

May 26, 1942.

J. ZIMARIK

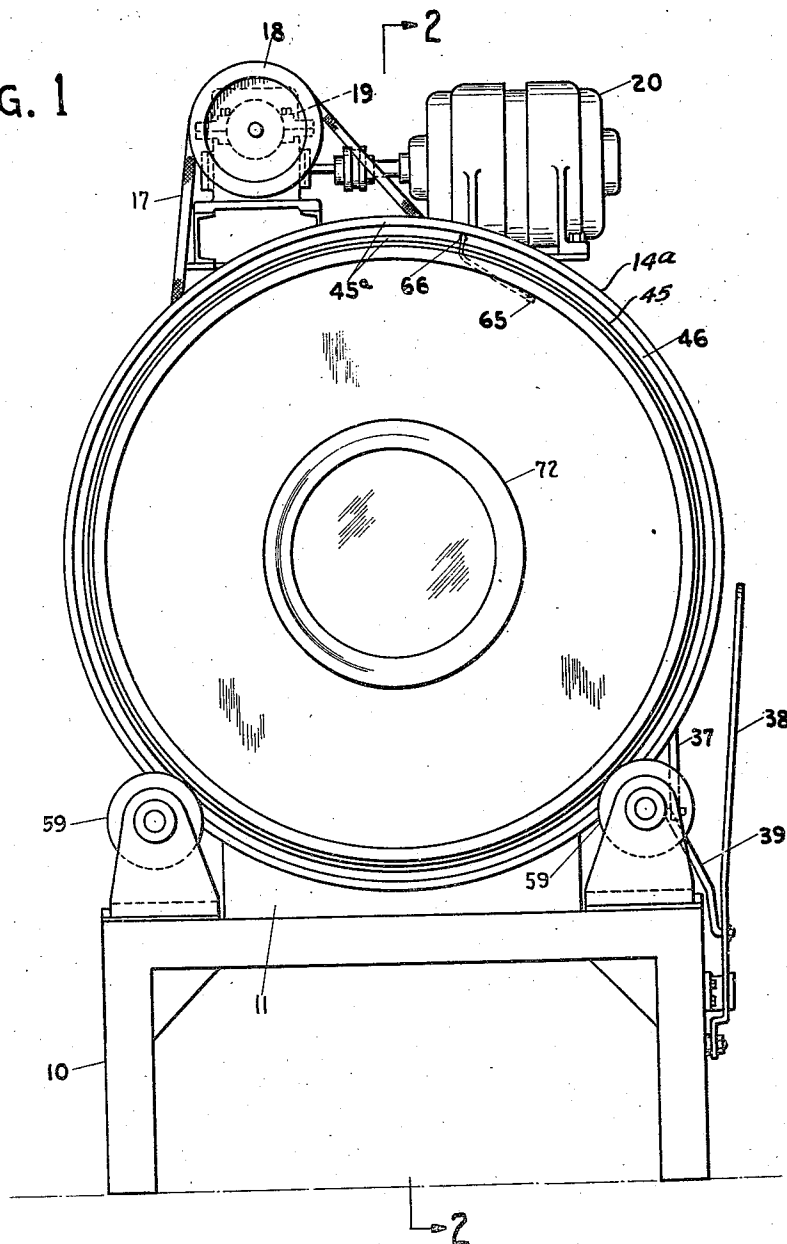
2,284,243

WASHING MACHINE

Filed July 12, 1938

4 Sheets-Sheet 1

FIG. 1



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WASHING MACHINE

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FIG. 2

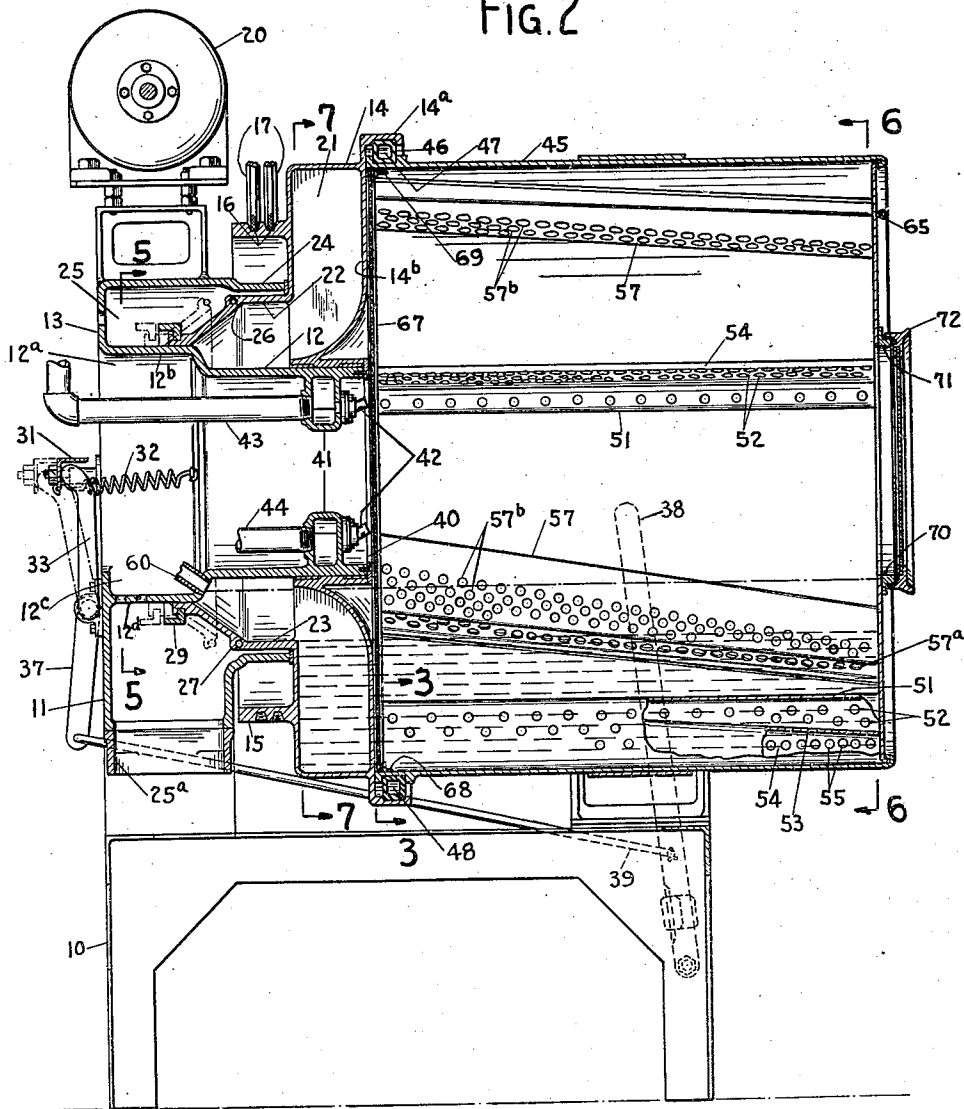
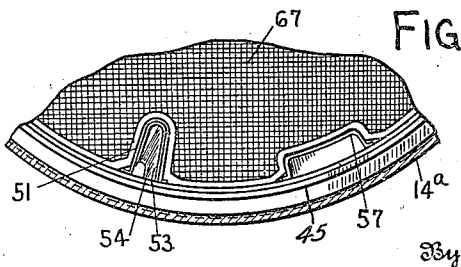


