

Jan. 11, 1955

H. R. PAINE

2,699,057

WASHING MACHINE DRUM HAVING A CENTRIFUGAL EXTRACTION
CHAMBER AND A REMOVABLE FLOW-INTERRUPTING ROLLER

Filed Jan. 5, 1952

3 Sheets-Sheet 1

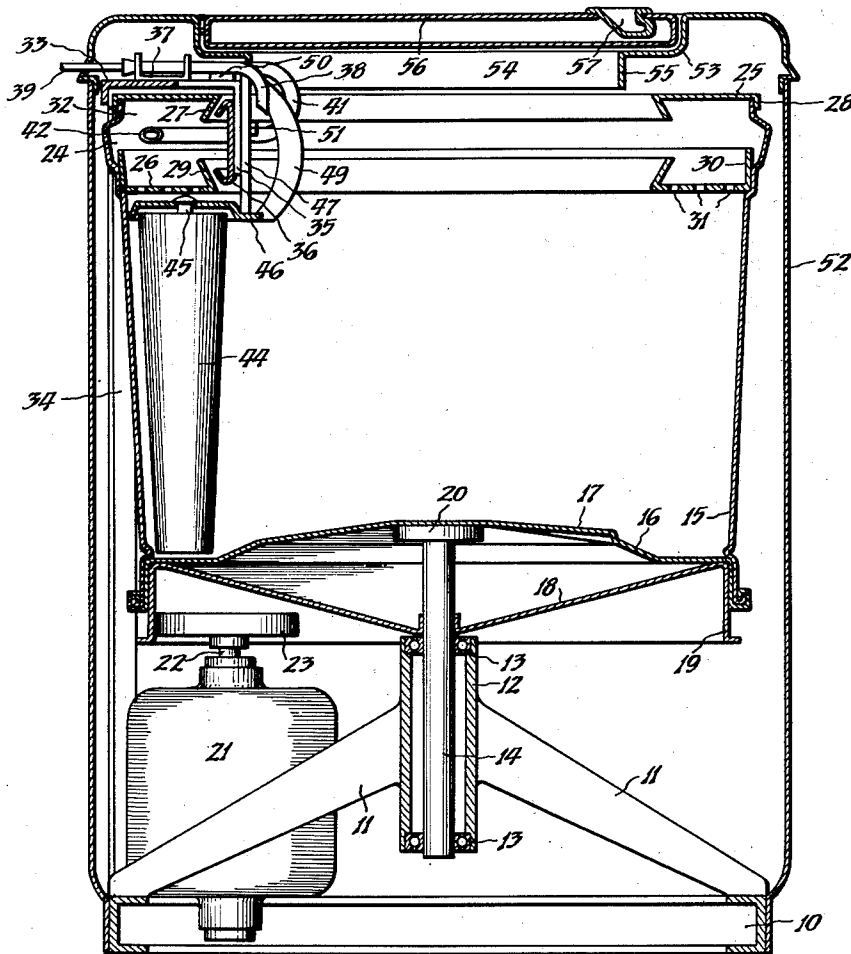


FIG. 1.

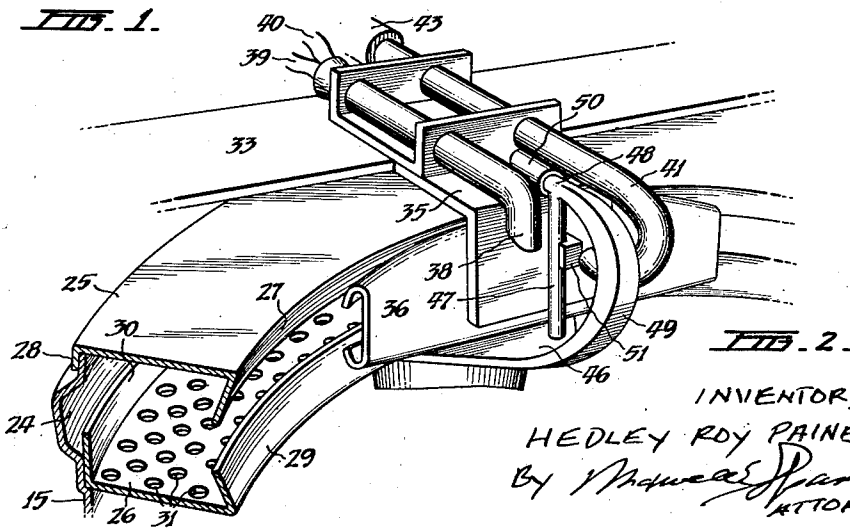


FIG. 2.

