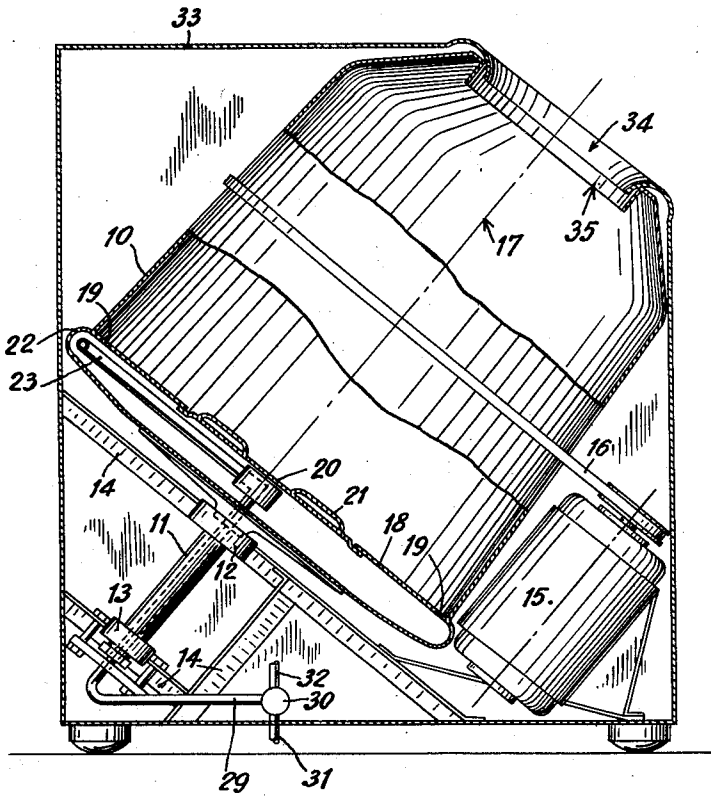


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LAUNDERING MACHINE

2 SHEETS--SHEET 1

Fig. 1.



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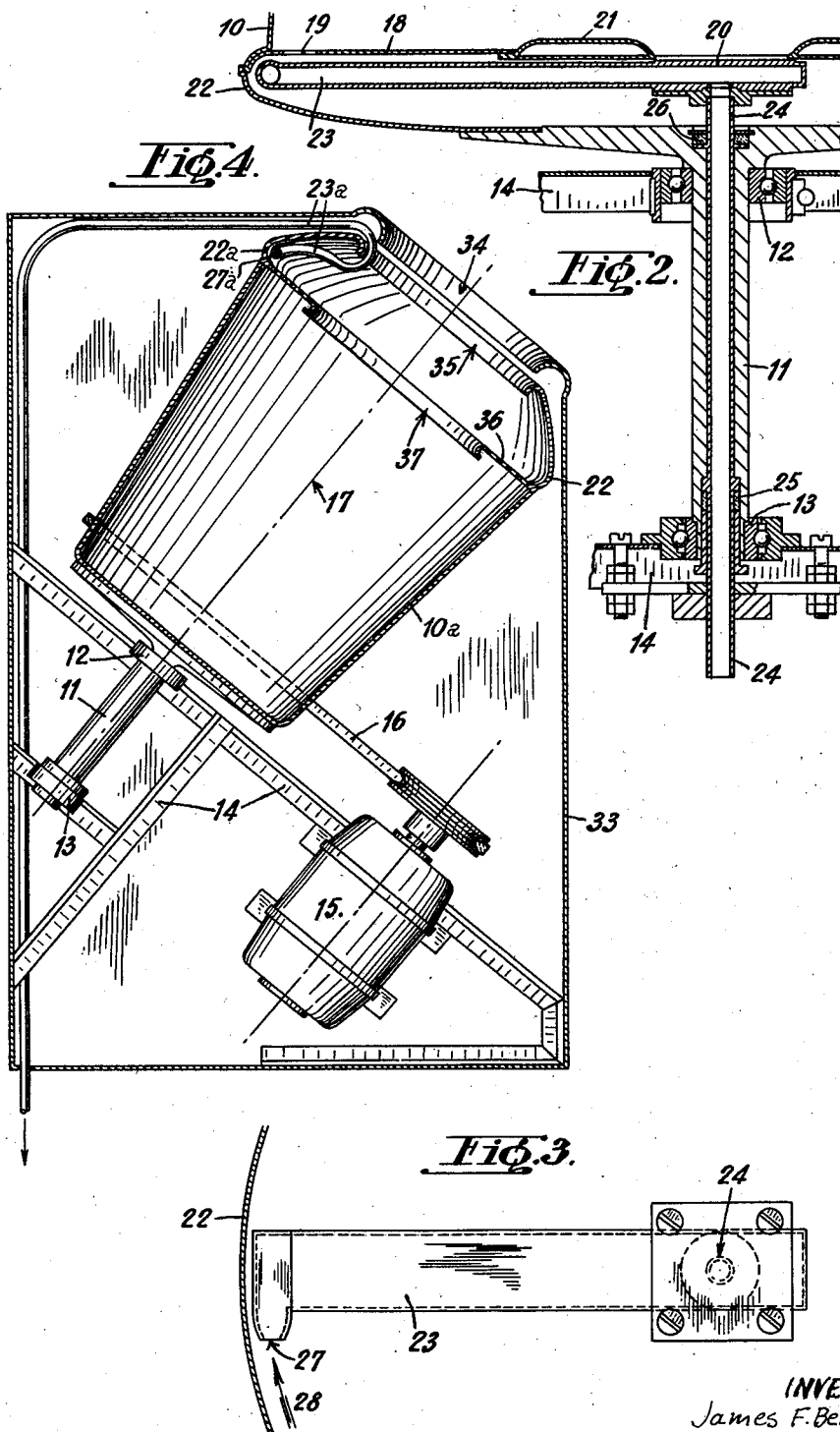
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LAUNDERING MACHINE

