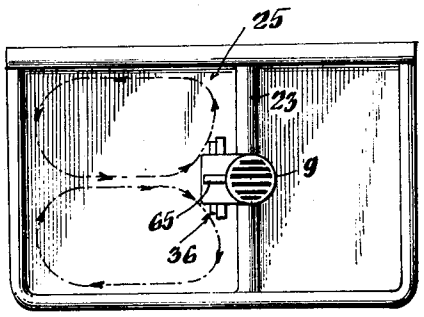
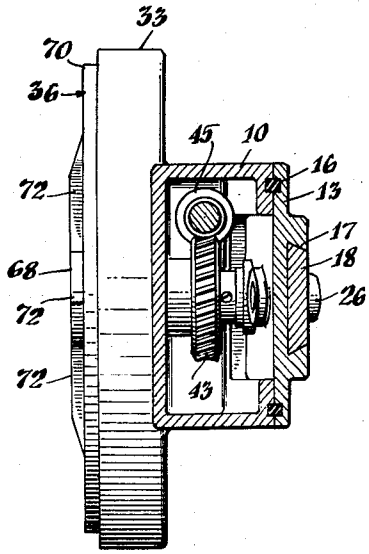


Fig. 5



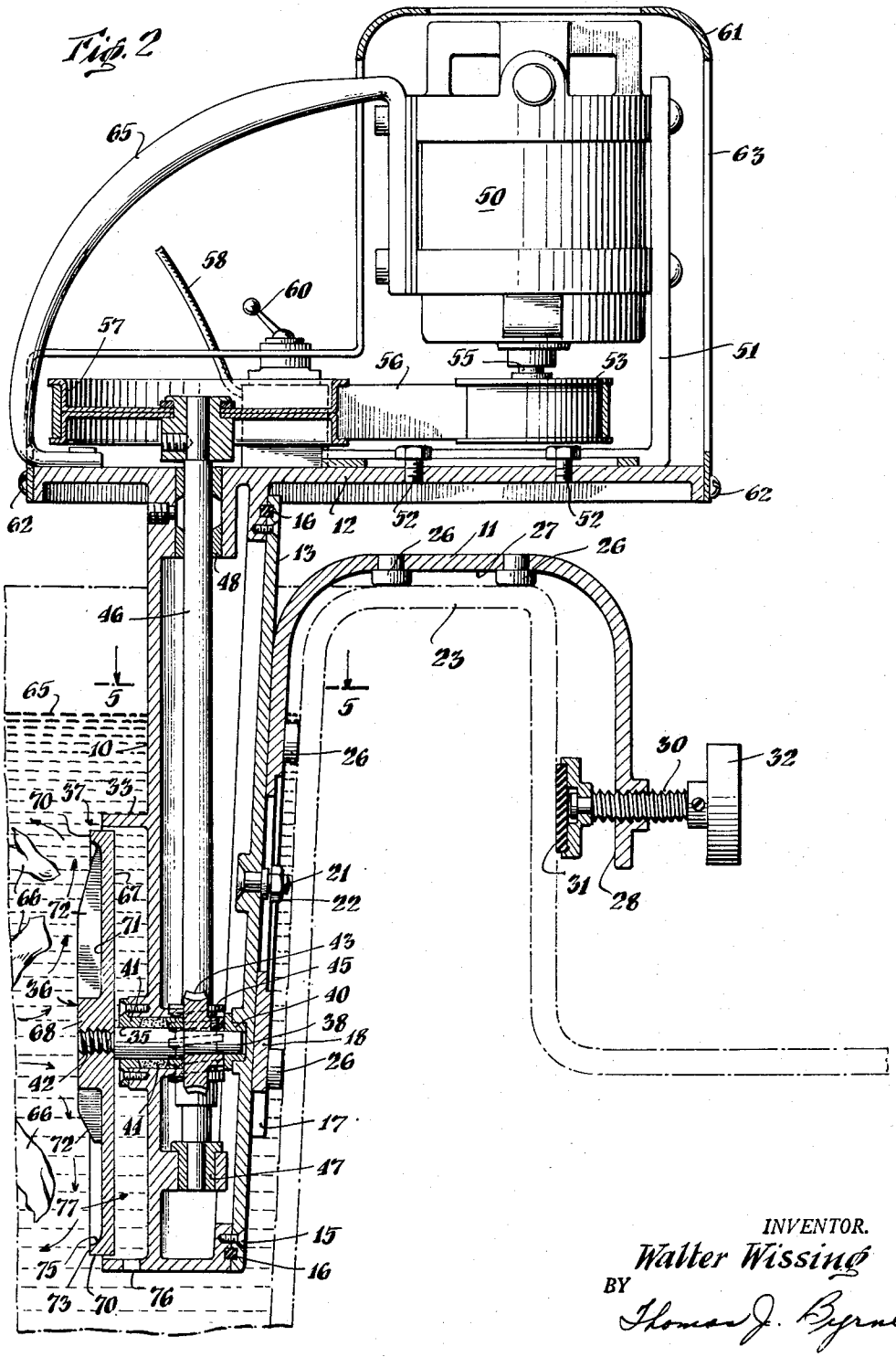
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Jan. 25, 1955 W. WISSING 2,700,288