INVENTOR:
HEDLEY ROY PAINE
By *Matthews P. Paine*
ATTORNEY

Jan. 11, 1955

H. R. PAINE

2,699,057

WASHING MACHINE DRUM HAVING A CENTRIFUGAL EXTRACTION
CHAMBER AND A REMOVABLE FLOW-INTERRUPTING ROLLER

Filed Jan. 5, 1952

3 Sheets-Sheet 2

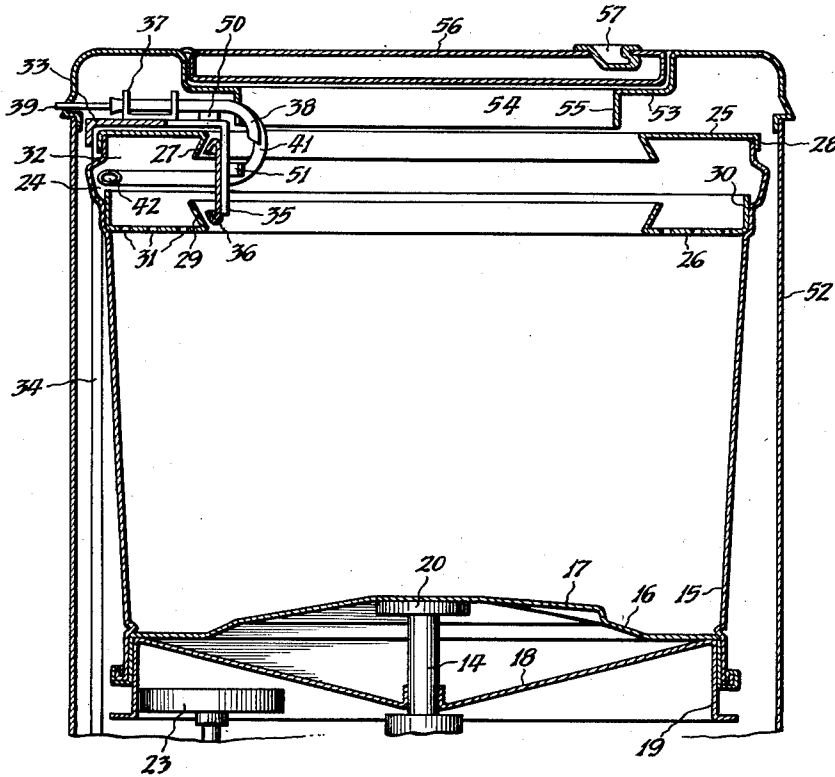


FIG. 3.

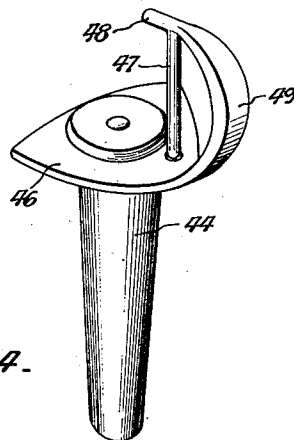


FIG. 4.

