

Jan. 1, 1952

J. B. KIRBY
WASHING MACHINE

2,580,435

Filed Jan. 29, 1947

4 Sheets-Sheet 1

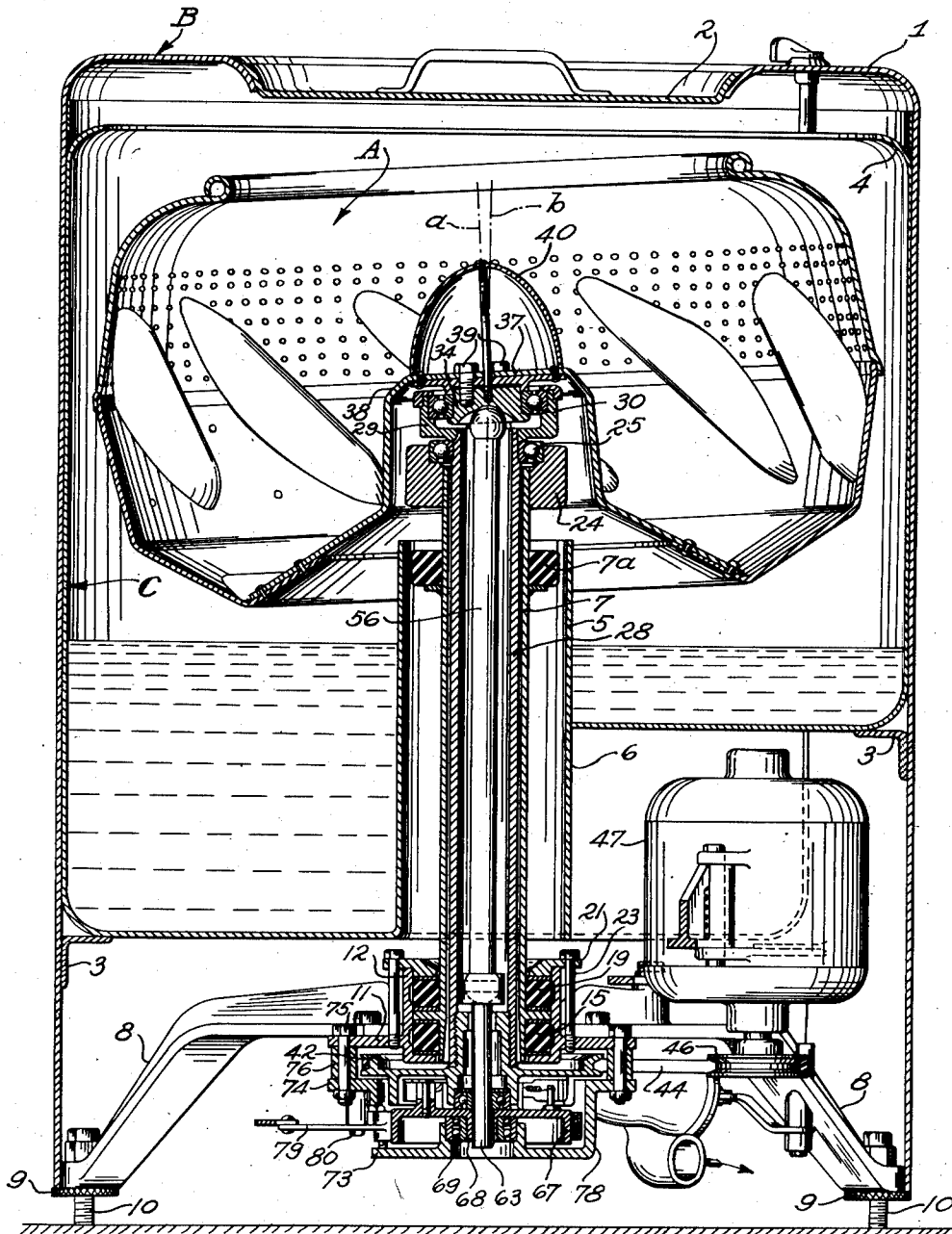


Fig. 1

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