March 26, 1935. J. B. KIRBY 1,995,926

LAUNDRY MACHINE

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FIG. 1

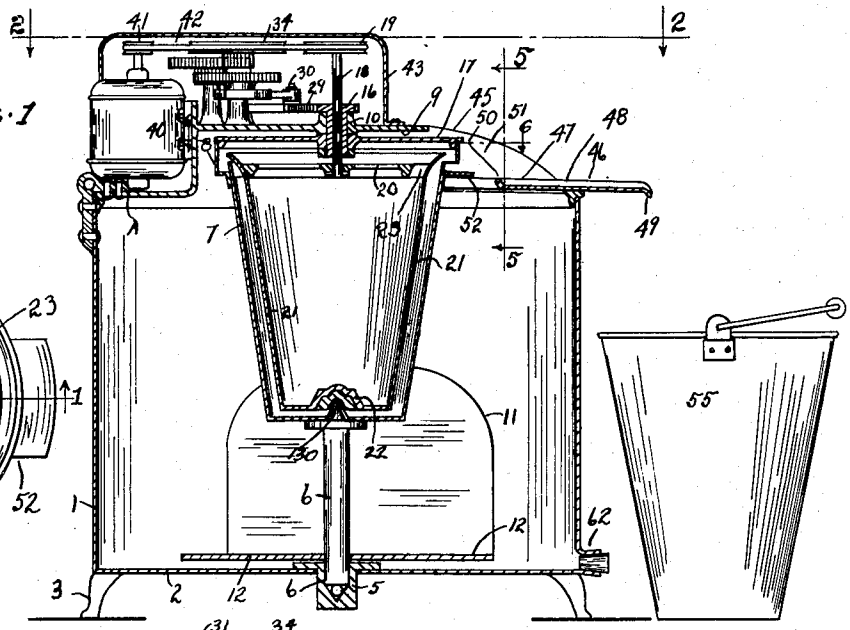


FIG. 6

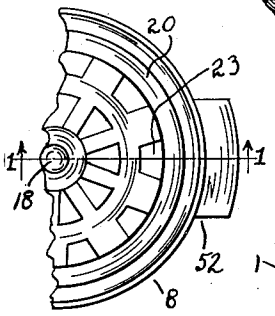


FIG. 3

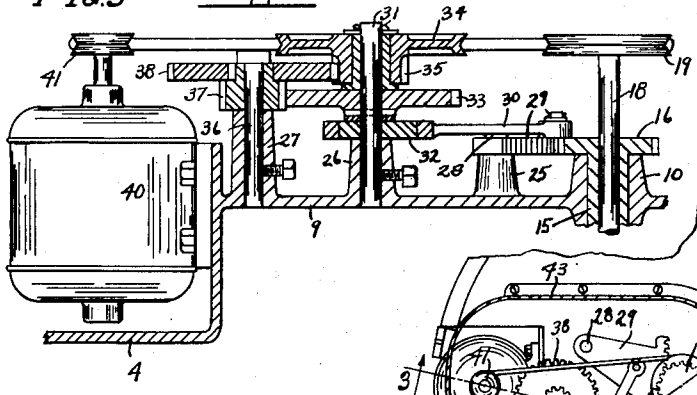


FIG. 2

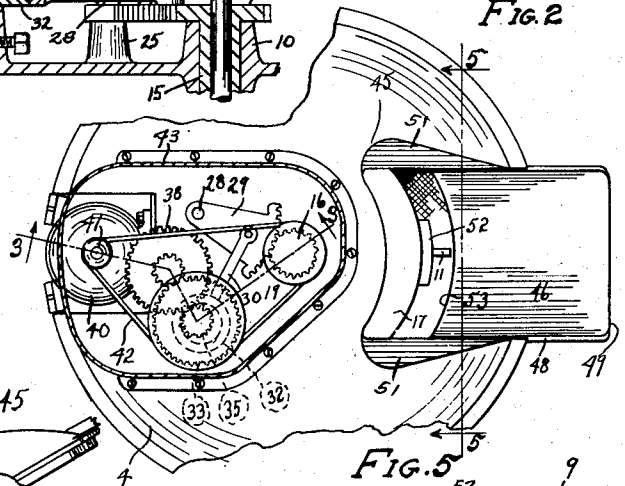