INVENTOR
HEDLEY ROY PAINE
By *Maxwell E. Paine*
ATTORNEY

Jan. 11, 1955

H. R. PAINE

2,699,057

WASHING MACHINE DRUM HAVING A CENTRIFUGAL EXTRACTION
CHAMBER AND A REMOVABLE FLOW-INTERRUPTING ROLLER

Filed Jan. 5, 1952

3 Sheets-Sheet 3

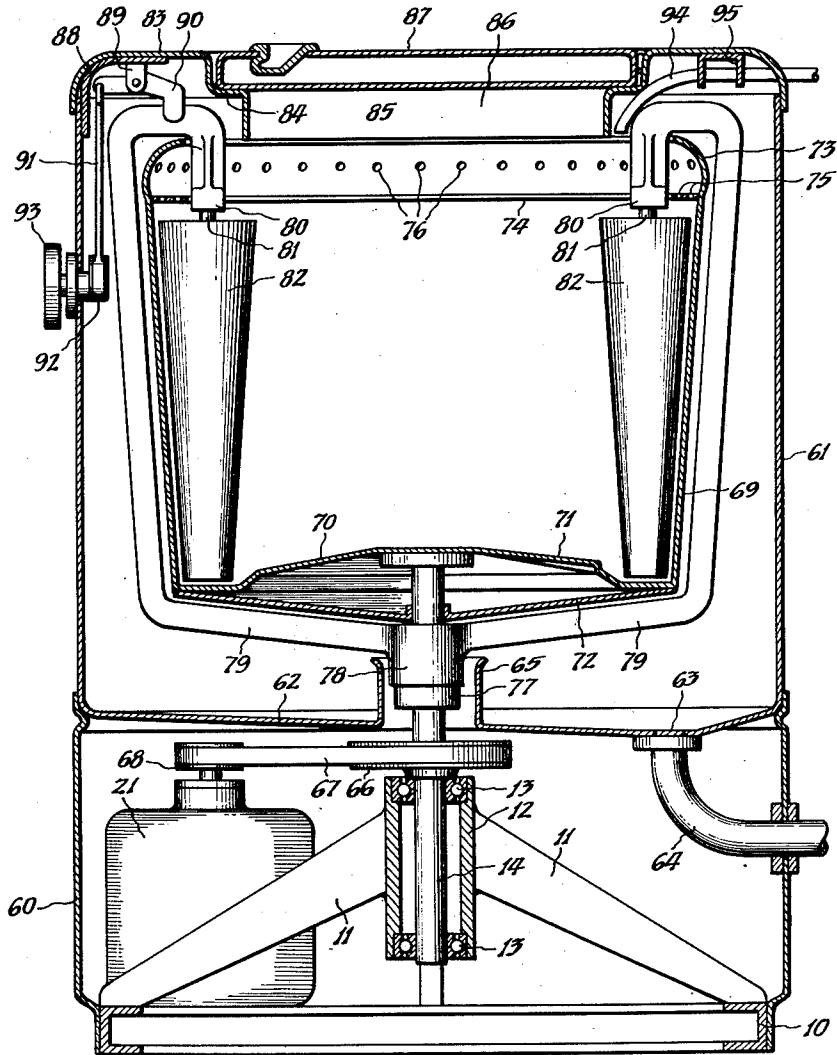


FIG. 5.

INVENTOR:
HEDLEY ROY PAINE
By *Arthur E. Spanner*
ATTORNEY

1

2,699,057

WASHING MACHINE DRUM HAVING A CENTRIFUGAL EXTRACTION CHAMBER AND A REMOVABLE FLOW-INTERRUPTING ROLLER

Hedley R. Paine, Brisbane, Queensland, Australia, assignor to N. V. Appleton Pty. Ltd., Brisbane, Queensland, Australia, a company of Queensland

Application January 5, 1952, Serial No. 265,076

Claims priority, application Australia January 5, 1951

3 Claims. (Cl. 68—23)

This invention relates to an improved clothes-washing machine.

The type of clothes washing machine which, in general, eliminates the greatest amount of time, trouble and inconvenience is that having a container or drum in which the clothes are washed by agitation of the clothes and the water, with cleansing agent, in which they are immersed, the clothes then being partly dried, whilst still in the drum, by expulsion of the liquid, generally centrifugally. In such a machine, the wet clothes are not required to be handled in removing them from the drum to a wringer or separate centrifugal dryer. However, clothes washing machines of this character have hitherto been of fairly complex character.

The principal objects of the present invention are to provide a clothes-washing machine of the character outlined which is particularly simple and economical to manufacture; which is very efficient and convenient in operation; and which is sturdy, durable and trouble-free in use.