ATTORNEYS

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4 Sheets-Sheet 2

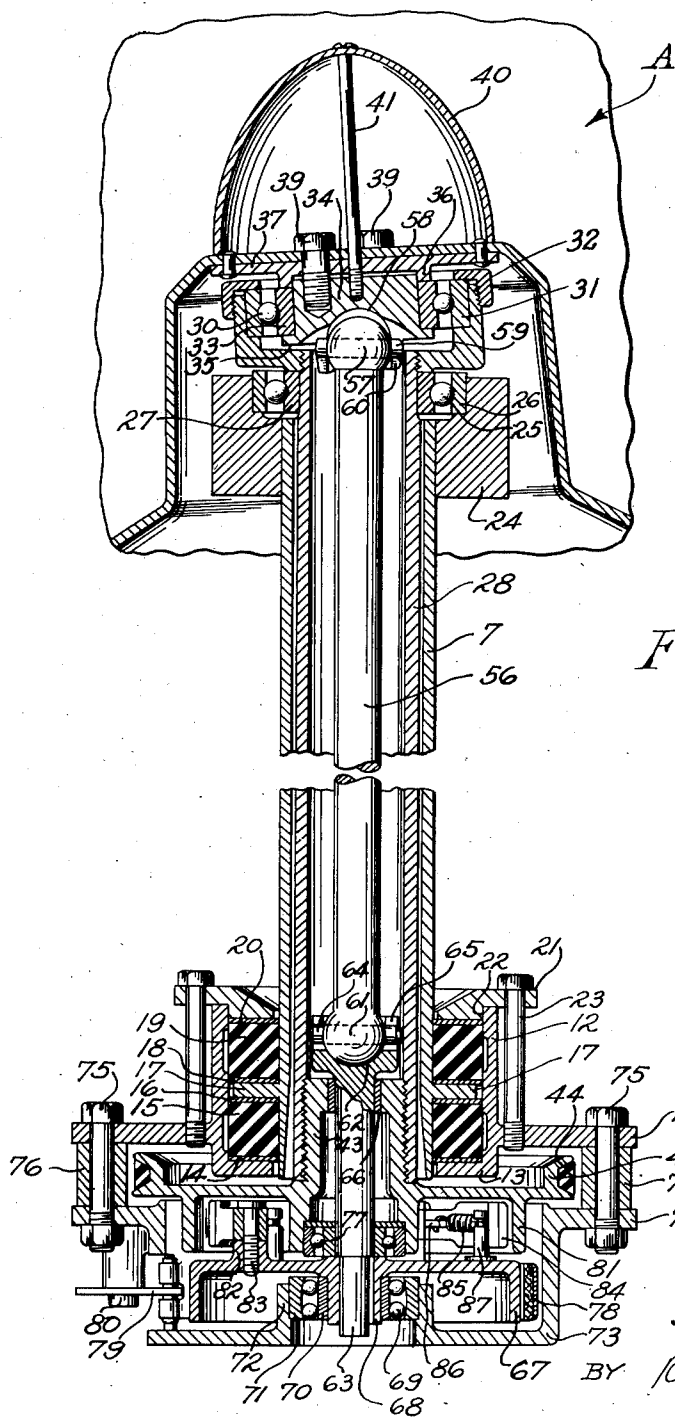


Fig. 2