FIG. 4

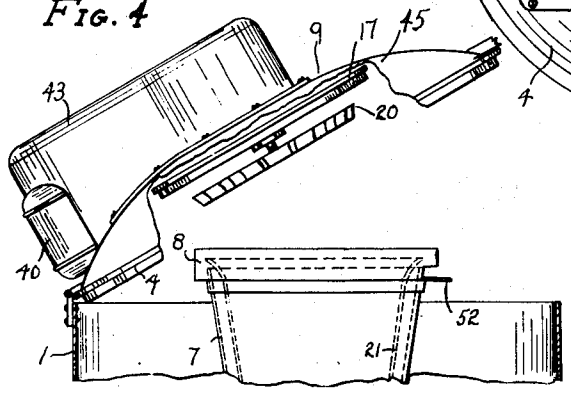
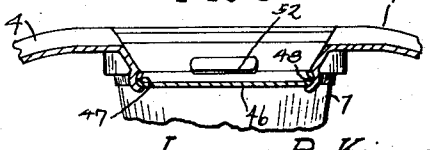


FIG. 5



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FIG. 7

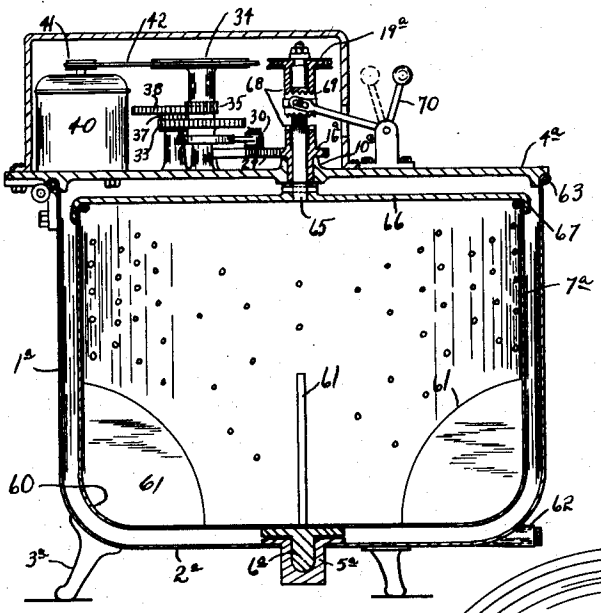


FIG. 9

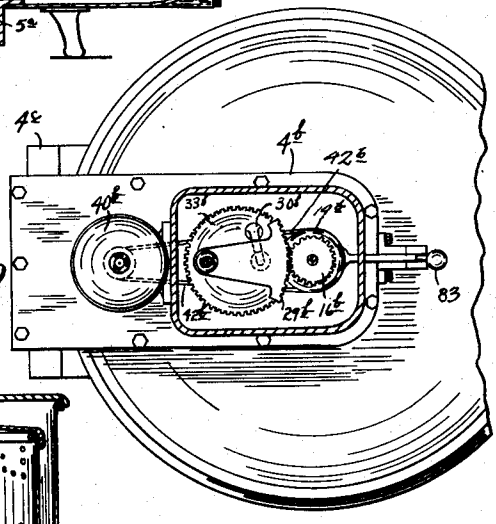
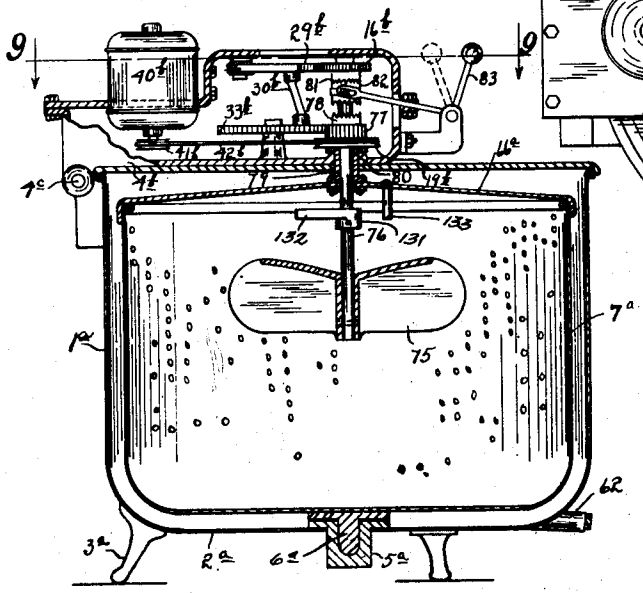


