

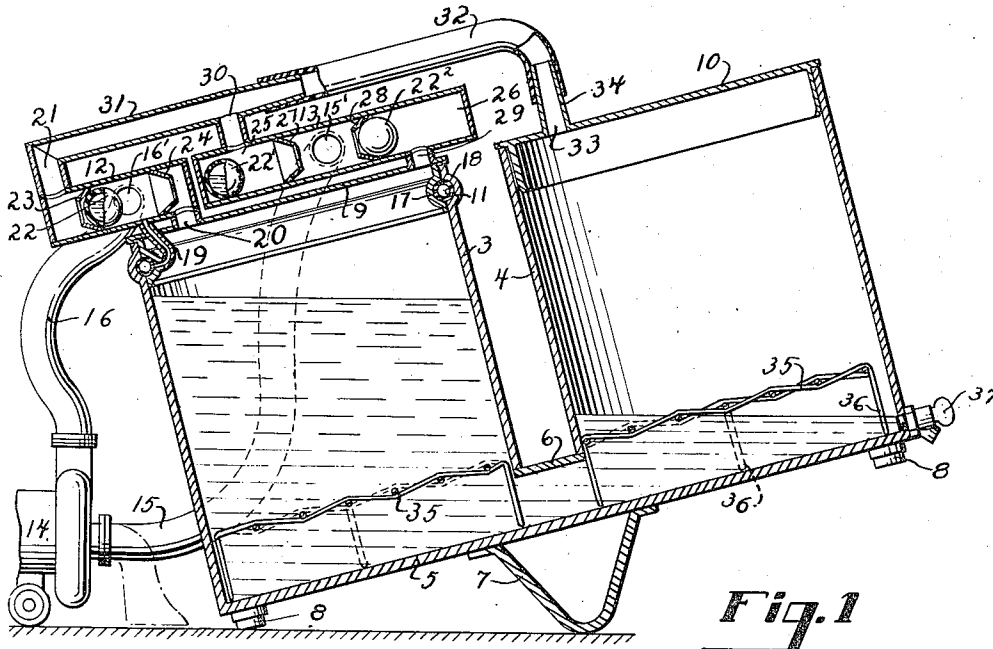
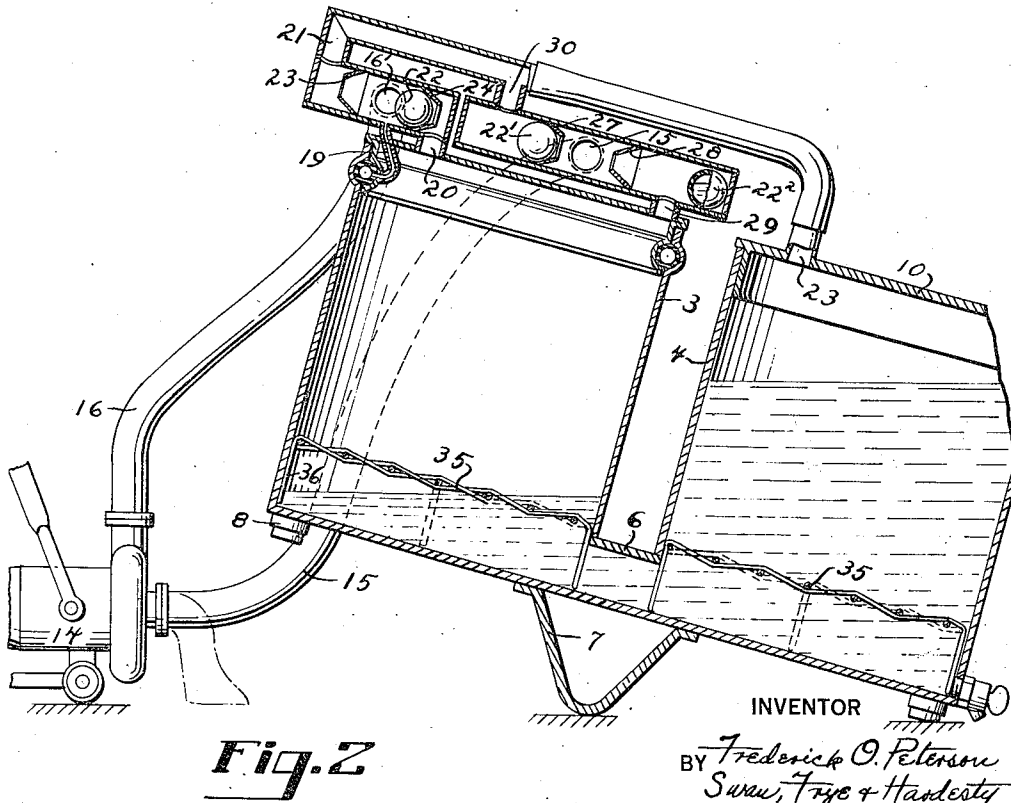
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WASHING MACHINE

