May 30, 1933. J. B. KIRBY 1,911,903

LAUNDRY MACHINE

Filed May 14, 1927 3 Sheets-Sheet 1

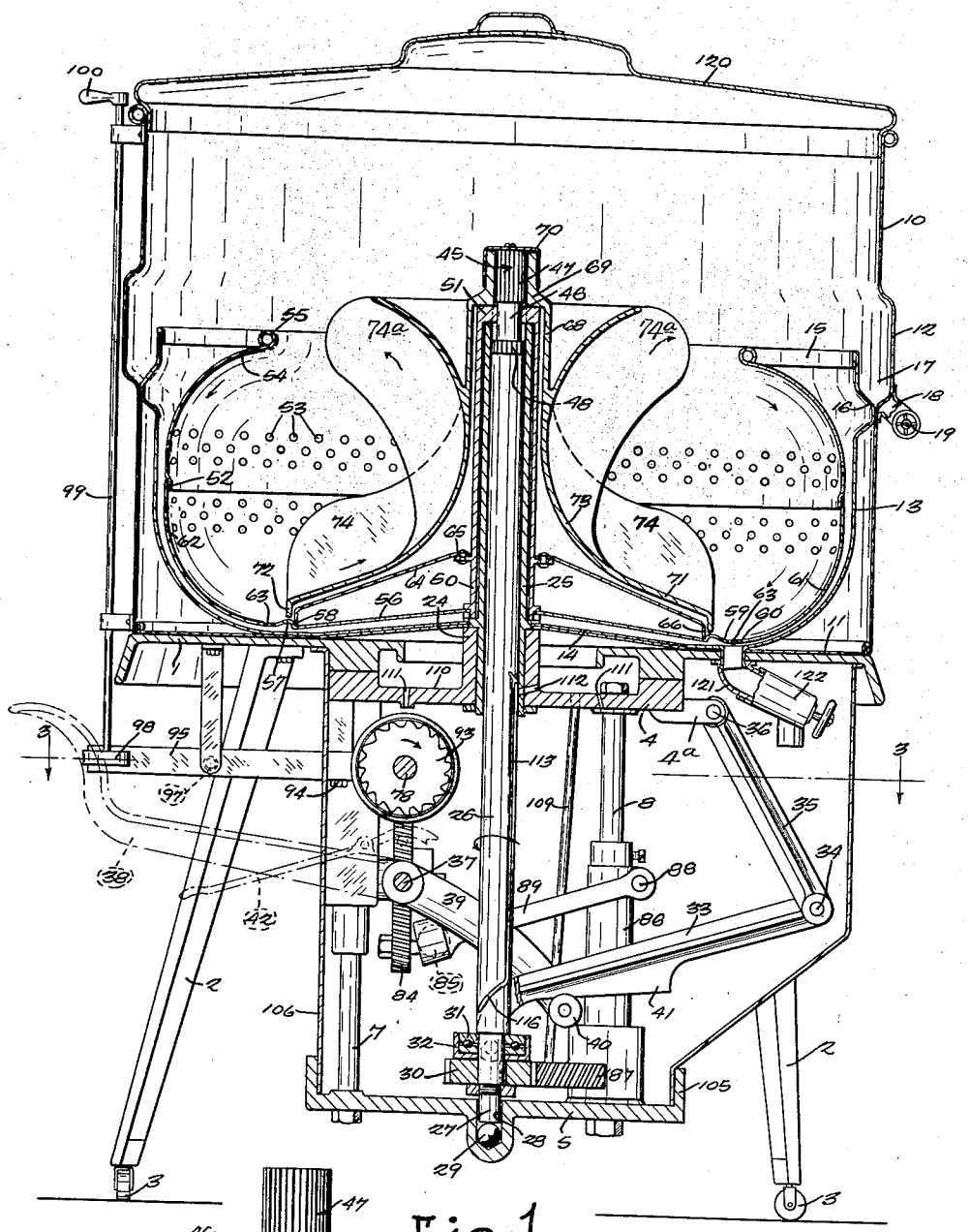


Fig. 1

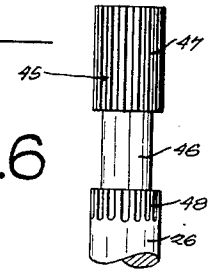


Fig. 6

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3 Sheets-Sheet 2

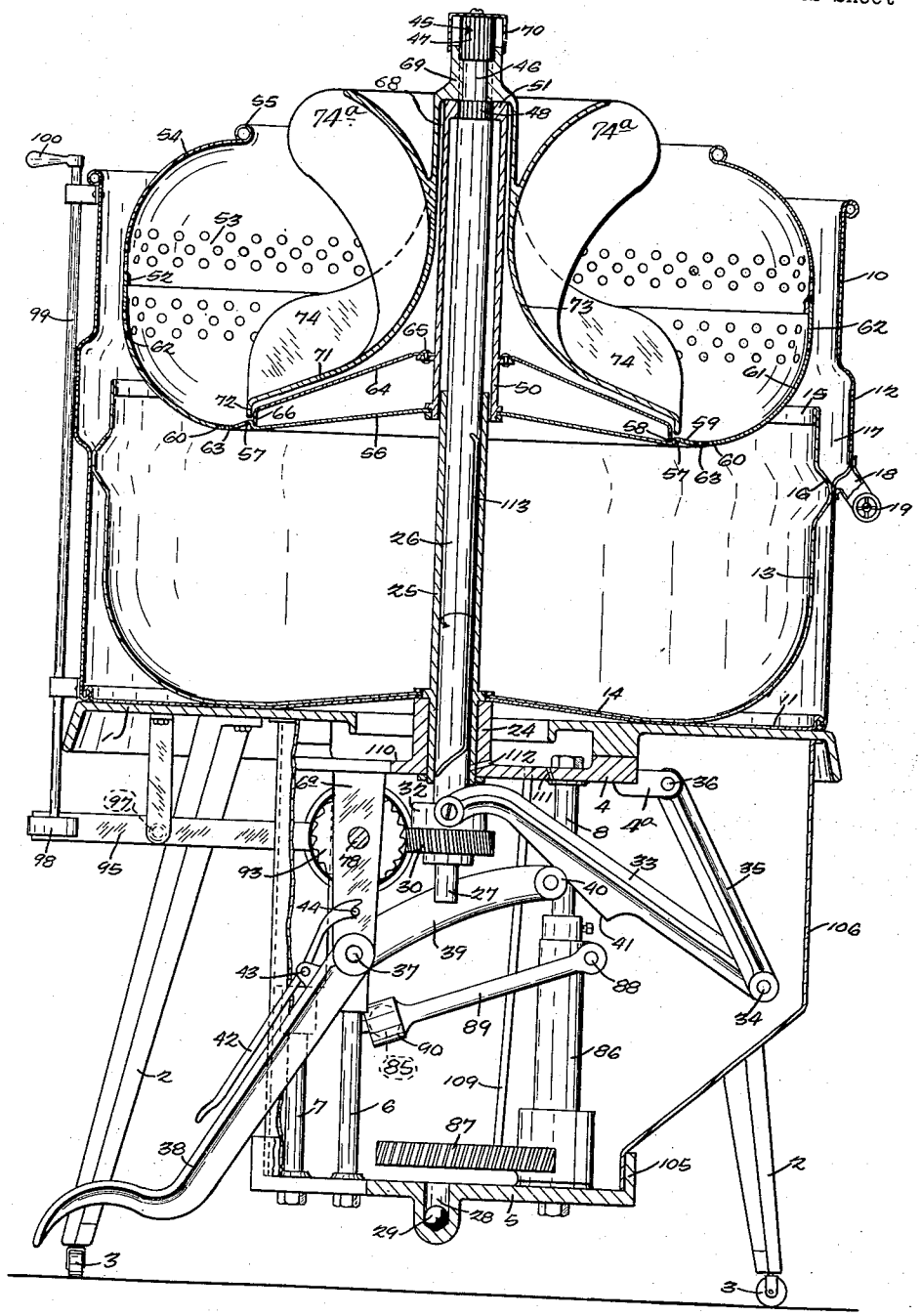


Fig. 2

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LAUNDRY MACHINE

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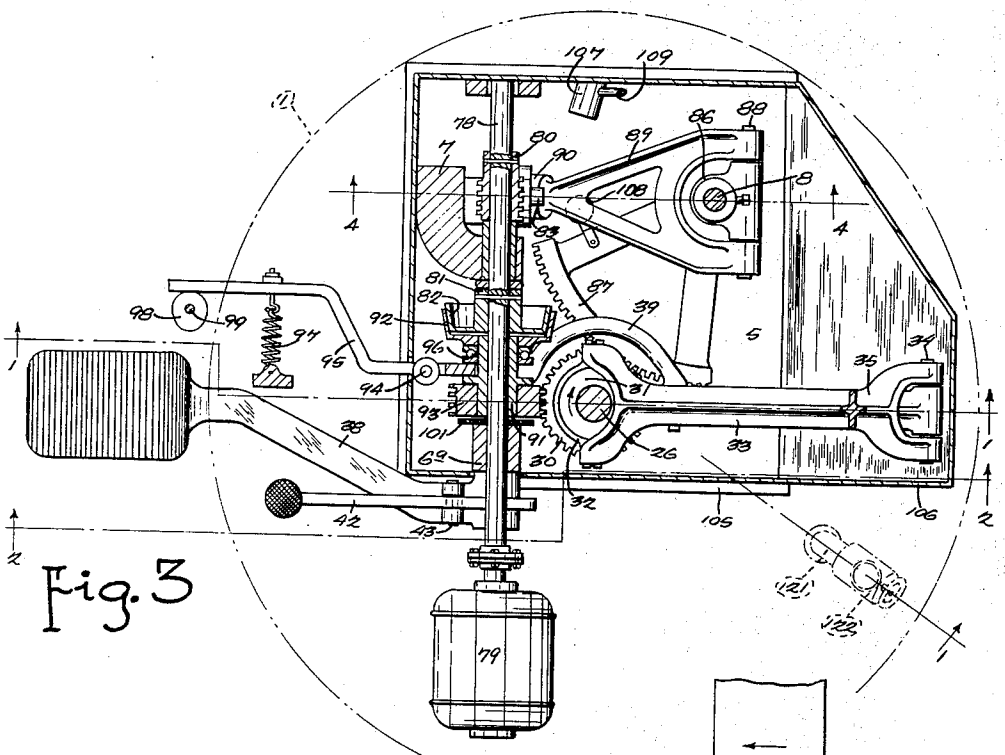


Fig. 3

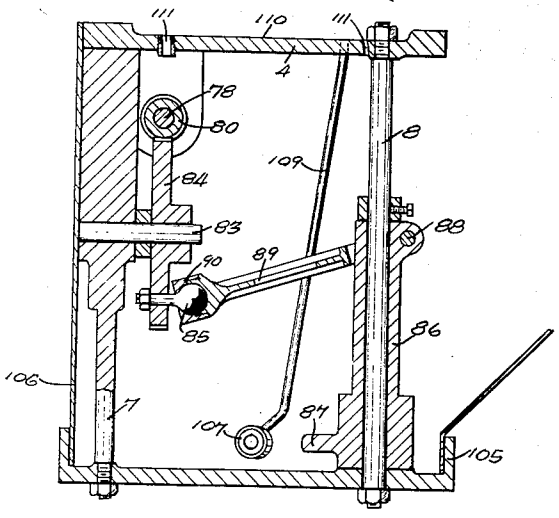


Fig. 4

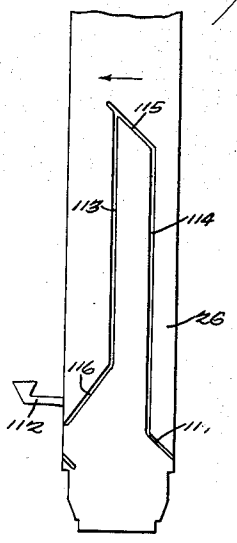


Fig. 5

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UNITED STATES PATENT OFFICE

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LAUNDRY MACHINE

Application filed May 14, 1927. Serial No. 191,483.

This invention relates to laundry machines and has for its objects the provision of a new, improved, and simplified machine for performing the functions of washing and of extracting in a single container, without the necessity of handling the clothes in any way between the commencement and completion of the operation. Another object of the invention is the provision of a machine which combines the advantages of the oscillating dasher for washing and the centrifugal separator for extracting. Other objects of the invention relate to means for removing the scum and soap lees prior to the extracting operation; the provision of a new and improved construction of tub for the elimination of grit and water from the fabrics; the provision of a new, improved and simplified operating mechanism; the provision of new and simplified means for raising and lowering and connecting and disconnecting the rotating tub; the provision of an improved dasher which shall facilitate the rotating and distributing movements of the clothing; the provision of a dasher so related to its tub as to reduce the danger of clothing or other articles from becoming caught therebeneath and to increase the ease of discharging the liquid contents of the tub; the provision of new and improved means for lubricating the various parts; while further objects and advantages of the invention will become apparent as the description proceeds.

In the drawings accompanying and forming a part of this application I have shown an illustrative embodiment of my inventive idea, wherein Fig. 1 is a vertical sectional view through a complete domestic washing machine the parts being shown in washing position, the line of section being indicated by 1—1 in Fig. 3; Fig. 2 illustrates the same machine with parts occupying the position assumed during the extracting operation the line of section being that indicated at 2—2 of Fig. 3; Fig. 3 is a horizontal sectional view corresponding to the line 3—3 of Fig. 1; Fig. 4 is a horizontal sectional view corresponding to the line 4—4 of Fig. 3; Fig. 5 is a development of the lower end of the vertical shaft; and Fig. 6 is an enlarged detail of the upper end of said shaft.

