

March 18, 1952

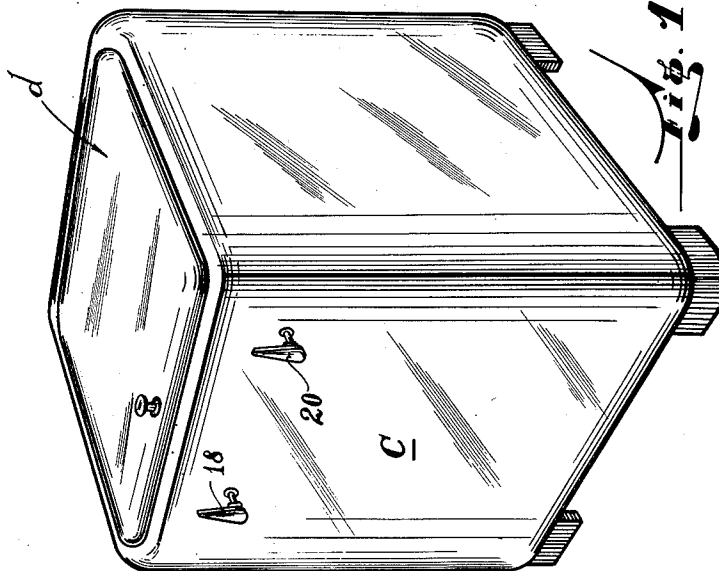
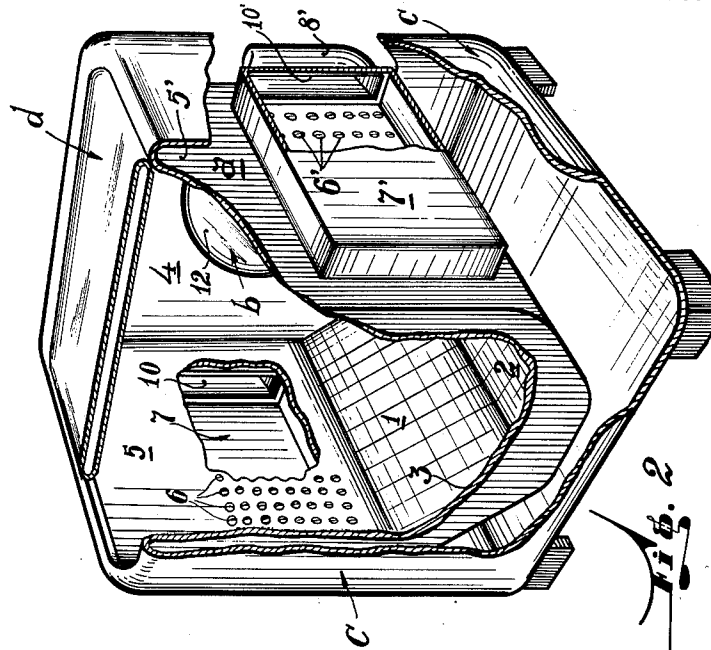
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2,589,247

PUMP OPERATED RECIRCULATION WASHING MACHINE

Filed Feb. 20, 1950

4 Sheets-Sheet 1



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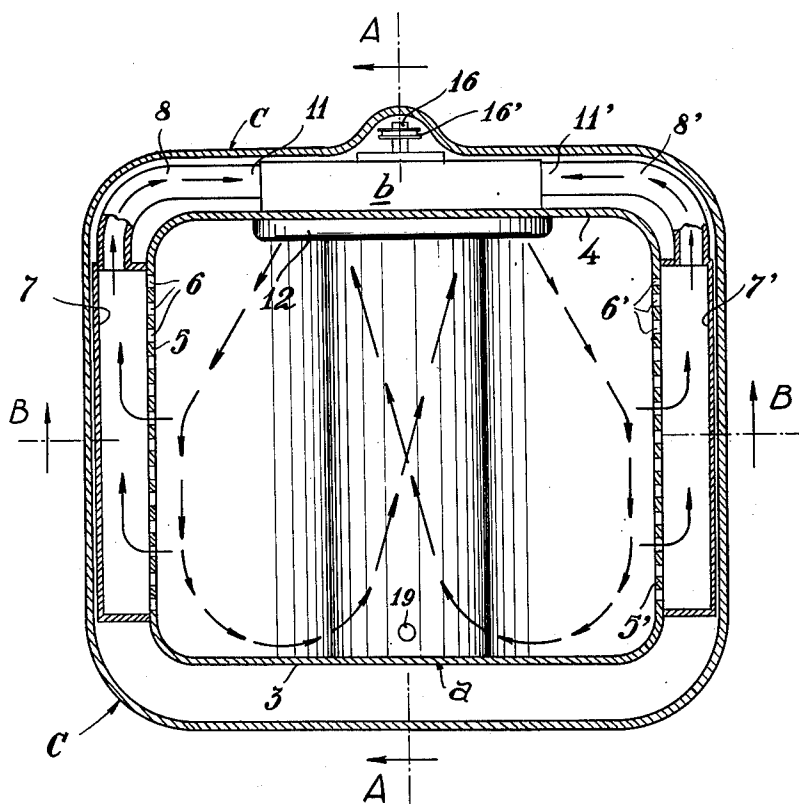
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4 Sheets-Sheet 3