FIG. 8



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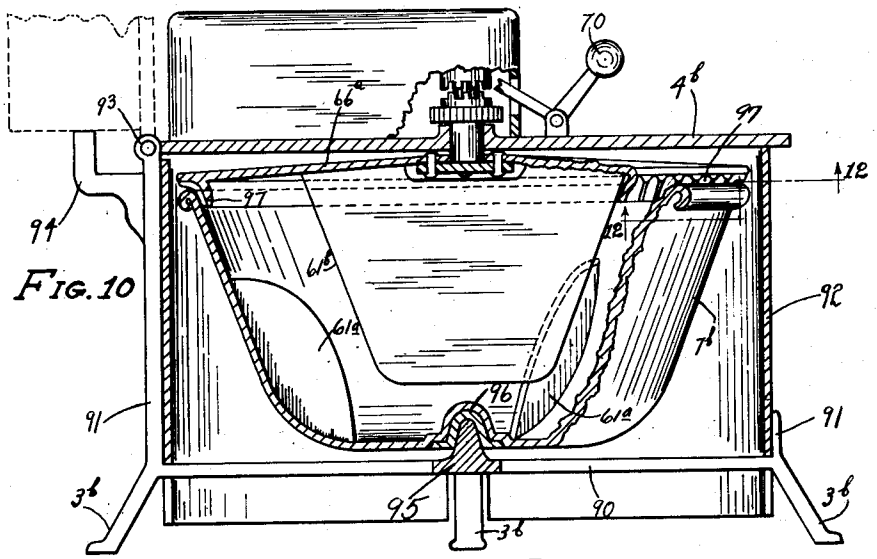


