

March 9, 1943.

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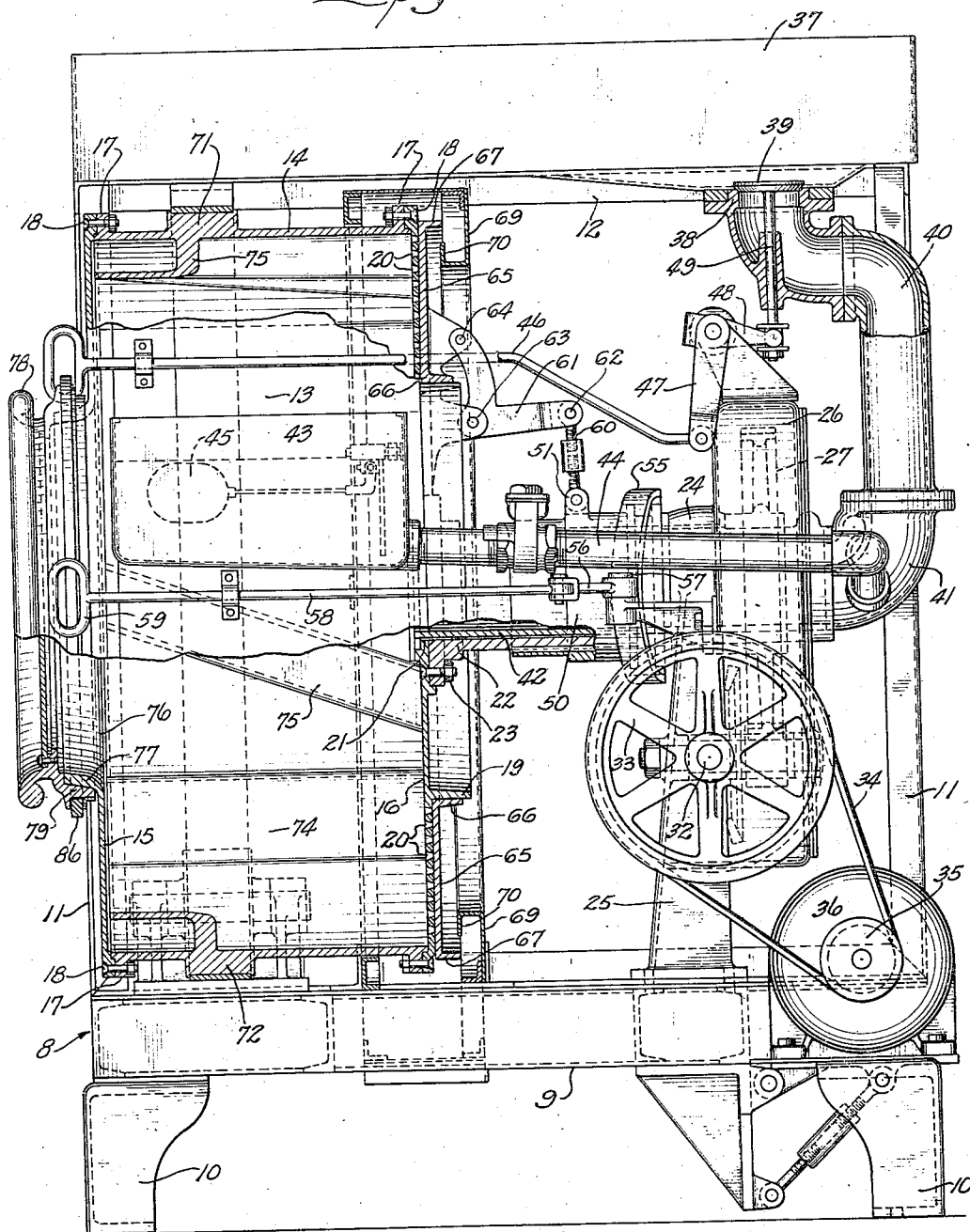
2,313,152

WASHING MACHINE

Filed Feb. 24, 1941

4 Sheets-Sheet 1

Fig. 1.