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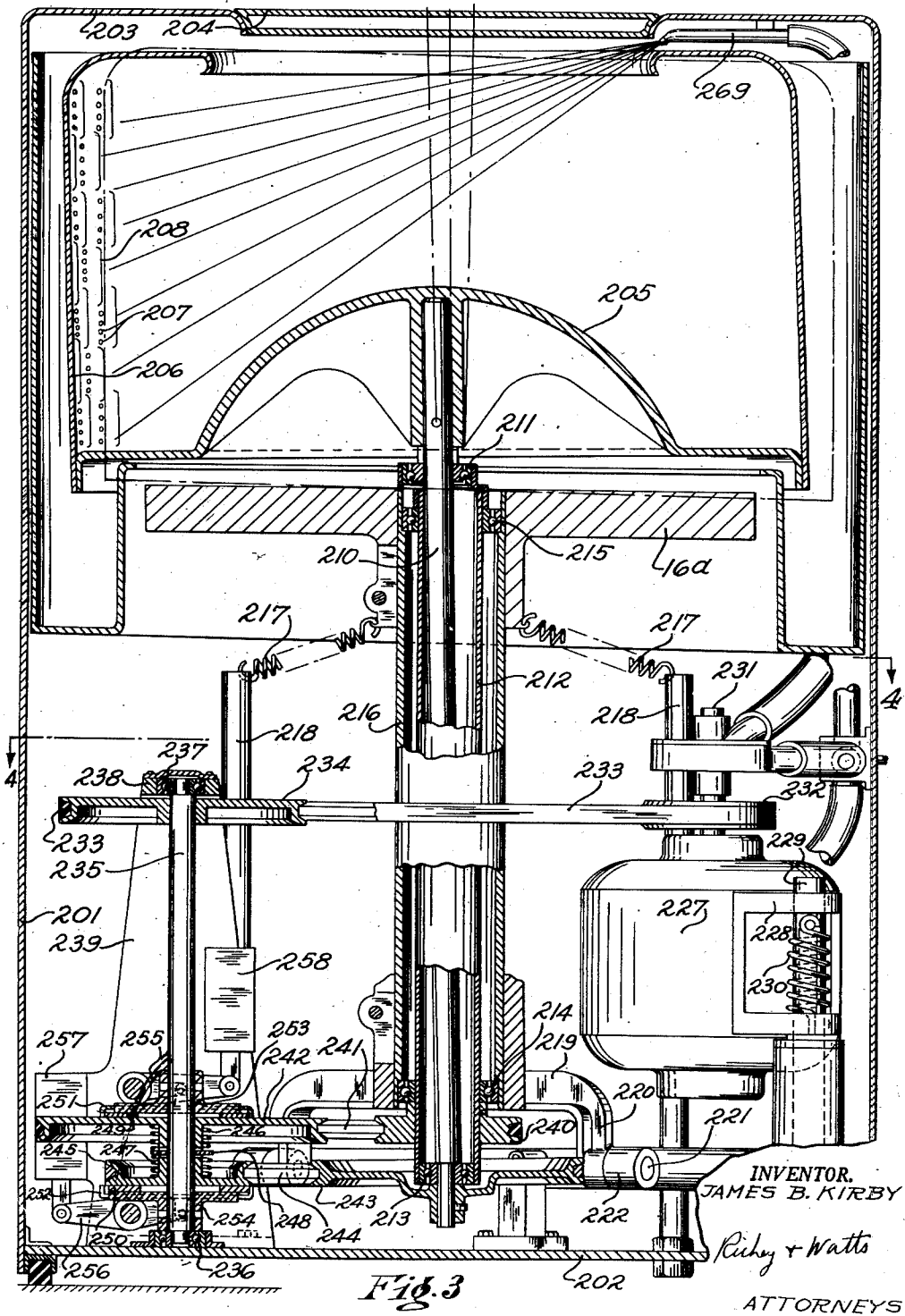
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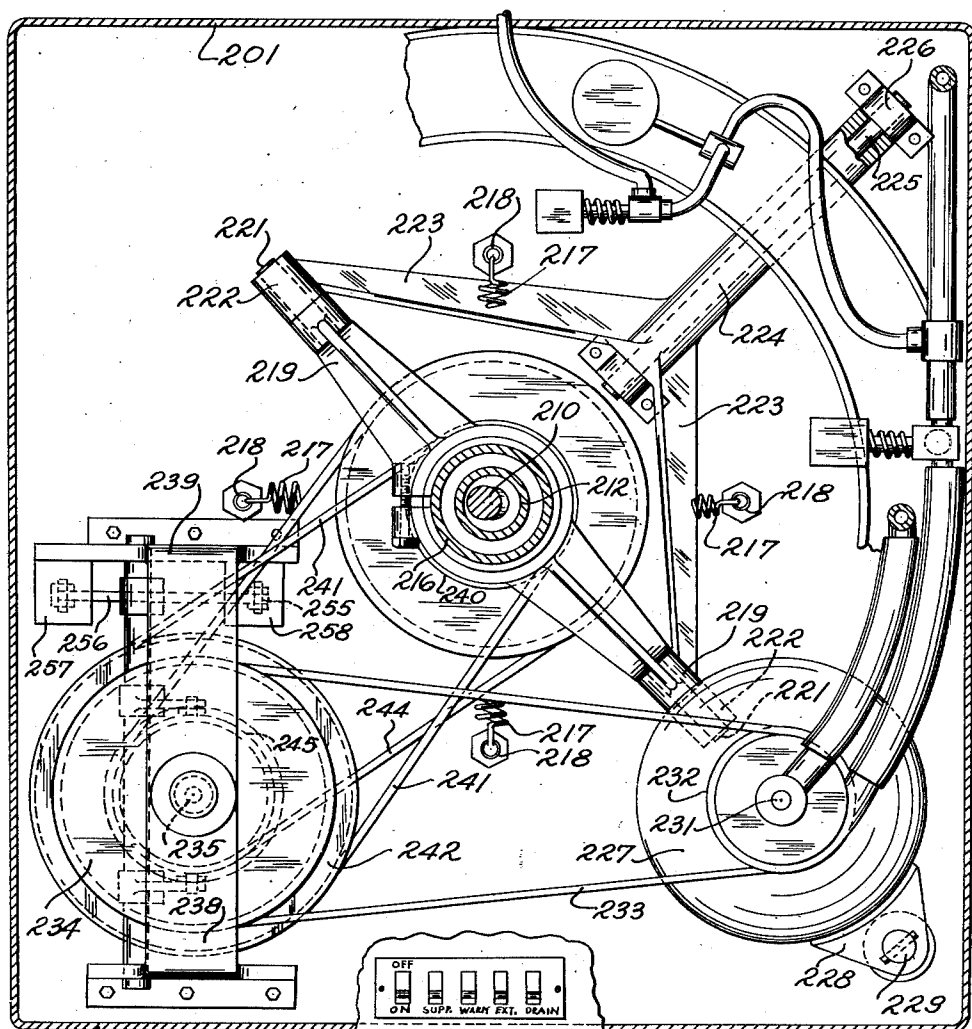
J. B. KIRBY