AGITATING APPARATUS

Filed Jan. 30, 1952 4 Sheets-Sheet 2

Fig. 2



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Jan. 25, 1955 W. WISSING 2,700,288

AGITATING APPARATUS

Filed Jan. 30, 1952 4 Sheets-Sheet 3

Fig. 3

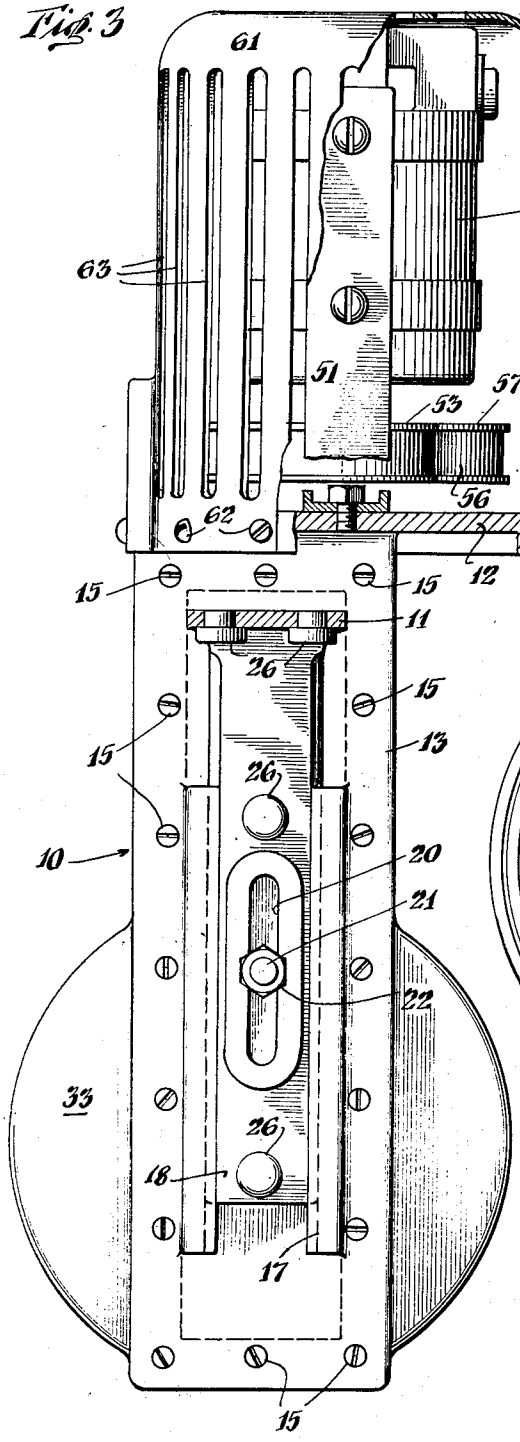
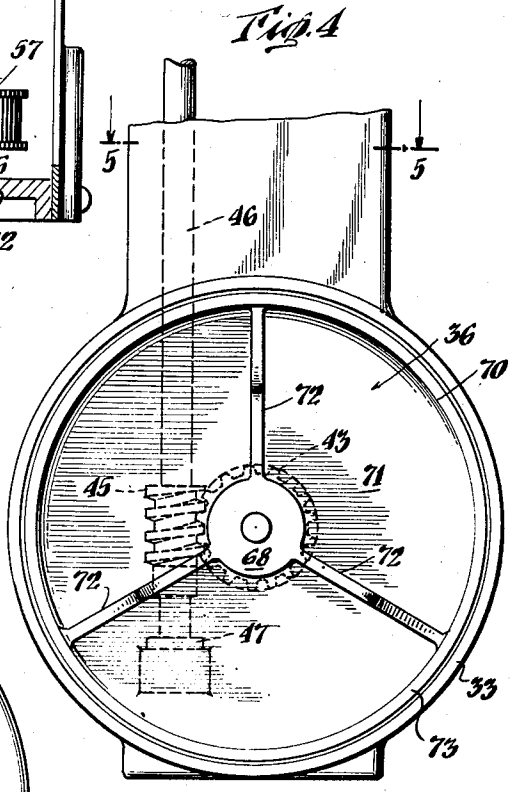


