

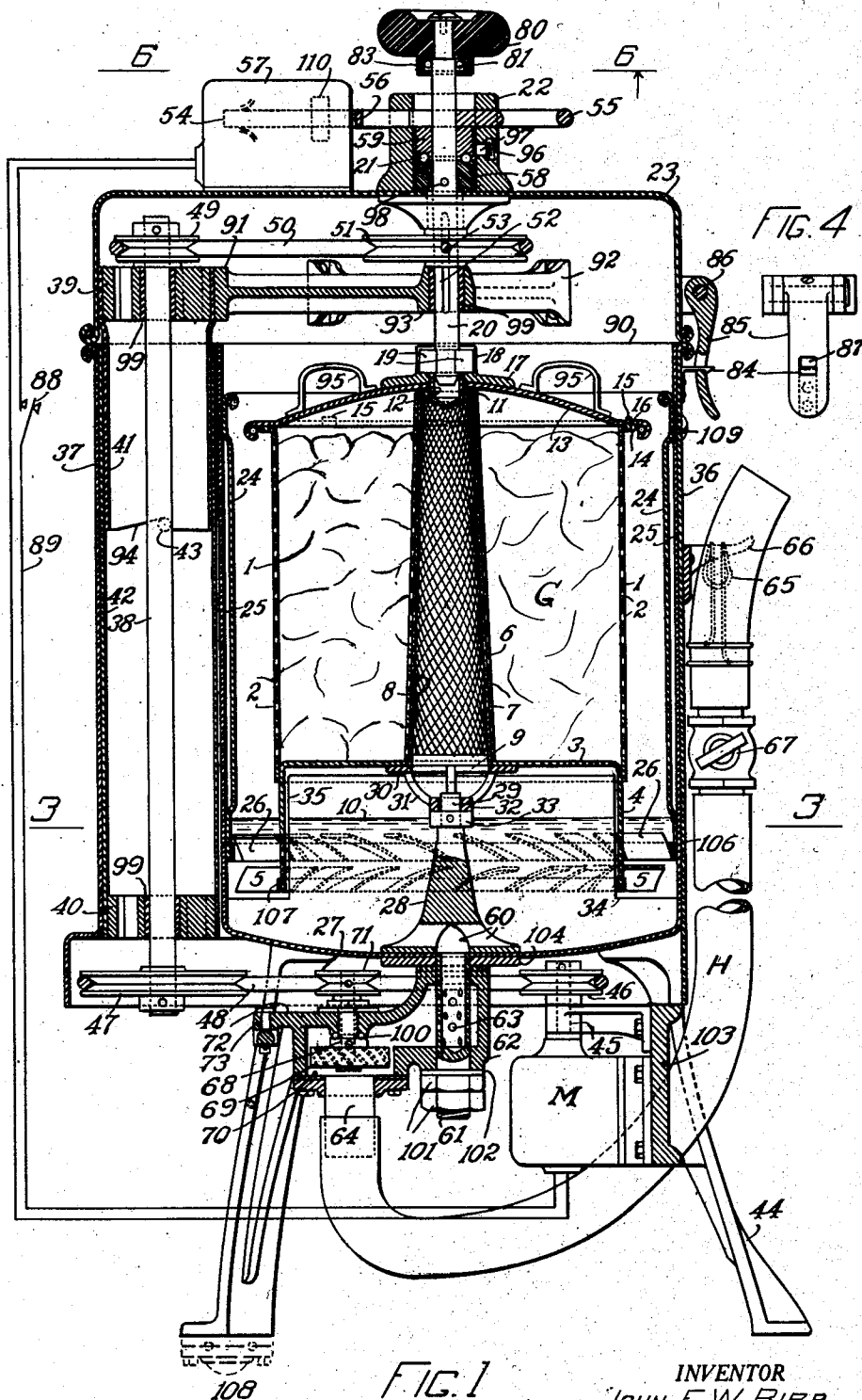
Dec. 1, 1936.