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2 SHEETS—SHEET 2



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LAUNDERING MACHINE

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5 Claims. (Cl. 68—24)

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The present invention relates to a laundering machine of simple design and great efficiency.

This machine comprises a rotating tub designed to hold the clothes to be washed and the washing solution, the axis of rotation of the tube being inclined, preferably between 40° and 60° with the horizontal.

Being inclined and not allowing any of the liquid it contains to spill out, the rotating tube sets the clothes and liquid in movement in such a way that—as will be explained below in greater detail—the clothes are completely cleansed by this motion alone. Consequently the inside of the tube can be quite smooth and no agitating device is required, two facts which not only simplify the construction of the machine but enable it to be used for washing very delicate articles such as woolen goods, silk underwear, etc., since the clothes are not set in motion by mechanical means but exclusively by the action of the liquid contained in the tub.

In addition to washing clothes, the machine of the invention can also be designed to rinse and spin-dry them without requiring any constructional complications. For this purpose the tub, having a circular cross-section, may be made, non-cylindrical, such as for instance a truncated cone, and fitted with a draining device. By rotating the tube after draining off the liquid the clothes are dried by centrifugal action, the shape of the tub causing the liquid to be driven to one of its bases where it is collected by the draining device. Rinsing is effected by feeding the tub clean water which is subsequently drained off. It is evident, therefore, that the machine can be used to wash, rinse and spin-dry clothes in the same tub, which presents the great advantage of eliminating all handling of the clothes when wet.

The accompanying drawing shows, by way of examples, two constructional embodiments of the invention with which clothes can not only be washed but also rinsed and spin-dried. The same reference numbers designate similar members in the two embodiments.

Fig. 1 is a front view of one constructional embodiment partly in cross-section.

Figs. 2 and 3 show details of the device for draining the tub in this first embodiment.

Fig. 4 is a front view similar to Fig. 1 but of a second constructional embodiment.

The machine illustrated in Figs. 1, 2 and 3 has a tub 10 in the shape of a truncated cone, the larger base of which forms the bottom of the tub. It would also be feasible, in a general way, to give the tub of circular cross-section any non-

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cylindrical shape with unequal bases. Tub 10 is mounted by a hollow shaft 11 which forms an angle of about 50° with the horizontal. The shaft 11 is mounted on two ball or friction bearings 12 and 13 fitted in a frame 14. An electric motor 15, also fitted in the frame 14, sets tub 10 in motion by means of a belt 16 which for the sake of simplicity rests directly on the lateral wall of tub 10.

