

May 30, 1933.

J. B. KIRBY

1,911,904

LAUNDRY MACHINE

Original Filed May 14, 1927 3 Sheets-Sheet 1

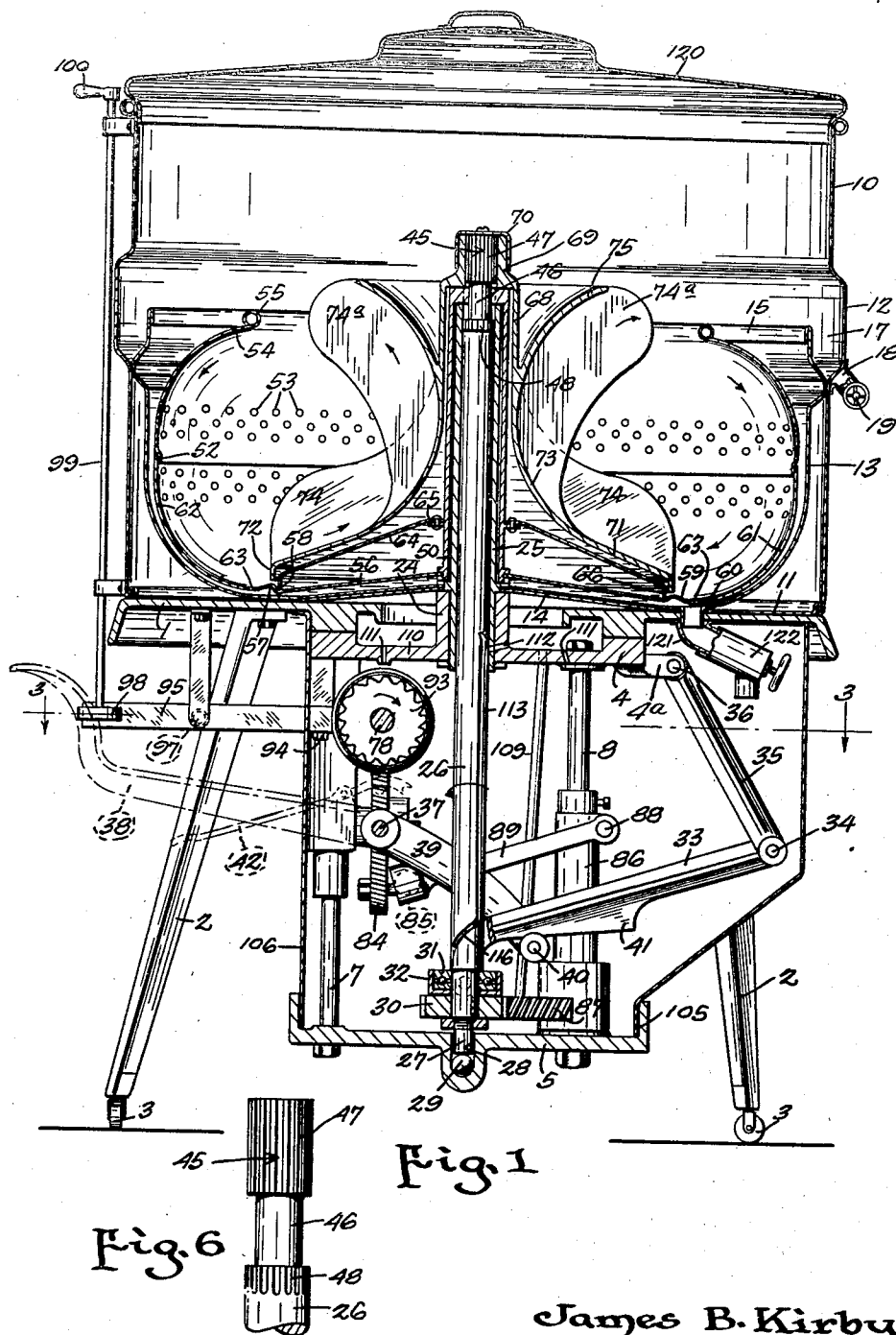