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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,580,435

WASHING MACHINE

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The Apex Electrical Manufacturing Co., Cleve-
land, Ohio, a corporation of Ohio, as trustee

Application January 29, 1947, Serial No. 725,032

18 Claims. (Cl. 68—23)

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This application is in part a continuation of my copending applications, Serial No. 526,154, filed March 13, 1944 (now Patent No. 2,520,366, August 29, 1950), and Serial No. 440,151, filed April 23, 1942 (now Patent No. 2,432,766, December 16, 1947).

The present invention relates to apparatus for washing and extracting articles such as clothes.

An object of the invention is to impede lateral vibration of rotating apparatus, such as an extractor receptacle for clothes carried upon a standard.

Another object of the invention is to avoid unbalance and attendant vibration in washing machines and other apparatus having a member which has an orbital movement but is prevented from rotating about its axis.

Other and further objects, features and advantages of the invention will become apparent as the description proceeds.

A better understanding of the invention will be afforded by the following detailed description, considered in conjunction with the accompanying drawing and those features of the invention, which are believed to be novel and patentable, will be pointed out in the claims. Certain features of my invention, disclosed herein but not claimed in the present application, are claimed in my copending application, Serial No. 619,849, filed October 2, 1945.

In the drawings:

Fig. 1 is a central vertical section through a combined washer and extractor embodying the invention;

Fig. 2 is a vertical axial section through the receptacle supporting standard showing the receptacle drive mechanism on an enlarged scale;

Fig. 3 is a central vertical section through a combined washer and extractor forming another embodiment of the invention;

Fig. 4 is a horizontal section taken on the broken line indicated at 4—4 in Fig. 3; and

Fig. 5 is a vertical sectional view of a modification of the embodiment of Figs. 3 and 4.

Like reference characters are utilized throughout the drawing to designate like parts.

An apparatus for cleansing and drying fabric articles such as clothes is shown by way of illustration in the accompanying drawings. In washing clothes in such apparatus, the clothes are placed in a suitable container of the extractor type indicated generally by the reference character A which is mounted for rotational movement in which the axis *a* of the container moves in an orbital path about an axis *b* that is out of align-

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ment with the axis *a*. The axis *a* is so disposed with respect to the axis *b* that the orbital movement of the container is of small ambit, and the axis *a* is preferably at an angle to the axis *b* so that the receptacle rocks during its orbital movement. As herein shown the axis of rotation *a* intersects the orbital axis *b* at a small angle, the point of intersection preferably being near the center of gravity of the receptacle when loaded so as to maintain both a static and running balance and thereby minimize the vibratory effect of the orbital movement. The washing operation is performed by placing the clothes with water in the receptacle A and imparting orbital movement to the container about the axis *b* while the container is held against rotation about its axis of rotation *a*. The receptacle A is mounted within a suitable housing B and within the upper portion of an annular collection receptacle or tub C. During the washing operation water drains from the receptacle into the tub and is pumped back into the receptacle to maintain the proper amount of water in the receptacle for the washing operation.

The speed of orbital movement during the washing operation corresponds to the speed of rotation for extraction and is preferably at least 600 R. P. M. With an orbital movement at such high speeds some portions of the receptacle bottom are at every instant moving in a downward direction faster than the water and clothes can fall by gravity and other portions are moving up to slap against the falling body of water and clothes so that the mass of water and clothes is subjected to rapidly repeated pulsations at all points throughout the extent thereof.

