

July 1, 1930.

P. E. BARKER

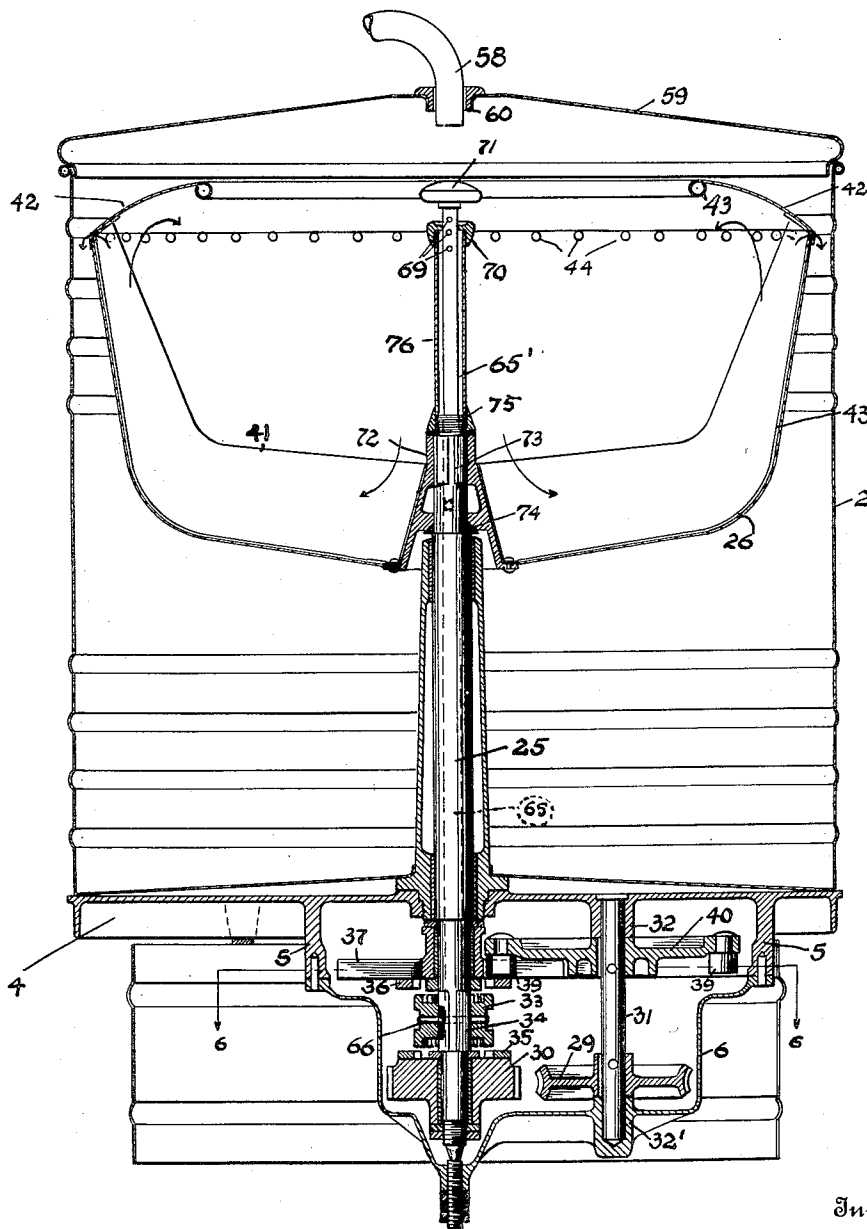
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COMBINED WASHING, RINSING, AND DRYING MACHINE

Filed July 24, 1925

5 Sheets-Sheet 1

Fig. 1.



