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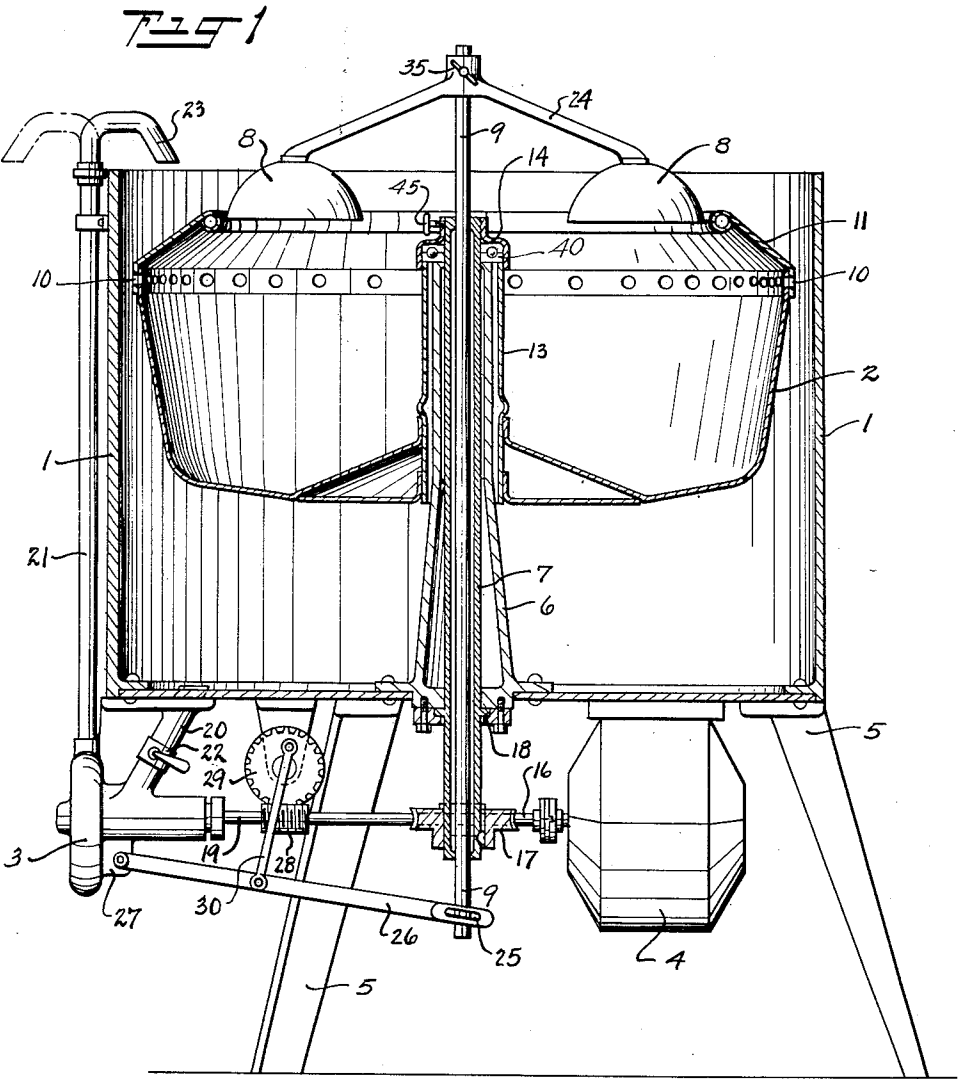
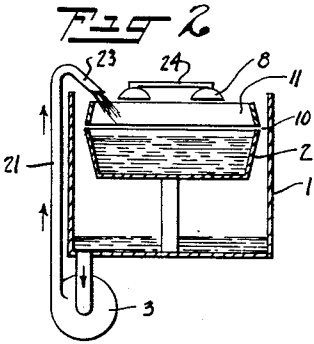
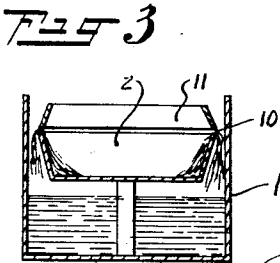
G. W. DUNHAM