FIG. 10

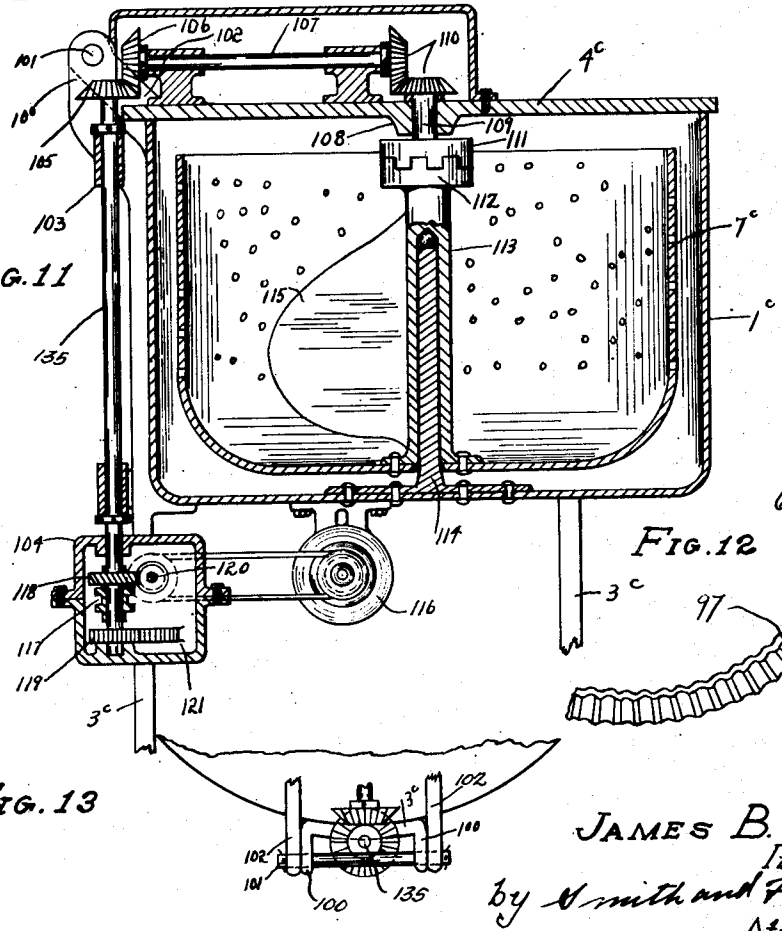


FIG. 11

FIG. 12

FIG. 13

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UNITED STATES PATENT OFFICE

1,995,926

LAUNDRY MACHINE

James B. Kirby, West Richfield, Ohio, assignor, by mesne assignments, to The Apex Electrical Manufacturing Company, Cleveland, Ohio, a corporation of Ohio, as trustee

Application July 21, 1930, Serial No. 469,573

13 Claims. (Cl. 68—15)

This invention relates to combined clothes washing and extracting machines and has for its objects the provision of a new, compact, and simple mechanism of this nature capable of inexpensive manufacture and designed particularly to be made of small size to serve the needs and capacities of apartments and rented rooms, and also of families who send their heavy work to commercial laundries, but who frequently desire to do some amounts of miscellaneous washing at home. The objects of the invention are the provision of a new mode of mounting and connecting the driving-elements of such a machine so as to secure added compactness and simplicity and enable inexpensive production and convenient storage, while still serving the purposes in view in an efficient manner; the provision of a combined washing machine and centrifuge in which the power connection is at the top and in which the difficulties of leakage, lubrication, and machine-control are substantially diminished. A subsidiary object of the invention is the provision, in some models, of a new and improved arrangement of the washing and extracting compartments providing compactness while still enabling simultaneous use; and the provision of new expedients for controlling the effluent from the extractor compartment. Other objects and advantages of the invention will become apparent as the description proceeds.

An illustrative embodiment of my invention is shown in the accompanying drawings in which Fig. 1 is a vertical sectional view through a combined washing and extracting machine containing my improvements; Fig. 2 is a sectional view corresponding to the line 2—2 of Fig. 1; Fig. 3 is a sectional view drawn to enlarged scale taken on the broken line 3—3 of Fig. 2; Fig. 4 is a partial view, partly in elevation and partly in section, showing the mode of securing access to the respective compartments; Fig. 5 is a sectional view corresponding to the line 5—5 in Figs. 1 and 2; and Fig. 6 is a sectional view corresponding to the line 6—6 of Fig. 1; Figs. 7 and 8 are vertical sectional views through two modified types of machines containing some at least of the invention, and Fig. 9 is a horizontal sectional view corresponding to the line 9—9 of Fig. 8; Figs. 10 and 11 illustrate other modifications and Fig. 12 is a sectional view on the line 12—12 of Fig. 10; and Fig. 13 is a fragmentary top plan view showing the cover hinge of Fig. 11.

One form of my improved machine as shown in Figs. 1 to 6, comprises an upright casing 1 of any desired horizontal section, having a bottom 2 and suitable legs 3. This casing acts as a frame for supporting the other parts, its upper end having a hinged cover 4, and its bottom 2 having an upwardly facing socket-member 5 in which is rotatably mounted the stud 6 projecting from the lower end of the hollow shell 7. The upper end of this shell is surrounded by an annular gutter 8 and the middle part of the cover is elevated to define a downwardly facing recess 9 into which the upper end of this shell projects, so as to rise above the top of the wall 1. The top wall of this recess is formed with a vertical bearing 10 in line with the socket 5. The shell 7 is defined by a surface of revolution about the vertical axis defined by these two bearings and flares outwardly from the bottom towards the top, and its exterior is provided with projecting blades or vanes 11 which may have any desired pattern, although in case they project near the bottom 2 they are preferably connected to a horizontal circular disk 12, since this oftentimes reduces the tendency of clothing to become wedged between the blades and the casing bottom.