According to the invention I provide a washing machine having an upright drum, and means for causing cleansing or rinsing liquid and clothes which have been placed in the drum to rotate within the drum about its axis. This rotational movement of the clothes and liquid within the drum is, however, during clothes rinsing or washing operations, opposed by one or more interrupters associated with the drum, and which may suitably consist of rollers having vertical axes, and normally extending downwardly in fixed positions near the wall of the drum. The opposition to the flow of liquid and clothes afforded by these interrupters results in considerable turbulence of the liquid and clothes; and moreover prevents said flow from reaching any considerable continuous speed within the drum. The turbulence results in the clothes being quickly and thoroughly washed or rinsed, and when the washing or rinsing has been completed, the interrupters may be brought out of opposition to the flow of the clothes and liquid so that the turbulence caused by the interrupters ceases, and the rotary flow of the clothes and liquid is substantially unimpeded. According to the invention, centrifugal liquid extraction means are provided whereby the liquid, when its rotary flow is unimpeded, may be speedily withdrawn from the drum. I prefer to provide a single interrupter removably held in position for washing or rinsing, and adapted to be lifted clear of the drum for drying; but alternatively there may be provided a pair of interrupters disposed diametrically oppositely with respect to the drum and supported by a mounting which is rotatable about the drum axis, a brake being provided to hold the interrupters in position during washing or rinsing. Release of the brake permits the interrupters to move with, and therefore cease opposing, the flow of liquid and clothes in the drum. The liquid and clothes may preferably be caused to rotate within the drum by rotation of the drum itself about its axis, one or more vanes extending from the drum bottom assisting this rotary flow. The centrifugal extraction may be carried out by the provision of an inverted conico-frustum drum and an annular extraction chamber about the top of, and in communication with the drum, the liquid, when its flow is unopposed being forced centrifugally up the wall of the drum into said annular chamber and either expelled centrifugally through openings about said chamber into an outer container, or col-

2

lected to an outlet pipe. Other features of the invention will become apparent from the following description.

In order that the invention may be readily understood and put into practical effect, reference is now made to the accompanying drawings, wherein:

Figure 1 is a sectional side elevational view of a clothes washing machine according to a preferred embodiment of the invention;

Figure 2 is a detail perspective view, to enlarged scale, of a portion of the machine;

Figure 3 is a sectional side elevational view of part of the machine shown in Figure 1, the machine being in this case adapted for the drying of clothes;

Figure 4 is a detail perspective view, to enlarged scale, of a portion of the machine; and

Figure 5 is a sectional side elevation view of a clothes washing machine according to an alternative embodiment of the invention.

Referring initially to Figures 1 to 4 of the drawings, we provide a washing machine which includes a sturdy base 10. Four arms 11 are secured to the periphery of the base and incline upwardly to a cylindrical member 12 to which said arms are rigidly secured. Installed in said cylindrical member are anti-friction radial and thrust bearings 13 for a central upright shaft 14 of a drum 15.

The drum 15 is made of sheet metal, and is of downwardly tapering, or inverted conico-frustum shape. There is secured and sealed within the lower part of the drum a sheet metal false bottom 16 the middle part of which is dished upwardly, and is formed with a single substantially radial projection or rib 17. There is also secured within the lower part of the drum 15, below the false bottom, a sheet metal bottom member 18 which is in the form of a shallow inverted conico-frustum having its edge portion downturned to form a cylindrical peripheral flange 19 which extends somewhat below the bottom of the drum 15. The drum shaft 14 is provided at its upper end with a flange 20, rigidly secured to the underside of the central part of the false bottom 16. The shaft 14 extends down through, and is welded or otherwise secured in, a central opening in the bottom member 18, and is rotatably mounted in the bearings 13.

An electric motor 21 is mounted on the base, its shaft 22 upright and carrying on its upper end a friction wheel 23 engaging within the cylindrical flange 19 extending downwardly from the drum 15.

