Oct. 18, 1955 K. W. LEWIS 2,720,771

LIQUID CIRCULATING MEANS FOR WASHING MACHINES AND THE LIKE

Filed Jan. 28, 1953 2 Sheets-Sheet 1

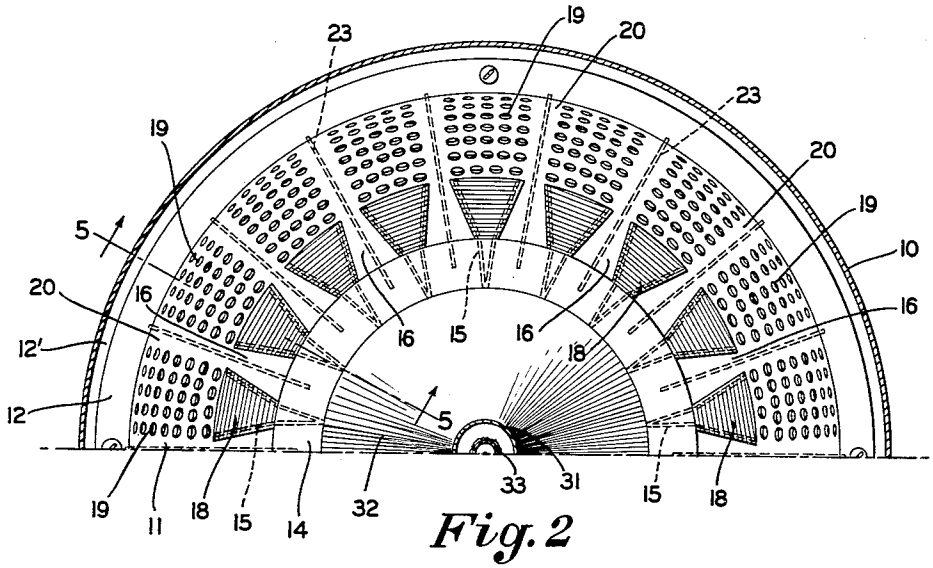


Fig. 2