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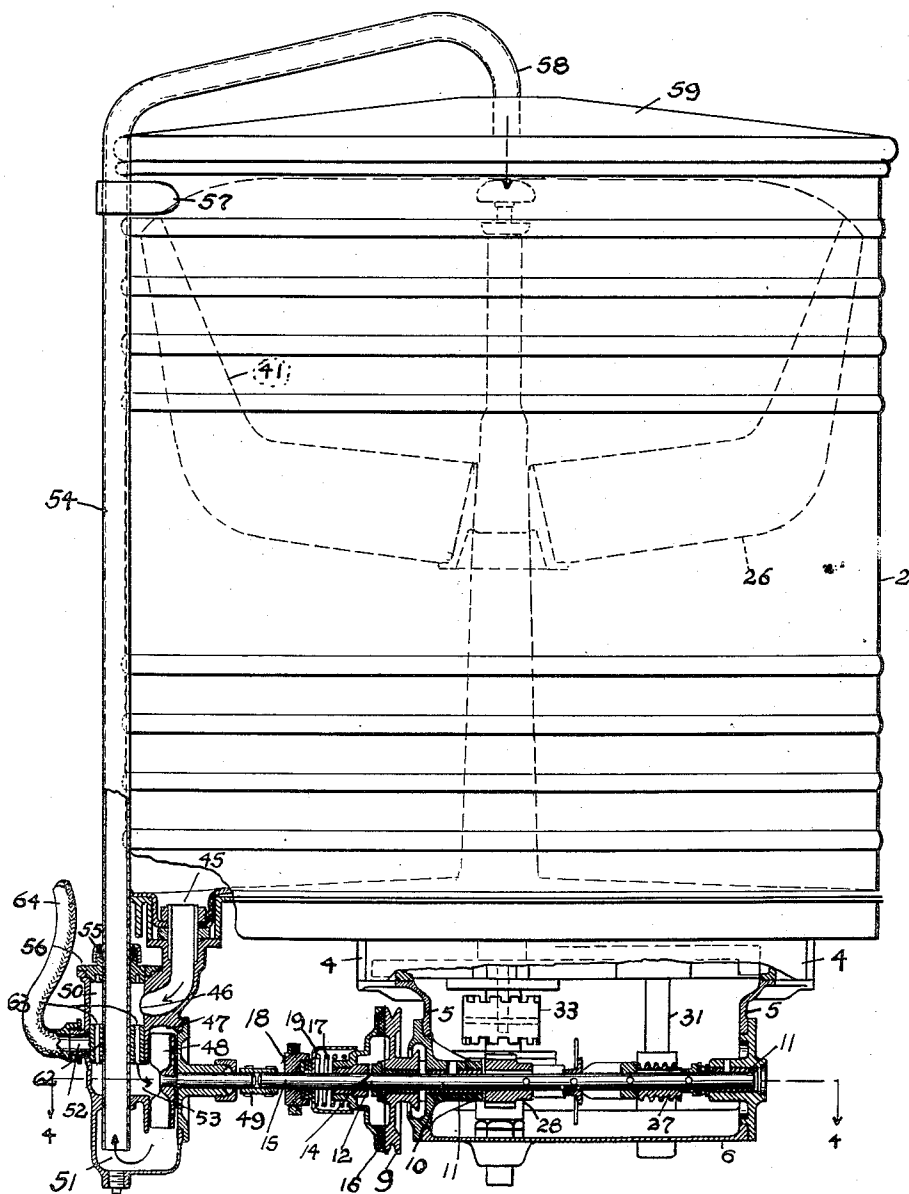
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Fig. 2.



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Fig. 3.

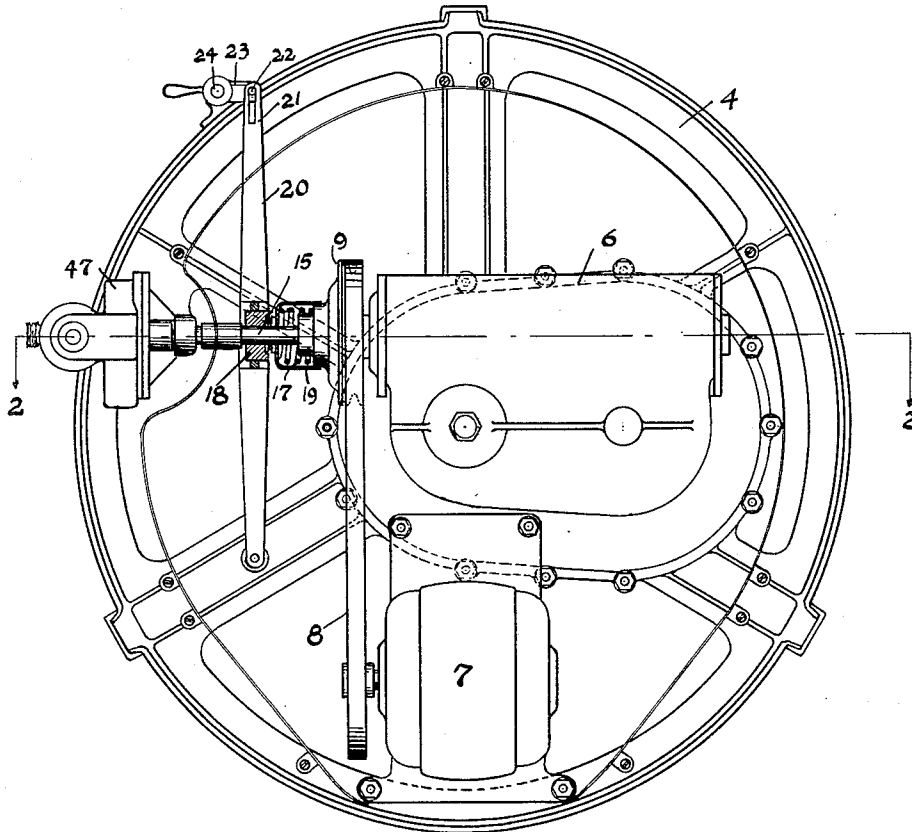
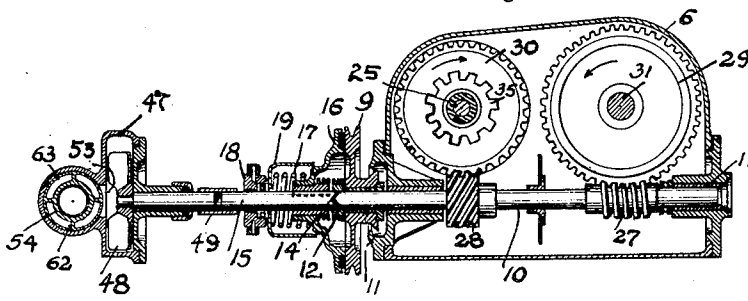