Fig. 5



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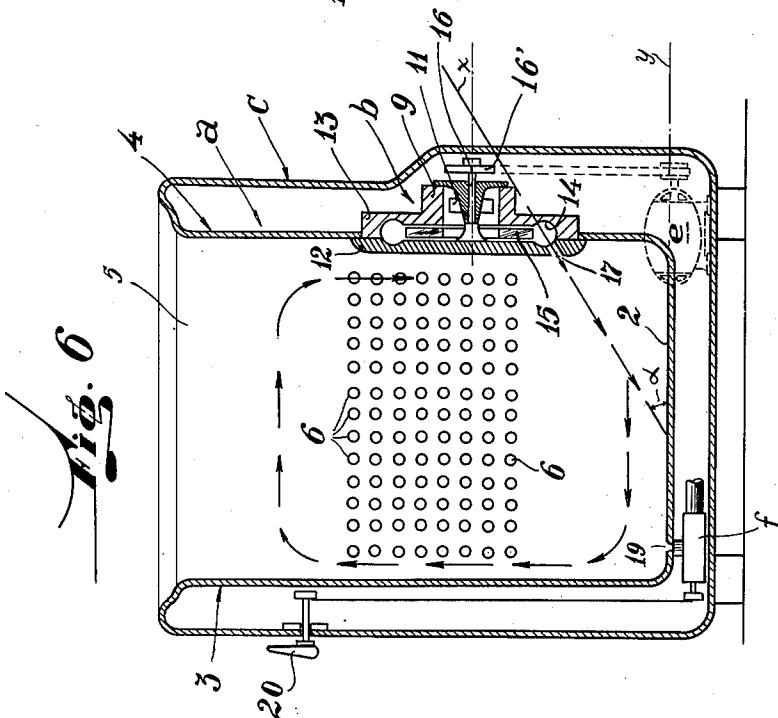
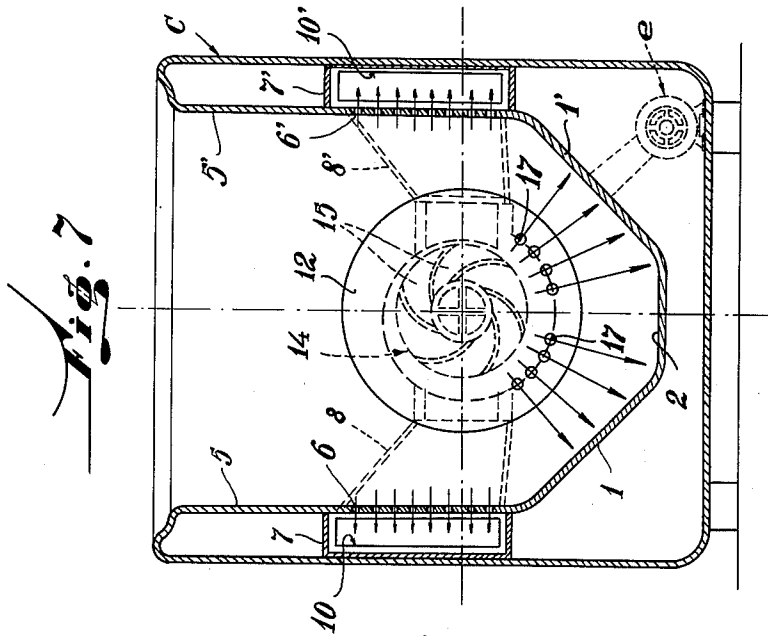
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PUMP OPERATED RECIRCULATION WASHING MACHINE

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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PUMP OPERATED RECIRCULATION
WASHING MACHINEAlfredo Guzzetti and Marcos Aimasso,
Córdoba, ArgentinaApplication February 20, 1950, Serial No. 145,194
In Argentina July 6, 1949

7 Claims. (Cl. 68—184)

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Washing machines of the type including a water receptacle or vessel through which a recirculation process is effected by means of a pump, usually of the centrifugal type, are well known. While this type of machine has the advantage of avoiding the use of a rotor or other mechanical device for causing the movement of the clothes, however, it has a drawback in that the clothes will have a tendency to move following the direction of the water circulation, until they unavoidably occupy a zone wherein the movement of the water may be considered inoperative.