Describing by reference characters the particular machine illustrated in the present drawings, 1 denotes a circular metal plate supported by legs 2 and casters 3. Secured to the bottom of this plate is a frame consisting of a top plate 4, a bottom plate 5 and a plurality of vertical posts 6, 7, 8. Secured to the top of the plate 1 is the casing in which the washing mechanism is located and the washing process performed. This casing in its present form comprises a substantially cylindrical upright sheet metal wall 10 seamed at its lower end to a circular bottom plate 11 and having intermediate its height an outwardly embossed hollow enlargement 12 producing an inwardly facing circumferential recess. Located in the bottom part of this cylinder is a sheet metal lining member comprising a cylindrical wall 13 here shown as integral with a bottom 14 which overlies the bottom plate 11 throughout the entire central region, but flares upwardly therefrom adjacent its margin. The lining wall 13 terminates in an annular rim 15 intermediate the height of the enlargement 12, and adjacent to the bottom of said enlargement the wall 13 is circumferentially enlarged as illustrated at 16, to fit tightly against the wall 10 to which it is soldered in leak-proof relation, thus producing a kind of annular gutter 17 for which is provided an outlet 18 closed by a suitable valve 19. The space outside the wall 13 and below the bottom 14 constitutes an insulating chamber which substantially decreases the loss of heat of the washing liquid. It will be understood that there is no connection essential between the gutter and the double wall, because either can be used without the other and the two, if used together can be made separately.

The top plate 4 of the mechanism frame is formed with a central upright hollow socket 24 in which is received the upright cylindrical sleeve 25, the bottom of the tub being suitably apertured therefor, and slidably and rotatably mounted in this sleeve is the vertical shaft 26 having its lower end reduced as shown at 27 to enter a socket 28 formed in

the plate 5 and there resting upon a thrust bearing 29. Tightly secured to said shaft above said reduced portion is a spiral pinion 30 and secured above said pinion is the ball-bearing 31 embraced by a cup member 32 to whose sides is pivoted the bifurcated end of the lever 33. The other end of said lever is articulated at 34 to the free end of an arm 35 pivoted at 36 about a bracket 4^a carried by the plate 4. The upper end of the post 6 is squared as shown at 6^a in Figs. 2 and 3 so as to afford room for bearings, and in the same is pivoted a horizontal rock shaft 37, having secured to one end the pedal lever 38 and to the other end the lifting lever 39 whose free end carries a roller 40 running along a suitably shaped track 41 on the lever 33. By pressing this pedal from the position shown in Fig. 1 to the position shown in Fig. 2, the lever 33 is moved from lower to upper position and with it the shaft 26. In order to hold the parts in elevated position I have shown a trigger lever 42 pivoted to the pedal lever at 43 and having one end formed to engage with a suitable pin 44 carried by the post 6^a. The trigger is located so as to be actuated by the toe of the same foot with which the pedal is operated.

The upper end of the shaft 26 has a plurality of angularly spaced vertical grooves 45 cut therein as illustrated in Fig. 6, after which a portion of the teeth so produced are removed by turning down the shaft as shown at 46 thereby forming two fluted portions 47 and 48 constituting a kind of head and shoulder respectively, separated by the neck 46. Loosely surrounding the sleeve 25 is another sleeve 50 having at its upper end an inwardly projecting annular flange 51 which, when the shaft 26 is depressed as illustrated in Fig. 1, rests on the upper end of the sleeve 25. The interior of the passageway through this flange is grooved to match the teeth on the head 47, while the distance between the thrust bearing 29 and neck 46 is so chosen that when the shaft is in lowered position as shown in Fig. 1 said flange shall register with said neck, the head 47 projecting thereabove and the shoulder 48 being withdrawn therebelow.

To the lower end of the sleeve 50 is secured the tub or container in which the clothing is washed and centrifuged. This tub or container is preferably made of two sheet metal members seamed together circumferentially at 52. The outer or rim member consists merely of a vertical perforated portion 53 merging with an inwardly tapered part 54 terminating in a roll rim 55. The other member consists of a circular bottom part 56 tightly secured to the sleeve 50 and surrounded by an upstanding annular bead 57 having an abrupt inner face 58 and a gradually slanting outer face 59. Outside of said bead the bottom of the tub first drops a little way as illustrated at 60 and then swings upwardly as at 61 to a cylindrical portion 62 which extends to the seam 52. This construction produces an annular trough or channel surrounding the elevated central portion of the tub, and adapted to catch buttons, sand, nails, pins and other articles sometimes accidentally found in clothing, and prevent the same from working under the dasher. The bottom of this trough or channel is formed with discharge provisions 63 for the drainage of liquid therefrom. The portion 62 is also perforated for the centrifugal discharge of the extracted liquid.

The container is preferably formed with a rounded bottom on any section taken through the axis of rotation of the container, and it is also shown herein as having its top part similarly rounded inwardly. This not only produces a device which is easy to make, but one which is devoid of angles in which clothing or sediment can collect, although these features are susceptible of wide changes.

Located inside the tub is a false bottom comprising a circular portion 64 tightly secured to the sleeve at 65 and having a downturned rim 66 braced against and soldered to the abrupt wall 58 of the rib 57. This false bottom has the multiple purpose of bracing the lower part of the tub, lightening the same by constituting a floating chamber, and guarding against the entering of clothing beneath the agitator or dasher now to be described. This agitator or dasher may take any one of numerous detail shapes, particularly as regards its blades, but as regards its body it preferably comprises a hollow cylindrical central sleeve 68 formed at its upper end with a hollow head 69 which is internally grooved to intermesh with the teeth on the head 47. I have shown a hollow sheet metal cap 70 as secured to the end of the shaft 26 and slidably overlapping the head 69 to prevent the ingress of water. At its lower end the sleeve 68 expands to form a flaring circular disk 71 terminating in a downturned flange 72 which laps over the vertical wall 66 of the false bottom. The disk 71 merges into the sleeve 68 in a long sweep as shown at 73, and the exterior of the device is provided with blades or vanes 74 of any desired conformation.

Journaled in the upper ends of the posts 6 and 7 above the rock shaft 37 is the horizontal driving shaft 78 to which is connected the motor 79 and on which is tightly mounted the worm gear 80 and the hub 81 of the friction clutch 82. Journaled on a horizontal stud 83 carried by the post 7 beneath the shaft 78 is a worm gear 84 meshing with the worm 80 and having a rigid ball 85 projecting from its face. Rotatably sleeved on the post 8 is the hub 86 of a segmental gear 87. Pivoted to said hub on the horizontal axis 88 is the bifurcated end of a crank arm 89 having at

its free end a socket 90 in which said ball is received. It will be seen that as the gear 84 is revolved the rack 87 will be oscillated about the post 8. The teeth of said rack are slanted to mesh with the teeth of the spiral pinion 30 when the latter is lowered as shown in Fig. 1.