Fig. 4.



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Fig. 5

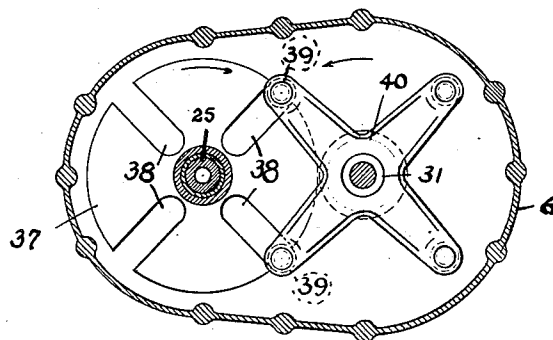
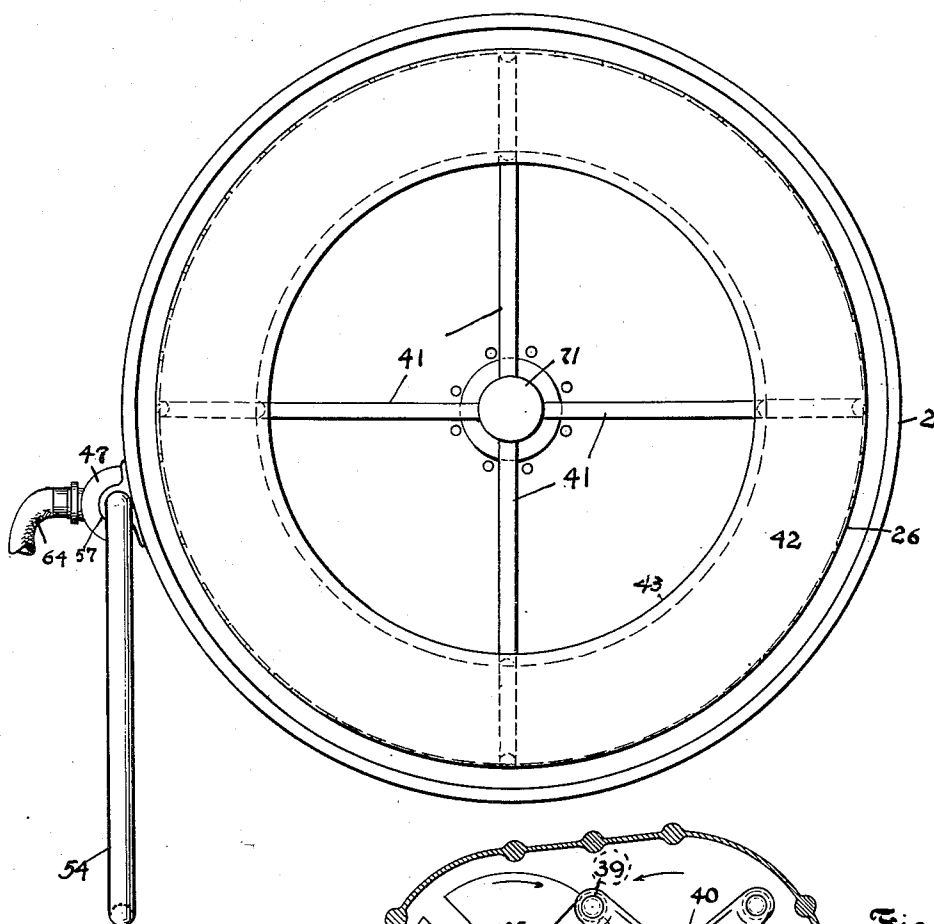