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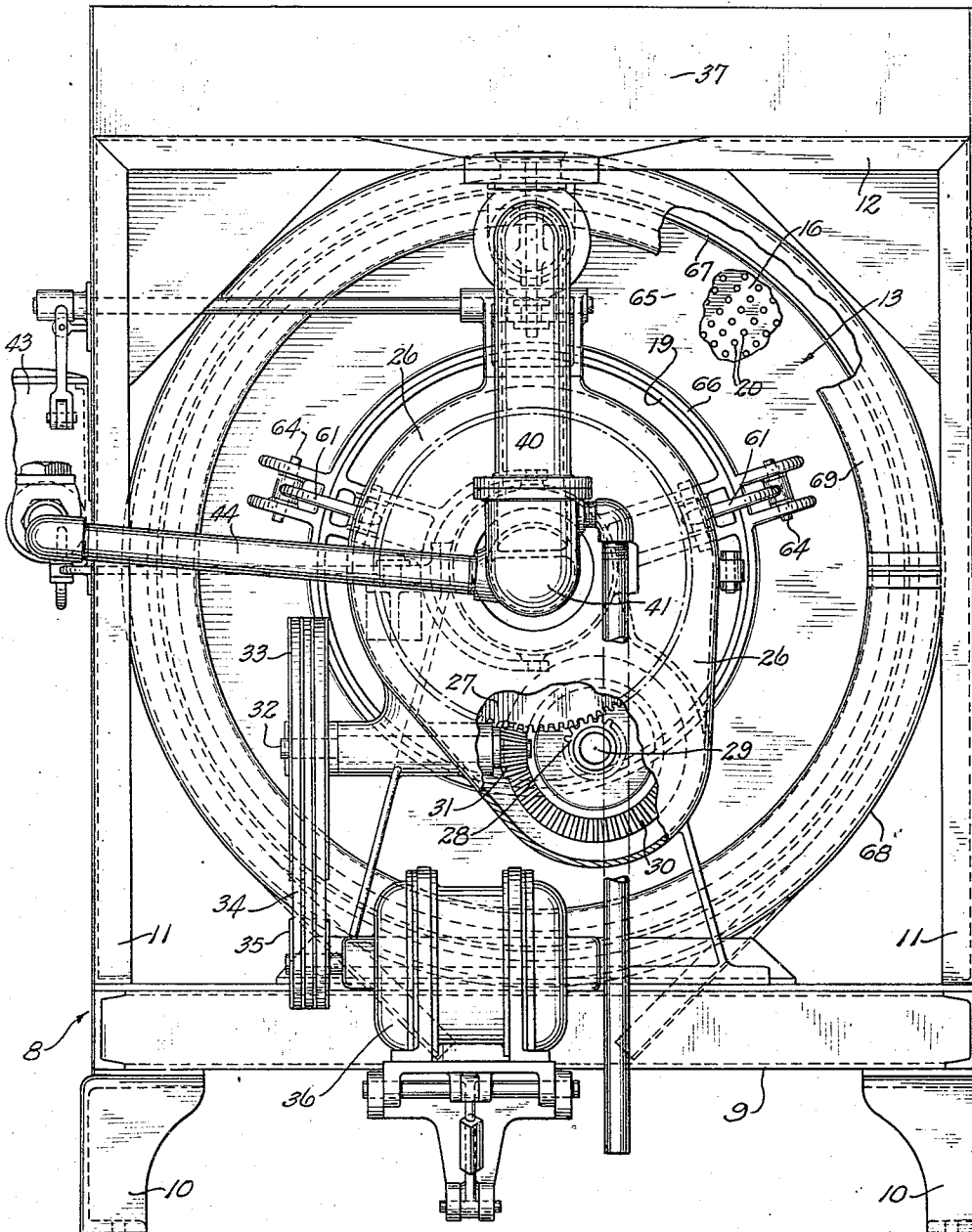
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Fig. 2.