Fig. 4



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Jan. 25, 1955 W. WISSING 2,700,288

AGITATING APPARATUS

Filed Jan. 30, 1952 4 Sheets-Sheet 4

Fig. 7

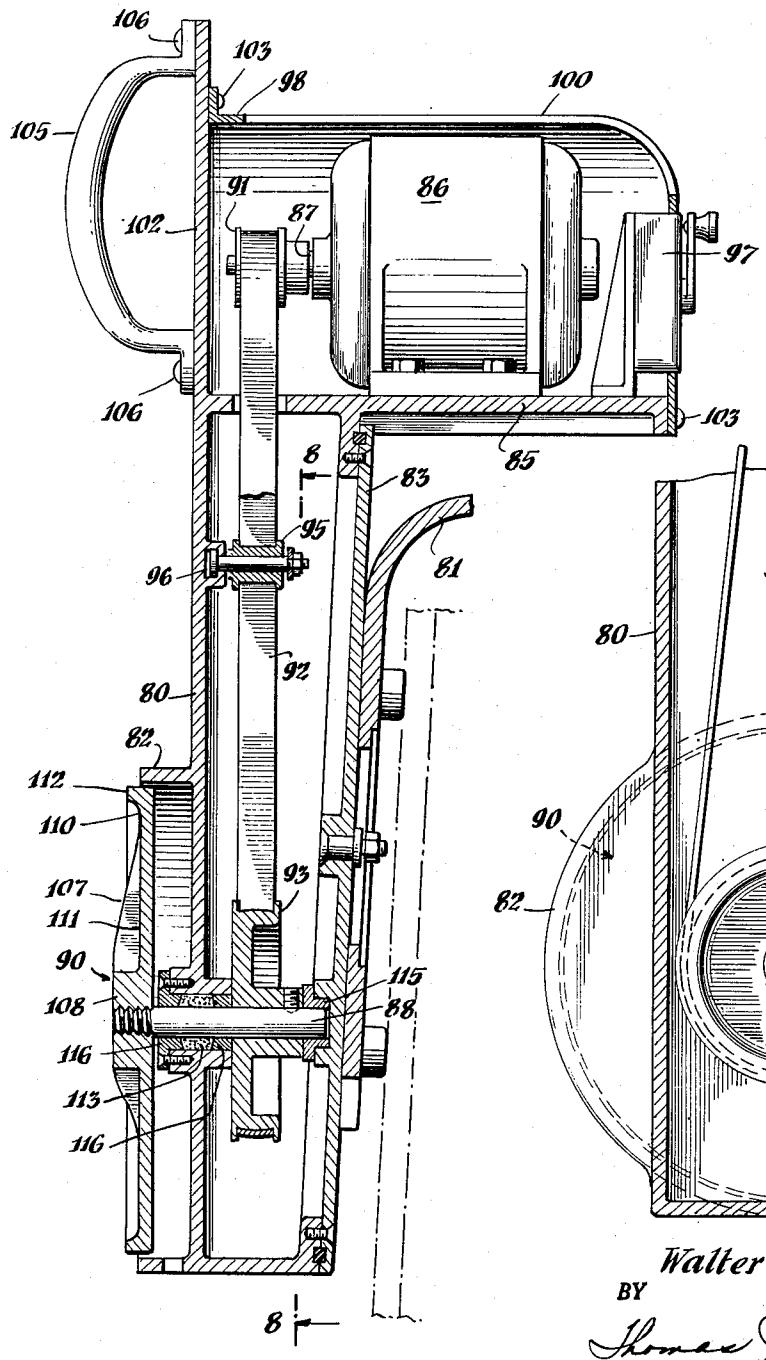


Fig. 8

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AGITATING APPARATUS

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7 Claims. (Cl. 68—131)

This invention relates to a clothes washing device and more particularly to washing and agitating apparatus which may be removably positioned in a container in which clothes may be washed.

In order to effectively and rapidly wash clothes, it is generally necessary to effect a mechanical scrubbing of adjacent pieces of cloth. This may be achieved in part by the circulation of the water in which the clothes are immersed so that the pieces of cloth brush each other in the circulating water. However, the circulation of the water results in only a limited amount of effective scrubbing action. Therefore, the prior devices which were adapted to be removably positioned in a wash tub or other clothes-washing container and which relied merely upon circulation of the water in the tub have not been completely effective as a clothes washing means because of the limited and impositive scrubbing action which resulted. Furthermore, the circulation of the water in such devices frequently required a pump device having an intake which was subject to becoming clogged by clothes thereby reducing or stopping the circulation of the water.

Other types of devices which were designed to be removably positioned in containers for washing dishes, mixing liquids and the like also could not be successfully used for washing clothes for the liquid circulation was through the blades of the circulating propellers. Such propellers would become entangled in the clothes and the clothes would be cut or torn by the rapidly moving ends of the propeller blades.

An important object of this invention is to provide an effective clothes washing device which may be removably positioned in a wash tub or other container for clothes washing and which will agitate the clothes to effect a mechanical scrubbing and will also circulate the water in which the clothes are immersed.

Another object of the invention is to provide a water circulation means which is not susceptible to clogging by clothes in water.

An additional object is to provide an adjustment means by which the circulating and agitating means of this invention may be removably positioned in the clothes-washing container at selected levels.

The invention may be embodied in an apparatus which is adapted to be removably positioned in a clothes-washing container. The apparatus includes a rotatable impeller member and a housing member closely encompassing the periphery of the rotatable impeller member. Means are provided for rotatably supporting the impeller member in a substantially horizontal position in the container at a selected level, and means are also provided for rotating the said impeller member. The housing in addition to encompassing the periphery of the impeller member also substantially encloses one face of said member. The enclosed face may be adjacent a wall of the container. The exposed face of the rotatable impeller member may be defined by a flat disc with the hub and the rim projecting therefrom, and with the flat portion of the impeller member curving upward at the projecting rim and hub. The rotatable impeller member is also provided with vanes which project from the flat surface in planes radial to the axis of said member. The vanes have a greater axial extent adjacent the hub than at the ends remote from the hub.