Journaled in the bearing 10 is a hollow sleeve 15 having at its upper end a toothed pinion 16 and at its lower end a connecting element here represented by a circular inner lid 17 fitted to the top of the gutter 8. Rotatably journaled inside the sleeve 15 is a vertical shaft 18 having at its upper end the belt-wheel 19 and at its lower end the inner cover 20. Rotatably mounted inside the shell 7 is the extractor-container 21 having an upwardly flaring side-wall defined by a surface of revolution coaxial with that of the shell 7 and overlapping the upper end of said shell so that liquid discharged centrifugally therefrom will fall into the gutter 8. The lower end of the container 21 is provided with a socket 22 receiving a pivot element 130, which projects through the hollow shell 7, the pivot element being integral with the top of the stud 6, and the upper end of said container tightly receives the inner cover 20, which in this instance is shown as fitting inside the container and formed in its periphery with notches 23 to permit the free escape of liquid.

The result of this construction is to provide an extractor inside of an agitator, the former being rotatable and the latter oscillatable, and I find it advantageous for several reasons to operate both from above, by means of mechanism carried by the cover 4 and suitably connected to these elements in driving relation. The detailed construction of the mechanical movement may take any one of many forms, a very satisfactory device being constructed as follows:

The top of the cover is provided at one side of the sleeve 10 with three hollow posts, 25, 26, and 27. A vertical stud 28 carried by the post 25 is journaled to the toothed gear-segment 29 meshing with the pinion 16 and having articulated thereto a connecting-rod 30. On a vertical stud 31 carried by the post 26 is journaled, first an eccentric 32 by which the rod 30 is operated and having rigidly connected thereto a spur-gear 33; and above said spur-gear and rotatable freely relative thereto is a belt-pulley 34 in the same plane with the pulley 19 and having a spur-pinion 35 rigid therewith. Journaled on an upright stud 36 carried by the post 27 is a spur-pinion 37 meshing with the gear 33 and having rigid therewith a gear 38 meshing with the pinion 35. Also secured to the cover is an electric-motor 40 having its axis vertical and having secured to its armature-shaft a belt-pulley 41, located in the same plane with the pulleys 19 and 34 and connected thereby by a single belt 42. This gear-mechanism can be made very compact and is preferably enclosed in a hollow housing 43 detachably secured to the cover 4.

One wall of the recess 9 is cut away as shown at 45 to disclose a portion of the upper end of the gutter 8 and the inner lid 17; the cover 4 is provided in front of this recess with a drainage shelf 46 inclined outwardly and slightly downwardly and slidable in ways 47 provided for the purpose at opposite sides. This shelf has upturned flanges 48 at its lateral margins, a down-turned lip at 49 at its forward end and an up-turned lip 50 at its rearward end. At the two sides of this shelf 46 the cover 4 is formed with a downwardly slanting wall 51 and the side wall of the shell 7 is formed immediately below the cover 17 with an out-turned discharge lip 52 which overlaps the lip 50 when the shelf is shoved rearwardly. The rear margin of this shelf is formed on a curve as illustrated at 53 in Fig. 2 so as to embrace rather closely the periphery of the shell 7 and receive from the lip 52 all ejected liquid despite a considerable angular movement of said shell. When the shelf 46 is drawn forward as shown in Fig. 2 a gap is left between the same and the discharge lip so that the extracted liquid is returned to the washing compartment.

Fabric articles to be washed together with the necessary liquid are placed in the outer casing and fabrics to be centrifuged in the compartment 21, access being had to both by raising the cover as shown in Fig. 4 at which time the motor 40 is, of course, stopped. When the simple gearing here shown is employed both the oscillating action of the dasher and the rotation of the extractor occur simultaneously at all times, each without impeding the action of the other. The nature of the washing and extracting operation will be understood by those skilled in the art without special description. The liquid expelled centrifugally from the container 21 is caught by the whirling air and elevated along the slanting walls of the shell 7 until discharged from the lip 52 where it is either discharged back into the casing or out over the shelf 46 into a pail 55 provided therefor.