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WASHING MACHINE

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This invention relates to clothes washing machines, and more particularly to a novel, effective and greatly simplified washing machine which need embody no inbuilt motor or other driving means, but may be coupled to an ordinary vacuum cleaner in a manner analogous to that in which accessories are ordinarily attached thereto, and its motive power derived entirely therefrom.

A primary object of the invention is the provision of a washing machine which will be both cheaper and more efficient than those now in common use, and the parts of which may be almost entirely stamped of sheet metal.

Another important object of this invention is the production of a clothes washing machine in which improved means are provided for forcing the water or suds thru the clothes, and wherein the clothes may be arranged to remain practically stationary, thus rendering it unnecessary to provide a tub large enough to permit moving the clothes about in it, as is necessitated by most designs, and enabling use of tubs but slightly larger than is necessary to hold the clothes, as well as permitting packing the tubs tightly with clothes without impairing the washing efficiency of the machine.

A further object of my invention is the provision of a washing machine in which all mechanical agitating means are eliminated, containing no moving parts whatever other than the valves, and requiring only to be connected to a blower, as of a vacuum cleaner, or to any suitable air pressure and vacuum lines.

Still another object of my invention lies in the incorporation in such a washing machine of improved means for drying the clothes, which drying means also incorporates no moving parts whatever, and constitutes an improvement upon the results attainable by means of the more common wringers, centrifugal driers or "spinners" with which washing machines are ordinarily provided.

A still further object of my invention is the provision of a washing machine so constructed and arranged that the operator can remove clothes from the machine by hand while the machine contains the full washing quantity of water without however having to dip the hands in water.

Still further objects will readily occur to those skilled in the art upon reference to the following description and the accompanying drawing in which

Figure 1 is a partly diagrammatical vertical

sectional view of a washing machine embodying one form of my invention and

Figure 2 is a similar view showing the machine tilted to the opposite direction.

In both views a vacuum cleaner is fragmentarily shown connected to the machine for actuating the same.

Referring now to the drawing, reference characters 3 and 4 designate a pair of tubs, mounted on the common base 5, here shown as rigid and forming the bottom of both tubs. The tubs may be of any desired size and shape, those here shown being cylindrical, somewhat higher than their diameter, and connected near the bottom by a pipe or passage 6. Rather than two separate tubs, a single tub having a dividing partition, apertured near its bottom, might of course be used. For reasons which will presently become apparent, however, I preferably utilize separate tubs, in order that separately removable lids for each compartment may be employed, as shown in the drawing.

The tub assembly is rockably supported upon a rocker or pivot member 7. A rocker having a longer radius and of any desired length might be used if more gentle rocking action should be desired. The more nearly the rocker approaches a pivot, which it might in fact be, the more violent will the tipping action of course be for a given height. I preferably provide rubber bumpers, as 8, to reduce the shock incident to tipping of the machine. In the construction here shown, each tub is provided with a sheet metal cover. The cover 9 of tub 3 is hermetically sealable by means of a pneumatic gasket 11, and carries valves 12—13 by means of which the intake and exhaust of a vacuum cleaner 14 are alternately connected to the air space above the water in the tub 3.

By means of flexible hose 15, which may be of the type commonly used for connecting attachments to vacuum cleaners, the suction side of the cleaner may be coupled to the valve 13, while by means of a similar flexible hose 16, the outlet of the vacuum cleaner is coupled to the valve 12. The pneumatic gasket 11 is housed in opposed annular grooves 17—18 in the tub 3 and cover 9, and is connected to the pressure valve 12 as by the connecting tube 19 in such manner as to be constantly inflated by the air pressure maintained in the valve by the blower of the vacuum cleaner as long as the latter is turned on. The cover is thus hermetically sealed upon the tub, as long as the blower is running, while when the vacuum cleaner is

turned off, the gasket is deflated and the cover may easily be removed.