For a more detailed description of the invention, reference is made to the drawings wherein:

Fig. 1 is a perspective view of a combination wash tub and sink with a device embodying the invention attached to the separating partition;

Fig. 2 is a vertical sectional view of the device shown in Fig. 1;

Fig. 3 is an end view of the device shown in Fig. 1, with parts cut away to show interior details;

Fig. 4 is a front view of the rotatable impeller member with its associated driving linkage;

Fig. 5 is a horizontal sectional view of the device taken along the line 5—5 in Figs. 2 and 4;

Fig. 6 is a diagrammatic plan view of a clothes-washing container with the device in operative position showing the circulation of clothes and water induced by the device;

Fig. 7 is a vertical sectional view of an alternate form of the invention; and

Fig. 8 is a vertical sectional view of the alternate form taken along the line 8—8 in Fig. 7.

The form of the invention shown in Figs. 1–5 is of a self-contained washing device 9, which is adapted to be removably positioned on the side or wall of clothes-washing containers. The device includes an elongated casing member 10, a supporting saddle 11 and a motor platform 12. These members may be made of metal, such as stainless steel, aluminum, enameled iron, or other suitable non-corroding material, for example, plastic or the like.

The elongated casing 10 and the platform 12 may be integral as shown with a removable plate 13 fixed to the back of the elongated member by screws 15. A gasket 16 may be disposed in channels adjacent the joint of the plate 13 and the casing member so that the latter is water tight.

The plate 13 is provided with a vertical keyway 17, best shown in Figs. 3 and 5.

End 18 of the saddle member is bevelled to form a key which is adapted to be received in sliding engagement in the keyway 17. The end 18 is also provided with a slot 20. A bolt or threaded stud 21 projects from the casing 10 through the slot 20 and a nut 22 is threaded on the stud 21 to maintain the end 18 of the saddle 11 in fixed relation to the keyway 17.

By releasing the nut 22 and moving the keyway with respect to the end 18 of the saddle and then tightening the nut, the elongated member may be adjusted to the desired level with respect to the saddle 11.

The saddle 11 is adapted to straddle the side or wall of a clothes washing container such as wall 23 of wash tub 25, as best shown in Fig. 1, which illustrates a typical combination sink and wash tub. A plurality of resilient pads 26 of rubber or similar material are positioned on the inner surface 27 of the saddle to engage the wall 23 or other supporting means. Adjacent end 28 of the saddle, as shown in Fig. 2, a threaded hole is provided to receive clamp screw 30. The clamp screw has a resilient pad 31 attached to its inner end for engaging the outer face of the wall 23. A knob 32 is used for adjusting the screw clamp 30.

Near the lower end of the elongated casing 10, a shallow cylindrical housing 33 is formed. The housing may be integral with the casing 10 as shown in Fig. 2. A shaft bore 35 which is coaxial with the cylindrical housing is formed in the side of the casing 10.

A rotatable impeller member 36 is adapted to be rotatably disposed at the open end 37 of the housing 33, the axis of the impeller being substantially horizontal. The impeller 36 is fixed on a shaft 38 which is rotatably mounted in bearings 40 and 41, as shown in Fig. 2, and the impeller 36 may be fixed to the shaft 38 in any convenient manner as by being screwed on to the threaded end 42 of the shaft 38. A gland 44 is provided around the impeller shaft 38 to prevent water from leaking into the casing around the shaft.

A worm pinion 43 is fixed on the shaft 38, in the casing and is adapted to engage worm 45 as shown in Figs. 2 and 4.

The worm 45 is fixed on vertically disposed shaft 46 which is rotatably mounted in bearings 47 and 48 in the casing 10.

Power means such as electric motor 50 is supported by

an L-shaped bracket **51**, the bracket being fixed to the platform **12** by bolts **52**.

Power is transmitted from the motor **50** to the vertical shaft **46** by means of pulley **53** fixed on motor shaft **55**, through belt **56** to pulley **57** mounted on the vertical shaft **46**.

The motor may be connected to a standard house outlet by extension cord **58**, with a suitable manual throw switch **60** imposed in the line, in the usual manner.