Fig. 1

Fig. 6

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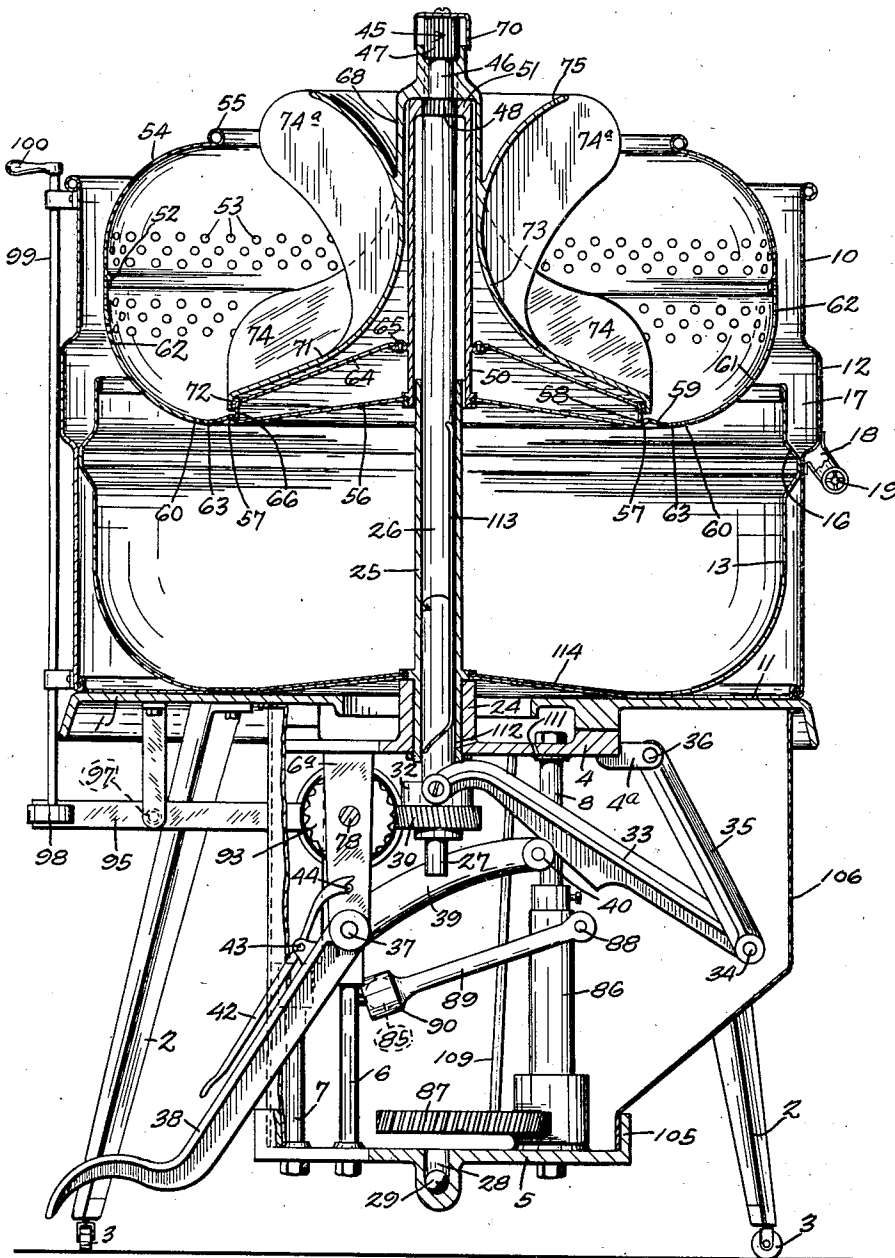