The orbital movement of the receptacle tends to cause the liquid in the receptacle to flow circumferentially in the direction of orbital movement. This flow of the liquid is impeded by suitable vanes on the peripheral wall of the receptacle which engage the clothes and water and have a rubbing action against the clothes during their movements in the receptacle. The receptacle actuating mechanism is so disposed that the orbital movement is imparted to the receptacle while it is being held against rotation about its axis *a*. When the receptacle is released the torque that is imposed thereon by the orbital movement serves to rotate the receptacle about its axis and to accelerate the rotational movement uniformly so that the receptacle is brought to extracting speed without strain on the driving mechanism.

During the washing operation the clothes move

outwardly along the bottom of the peripheral wall of the receptacle and simultaneously progress around the receptacle circumferentially. The engagement of the clothes with the vanes on the laterally and vertically rocking peripheral wall causes them to work their way up the wall and then to move back over the top of the body of water and clothes toward the center of the receptacle during their travel about the orbital axis. The rocking orbital movement imparted to the washing receptacle is very rapid and serves to effectively distribute the clothes throughout the body of water in the receptacle and subjects the clothes to continuous agitation and rubbing action against the peripheral vanes.

In the machine herein illustrated the housing B is of rectangular form and has a top 1 provided with a central opening closed by a suitable lid 2, the tub C being supported within the housing on suitable brackets 3. The tub C extends to the top of the receptacle and has an inturned splash flange 4 at its upper edge. The tub C has a central upright tubular wall 5 and is provided in its bottom with a segmental motor receiving recess 6. The combined washing and extracting receptacle A is mounted within the upper portion of the tub C, being supported upon the upper end of a tubular standard or pedestal 7 that is mounted within the interior tubular wall 5 of the tub. The pedestal 7 is supported centrally of the housing by four supporting legs 8 extending radially and downwardly beneath the tub C to the bottom of the housing at the four corners thereof where suitable nuts 9 on threaded foot members 10 provide adjustable supports for the housing B. The inner ends of the supporting legs 8 are attached to a central ring 11 which serves as a support or base for the pedestal or standard 7.

The ring 11 is formed with an upright cylindrical body member 12 within which the lower end of the standard 7 is mounted, the member 12 having an inwardly extending supporting flange 13 at its lower end. The lower end of the standard 7 is positioned within the inner margin of the inwardly extending flange 13 and fitting upon the lower end of the tubular standard 7 there is a washer 14, which rests upon the flange 13. Upon the washer 14 there is mounted a rubber ring 15 which is preferably of rectangular cross section and which fits upon the exterior of the standard 7 and within the interior of the cylindrical body 12 of the supporting ring. Upon the top of the rubber ring 15 there is mounted a washer 16 which has an internal diameter greater than the diameter of the tubular standard 7 and an external diameter such that it fits within the cylindrical member 12 of the supporting ring. The standard 7 has a peripheral flange 17 that rests upon the top face of the washer 16, and on the top face of the flange 17 there is mounted a second washer 18 which may be a duplicate of the washer 16. A rubber ring 19, similar to the ring 15, is mounted upon the top of the washer 18. A clamping ring 21 is mounted upon the upper end of the member 12 and has a shouldered inner portion 22 that fits within the upper end of the cylindrical member 12 and bears against the washer 20. The clamping ring 21 is held in place by bolts 23 that secure the same to the ring 11. The tubular standard 7 is thus resiliently supported in, and resiliently urged into axial alignment with the ring 11 by means of the rubber rings 15 and 19 and these rings are held securely in place by the confining washers 14, 16, 18 and 20 which prevent the corners of the soft

rubber rings from being pinched between the standard and supporting ring. The standard 7 may have a resilient buffer ring 7a mounted thereon which is engageable with the interior of the tubular wall 5 of the tub to limit excessive lateral movements of the standard. The resilient mounting permits the standard 7 to have slight vertical and lateral movements with respect to the supporting frame, the resilient cushioning support and buffer serving as a damping means to check the transmission of vibrations to the supporting frame.

At the upper end thereof the standard 7 has a coaxial heavy collar 24 upon which is mounted a ball bearing 25 that has an outer race ring 26 mounted in the collar 24 and an inner race ring 27 that is secured to a tubular shaft 28 positioned within the tubular standard 7, the inner race ring 27 being seated against the underside of an enlarged head 29 at the upper end of the tubular shaft 28. The inertia of the collar 24, serving as a counterweight or inertia member having its center of mass coincident with the axis of the pedestal or standard 7, acts in combination with the resilient mounting of the standard 7 to impede lateral vibrations of the standard.