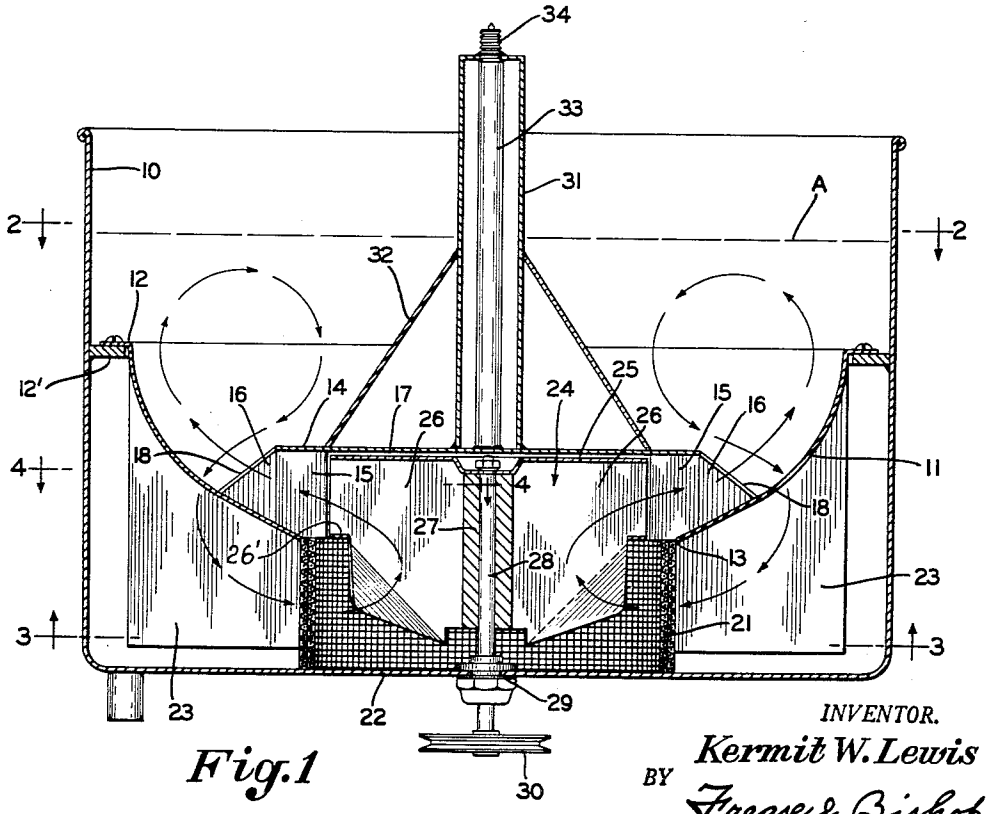


Fig. 1

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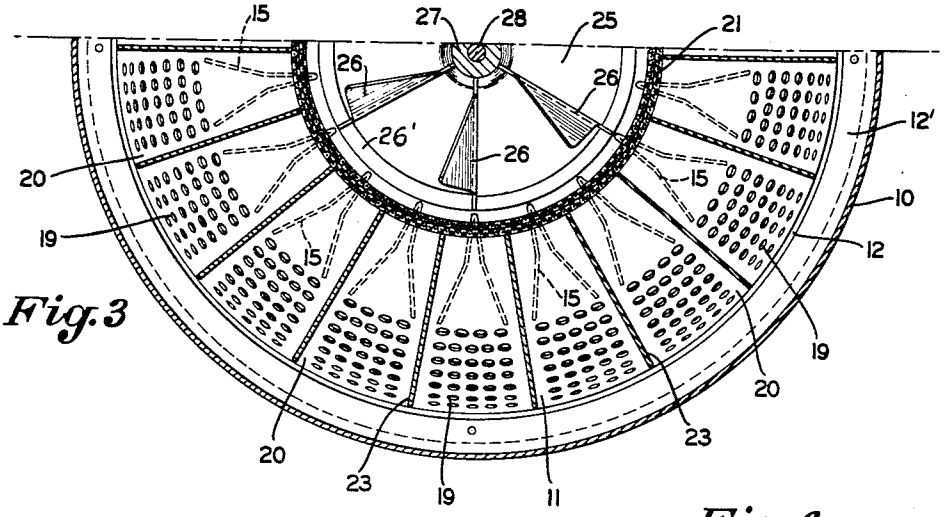
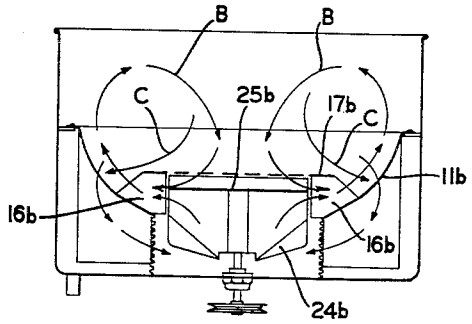