The washing machine shown in Figs. 7 and 8 has similar casings which comprise side walls 1^a and bottom walls 2^a likewise provided with legs 3^a and each bottom having a central socket member 5^a in which is journaled a stud 6^a carried by the bottom of a hollow foraminous container 7^a. The side wall of this container is preferably joined to the bottom wall by a rounded portion 60, and fixed vanes 61 carried inside this container serve for the agitation of its liquid and laundry contents when said container is oscillated about its vertical axis. The clearance between it and the casing 1^a is preferably made small and suitable means such as a spout and plug 62 is provided to remove the liquid contents. These casings also serve the double function of frames for supporting purposes and reservoirs for liquid holding purposes. The top of the wall 1^a is suitably stiffened as by a roll rim 63 and is provided with a hinged cover 4^a formed with a vertical bearing 10^a in line with the socket 5^a. Slidably and rotatably mounted in this bearing is a shaft 65 to which is secured a circular lid 66 having a depending rim 67 which fits around the top of the container 7^a in steadying and driving relation. Rotatably sleeved around said shaft above the bearing 10^a is the pinion 16^a, and wheel 19^a. The hubs of the last named pinion and pulley are formed with teeth 68 adapted to be engaged by complementary teeth carried by the clutch-spool 69 which is slidably splined to the shaft 65 between the two hubs and is adapted to be raised and lowered by the hand-lever 70. The gear 16^a meshes with a toothed segment 29 here shown as mounted and driven as in Figs. 1, 2, 3, and the belt-pulley 19^a is driven by a belt 42 from a motor 40 in the same way as before, viz: when the clutch-spool 69 occupies the position shown in Fig. 7, the container is rotated by the action of the belt 42 on the pulley 19^a, while the pinion 16^a oscillates idly under the action of the oscillating rack 29; when the clutch-spool is moved to its depressed position by shifting the lever 70 to the position shown in dotted lines in Fig. 7 said container is oscillated about its axis, the pinion 19^a revolving idly.

In the modification shown in Fig. 8 the casing is substantially the same as in Fig. 7, but the mechanism, instead of being carried by a cover which entirely closes the top of the casing, is carried in a mere hollow gear-box 4^b pivoted on a rather massive hinge 4^c at the rear. This gear-box is made hollow to accommodate the mechanism. In Fig. 8 I have also shown a dasher 75, separate from the container and located inside the same, being carried by a vertical shaft 76 depending from the gear-box and provided at its upper end with a toothed pinion 16^b. Rotatably sleeved on the shaft 76 is a belt-wheel 19^b having a toothed pinion 77 secured to its upper face and also a toothed hub 78. Depending from the pulley 19^b is the hollow sleeve 79 surrounding the shaft 76, and itself journaled in the bearing 80 of the gear-box, the lid 66^a being secured to the lower end of this sleeve. The pulley 19^b is driven by a belt 42^b from the pulley 41^b operated by the motor 40^b. The pinion 16^b meshes with the toothed segment 29^b which is operated by pitman 30^b articulated to a gear-wheel 33^b meshing with the pinion 77. The hub of the pinion 16^b is provided with clutch-teeth 81, and the shaft 76 is provided with a clutch-spool 82 slidable thereon by the lever 83 and adapted to engage the teeth 78 or 81 selectively. Fastened to the shaft 76, inside the cover 66^a, is a hub 131 formed with a projecting finger 132, adapted to engage a stud 133, fixed to the inner lid 66^a, when the machine is in extracting operation. When in washing operation the arc swung by the shaft 76 is small enough so that the finger 132 will not engage the stud 133.

The washing operation in Fig. 7 is effected by an oscillating motion of the entire container. In

the modification shown in Fig. 8 the washing operation is effected by a movement of the agitator independently of the container. In order to permit the extracting operation it is necessary to draw off the liquid by the spout 62 after each of the steps of washing, rinsing, bluing, etc., but the amount of liquid is small and the waste is not ordinarily noticed by the apartment dwellers and many rented apartments furnish hot water as a part of the rental agreement. The omission of provisions for handling or storing liquid substantially simplifies and cheapens the machine.

In the modification shown in Fig. 10 the container 7^b, instead of being perforated is imperforate throughout, the side walls being slanted upwardly and outwardly so as to cause liquid to be discharged centrifugally over the rim, and the interior of the container having dasher blades 61^a. The casing in this case comprises merely a skeleton frame comprising legs 3^b connected by horizontal braces 90 and provided with upright extensions 91 to receive and hold the splash-band 92 which has a wholly open bottom. One of the uprights 91 is extended to the top of the splash-band as shown at the left-hand side of Fig. 10 and is there provided with a hinge element 93 to which the cover 4^b is pivoted on a horizontal axis. The same mechanism may be employed as is shown in Fig. 7. I have here shown the upright 91 as provided with a bracket 94 to engage the gear-housing to hold the cover upright when open.