Tub 10 can thus be made to rotate round its inclined axis 17. The inner surface of its conical wall is smooth and does not present any aperture through which the liquid could escape. Tub 10 has a false bottom 18 perforated round the edge at 19 and whose removable central portion 20 is reinforced with cross-pieces 21.

The device for draining the tub comprises a circular channel 22 situated in proximity to the larger base of the tub under the latter's false bottom and a pipe 23. The pipe 23 is carried by a fixed hollow support 24 which passes through the hollow shaft 11, whose ends are fitted with a stuffing-box 25 and a rubber washer 26, respectively. The pipe 23 has the shape of a Pitot tube and is streamlined (see Fig. 3) in order to offer as little resistance as possible to the movement of the liquid in the double bottom of the tub. The inlet aperture 27 of the pipe 23 is situated in the channel 22 and is directed against the current of the liquid which rotates in the direction of the arrow 28. The hollow support 24 is connected to a pipe 29 which is controlled by a three-way cock 30 communicating with an exhaust pipe 31 and a feed pipe 32.

The various components of the machine are housed in a cabinet 33 whose aperture 34 coincides with the mouth 35 of the copper. Since these openings are inclined at an angle of about 55° they have the advantage of being at the ideal height and inclination for loading and unloading the clothes. The top of the cabinet is designed to accommodate either a tray for the clothes or a tank for storing the washing solution.

The machine described above operates as follows:

The tub is filled with water by turning the three-way cock 30 so as to connect the pipe 29 with the feed pipe 32. When the water has almost reached the mouth 35 of the tub the cock 30 is closed and the clothes and the soap needed to wash them are introduced through the openings 34 and 35. The machine is then set in motion by switching on the motor 15 by means of an appropriate switch.

Tub 10 very rapidly attains its normal speed while the water it contains assumes a rotatory movement gradually because of its friction against the walls and bottom of the tub. The clothes are also set in motion. After a few seconds the water and the clothes reach a certain stable regimen according to which different portions of the mass of clothes and the water with which they come in contact present different relative velocities. This gives a rise to a churning and sudsing action. The water forms a large vortex as a result of the inclination of the tub which has been determined very exactly. The clothes tend to follow the same path but, being more compact, their movement is opposed by the force of gravity. This brings about a considerable difference between the relative velocities of the water and the clothes, and the latter, although pushed towards the wall of the tub by the action of the centrifugal force, fall down into the centre of the vortex as a result of their weight. These differences in velocity and the complex churning action force the water through the material from which all the dirt is removed.

When washing proper is terminated the water is drawn off and the clothes spin-dried. This is done simply by turning the three-way cock 30 towards the exhaust pipe 31 while maintaining the tub in movement. The water, which is driven into the channel 22 by the centrifugal force, is caught by the aperture 27 at the extremity of the pipe 23. The dynamic pressure of the water suffices to overcome the losses of charge in the various pipes and to ensure rapid draining. It also permits the outlet aperture of the pipe 31 to be placed at a higher level than its inlet aperture 27, which enables the water to be drawn off into a sink or the like. Since the water flows continuously through the holes 19 the channel 22 is filled automatically until the tub is completely empty.

While the tub is being drained the regimen is modified without any intervention on the part of the person operating the machine. When the water sinks to a certain level washing is immediately replaced by centrifugation. This is due to the fact that when for a given load of clothes the quantity of water is reduced the relative velocities of water and clothes, on which the washing action depends, diminish by degrees until the tub, the liquid and the clothes rotate practically at the same speed. At this point the centrifugal force predominates and the water and clothes are pushed against the lateral wall of the tub.

After this point is reached not only is the tub emptied but the water retained by the fibres of the material is driven against the conical wall of the tub down which it flows towards the larger base of the truncated cone; there it enters the channel 22 from which it is evacuated by the pipe 23.

When the tub is empty washing proper is finished and the same cycle of operations is repeated for rinsing and spin-drying the clothes, the tub being refilled with clean water.