Fig. 3

Fig. 6



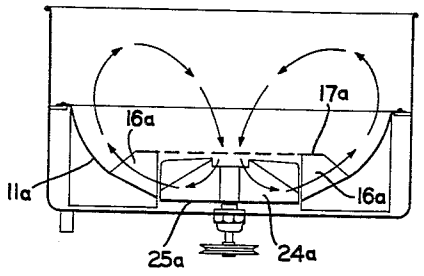


Fig. 7

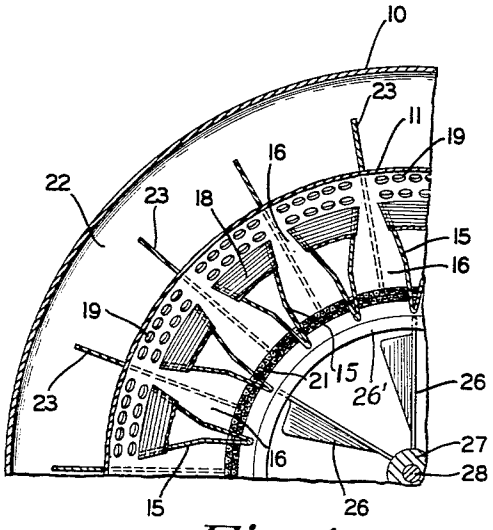


Fig. 4

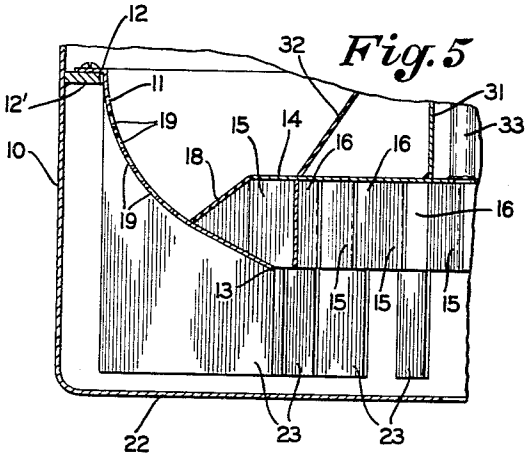


Fig. 5

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LIQUID CIRCULATING MEANS FOR WASHING MACHINES AND THE LIKE

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6 Claims. (Cl. 68—184)

The invention relates to means for circulating water or other liquid in washing machines, dish washers, metallic parts washers, hydrotherapy devices and other apparatus.

In the washing of clothes and the like, it is a known fact that the washing action is produced by passing the soapy water, or other cleaning liquid, through the clothes. Under present practice, washing machines are provided with means for agitating the water, either by means of an oscillating agitator within the tub, or by oscillating or rocking the tub itself.

Such devices all produce substantially the same action, that is, they cause the water to oscillate, or move back and forth in the same path within the tub, and to a considerable extent the clothes are moved back and forth through the same path, with the movement of the water.

Thus the maximum efficiency of driving the water through the clothes is not obtained, and furthermore the continual movement of the clothes in the water causes rubbing of the clothes against the tub, naturally resulting in wear upon the clothes.

The present invention contemplates the provision of a washing machine in which the tub itself remains stationary, and in which there is no agitator or other moving part within the tub for producing movement of the water therein.

The invention has also for an object, the provision of a washing machine having means for continuously circulating water in the same direction within the tub, so as to continuously drive the water through the clothes in the tub without producing undue movement of the clothes.

Another object is to provide a washing machine including a tub with a propeller chamber beneath the tub, with spaced discharge and inlet openings forming communication between the propeller chamber and the tub.

A further object is to provide such a washing machine having filter means between the tub and the propeller chamber.

A still further object is to provide a washing machine of the character referred to in which the liquid is continuously discharged from the propeller chamber into the lower portion of the tub in such manner that the liquid circulates upwardly and outwardly and then downwardly and inwardly and is returned to the propeller chamber.

Another object of the invention is to provide a washing machine having no moving parts within the tub, in which the water is continuously circulated in the form of a horizontal ring the cross section of which is continually rotating.

A further object is to provide such a machine having a tub provided with a curved bottom wall having spaced perforate portions, and means for discharging liquid from the propeller chamber onto imperforate portions of the bottom wall located between said perforate portions.

The above objects together with others which will be apparent from the drawings and following description, or which may be later referred to may be attained by constructing the improved machine and operating it in the

manner hereinafter described in detail and illustrated in the accompanying drawings, in which:

Fig. 1 is a vertical, sectional view of a clothes washing machine embodying the invention;

Fig. 2 a plan section of one-half of the washing machine, taken on the line 2—2, Fig. 1;

Fig. 3 a section of one-half of the machine, taken on the line 3—3, Fig. 1;

Fig. 4 a fragmentary section taken on the line 4—4, Fig. 1;

Fig. 5 a fragmentary section taken on the line 5—5, Fig. 2;

Fig. 6 a schematic view of a modification of the machine; and,

Fig. 7 a schematic view of another modified form of the invention.

Although the invention is applicable to various apparatus, including clothes washing machines, dish washers, apparatus for washing metallic parts and the like, and hydrotherapy devices, for the purposes of illustration the invention is disclosed herein as applied to a clothes washing machine.