J. E. W. BIRR

2,062,286

WASHING MACHINE

Original Filed April 21, 1933 2 Sheets-Sheet 1



INVENTOR
JOHN E. W. BIRR

BY
Alfred T. Palmer
ATTORNEY

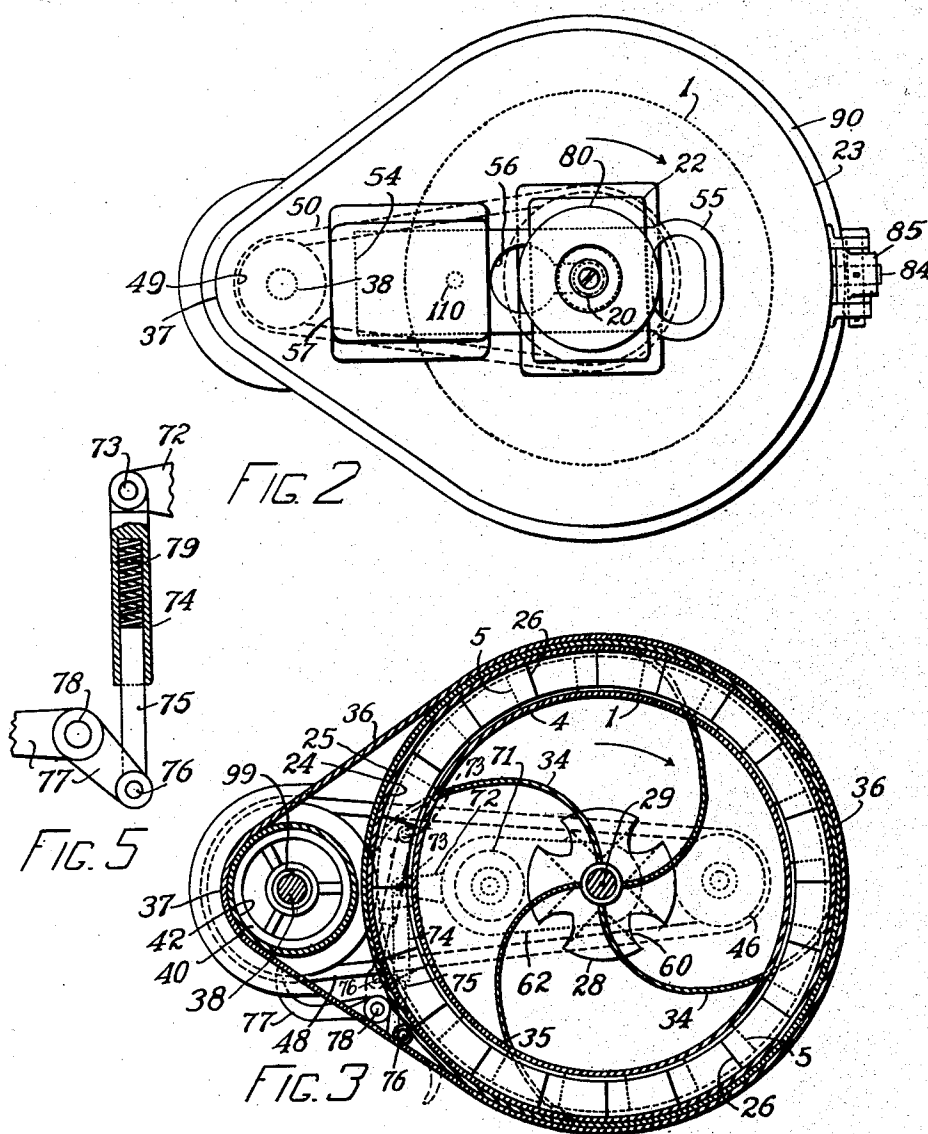
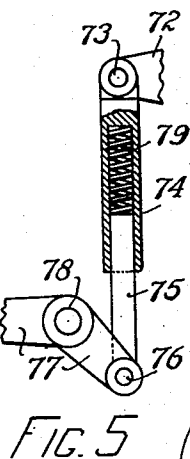
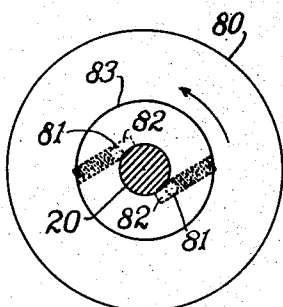
Dec. 1, 1936.

J. E. W. BIRR

2,062,286

WASHING MACHINE

Original Filed April 21, 1933 2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,062,286

WASHING MACHINE

John Emil Wilhelm Birr, San Leandro, Calif.,
assignor of one-half to Albert G. Nicolini, Oak-
land, Calif.