About the upper part of the drum 15 there is spun an annular recess 24. There are associated with the drum 15 two substantially ring-shaped sheet metal members 25 and 26, hereinafter referred to as the upper and the lower ring. The upper ring 25 is formed with downturned edge portions which form outer and inner peripheral flanges 28 and 27, of which the outer flange 28 fits closely about and is secured to the top of the drum 15. The lower ring 26 is formed with upturned edge portions likewise forming inner and outer peripheral flanges 29 and 30 of which the outer flange 30 fits closely within and is secured to the drum 15 in such position that its upper part extends for some distance above the level of the bottom of the annular recess 24 in the drum. The inner peripheral flanges 27 and 29 of the upper and lower rings incline slightly outwardly in relation to the vertical axis of the drum. The lower ring has a multiplicity of holes 31 formed therethrough, including holes close to the outer and the inner peripheral flanges 30 and 29 thereof. The upper and lower rings 25 and 26, with the annular recess 24 of the drum therebetween, and the inner peripheral flanges 27 and 29 of upper and lower rings 25 and 26, which flanges are spaced somewhat apart, define an annular water extraction chamber 32 of the drum 15.

There is provided a lateral mounting bracket 33, the ends of which are rigidly secured to the tops of two uprights 34 secured to and extending upwardly from the base 10 of the machine, the bar 33 being disposed at the rear of the machine, somewhat above the level of the upper ring. Formed integrally with the mounting bracket 33 is an angle bracket 35 which extends inwardly from the mounting bracket, and then downwardly and fairly close to the inner peripheral flanges 27 and 29. Rigidly secured to an outwardly facing side of the downwardly extending portion of said angle bracket 35 is an

3

anti-splash plate 36 consisting of a sheet metal piece tapering somewhat to each end, and curved arcuately to conform to the curvature of the flanges 27 and 29, its upper and lower edge portions being curved over outwardly to form channels.

There is welded to the mounting bracket 33 and the angle bracket 35 a channel-piece 37 having formed in its front and rear webs corresponding holes in which are welded a water inlet pipe 38. Hot and cold water pipes 39 and 40, adapted to be connected as by suitable hoses 10 to domestic sources of hot and cold water, lead into the rear end of the water inlet pipe, the front end of said pipe 38 being curved downwardly in front of the angle bracket 35, and so adapted to direct water into the drum 15.

Further corresponding holes are formed in the front and rear webs of the channel-piece 37 to receive slidably the upper arm of a water outlet pipe 41 which has a U-bend formed therein. The lower arm of the pipe 41 is directly below the upper arm and is engaged slidably in registering holes through the angle bracket 35 and the anti-splash plate 36, said lower arm passing between the peripheral flanges 27 and 29 of the upper and lower rings 25 and 26. The extremity of the lower arm of the water outlet pipe 41 is cut obliquely to form a scoop 42; and the water outlet pipe 41 is adapted to be moved slidably so that the scoop 42 is located within the annular recess 24 at the upper part of the drum 15, as shown in Figure 3, or clear of such recess, as shown in Figure 1. A flexible hose 43 is connected at one end to the rear of the upper arm of the water outlet pipe 41, and may be carried to a drain.

The washing machine includes an interrupter roller 44 of generally downwardly tapering or inverted conico-frustum shape. The roller shown in the drawings has a plain surface, but if desired the roller may be formed with a number of longitudinal ridges, or longitudinal grooves, in equally spaced arrangement. The roller is mounted rotatably on a roller shaft 45, the upper end of which is rigidly secured centrally to a recessed portion of a roller-carrying plate 46, the upper end of the roller being located within the recess. The roller-carrying plate 46 extends to either side, and inwardly, of the recessed portion thereof, its front edge being curved arcuately to conform to the curvature of the drum 15, which it closely approaches. There is rigidly secured to the rear portion of the roller-carrying plate 46 an upwardly extending metal rod 47, the upper end of which is bent over through a right angle to form a stud 48. A handle 49 extends upwardly from the rear of the roller-carrying plate 46 and is rigidly secured at its upper end to the top part of the rod 47.

The roller assembly may be conveniently held by the handle 49, for engagement with or disengagement from the angle bracket 35 of the mounting bracket 33. The roller assembly is adapted to be so engaged by holding the assembly somewhat obliquely to perpendicular and engaging the stud 48 slidably in a cylindrical socket 50 welded or otherwise secured to the front of the angle bracket 35 between the water inlet pipe 38 and the water outlet pipe 41, until the rod 47 contacts the front face of said angle bracket. The roller assembly is then brought to vertical position so that the rod 47 becomes engaged by a catch 51, L-shaped in plan, projecting from the front of the angle bracket 35. The roller assembly may be removed by grasping the handle 49, turning the assembly obliquely so that the rod 47 is disengaged from the catch 51, and slidably withdrawing the stud 48 from the socket 50.