The valve 12 may comprise a cylindrical sheet metal housing, the inlet 16¹ of which is arranged substantially in the middle of its side wall, while it is provided with a discharge aperture at each end, one of which (20) opens directly into the container thru the cover. The other discharge aperture, 21, may either communicate with the open air, or be connected, as here shown, to the other tub. The valve proper comprises a soft rubber ball 22 of somewhat lesser diameter than the cylindrical valve housing, trapped in the space between the frusto conical valve seat members 23—24. The valve ball may be partly filled with a substance adapted to increase its weight and inertia, as mercury, water, or water and shot. The operation of this and the vacuum valve will presently be more fully explained.

The vacuum valve 13 may comprise a similar but somewhat longer cylindrical housing in which a pair of such valve balls 22¹—22² are arranged in chambers 25—26 at opposite ends of the valve housing. The chamber 26 communicates with the interior of the tub 3, the passage 29 being formed through the cover for that purpose, while the chamber 25 is connected to the passage 30, which opens either to the air or to the connecting pipe 31 which communicates with the other tub. The tube 15 is connected to the vacuum valve, as at 15¹, between the valve seats 27 and 28, which are so arranged that the vacuum line tends to draw the balls toward the seats.

The cover 10 of tub 4 is apertured as at 33, and to the upstanding neck 34 surrounding the aperture the flexible hose 32 may be coupled which may connect the same to the pipe 31 which communicates with valve ports 21—30. The hose 32 may be detachable and flexible, to enable its easy removal, so that the covers may be separately removed and applied.

The valve arrangement will seem to be such that when the machine is in the position in which it is shown in Figure 1, the outlet 21 of the blower valve will be closed by the ball 22, and the outlet of the blower will thus be directed to the interior of tub 3 thru passage 20. The connection between the vacuum line and the tub 3 will be held closed by the valve 22², as also shown in that view. The ball 22¹ will be unseated, and the vacuum line thus connected to the tub 4 through the passage 30 and coupling hose 32. The reduced pressure in the vacuum line and in the connecting pipe 31 will of course also assist in maintaining the valve balls 22—22² firmly seated. The air forced into the space above the water in the tub 3 under pressure while the valves are in this position will force the water out of the tub 3 and into the tub 4 thru the connecting pipe 6. This action will of course be assisted by the reduced pressure in tub 4 caused by its connection to the vacuum line.

When enough water has been forced into tub 4 to overbalance the assembly, it tips to the position shown in Figure 2. This movement, and the incident jar, unseats the valve balls 22—22² from their seats 23—28. Unseating of the valves is assisted not only by the jar, but by the weight and inertia of their fluid contents, co-operating with their resiliency and by the fact that the valves are of slightly lesser diameter than the cylindrical valve housing so that the distortion of the balls and the assisting

influence of gravity are unrestricted. The valve ball 22 is thrown to the opposite end of the pressure valve 12 by tilting of the machine to this position, and then closes the pressure inlet 20 and the tub 3 by seating against seat member 24. The ball 22¹ in the vacuum valve chamber similarly seats against the seat member 27, sealing off communication between the vacuum line and the tub 4 and connecting tubes, while the ball 22² is unseated and the vacuum line 15 thus connected to the tub thru the passage 29. When the valves are in this position the outlet of the blower is directed to the tub 4 thru the hose 16, inlet 16¹ and thence through the valve orifice and outlet 21 to the connecting pipe 31 and coupling hose 32, which is connected to the cover 10 as previously pointed out. It will be seen that the valves 22—22¹ are also positively maintained seated when in this position by both increased pressure on their one side and decreased pressure on the other. When the machine is tilted to this position the pressure of the air delivered to the tub 4 through the coupling hose 32, aided by the reduction of pressure in tub 3, caused by connection of the vacuum line thereto, forces the water back out of tub 4 and into tub 3 through the connecting pipe 6. When the machine is overbalanced by the greater weight of water in tub 3 it will again tip to the position shown in Figure 1, the valves will be thrown to the opposite position in which they are there shown, and the cycle recommences.