Application April 21, 1933, Serial No. 667,185
Renewed August 5, 1935

12 Claims. (Cl. 68—18)

This invention relates to washing machines and has particular reference to that class which has, for its principal feature, the forcing of the water through the clothes, instead of pushing the clothes through or against the water, as is customary in washing machines. By this means, where the garments are held stationary with relation to the containing drum, it is possible to launder the most delicate fabrics or lace curtains without possibility of damage.

As a second important feature of my invention, the garments which are to be cleansed are never immersed in the cleaning fluid, but are held above the normal level of the liquid, means being provided to raise this liquid, in a central tower, to the top level of the clothes and thence, by centrifugal action, the liquid is forced through perforations in the tower walls and to and through the garments and then through perforations in the side walls of the drum, from whence it returns to the liquid reservoir beneath, there to repeat the process until the cleaning operation is completed.

Other features of construction and use will appear in the specification that follows, and also in the drawings which accompany and form part thereof, and in which

Fig. 1 is a vertical section of my machine.

Fig. 2 is a top plan thereof.

Fig. 3 is a plan section on line 3—3 of Fig. 1.

Fig. 4 is a detailed view of the latch shown in Fig. 1.

Fig. 5 is a detail of the pump-shifting mechanism.

Fig. 6 is an enlarged view of the hand wheel, looking up.

Primarily, my machine comprises a revolving drum 1, whose vertical walls are provided with perforations 2. A floor-plate 3, fast with drum 1, is constructed with a downwardly extending wall 4, provided, at its lower extremity, with a series of deflecting vanes, 5, thus forming what I call a turbine or agitator. Within drum 1 and firmly secured to floor-plate 3, is a vertically disposed cone or tower 6, whose walls are provided with perforations 7. Within tower 6 is arranged a closely-woven screen 8, to properly break up the water into a fine spray. The bottom of tower 6 is open to fit a corresponding opening 9 in floor-plate 3, thus providing free ingress for the liquid which is to be raised from the water-well 10, as will be later described. The top of tower 6 is closed, partly by the in-turned lip 11 of the side-wall of tower 6, and partly by a cup 12, depending from and secured to a lid 13, which completely covers drum 1. At the upper edge of the

side-wall of drum 1, I form a flange 14, from which is struck up a series of lugs 15 adapted to register with and extend through a corresponding series of openings 16, formed around the edge of lid 13. At the center of lid 13, I provide, fast thereon, a clutch member comprising a flange 17 with an upwardly extending socket 18 adapted to snugly engage a pair of lugs 19 which are fast on drive-shaft 20, these lugs comprising a second clutch member. When the machine is at rest, lugs 19 will rest upon the bottom of socket 18 and thus support the weight of the driving mechanism immediately above them; but when the drum 1 is being rotated, the lifting tendency of the water within tower 6 and beneath floor 3 will produce an upward thrust of drum 1 and shaft 20 against a ball-bearing 21 which is formed within a block 22 that is fast upon a cover 23, which houses the driving mechanism, presently to be described.

Surrounding drum 1 is an open-ended cylinder 24 of somewhat larger diameter, this cylinder being enlarged near its ends to snugly fit within the barrel 25 which contains the washing fluid, seen at 10, Fig. 1. At the lower extremity of cylinder 24 and extending inwardly therefrom, I arrange, fast thereon, a series of deflecting vanes 26 which, although stationary, are adapted to cooperate with turbine 5 in raising the liquid to tower 6.

Within barrel 25, and secured to the floor 27 thereof, is a centrally arranged pedestal 28 whose upper end is formed as a post or stud 29, around which is journaled a spider 30 which has upwardly and outwardly extending arms 31 connecting the bearing 32 to the ring of spider 30, which latter is secured to and underneath floor 3. When the machine is at rest, the collar 33, fast on stud 29, acts as a support for bearing 32 and thus for drum 1 and the moving parts above it; but when the machine is operating, the upward thrust of the liquid, before referred to, tends to lift spider 30, with its superimposed mechanism, from direct contact with collar 33, thus transferring the thrust to ball-bearing 21.

Surrounding pedestal 28, and fast thereto, I preferably arrange a plurality of curved blades 34 whose contours form a reasonably snug fit within barrel 25 and the walls 4 of floor 3, to act as dams to break up the rotary motion of the liquid within water-well 10, and further, by means of their curved outline, to crowd the liquid toward the center and directly beneath tower 6. To more clearly illustrate this feature, I have not foreshortened the edges 35 of blades 34, in Fig. 1, as

would be necessary to correctly portray these edges as seen in Fig. 3.