The braces 90 are provided at the center with an up-standing pivot element 95 to support the weight of the container and its contents. Preferably this container is formed with an indented socket 96 so that when the same is removed from the machine it can be set on a table or elsewhere to enable any desired portions of the washing operations to be performed by hand. The bottom of the connecting-element or inner lid 66^a is here shown as provided with a scalloped marginal flange 97 tapered to fit inside the container, the scallops permitting free escape of the liquid when extracting speed is obtained while preventing escape of the clothing. The inner lid can be provided with washing blades 61^b if desired. This device is intended to be set in a sink, bath-tub, or the like to catch the extracted liquid.

In this modification the outside casing has no water-retaining function, this being given fully to the container which also houses the washing operation and has the further function of permitting hand-washing elsewhere than in its position on the machine.

In the form shown in Fig. 11 a water-holding casing 1^c is provided supported on floor legs 3^c, one at least of which is extended to the top of the casing as shown at the left-hand side of Fig. 11 and is there provided with a pair of spaced outwardly projecting cheeks 100 in which is supported the horizontal pintle 101 to which the cover 4^c is attached by means of other brackets 102. Journaled in a vertical position along this leg, outside of the casing, is the drive shaft 135 having its upper end journaled in a bracket 103 and its lower end in a gear-box 104. The upper end of this shaft is provided with a cog-wheel 105 meshing with a companion wheel 106 on the horizontal shaft 107 journaled to the cover 4^c. Journaled in the boss 108 of the cover is a vertical shaft 109 having its upper end geared to the shaft 107 by the miter-gears 110, and having at its lower end a clutch element 111 which engages a complementary clutch element 112 carried by the upright pillar 113 tightly secured in the axis of the container 7^c. The weight of this container is carried by a suitable bearing 114 and I have shown the pillar as provided with dasher blades 115 although any mode of supporting these may be employed. When the cover 4^c is raised the gears 105 and 106 are separated and at the same time the clutch elements 111 and 112. Driving is effected by an electric motor 116 beneath the casing, and any suitable type of mechanism can be employed for imparting rotary or oscillating motion selectively to the shaft 135. In the present embodiment a clutch spool 117 is splined to this shaft between a loose spiral gear 118 and a loose pinion 119. The spiral gear is driven continuously by a companion spiral gear 120 operatively connected to the motor and the pinion 119 is continuously reciprocated by a rack 121 operated by means not shown.

It will be understood of course that many other changes in details can be made, and many additions employed without departing from the scope of my invention, and I therefore do not limit myself except as 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 laundry machine, a stationary upright casing having a supporting member inside, a top member hinged to said casing for movement into and out of overhanging position relative thereto, a container in said casing pivoted to said supporting member upon a vertical axis, an inner lid rotatably carried by said top member and adapted to engage the top of said container in steadying and rotating relation, liquid agitating blades located inside of said container and driving mechanism carried by said top member, said driving mechanism including an oscillating element and a rotating element and means for connecting said elements selectively to said container.

2. In a laundry machine, a stationary upright casing, a cover hinged thereto on a horizontal axis, an extractor-container pivoted inside said casing on a vertical axis, a connecting element rotatably carried by said cover and adapted to engage and drive said container, power mechanism carried by said cover and comprising an oscillating element and a rotating element, and normally controlled means for operatively connecting said oscillating element to said connecting-element to oscillate the same angularly about a vertical axis, and for alternatively connecting said rotating element to said connecting-element to rotate the same about the same vertical axis, and liquid agitating blades located inside said extractor-container and oscillated by said oscillating element.

3. A laundry machine comprising a stationary upright casing, an extractor-container journaled therein on a vertical axis, said casing having a removable cover and having bearings at top and bottom, the top bearing carried by said cover, liquid agitating devices located inside said casing, driving mechanism carried by said cover and working through the top bearing, said mechanism comprising a driving element and an oscillating element and a rotating element, means for connecting said oscillating element to oscillate said agitating devices about the axis of said container, and means for connecting said

rotating element to rotate said container about said axis.