1,898,038

WASHING MACHINE

Filed Aug. 22, 1924

2 Sheets-Sheet 1



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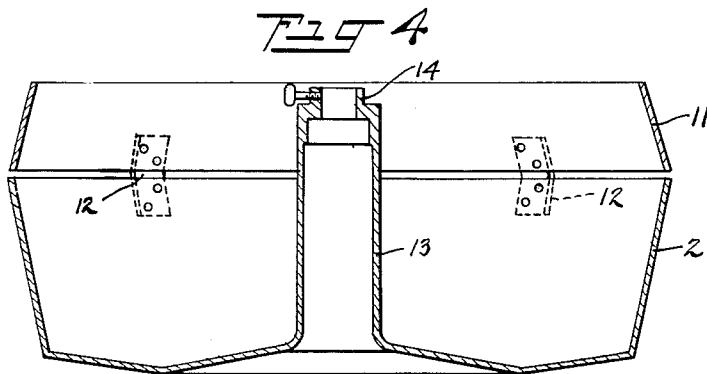
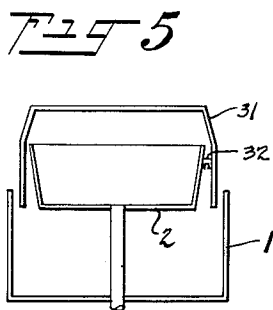
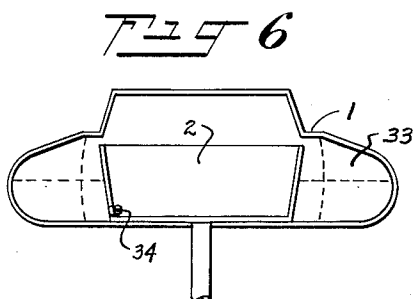
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1,898,038

WASHING MACHINE

Filed Aug. 22, 1924

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

GEORGE W. DUNHAM, OF UTICA, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
THE WHIRLDRY CORPORATION, OF NEW HAVEN, CONNECTICUT, A CORPORATION
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WASHING MACHINE

Application filed August 22, 1924. Serial No. 733,482.

This invention relates to improvements in laundry machines and particularly to machines for washing and drying intended for domestic use.

5 The invention involves an improved apparatus and construction and also a novel method of operating laundry machines whereby the two distinct functions of washing and of drying may be performed in the
10 same apparatus without changing the position of any of the parts of the apparatus, and effecting in an extremely simple and efficient manner the complete cycle of operations in a minimum of time and with a
15 minimum of effort.

The invention consists broadly in a new and novel application of centrifugal force for the purpose of handling the liquid that is used in washing the articles. It is well
20 known that any substance having mass is subject to the action of centrifugal forces when rotated with respect to a fixed axis, and that a liquid is subject to this law as well as a solid, but this fact has not heretofore been recognized or utilized in the construction and operation of laundry machines
25 for domestic use. This principle, however, is utilized in my improved construction, which results in distinct changes and modifications in the structure employed in carrying the principles underlying the invention into effect.
30

The invention also consists in certain new and novel structural features resulting in
35 greater simplicity of construction, rigidity of structure, uniformity of operation, and safety against damage and against accident.

The invention also consists in the new and
40 novel type receptacle for the articles to be washed, which may be permanently mounted upon fixed bearings, and which can be used both for washing and for drying without change in its position and without removing the articles therefrom.
45

In the accompanying drawings:

Figure 1 is a vertical sectional view of a washing and drying machine, illustrating one form of my improved receptacle, container and operating means;

Figure 2 is a diagrammatic view illustrating the washing operation;

Figure 3 is a diagrammatic view indicating the method of removing the liquid from the receptacle by centrifugal force;

Figure 4 is a detail sectional view showing a different form of the receptacle;

Figure 5 is a diagrammatic view illustrating a different form of the receptacle and a modified type of container therefor;

Figure 6 is a diagrammatic view showing a further modification of the container for the receptacle and indicating the relative positions of the liquid in said container when in motion and when at rest.

Referring to the drawings showing one type of structure and some modifications thereof embodying the principles of my invention, an outer receptacle or container 1 is provided to receive the liquid employed
70 in washing the articles which are placed in a receptacle 2. The liquid in the container may be transferred to the receptacle by suitable means, as a pump 3, supported by the container. The receptacle and also the pump
75 may be actuated by a motor 4, likewise mounted upon the container or upon the supports 5 therefor.