Closely surrounding barrel 25 is an enclosing shell 36, partly cylindrical in contour, but extending at one side, as at 37, to house the auxiliary driving shaft 38, this shaft being journaled in two spiders 39 and 40, the former of which is fast within the upper end of a movable cylinder 41, and the latter being fast within a stationary auxiliary cylinder 42, this last being fast to the shell extension 37. The movable cylinder 41 rests on a pin 43 which is fast with auxiliary cylinder 42, but pin 43 has also another function which will be later described.

My machine is provided with legs 44 which may be secured to barrel 25 or shell 36, as desired, and it is to be understood that I may mount legs 44 on rollers or castors 108, without departing from the spirit of my invention. The driving mechanism will now be described. Beneath barrel 25, and preferably mounted on legs 44, is a motor M with an upwardly extending shaft 45 at whose upper end is fastened a driving pulley 46. On the lower end of auxiliary shaft 38, is fast a second drive pulley 47, pulleys 46 and 47 being connected by the rope or belt drive 48. At the upper end of auxiliary shaft 38 is fast a third drive pulley 49 which, by a second rope or belt drive 50, is connected to a fourth drive pulley 51, this last being splined on drive-shaft 20, as seen at 52. A stud 53 in fourth drive pulley 51 is adapted to engage the key-slot 52 on drive-shaft 20, and, being removable, pulley 51 becomes loose on shaft 20 when it is desired to dis-assemble the machine. The preceding word "loose" has a relative meaning, as pulley 51 is adapted to snugly engage shaft 20 so as to cause sufficient friction to hold shaft 20 in raised position, as will be later described.

Within block 22, and surrounding shaft 20, is a sliding bar 54, provided with a handle 55, and also with an enlarged opening 56, this opening being adapted to register with the collars of ball-bearing 21, in a well-known manner. See Fig. 2. Opposite block 22, and fast on cover 23, I preferably mount a switch-box 57 with which bar 54 operatively connects when it is desired to operate my machine. This position is shown in Figs. 1 and 2. When bar 54 is withdrawn the circuit is broken in switch-box 57 and motor M becomes idle.

Ball-bearing 21 comprises a collar 58 fast on shaft 20 and a second collar 59 loose thereon. With bar 54 in the position shown, the upward thrust of the water, before referred to, causes collar 59 to impinge against the under side of bar 54 as an abutment. Being free on shaft 20, this friction causes collar 59 to remain stationary while the machine is in operation, thus calling ball-bearing 21 into play.

From the foregoing description, it will be seen that when motor M operates, lugs 19 on drive-shaft 20, by engaging socket 18 on flange 17, cause lid 13 to revolve in clock-wise direction and, through the agency of lugs 15, which are formed integral with drum 1, the drum, with its central tower 6 and turbine 5 also are rotated. The garments to be cleaned are packed within drum 1 and around tower 6, and the action of turbine 5 sets up a whirling motion of the liquid in well 10 which is caught by the blades 34 and concentrated directly beneath tower 6. As the speed of the motor increases, this concentration produces a pressure which forces the liquid upward within tower 6 until it has reached the top thereof,

whence, by centrifugal action, the liquid, finely comminuted by the screen 8, passes through the perforations 7 and through the garments G, after which it escapes through perforations 2 in the sidewall of drum 1 and falls upon the stationary vanes 26, the contour of which accentuates the whirling efficiency of turbine 5.

Thus it will be noticed that, during the entire washing operation, clothes G are held stationary within drum 1, being pressed against the outer wall thereof by centrifugal action and thus leaving a very small space immediately surrounding tower 6, the amount of this space depending partly upon the tightness with which the garments have been packed, and partly upon the speed of the motor. The liquid which emerges from tower 6 in the form of a fine spray or mist is driven through the clothes by centrifugal force, thus searching out every part and hidden fold thereof. The height to which the liquid can be forced in tower 6 depends partly upon the speed of motor M, but mainly upon the fineness of the mesh of screen 8.

At the completion of the cleaning operation, it becomes necessary to draw the cleaning fluid from the machine and replace it with clean water for rinsing purposes. To accomplish this, I employ a pump connected with a flexible hose H, by means of which the liquid may be drained directly into a sink-tray or set-tub which may be located in close contiguity with my machine.

The draining mechanism will now be described in detail.