4. A laundry machine comprising a stationary upright casing, a container therein, a cover for said container, aligned bearings to which said cover and container are journaled, a top-member pivoted to said casing upon a horizontal axis at one side of said casing and carrying that bearing to which said cover is journaled, liquid agitating blades inside said casing, and mechanism carried by said top-member and working through the cover-bearing for oscillating said agitating means angularly about the axis of said bearings and for rotating said container at extracting speed about the same axis.

5. A laundry machine comprising a casing, liquid agitating means and liquid-extracting means located inside said casing, said agitating means being oscillatable and said extracting means being rotatable about one and the same vertical axis, a top member removably overlying said casing, an electric motor carried by said top member, mechanism carried by said top member and operatively connecting said motor to said agitating and extracting means, the connecting mechanism comprising an oscillating element for said agitating means, a rotating element for said extracting means and devices for connecting said elements to said means selectively, and means supporting said liquid extracting means in upright position inside said casing in the absence of said top member.

6. In a laundry machine, a casing, a liquid-agitating device comprising blades mounted for oscillation about a vertical axis, a top member removably overlying said casing, a container surrounding said agitating device inside said casing and having its side wall formed as a surface of revolution adapted to discharge liquid centrifugally when rotated, an oscillating driving element for said agitating device and a rotating driving element for said container carried by said top member, and means holding said container upright independently of said top member.

7. In a laundry machine, a casing, an extractor-container inside said casing, liquid agitating blades located inside said casing, said blades and container movable about a vertical axis, a top member removably overlying said casing, operating mechanism for said container carried by said top member and comprising a rotatable element and an oscillatable element, both coaxial with said first axis, and means for connecting said oscillatable element to oscillate said blades about a vertical axis and for connecting said rotatable element to rotate said container about the same axis.

8. A laundry machine comprising a casing having a bearing carried by its bottom and a bladed, liquid-agitating dasher and an extractor located one inside the other, and both pivoted for movement about the axis of said bearing, a cover hinged to said casing, and means carried by said cover driving both said dasher and extractor from above.

9. In a laundry machine, an upright casing, a top-member removably overlapping said casing, a hollow member pivoted on a vertical axis inside said casing and having dasher blades rigid therewith, a cover for said hollow member journaled to said top member, an electric motor, and driving connections comprising selectively operable oscillating and rotating elements carried by said top-member and engaging said cover, said connections comprising relatively operable oscillating and rotating elements and said cover engaging said hollow member when said top-member is in position for selectively oscillating and rotating the hollow member.

10. In a laundry machine, an upright casing, a top-member removably overlapping said casing, a hollow member pivoted on a vertical axis inside said casing, dasher blades inside said hollow member, a rotating element and an oscillating element journaled to said top-member, power driving mechanism carried by said top-member and operatively connected to said elements, said top-member being hinged to said casing, and means for connecting said rotating element to said hollow member and for connecting said oscillating element to said dasher blades.

11. In a laundry machine, a casing, a top cover hinged thereto, an upright extractor container pivoted on a vertical axis inside said casing, an inner lid for said container journaled to said top cover, an electric motor carried by said top cover, and driving connections between said motor and said lid, said lid engaging said container in driving relation when said casing-cover is closed and said driving connections comprising selectively usable rotating and oscillating elements.

12. A laundry machine comprising a lightweight portable container for clothes and liquid having a side wall which slants upwardly and outwardly and defines a surface of revolution about a vertical axis and also having a bottom formed to sit stably on a flat surface, in combination with devices to support said container for rotation about said axis, a cover detachably engaging said container and recessed to permit the escape of liquid while retaining clothes, and driving means operably connected to said cover for rotating said container and cover about said axis.

13. A laundry machine comprising a frame, a flat-bottomed receptacle having an upwardly-flared side-wall defining a surface of revolution about an axis which is normal to its bottom, means carried by said frame for supporting said receptacle for rotation about a vertical axis, a rotatable power-driven cover detachably engaging said receptacle and having recesses to permit escape of liquid centrifugally during the rotation of the receptacle, and means for deflecting the extracted liquid, said receptacle being readily removable from said frame.

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