FIG. 3



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FIG. 4

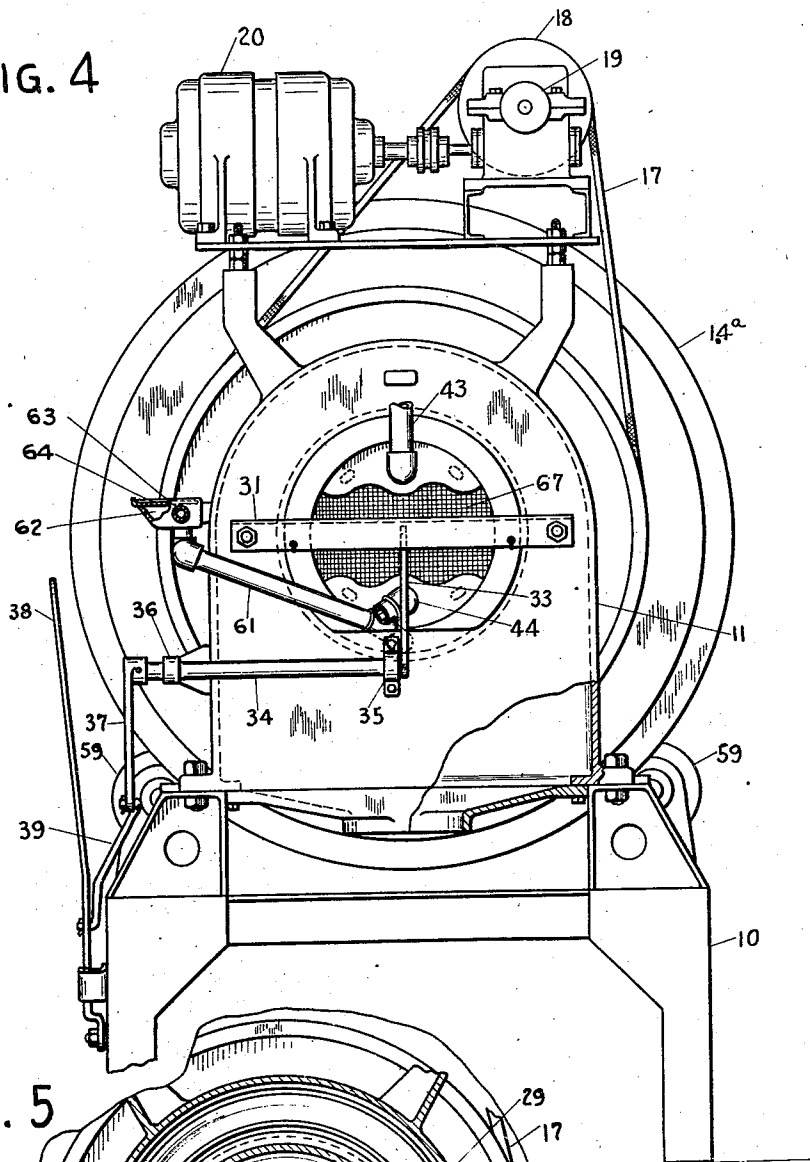
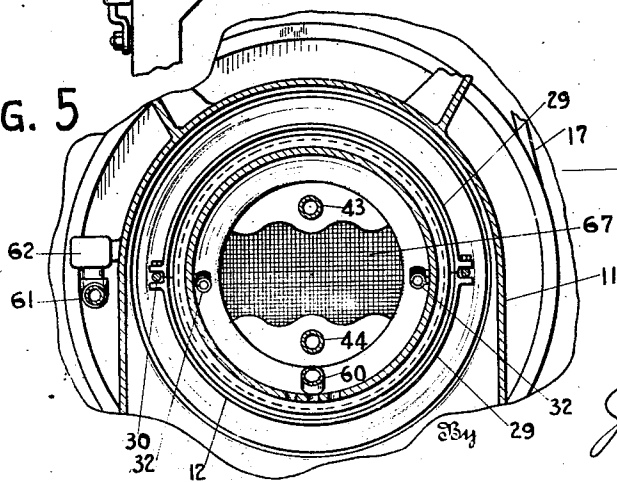