Loosely journaled on the shaft 78 adjacent to the clutch member 82 is a sleeve 91 having tightly secured to one end a companion clutch member 92 and to the other end a spiral gear 93 adapted to mesh with the pinion 30 when the latter is raised to the position shown in Fig. 2. Pivoted to the plate 1 upon a vertical axis 94 is a clutching lever 95 which engages said sleeve through the medium of a thrust bearing 96, a spring 97 being provided to produce engagement between the members 82 and 92 of the clutch whenever said lever is released by the turning of the cam 98 carried by the upright rod 99 provided with the control handle 100. The direction of slant of the gear teeth 93 is so chosen relative to the direction of rotation of the shaft 78 as to tend to disengage the clutch members 82–92 against the action of the spring 97 whenever the resistance to rotation of the shaft 26 is excessive, as upon starting the same from rest. Accordingly the load on the motor is determined by the stiffness and adjustment of the spring 97 and can never be excessive. The angle of the pinion 30 and rack 87 are determined in turn by that of the gear 93. A washer 101 of friction material can be inserted at the opposite side of the gear 93 in order to bring the container rapidly to rest whenever the cam 98 is rotated in the appropriate direction.

To hold lubricant without splashing or leaking I form the plate 5 with a surrounding flange 105 into which depends the lower end of the sheet metal housing 106; and for the purpose of distributing the oil to different gears I have shown a simple oil pump consisting of a cylinder 107 located in the plane of the rack 87, said rack being provided with a suitable plunger 108 adapted to enter said cylinder at each oscillation and force its contents through an oil pipe 109. This pipe delivers into a hollow basin 110 formed in the upper surface of the plate 4. The bottom of this basin is formed above each gear and adjacent to each shaft with suitable perforations as indicated at 111 to discharge a continuous supply of oil thereto. Also a radial oil hole 112 is provided into the interior of the sleeve 25. To produce the desired flow of oil throughout the height of the shaft 26 engaged by the sleeve 25 when the shaft is in its raised position, special provisions are made as illustrated in Figs. 2 and 5. To this end the surface of said shaft is provided with two parallel longitudinal oil grooves 113 and 114 connected at their upper ends in any suitable manner but preferably by a slanted groove 115 which extends from the downflow groove 114 in such direction as to tend, when rotated in the direction shown by the arrow in Fig. 5, to draw the oil downwardly. To the lower end of the groove 113 is joined another groove 116 slanted oppositely from the groove 115, and to the lower end of the groove 114 is joined yet another spiral groove 117 of the same slant as groove 15. The oil hole 112 must intersect the groove 116 and the groove 114. As a result the continuous rotation of the shaft in the direction shown by the arrow causes the oil entering through the hole 112 to move upwardly in the portion 116 and hence through the straight groove 113; while the inclination of the portions 115 and 117 causes a downflow through the groove 114. The fact that groove 114 is parallel to the axis where it passes the hole 112 prevents any tendency to flow in either direction at that point. As a result of this construction a continuous circulation of oil is produced up groove 113 and down the groove 114 without any overflow from the top of the sleeve 25. In the present specific machine the lubricant grooves are located wholly beneath the sleeve when the shaft 26 is lowered so as to become operative only when said shaft is elevated but sufficient oil is supplied to the sleeve at such times to serve the comparatively slight requirements of the intervening washing periods. In case the tub be made to operate always at one level the oil grooves are arranged to operate all the time. The pattern of the grooves is of very little importance except at the two ends, and especially the end nearest the oil hole. This entire feature is a refinement capable of independent use and not indispensible even to this machine although very helpful. The top of the machine is provided with a suitable cover 120 and the bottom with a suitable outlet pipe 121, provided with a stop valve 122.

In use the gears are supplied with a quantity of oil such as a quart, the valves 19 and 122 are closed, the tub lowered to the position shown in Fig. 1 and supplied with the articles to be washed, and liquid introduced preferably to submerge the rims 55 and 15. It will be noted that while those rims here exhibit the same level they need not always do so. Energizing the motor imparts a brisk oscillation to the dasher which not only creates an alternating circumferential movement of the clothes but also sets up a slow radial rotation as indicated by the arrows in Fig. 1. This latter movement is assisted by the shape of the tub and dasher which tub everywhere exhibits a rounded contour in axial section. The apertures 63 at the lowest point of the extractor container discharge all sand and grit, the slanting portion 59 directs the clothes past the edge of the flange

72 and minimizes the tendency to catch. The cone portion 64 decreases the tendency of clothes to work beneath the dasher and also facilitates discharge of the liquid contents of the tub. The scum and grit are discharged from the tub by the currents produced by the dasher, and are separated from the detergent liquid in the quiet zone between the tub and casing.

During the washing operation the toothed collar 51 registers with the neck 46.

The pedal 38 is now depressed, which raises the shaft 26 and inserts the teeth 48 into this collar in driving relation, while the engagement of this collar with the bottoms of the grooves which produce these teeth causes the tub to be raised to the position shown in Fig. 2. The head 47 also preferably slips through the head 69, thus leaving the dasher undisturbed so as not to produce any gaps in which clothes can find their way. At the same time the pinion 30 disengages the rack 87 and eventually engages with the gear 93, which is supposed to be free since the clutch 82–92 is supposed to be engaged only while the centrifuge is in actual use. The casing is preferably rather small so that the liquid remaining behind after the tub is elevated stands well below the bottom thereof as shown in Fig. 2.

The handle 100 is now turned to release the lever 95 to the action of the spring 97 which causes such an acceleration of the tub as the motor can bear. The dasher is not removed but rotates with the tub and clothes, the blades producing such an air current as to assist the drying effect if long continued. If desired to save the extracted liquid the valve 19 can be closed so that the gutter will overflow back into the casing. It will be noted that the rim of this gutter is shown as above the bottom of the tub but if it be below the extracting perforations it will catch the effluent therefrom. The clothes can also be rinsed by causing a hose to discharge into the tub during the rotation thereof, all the rinse water passing into the annular gutter and none into the casing so long as the rotation be maintained.

The rotation is arrested by turning the handle 100 so that the cam 98 may force the gear 93 against the brake material 101 through the action of the lever 95. The finished clothes are removed, the tub depressed to its original position, and more clothes added, enough fresh liquid being introduced to compensate for that discharged while floating out the scum. The lowering of the shaft 26 automatically disengages it from the tub and engages it with the rack 87.

It will be understood that although the various parts and features of this machine have been designed with reference to the most successful interaction it is possible to modify or substitute many of those parts and features without serious impairment of the device so that I do not limit myself in any wise to the things illustrated or described, except as the same are specifically recited in my several claims which I desire may be construed each independently of limitations contained in other claims.

Having thus described my invention what I claim is:

1. In a combined clothes washing and extracting machine, in combination, a casing adapted to hold washing liquid, a clothes container located inside said casing and conforming to a surface of revolution about a vertical axis, the side wall of said container having liquid discharge apertures, a clothes agitating element located inside said container, means working through the bottom of said casing and container for producing a to-and-fro movement of said washing element independently of any movement of said container and also for rotating said container to discharge liquid through said wall apertures, means for raising said container to an extracting position and for lowering said container to a washing position, and an annular trough surrounding said container inside said casing and located below said wall apertures during the rotation of said container so as to receive the liquid expelled therefrom during such rotation.