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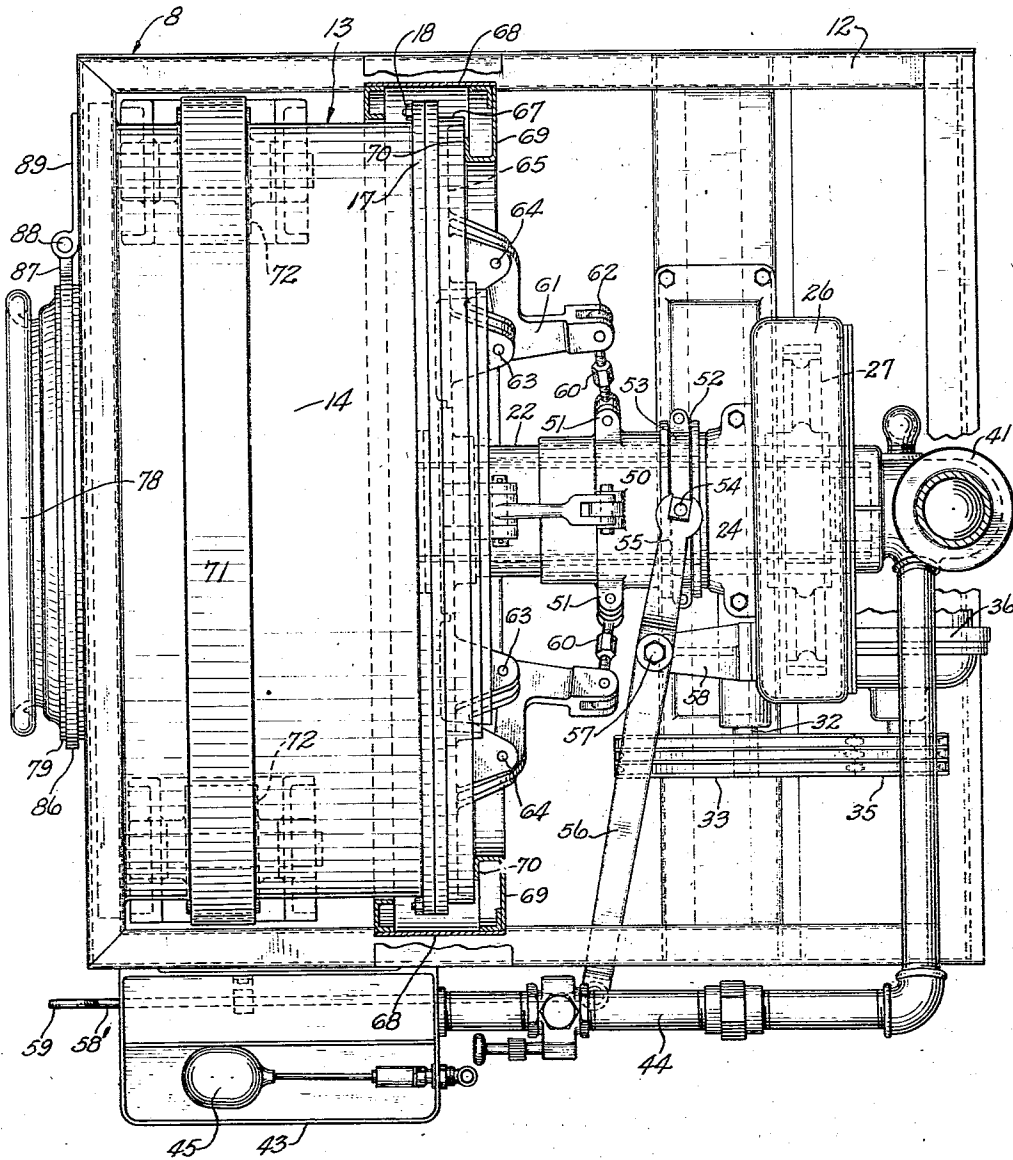
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Fig. 3.