The clothes are spin-dried without any intervention on the part of the person operating the machine. Since rinsing takes a much shorter time than washing, it suffices to turn the cock 30 to "drain," letting the tub rotate the while. The clothes continue to rotate for a few minutes and are thus subjected to a vigorous churning action in the clean water which is drawn off little by little. When the level of the water is sufficiently

low the clothes take up the position of centrifugation of their own accord, so that spin-drying takes place automatically.

In the constructional embodiment illustrated in Fig. 4 the upper part of the tub 10a has a greater diameter than the bottom. The draining device is also situated in the upper part of the tub; it consists of a channel 22a fashioned in the tub itself and a fixed pipe 23a which passes through the mouth 35 of the copper. The pipe 23a is controlled by a three-way cock, not shown in the drawing, as in the first embodiment of the invention.

At its larger base the tub is provided with a perforated diaphragm 36 which has a central aperture 37 through which the clothes are loaded and unloaded. The diaphragm 36 prevents the clothes in the tub from coming in contact with the inlet aperture 27a of the pipe 23a. Its purpose is therefore, like that of the member 18 in Fig. 1, to separate the pipe from the part of the tub which holds the clothes.

Since there is no opening in the bottom of the tub 10 nor in its lateral wall, there is no need for a stuffing-box or other watertight joint. The shaft 11 which carries the tub is borne simply by two bearings 12 and 13.

The other components of this machine are similar to those of the first embodiment and its operation is identical except that the water is drawn off from the upper part of the tub, where the diameter is greatest, instead of from the bottom.

The perforated diaphragm 36 can be eliminated by placing the pipe 23 in a position such that the clothes cannot contact it or be caught by it.

In the two constructional embodiments just described the position of the motor and of the various other components can be altered with a view to changing the appearance of the machine. The motor can be electric or hydraulic and might, for instance, be directly attached to the shaft of the tub. Instead of a single speed, it might have two speeds so as to give the tub a certain velocity for washing and a greater one for spin-drying the clothes.

Needless to say, it is also possible to fit the tub with a removable basket for holding the clothes; this basket would rotate with the tub.

What is claimed is:

1. A laundering machine comprising, in combination, a wash tub of generally circular cross-section having one end of a larger diameter than the other end, means for rotating the tub about an inclined axis, a generally circumferential channel adjacent to and communicating with the larger diameter end of the tub, said channel having a diameter larger than the larger end of the tub, and a drain pipe mounted in an opening at the larger diameter end of the tub, said drain pipe having an inlet opening adjacent the side wall of the tub in said circumferential channel and adapted to drain off liquid from the tub as a result of rotational movement thereof.

2. A laundering machine as defined in claim 1, wherein valve means is provided connected to the drain pipe, said valve means being selectively operable to permit the admission and discharge of liquid to and from the drain pipe.

3. Laundering machine as defined in claim 1, wherein the tub is substantially frusto-conical.

4. Laundering machine as defined in claim 3, wherein the tub is provided at the larger diameter end with a false bottom separating the interior

of the tub from the circumferential channel, said channel communicating with said interior through perforations in the false bottom.

5. A laundering machine comprising, in combination, a wash tub of generally circular cross-section having one end of a larger diameter than the other end, and inclined hollow shaft forming a rotatable support for the tub, a circumferential chamber adjacent to and communicating with the larger diameter end of the tub, said chamber having a diameter larger than the larger end of the tub, and a drain pipe arranged radially in said chamber, the outer end of the drain pipe being provided with an inlet opening adjacent the sidewall of the tub and arranged to oppose the direction of movement of liquid upon rotation of the wash tub and the inner end of the drain pipe being connected to a discharge conduit passing through said hollow shaft.

JAMES FRANK BELAIEFF. 20

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
347,702	Evans -----	Aug. 17, 1886
383,707	Craig et al. -----	May 29, 1888
810,975	Petersen -----	Jan. 30, 1906
884,830	Lindahl -----	Apr. 14, 1908
1,480,646	Waller -----	Jan. 15, 1924
1,633,796	Sinclair -----	June 28, 1927
2,273,712	Kottgen -----	Feb. 17, 1942
2,356,818	Bruckman -----	Aug. 29, 1944