Pedestal 28 is provided with a plurality of drain openings 60 through which the liquid may freely and fully escape. Openings 60 register with a vertically arranged and partly hollowed bolt 61, the upper end of which is fast with floor 27 of barrel 25. The free end of bolt 61 is housed in a closed box 62, and its hollowed portion is provided with perforations 63. Also, to box 62, but at one side, I make fast a short nipple 64, to which is attached the flexible hose H. The free end of hose H is adapted to rest within the sink-tray, being held there by means of a wire hook 65 which hooks over the edge of the tray. This hook is adjustably secured on hose H, and when the washing operation is under way, hose H may be suspended against the side of the machine by placing hook 65 over the bracket 66, secured to shell 36. A stop-cock 67 may be inserted in the line of hose H at any convenient point. Directly above nipple 64 is a vertically arranged shaft 68, journaled in box 62. Fast upon the lower end of shaft 68 is a turbine wheel 69, housed in a turbine-well 70. Fast at the upper end of shaft 68 is a drive pulley 71 so positioned as to be within the sphere of action of rope drive 48. Exteriously connected to the free end of box 62 is an arm 72 which is pivotally connected at 73 to a partly hollow tube 74 (see Fig. 5). Within tube 74 is a plunger rod 75 which is pivotally connected at 76 to a rock-arm 77, the latter being pivotally mounted at 78 to the shell 36. The free end of rock-arm 77 is so shaped as to be readily grasped by the hand of the operator. Ordinarily, pulley 71 is out of commission, it being positioned midway between the two strands of rope-drive 48, as shown in Fig. 3. When it is desired to start the pump, rock-arm 77 is thrown from the full position seen in Fig. 3 to the dash position thereof. This action changes the positions of parts 72, 74, 75 and 76 from that shown in finely dotted lines in Fig. 3 to the dash lines position, where it will be noted that pivot 76 has

been thrown beyond dead center. In this operation, plunger 75 compresses spring 79 within tube 74, and in the thrown position, the thrust of spring 79 keeps pulley 71 in operative contact with one strand of rope-drive 48. As the motor M is running, the turbine wheel 69 is operated to expel the liquid through hose H, being assisted by the centrifugal force of turbine 5. After draining off the washing fluid, motor M is stopped and hose H is attached to the water faucet ordinarily found within sink-trays, whereupon the pressure behind the faucet will force clean water back through hose H and into water-well 10. When a sufficient amount of water is assembled within the machine, hose H is disconnected, stop-cock 67 is shut off, rock-arm 77 is reversed to free pulley 71 and motor M is again started by pushing bar 54 back into switch-box 57 or, preferably by closing auxiliary switch 88. Again the whirling motion is set up and the clean water, delivered in the form of spray or mist, through screen 8, is driven through the clothes G, thus searching out and eliminating all traces of the cleaning fluid from the clothes.

After draining off the rinsing water by repeating the former operations for the cleaning fluid, the positions of the parts as seen in the drawings are restored and again the motor is set in operation. On this occasion, what water remains in the clothes is forced out through perforations 2, and none entering from tower 6, the clothes are partially dried, as is customary in wringing methods.

From the above description, it will be clearly seen that, once packed within drum 1, the clothes are not disturbed until after the rinsing and wringing operations are completed, thus saving all wear and tear upon the garments.

As a support for cylinder 24, I provide one or more set-screws 109 which pass through shell 36 and barrel 25.

The method of packing and unpacking the clothes will now be described. Referring to Figs. 2 and 3, it will be noticed that the auxiliary drive-shaft 38 may be termed the pivot around which the cover 23 may be swung until the lid 13 is fully exposed. With the cover will move the drive-shaft 20 with all its mountings, but first, drive-shaft 20 must be disengaged from lid 13. The method of procedure is as follows: At the upper extremity of drive-shaft 20, I mount a hand-wheel 80 which is so constructed that, while the machine is in operation, the operator could grasp wheel 80 and hold it against rotation with shaft 20; but if the machine is idle, wheel 80 may not be turned in clock-wise direction without rotating shaft 20. This check or ratchet-like effect is obtained by the well-known means of mounting one or more ball-checks 81 in a recess or recesses 82 which is or are formed in the hub 83 of wheel 80. See Fig. 6. The purpose of this will later appear.

When in place, cover 23 fits the shell 36, rim to rim, and is held there by a spring fastening 84 fast on shell 36 and adapted to be engaged by a lever 85 which is pivotally secured to cover 23 at 86. The spring fastening 84 is adapted to register with the opening 87 in lever 85 and thus prevent horizontal movement of cover 23.