Fig. 6

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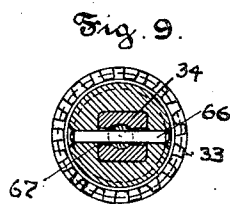
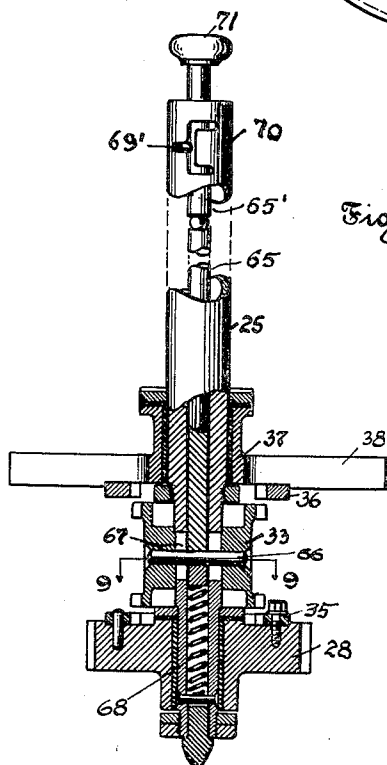
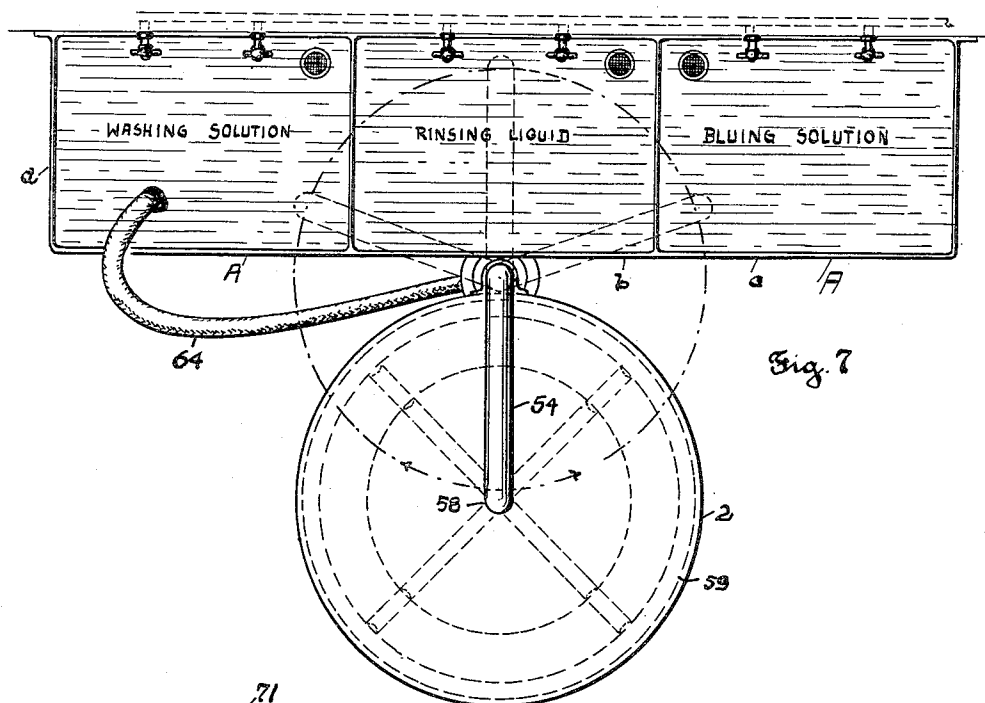
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COMBINED WASHING, RINSING, AND DRYING MACHINE

Filed July 24, 1925

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

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COMBINED WASHING, RINSING, AND DRYING MACHINE

Application filed July 24, 1925. Serial No. 45,797.