The motor **50** and the associated pulleys and belt may be enclosed in a protective housing **61** fixed to the platform **12** by screws **62**. The housing may be provided with suitable vents **63** and a handle may be fixed to the platform and the motor, as shown in Fig. 2, so that the apparatus may be moved conveniently.

The impeller **36**, as shown in Fig. 2, is formed as a relatively flat disc having no projections on the inner face **67** which is enclosed in the housing **33**. On the outer face of the impeller, a hub portion **68** and rim portion **70** project from flat face **71**, said face curving up sharply to the raised hub and curving up more gradually at **75** to the raised rim **70**. Vanes **72** also project from the face **71**. The vanes extend radially from the hub and lie in planes passing through the axis of the impeller **36**. The vanes **72** have a greater width or axial extent adjacent the hub and taper to a narrow width adjacent the rim **70**. The leading or clothes-engaging edges of the vanes may be smoothed to prevent tearing of the clothes during operation. As shown the impeller is provided with three vanes spaced at 120° intervals around the axis thereof. The impeller is made as a unit of non-corrosive metal. However, if desired the impeller may be made of relatively stiff rubber, plastic, or similar material which is slightly resilient or the vanes alone may be made of slightly resilient material. Also, while in the presently preferred form the vanes are relatively thin blades having no pitch but rather being co-planar with axial radial planes of the impeller, it will be understood that the vanes can be wider in cross-section or of various shapes within the terms of this invention provided the profile tapers generally from hub outwardly and the flat face **71** curves up to meet the projecting rim.

To operate the apparatus, it is lifted into position on the wall of a wash tub such as the wall **23** of the tub **25** with the saddle **11** straddling the wall, and securely fastened to the wall by turning the knob **32** to tighten the screw **30** and press the pad **31** against the outer face of the wall **23**. Either before or after the apparatus is in place, the tub is filled with water **65** and clothes **66** so that the level of the water is somewhat above the upper end of the housing **33**. About five pounds of clothes in an average size tub filled about three-quarters full of water should provide sufficient room for the clothes to circulate and to rub each other. When a powdered or flake soap or detergent has been added, the apparatus may be connected to an electrical outlet by means of cord **58** and the motor turned on by means such as the switch **60**.

In order to reduce the danger of electrical shocks, or grounding of the motor, it may be found desirable to insulate it from the rest of the apparatus.

When the motor is energized, the pulley **53** on motor shaft **55** will rotate, causing the pulley **57** to rotate by means of the belt **56**. The rotation of the pulley **57** is transmitted through vertical shaft **46**, worm **45**, pinion **43**, shaft **38** to the impeller **36**. As the impeller **36** is rotated, the water and clothes in the tub are caused to circulate in the manner indicated in Figs. 2 and 6 being drawn slowly toward the hub of the impeller and then being moved rapidly toward the rim thereof and thrust outward at the rim. This motion is accompanied by a rotary churning of the clothes and water imparted by the rotating impeller. The vanes which are relatively wide adjacent the hub entrain the clothes near the hub and because the rotation is slower at that point, they do not cause any damage. As the rotation becomes more rapid, toward the rim, the abrasive action on the clothes is steadily reduced because of the tapering of the vanes. The curving of the face **71** upward at **75** toward the rim **70** tends to throw the clothes and water outward in a generally axial direction. The flat outer face **73** of the rim **70** cooperates with the curve **75** to move the clothes axially away from the impeller by shearing the water sharply in the same manner as the step of a motor boat and reducing radial eddying which would occur if the rim surface were rounded.

To prevent clothes from being drawn into the housing **33** at the periphery of the impeller because of any pressure differential between the inner and outer faces of the impeller **36**, an opening **76** is provided in the wall of the housing **33** so that water may circulate freely into and out of chamber **77** of the housing **33**. The opening **76** also serves as a convenient drain for the water in the chamber **77** when the apparatus is removed from the tub or when the tube is drained.

After the washing operation is completed, the tub may be drained and refilled for one or more rinsings during which the impeller is rotated to thoroughly circulate and rinse the clothes.