The enlarged head 29 of the shaft 28 provides a support for a second ball bearing 30 that is mounted at a slight inclination to the ball bearing 25. The ball bearing 30 has an outer race ring 31 that is seated in the enlarged head 29 of the shaft and held in place therein by a clamping collar 32 that is threaded upon the upper end of the head 29. The bearing 30 has an inner race ring 33 that is secured to a supporting block 34, the block 34 having a projecting flange 35 at its lower end upon which the race ring 33 is seated and the race ring 33 being clamped against the flange 35 by means of a circular flange 36 on a plate 37 that is attached to the central bottom member 38 of the receptacle A. A plurality of attaching screws 39 extend through the member 38 and plate 37 and are threaded into the block 34 to secure the receptacle to the block 34 and to clamp the race ring 33 against the flange 35 of the block. A dome-shaped shield 40 is mounted upon the bottom member 38 and covers the screws 39, the shield 40 being held in place by means of a center bolt 41 that is threaded into the block 34 at its lower end. The ball bearing 30 serves to rotatably support the receptacle A, the axis of the bearing being the axis a about which the receptacle may rotate and the axis of the tubular shaft 28 being the axis b about which the receptacle may move orbitally. The angle of inclination of the axis a with respect to the axis b is small. In the machine illustrated the angle is about four and one half degrees. It is to be understood however that greater or less angularity may be desirable for machines of smaller or larger size or for machines operated at lower or higher speeds.

The tubular shaft 28 has a pulley 42 attached to its lower end, the pulley 42 being positioned beneath the lower end of the standard 7 and having a threaded hub portion 43 screwed into the lower end of the tubular shaft 28. The pulley 42 and shaft 28 are driven by suitable belt 44 that extends around the pulley 42, and around a driving pulley 46 on the shaft of an electric motor 47. The shaft 28 is driven by the motor 47 at a speed at which the receptacle may be advantageously driven for the extracting operation. For extracting, the speed should be above 400

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R. P. M., a speed of about 600 R. P. M. being preferred.

Within the tubular shaft 28 there is mounted a shaft 56 which has an upper ball shaped end 57 that is received in a socket 58 on the under side of the block 34. A pin 59 extends transversely through the ball-shaped end 57 and projects into vertical slots 60 formed in the socket 58, the ball, socket and pin providing a flexible driving connection between the washing receptacle and the shaft 56. The shaft 56 has a ball-shaped lower end 61 that is located a short distance above the hub 43 of the driving pulley, the ball 61 fitting into an enlarged socket 62 in the upper end of a vertical lower shaft section 63 which extends downwardly through the pulley 42. A pin 64 extends through the ball end 61 and engages in vertical slots 65 in the socket 62, the ball, socket and pin forming a flexible connection between the upper and lower shaft sections 56 and 63. An oil-less bearing sleeve 66 is interposed between the shaft section 63 and the hub 43 of the driving pulley and to the lower end of the shaft section 63 there is attached a brake drum 67. The drum 67 has a hub 68 keyed to the shaft 63 and mounted in a self aligning bearing 69 that has an inner race ring 70 secured to the hub 68 and an outer race ring 71 mounted in a tubular flange 72 of a lower housing plate 73 that is cupped to enclose the brake drum 67 and provided with a peripheral flange 74 underlying the ring 11. The plate 73 is suspended from the ring 11 by means of bolts 75 and held in proper spaced relation with respect to the ring 11, by means of spacing sleeves 76 mounted on the bolts 75 and interposed between the plate 74 and the ring 11.

To insure proper alignment of the shaft 63 with the driving pulley 42 and the shaft 28, an additional ball bearing 77 is interposed between the lower end of the hub 43 and the shaft 63. The mounting of the shaft section 63 in the hub of the pulley 42 maintains the shaft section 63 in axial alignment with the shaft 28 and the bearing 69 will permit the tubular shaft 28 and the sectional shaft mounted therein to rock slightly with respect to the supporting frame. Only slight vibratory rocking movements of the shafts and standard occur during operation of the machine and the amplitude of these movements is not sufficient to interfere with the operation of the driving belt. Such vibratory rocking movement is impeded and damped by the inertia of the counterweight collar 24 acting in combination with the resilient rubber mounting which urges the pedestal toward its vertical centered position.

During the washing operation the washing receptacle A is held against rotation and rotation of the shaft 28 causes the washing receptacle A to have an orbital rocking movement about the intersection of its axis *a* with the vertical axis *b* such that each point in the receptacle wall moves in an orbit of small circumference or ambit.