My invention relates to a combined washing, rinsing, and drying machine, and in general my object is to provide a power-operated machine wherein a quantity of goods may be deposited, and washing, rinsing and drying of the goods may be performed thoroughly and expeditiously step by step without handling the goods by hand or removing them from the machine until the cycle of operation is completed, and if desired, the rinsed goods may also be treated with a bluing solution before drying or removing the goods from the machine. The machine also permits re-use of the washing, rinsing, and bluing liquids or solutions on one or more additional batches of goods, thereby expediting large laundering operations without waste of the liquids or solutions and with a saving in time, cost and labor. These and other objects are attained by the mechanism described in detail herein and illustrated in the accompanying drawings, in which

Figure 1, is a vertical section of the machine centrally thereof; Figure 2, is a side view of the upper part and a sectional view of the base part of the machine on line 2—2 of Figure 3; Figure 3, a bottom view of the machine; Figure 4, a horizontal section on line 4—4 of Figure 2; Figure 5, a top view of the tub and receptacle with the cover removed; Figure 6, a horizontal section of the gear case on line 6—6 of Figure 1, showing the star wheel which imparts variable speed movements intermittently to the shaft of the washing and drying receptacle; Figure 7, a top view of the machine stationed opposite a compartmented laundry tray; and Figure 8, a sectional view, enlarged, of the clutch controlling mechanism within the tubular supporting shaft for the washing and drying receptacle. Figure 9 is a cross-section of the clutch on line 9—9 of Figure 8.

The invention comprises a cylindrical tub 2 mounted upon a suitable support, such as a cast metal frame 4 of skeleton pattern. A casing 6 of irregular shape is detachably bolted to a depending flange 5 on frame 4 to provide a sealed chamber within which the main operating gears for the machine may be confined together with a lubricant. An electric motor 7 is also suspended from frame 4 adjacent casing 6 to transmit power by belt 8 or otherwise to a wheel or pulley 9, sleeved loosely, upon a horizontal shaft 10 which extends into casing 6 and is journaled in removable bearings 11 therein. Shaft 10 is fixed against longitudinal movement and has a reversely-beveled extremity 12 socketed within a correspondingly-shaped recess within the abutting end 14 of a short shaft or extension 15 upon which a friction disk or clutch 16 is slidably mounted opposite the outer face of wheel 9. A coiled compression spring 17 presses the friction disk or clutch against wheel 9 and holds the notched end 14 of shaft 15 in driving engagement with the beveled extremity 12 of shaft 10. This clutch is self-releasing when an overload is placed on the motor or the driven parts of the machine are checked or stopped. A movable collar 18 on shaft 15 provides a seat for the cylindrical housing 19 for compression spring 17, and a lever 20 is connected with collar 18 to fix its position on shaft 15. Lever 20 is pivotally connected at one end to frame 4, see Figure 3, and its opposite end 21 is slotted to receive a crank pin 22, whereby the lever may be locked immovably in one position to hold the spring under compression and the clutch operative, or whereby the lever may be shifted to relieve the tension and render the clutch inoperative. Thus, the crank pin 22 forms part of an arm 23 which may be fixed to a rotatable controlling rod 24 extending upwardly at one side of tub 2, but any other suitable controlling device for the clutch may be used instead.

The motor and clutch revolve horizontal shaft 10 at a predetermined speed and there-through two separate sets of gears which may be used selectively to rotate a vertical shaft 25 and a goods receive or receptacle 26, either at slow and variable speed or at high and equal speed. Thus, horizontal shaft 10 carries a screw pinion or worm 27 and also a small spiral gear 28 which mesh with a large worm gear 29 and a large spiral gear 30, respectively, the latter gear 30 being loosely sleeved upon the lower reduced part of vertical shaft 25, and worm gear 29 being fixed

upon a short vertical shaft 31 journaled in suitable bearings 32—32' forming part of base frame—4—and casing 6.