It will be apparent that as long as the vacuum cleaner is connected and running the water will alternately be forced from one tub to the other while the machine rocks first to one position and then the other, throwing the valves to the required positions to reverse the applications of the intake and outlet sides of the blower. In this particular construction the same air is used over and over, preventing undue cooling of the washing water, which many people preferably use hot. The valve construction and movement is entirely optional. The valves shown in the accompanying drawing will be seen to be disproportionately enlarged and diagrammatically illustrated in the interests of clarity. The provision of rockers or a pivot and a tilting assembly in the manner shown increases the agitation of the contents of the tub, and furnishes simple and positive means for actuating valves which may be of very simple and inexpensive construction such as those shown, which are entirely of sheet metal with the exception of the simple loaded rubber balls, while the dimensioning and fitting need not be accurate.

So also the use of the connecting hose 32 is optional. If this connection is dispensed with, and the valve ports 21—30 left open to the air, while the aperture 33 thru the cover 10 is also left open, the operation of the device will be similar, save that the vacuum and pressure lines will alternately be connected one to the tub 3 and the other to the open air, and then the other to the tub and the first to the open air, while air freely enters and leaves the tub through the opening 33 as the water rises and falls. While this arrangement works equally satisfactorily, it involves constant changing of the air in both tubs, and repeated forcing of fresh and relatively cool air thereinto. When the coupling hose is used in the preferred manner shown and first described, however, the same air will be seen to be used over and over, thus

preventing cooling the water in the tubs by constantly forcing fresh air thereinto.

If boiling water is used, or a heater adapted to boil the water is installed upon the machine, the pressure of steam so generated might interfere with the operation of a machine set up and connected in the manner shown. This difficulty may easily be obviated, however, by utilizing only the pressure line to operate the machine, applying it alternately to first one tub and then the other, and alternately opening the other tub or otherwise permitting escape of steam. All of this may of course be done by means of a similar or any suitable valve action.

As shown in the drawing, no such pressure sealing means as is utilized for sealing the cover 9 need be used to seal the cover 10 upon the tub 4, although this is of course optional. The operation of the device will of course be satisfactory in any event, the only essential being that the cover 10 be attached securely enough to prevent its being blown off when the pressure line is connected to tub 4.

To prevent any possibility of the clothes, which are usually inserted in both tubs, clogging the connecting pipe 6, I may provide wire mesh guards in the form of racks 35 extending across each tub and spaced from the floor upon legs 36 which may be formed integrally with the wire of which the racks are woven. A petcock as 37 may of course be provided adjacent the bottom of one tub 4 for drainage.

If desired the connecting passage may be large enough to permit the clothes to pass from one tub to the other with the water when screens 35 are not in place. If air, together with the water is forced, with the clothes, back and forth between the tubs, when the machine is so operated the violence of the action is of course increased. This method of operation, which may be arranged to be available by merely removing the screens, may be made to function with a smaller amount of water and soap, and so might be preferred by the user when doing a small washing. A washer designed primarily to so operate might of course comprise a simple U-pipe.

To partly dry the clothes, the water may first be drained from the tubs, while the clothes are left therein. The hose 32 may then be removed from the coupling 34, and the hoses 15-16 disconnected from the vacuum and pressure valves. The valve-carrying cover is then removed from tub 3, and the vacuum hose 15 connected to the coupling 34, while the pressure hose is left free. The tub 3 is left open. Running the vacuum cleaner will then reduce the pressure in the tub 4, and the clothes in tub 3 will be forced downwardly against the rack 35 in that tub under atmospheric pressure. By reason of this squeezing of the clothes against the rack, and the drying effect of the air which is forced thru them, they will be sufficiently dried in a few minutes to enable their being removed in condition for pressing or hanging upon the line, in the manner usual after wringing. To similarly dry the clothes in tub 4, it is merely necessary to remove the cover 10 from tub 4, while the vacuum line is still connected thereto, and place it upon tub 3, after which the drying operation may be repeated in the opposite direction, and running the vacuum cleaner will then result in the clothes being pressed against the rack in the tub 4, while the air flow assists in drying them as before.

This ability of the machine to draw the water out of whichever tub is desired without necessitating draining the entire machine, enables convenient rinsing of the clothes by merely throwing water over them as they lay in the bottom of the low tub from which the water is being withheld by the vacuum line connection to the other tub, in the manner described. Rinsing water so thrown over the clothes will be drawn into the other tub, and the operator merely lifts out the rinsed and partially dried clothes. The use of very hot water, strong soaps or washing compounds, and such aids to quick and effective washing, is not objectionable to a user of my improved washer, for there is no necessity of placing the hands in the water.