Points in the receptacle wall lying in a plane normal to the axis *a* at the intersection of said axis *a* with the vertical axis *b* will reciprocate vertically in an arc having its center at said point of intersection. The orbital center where the axes *a* and *b* intersect is located at a point above the bottom of the receptacle and below the top thereof. The orbital movement of the receptacle and the action of gravity upon the water causes a circumferential flow of water in the receptacle and the rapid oscillatory impulses serve to keep the clothes uniformly dispersed and distributed throughout the receptacle during washing. The

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speed of vertical oscillation is such that downward movements are faster than the movement of the water due to gravity so that the bottom of the receptacle slaps against the body of water and creates rapidly repeated pulsations throughout the body of clothes and washing fluid that causes the fabrics to be continually flexed while the washing fluid surges through the interstices thereof.

For holding the shaft 56 and the receptacle A against rotation, a brake band 78 surrounding the brake drum 67 has one of its ends anchored to the supporting plate 73 and its opposite end attached to an actuating lever 79 which swings on a vertical pivot 80. When the brake band 78 is applied, the brake drum 67 and the receptacle A connected to the drum through the shaft 56 is held against rotation so that an orbital rocking movement only is imparted to the receptacle A. When the brake band 78 is released, the shaft 56 and receptacle A are free to rotate and, upon release of the brake, the torsional thrust exerted by the shaft 28 on the receptacle causes the receptacle to rotate with gradually increasing speed. If desired, a suitable clutch mechanism may be provided to establish a direct driving connection between the receptacle and the shaft 28 to rotate the receptacle at full speed. In the example shown, the pulley 42 is provided with a depending cylindrical flange 81 which serves as a clutch element and the upper face of the brake drum 67 is provided inwardly of the flange 81 with bosses 82 in which are mounted pivot pins 83 upon which clutch shoes 84 are mounted to swing into and out of engagement with the interior of the flange 81. Each of the clutch shoes 84 is normally held in retracted position with respect to the flange 81 by means of a coil spring 85 which is attached to one end to a lug 86 on the clutch shoe and at its other end to a post 87 attached to the brake drum 67. When the brake drum 67, which rotates with the receptacle A, attains a predetermined speed of rotation, the centrifugal force acting upon the clutch shoes 84 presses the shoes outwardly against the interior surface of the clutch element 81 so that torsional force is exerted upon the drum 67 and receptacle A. While the shoes 84 may permit some slippage when first engaged with the flange 81, the pressure of the shoes against the flange 81 is increased as the speed of the receptacle increases so that the receptacle is frictionally clutched to the rotating shaft 28 to transmit additional torque from the drive shaft.

In Figs. 3 and 4 of the accompanying drawings, an embodiment of the invention is shown in which a rectangular housing 201 has a base 202 which provides a support for the mechanism, and a top 203 which is provided with a central removable closure member 204 through which clothes may be inserted or removed. All of the mechanism is supported solely by the base 202 so that the side and top walls of the housing are substantially free from vibration, and, since the housing walls carry only their own weight, they may be of very light construction. A clothes receptacle or container 205 of the type commonly used in centrifugal extractors is mounted within the upper portion of the housing. Various forms of containers having a peripheral wall provided with liquid discharge passages may be used. As shown, the container 205 is provided with a peripheral wall 206 having discharge passages in the form of small

openings 207 interspersed throughout its height and circumference, and short corrugations or ribs 208 extending vertically and projecting inwardly and also interspersed throughout the height and circumference of the wall. The low rounded ribs 208 provide a rubbing surface similar to that of a washboard. The container 205 is preferably provided with an arched bottom which serves to insure the movement of the clothes to the peripheral wall upon vibration of the container.

The container 205 is attached to the upper end of an upright supporting shaft 210 which is journaled immediately beneath the container in a ball bearing 211 which is eccentrically mounted in the upper end of an upright tubular shaft 212 which receives the shaft 210. The lower end of the shaft 210 is supported in a ball bearing 213 mounted centrally in the lower end of the tubular shaft 212. The ball bearings 211 and 213 permit the shaft 210 to have a gyrating movement within the tubular shaft 212 when the shaft 212 is rotated. The tubular shaft 212 is mounted in ball bearings 214 and 215 adjacent its lower and upper ends in a tube 216 which carries a disc-shaped weight 16a at its upper end, which is normally held in horizontal position by means of a series of coil springs 217 attached at spaced points to the periphery of the weight 16a and to the upper end of posts 218 extending upwardly from the base 202. The lower end of the tube 216 is mounted in a universal support which will permit lateral movements of the tube 216 and gyratory movements of the tubular shaft 212 which is yieldingly held in upright position by the springs 217. The lower end of the tube 216 is secured to a cross bar 219 which has downturned end portions 220 provided with outwardly projecting aligned pivot pins 221. The pivot pins 221 are journaled in bearings 222 in the outer ends of diametrically opposite arms 223 (Fig. 4) which are attached to a sleeve 224 rotatably mounted upon a horizontal shaft 225 disposed at right angles to the axis of the pivot pins 221 and mounted in supporting brackets 226 attached to the base 202.