Spiral gears 28 and 30 serve to rotate central shaft 25 at high speed when a toothed collar or clutch 33 is moved downwardly on the squared portion 34 of shaft 25 and engaged with the clutch teeth on a flat ring 35 which is secured to the top of spiral gear 30, see Figure 1; but when central shaft 25 is to be rotated at slow and variable speed clutch collar 33 is raised beyond a neutral position into contact with a toothed ring 36 fixed to the bottom of a star wheel 37 which is loosely sleeved upon a round portion of central shaft 25. In the present instance star wheel 37 comprises a disk having four radial slots 38 which are open at their outer ends to receive the rollers 39 at the outer ends of the four radial arms of the driving wheel 40 of this star wheel assembly. Wheel 40 is fixed to the upper part of short shaft 31 which is continuously driven by worm gear 29, but the continuous rotation of shaft 31 and wheel 40 is changed to a variable rotary movement at star wheel 37, which movement is imparted to central shaft 25 providing clutch collar 33 is interlocked with toothed ring 36. Star wheel 37 is rotated when a roller 39 passes through the mouth or open end of a slot 38, and then as the roller moves in an arc toward the inner end of the slot the wheel is rotated with gradually increasing speed which reaches its maximum when the roller arm and slot are parallel and the roller is at its greatest depth within the slot. Thence as the roller continues to move in an arc it will move outwardly toward the open end of the slot thereby gradually diminishing the speed of rotary movement of the star wheel until the roller passes outwardly through the mouth of the slot and a second roller is entering another slot to repeat the movement. The rotary movement at variable speed effectively agitates the washing, rinsing or bluing solutions in the receptacle, and causes the solution and the goods in the receptacle to regurgitate, the goods being thrown back with rubbing effect over a series of radial ribs or division walls 41 within the bottom and sides of the receptacle. The solution confined in the spaces between the relatively high radial ribs or walls 41 is also caused to flow outwardly toward the side wall of the receptacle and upwardly along said walls and against the inwardly-turned apron or flange 42 at the upper outer edge of the receptacle whence it is thrown back into the receptacle toward the depending guard or roll 43 on the inner edge of apron 42. To promote the movement of the solution outwardly and upwardly the bottom of the receptacle may be more or less inclined upwardly and outwardly from the center, and the sides of the receptacle may also slope up-

wardly and outwardly more or less, as shown in Figure 1; and a series of openings 44 may also be used in the side walls of the receptacle at or near its top, to permit the solution to escape in part when the receptacle is being variably rotated, and to escape altogether when the receptacle is continuously rotated at high speed.

Receptacle 26 occupies the upper half of tub 2, and the tub is relatively deep to provide a large receiving chamber for the liquid which escapes or is expelled from the receptacle, and the liquid may be trapped and held within this chamber or withdrawn through a drain passage 45 which connects with the intake port 46 of a pump casing 47 in which a rotary impeller 48 is confined in operating connection with horizontal shaft 15, preferably by means of a flexible coupling 49, see Figure 2. Casing 47 is divided into upper and lower chambers 50 and 51 respectively, the upper chamber 50 having intake port 46 at one side near its upper end, a second intake port 52 at its side near its middle, and an outlet 53 at its lower end opposite the center of impeller 48. The impeller discharges into lower chamber 51 and the outflow is through the pipe or tube 54 which is open at its bottom to lower chamber 51 and extends upwardly through upper chamber 50 and a sealing gland 55 in the cover or cap 56 for the latter chamber. Discharge pipe 54 may be rotated and reciprocated, and it extends upwardly parallel with the side wall of the tub and through a bracket 57 at the top where it is bent laterally to overhang the tub with its extremity bent downwardly to provide a spout 58 which may be placed directly over the center of the goods receiver or receptacle 26. A removable cover 59 may also be provided for tub 2, and spout 58 may extend through a central bushing or opening 60 in this cover, when the cover is in place. Furthermore, pipe 54 is movable vertically so that its spout 58 may be lifted free from the cover, thereby permitting the overhanging or laterally extending part of the pipe to be turned to one side of the tub whenever the operator desires to discharge the contents of the tub into another vessel, for example, any one of the several compartments of a laundry tray A, see Figure 7.

A valve or plunger 62 is fixed to discharge pipe 54 within pump chamber 50 whereby the intake ports 46 or 52 may be closed and opened alternatively by reciprocating the pipe, the upper intake port 46 being closed when the plunger is raised and the second intake port 52 being closed when the plunger is lowered. When the upper port 46 is open the liquid passes downwardly through a series of openings 63 in plunger 62 and thence through outlet 53 to the center of impeller 48, but when the plunger is raised to close upper port 46 the impeller may be used to draw

liquid into the pump through middle port 52 and a flexible hose 64 attached thereto. In either case the outflow from the pump is through vertical pipe 54 and its delivery spout 58, thereby permitting any solution or liquid to be drawn through hose 64 from an outside source and delivered into the tub until a desired amount has been collected, and then used and circulated within the receptacle and tub for washing, rinsing or bluing the goods, and then withdrawn from the tub and delivered to a vessel outside of the tub for re-use.