2. In a combined clothes washing and extracting machine, in combination, a casing adapted to hold washing liquid, a container located inside said casing and having its side and bottom walls conforming to a surface of revolution about a vertical axis, the lower portion of said side walls being slanted outwardly and upwardly and substantially devoid of perforations, the upper portion of said side walls being perforated above said slanting portion, a clothes agitating element located inside said container, means working through the bottom of said casing and container for producing a reciprocating movement of said element and also for rotating said container to discharge liquid through said wall apertures, means for raising said container to an extracting position and for lowering said container to a washing position, and an annular trough surrounding said container inside said casing to receive the liquid expelled therefrom during the rotation thereof, said trough being located at a lower level than that defined by the lowermost of said wall apertures during the extracting operation.

3. In a laundry machine, a combined clothes container and centrifuge having substantially the shape of a very oblate spheroid mounted with its axis vertical and having water discharge apertures formed in its equatorial zone and an opening through its upper polar zone, in combination with a washing element located inside said clothes

container and movable independently thereof.

4. In a clothes washing machine, a casing, a circular container for clothing therein having a perforated wall for the circulation of liquid, an oscillatable dasher mounted in said container on a vertical axis, and means for oscillating said dasher about said axis, said dasher having radial blades and having at its lower end an outwardly flaring circular disk, said disk underlying the clothing and overlapping the container bottom.

5. In a laundry machine, a casing, a circular tub therein, an oscillatable dasher mounted on a vertical axis inside said tub and having at its lower end a circular disk close to the tub bottom, and means for selectively oscillating said dasher and spinning said tub, the lateral wall of said tub having perforations and the bottom wall being perforated outside of said disk.

6. In a laundry machine, a casing, a vertical bearing in its bottom, a shaft rotatably and slidably mounted in said bearing, a container in said casing, a washing element in said container operatively connected to said shaft, means for raising and lowering said shaft, means for securing said container to said shaft to rise and rotate therewith, said container when elevated being located above the liquid contents of the casing, a pinion carried by said shaft and mechanism beneath said casing for driving said pinion, said mechanism including a constantly rotating gear engaged by said pinion at its uppermost position and a constantly reciprocating rack engaged by said pinion at its lowermost position.

7. In a laundry machine, a casing, a vertical bearing in its bottom, a shaft rotatably and slidably mounted in said bearing, a container in said casing, a washing element in said container operatively connected to said shaft, means for raising and lowering said shaft, means for securing said container to said shaft to rise and rotate therewith and for disengaging said container from said shaft at its lowest position, said container when elevated being located above the liquid contents of the casing, a horizontal drive shaft beneath said casing having two spiral gears thereon, a rack gear oscillatably mounted below said drive shaft, driving connections for said rack gear including one of said spiral gears, and a spiral pinion on said first shaft adapted at opposite limits of its vertical movement to mesh with said other gear and said rack gear selectively.

8. In a laundry machine a tub having a bottom, an agitator journaled in said tub on a vertical axis and having a bottom disk recessed underneath and having its margin located close to the tub bottom, said bottom having a slant-topped elevation rising into such recess, and also an annular trough outside of said agitator, and drainage provisions in said trough, said trough having its inner wall slanting downwardly and outwardly outside of the margin of said agitator.

9. In a laundry machine a tub, a vertical shaft projecting through the tub bottom, an agitator carried by said shaft and having at its lower end a circular disk which overlies the tub bottom, said tub bottom being slanted downwardly and outwardly outside of said disk to define an annular trough, and drainage provisions at the lowest point of said trough.

10. In a combined clothes washing and extracting machine, a sheet metal container having a region of maximum diameter intermediate the top and bottom thereof, said region having water discharge perforations therein, a casing surrounding said container, the lower part of said casing conforming closely to the shape of the portion of said container below the largest part of said container, means for supporting said container at different heights in said casing.

11. A washing machine comprising: a casing for washing liquid, a perforated tub adapted to be immersed in said washing liquid, or to be disposed clear of said liquid, and an oscillatable dasher in said tub having a base adjacent to the bottom thereof and underlying the articles being washed; said tub and dasher being mounted for movement relative to a common axis; and means for effecting oscillating movements of said dasher about the axis of said tub when the latter is immersed in said liquid and for rotating said tub when disposed above the liquid.

12. A washing machine comprising: a casing, a tub and an agitating device in said tub, said tub and agitating device being relatively movable about a common axis, and said tub and agitating device being axially shiftable with respect to said casing; means for effecting oscillating movements of said agitating device about the axis of said tub and for rotating said tub; and an annular trough adapted to catch liquid discharged centrifugally from said tub.

13. A washing machine comprising: a casing, a tub in said casing, and an oscillatable dasher in said tub, said tub and dasher being adapted for movement about a common axis relative to said casing and also movable about said axis with respect to each other; means for raising and lowering said tub and dasher; means for effecting oscillating movements of said dasher about the axis of said tub when in its lowered position and for rotating said tub when in its elevated position; and an annular trough adapted to catch liquid discharged from said tub during such rotation.

14. In a combined clothes washing machine and extractor, a container having approximately the form of the equatorial zone of a

highly oblate spheroid and formed with liquid discharge apertures at its region of greatest diameter, the side wall being substantially imperforate elsewhere.

15. In a laundry machine, a casing, a clothes container in said casing, a washing element located in said container and mounted for oscillation about a vertical axis, means for raising and lowering said container and washing element, said container when lowered being immersed in the liquid contents of said casing and when elevated being located above the liquid contents of the casing, a rotating member and an oscillating member located beneath said casing, and means operative upon the elevation of said container for automatically connecting said rotating member thereto in operating relation and automatically disconnecting said oscillating member from said washing element, said means also operative upon the lowering of said container to connect said oscillating member automatically to said washing element and to disconnect said container automatically from said rotating element.

16. In a laundry machine in combination, a casing, a clothes container in said casing, an agitator located in said container and mounted for oscillation about a vertical axis, means for raising and lowering said container and agitator relatively to said casing so as to locate the same above the washing liquid and immerse the same in such washing liquid respectively, oscillating mechanism and rotating mechanism located below said casing, means operative solely when said container and agitator occupy their lowered position for connecting said oscillating mechanism to said agitator and for disconnecting said rotating mechanism from said container, and means operative upon the elevation of said container and agitator for connecting said rotating mechanism to said container and disconnecting said oscillating mechanism from said agitator.

17. In a laundry machine, in combination, a casing, a container located inside said casing, an agitator located inside said container and mounted therein for oscillation about a vertical axis, a lever pivoted outside said casing upon a horizontal axis, connections between said lever and container for raising and lowering said container inside said casing, oscillating mechanism and rotating mechanism located below said casing, means operative when said container is lowered for automatically connecting said oscillating mechanism to said agitator, said means serving upon the elevation of said container to disconnect said agitator from such oscillating mechanism, and means operative upon the elevation of said container for connecting such rotating mechanism thereto, said means also serving to disconnect said container from said rotating mechanism when lowered.