Preferably the receptacle is supported upon a hollow tubular post 6 secured centrally in the container, the said post inclosing a hollow shaft or coupling member 7 operatively connected with the motor and adapted to be detachably connected to the receptacle as by means of a thumb screw 45,
85 Figure 1, acting as a releasable clutch. Suitable means are also provided for agitating articles in the container, such as the vacuum cups 8, which may be actuated from the motor through a shaft 9, which passes through
90 the tubular post. If desired, however, the liquid instead of the articles to be washed may be agitated as by means of the pump or other suitable water impelling devices.

The receptacle, 2, which receives the articles to be washed, such as clothing and the like, is characterized by the fact that it has walls closed to hold the washing water and further by the fact that it can be mounted to rotate in the same plane and in the same
100

position when used for washing or for drying purposes. Preferably the receptacle is circular in outline with walls which are vertical or which bear outwardly slightly toward the rim or top of the receptacle of which flare slightly to outline opening 10 for the liquid, as shown.

The top of the receptacle or upper section 11, preferably converges inwardly toward the axis of the receptacle to provide a baffle for the liquid and a guard or retainer for the articles in the receptacle. Said baffle extension or section may be attached to the receptacle as in Figure 1, or may be spaced therefrom and permanently secured thereto by straps 12 as in Fig. 4 or be constructed in any other suitable manner.

The receptacle is provided at or near its top with a flange or collar providing a bearing to support the receptacle upon the stationary post 6. In the detail views, Figures 1 and 4, the receptacle is of annular construction with a central sleeve or column 13, rising from the closed bottom and having a shouldered upper end portion 14, resting on top of the post and surrounding the upper end of the tubular drive shaft 7, which is coupled at its lower end to the motor shaft 16 by worm gearing 17, whereby the receptacle may be rotated at the desired speed from the motor.

A ball bearing 40 may be interposed between the supporting shoulder of the receptacle and the top of the stationary post to eliminate friction, and the drive shaft may be supported at the bottom by a suitable step bearing 18.

The container 1 may be of any suitable material and the central post 6 may form a separate part. The walls of the container may extend either above or below the top of the receptacle, depending upon the particular form or type of receptacle which may be used, and the container should have sufficient capacity to hold all of the liquid which may be removed from the receptacle while it is being used as a dryer and an additional amount necessary to keep the pump inlet covered during the washing operation. In Figures 1 to 3, the sides of the container are extended up past the receptacle and spaced therefrom to catch the discharge from the receptacle without impeding the flow.

The pump may be of any preferred construction, but for purposes of illustration I have indicated a centrifugal pump coupled directly to the motor through an extension 19 of the motor. An outlet 20 from the bottom of the container feeds to the pump and a discharge pipe in the nature of a stand pipe 21, extending up at the side of the tank carries the liquid over to top of the container and discharges through a spout

directly into the receptacle. Valve 22 controls the outlet from the container. If preferred, the spout 23 of the discharge pipe may be swiveled on the top of the stand-pipe and be turned to direct the water either into the receptacle or back into the container or entirely clear of both. With the latter the valve can be eliminated if desired.

The vacuum cups 8 are mounted on spider arms 24, supported by the shaft 9, having a bearing within the drive sleeve. Said shaft projects below the bottom of the sleeve, and is connected through a suitable pin and slot engagement 25 with a lever 26, which may be pivoted at any convenient point to a stationary part of the apparatus, for example, to the flange 27 on the pump. This lever is reciprocated to actuate the vacuum cups by means of a worm 28 upon the motor shaft in engagement with a gear 29 which is connected by a link 30 with the lever. The cups are thereby caused to agitate the liquid and the clothes, producing the desired washing action. While the cups, the receptacle or the liquid may be caused, by various means to slowly rotate in order that all the clothes may be uniformly effected by the agitation preferably in the construction shown, a relatively slow rotation is imparted to the receptacle and contents during the washing by turning the nozzle 23 as to direct the stream into the receptacle on an angle or tangent sufficient for the stream to impart the desired movement.