The rotary pump may be operated while the receptacle 26 is either idle or rotating, that is to say while toothed collar 33 on shaft 25 is in a neutral position, or engaged with spiral gear 30 or star wheel 37. Any suitable device may be used to shift and fix the position of clutch collar 33 relatively to said gear and wheel, and a controlling handle may be located in an accessible place, either at the side or top of the machine. As shown, a rod 65 extends upwardly through central shaft 25 which is connected to clutch collar 33 by a pin 66, thus coupling the parts together for common rotation. A cross slot 67 in shaft 25 permits the pin to move vertically within limits, and a coiled compression spring 68 confined within the lower hollow end of the shaft presses the rod upwardly so that it may be locked and the clutch collar 33 stationed in three positions. A series of projections or pins 69 at the upper end of rod 65 may pass through a slot in a cap member 70 to permit the rod to move upwardly under the pressure of spring 68, but by turning the knob or handle 71 one of the three pins may be caused to engage the bottom of cap member 70 and lock the rod and clutch collar against vertical movement. In lieu of the pin and slot locking arrangement described, cap member 70 may be provided with three notches at spaced intervals, and the rod may be provided with a single pin 69' to enter said notches alternatively, see Fig. 8. Rod 65 may also be made in two or more sections or lengths to permit the upper part to be rotated independently of the lower part, and also to permit the upper part 65' having handle 71 to be lifted together with receptacle 26 when the latter is removed from tub 2. To permit such removal the receptacle is provided with a tubular bearing 72 at its center having an angular opening adapted to sleeve over an angular or square-sided part 73 of shaft 25, and a cone-shaped collar 74 is also fixed on the shaft to provide a centering seat for bearing 72. The upper portion 75 of shaft 25 is reduced and screw-threaded to permit a tubular extension 76 to be detachably affixed thereto, thereby also enclosing and supporting the upper section 65' of rod 65 and also holding the receptacle down upon its cone seat upon shaft 25. Han-

dle 71 is placed centrally above receptacle 26 to induce the operator to stop the electric motor by the usual switch whenever the receptacle is revolving and it is found desirable to shift the gear clutch collar 33, but nevertheless, the handle can be manipulated safely under those conditions.

In operation, the machine may be stationed opposite a compartmented laundry tray A, or one or more vessels of any kind in which various washing and laundrying solutions or liquids may be stored temporarily. For example, in the laundry tray A shown in Figure 7, the three compartments *a*, *b*, and *c*, may contain separately a hot washing solution, a rinsing liquid, and a bluing solution, respectively. These may be used in the machine successively, and each restored to its compartment for use again with a second or third batch of goods, if desired. Thus, assuming a hot soapy mixture has been prepared in compartment *a*, the solution may be delivered into receptacle 26 containing the goods by swinging spout 58 into discharge position over the open top of the receptacle and raising the pipe and its valve member so that upper port 46 is closed and middle port 52 is open, thereby permitting the pump to draw the solution through hose 64 which at present has its intake end immersed in the solution within compartment *a*. Washing receptacle 26 may be at a standstill or rotating at this time.

The desired quantity of washing solution having been delivered, tube 54 may then be lowered, thereby cutting off the supply and at the same time opening port 46 and drain passage 45 leading to the bottom of the tub. The controlling rod may now be raised to shift clutch collar 33 from a neutral position to an engaging position with star wheel 37, and the electric motor may then be started, or if the motor is running lever 20 may be manipulated to throw friction clutch 16 into action. Receptacle 26 will now rotate at slow and variable speed, thereby causing regurgitation of the solution and a rubbing effect on the goods, and also a circulating flow of the solution upwardly of the side wall of the receptacle and inwardly as previously described, a part of the solution escaping into tub 2 from whence it will flow through drain passage 45 to the pump and up through tube 54 and out of spout 58 back upon the goods in receptacle 26. This washing step continues for a short time until the goods are clean, and then tube 54 is rotated or turned to place spout 58 above compartment *a* in tray A in order that the washing solution may now be returned thereto. Clutch collar 33 is then lowered into engagement with spiral gear 30, thereby rotating receptacle 26 at high speed for a given interval, during which period the solution in the goods and within receptacle 26 is ex-

5 pelled, the solution escaping through the side openings 44 and collecting within the bottom chamber of tub 2 from whence it is discharged by the pump and tube 54 which is now in delivering position above compartment a.