FIG. 5



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WASHING MACHINE

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FIG. 6

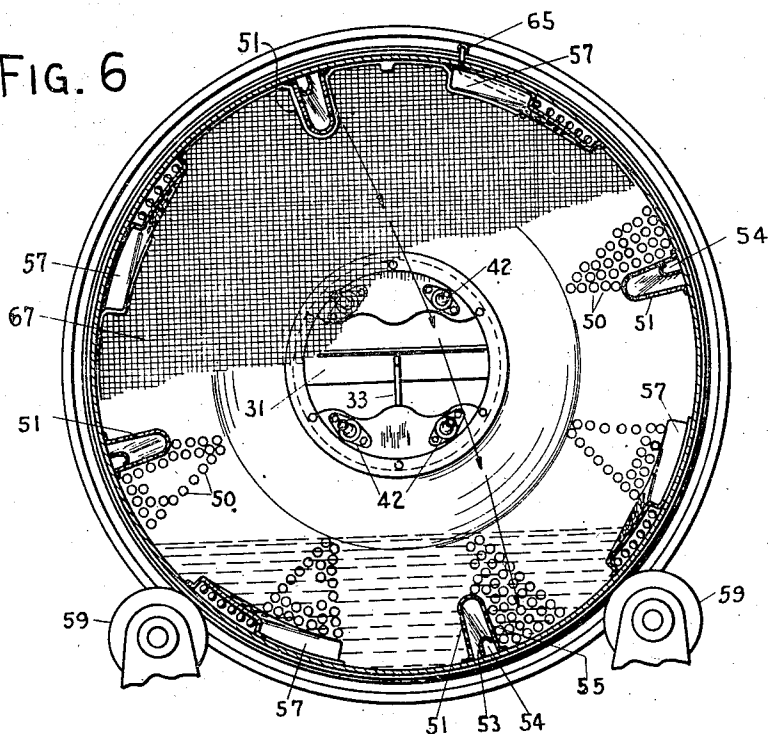
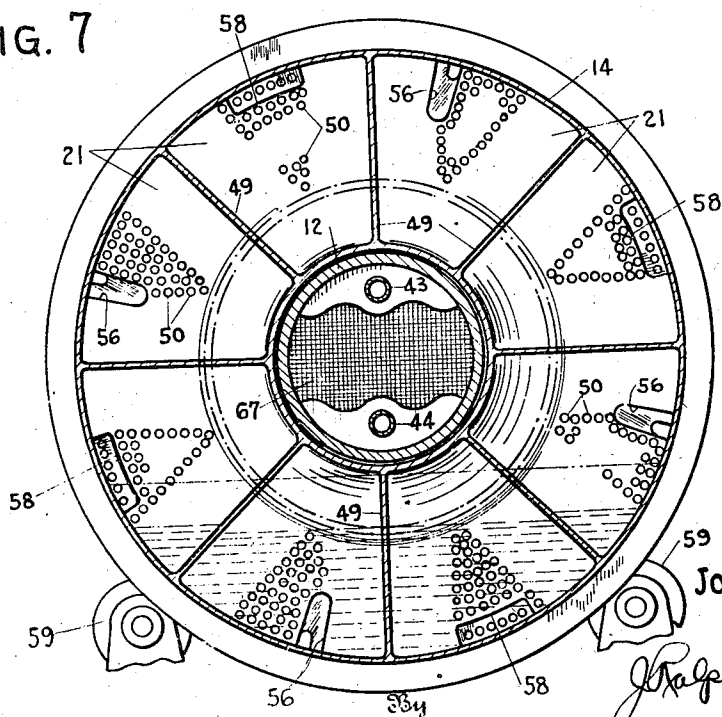


FIG. 7



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WASHING MACHINE

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Application July 12, 1938, Serial No. 218,803

31 Claims. (Cl. 68—58)

This invention relates to washing machines.

One purpose of the invention is to provide an improved washing machine of the tumbler-drum type in which the wash water and rinse water are contained and retained in the drum without the use of a surrounding water-retaining casing and to which the washing and rinsing water may be supplied and from which the washing and rinsing water may be expelled while the drum is rotating, the supply and drainage of the wash and rinse water being accomplished all from one side of the drum leaving the other side of the drum free and unobstructed.

Another purpose of the invention is to provide in such a washer construction means for supplying and expelling the washing or rinsing water from the same side of the drum whereby filling and emptying of the laundry may be easily and effectively accomplished through one side of the drum.

Another purpose of the invention is to provide an improved washing machine as described in the preceding paragraph and in which the body portion of the drum is made separable from the washing machine at the side of the drum through which the washing water is introduced and expelled, whereby to facilitate laundry loading and unloading operations and transportation of washed laundry to extractors or other points in the laundry plant.

Another purpose of the invention is to provide in a washing machine of the character disclosed means for rapidly and effectively pumping or expelling the water therein from the drum by the rotation thereof.

Another purpose of the invention is to provide in a washing machine of the character disclosed means for expelling a large volume of treating liquid therefrom quickly by gravity.

Another purpose of the invention is to provide in a washing machine of the tumbling-drum type means effectively causing the contents to be given shifting movements to and fro axially of the drum.

Another purpose of the invention is to provide an improved rinsing arrangement in tumbler-drum type washing machines whereby a continuous flow of fresh rinsing water may be maintained through the drum while it is rotating.

A further purpose of the invention is to provide a washing machine of the tumbler-drum type in which access to the interior of the drum may be attained, as for example, for inserting treating materials, while the drum is rotating.

The foregoing and other purposes of the inven-

tion are attained in the washing machine illustrated in the accompanying drawings and described below. It is to be understood that the invention is not limited to the specific form thereof shown and described.

This application is a continuation in part of application Serial No. 167,082, filed October 4, 1937.

Of the accompanying drawings:

Figure 1 is a front elevation of a washer embodying the invention.

Figure 2 is a cross-section partly broken away, taken on line 2—2 of Figure 1.

Figure 3 is a cross-section taken on line 3—3 of Figure 2.

Figure 4 is a rear elevation of the washer shown in Figure 1.

Figure 5 is a cross-section taken on line 5—5 of Figure 2.

Figure 6 is a cross-section taken on line 6—6 of Figure 2.

Figure 7 is a cross-section taken on line 7—7 of Figure 2.