In Figs. 7 and 8, an alternate form of the invention is shown. In this form, casing **80**, saddle **81**, housing **82** and back plate **83** correspond generally to similar parts shown in Figs. 1 to 5. Motor platform **85** is in a slightly different position so that motor **86** may be supported with its shaft **87** horizontal and parallel to impeller shaft **88**. The drive for impeller **90** is provided by pulley **91** mounted on motor shaft **87**, belt **92** and pulley **93** fixed on the impeller shaft **88**. Tension on belt **92** may be varied by removing back plate **83** and adjusting the shaft of idler pulley **95** along keyway **96**.

The motor **86** may be energized and controlled in any suitable manner such as by transformer **97** imposed in power lines (not shown). The electrical connections for the motor **86** and the motor **50** may be of any suitable well-known types and as such form no part of this invention and therefore no further description is deemed necessary.

The motor **86**, pulley **91**, and transformer **97** may be enclosed in a housing **98** having vents **100**. The housing **98** is attached to the motor platform **85** and extension **102** of the casing **80** by screws **103**. A handle **105** may be attached to the casing extension **102** by screws **106** or other suitable fastenings to provide a means for readily lifting and positioning the apparatus.

The impeller **90** is similar to the impeller **36** except that vanes **107** have a continuously sloping or tapering profile from raised hub portion **108** to the base of curve **110**, which is intermediate flat portion **111** and raised rim **112**.

A gland **113** corresponding to the gland **44** may be disposed around the impeller shaft **88** to prevent water from leaking into the casing **80**. As shown in Fig. 7, the impeller shaft **88** is rotatably mounted in a substantially horizontal position in bearings **115** and **116**.

The operation of the apparatus shown in Figs. 7 and 8 is generally similar to that shown in Figs. 1 to 5.

Although the invention has been described as a clothes washing machine, it has also been found useful as a means for agitating water in a bath tub or similar container in therapeutic bath treatments.

The apparatus may also be adaptable for use in various agitating, circulating, mixing and blending operations and because of the arrangement of parts, is not susceptible to clogging because there are no intakes such as are found in pump type circulators and the fluid being circulated does not have to pass through the blades of the circulating impeller as in the propeller type circulators and agitators.

In the operation of the apparatus of this invention, it may be found necessary to raise or lower the impeller with relation to the tub. To make the desired adjustment, the lock nut **22** on the threaded stud **21** (see Figs. 2 and 3) is loosened and the end **18** of the saddle **11** and the keyway **17** of the casing are moved relative to each other to a selected position. Then the nut **22** is tightened so as to retain the saddle and casing in the selected position in order to maintain the impeller at the desired level when the saddle is fixed on the wall of the tub.

During the washing operation, it is desirable to have the top of the impeller somewhat below the surface of the water and the lower end of the impeller housing may be spaced from the bottom of the tub so that full circulation may be had in the area of the impeller.

Also, the apparatus may be positioned in the center of the wall to which the saddle is attached, as shown in Figs. 1 and 6, to have lateral circulation on both sides.

Because of the curved portions **75** of the impeller face adjacent the rim **70** and the flat outer face **73** providing a sharp break at the rim, the water and clothes are thrown away from the impeller in a direction substantially parallel to the impeller axis, rather than radi-

ally. As a result, there is relatively little splashing at the surface of the water, even though there is vigorous sub-surface circulation, and, therefore, it is not necessary to cover the tub while the apparatus is in operation.

The apparatus embodying this invention can be made in any desired suitable dimensions. However, as an example, it has been found that with an impeller of about six inches in diameter rotated at about 650 R. P. M., an effective washing action is achieved. The impeller may be driven by a fractional horsepower motor operating at about 6500 R. P. M. The pulleys and the worm and pinion train provide the desired speed reduction. It also has been found that the complete machine may weigh less than ten pounds.

From the foregoing, it will be appreciated that the apparatus of this invention is of relatively simple and inexpensive construction, that it is sufficiently small and light in weight so that it can be positioned easily on a tub or other clothes-washing container and also may be readily removed.