Therefore, one of the main problems has been that of finding, in a machine based on the aforesaid principle, means whereby the moving condition of the mass of water contained in the tank or receptacle will be complete and said movement carried out so that there will be no periodicity in an operative cycle, whereby the clothes submitted to the action of the machine will be constantly in a state of multi-directional movement in which the main component, considered vectorially, will tend to generate a compound rotational motion.

A further essential feature of the improved machine in accordance with this invention resides in the fact that the working capacity of the receptacle exceeds the dimensional limits thereof, since it carries a pair of additional water boxes having a considerable volumetric capacity and communicating with said receptacle through a plurality of openings providing for discharging the liquid components of said receptacle for the purpose of causing the recirculation of liquid by means of a centrifugal pump, but with the fundamental feature that the end of the inflow conduit having a small cross-section corresponds to the pump inlet and the return conduit tapers off in cross-section from the water box to said pump inlet.

With this construction, when the clothes contained in the receptacle are projected and driven by the movement of the water towards the discharge openings, they will not cling over said openings, since the return velocity in that zone is considerably lower than the speed at which the water will move as a result of the driving action produced by the pump at the outlet thereof, and this difference in speed will become apparent if it is remembered that the cross-section of the return conduit in that zone, as mentioned above, is considerably larger with respect to the portion opening into the pump inlet.

In order that the invention may be more

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clearly understood and readily carried into practice, a preferred embodiment thereof has been illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a general view of a machine embodying this invention.

Fig. 2 is a perspective view, partly in section so as to show the arrangement of the so-called water boxes.

Fig. 3 is a perspective view, also partly in section so as to show the arrangement and nature of the centrifugal pump causing the recirculation of water.

Fig. 4 is also a perspective view, partly in section so as to show the arrangement and features of the return conduit, this view showing the tapering in the sections thereof, from the water box towards the admission pump.

Fig. 5 is a sectional plan view of the machine.

Fig. 6 is a sectional view, taken along the line A—A in Fig. 5; and

Fig. 7 is a sectional view taken along the line B—B in Fig. 5.

The same reference characters are used to indicate like or corresponding parts or elements throughout the drawings.

In accordance with the embodiment shown by way of example, the reference character *a* indicates generally the water receptacle or vessel communicating with a centrifugal pump *b* and housed in a case *c* constituting the supporting frame of the machine, the reference character *d* also indicating generally a cover for closing the open end of said receptacle.

In accordance with the embodiment shown by way of example, the receptacle *a* is preferably rectangular in horizontal cross-section and the bottom thereof has a gradually decreasing section towards the base, by means of the sloping walls *1* and *1'*, the continuity of which is established by a horizontal surface *2*, said sloping walls extending between two end faces *3* and *4* of said receptacle, one of which has applied thereto the centrifugal pump *b*.

The side faces *5* and *5'* of said receptacle are provided with a plurality of openings *6* and *6'* communicating said receptacle with the interior of a pair of water boxes *7* and *7'* constituting an extension of the volumetric capacity of the receptacle *a*, the surface of the opening through which said water box communicates with the receptacle being considerable.

The return to the pump *b* is completed by means of a pair of return conduits *8* and *8'* communicating the water boxes with the pump inlet

conduit 9, said conduits tapering in the direction of circulation of the liquid therethrough, i. e., that the end 10, 10' by which said conduits communicate with the water boxes is much larger in cross-section than the ends 11, 11' through which they lead into the pump inlet. Said pump 5 b generally comprises a pump casing 12—13 having therein a cavity bounded by a spiral wall 14 of the equiangular type, housing therein a vane rotor 15 mounted on a rotary shaft 16 extending out of the pump for allowing the engagement of a pulley 16' or other suitable means through which it is possible to transmit thereto a rotary motion from a suitable power unit.