Referring to the drawings, the numeral 10 designates a suitable supporting frame on which may be secured a bracket 11 provided with a forwardly extending central sleeve 12, integral with the rear wall 13 of bracket 11, for rotatably supporting a revolving pump and drum-chuck member 14. For rotatably driving chuck 14 the rear side thereof is provided with an annular coaxial flange 15 having V-grooves 16, 16 on the outer periphery for engagement with V-belts 17, 17. The belts 17 may be driven by a pulley 18 through suitable reduction gearing 19 from a motor 20, which preferably is a reversible type motor and which may be periodically reversed by suitable well-known means to turn chuck 14 one or more revolutions alternately in one direction and then in the other direction.

The chuck 14 contains a mixing and pumping chamber or compartment 21 in which is a comparatively large central rear opening 22, concentric with the sleeve 12, the chuck 14 being formed with a flange 23 about its opening. The flange 23 is arranged to project inside a flange 24 of slightly larger internal diameter on the forward wall of the bracket 11 to communicate opening 22 with a chamber 25 within the bracket 11 and surrounding the sleeve 12. The flange 23 may be formed with a beveled edge 26 for seating a valve 27 to close the opening 22 from chamber 25, valve 27 being slidably and rotatably mounted on an enlarged portion 28 of the

sleeve 12. A shifting collar 29 may be rotatably engaged with valve 27 and connected to valve-operating rods 30 operable by a cross-piece 31, normally held in valve closed position by springs 32, 32, through an arm 33 secured on a shaft 34 journaled in brackets 35 and 36, which brackets are secured on bracket 11, and an arm 37 fixed on the rod 34 connected to a hand-lever 38 by a link 39. This provides a quick-acting valve device for bringing about a quick expulsion of water or other fluid from the chamber or compartment 21. Other suitable quick-acting valves may be used and located at any convenient point in the discharge duct.

The sleeve 12 may have a relatively large central passage 12^a therein extending from the rear of bracket 11 and communicating with the interior of the washing drum, but having the lowermost point of its smallest internal diameter above the normal fluid level when the washing drum is in use for washing. The enlarged end 12^b of sleeve 12 may be constructed to provide a pocket 12^c having perforations 12^d at the bottom thereof for permitting overflow from the washing drum to pass down through drain 25^a. The central passage 12^a provides a convenient means for looking into the interior of the washing drum as well as providing free access to the interior thereof for various purposes, such as injecting treating materials, while the drum is rotating.

It has been found that by mounting the drum 45 on the chuck 14 without the screen 67, the central passage or opening 12^a may also be utilized for supplying clothes to the drum, or for removing the clothes therefrom after they have been treated. This is particularly advantageous in that the clothes supplying and emptying operations may be safely accomplished while the drum is either rotating or stationary.

Chuck 14 may be retained on sleeve 12 in one direction by an annular flange 40 secured, as by screws, on the edge of sleeve 12, and retained in the other direction by close proximity to the edge of flange 24 to the rear wall of the chuck as well as by the yielding pressure of valve 27 when it is in closed position.

Adjacent the forward end of the sleeve 12, extending radially inward, there may be hollow chambers 41, 41 suitably apertured for a plurality of rinsing nozzles 42, 42, and supply pipes 43 and 44. The supply pipes 43 and 44 may both be used for supplying rinsing water or other washing fluid, or they may be used for distinct purposes as will be readily understood. The nozzles 42 preferably are adjustable so that one or more may be extended upwardly to project rinsing water or other fluid above the tumbling contents of the washer drum as will subsequently be described.

The chuck 14 may be suitably constructed removably to retain therein a washer drum 45. For example, chuck 14 may be formed with an annular L-shaped flange 14^a on its front side for receiving therein an expansible and contractile tube or ring 46 mounted in an annular groove 47 on the rear marginal edge of drum 45. Ring 46 may be pneumatic and may be expanded by air pressure into an annular groove 48 on the inner periphery of flange 14^a. The rear edge of drum 45 may be arranged to seat itself in sealing relation with the front wall 14^b of chuck 14 when pressure is applied to ring 46.

As best shown in Figure 7, the compartment 21 is divided into a plurality of pockets by radial

vanes 49, 49 serving to act during rotating of the drum as pump impellers and also mixing paddles for thoroughly mixing soap, bluing and other washing reagents with water. When valve 27 is open these are adapted to pump washing fluid from compartment 21 into chamber 25 from which the fluid may pass out of drain 25^a.

The front wall 14^b of compartment 21 is perforated as at 50, 50 between the vanes 49 whereby fluid may be delivered by flow under gravity between compartment 21 and the interior of drum 45 either while the drum is stationary or rotating. These areas are so arranged, however, that comparatively large quantities of washing fluid will pocket itself between vanes 49 in compartment 21 so as to flow out of the chuck opening 22 when valve 27 is open (see Figure 7) to empty drum 45 of fluid.

The interior of drum 45 may be provided with tumbler ribs 51, 51 of a known shape and formation but preferably which are hollow (see Figures 2 and 6) and perforated at 52, 52 to permit drainage of washing fluid from ribs when in inverted relation as at the top of Figure 6, and to permit circulation of the fluid through the ribs. A partition 53 in each rib forms a chamber 54 receiving washing fluid through perforations 55, 55 on one side (see Figures 2 and 6) of ribs 51 on counter-clockwise rotation of drum 45 and forcing that fluid endwise toward the rear of the drum under considerable force, the partition sloping, as shown, for this purpose, and the enlarged end of the chamber 54 being in registry with an orifice 56 in wall 14^b of the chuck 14 whereby the fluid will flow into pump compartment 21.

Other ribs 57, 57 are provided on the inner periphery of drum 45. These preferably extend angularly or helically across the drum as shown to impel the contents alternately in opposite directions axially of the drum as the drum rotates in reversed directions. These ribs may be hollow as shown and perforated on one side and a portion of the top thereof as at 57^a, 57^b so as to trap water therein upon clockwise rotation of drum 45, the ribs forcing water trapped therein through orifices 58, 58 in the wall 14^b into the pump-chamber 21 in a manner similar to that described with respect to ribs 51.