To remove or swing cover 23, handle 55 of bar 54 is grasped and pulled longitudinally until opening 56 registers with collar 59. This stops motor M. Incidentally, it might be noted that an auxiliary switch, as 88, may be inserted in the circuit 89 that connects switch-box 57 with motor

M, in case it is desired to leave bar 54 in illustrated position when the machine is not in use. To continue, the second step in the operation is to grasp hand-wheel 80 and raise it and, with it, shaft 20 against the friction caused by the close sliding fit thereon of drive-pulley 51. When shaft 20 is in raised position, the collar 59 is within and even partly above opening 56 of bar 54, and the lugs 19 are disengaged from the socket 18 until the lower end of shaft 20 is clear of the rim 90 of shell 36. In this position, the friction of drive-pulley 51 will hold shaft 20 in raised position and cover 23 is free to swing on the pivot-center of auxiliary shaft 38. A slight upward pressure on spring-catch 84 will release lever 85 and cover 23 is swung clock-wise until lid 13 is completely uncovered. As cover 23 swings, movable cylinder 41 swings with it, said cylinder being held fast in the grip of a fork 91 which forms part of the grid 92 that provides a bearing 93 for shaft 20.

This and other fastenings referred to throughout this specification, unless otherwise illustrated, are formed by brazing or soldering the parts together, although it is to be understood that I may employ bolts or other detachable fastenings without departing from the spirit of my invention.

As cylinder 41 rotates, the cam surface 94, formed on the lower edge of said cylinder, rides on the pin 43 and causes cover 23 to lift as it swings, thus avoiding the sliding friction or rubbing that otherwise would occur.

With cover 23 aside, lid 13 may be removed by graphing handles 95, 95 and raising to free lugs 15 from the openings 16. After the clothes are packed within drum 1, the above operations are reversed to restore the illustrated conditions. Also, the same operations are repeated when it is desired to remove the clothes.

A plug 96 conceals an opening 97 in block 22, this opening being necessary to insert the set-screw 98 that fastens collar 58 on shaft 20. Among the miscellaneous parts which enter into the construction of my machine may be mentioned a series of wood bushings 99, 99 which are inserted into a number of the bearings to avoid the necessity of oiling; a ball-bearing 100 inside the pump; lock-nuts 101 for bolt 61; wooden gaskets 102 around bolt 61; the channel-bar 103 upon which motor M and bearing 45 are mounted; the collar 104 which surrounds the upper end of bolt 61 and is fast to the under side of floor 27 of barrel 25; and the pin 110 which forms a stop to prevent the complete removal of bar 54.

The stationary vanes 26 are shown as formed upon a ring 106 that is brazed or soldered within the lower rim of open-ended cylinder 24. Similarly, the vanes of turbine 5 are formed on a ring 107 that is brazed or soldered on the outside of the lower edge of the depending wall 4 that is connected with drum 1.

By an inspection of Fig. 3, it will be noted that vanes 26 are so constructed as to leave a suitable clearance around wall 4. Similarly, the vanes of turbine 5 are so constructed as to provide a suitable clearance within the side wall of barrel 25.

To remove drum 1 for inspection or repair, set-screws 109, but one of which is shown, are removed and cylinder 24, with its vanes 26 may be lifted out, after which drum 1 may be removed.

Having described my invention, what I claim is:
1. In a washing machine, a container for the washing fluid; a drum rotatably mounted within said container and above said fluid, said drum having an opening in its bottom wall, and perfo-

rations through the side-walls thereof; a hollow tower with open base, said tower being centrally arranged within said drum, and fast therewith so as to register with said floor-opening in said drum, and having its side-walls perforated; a series of vanes arranged without the profile of said drum, said vanes being upwardly inclined toward the direction of rotation of said drum, and being positioned below said drum so as to impart a downward whirling motion to said fluid when said drum is rotated; means for securing said vanes fast with said drum; a plurality of curved radially arranged blades fast to and within said container and below said vanes, and positioned so as to direct the whirling fluid to and within said tower; and means for rotating said drum in one direction.