Fig. 2

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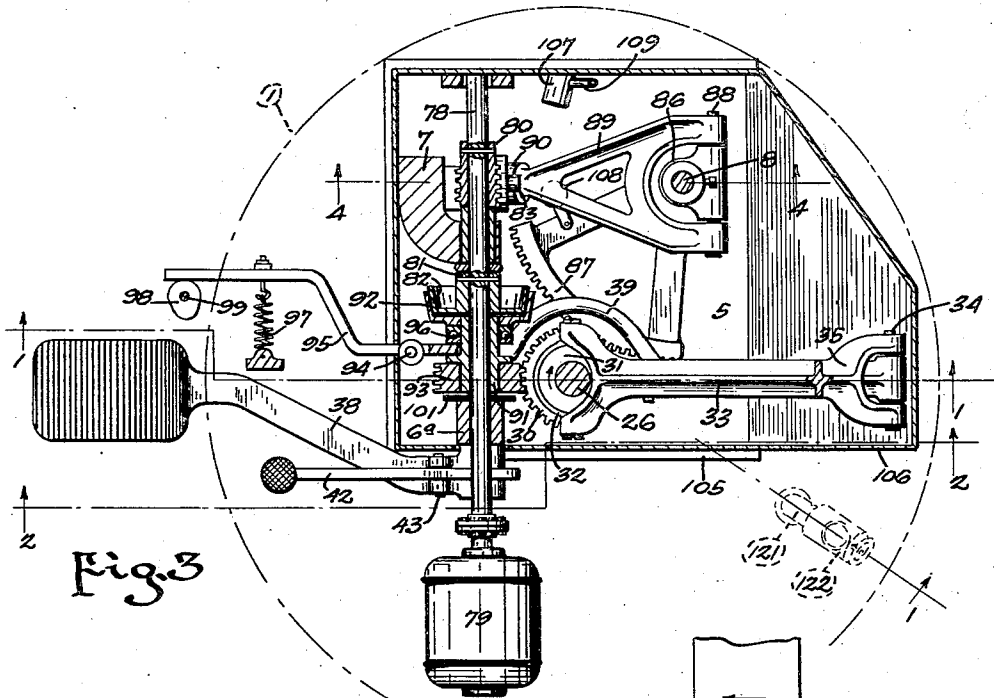


Fig. 3

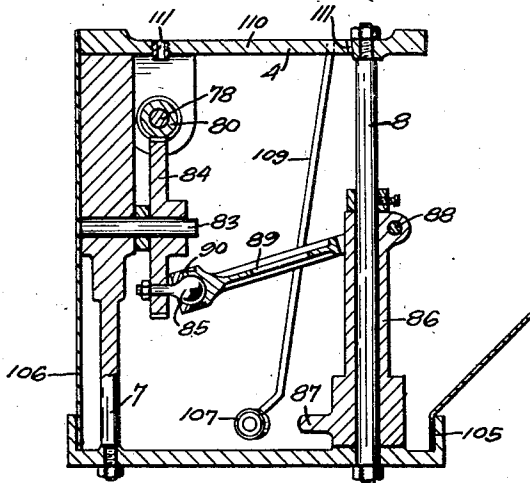


Fig. 4

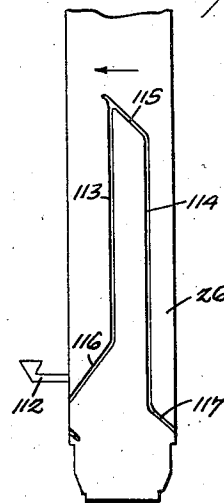


Fig. 5

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LAUNDRY MACHINE

Original application filed May 14, 1927, Serial No. 191,483. Divided and this application filed May 14, 1929. Serial No. 363,026.