The drum 45 may be removably supported in the chuck 14 and on rollers 59, 59 on base frame 10, engaging the outer periphery of the drum.

An inlet for introducing water with soap, bluing or other washing ingredients into the drum may be provided at 60 being formed in sleeve portion 12 of the bracket 11 and opening into the compartment 21 inside of valve 27. Piping 61 may be connected to this inlet and to a supply chamber 62 into which water may be introduced by piping 63 controlled by a suitable valve (not shown) chamber 62 having a removable slidable lid 64 whereby soap, bluing, etc. may be supplied to the water flowing through the same and through piping 61 into the drum 45.

To secure and release drum 45 in the chuck an inflation valve 65 of the usual type used in inflating tubes, swimming belts, etc. may be arranged at the front of the drum 45 and may be connected by flexible tubing 66 to the inflatable tube or ring 46.

As is best shown in Figures 2 and 3, the drum 45 may be provided with a suitable screen 67 for closing the forward end of passage 12^c in the sleeve 12 when drum 45 is secured on the chuck 14, as well as for holding the washed or treated

articles within the drum 45 when it is removed from chuck 14 with such articles still inside. For this purpose screen 67 may be hinged at 68 and suitably locked in position as by a quickly releasable spring catch at 69. The screen 67 preferably is shaped to avoid interference with free passage of fluid between the chambers in the vanes 51 and 57 and the pumping chamber 21. If desired, the drum 45 may be filled and emptied of articles to be washed or cleaned through a front opening 70 about which may be a flange 71 adapted to receive a removable cover 72 preferably having a central transparent pane therein, through which the interior of the drum may be seen.

In the use of the machine for washing or treating clothes, either the clothes may be placed in the drum 45 through the opening 70 therein, while the drum is in place on chuck 14, or a drum may be previously loaded with clothes, as for example at a loading station (not shown), through the large opening at the rear of the drum and subsequently secured in place on chuck 14 by means of the pneumatic ring 46, the screen 67 being utilized to retain the clothes while drum is being lifted into position. As a guide for aligning the ribs 51 and 57 with their respective communicating openings in the wall 16^b of chuck 14, suitable readily visible indicating marks may be provided at 45^a on the chuck 14 and drum 45 (see Figure 1). When the drum is in proper position with clothes therein, and valve 27 closed as shown in full lines in Figure 2, the machine may be filled with sufficient washing or other fluids along with soap, bluing, etc., supplied through receptacle 64, piping 61, and inlet 60 to compartment 21 and into the main body of drum 45. Any overflow will pass through sleeve 12 to the pocket 12^a and into chamber 25 and drain pipe 25^a. During the clothes washing or treating operation the ribs 57, due to the arrangement thereof and the alternating rotational movement of the drum, will cause the clothes load to be shifted back and forth, thereby aiding a thorough agitation of the clothes, as they are tumbled about the drum.

For emptying the machine of washing or other treating fluid, valve 27 will be opened which immediately causes a large volume of water to flow out of the drum solely by gravity and not depending upon rotation of the drum. This is illustrated by full and chain-dotted lines in Figure 2. Thereafter while the chuck 14 is rotating the vanes 49 in compartment 21 pick up fluid flowing therein from drum 45 and cause it to flow through the opening 22 into the chamber 25 in bracket 11 and cut the drain pipe 25^a. The construction of the ribs 51 and 57 is such that substantially every particle of fluid will be ejected from the drum as the latter is rotated alternately in different directions. At the initial opening of valve 27 the fluid level will drop instantly from a level substantially as shown in chain-dotted lines in Figure 2 to a level in line with the bottom edge of opening 22, after which continued rotation of the drum will pump the remaining fluid out extremely rapidly. After the treating fluid has been discharged, with the valve 27 either closed or open the clothes may be thoroughly rinsed by means of the nozzles 42. As indicated by means of a series of arrows in Figure 6, the nozzle 42 may be so adjusted as to play streams of rinse water over the top of the clothes toward the front of the drum as the clothes are tumbled by the alternate rotation of the drum, thus insuring a thorough rinsing operation. Upon completion

of the washing and rinsing operation the drum 45 may be removed bodily, with the clothes retained therein by screen 67, and replaced by another drum previously filled with clothes to be similarly treated.

It is to be understood that the machine may be used for other purposes than washing clothes. For example, it may be used for dyeing articles, in which case, the action of the ribs 51 and 57 for removing the dyeing fluid during the fluid ejecting period without leaving a pool at the bottom of the drum is particularly desirable for obvious reasons. This equipment may also be used for dry-cleaning machines using suitable cleaning fluids instead of water.

Modifications of the invention may be resorted to without departing from the spirit thereof or the scope of the appended claims. For instance by enlarging opening 22 in comparison with the size of the drum it is possible to discharge all the water very quickly solely under action of gravity.

What is claimed is:

1. A machine of the character described comprising a liquid-containing-drum rotatable about a substantially horizontal axis, and one or more hollow ribs disposed helically across the inner periphery of the drum, and adapted to impel the contents of the drum alternately in opposite directions axially of the drum as it is rotated in opposite directions, said ribs having discharge openings at one end thereof, means at one side of said drum for conveying liquid from said discharge openings of said ribs, said ribs having perforations adjacent a leading side thereof for passage of liquid from the drum to the interior of the ribs, rotation of said drum in one direction by reason of the helical arrangement of said ribs thereby causing the liquid passing into the ribs through said perforations to be forced along the helical ribs and to be expelled through said discharge openings to said liquid-conveying means.

2. A machine of the character described comprising a liquid-containing drum rotatable about a substantially horizontal axis, a plurality of axially extending hollow ribs on the inner periphery of said drum and having discharge openings at one end thereof, means at one side of said drum for conveying liquid from said discharge openings of said ribs, said ribs having perforations along leading portions thereof in one direction of rotation of the drum for passage of liquid from the drum to the interior of the ribs, and means within said ribs for receiving liquid passing through said perforations and operable by rotation of the drum in said one direction for impelling the liquid along the ribs and through said discharge openings to said liquid-conveying means.