The washing machine includes a cabinet 52 made of sheet metal to the form of a box-like structure open at the bottom and having formed in the top a rectangular or square recessed part 53 in which is formed a round opening 54 from the periphery of which depends a cylindrical flange 55. The cabinet is fitted down over the machine, its lower edge portion being secured to the base 10. The lower edge of the cylindrical flange 55 is at about the level of, and within, the upper ring 25, so that clothes may be easily fed through the round opening of the cabinet into the drum 15. The flange 55 is suitably cut away for the water inlet and outlet pipes 38 and 41.

There is provided a lid 56 hinged at its rear to the cabinet 52 in such manner that the lid is adapted when lowered to closed position to fit closely within the recessed portion 53 of the top of the cabinet. A finger-

4

grip 57 is recessed into the lid, whereby the lid may be conveniently raised.

In use, a suitable quantity of hot water is fed into the drum by way of the water inlet 38, and clothes are placed in the drum together with soap, a detergent or the like, the roller 44 being fitted in place, as before described, and as shown in Figure 1. The water outlet pipe 41 is slid inwardly to inoperative position, as shown in Figure 1. The lid 56 may be closed if desired, and the motor 21 is operated so that its friction wheel 23, bearing on the cylindrical flange 19 about the bottom of the drum 15 causes the drum 15 to rotate. The clothes and water in the drum are caused to rotate with the drum, assisted by the radial rib 17 on the false bottom 16 of the drum. Owing to the provision of the interrupter roller 44, the rotating clothes and water are considerably agitated, and the speed of the rotating water consequently is insufficient to cause any material quantity of the water to be impelled centrifugally up the inclined sides of the drum 15 into the water-extraction chamber 32. Any little water which may enter the said chamber will be insufficient to be received by the retracted scoop 42. The agitation of the clothes and soapy water acts to clean the clothes. If the drum should be overloaded with clothes, it will be found that the roller carrying plate 46 will act to prevent any clothes from being caught between the roller and the lower ring 26.

After a suitable time the motor 21 is stopped, and the interrupter roller 44 is disengaged and withdrawn, as before described. The water outlet pipe 41 is next slid outwardly to its operative position shown in Figure 3, the scoop 42 then being located within the annular recess 24. The lid 56 may again be closed and the motor 21 is operated, causing the drum 15 to rotate again. As the roller 44 no longer acts to oppose the rotary flow of the water and clothes, the rapidly rotating water is driven centrifugally up the wall of the drum 15 and through the holes 31 of the lower ring 26 into the water extraction chamber 32. The lower ring 25 acts, of course, to prevent any garments from being forced up above a certain level. Water entering the water extraction chamber 32 is forced through the scoop 42, the water outlet pipe 41 and the outlet hose 43 to a drain, and the anti-splash plate 36 materially reduces splashing of the water impinging against the outlet pipe 41. After a short time, the garments in the drum will have nearly all of the water extracted centrifugally therefrom, whereupon the motor 21 is stopped and the drum 15 is brought to rest. The scoop 42 is unlikely to withdraw all of the water from the water extraction chamber 32, and what little is left will be trapped behind the outer flange 30 of the lower ring 26, which rises above the bottom part of the annular recess 24 of said chamber. Clean rinsing water may then be added to the drum 15, the roller 44 replaced and the water outlet pipe 41 being slid inwardly to inoperative position, and the clothes may then be rinsed thoroughly by agitation in the water, after which they may again be centrifugally dried as before described.

A clothes washing machine as above described will be found to be very simple and economical to manufacture, as it does not require any change-speed gear for the drum, has no glands, very few wearing parts, no bowl outside the drum to receive centrifugally extracted water, and no outlet cock. The machine may be made in compact form, and yet be adapted to wash a considerable quantity of clothes at each operation. Moreover, the machine will not be found to be subject to excessive vibration, and consequently it may be easily and economically installed. The machine will furthermore be found to be very convenient to operate, and efficient in use.