This invention relates to laundry machines and has for its objects the provision of a new, improved, and simplified driving and braking mechanism for centrifugal extractors; while further objects and advantages of the invention will become apparent as the description proceeds. This application is a strict division of my application Serial No. 191,483, filed May 14, 1927, and illustrates a domestic laundry machine which combines in itself the function of washing as well as of extracting but the present invention relates only to those features which concern the operation of the extractor regardless of the presence or absence of the washing elements.

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 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 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 extension is a spiral pinion 30 and secured above said pinion is the ballbearing 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 at 37 a horizontal rock shaft, 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 is removed by turning 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 passage 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 in which the clothing is washed and centrifuged. This tub is preferably made of two sheet metal members seamed together circumferentially at 52. The outer or rim member consists merely of a vertical portion perforated at 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 for the drainage of liquid therefrom. The portion 62 is also perforated for the centrifugal discharge of the extracted liquid, and the lowest portion is formed with apertures 63 for the escape of sand, grit, etc.

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 down-

turned 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 dolly or dasher now to be described. This dolly 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 and 74^a of any desired conformation.

Journalled 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. Journalled 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 85 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 journalled 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 frictional 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 but to produce the desired flow of oil throughout the operative height of the shaft 26 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 115. 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 indispensable 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 sufficient to submerge the pump 108 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. The apertures 63 at the lowest point 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, while the outwardly flared plate 75 serves the two fold purpose of preventing the pronounced vertical splashing otherwise produced along the axis of the dasher and of directing an outward movement of all floating articles, clothes and scum. The cone portion 64 also decreases the tendency of clothes to wash beneath the dasher. During all this time the toothed collar 51 has registered 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 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.

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. 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. The combination with a centrifuge, and an electric motor for driving the same, of a drive comprising two shafts and intermeshing spiral gears carried thereby, means including a friction clutch for connecting one of said gears to its shaft, a brake device at the opposite end of said gear, and means for shifting said gear lengthwise to engage said clutch and brake selectively.

2. In a laundry machine, the combination with a centrifuge, a shaft therefor, and a driving shaft, said shafts having intermeshing spiral gears, of driving connections between each gear and its respective shaft, one of said connections including a friction clutch, and a spring tending to hold the members of said clutch in engagement against the endwise thrust of the respective gear.

3. In a laundry machine, the combination with a centrifuge shaft, a centrifuge carried thereby, and a drive shaft perpendicular thereto, of two intermeshing spiral gears, one on each shaft, driving connections between each gear and its respective shaft, one of said connections including a friction clutch, and a spring tending to hold the members of said clutch in engagement against the endwise thrust of the respective gear.

4. In a laundry machine, the combination with a centrifuge shaft, a centrifuge carried thereby, and a drive shaft perpendicular thereto, of two intermeshing spiral gears, one rigidly rotatable with said first shaft and the other loosely sleeved on said drive shaft, driving connections between said drive shaft and the spiral gear thereon, said connections including a friction clutch, a lever for disengaging said clutch, and spring means for holding the clutch members in engagement with a predetermined limit of pressure.

5. In a laundry machine, the combination with a centrifuge, of a shaft therefor, a drive shaft, intermeshing spiral gears carried by said shafts, the gear on said drive shaft being loosely sleeved thereon, a lever for mov-

ing said last gear along the shaft, friction driving means for said last gear engageable at one limit of its movement and friction braking means for said gear engageable at the other limit of its movement.

6. In a centrifuge, the combination with a rotatable container of driving-mechanism comprising a spiral gear, a second spiral gear at right angles thereto, a driven element coaxial with said second gear and operatively connected to said container, a friction clutch between said element and second gear, a spring tending to move said second gear axially in a direction to increase the friction of said clutch, and means for rotating said first gear in such direction that one component of its motion shall oppose the action of said spring.

7. The combination with centrifugal mechanism, and an electric motor for rotating the same, of a combined driving gear and friction clutch interposed between said motor and mechanism, one member of said clutch being movable along its axis of rotation toward and away from the companion member, a spring tending to force said movable member towards said companion member, and a spiral gear drive, one of the gears being carried by said movable member and the thrust of said gears being opposed to the force of the spring.