3. A machine of the character described comprising a fluid-containing drum rotatable about a substantially horizontal axis, means for rotatably supporting said drum at one side whereby the other side thereof is free and unobstructed, said drum having two axially aligned sections, one of which is removable at said other side and provides a treating compartment and the other section providing a liquid emptying chamber in liquid communication therewith, means for releasably securing said first section in fluid-sealing relation to the second section, means within said chamber operable by rotation of said drum for conveying liquid therefrom to empty said drum, and means in said compartment op-

erable by rotation of said drum for forcibly expelling liquid from the treating compartment to the emptying chamber.

4. A machine of the character described comprising a fluid-containing drum rotatable about a substantially horizontal axis thereof, said drum having a treating compartment and a liquid emptying chamber, said chamber being in liquid communication with said compartment, means mounted within said chamber operable by rotation of said drum for conveying liquid therefrom to empty said drum, and means mounted on the inner periphery of said compartment operable by rotation of said drum for forcibly expelling liquid from the treating compartment to said emptying chamber.

5. A machine of the character described comprising a liquid-containing drum rotatable about a substantially horizontal axis thereof, means for rotatably supporting said drum at one side whereby the other side thereof is free and unobstructed, said drum having two axially aligned sections, one of which is removable at said other side and provides a treating compartment and the other section providing a liquid emptying chamber, said chamber being in liquid communication with said compartment, means for releasably securing said first section in liquid-sealing relation to said second section, and means mounted within said chamber operable by rotation of said drum for conveying liquid therefrom to empty the drum.

6. A machine of the character described comprising a liquid-containing drum rotatable about a substantially horizontal axis thereof, means for rotatably supporting said drum at one side whereby the other side thereof is free and unobstructed, said drum having two axially aligned sections, one of which provides a treating compartment and the other section providing a liquid emptying chamber, said chamber being in liquid communication with said compartment, one of said sections being removable from the other at said other side of the drum, means for releasably securing said removable section in liquid sealing relation to the other section, means mounted in said chamber operable by rotation of said drum for conveying liquid therefrom to empty the drum, said chamber having an outlet axially of the drum, and a valve operable at will either to close said outlet to retain the liquid in the drum or to open said outlet and permit the liquid to be conveyed from the drum, said valve rotating with the drum when closing said outlet.

7. A machine of the character described comprising a support, a chuck mounted on said support to rotate about a substantially horizontal axis, a single-shell treating container, and means for releasably securing said container in fluid-sealing relation on said chuck in axial alignment therewith and to extend therefrom on the side opposite to said support, said container thereby extending free and unobstructed from said chuck whereby said releasable means is operable for removing or replacing the container without removing the articles therefrom.

8. A machine of the character described comprising a support, a drum mounted at one side thereof on said support to be rotatable about a substantially horizontal axis, said drum having a self-contained pump and a removable treating container in axial alignment, said pump having an outlet concentric with said axis of the drum, said container extending free and unobstructed

outwardly of said support, said pump rotating with and being operable by rotation of said drum for conveying liquid from the drum, means for quickly releasably securing said removable container in fluid-sealing relation to said conveying pump, a valve, and means for shiftably and rotatably mounting said valve in association with said pump to be shiftable at will to close said outlet from said pump to retain the liquid in the drum or shiftable to open said outlet and permit the liquid to be conveyed from the drum, said valve rotating with the drum when closing said outlet.

9. A machine of the character described comprising a drum rotatable about a substantially horizontal axis thereof, a self-contained pump in said drum, a treating compartment in said drum, said pump rotating with and being operable by rotation of said drum for conveying liquid from the drum, and hollow members extending across the inner periphery of said treating compartment, said members having openings therein communicating with said treating compartment and discharge openings at one end communicating with said pump, said members having interior surfaces tapering toward said discharge openings operable by rotation of the drum for forcibly expelling liquid axially from said compartment toward said discharge openings to said pump.

10. A machine of the character described comprising a drum rotatable about a substantially horizontal axis thereof, a self-contained pump in said drum, a treating compartment in said drum, said pump rotating with and being operable by rotation of said drum for conveying liquid from the drum, hollow members extending across the inner periphery of said treating compartment said members having openings therein communicating with said treating compartment and discharge openings at one end communicating with said pump, said members having interior surfaces tapering toward said discharge openings and operable by rotation of said drum for forcibly expelling liquid axially from said compartment toward said discharge openings to said pump, a valve, and means for shiftably and rotatably mounting said valve in association with said pump to be shiftable at will to close an outlet from said device to retain the liquid in the drum or operable to open said outlet and permit the liquid to be conveyed from the compartment, said outlet being concentric with said horizontal axis, said valve rotating with the drum when closing said outlet.

11. A machine of the character described comprising a fluid-containing drum rotatable about a substantially horizontal axis, means for rotatably supporting said drum at one side whereby the other side thereof is free and unobstructed, said drum having two sections, one of which is removable at said other side and provides a treating compartment and the other section providing a liquid emptying chamber, said chamber being in liquid communication with said compartment, means for quickly releasably securing said first section in fluid-sealing relation to said second section, means mounted in said chamber operable by rotation of said drum for conveying liquid therefrom to empty the drum, said chamber having an outlet co-axially with the axis of the drum, a valve rotatable with the drum and operable at will either to close said outlet to retain the liquid in the drum or to open said outlet and permit the liquid to be con-

veyed axially from the drum, means mounted on the inner periphery of said compartment operable by rotation of said drum for forcibly expelling liquid from the treating compartment into the emptying chamber, and means mounted in said compartment operable by rotation of the drum for impelling the contents thereof alternately in opposite directions axially of the drum as it is rotated in opposite directions.