18. In a laundry machine, a casing for the reception of detergent liquid, a hollow vertical sleeve carried by the casing bottom and rising above liquid level, a second vertical sleeve surrounding said first sleeve and movable relatively thereto, a container for articles to be washed secured to said second sleeve coaxial therewith and having its wall formed to discharge liquid centrifugally upon rapid rotation, a third vertical sleeve surrounding said second sleeve and movable relatively thereto, dasher blades carried by said third sleeve, a rotating member and an oscillating member located below said casing, shaft means working through said first sleeve, means located beneath said casing and working in cooperation with said shaft-means for raising and lowering said second and third sleeves, and means operative upon elevation of said second and third sleeves to disconnect said third sleeve from said oscillating member and to connect said second sleeve in operated relation to said rotating member, said means also operative upon lowering of said second and third sleeves to disconnect said second sleeve from said rotating member and to connect said third sleeve in operated relation to said oscillating member.

19. In a clothes washing machine, a casing, a container for clothing located inside said casing and defining with the casing wall a narrow annular liquid space, said container being everywhere circular in horizontal section and its side wall being outwardly rounded in vertical-section adjacent to its upper and lower margins, in combination with an ocillatable dasher mounted inside said container on a vertical axis and having at its lower end a circular flaring disk which projects close to the bottom of said container, said dasher also having blades projecting from said disk, and said side wall having apertures adjacent to its portion of greatest diameter, there being an imperforate region between said perforations and the top rim of said container.

20. In a combination washing machine and extractor, a casing having an upright sleeve, an extractor having an upright sleeve adapted to loosely surround said first sleeve, a washing element having a sleeve loosely surrounding said second sleeve, a shaft in said first sleeve having said washing element secured thereto, means for moving said shaft vertically, means for connecting said shaft to said second sleeve at one height and for disconnecting it therefrom at a different height, and means for imparting to said shaft a different type of motion at different heights.

21. In a combined washing machine and extractor, a casing having an upright sleeve, an extractor in said casing having a central sleeve loosely surrounding said first sleeve,

said second sleeve having a collar overlapping the top of said first sleeve and interiorly toothed, a vertical shaft in said first sleeve having a fluted portion adapted to fit the teeth of said collar and also having adjacent thereto a reduced neck adapted to pass freely through said collar, means for raising and lowering said shaft and thereby engaging and disengaging said shaft relative to said central sleeve, and driving mechanism adapted to rotate said shaft when the same is located at the height which causes said fluted portion to engage the teeth in said collar.

22. In a combined washing machine and extractor, a casing having an upright sleeve, an extractor in said casing having a central sleeve loosely surrounding said first sleeve, said second sleeve having a collar overlapping the top of said first sleeve and interiorly toothed, a washing device in said container, said device having an interiorly toothed socket located above said collar, a vertical shaft in said first sleeve having a fluted head adapted to fit said socket and also having a neck adapted to project loosely through said collar, means for raising and lowering said shaft, a motor, and mechanism for connecting said motor to said shaft in oscillating relation at one elevation and in rotating relation at another elevation.

23. In a combined washing machine and extractor, in combination, a casing, a container in said casing, a washing device in said container, a vertical shaft rotatably and slidably mounted in the bottom of said casing having said washing device secured thereto, a spiral pinion fixed on said shaft below said container and rotatable therewith, means for raising and lowering said shaft and pinion, a horizontal shaft having two spiral gears thereon, a pinion meshing with one of said gears, a rack operatively connected to said last pinion and adapted to engage said first pinion in one position of the latter, the second of said spiral gears being located so as to engage said first pinion at another position of the latter, said first pinion and rack also having spiral teeth, and means for connecting said shaft to said container in driving relation at the elevation corresponding to the engagement of said pinion with said second gear and disconnecting it from said container at the elevation corresponding to its engagement with said rack.

24. In a combined washing machine and extractor, in combination, a casing, a vertical shaft journaled in said casing adapted to operate a washing and extracting mechanism, a pinion carried by said shaft beneath said casing, means compelling said shaft and pinion to rotate together at all times while permitting vertical movement of said pinion along the axis of said shaft, a horizontal shaft beneath said casing, two spiral gears carried by said horizontal shaft, a pinion meshing with one of said gears, a rack operatively connected to said last pinion and movable transversely of said first shaft, and means for raising and lowering said first pinion, said first pinion meshing with said rack at one position of its elevation and with the second of said gears at another position of its elevation, and being out of contact with either said rack or said gear at a third position of elevation, said first pinion having spiral teeth to mesh with said second gear and said rack having spiral teeth to correspond to those of said first pinion.

25. In a combined washing machine and extractor, a casing, a hollow vertical sleeve carried by the casing bottom and rising therefrom, a clothes container inside said casing and also having a hollow vertical sleeve carried by its bottom and rising therefrom, said last sleeve surrounding said first sleeve, a washing element inside said container adjacent to the bottom thereof and having vanes extending upwardly therefrom, the side of said container having perforations for the passage of liquid, a rotatable power shaft below said casing, two sets of movement-converting mechanism operatively connected to said shaft and adapted to produce both rotational movement and oscillating movement, a vertically movable shaft inside said first sleeve for transmitting such movement to said container and washing element respectively, and means at the upper end of said second sleeve for connecting said shaft to and disconnecting it from said container according to its height and also to connect said shaft means to said washing element to impart back and forth motion thereto.

26. In a combined washing machine and extractor, a casing, a hollow vertical sleeve carried by the casing bottom and rising therefrom, a clothes container inside said casing and also having a hollow vertical sleeve carried by its bottom and rising therefrom, said last sleeve surrounding said first sleeve, and said container adapted to have clothes washed and extracted therein, a washing element located in the bottom part of said container and having vanes extending upwardly therefrom, a rotatable power shaft below said casing, two sets of movement-converting mechanism operatively connected to said shaft and adapted to produce both rotational movement and oscillating movement, a vertically movable shaft inside said first sleeve for transmitting such movement to said container and washing element respectively, means for connecting said shaft to said washing element in operating relation, and interfitting provisions carried by the upper end of said shaft and by the upper end of said second sleeve, whereby said shaft is connected to said container when said shaft stands at one elevation and is disconnected from said

container when said shaft stands at a second elevation.

27. In a combined clothes washing machine and extractor, a casing having an upright sleeve, an extractor in said casing having a central sleeve loosely surrounding said first sleeve, said second sleeve having a collar overlapping the top of said first sleeve and interiorly toothed, a vertical shaft in said first sleeve having a fluted portion adapted to fit the teeth in said collar and also having adjacent thereto a reduced neck adapted to pass freely through said collar, means for shifting said extractor and shaft vertically one relatively to the other to cause said fluted portion to be engaged with and disengaged from said collar, and driving mechanism adapted to operate said shaft.

28. In a combined clothes washing machine and extractor, a casing having an upright sleeve, washing means and extracting means in said casing, said extracting means having a central sleeve loosely surrounding said first sleeve, said second sleeve having a collar overlapping the top of said first sleeve and being interiorly toothed, vertical shaft-means projecting through said first sleeve and having two vertically spaced fluted portions having teeth complementary to the teeth of said collar, one of the fluted portions of said shaft-means being selectively engageable therewith and the other of the fluted portions of said shaft-means being provided for driving engagement with said washing means, and also having between said fluted portions a reduced neck adapted to pass freely through said collar, said neck having a length greater than the height of the toothed portion of said collar, said collar and shaft-means being vertically movable one relatively to the other to engage and disengage said shaft means and central sleeve, and driving mechanism operatively connected to said shaft-means to produce rotative movement and oscillating movement thereof.