The cavity corresponding to the pump casing communicates with the interior of the receptacle or vessel *a* through a plurality of outlets 17 directed towards the bottom of the receptacle, so that an imaginary axis *x* indicating the axial direction thereof would form a certain angle α with another axis *y* contained in the plane defining any portion of the bottom of the receptacle.

In order to operate the machine, it is necessary to admit into the receptacle *a* a quantity of water sufficient so that upon inserting the clothes, the water level will be above the water boxes, taking as a basis the supporting plane of the machine, i. e., the water should fill completely the capacity of said boxes and, by the principle of communicating vessels complete also the capacity of the pump so that the latter will not work idle.

A handle such as that shown at 18 closes the circuit of an electric motor *e* which transmits its rotary motion to the pump, thereby causing a forced recirculation between the receptacle and the pump.

The inflow takes place through the return conduits, but the speed of the liquid spirals will gradually increase as a function of the decreasing section of the conduits, whereby the highest speed will be acquired at the ends 11, 11' where said conduits open into the pump inlet.

The outflow takes place through the discharge orifices 17 which are so directed that the streams of liquid will strike against the bottom of the receptacle, thus generating a rotational motion the axis of which passes through the water boxes 13 and 13'; as a result, the impelled liquid will in turn tend to strike against the front face 3 of said receptacle, which in this case will act as a break-water.

Since each of the outlets 17 is oriented in a different direction towards the bottom of the receptacle, and since the different streams will meet and be deflected by the front wall, the mass of liquid will have a multi-directional motion, with a final tendency to flow upwardly along or parallel to the front wall, and out of the receptacle as there are no obstructions to the straight upward flow. The liquid will not, of course, leave the receptacle since gravity will intervene to redirect the flow. This behavior of the liquid is the reason why the clothes will be kept in a state of permanent and non-periodical agitation.

The water is drained off through a drain conduit 19 which may either have applied thereto a flexible tube made of rubber or the like, or have interposed a three-way valve *f* actuated by means of a handle 20 through a turnbuckle system.

It is evident that in carrying out the invention, several modifications, changes and/or alterations will occur to those skilled in the art, without departing from the scope of the invention as clearly set forth in the appended claims.

We claim:

1. A washing machine comprising a forced circulation pump having an intake and an outlet, a receptacle for a washing liquid having a pair of spaced opposed side faces, a rear wall, a front wall and a bottom, each of said opposed faces having a plurality of orifices spaced apart and distributed over a relatively large area of said side faces, a water box mounted on the outside of said receptacle on each of said side faces and communicating with the interior of the receptacle through said orifices, whereby the volumetric capacity of said receptacle is considerably increased, said pump being mounted on said rear wall outside the receptacle, a return conduit connecting each water box with the intake of said pump, said conduit having a cross-section which decreases in the direction of circulation of said liquid, and a plurality of differently directed passages in said rear wall and in communication with the outlet of the pump, said passages being oriented towards the bottom of the receptacle, whereby said passages may generate a rotational motion of said liquid, the virtual axis of which motion is normal to said water boxes and passes therethrough.

2. A washing machine comprising a casing, a forced circulation pump having an inlet and an outlet, a receptacle for a washing liquid likewise mounted within said casing and having a pair of spaced opposed side faces, a rear wall, a front wall and a bottom, each of said opposed faces having a plurality of orifices spaced apart and distributed over a relatively large area of said side faces, a water box mounted on the outside of said receptacle on each of said side faces and communicating with the interior of the receptacle through said orifices, whereby the volumetric capacity of said receptacle is considerably increased, said pump being mounted on the rear wall outside of said receptacle and within the casing, a return conduit connecting each water box with the intake of said pump, said conduit having a cross-section which decreases in the direction of circulation of said liquid, and a plurality of differently directed passages in said rear wall communicating with said pump outlet, said passages being oriented towards the bottom of the receptacle, whereby said passages may generate a rotational motion of said liquid, the virtual axis of which motion is normal to said water boxes and passes therethrough.

3. A washing machine comprising a forced circulation pump having an intake and an outlet, a receptacle for a washing liquid having a pair of spaced opposed side faces, a rear wall, a front wall and a bottom, each of said opposed faces having a plurality of orifices spaced apart and distributed over a relatively large area of said side faces, a water box mounted on the outside of said receptacle on each of said side faces and communicating with the interior of the receptacle through said orifices, whereby the volumetric capacity of said receptacle is considerably increased, said pump being mounted on the rear wall outside of the receptacle, a return conduit connecting each water box with the intake of said pump, said conduit having a cross-section which decreases in the direction of circulation of said liquid, and a plurality of differently directed passages in said rear wall communicating with the outlet of the pump, said passages being oriented towards the bottom of the receptacle, whereby said passages may generate a rotational motion of said liquid, the virtual axis of which motion is

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normal to said water boxes and passes there-through, said bottom comprising a pair of opposed inclined walls converging downwardly from said side faces.