12. A machine of the character described comprising a fluid-containing drum rotatable about a substantially horizontal axis, means for rotatably supporting said drum at one side whereby the other side thereof is free and unobstructed, said drum having a treating compartment and a liquid emptying chamber, said chamber being in liquid communication with said compartment, means mounted in said chamber operable by rotation of said drum for conveying liquid axially from said one side of the drum, said chamber having an outlet at said one side of the drum and co-axially with the axis of the drum, a valve shiftably mounted in association with said outlet to be rotatable with the drum and operable at will to close said outlet either to retain the liquid in the drum or to open said outlet and permit the liquid to be conveyed therefrom to empty the drum, means mounted on the inner periphery of said compartment operable by rotation of said drum for forcibly expelling liquid from the treating compartment into the emptying chamber, and means mounted on the inner periphery of said compartment operable by rotation of the drum for impelling the contents thereof alternately in opposite directions axially of the drum as it is rotated in opposite directions.

13. A machine of the character described comprising a drum adapted to rotate about a substantially horizontal axis, said drum having a single-shell treating compartment and a liquid supplying and emptying chamber, said compartment being in communication with said chamber, said emptying chamber having an outlet, a valve operable at will to close said outlet to retain liquid in the drum or to open said outlet and permit liquid to be conveyed from the drum, lifting vanes in said chamber operable by rotation of the drum for lifting liquid from the drum, and hollow ribs in said treating compartment, means in said ribs for forcibly expelling liquid axially of the drum from the bottom of said compartment and into the path of said vanes as the drum is rotated.

14. A machine of the character described comprising a drum adapted to rotate about a substantially horizontal axis, said rotatable drum having a single-shell treating compartment and a liquid supplying and emptying chamber, said compartment being in communication with said chamber, said chamber having an outlet concentric with the axis of the drum, a valve, means for axially shiftably and rotatably mounting said valve to be shiftable at will to close said outlet to retain the liquid in the drum or to open said outlet and permit liquid to be conveyed from the drum, lifting vanes in said chamber operable by rotation of the drum for lifting liquid from the drum to discharge the same through said outlet, and hollow article tumbling ribs arranged across the inner periphery of said treating compartment and having tapered portions to trap liquid from the bottom of said compartment as the drum is rotated, said tapered portions there-

by forcibly expelling the liquid from said compartment into said emptying chamber.

15. A machine of the character described comprising a drum adapted to rotate about a substantially horizontal axis, said drum having a single-shell treating compartment and a liquid supplying and emptying chamber, said compartment being in communication with said chamber, said emptying chamber having an outlet co-axial with the axis of the drum, a valve operable at will to close said outlet to retain liquid in the drum or to open said outlet and permit liquid to be conveyed from the drum, lifting vanes forming pockets in said chamber and operable by rotation of the drum for lifting liquid from the drum and discharging the same through said outlet, a sleeve interiorly co-axial with said valve outlet for supporting said drum and having an opening extending from the exterior of the drum into the interior of said treating chamber, said valve being rotatable on said sleeve when said drum is rotated, said valve being shiftable on said sleeve to open or close said outlet, and nozzles for projecting streams of liquid into said chamber, said nozzles being angularly adjustable through said sleeve opening while said drum is stationary or rotating.

16. A machine of the character described comprising a fluid containing drum rotatable about a substantially horizontal axis, means for rotatably supporting said drum at one side whereby the other side thereof is free and unobstructed, said drum having a treating compartment removable at the other side of the drum and a liquid supplying and emptying chamber, means mounted in said chamber operable by rotation of said drum for conveying liquid axially from the chamber to empty the drum, means for releasably securing said compartment in fluid sealing relation to said chamber, and perforate means removably mounted in said compartment at the inner end thereof to retain treated articles therein while said compartment is being placed on or removed from said machine.

17. A machine of the character described comprising a drum adapted to rotate about a horizontal axis, said drum having two sections, one of which is removable and provides a single-shell treating compartment and the other section providing a liquid supplying and emptying chamber, said compartment being in communication with said chamber, means for releasably securing said removable section to said second section, said emptying chamber having an outlet, a valve operable at will to close said outlet to retain the liquid in the drum or to open said outlet and permit liquid to be conveyed from the drum, lifting vanes in said chamber operable by rotation of the drum for lifting liquid from the drum, hollow ribs in said treating compartment shaped and arranged to expel liquid from the bottom of said compartment and into the path of said vanes upon rotation of the drum in either direction, and ribs disposed angularly or helically across the inner periphery of said compartment to impel the contents thereof alternately in opposite direction axially of the drum as the latter rotates in reversed directions.

18. A machine of the character described comprising a fluid-containing drum rotatable about a substantially horizontal axis, said drum having a treating compartment and a liquid emptying chamber in liquid communication therewith, and liquid-lifting means mounted in said chamber operable by rotation of said drum for conveying

liquid from said drum to empty the same, said chamber having an open central passage there-through and co-axial with said axis of the drum for communicating the interior of said compartment with exterior of the drum.

19. A machine of the character described comprising a fluid-containing drum rotatable about a substantially horizontal axis, said drum having a treating compartment, and draining means communicating with said compartment at one side of the drum for expelling a large volume of liquid quickly therefrom by gravity, said draining means comprising a duct having a relatively large opening coaxial with said axis of the drum, said drum having an opening therein registering with the opening in said duct, and a valve shiftably and relatively rotatably mounted with respect to the drum and operable at will to control said draining means whereby said drum may be drained while the drum is rotating or stationary.

20. A machine of the character described comprising a fluid-containing drum rotatable about a substantially horizontal axis, said drum having a treating compartment and a liquid emptying chamber in communication therewith, draining means in communication with said compartment at one side of the drum for expelling a large volume of liquid quickly therefrom by gravity while the drum is rotating or stationary, said draining means comprising a duct having a relatively large opening coaxial with said axis of the drum, said drum having an opening therein registering with the opening in said duct, and means mounted on the inner periphery of said chamber operable by rotation of the drum for forcibly expelling liquid remaining in said compartment into said draining means.