10 The goods, more or less dry, are permitted to remain within the receptacle, and may now be rinsed by inserting hose 64 into compartment b, containing a rinsing liquid; by swinging spout 58 over receptacle 26, and by raising tube 54 to open middle port 52 leading to the hose. The rinsing liquid is then transferred to the receptacle and tub, and when a sufficient amount has been collected in the tub, tube 54 may be depressed to open drain passage 45 and the receptacle rotated in the same way as described in washing the goods. At the close of this operation the receptacle may be rotated at high speed to expel the rinsing liquid and to dry the goods more or less as desired, while returning the liquid to compartment b or discharging it into a catch basin or sewer. The receptacle may also be rotated continuously at high speed to dry the clothes so that they may now be removed if no bluing treatment is required. But if the latter operation must be performed, the hose can be shifted to bluing compartment c and the same or substantially the same steps taken, when at the close the bluing solution may be returned to compartment c, and the solution expelled and the goods dried centrifugally before removing the goods from the machine. Another batch of goods may now be deposited in the machine and the same solutions and liquids used and the successive operations repeated without waste, arduous labor or loss of time.

40 What I claim, is:

1. A washing machine, comprising a rotatable washing receptacle, gearing to rotate said receptacle at high speed, star wheel mechanism to slowly rotate said receptacle at variable speed in one direction, and a clutch for said gearing and mechanism.

2. A washing machine, comprising a stationary tub, a rotatable washing receptacle mounted upon a hollow shaft within said tub, separate sets of low speed and high speed gears operable from a common source of power, a clutch for said gears upon said shaft, and clutch controlling means extending through said shaft to the top of said receptacle.

3. A washing machine, comprising a stationary tub, having a vertical shaft extending thereinto, a rotatable washing receptacle removably mounted upon said shaft, separate sets of high speed and low speed gears for said shaft, and a clutch for said gears having a controlling device extending upwardly through said shaft and said controlling device removable in part with said receptacle.

4. A washing machine, comprising a pump having an intake port open to the bottom of said machine and a separate intake port open to a separate source of liquid supply, and a shiftable discharge tube for said pump having a valve member adapted to control the opening and closing of said ports alternatively.

5. A washing machine, comprising a tub and a rotary washing receptacle, a rotary pump having a valve chamber provided with an intake port communicating with the bottom of said tub and a separate intake port for a hose connection, a movable discharge tube for said pump having a delivery spout adapted to swing relatively to said receptacle, and a valve within said chamber adapted to control the opening and closing of said intake ports.

6. A washing machine, comprising a tub, a washing receptacle having a compartmented bottom and rotatably mounted within said tub, and means for rotating said receptacle either slowly with periodically varying speed or continuously at higher speed.

7. A washing machine, comprising a tub, a washing receptacle rotatably mounted within said tub having liquid escape openings in its side wall, and ribs to promote a circulating flow of liquid toward said openings, and means for rotating said tub either slowly with periodically varying speed or continuously at different speed.

8. A washing machine, comprising a tub, a cylindrical receptacle rotatably mounted within said tub having a flaring side wall provided with an inturned apron at its top and formed with liquid escape openings, radial division walls within the bottom of said receptacle to promote circulation and regurgitation of the liquid therein, and means for rotating said receptacle either slowly with periodically varying speed or continuously at a higher speed.

9. A stationary tub having a removable cover provided with an opening, a pump having an intake port in open communication with said tub, and a laterally swinging and vertically adjustable discharge pipe for said pump having a spout adapted to be inserted and held in said opening to deliver the pumped liquid into said tub.

10. A washing machine, comprising a tub having a rotatable washing receptacle therein, a rotary pumping device adapted to circulate a liquid through said receptacle and tub, and selective gearing including means to rotate said receptacle in one direction at periodically accelerated and retarded speed and means to rotate said receptacle continuously at high speed.

11. A washing machine, comprising a tub, a rotatable washing receptacle within the tub, a pump having an intake connection with said tub and a separate liquid intake with

another source of supply, and a discharge connection for said pump shiftably connected therewith, said connection including means for connecting the pump with either one of said intakes.

12. A washing machine, comprising a tub and a rotatable washing receptacle therein, gearing to rotate said receptacle at high speed, gearing to slowly rotate said receptacle in one direction with variable speed, a rotary pump connected with said gearing having an intake communicating with the bottom of said tub and a separate intake for a hose connection, and a shiftable discharge tube for said pump including means for connecting said pump with either one of said intakes said discharge tube being adapted to swing back and forth relatively to said tub.

13. A washing machine, comprising a liquid receiver, a washing receptacle rotatably mounted within said receiver and adapted to expel liquid therefrom into the receiver, a drain connection for said receptacle and a pump adapted to withdraw liquid from said receiver, a separate liquid supply connection for said pump, and a vertically shiftable discharge tube for the pump including means for connecting said pump either with said drain or said separate liquid supply connection for delivery of the liquid discharged from the pump into said discharge tube.

In testimony whereof I affix my signature.

PERCY E. BARKER.

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