The alternative form of the invention shown in Figure 5, to which reference is now made, includes a base 10 as before described, having associated therewith arms 11 secured to and supporting a cylindrical member 12 fitted with anti-friction bearings 13 for a drum shaft 14, an electric motor 21 being mounted on said base.

In this form of the invention there is mounted on the base 10 a lower casing 60, the open upper part of which is shaped to support an upper casing 61. The upper casing 61 is of sheet metal construction, and is provided with a bottom 62, somewhat dished down to a drainage outlet 63 toward the rear thereof, said drainage

5

outlet having connected thereto a conduit 64 which passes through the rear wall of the lower casing 60, and may be carried to a drain (not shown). In the bottom 62 of the upper casing 61 there is formed a central hole from the periphery of which there extends upwardly a cylindrical sleeve 65 through which the drum shaft 14 passes axially. A pulley wheel 66 is mounted on the drum shaft 14 below the upper casing bottom 62, and is connected by a belt 67 to a smaller pulley wheel 68 carried by the shaft of the motor 21.

The washing machine drum 69 is of substantially inverted conico-frustum shape, and it is provided with a false bottom 70 having an integral radial upstanding rib 71, and with a bottom 72, the drum shaft 14 being secured to the false bottom and the bottom of the drum so that the drum is held rigidly on the shaft.

The upper edge portion of the drum 69 is curved inwardly, as indicated at 73; and some distance therebelow there is secured within the drum 69 a ring 74 having formed therethrough a multiplicity of holes 75. A number of holes 76 are formed through the wall of the upper part of the drum 69 above the ring 74.

A collar 77 is secured on the portion of the drum shaft 14 which is within the sleeve 65, said collar supporting a boss 78 which is rotatably mounted on said shaft, and from which there extend two opposed roller-carrying arms 79. Each of said arms 79 extends more or less radially below the bottom 72 of the drum 69; then upwardly close to the outside of the wall of the drum 69; then more or less radially inward over the top edge portion 73 of the drum; and then downwards, to terminate in a boss 80, the lower face of which is somewhat below the level of the ring 74. There is rigidly secured in each of the bosses 80 the upper end of a downwardly extending roller shaft 81; and an interrupter roller 82 is rotatably mounted on each of the shafts 81, each roller closely approaching the wall and the false bottom 70 of the drum 69.

A top plate 83 is secured on the top of the upper casing 61, said top plate being formed with a square or rectangular recessed portion 84, in which is a round opening 85 from which depends a cylindrical flange 86, to form a lead-in to the top of the drum 69, a lid 87, corresponding to the lid 56 of the preferred embodiment, being hinged to the top plate 83 and adapted when in closed position to lie within the recessed portion 84 of the top plate.

A mounting bracket 88 is secured within the upper front part of the cabinet of the machine, being secured to the upper casing 61 and the top plate 83. A pair of lugs 89 depend from the mounting bracket, and there is pivotally mounted therebetween a stop lever 90, the front end of which is connected by a connecting rod 91 to an eccentric device 92. The eccentric device is adapted to be rotated by means of a handle 93 in front of the upper casing 61 to cause the rear end of the stop lever 90 either to be lowered, as shown in Figure 5, so as to intercept one of the roller carrying arms 79 to prevent the rotation of these arms and the associated interrupter rollers 82; or alternatively to raise the rear end of said stop lever clear of the roller-carrying arms 79.

A water inlet pipe 94, supported by a channel piece 95 secured to the underside of the rear portion of the top plate 83 is adapted to be connected to hot and cold water pipes, and is adapted to direct water into the drum 69.