21. A machine of the character described comprising a fluid-containing drum rotatable about a substantially horizontal axis, means for rotatably supporting said drum at one side whereby the other side thereof is free and unobstructed, means at said one side of the drum for supplying a treating liquid axially to the interior of the drum, liquid-lifting means in the drum at said one side thereof and operable by rotation of the drum for conveying said liquid axially therefrom at said one side, said drum having an opening in said other side thereof, and a closure for said opening.

22. A machine of the character described comprising a liquid-containing drum rotatable about a substantially horizontal axis, means for rotatably supporting said drum at one side whereby the other side thereof is free and unobstructed, said drum having a treating compartment at said one side of the drum and a liquid supplying and emptying chamber at said other side thereof, means at said one side of said drum for introducing a liquid into said supplying and emptying chamber axially of the drum, said chamber being in communication with said treating compartment for permitting flow of liquid therebetween, liquid-lifting means in said supplying and emptying chamber operable by rotation of the drum for conveying the liquid axially from the drum at said one side thereof, said drum having an opening at said other side thereof, and a closure for said opening.

23. A machine as set forth in claim 21, said drum having a liquid outlet in said one side thereof, and a valve shiftably mounted in association with said outlet and operable at will to keep the outlet closed either to retain the liquid in the

drum or to open said outlet whereby the liquid will be conveyed out of the drum by said liquid-lifting means upon rotation of the drum.

24. A machine as set forth in claim 22, said supplying and emptying chamber having an outlet at said one side of the drum, a valve shiftably mounted in association with said outlet and operable at will either to close said outlet to retain the liquid in the drum or to open said outlet whereby the liquid will be conveyed out of the drum.

25. A machine of the character described comprising a liquid-containing drum rotatable about a substantially horizontal axis, a treating chamber in the drum, a self-contained pump in said drum including liquid-lifting vanes converging toward said axis, said vanes rotating with and being operable by rotation of said drum for lifting a liquid axially from said drum, a valve, and means for mounting said valve in association with said pump to rotate coaxially with said axis of the drum and to be shiftable on said axis at will to close or open an outlet from said pump to retain the liquid in the drum or to remove the liquid from the drum, said valve being rotatable with the drum when in said closed position on said mounting means with respect to said outlet.

26. A machine of the character described comprising a drum adapted to rotate about a horizontal axis, said drum having a treating chamber with article agitating webs therein, and a pumping or liquid conveying compartment with liquid lifting vanes therein, said chamber and said compartment being divided by a partition, said partition having openings between said vanes permitting flow of a liquid from the chamber to the compartment between the vanes so that the latter may lift quantities of liquid during rotation of the drum to convey a liquid from the drum, supply and drainage ducts connected to said compartment solely from one side of the drum, the other side of the drum being free and unobstructed and having an article receiving opening therein and a removable closure for said article receiving opening.

27. A machine of the character described comprising a drum adapted to rotate about a horizontal axis, said drum having a treating chamber with article-agitating webs therein, and a pumping or liquid conveying compartment with liquid lifting vanes therein, said chamber and said compartment being divided by a partition, said partition having openings between said vanes permitting flow of a liquid from the chamber to the compartment between the vanes so that the latter may lift quantities of liquid during rotation of the drum to convey a liquid from the drum, said compartment having an outlet from which said lifted liquid may flow out of the compartment, a valve operable at will to close or open said outlet, and supply and drainage ducts connected to said compartment solely from one side of the drum, the other side of the drum being free and unobstructed and having an article receiving opening therein and a removable closure for said article receiving opening.

28. A machine of the character described comprising a drum adapted to rotate about a horizontal axis, said drum having a treating chamber with article-agitating webs therein, and a pumping or liquid conveying compartment with liquid lifting vanes therein, said chamber and said compartment being divided by a partition, said partition having openings between said vanes permitting flow of a liquid from the chamber to

the compartment between the vanes so that the latter may lift quantities of liquid during rotation of the drum to convey a liquid from the drum, a liquid receptacle associated with the compartment, a valve, said compartment having an outlet concentric with said drum axis and communicating with said receptacle, and means for rotatably mounting said valve to be axially shiftable toward and from the outlet in said compartment to close or open the same, said valve thereby being rotatable with the drum when the valve is closed.

29. The combination in a machine of the character described comprising a single treating shell rotatable on a horizontal axis, and adapted to contain a liquid while rotating and means in the shell operable by rotation thereof for lifting quantities of liquid from the bottom thereof, an outlet from the drum concentric with the axis thereof and arranged to receive liquid from said lifting means as the drum rotates, and a valve operable at will to close or open said outlet to retain a liquid in the drum or to permit the liquid to be conveyed out of the drum, means for rotatably and axially shiftable mounting said valve in cooperation with said outlet, and means for axially shifting said valve toward and from said outlet, said valve rotating with the drum when in contact therewith and closing said outlet.

30. A machine of the character described comprising a fluid-containing drum rotatable about

a horizontal axis, means for rotatably supporting said drum at one side whereby the other side thereof is free and unobstructed, means to supply a liquid axially into the drum, conduit means to convey a liquid axially from the drum, both said means being arranged at said one side of said drum, liquid-lifting means in the drum operable by rotation thereof to lift a liquid from the bottom of the drum toward the axis thereof to convey the liquid to said conveying means and thereby axially out of said drum, said other side of the drum having an article receiving opening therein, and a closure releasably mounted on said drum from closing said article receiving opening.

31. A machine of the character described comprising a liquid-containing drum rotatable about a horizontal axis, means to supply a liquid axially into the drum, means to convey a liquid axially from the drum, both said means being arranged at one side of said drum leaving the other side thereof free and unobstructed, a valve to control the discharge of liquid therefrom by said conveying means, and means in the drum operable by rotation thereof to lift a liquid from the bottom of the drum toward the axis thereof to convey the liquid to said conveying means and thereby axially out of said drum, said other side of the drum having an article receiving opening therein, and a releasable closure for said article receiving opening.

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