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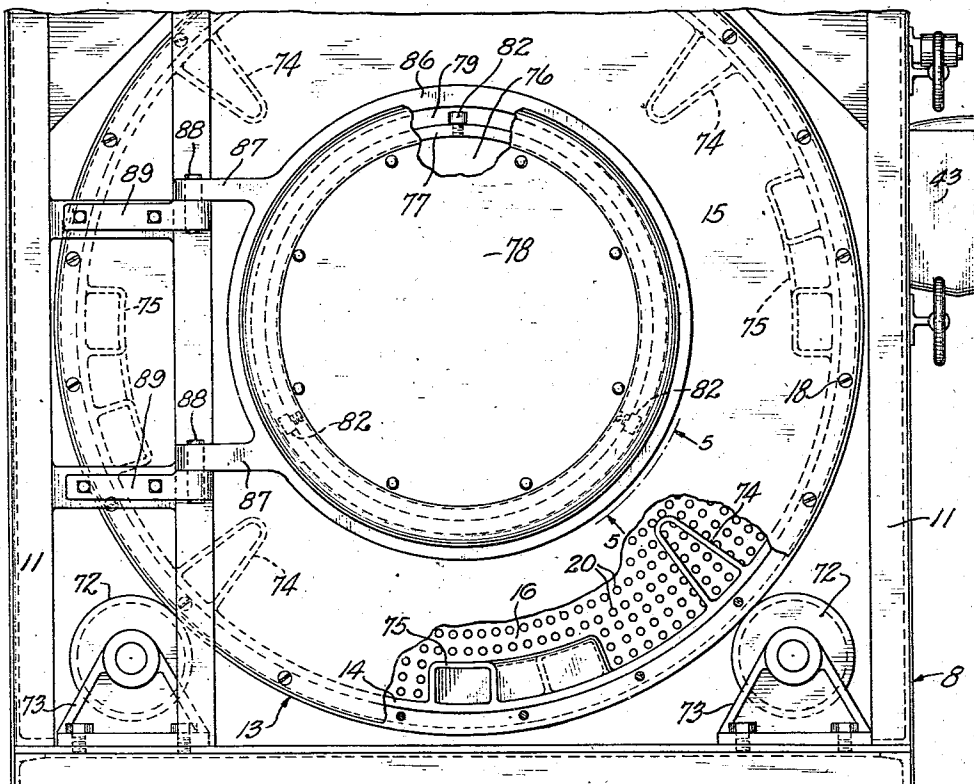


Fig. 4.

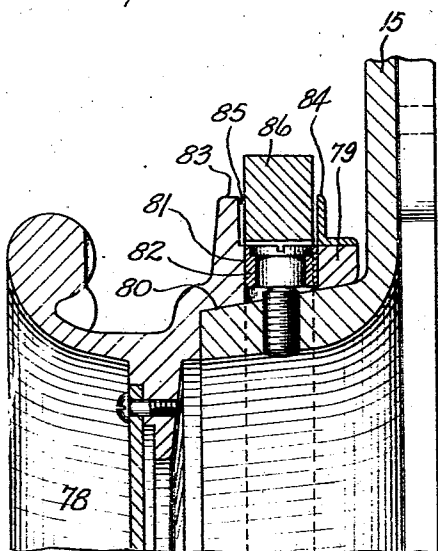


Fig. 6.

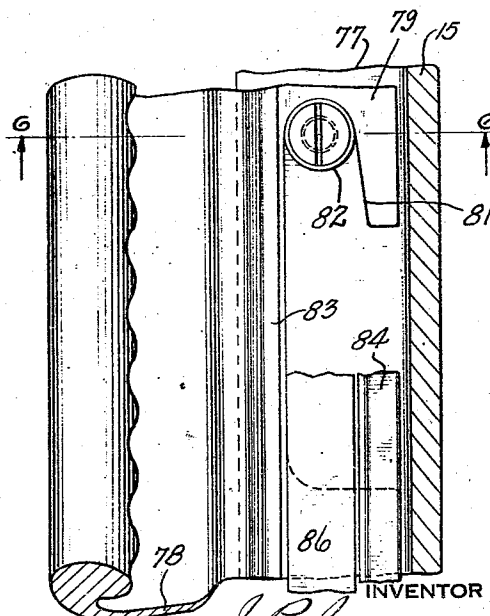


Fig. 5.

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UNITED STATES PATENT OFFICE

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WASHING MACHINE

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Application February 24, 1941, Serial No. 380,085

8 Claims. (Cl. 68—208)

This invention relates to improvements in washing machines.

Heretofore, in washing machines, it has been common practice to utilize a cylindrical drum having an apertured periphery which is rotatable in a water containing outer shell. With this type of construction the water flows into and out of the apertures in the periphery of the cylinder during rotation of the latter to effect a cleansing action.

It is a general object of the present invention to provide an improved construction wherein there is no outer shell containing water and wherein a washing cylinder rotatable on a horizontal axis and having an imperforate peripheral wall contains both the water and the garments to be cleaned, there being means on the inner side of the peripheral wall of the cylinder for agitating and lifting the water to splash the same upon the garments as the cylinder rotates, with all the water confined in said cylinder.

A further object of the invention is to provide a construction as above described wherein there are liquid discharge outlets in an end wall of the cylinder and means rotatable with the cylinder normally closing said discharge outlets, said means being readily releasable, either when the cylinder is rotating or when it is idle, to permit the discharge of spent liquid.