2. In a washing machine, a container for the washing fluid; a drum for receiving the garments to be cleansed, said drum being rotatably mounted within said container and above said fluid, and having its side-walls perforated; a centrally arranged tower with open base, in free communication with the fluid in the bottom of said container, and with perforated side-walls, said tower being fast within said drum; a downwardly projecting wall fast with said drum; a plurality of vanes fast upon the outer periphery of said wall, and without the profile of said drum, said vanes being so inclined with respect to the axis of rotation of said drum, and so positioned as to impart a downward whirling motion to said fluid when said drum is rotated; a plurality of blades fast within and to said container, and below said vanes, said blades being radially arranged around the axis of rotation of said drum, and being so shaped as to direct the whirling fluid to and within the open base of said tower; and means for rotating said drum in one direction.

3. In a washing machine, a container for the washing fluid; a perforated drum rotatably mounted within said container and above said fluid; a hollow perforated tower with open base in free communication with the fluid in the bottom of said container, said tower being fast within said drum; a series of vanes positioned below and outside the profile of said drum, said vanes being so inclined with respect to the axis of rotation of said drum as to impart a downward whirling motion to said fluid when said drum is rotated; a depending wall fast with said drum and fast with said vanes; stationary means within said container and below said vanes, said stationary means being radially arranged with respect to the axis of rotation of said drum, and so shaped as to convert said downward whirling motion into an inward and substantially radial movement to force said fluid upward into said tower; in combination with a driving shaft detachably connected with said drum; a horizontally swinging cover for said container; means for adjustably mounting said shaft upon and within said cover; and means for rotating said shaft.

4. In a washing machine, a perforated rotatable drum with a central opening in the bottom wall thereof; a hollow perforated tower with open base fast over said opening and registering therewith, said tower with its open base being in free communication with the fluid in the bottom of said container; a series of vanes fast with said drum and outside the profile thereof, said vanes being so inclined with respect to the axis of rotation of said drum, and so positioned as to impart a downward whirling motion to a washing

fluid which may be brought within its influence; and a screen lining for said tower; in combination with a container for said fluid, within which said drum is rotatably mounted; a plurality of blades fast within said container and below said vanes, said blades being radially arranged with respect to the axis of rotation of said drum, and being adapted to direct the downwardly whirling fluid toward and into the open base of said tower; and means for rotating said drum.

5. In a washing machine, a container for the washing fluid; a perforated drum rotatably mounted within said container and above said fluid; turbine vanes positioned without the profile of said drum, said vanes being upwardly inclined toward the direction of rotation of said drum; means for rigidly connecting said vanes to and below said drum; a series of stationary deflecting vanes fast within said container and above said turbine vanes, said deflecting vanes being oppositely inclined with respect to said turbine vanes; and a hollow perforated tower with open base fast to and within said drum, and so positioned, with its open base in free communication with the fluid in the bottom of said container, as to receive the washing fluid when agitated by said turbine vanes, and deliver the same through its perforations to and within said drum; a plurality of blades fast to and within said container and below said turbine vanes, said blades being radially arranged with respect to the axis of rotation of said drum, and further adapted to direct the agitated fluid toward and into said tower; and means for rotating said drum in one direction.

6. In a washing machine, a container for the washing fluid; a perforated drum rotatably mounted within said container; a lid having a detachable and slidable driving connection with said drum; a shaft detachably connected with said lid for the purpose of rotating said drum; means for raising said shaft to disconnect it from said lid; and a sliding bar alternately adapted to lock the said shaft in engagement with said lid, or to release said engagement.

7. In a washing machine, a frame; a motor mounted upon said frame; a vertically-arranged auxiliary driving shaft operatively connected with said motor; a main driving shaft operatively connected with said auxiliary shaft; a container for the washing fluid and mounted upon said frame; a cover for said container; means for pivotally connecting said cover with said auxiliary shaft; means for detachably connecting said main driving shaft with a revoluble drum; and said drum rotatably mounted within said container.

8. In a washing machine, a container for the washing fluid; a drum with perforated side-walls and a bottom wall opening, said drum being rotatably mounted within said container; a hollow tower with perforated side-walls and open base, said tower being secured within said drum so as to register with said bottom wall; an agitator fast with said drum and below the same, said agitator being outside the profile of said drum, and being so inclined with respect to the axis of rotation of said drum as to direct the fluid downward when said drum is rotated; deflecting blades fast within said container and below said agitator, said blades being radially arranged, and further adapted to direct the fluid toward and into said tower; a lid detachably secured to said drum; a clutch member fast upon said lid; a driving shaft; a second clutch member on said shaft and

adapted to co-operate with said first clutch member to rotate said drum; and means for raising said shaft to disconnect said clutch members.