8. The combination of a centrifuge container, a vertical shaft coaxial therewith, a spiral gear coaxial with said shaft, a horizontal shaft, a spiral gear coaxial with said horizontal shaft and meshing with said first gear, a friction clutch element secured to and rotatable with one of said spiral gears, said element and gear being loosely sleeved upon the corresponding shaft, a companion clutch member secured to such shaft for rotation therewith, one of said clutch members being also longitudinally slidable relative to its shaft, a manually operable element for sliding said last named clutch member along said shaft into and out of operative engagement with the companion clutch member, and an annular washer of friction material surrounding said shaft and making contact with a part of said movable clutch member alternatively with the companion clutch member.

9. A driving mechanism for centrifugal devices comprising two intermeshing spiral gears, perpendicular shafts for said gears, one of said gears being fixed to its shaft, the other being rotatably sleeved, a friction clutch having one member rigidly secured to the rotatably sleeved gear, the other member of said clutch being secured to said shaft so as to rotate therewith, one member of said clutch being longitudinally movable toward and from the other, manually operable devices for moving said last named member into and out of contact with the companion member, a brake element adapted to engage said

longitudinally movable member, a driving motor connected to one of said shafts and a centrifuge container connected to the other shaft.

5 10. The combination with a centrifuge of two shafts, one of which is connected axially to the centrifuge container, two continuously intermeshing gears mounted one on each shaft, one of said gears being fixed to its
10 shaft and the other being rotatably sleeved on its shaft, a friction clutch at one end of the rotatably sleeved gear, a friction brake at the other end of said rotatably sleeved gear, a driving motor connected to one of said
15 shafts, and manually operable devices for engaging said friction clutch or said friction brake selectively whereby to start or stop said container.

20 11. The combination with a centrifuge and an electric motor, of two shafts, one of which is connected to said motor and the other of which is connected axially to the centrifuge container, two continuously intermeshing
25 gears mounted one on each shaft, one of said gears being fixed to its shaft and the other being rotatably sleeved, a friction clutch having one member rigidly secured to the rotatably sleeved gear, the other member of said clutch being secured to the shaft on which
30 said gear is sleeved, one member of said clutch being longitudinally movable toward and from the other member, a brake element located adjacent to said longitudinally movable member, and manually operable devices
35 for producing engagement between said movable member and the companion clutch member or between said movable member and said brake element selectively, whereby to start or stop said container.

40 12. The combination with a centrifuge and an electric motor for driving the same, of a drive comprising two shafts and intermeshing spiral gears carried thereby, one of said
45 gears being rigidly fixed to one shaft and the other gear being rotatably sleeved on the other shaft, a friction clutch having one member rigidly secured to the rotatably sleeved gear, the other member of said clutch being secured to the corresponding shaft so as to
50 rotate therewith, an annular brake element also carried by and rotatable with said longitudinally movable clutch member, a companion brake member, and manually operable devices for causing engagement between said
55 brake members or said clutch members selectively whereby to rotate and arrest said container respectively.

13. The combination of a centrifuge container, a vertical shaft coaxial therewith, a
60 spiral gear coaxial with said shaft, a driving shaft, a spiral gear coaxial with said driving shaft and meshing with said first gear, one of said gears being fixedly connected to its shaft and the other gear being loosely sleeved
65 upon the other shaft, a slidable collar sur-

rounding the last named shaft, a friction clutch element carried by said collar for securing the corresponding spiral gear operatively to said shaft, a brake element at another point of said collar, a companion brake
70 element located adjacent to said collar, and manually operable devices for sliding said collar to engage the clutching element and disengage the braking elements, or to engage
75 said braking elements and disengage said clutching element, selectively.

In testimony whereof I hereunto affix my signature.

JAMES B. KIRBY.

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