Referring to Figure 2, I have indicated diagrammatically the stage in the washing operation when the liquid is at or approximately at the level of the outlet at the top of the receptacle, and is constantly spilling over and discharging into the container, from which it is drawn by the pump, as indicated by the arrows, and returned to the receptacle, serving not only to keep the receptacle full but to agitate the liquid in the receptacle and aid in the washing operation.

In Figure 3, I have indicated diagrammatically one stage of the drying operation in which the receptacle, in the same relative position with respect to the container and without being adjusted or moved in any way, is coupled to and rotated by the motor at a high rate of speed, causing the liquid under the action of centrifugal force to pile up against the side and creep upward along the same and overflow over the rim of the receptacle into the container. The depth of the liquid indicates that the pump action has been stopped, for instance by closing outlet valve 22, and that the liquid is accumulating in the receptacle. The operation may be continued until all of the liquid passes out of the receptacle into the container, and until the articles of clothing in

the receptacle have become satisfactorily dry.

In Figures 5 and 6 I have indicated some of the various modifications of the apparatus, which may be made both in the receptacle and the container without departing from the invention.

Referring to Figure 5, the receptacle is provided with a removable cover 31 having a depending skirt or flange extending downwardly below the top of the container, which has relatively low walls. The cover, which may or may not have the skirt attached or formed integral therewith, is supported and spaced from the receptacle by any suitable means, as the flange 32, which may be secured to the receptacle.

In the construction shown in Figure 6, I have indicated diagrammatically another type of container, in which the receptacle is formed integral therewith and both rotate as a unit. In this embodiment of my invention the container has a depth only slightly greater than the depth of the receptacle, but it has a much greater diameter, forming an annular pocket 33 at the sides of the receptacle to receive the liquid, which may be supplied thereto from the receptacle. During the drying operation the liquid in the receptacle will pass outward under centrifugal force and over the rim of the receptacle as hereinbefore described, and will also move outward and bank up against the sides of the container, forming an annular rim of liquid, which will remain in place until the drying operation has been completed and receptacle and container have come to rest.

With this construction the pump might be dispensed with, as most of the liquid can be caused to flow back into the receptacle by operating a plug 34 in bottom of receptacle.

It will be seen that in this construction the overstanding inwardly-inclined guard flange is carried by the container and rotates therewith.

In operation of the machine as disclosed in Figure 1, the container is filled with liquid to the desired height, and the clothing, or other articles to be washed, placed in the receptacle. Sufficient water is added, if necessary to cause an overflow of the liquid into the container. The motor is then started and the cups caused to impart a suitable movement to the clothing and at the same time to agitate the liquid so as to effect the washing of the clothing in the usual well-known manner. When the batch of clothing in the receptacle has been thoroughly cleansed, the receptacle which has been at rest or rotating slowly during the washing operation is connected with the drive shaft, and if desired the vacuum cups are disconnected from the shaft 9, as by loosening the

set screw 35. After shutting off the pump, as by closing valve 22, the receptacle is rotated at a relatively high rate of speed, so as to cause the liquid to flow toward the edge of the receptacle and spill out over the rim, through the space provided between the receptacle and the guard extension. The extension prevents the clothing or other articles, which are likewise thrown outward toward the edge of the receptacle, from piling upward and being thrown out with the liquid. The rotation of the receptacle is continued until the clothing has become sufficiently dry, the liquid meantime having accumulated in the container. The clothing is then removed from the receptacle, and the valve in the feed pipe may be opened to cause the pump to transfer the water from the container back into the receptacle ready to receive another batch of wash. If desired, the water may be wasted by turning the outlet spout away from the container and then operating the pump. The vacuum cups may be again fixed to the shaft by means of the set screw, the receptacle be released from the driving sleeve, and the motor again started to repeat the cycle of operations just described.

By means of this construction the receptacle is mounted in a position stationary with respect to the container, and no manipulation, movement, or adjustment of the parts of the apparatus, or any of them, is required, other than the alternate attachment and release of certain coupling parts, to effect both the drying and the washing operations.