29. In a laundry machine, a casing, an upright sleeve therein, a tub in said casing having a vertical sleeve surrounding said first sleeve, a dasher in said tub having a vertical sleeve surrounding said second sleeve, a vertical shaft slidably and rotatably mounted in said first sleeve, the upper end of said shaft having two engaging portions, one for said second sleeve and one for said third sleeve, and said second and third sleeves being formed to cooperate therewith, and means for raising and lowering said shaft, the engaging portions thereof being so related to said second sleeve as to become disconnected upon lowering said shaft and connected upon raising said shaft.

30. In a laundry machine, a casing, an upright sleeve therein, a tub in said casing having a vertical sleeve surrounding said first sleeve, a dasher in said tub having a vertical sleeve surrounding said second sleeve, a vertical shaft slidably and rotatably mounted in said first sleeve, the upper end of said shaft having two engaging portions, and a reduced neck between them, said second sleeve being constructed to engage with the lower portion and said third sleeve being constructed to engage with the upper portion, means for raising and lowering said shaft, and mechanism for rotating said shaft when in elevated position and oscillating it when in lowered position, the lower engaging portion being formed when raised to engage and elevate and drive said second sleeve and when lowered to lower and disengage said second sleeve.

31. In a laundry machine, a casing having an upright sleeve, an extractor in said casing having a central sleeve loosely surrounding said first sleeve, said second sleeve having interiorly projecting teeth located above the top of said first sleeve, a vertical shaft in said first sleeve having a fluted portion adapted to fit said teeth and also having adjacent thereto a reduced neck adapted to pass freely through the aperture defined by said teeth, said shaft and extractor being vertically shiftable one relatively to the other to produce engagement and disengagement between said teeth and said fluted portion, means for operating said shaft, and means for maintaining said shaft and said extractor in their relative selected positions of adjustment.

32. In a combined washing machine and extractor, a casing having an upright sleeve, an extractor in said casing having a central sleeve loosely surrounding said first sleeve, said second sleeve having interiorly projecting teeth located above the top of said first sleeve, a washing device in said container, said device having an interiorly toothed socket located above said first teeth, a vertical shaft in said first sleeve having a fluted head adapted to fit said socket and also having a neck adapted to project loosely through the aperture defined by said teeth, said shaft and extractor being vertically shiftable one relatively to the other to produce engagement and disengagement between said teeth and fluted head, means for maintaining said shaft and extractor in their relative selected position of adjustment, a motor, and mechanism for connecting said motor to said shaft in oscillating relation and in rotating relation selectively.

33. In a combined washing machine and extractor, a casing having an upright bearing, vertical shaft-means journaled in said bearing and having vertically spaced fluted portions, washing means and extracting means in said casing, said extracting means having a central sleeve coaxial with said bearing and formed with interiorly projecting teeth adapted to interfit with said fluted por-

tions selectively, said shaft-means and extracting means being vertically shiftable, one relatively to the other, to produce engagement and disengagement between said teeth and one of the fluted portions of said shaft-means, the other of the fluted portions of said shaft-means being provided for driving engagement with said washing means, means for maintaining said extractor and shaft-means in their relative selected positions of adjustment, and means for imparting oscillating and rotating movements to said fluted portions.

34. In a clothes washing and extracting machine, in combination, a casing for holding the washing liquid, a clothes container therein, means for raising and lowering said container so as either to immerge its contents in said washing liquid, or to elevate the same above the level of the liquid, an agitator in said container having a hub with blades extending therefrom, means working through the bottom of said container and casing for oscillating said agitator independently of said container when said container is lowered, and means for rotating said container in its raised position.

35. In a clothes washing and extracting machine, in combination, a casing for holding the washing liquid, a clothes container therein, means for raising and lowering said container in said casing so as either to raise it above said washing liquid, or to immerge its contents in said liquid, an agitator located in said container having a plate portion with liquid agitating blades traversing the face of the plate and projecting therefrom and mounted for angular oscillation about a vertical axis relative thereto, means for oscillating said agitator to effect the washing operation, and means operative when said container is in its elevated position for rotating said container about its vertical axis.

36. In a clothes washing and extracting machine, in combination, a casing for holding a detergent liquid, a clothes container in said casing adapted to be positioned adjacent to the bottom of the casing and in the liquid during the time the washing operation takes place, liquid circulating vanes located adjacent to the bottom central portion of said container and projecting upwardly therefrom, means for oscillating said vanes about a vertical axis and means for rotating said container to discharge its liquid contents.

37. In a combined clothes washing machine and extractor, in combination, an agitator oscillatable about a vertical axis to effect the washing operation, a centrifuge container rotatable about a vertical axis to extract adherent liquid from the clothing, driving means for said agitator and container comprising a source of power, a pair of axially aligned spiral gears driven by said source of power, the axes of said gears being substantially at right angles to the axis of said agitator and container, a continuously driven worm gear meshing with one of said spiral gears, motion translating means for connecting said worm gear to said agitator to effect its oscillation, a second worm gear meshing with the other of said spiral gears and coaxial with said container and operatively connected thereto, and a friction clutch having a part fixed to rotate with said source of power and said first worm gear and having another part movable along the axis of said spiral gears for connecting and disconnecting said second spiral gear to and from said source of power.

38. In a laundry machine, a casing, an upright sleeve therein, a container in said casing having a vertical sleeve movably surrounding said first sleeve, a dasher in said container having a vertical sleeve movably surrounding said second sleeve and also having blades located in position to be immersed in the liquid contents of said container, operating mechanism located beneath said casing, said mechanism comprising an oscillating element and a rotating element, and a vertically movable shaft working in said first sleeve for connecting said rotating element to said second sleeve and for connecting said oscillating element to said third sleeve.

39. In a laundry machine, an upright casing having an unobstructed top opening, an upright sleeve rising from the bottom of said casing, an upright, open-topped container in said casing having a vertical sleeve movably surrounding said first sleeve and coaxial therewith, a dasher in said container having a vertical sleeve movably surrounding said second sleeve and also having liquid-agitating blades, vertical shaft-means journaled inside said first sleeve for supporting and operating said second and third sleeves, driving mechanism located beneath said casing, and mechanism including said shaft-means for connecting said driving mechanism in operative relation to said second and third sleeves selectively.

40. In a laundry machine, a casing, an upright stationary hollow sleeve located therein and having its lower end secured to the casing-bottom in leak-tight relation, a vertical shaft movably mounted inside said sleeve, means located beneath said casing for operating said shaft, two hollow sleeves located inside said casing one outside the other and both surrounding and coaxial with said first sleeve, means for securing the upper ends of said two last-named sleeves independently to said shaft above said first sleeve, agitator blades carried by one of said last mentioned sleeves, and a container carried by the other of said last mentioned sleeves.