In using the machine, the lid 87 is raised to open position, and clothes to be washed are fed into the drum 69. A quantity of hot water and soap or the like are fed into the drum 69. The handle 93 is turned to "Washing" position, the eccentric device 92 then acting to cause the stop lever 90 to be brought to operative position as shown in the drawing. The lid 87 is closed, and the motor 21 is operated to rotate the drum 69. The water and clothes in the drum are rotated therewith, assisted by the rib 71 of the false bottom 70. The interrupter rollers 82 on the arms 79, which arms are held against rotation about the drum shaft, cause the water and clothes to be considerably agitated, and prevent the rotating water in the drum 69 from attaining such speed that it will be forced centrifugally up the sloping sides of the drum 69. The agitation of the clothes and soapy water will act to clean the clothes, and after a suitable period the handle 93 is moved from "Washing" to "Dry-

6

ing" position, so that the eccentric device 92 is caused to move the stop lever 90 to inoperative position. Thereupon, the interrupter rollers will be free to rotate with the drum 69 and contents thereof, and consequently will cease to oppose the movement of the rotating water and clothes in the drum. As a result, the water in the drum will attain such speed of rotation that it will be forced centrifugally up the sloping wall of the drum, through the holes 75 in the ring 74, and out through the holes 76 in the upper part of the drum. The water so expelled is received in the upper casing 61, and is carried away through the outlet 63 and conduit 64 to a drain.

It will be found that the clothes will quickly have the major part of the water extracted therefrom in this manner. After a sufficient time has elapsed, the motor 21 is shut off and the drum and the interrupter rollers are brought to rest. The handle 93 is again brought to "Washing" position, and rinsing water is introduced into the drum. Rinsing is then carried out in similar manner to the washing operation before described, and then the clothes are again centrifugally part-dried.

Washing machines according to this form of the invention will be found to save considerable time, as there is no need to halt the operation of the machine between washing or rinsing and drying. Moreover, such machines will be found to be simple and economical to manufacture and effective in operation.

What I claim is:

1. A clothes washing machine including a drum rotatable about a substantially vertical axis, and adapted to contain a quantity of clothes and cleansing or rinsing liquid; a rotor operable to rotate said drum about said axis to cause a flow of liquid and clothes in said drum; a roller; means to mount the roller substantially vertically in the drum and close to the wall thereof in opposition to the rotary flow of liquid and clothes, the roller being separable from said mounting means so as to be removable from the drum; and means for withdrawing liquid centrifugally from the drum after the roller has been removed, said means for withdrawing liquid centrifugally from the drum including an extraction chamber coaxial with the rotatable with the drum and in communication therewith, a scoop positioned within the extraction chamber near the periphery thereof, and a water outlet leading from the scoop, the scoop, upon rotation of the extraction chamber, conveying water therefrom to the water outlet.

2. A clothes washing machine including a drum rotatable about a substantially vertical axis, said drum being of inverted conico-frustum shape and adapted to contain a quantity of clothes and cleansing or rinsing liquid; a rotor operable to rotate said drum about said axis to cause a flow of liquid and clothes in said drum; a roller; means to mount the roller substantially vertically in the drum and close to the wall thereof in opposition to the rotary flow of liquid and clothes, the roller being separable from said mounting means so as to be removable from the drum; and means for withdrawing liquid centrifugally from the drum after the roller has been removed, said means for withdrawing liquid centrifugally from the drum including an extraction chamber extending around the upper part of the drum and in communication therewith, and at least one liquid outlet extending from the extraction chamber for removing centrifugally expelled liquid.

3. A clothes washing machine including a drum rotatable about a substantially vertical axis, said drum being of vertical conico-frustum shape and adapted to contain a quantity of clothes and cleansing or rinsing liquid; a rotor operable to rotate said drum about said axis to cause a flow of liquid and clothes in said drum; a roller; means to mount the roller substantially vertically in the drum and close to the wall thereof in opposition to the rotary flow of liquid and clothes, the roller being separable from said mounting means so as to be removable from the drum; and means for withdrawing liquid centrifugally from the drum after the roller has been removed, said means for withdrawing liquid centrifugally from the drum including an extraction chamber extending around the upper part of the drum and in communication therewith, a liquid outlet, and a scoop in communication with the outlet, the scoop being positioned within the extraction chamber to receive and

to direct to the outlet such liquid as is centrifugally expelled into the rotating extraction chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

5

347,702 Evans ----- Aug. 17, 1886
2,305,956 Dyer ----- Dec. 22, 1942

FOREIGN PATENTS

188,861 Switzerland ----- Apr. 16, 1937