A further object of the invention is to provide in a washing machine of the character described having a drum rotatable on a horizontal axis and having a garment door in an end wall of said drum which is rotatable with the drum, means whereby the hinge for said door is non-rotatably supported and remains in a convenient fixed position so that opening of said door can be quickly accomplished regardless of the position in which the drum comes to rest after use.

Other objects of the invention are to provide a device of the class described wherein the cylinder has a cast peripheral wall and cast end walls secured thereto; wherein the water and other washing liquids are admitted axially into the drum; wherein the drum is rotatable on supporting rollers engageable with the exterior of the peripheral wall of the drum; and wherein there is a circular trough positioned to receive liquid from the discharge outlets of the cylinder when the closure for the latter is moved to open position.

With the above and other objects in view, the invention consists of the improved washing machine and all its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawings, illustrating one complete embodiment of the preferred form of the invention, in which the same reference numerals designate the same parts in all of the views:

Fig. 1 is a side elevational view of the improved washing machine, parts being broken away and shown in section;

Fig. 2 is a view of the liquid discharge end of the washing machine, parts being broken away;

Fig. 3 is a top view, parts being broken away;

Fig. 4 is a view of the garment loading end of the machine, parts being broken away;

Fig. 5 is a fragmentary sectional view on an enlarged scale taken approximately on the line 5—5 of Fig. 4; and

Fig. 6 is an enlarged fragmentary sectional view taken on line 6—6 of Fig. 5.

Referring more particularly to the drawings, the numeral 8 designates a suitable supporting frame having a base 9, supporting legs 10, corner uprights 11, and a horizontally disposed upper frame portion 12 supported by the upper ends of the uprights 11.

A washing cylinder or drum 13 has a cast imperforate peripheral wall 14 and end walls 15 and 16 bolted to outstanding flanges 17 of the peripheral wall as at 18.

The outer side of the end wall 16 is formed with an outstanding circular flange 19 and outwardly of the flange 19 is a ring of openings 20 extending through the end wall 16 and forming discharge outlets for liquid. The end wall 16 is also formed with a central opening 21, and the end of a driving sleeve 22 is bolted to the end wall 16, as at 23, with the bore of the sleeve in registration with the opening 21 of the end wall. The sleeve 22 extends outwardly and is journaled in a bearing 24 supported on a bracket 25. The bearing 24 and bracket 25 support a housing 26 for a driving gear 27, and the driving gear is keyed to the sleeve 22 to drive the latter and the washing cylinder 13.

Referring to Fig. 2, the gear 27 is driven by a pinion 28 mounted rigidly on a shaft 29. The shaft 29 is journaled in the housing 26 and also carries a bevel gear 30 rigidly thereon which is driven by a bevel pinion 31 mounted rigidly on a shaft 32. The opposite end of the shaft 32 has a rigidly mounted pulley 33 thereon which is driven by endless belts 34 operating in conjunction with a pulley 35 on the drive shaft of a motor 36.

A tank 37, for water or other liquid, supported on top of the frame 8 has a bottom opening 38

controlled by a valve 39, and a delivery pipe 40 extends downwardly from the opening 38. The pipe 40 is connected to an elbow 41 and the elbow is in turn connected to inlet pipe 42 which extends non-rotatably through the drive sleeve 22. The inner end of the inlet pipe 42 projects into the washing cylinder.

A tank 43 for liquid soap or other cleaning agent is adapted to deliver its contents through a pipe 44 into the elbow 41. The tank may be provided with a float controlled valve 45, or other means for controlling the delivery of soap solution, and the valve 39 for the water tank 37 may be operated by a hand rod 46 which is connected by levers 47 and 48 with the rod 49 for the valve 39. It is thus apparent that both water and soap solution may be fed axially into the washing cylinder through the medium of the inlet pipe 42 and that the drive sleeve for the washing cylinder when driven by the electric motor 36 is rotatable around the inlet pipe 42.