The efficiency of my washing machine will be seen not to depend upon the provision of room for moving the clothes about in the water, nor is violent agitation of the water or forcing of air therethru necessary, altho, as stated above, the same principles of operation may be applied to a similar washer of the swishing type in which the clothes are moved by the water and air passing from one tub to the other. It will be noted also that an activating blower might be mounted upon the machine itself, in which event mechanical valve actuation could be incorporated, but this too is a matter of selection, and I preferably utilize such a system as that shown, in which provision is made for coupling the device to a vacuum cleaner, because of the economy which may thus be effected, without sacrifice of efficiency.

If it is desired to increase the agitation of the water, the valve action may be so delayed that tripping does not occur until all the water has been forced out of the tub under positive pressure, and some air has been forced thru the connecting pipe. This assists somewhat in the formation of suds, but is not essential for efficient operation of the machine.

By blocking the machine in either position, clothes may be removed from the low tub, as soon as the water has all been drawn into the high tub, by merely removing its cover and leaving the hoses connected, the blower running and the other cover in place upon the high tub. Whether or not tilting action is provided, similar operation will be attainable by providing means for blocking the valves in one position so that the clothes may be removed from the tub having the low water level. The vacuum line being then connected to the low tub, the water will be held therein and out of the high tub, so that clothes may be removed from the latter without dipping the hands in the water.

Such a device as that herein shown will also be seen to be usable as a motor, by means of which power may be derived from a blower for performing mechanical work of any sort.

Now having described the invention and the preferred embodiment thereof, it is to be understood that the said invention is to be limited, not to the specific details herein set forth but only by the scope of the claims which follow.

What I claim is:

1. In combination with means for causing a flow of air under pressure, a motor operable thereby comprising a rockable support, a pair of receptacles carried thereby and adapted to receive a quantity of liquid, means connecting the receptacles to enable liquid to pass from one to the other, and means for directing the air first into one receptacle and then the other, to force the liquid from one receptacle to another,

and thus cause a rocking movement of the assembly.

2. In combination with means for causing a flow of air under pressure, a motor operable thereby comprising a rockable support, a pair of liquid holding receptacles carried by said support and connected by a passageway, to allow liquid to flow from one to the other, and valve means for causing air to flow first into one receptacle and then the other, whereby the liquid is forced from one receptacle to the other and a rocking movement of the assembly induced.

3. In combination with a supply of air under pressure, a motor operable thereby comprising a rockable support, a pair of liquid-holding receptacles carried by said support and connected by a passageway to allow liquid to flow from one to the other, conduits connecting the air supply to one receptacle and means for forcing the water from one receptacle to the other and thereby inducing a rocking movement of the assembly, including a valve actuable by the rocking movement of the assembly and adapted to intermittently direct the air into the receptacle to which it is connected.

4. In combination with a supply of air under pressure, a motor operable thereby comprising a rockable support, a pair of receptacles carried thereby and adapted to contain a quantity of liquid, means including a passageway connecting the receptacles to provide means whereby liquid may flow from one to the other, and means

for intermittently directing the air into one of the receptacles to thereby first force the water out of that and into the other receptacle and then allow it to flow back, to induce rocking movement of the assembly, said means including a valve actuated by such rocking movement.

5. In a washing machine incorporating means operable by air pressure, a tub, a lid for the tub, an air supply line for furnishing the motivating air supply to the machine and connected to the tub, and a pneumatic gasket for sealing the lid upon the tub comprising a hollow resilient tube trapped between the cover and lid and connected to the air supply line.

6. In combination with means for causing a flow of air under pressure, a motor operable thereby comprising a rockable support, a pair of receptacles carried thereby and adapted to receive a quantity of liquid, means connecting the receptacles to enable liquid to pass from one to the other, and means for intermittently directing and interrupting the air flow to at least one of said receptacles to force liquid from one receptacle to another and induce rocking movement of the assembly.

7. In a washing machine incorporating means operable by air pressure, a liquid holding tub, a lid for said tub, an air supply conduit leading to the tub, and a pneumatic gasket sealing the lid upon the tub and connected to the air supply conduit.

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