9. In a washing machine, a rotatable drum with perforated side-walls and a central opening in its bottom wall; a hollow tower with perforated side-walls and open base, said tower being secured within said drum so as to register with said floor and having its open base in free communication with the fluid in the bottom of a container in which said drum is mounted; a depending wall fast with said drum and registering with the side-walls thereof; and a series of vanes fast with said depending wall and arranged around the outer periphery thereof, said vanes being upwardly inclined in the direction of rotation of said drum; in combination with a container for the washing fluid; means for rotatably mounting said drum within said container and above said fluid; guiding means fast within said container and below said vanes, said guiding means being radially arranged, and so shaped as to direct said fluid to and within said tower; and means for rotating said drum in one direction.

10. In a washing machine, a container for the washing fluid; a drum rotatably mounted within said container and above said fluid, said drum having perforated side-walls and a central bottom wall opening; a hollow perforated tower with open base fast within said drum and registering with said bottom wall, said open base being in free communication with the fluid in the bottom of said container; a depending wall fast with said drum; agitating means for said fluid and fast upon said wall, and without the profile of said drum, and below the same, said means being so inclined with respect to the axis of rotation of said drum, and so positioned as to direct said fluid downward when said drum is rotated; guiding means fast within said container and below said agitating means, said guiding means being radially arranged with respect to the axis of rotation of said drum, and so shaped as to direct the agitated fluid to and within said tower; and means for rotating said drum in one direction.

11. In a washing machine, a container for the washing fluid; a perforated drum with a central opening in the bottom wall, said drum being rotatably mounted within said container and above said fluid; a hollow perforated tower with open base fast within said drum and registering with said bottom wall, said open base being in free communication with the fluid in the bottom of said container; a screen lining for said tower; a lid for said drum; a clutch member on said lid; a vertically arranged driving shaft; a second clutch member on said shaft; a cover for said container; means for adjustably mounting said shaft upon and within said cover; a vertically arranged auxiliary shaft operatively connected with said driving shaft; means for pivotally securing said cover to said auxiliary shaft; means for alternately causing engagement and disengagement of said clutch members; a frame upon which said

container is mounted; and a motor mounted upon said frame and operatively connected with said auxiliary shaft; in combination with a depending wall fast with said drum and registering with the outer periphery thereof; a plurality of turbine vanes fast upon the outside of said wall and without the profile of said drum, said vanes being upwardly inclined in the direction of rotation of said drum, and so shaped and positioned as to cause a downward whirling movement of the washing fluid when said drum is rotated through the agency of said motor; a series of stationary vanes within said container and immediately above said turbine vanes, said stationary vanes being oppositely inclined to said turbine vanes; and a plurality of curved blades fast within said container and below said turbine vanes, said blades being radially arranged and so positioned as to direct the downward whirling fluid to and within said tower.

12. In a washing machine, a container for the washing fluid; a perforated drum with a central opening in its bottom wall and rotatably mounted within said container and above said fluid; a hollow perforated tower with open base fast within said drum and registering with said bottom wall, said open base being in free communication with the fluid in the bottom of said container; a screen lining for said tower; a lid detachably secured to said drum; a vertically arranged driving shaft; a cover for said container; means for adjustably mounting said shaft upon and within said cover; a vertically arranged auxiliary shaft operatively connected with said driving shaft; means for pivotally securing said cover to said auxiliary shaft; means for alternately causing engagement and disengagement of said driving shaft with said lid; a frame upon which said container is mounted; and a motor mounted on said frame and operatively connected with said auxiliary shaft; in combination with a depending wall fast with said drum and registering with the outer periphery thereof; a plurality of turbine vanes fast on the outside of said wall and without the profile of said drum, said vanes being upwardly inclined in the direction of rotation of said drum, and so shaped and positioned as to cause a downward whirling movement of the washing fluid when said drum is rotated through the agency of said motor; a series of stationary vanes fast within said container and immediately above said turbine vanes, said stationary vanes being oppositely inclined to said turbine vanes; a plurality of curved blades fast within said container and below said turbine vanes, said blades being radially arranged and so positioned as to direct the downward whirling fluid to and within said tower; and a pump mounted on said frame and below said container; means whereby said pump may be operatively connected with said motor; and means whereby said pump, when so connected, may exhaust the fluid from said container into a receptacle located above said pump.

JOHN EMIL WILHELM BIRR.