Referring now more particularly to the washing machine shown in Figs. 1 to 5, a substantially cylindrical tub is shown at **10**, having the concaved bottom wall **11** which may be, as best shown in Fig. 1, in the form of an insert or false bottom attached at its upper, outer perimeter to the side wall of the tub as by the peripheral flange **12** and the annular flange **12'** carried by the side wall of the tub.

This bottom wall **11** is in the form of a concaved annulus having the central opening **13**, spaced above which is mounted the horizontal platform **14** of somewhat greater diameter than the central opening **13**.

The platform **14** is rigidly supported in spaced position above the curved bottom wall by the substantially V-shape sheet metal members **15** which form therebetween the discharge outlets **16** from the propeller chamber **17** to the interior of the tub **10**. Closures **18** are fixed upon the outer, angular edges of the V-shape members **15**. The platform **14** is raised above the terminal of the curved bottom wall so as to hold the clothes above and at least partly out of contact with the discharge passages **16**.

Spaced, perforated portions **19** are provided in the curved bottom wall **11**, between which are located the imperforate portions **20** opposite to the discharge openings **16**. An annular filter **21**, of any suitable design, may extend from the center opening **13** in the curved bottom wall **11** to the flat bottom wall **22**.

For the purpose of reducing swirling action of the water, radial vanes **23** may extend downwardly from the curved bottom wall **11** around the exterior of the filter **21**.

A propeller, indicated generally at **24**, of any suitable design, comprising a circular end wall **25** and radial blades **26**, is located within the propeller chamber **17**, the hub **27** thereof being fixed upon a drive shaft **28** journalled through a suitable bearing **29** in the flat bottom wall **22** and provided with a pulley or the like, as indicated at **30**, for operatively connecting drive means thereto, such as a belt from a motor or the like.

As best shown in Fig. 1, each blade **26** of the propeller is offset inwardly at a point corresponding with the lower sides of the discharge passages **16** and a ring **26'** is attached thereto.

A center post may be located above the platform **14**, as indicated at **31**, and may be provided with the conical base portion **32** for separating clothes placed in the tub for washing, and for controlling the flow of the water.

If desired, a pipe or tube **33** may be located within the center post **31**, communicating at its lower end with the propeller chamber **17** and having a valve **34**, similar to the conventional automobile tire valve, at its upper end,

for the purpose of preventing formation of a partial vacuum within the propeller chamber.

In the operation of the machine to wash clothes, the articles to be washed are placed upon the curved bottom wall **11** and platform **14**, and water with a sufficient amount of soap powder or detergent is placed in the tub, filling the propeller chamber and the space between the curved false bottom **11** and the flat bottom **22**, and filling the tub to any suitable level, such for instance as indicated at A in Fig. 1.

It should be understood that the greater the volume of water placed in the tub, the less the action produced by the propeller, and vice versa. It is also pointed out that the propeller may be driven by a variable speed motor, or by any conventional variable speed drive means for the purpose of increasing or decreasing the action of the water as desired.

The propeller is then rotated at proper speed, discharging water radially from the propeller chamber through th discharge openings **16** onto the imperforate portions **20** of the curved bottom wall **11**, the water circulating upward and then inward and downward, as indicated by the arrows in Fig. 1, passing down through the perforations **19** on either side of the imperforate portions **20**, and being drawn through the filter **21** into the propeller chamber and again discharged therefrom through the radial discharge openings **16**, the action being continuous so long as the propeller is operated.

The water within the tub being circulated in this manner assumes the form of a horizontal annulus or ring, the cross section of which is continually rotating in the direction of the arrows shown in Fig. 1, thus continuously driving the water through the clothes, producing rapid washing action without materially moving the clothes within the tub.

The above arrangement has been found in actual use to produce very satisfactory results in the washing of clothes and the like. However, it has been found that the same principle may be applied to other apparatus, such as dish washers, washers for automotive parts and the like, hydrotherapy apparatus and other devices, by slightly modifying the means for circulating the water or other cleaning liquid.