Keyed to the exterior of the drive sleeve 22, but slidable longitudinally thereon, is a shifter collar 50 having pairs of apertured lugs 51 projecting radially outwardly therefrom at spaced points (see Figs. 1 and 3). The shifter collar is also formed with an external annular groove 52 within which a shifter ring 53 fits so that the shifter collar is rotatable within the shifter ring 53. The shifter ring is provided with oppositely disposed projections 54 which are engaged by the ends of a shifter fork 55. The fork 55 has a shifter lever 56 projecting outwardly therefrom which is fulcrumed as at 57 to a bracket 58 projecting from the gear housing 26. The shifter lever 56 is operable by a rod 58' having a conveniently positioned handle 59. It is thus apparent that the manipulation of the handle 59 will cause axial movement of the shifter collar 50 on the drive sleeve 22 even while the collar is rotating with the drive sleeve.

Adjustable links 60 have one end pivotally connected to the projecting lugs 51 of the shifter collar and the other end pivotally connected to bell crank levers 61, as at 62. The bell crank levers are pivotally supported, as at 63, on the end wall 16 of the washing cylinder, and the inner ends of the bell crank levers are pivotally connected, as at 64, with a valve or closure ring 65. This ring has an inner circular flange 66 which fits against the outer surface of the circular flange 19 on the end wall of the cylinder, as shown in Fig. 1, and the closure ring also has an outer circular flange 67. It is apparent that when the handle 19 on the rod 58 is pulled outwardly it will act through the lever 56, shifter ring 53, shifter collar 50, links 60, and bell cranks 61 to pull the closure ring outwardly out of sealing contact with the liquid discharge openings 20 in the end wall of the cylinder, and this may be accomplished either when the cylinder is rotating or when it is idle.

Liquid discharged from the cylinder when the closure ring 65 is opened is received in a circular trough 68 carried by the frame 8. The trough has a front guard wall 69 which extends inwardly beyond the flange 67 of the closure ring 65, and the inner edge of the guard wall 69 is hooked as at 70 whereby when the closure ring is opened all liquid being discharged is directed into and confined in the trough 68. The trough 68 has a bottom opening leading to a suitable point of discharge.

The outer surface of the peripheral wall 14 of the washing cylinder is formed with a projecting

circular rib 71 having a flat outer surface to run on rollers 72 (see Fig. 4). These rollers are rotatably supported on brackets 73 projecting upwardly from the bottom of the frame 8 and form a support for the washing cylinder during its rotating movement.

The inner surface of the peripheral wall 14 of the washing cylinder is cast with inwardly projecting ribs 74 which extend in an axial direction and with other flatter ribs 75 which extend at an angle to the axis, as shown in Figs. 1 and 4. These ribs are adapted to lift water in the lower portion of the cylinder, as the cylinder rotates, and splash said water back on the clothes. The ribs also keep the water in an agitated condition and keep the garments in motion. The use of these ribs which are not perforated in conjunction with a cylinder having a peripheral wall without perforations, produces a very effective washing action.

The end wall 15 of the washing cylinder has a large central garment opening 76 surrounded by an outwardly projecting circular flange 77. A circular door 78 (see Figs. 4, 5, and 6) has an inwardly extending circular flange 79 adapted to fit around the flange 77 of the end wall opening, as shown in Fig. 6. The circular flanges 77 and 79 have cooperating angled surfaces 80 to produce a wedge fit for the door. In addition the flange 79 of the door has three or more bayonet slots 81, as shown in Fig. 5, which cooperate with rollers 82 projecting from the flange 77 to permit locking of the door to the end wall of the washing cylinder by a partial rotation of the door to bring the rollers 82 into engagement with the inner ends of the bayonet slots 81, as shown in Fig. 5.

The outer side of the flange 79 of the door has outwardly projecting spaced flanges 83 and 84 forming a groove 85 cooperating with a hinge ring 86 (see Fig. 6). The hinge ring 86 has hinge projections 87 from its left-hand side pivotally connected as at 88 with fixed hinge members 89 secured to the frame of the machine.

The hinge ring 86 fits loosely within the groove 85, whereby, when the cylinder is rotating, the door 78 can rotate with the cylinder and within the non-rotatable hinge ring 86. Heretofore it has been customary to hinge the doors directly to the end wall of the cylinder, with the result that when the cylinder was stopped the hinge would usually be in an inconvenient position for opening the door to remove the garments or load garments into the cylinder. With the present arrangement the hinge is always in a proper left-hand position and no matter where the cylinder comes to rest the door may be quickly and conveniently opened.