It will also be appreciated that this invention fulfills the objects of providing an apparatus which is not susceptible to clogging by clothes in the water, and which will mechanically manipulate the clothes and also will circulate both the clothes and water to effect a dual washing action.

Furthermore, the washing device of this invention requires no special container as is the case with standard washing machines and may be easily stored when not in use.

The invention also provides a water agitating and circulating device in which the water need not be drawn through the blades of the circulator, or impeller and one in which the portions adjacent the periphery of the impeller are so formed that the clothes will not be cut or torn as they would be if the ends of the blades or vanes were exposed.

In accordance with the provisions of the patent statutes, I have herein described the principle of operation of the invention, together with the elements which I now consider the best embodiments thereof, but I desire to have it understood that the structure disclosed is only illustrative and the invention can be carried out by other means. Also, in the combinations and relations described, some of these may be altered and modified without interfering with the more general results outlined.

Having thus described my invention, I claim:

1. An apparatus for washing clothes disposed in a container in which water and a cleansing agent are present, said apparatus comprising, a rotatable impeller member having two faces, vanes projecting from one face thereof, said vanes lying in planes radial to the axis of rotation of the member, each of said vanes having a tapering profile, being of greater extent adjacent the axis, said member having a continuous peripheral rim to which the ends of the vanes remote from the axis are attached, the rim of the member having greater axial extent than the said ends of the vanes, and flat portions between said vanes, a housing for said member closely encompassing the periphery of the impeller member and substantially enclosing the other face thereof, means for rotatably supporting the member and means for rotating the member.

2. An apparatus for washing clothes disposed in a container in which water and a cleansing agent are present, said apparatus comprising a rotatable impeller member, said member having a substantially planar surface perpendicular to the axis of rotation and having a hub portion and a peripheral rim projecting from one face of said planar surface, vane members also projecting from the planar surface of the impeller member, said vanes lying in planes radial to the axis of rotation of the member and having greater axial extent adjacent the hub and tapering toward the rim, and a curved portion between the planar surface and the rim, a housing for said member closely encompassing the peripheral rim of the rotatable member and substantially enclosing the other face of said member, means for rotatably supporting the member with its axis horizontal and with the enclosed side of the member adjacent a wall of the container and means for rotating the member.

3. The apparatus of claim 2 wherein the means for rotatably supporting the member with its axis horizontal and with the enclosed side of the member adjacent the wall of the container includes an axially disposed supporting shaft for said member and an elongated casing having bearing means at one end thereof adapted to receive said axially disposed supporting shaft and a supporting saddle member adjustably connected to said elongated casing for supporting the elongated casing in position adjacent the side of the container, said saddle member being shaped to straddle the side of the container.

4. The apparatus of claim 3 wherein means for rotating the member includes a platform to support a motor at the end of the elongated casing, a motor mounted on said platform and a shaft means disposed in the elongated casing, means for rotating said shaft means by said motor and gear means for rotating the axial supporting shaft of the rotatable member by rotation of the shaft disposed in the elongated member.

5. The apparatus of claim 2 wherein the projecting rim has a substantially flat surface parallel to the planar surface of the impeller, said flat surface meeting the curved portion from the planar surface in a relatively sharp edge.

6. The apparatus of claim 3 wherein the means for rotating the impeller member includes a motor supported at one end of the elongated casing and belt means connecting the motor and the axial supporting shaft for said member.

7. A clothes-washing apparatus which may be removably positioned in a clothes-washing container, said apparatus comprising, a rotatable impeller member and a housing closely encompassing the periphery of the impeller member and substantially enclosing one face thereof, means for removably supporting the impeller with its axis of rotation substantially horizontal at adjustably selected levels in a clothes-washing container, and means for rotating the impeller, said impeller having a clothes-engaging face with vanes and a peripheral rim projecting therefrom, said vanes lying in planes radial to the axis and having greater axial extent adjacent the hub and tapering toward said rim.

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