The improved washing machine above described may be provided with a conventional wringer, or may be used in combination with a spinner drier without requiring any change in the construction.

In Fig. 6 is shown schematically the manner in which the invention may be applied to dish washers and washers for automotive parts or similar articles. In this embodiment of the invention the center post is dispensed with and the platform **17***a* is perforated, while the curved bottom wall **11***a* is imperforate throughout. The propeller **24***a* is inverted, so that the circular end wall **25***a* thereof is located at the bottom rather than at the top of the propeller.

In this form of the invention the water is continuously circulated outward from the propeller chamber through the discharge outlets **16***a*, circulating outwardly and upwardly in the tub and then downwardly and inwardly, in the direction of the arrows shown in Fig. 6, returning to the propeller chamber through the perforate platform **17***a*.

The water or other cleaning liquid is thus continually circulated over substantially the entire lower portion of the tub, thus producing a rapid cleaning action upon the articles located therein.

In Fig. 7 is shown schematically another modification of the invention especially adapted for use in hydrotherapy apparatus. In this embodiment of the invention the curved bottom wall **11***b* may be the same as shown in Figs. 1 to 5, having spaced perforate portions with intervening imperforate portions located opposite to the discharge outlets **16***b*.

The platform **17***b* is perforated in the same manner as the platform in Fig. 6, and the propeller **24***b* differs from the propeller above shown and described in that the circular wall **25***b* thereof is located intermediate the upper and lower ends thereof.

This form of the invention produces a double action of the water, discharging water from the lower portion of the propeller through the discharge outlets **16***b* onto the imperforate portions of the curved bottom wall **11***b*, the water traveling outward and upward and then inward and downward, as indicated by the arrows B in Fig. 7, a portion of the water returning to the propeller chamber through the perforate platform **17***b*, and being discharged through the discharge passages **16***b* by the upper portion of the propeller, and the remainder of the water passes downward through the perforate portions of the curved bottom wall **11***b* as indicated by the arrows C and returns to the lower portion of the propeller chamber, from which it is again discharged through the discharge passages **16***b* by the lower portion of the propeller.

In the foregoing description, certain terms have been upsed for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiments of the improved construction illustrated and described herein are by way of example, and the scope of the present invention is not limited to the exact details of construction.

Having now described the invention or discovery, the construction, the operation, and use of preferred embodiments thereof, and the advantageous new and useful results obtained thereby; the new and useful constructions, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.

I claim:

1. Apparatus of the character described comprising a tub having side wall structure and a bottom wall, an insert in the lower portion of the tub, said insert comprising a horizontal platform of less area than the tub and spaced above the bottom wall of the tub, a concaved annular wall extending from a point spaced below the peripheral portion of said platform upwardly and outwardly to the side walls of the tub at a point spaced above said platform, spaced downwardly and outwardly inclined closure members extending from the periphery of the platform to intermediate points on the concaved annular wall and defining discharge outlets therebetween, there being spaced groups of inlet openings in the concaved annular wall beyond and radially aligned with said closure members, the portions of the concaved annular wall radially aligned with said discharge outlets being imperforate, there being a propeller chamber between said platform and the bottom wall of the tub and within and extending above and below the inner perimeter of said concaved annular wall, a centrifugal propeller in said chamber, and means for rotating the propeller.

2. Apparatus of the character described comprising a tub having side wall structure and a bottom wall, an insert in the lower portion of the tub, said insert comprising a horizontal platform of less area than the tub and spaced above the bottom wall of the tub, a concaved annular wall extending from a point spaced below the peripheral portion of said platform upwardly and outwardly to the side walls of the tub at a point spaced above said platform, spaced downwardly and outwardly inclined closure members extending from the periphery of the platform to intermediate points on the concaved annular wall and defining discharge outlets therebetween, there being spaced groups of inlet openings in the concaved annular wall beyond and radially aligned with said closure members, the portions of the concaved annular wall radially aligned with said discharge outlets being imperforate, there being a propeller chamber between said platform and the bottom wall of the tub and within

and extending above and below the inner perimeter of said concaved annular wall, a centrifugal propeller in said chamber, said propeller having a horizontal end wall located adjacent to the under side of said platform and radial blades extending downwardly from said end wall, and a ring connected to the outer edges of the blades adjacent to the bottom of the discharge outlets, and means for rotating the propeller.