4. A washing machine comprising a forced circulation pump having an intake and an outlet, a receptacle for a washing liquid having a pair of spaced opposed side faces, a rear wall, a front wall and a bottom, each of said opposed faces having a plurality of orifices spaced apart and distributed over a relatively large area of said side faces, a water box mounted on the outside of said receptacle on each of said side faces and communicating with the interior of the receptacle through said orifices, whereby the volumetric capacity of said receptacle is considerably increased, said pump being mounted on the rear wall outside of the receptacle, a return conduit connecting each water box with the intake of said pump, said conduit having a cross-section which decreases in the direction of circulation of said liquid, a plurality of differently directed passages in said rear wall communicating with the outlet of the pump, said passages being oriented towards the bottom of the receptacle, whereby said passages may generate a rotational motion of said liquid, the virtual axis of which motion is normal to said water boxes and passes therethrough, said bottom having a drain orifice therein, and means for normally closing said drain orifice.

5. A washing machine comprising a forced circulation pump having an intake and an outlet, a receptacle for a washing liquid having a pair of spaced opposed side faces, a rear wall, a front wall and a bottom, each of said opposed faces having a plurality of orifices spaced apart and distributed over a relatively large area of said side faces, a water box mounted on the outside of said receptacle on each of said side faces and communicating with the interior of the receptacle through said orifices, whereby the volumetric capacity of said receptacle is considerably increased, said pump being mounted on the rear wall outside of the receptacle, a return conduit connecting each water box with the intake of said pump, said conduit having a cross-section which decreases in the direction of circulation of said liquid, a plurality of differently directed passages in said rear wall communicating with the outlet of the pump, said passages being oriented towards the bottom of the receptacle, whereby said passages may generate a rotational motion of said liquid, the virtual axis of which motion is normal to said water boxes and passes therethrough, said bottom having a drain passage therein, and a manually operable valve connected to said drain passage.

6. A washing machine comprising a forced circulation pump having an intake and an outlet, a receptacle for a washing liquid having a pair of spaced opposed side faces, a rear wall, a front wall and a bottom, each of said opposed faces having a plurality of orifices spaced apart and distributed over a relatively large area of said side faces, a water box mounted on the outside

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of said receptacle on each of said side faces and communicating with the interior of the receptacle through said orifices, whereby the volumetric capacity of said receptacle is considerably increased, said pump being mounted on the rear wall outside of the receptacle, a return conduit connecting each water box with the intake of said pump, said conduit having a cross-section which decreases in the direction of circulation of said liquid, and a plurality of differently directed passages in said rear wall communicating with the outlet of the pump, said passages being oriented towards the bottom of the receptacle, whereby said passages may generate a rotational motion of said liquid, the virtual axis of which motion is normal to said water boxes and passes therethrough, said machine comprising a hand operated switch and an electric motor operatively connected to said switch and to said pump.

7. A washing machine comprising a casing, a forced circulation pump having an inlet and an outlet, a receptacle for a washing liquid likewise mounted within said casing and having a pair of spaced opposed side faces, a rear wall, a front wall and a bottom, each of said opposed faces having a plurality of orifices spaced apart and distributed over a relatively large area of said side faces, a water box mounted on the outside of said receptacle on each of said side faces and communicating with the interior of the receptacle through said orifices, whereby the volumetric capacity of said receptacle is considerably increased, said pump being mounted on the rear wall outside of said receptacle and within said casing, a return conduit connecting each water box with the intake of said pump, said conduit having a cross-section which decreases in the direction of circulation of said liquid, a plurality of differently directed passages in said rear wall communicating with the outlet of the pump, said passages being oriented towards the bottom of the receptacle, whereby said passages may generate a rotational motion of said liquid, the virtual axis of which motion is normal to said water boxes and passes therethrough, said bottom having a drain passage, a manually operable valve connected to said drain passage, an electric motor operatively coupled to said pump, a manually operable switch mounted on said casing and operatively connected to said motor, and manual valve control means mounted on said casing and operatively connected to said valve.

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