41. In a combined clothes-washing and extracting machine, a casing, a vertical sleeve

in the bottom thereof, a vertical shaft in said sleeve, a clothes-container concentric with said shaft inside said casing and movable vertically to and ~~between~~ positions in and out of liquid contact, a washing-element in said container operatively connected to said shaft, a driving-element located below said casing, two selectively operable driving connections between said driving element and shaft, one of said connections serving to rotate said shaft continuously in one direction and the other serving to rotate said shaft first in one direction and then in the opposite direction, said washing-element being of a type to be actuated by such oscillation, means for detachably connecting said shaft to said container whereby the same may be elevated and rotated, means independent of said shaft for supporting said container during the washing operation, a lever adapted and arranged for raising and lowering said shaft, and means operative upon determined changes in position of said lever to connect said driving element to said shaft through one or the other of said driving connections.

42. In a combined clothes-washing and extracting machine, a casing, a vertical sleeve in the bottom thereof, a vertical shaft in said sleeve, a clothes-container concentric with said shaft inside said casing and movable vertically to and between positions in and out of the liquid, a washing-element in said container operatively connected to said shaft, means for detachably connecting said container to said shaft whereby the container may be raised and rotated for extracting adherent liquid from its fabric contents, means independent of said shaft for supporting said container during the washing operation, a pedal for raising and lowering said shaft, a driving-element located beneath said casing, two selectively operable driving-connections between said driving-element and shaft, one of said connections serving to rotate and the other to oscillate said shaft angularly, said washing-element being of a type to be actuated by such oscillation, and means operatively connected with said pedal for automatically connecting said driving-element and shaft through one or the other of said connections according to the position of said pedal.

43. In a washing machine, a casing, a vertical bearing sleeve therein, a clothes-container inside said casing adapted to rest upon a stationary part of said casing during the washing operation, a washing-element in said container having blades adapted to produce liquid movement when oscillated angularly, a shaft projecting through said sleeve, driving-connections between said shaft and washing element, means for connecting said shaft to said container, a lever located for actuation by the operator, operative connections from said lever to said shaft for elevating said shaft to lift said container out of contact with the washing liquid, a driving-element, means operative when said lever is in one position for connecting said driving-element to said shaft in a manner to produce angular oscillation thereof relative to said container, and means operative when said lever is in another position for connecting said driving-element to said shaft in a manner to rotate the same continuously in one direction.

44. In a combined clothes washing and extracting machine, a casing, a container therein, a vertical shaft traversing the bottom of both said casing and container, a driving-element below said casing, operative connections between said driving-element and said shaft adapted to impart to said shaft either a motion of angular oscillation or a motion of continuous rotation, a washing element having a base portion overlying the bottom of said container and connected to said shaft, means for securing said shaft detachably to said container in rotating relation in addition to said washing element, said washing element having liquid agitating blades, and means for supporting the container close to the bottom of the casing during the washing operation.

45. In a combined washing machine and centrifuge, in combination, an upright liquid-containing casing, an upright container, means for supporting said container inside said casing and close to the casing bottom, said container having an apertured side wall defining a surface of revolution about its axis, a washing element located inside said container and having liquid agitating blades extending upwardly from the bottom thereof and adapted to set up currents of liquid upon oscillation of said washing-element about a vertical axis, an electric motor, two trains of gearing, one train including oscillating elements and the other train including rotating elements, and means for connecting said oscillating element to said washing-element in operating relation and for connecting said rotating elements to said container in rotating relation, said means including a manually operable element outside of said casing and also including a selectively positioned part whereby simultaneous connection of said oscillating and rotating elements is rendered impossible.

46. In a combined clothes-washing and extracting machine, a casing, a vertical shaft therein, an upright container located therein and having liquid circulation apertures formed at a plurality of different elevations in its side wall, said side wall defining a surface of revolution about said shaft, means including an electric motor for oscillating said shaft angularly about its axis, a washing element located inside said container and comprising liquid agitating blades extending upwardly from the bottom thereof, operative

connections between said shaft and washing element, means for connecting said shaft to said container, means including the same motor for thereafter rotating said shaft and container, said means being interdependent and exclusive each of the other and said container being located close to the bottom of said casing during the operation of said oscillating means.

47. In a combined clothes washing and extracting machine, a casing, a container inside said casing and having side walls which define a surface of revolution about a vertical axis, said casing and container having registering openings at their upper ends and the wall of said container being formed to allow the centrifugal expulsion of its liquid contents upon the rapid rotation of said container about its axis, a washing-element mounted on a vertical axis inside said container and movable relative to said container, said washing-element having blades extending upwardly and outwardly therefrom and adapted to produce liquid currents when said washing element is oscillated angularly about its axis, an electric motor, means for supporting said motor relative to said casing, gearing including oscillating devices for connecting said motor to said washing element in operating relation, gearing including rotating devices for connecting said motor to said container in rotating relation, means for effecting the attachment of said gearing selectively to said washing-element and container and preventing the attachment of said gearing simultaneously to said washing-element and container, and means for supporting said container in close proximity to the bottom of said casing during the connection of said motor to said washing-element.

48. In a clothes washing and extracting machine, a casing, a foraminous walled container inside said casing, a washing element inside said container, reciprocating mechanism for said element and rotating mechanism for said container located below said casing and working through the bottom thereof, a pedal pivoted on a horizontal axis beneath said casing and means controlled by said pedal and operative when said pedal stands at one limit of its movement for causing the actuation of said reciprocating mechanism, and operative when said pedal stands at the other limit of its movement for causing the actuation of said rotating mechanism, means connecting said washing element to said reciprocating mechanism for producing a washing operation, means securing said container to said rotating mechanism for producing an extracting operation, means for supporting said container close to the bottom of said casing during the connection of said reciprocating mechanism to said washing element, means connecting said pedal to said container whereby said container is elevated above liquid level by the movement of said pedal to effect connection of said rotating mechanism to said container, and means for releasably securing said pedal in its last-named position.

49. In a combined washing and extracting machine, a container for the articles to be washed, means for washing the articles therein and also for rotating said container at extracting speed, a sheet metal casing surrounding said container and arranged to catch the liquid expelled therefrom, and a metal shield surrounding the liquid-contacting part of said casing and defining therewith an annular air-chamber, and serving to protect the casing both against blows and against heat-loss.

50. In a laundry machine, a casing having a circular bottom formed with an upwardly rounded side wall and an outwardly displaced annular portion in the upper part thereof, and a circular side wall member spaced from and surrounding said rounded portion and in contact with said annular portion, said side wall member extending upwardly above said annular portion.

In testimony whereof I hereunto affix my signature.

JAMES B. KIRBY.

CERTIFICATE OF CORRECTION

Patent No. 1,911,903. May 30, 1933.

JAMES B. KIRBY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 75, for "15" read "115"; page 5, line 10, claim 4, after "disk" insert the words "coaxial with said vertical axis"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of August, A. D. 1933.

M. J. Moore.

(Seal) Acting Commissioner of Patents.