3. Apparatus of the character described comprising a tub having side wall structure and a bottom wall, an insert in the lower portion of the tub, said insert comprising a horizontal platform of less area than the tub and spaced above the bottom wall of the tub, a concaved annular wall extending from a point spaced below the peripheral portion of said platform upwardly and outwardly to the side walls of the tub at a point spaced above said platform, spaced downwardly and outwardly inclined closure members extending from the periphery of the platform to intermediate points on the concaved annular wall and defining discharge outlets therebetween, there being spaced groups of inlet openings in the concaved annular wall beyond and radially aligned with said closure members, the portions of the concaved annular wall radially aligned with said discharge outlets being imperforate, there being a propeller chamber between said platform and the bottom wall of the tub and within and extending above and below the inner perimeter of said concaved annular wall, a centrifugal propeller in said chamber, and means for rotating the propeller, a vertical tube centrally located upon the horizontal platform and extending above the water line of the tub, the lower end of said tube communicating with the propeller chamber, and an air valve in the upper end of the tube.

4. Apparatus of the character described comprising a tub having side wall structure and a bottom wall, an insert in the lower portion of the tub, said insert comprising a horizontal platform of less area than the tub and spaced above the bottom wall of the tub, a concaved annular wall extending from a point spaced below the peripheral portion of said platform upwardly and outwardly to the side walls of the tub at a point spaced above said platform, spaced downwardly and outwardly inclined closure members extending from the periphery of the platform to intermediate points on the concaved annular wall and defining discharge outlets therebetween, radial walls extending between the platform and the annular concaved wall forming discharge passages communicating with said discharge outlets, there being spaced groups of inlet openings in the concaved annular wall beyond and radially aligned with said closure members, the portions of the concaved annular wall radially aligned with said discharge outlets being imperforate, there being a propeller chamber between said platform and the bottom wall of the tub and within and extending above and below the inner perimeter of said concaved annular wall, a centrifugal propeller in said chamber, and means for rotating the propeller.

5. Apparatus of the character described comprising a tub having side wall structure and a bottom wall, an insert in the lower portion of the tub, said insert comprising a horizontal platform of less area than the tub and spaced above the bottom wall of the tub, a concaved annular wall extending from a point spaced below the peripheral portion of said platform upwardly and outwardly to the side walls of the tub at a point spaced above said platform, spaced downwardly and outwardly inclined closure members extending from the periphery of the platform to intermediate points on the concaved annular wall and defining discharge outlets therebetween, there being spaced groups of inlet openings in the concaved annular wall beyond and radially aligned with said closure members, the portions of the concaved annular wall radially aligned with said discharge outlets being imperforate, radial vanes extending downwardly from said concaved annular wall at points between said groups of inlet openings, there being a propeller chamber between said platform and the bottom wall of the tub and within and extending above and below the inner perimeter of said concaved annular wall, a centrifugal propeller in said chamber, and means for rotating the propeller.

6. Apparatus of the character described comprising a tub having side wall structure and a bottom wall, an insert in the lower portion of the tub, said insert comprising a perforate horizontal platform of less area than the tub and spaced above the bottom wall of the tub, a concaved annular wall extending from a point spaced below the peripheral portion of said platform upwardly and outwardly to the side walls of the tub at a point spaced above said platform, spaced downwardly and outwardly inclined closure members extending from the periphery of the platform to intermediate points on the concaved annular wall and defining discharge outlets therebetween, there being spaced groups of inlet openings in the concaved annular wall beyond and radially aligned with said closure members, the portions of the concaved annular wall radially aligned with said discharge outlets being imperforate, there being a propeller chamber between said platform and the bottom wall of the tub and within and extending above and below the inner perimeter of said concaved annular wall, a centrifugal propeller in said chamber having a horizontal wall intermediate the upper and lower ends thereof, and means for rotating the propeller.

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