The receptacle is of solid, imperforate construction. It may be made of lighter material, yet have greater rigidity and strength than the receptacles now in use, which are provided with a large number of perforations. The means for driving the receptacle are extremely simple and compact, comprising only a few parts. The driving is done through a single shaft, so there is very little loss of motion. The apparatus can be used with any standard form of pump, and may be actuated from a driving pulley, or in any other suitable manner.

The container may be of any suitable material, and may be made in various shapes most convenient for the particular use for which the machine is being employed or to meet the demands of the trade. The receptacle likewise can be modified with respect to shape and design. Various other changes may be made in the structure without departure from the broad spirit and scope of the invention as hereinafter claimed.

When the sides of the receptacle are vertical, or substantially so, there is but little tendency for the clothes to creep up and the guard may then be stationary and be simply a flat part of either perforate or imperforate

form. If desired, a separately controlled motor may be provided for the pump to make the pump operation entirely independent of the washing and drying operations.

Preliminary to the actual washing operations the clothes may be "soaked" for a time, the imperforate character of the clothes receptacle enabling this further desirable use of the machine. The clutch construction by which the receptacle is coupled to and uncoupled from the driving means therefor may vary as to structure and location but should be of such a nature and so placed that it can be quickly and easily operated.

In the foregoing description and in the claims the term imperforate type as applied to the receptacle is intended to include any type of receptacle which is sufficiently imperforate to hold laundry liquid for washing regardless of the fact that holes may be provided for certain purposes.

I claim as my invention:

1. In a laundry machine, a tank, a hollow pedestal extending upwardly in said tank, a receptacle having a tubular upstanding hub, said hub telescoping with and having direct bearing on said pedestal, a tubular shaft within and having direct bearing relation with said pedestal, agitating means operating in said receptacle, a second shaft within and having direct bearing relation with said tubular shaft, and means whereby one of said shafts drives said receptacle for drying and the other of said shafts drives said agitating means for washing.

2. In a laundry machine, a tank, a hollow pedestal extending upwardly in said tank, a receptacle having a tubular upstanding hub, said hub telescoping with and having direct axial bearing on said pedestal, a tubular shaft within and having direct bearing in said pedestal, a clutch at the top of said hub for connecting and disconnecting said tubular shaft and hub, a second shaft having direct bearing in said tubular shaft, agitating means operating in said receptacle, and coupling means at the top of said second shaft for connecting and disconnecting said agitating means and second shaft, and means for driving said shafts.

3. A laundry machine comprising a hollow pedestal, a tubular shaft in said pedestal, an inner shaft in said tubular shaft, said pedestal and inner shaft each having direct bearing relation with said tubular shaft, a receptacle directly journaled on said pedestal, washing devices in said receptacle and means for selectively connecting one of said shafts to said receptacle and the other to said washing devices.

4. A laundry machine comprising a hollow pedestal, washing devices including a receptacle having a hub surrounding said pedestal, a tubular drive shaft in said pedestal,

an inner drive shaft in said tubular shaft, said pedestal, hub, tubular shaft and inner shaft telescoping all one within the other, each of the telescoping members having direct bearing relation with its contiguous members, and means for selectively connecting said shafts to said washing devices.

5. In a laundry machine, a laundry receptacle having a hollow hub, a pedestal on which said hub is positioned, a drive shaft extending up through said hub, clutch elements at the top of said shaft and hub for connecting and disconnecting said receptacle and shaft, and means for driving said shaft below said receptacle, said elements being disposed in engageable relation both when said receptacle and drive shaft are connected and disconnected.

6. In a laundry machine, a laundry receptacle, a support for said receptacle, a vertically disposed drive shaft, clutch elements on said receptacle and drive shaft operable from the top of said receptacle for connecting and disconnecting said drive shaft and receptacle, and means for driving said shaft below said receptacle, said elements being disposed in engageable relation both when said receptacle and drive shaft are connected and disconnected.

7. In apparatus of the character disclosed, a tank, a tubular column rising from the bottom of said tank, a bearing on top of said column, a clothes receptacle supported by said bearing and provided with an upwardly projecting clutch sleeve, a drive shaft extending up through the column of said clutch sleeve and a shiftable clutch element interposed between said drive shaft and clutch sleeve.

Signed at Utica in the county of Oneida and State of New York this 12th day of August A. D. 1924.

GEORGE W. DUNHAM.