From the above it is apparent that the improved construction, wherein no outer water containing shell is utilized and wherein all the water is confined in the rotating cylinder and acted upon by the nonperforated ribs 74, produces a very efficient washing action in a construction which is relatively simple and inexpensive to manufacture. It is also clear that the improved door construction, wherein the hinge remains in fixed position, is particularly suited for use in this type of washing machine and facilitates the use thereof. The ring of discharge openings in the other end wall of the washing cylinder, controlled by the closure ring, either when the cylinder is rotating or when it is idle, permits quick and complete emptying of the cylinder when desired.

Although only one form of the invention has

been shown and described, it is obvious that various changes and modifications may be made without departing from the spirit of the invention, and all of such changes are contemplated as may come within the scope of the claims.

What I claim is:

1. In a washing machine, a drum rotatable on a horizontal axis and having end walls and a peripheral wall, said drum being adapted to confine a quantity of washing liquid, means for conducting liquid axially into one of said end walls, said end wall having liquid discharge openings therein positioned radially outwardly from the liquid conducting means, and a valve rotatable with said drum and having a central opening through which said liquid conducting means extends and normally closing said liquid discharge openings.

2. In a washing machine, a drum rotatable on a horizontal axis and having end walls and an imperforate peripheral wall, said drum being adapted to confine a quantity of washing liquid, one of said end walls having liquid discharge openings therein adjacent the outer periphery of said end wall, and a ring shaped valve surrounding the drum axis and rotatable with the drum and normally closing said end wall openings.

3. In a washing machine, a drum rotatable on a horizontal axis and having end walls and an imperforate peripheral wall, said drum being adapted to confine a quantity of washing liquid, one of said end walls having a ring of liquid discharge openings surrounding the drum axis, and a ring shaped valve surrounding the drum axis and rotatable with the drum and normally closing all of said liquid discharge openings.

4. In a washing machine, a drum rotatable on a horizontal axis and having end walls and an imperforate peripheral wall, said drum being adapted to confine a quantity of washing liquid, a driving sleeve connected to and projecting from one end of said drum, means for rotating said sleeve to cause rotation of the drum, means for introducing washing liquid axially into the drum through said sleeve, said end of the drum having a circle of liquid discharge openings therein positioned outwardly of the sleeve, a valve shaped to surround the driving sleeve for controlling said openings simultaneously, and means including a shifting collar surrounding the driving sleeve for operating said valve.

5. In a washing machine, a drum rotatable on a horizontal axis and having end walls and an imperforate peripheral wall, said drum being

adapted to confine a quantity of washing liquid, one of said walls having a circle of liquid discharge openings therein positioned outwardly of the drum axis, a valve shaped to surround the driving sleeve rotatable with the drum and normally closing said discharge openings and movable axially to expose said openings, axially movable valve shifting mechanism connected to said valve and rotatable with the drum, and readily accessible means providing for manual operation of said valve shifting mechanism.

6. In a washing machine, a drum rotatable on a horizontal axis and having end walls and an imperforate peripheral wall, said drum being adapted to confine a quantity of washing liquid, one of said walls having liquid discharge openings therein positioned outwardly of the drum axis, a valve ring rotatable with the drum and normally closing said discharge openings and movable axially to expose said openings, an axially movable valve shifting collar rotatable with the drum, operating connections between spaced points on said collar and said valve ring, and readily accessible means for operating said valve shifting mechanism.

7. In a washing machine, a drum rotatable on a horizontal axis and having end walls and an imperforate peripheral wall, said drum being adapted to confine a quantity of washing liquid, one of said end walls having liquid discharge openings therein and having a circular outstanding flange inwardly of said openings and surrounding the drum axis, a ring valve rotatable with said drum and normally closing said discharge openings, said valve having a flange on its inner edge cooperable with the circular flange on the end wall of the drum, means for moving said valve axially to expose said discharge openings, and a receptacle positioned to receive liquid discharged from said openings.

8. In a washing machine, a drum rotatable on a horizontal axis and having end walls and an imperforate peripheral wall, said drum being adapted to confine a quantity of washing liquid, one of said end walls having liquid discharge openings therein, a ring valve rotatable with said drum and normally closing said discharge openings, means for moving said valve axially to expose said discharge openings, and a circular trough positioned to receive liquid discharged from said openings and having a wall overlapping the outer side of the ring valve.

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