An electric motor 227 is mounted with its axis disposed vertically by means of a bracket 228 attached to the periphery of the motor housing and supported on a vertical pivot pin 229. A coil spring 230 is attached at one end to the supporting post and at the opposite end to the bracket 228 so as to exert a force tending to swing the motor in one direction about its pivot. The motor 227 is provided with a vertical shaft 231 upon which a pulley 232 is mounted above the motor. The pulley 232 receives a belt 233 which extends over the pulley 232 and over a pulley 234 on a countershaft 235. The countershaft 235 is mounted on lower bearings 236 on the base 202 and in upper bearings 237 mounted in a horizontal cross bar 238 forming the top of a U-shaped bracket 239 attached to the base 202. The countershaft 235 is driven by the motor 227 through the belt 233 and the spring 230 serves to maintain the tension of the driving belt 233. The tubular shaft 212 is provided with a pulley 240 attached to its lower end below the bearing 214 and supporting cross bar 219, and this pulley receives a belt 241 which extends over the pulley 240 and over a pulley 242 on the countershaft 235. The shaft 210 has a pulley 243 attached to its lower end below the lower end of the tubular shaft 212, which receives a belt 244 which runs over the pulley 243 and over a pulley 245 on the

countershaft 235 below the pulley 242. The tubular shaft 212 and the shaft 210 may be continuously driven from the countershaft 235 by means of the belts 241 and 244. The pulleys 242 and 245 are preferably loosely mounted on the shaft 235 and suitable friction clutches are provided for connecting these pulleys to the shaft. The pulley 242 is pressed upwardly by means of a spring 246 and the pulley 245 is pressed downwardly by means of a spring 247, a disc 248 attached to the shaft 235 being interposed between the springs 246 and 247. The pulley 242 has a friction shoe 249 on its upper face and the pulley 245 has a friction shoe 250 on its bottom face. A clutch disc 251 is attached to the shaft 235 above the pulley 242 and a second clutch disc 252 is attached to the shaft 235 below the pulley 245. Upper and lower shifter rings 253 and 254 are engageable with the pulleys 242 and 245 outwardly of the peripheries of the discs 251 and 252 and these shifter rings are operated by levers 255 and 256 which are operated by suitably controlled solenoids 257 and 258 to engage or release the clutches. The action of the rotating tubular shaft 212 in imparting gyratory movement to the shaft 210 and orbital movement to the container 205 tends to impart a gyratory movement to the shaft 212. The heavy disc 16a by reason of its inertia reduces the amplitude of lateral movement of the upper end of the shaft 212 as the speed or rotation of the shaft 212 increases. It is desirable that the container be of light weight to avoid excessive gyratory movement of the shaft 212, and the container is preferably formed of a light weight metal such as aluminum.

When the shaft 210 and tubular shaft 212 are simultaneously driven the container 205 is continuously rotated about its axis by the shaft 210 and it has a simultaneous orbital movement by reason of the rotation of the tubular shaft 212 which carries the eccentrically mounted bearing 211 for the upper end of the shaft 210. The relative sizes of the driving pulleys are preferably such that the rotary speed of the tubular shaft 212 is several times that of the shaft 210 and the container has several orbital rotations about a short radius during each revolution. The orbital rotation of the container 205 effects a lateral vibratory oscillating movement during rotation of the container which causes the clothes to slap against the wall and, since the direction of orbital movement is alternately in the direction of peripheral movement and in the opposite direction, the peripheral speed of the wall 206 is alternately accelerated and retarded, causing a rubbing action between the clothes and wall 206. The periodic acceleration and retardation and the inward and outward movements of the peripheral wall against which the clothes are held by centrifugal force due to the orbital movement of the container causes a rapid vibratory movement of the container wall with respect to the clothes which rub and slap against the wall.

For washing, the clothes are placed in the receptacle 205 with suitable soap or other detergent and washing water is supplied to the basket, preferably in the manner set forth more in detail in my copending applications, Serial No. 526,154, filed March 13, 1944, and Serial No. 440,151, filed April 23, 1942. The clutches 251 and 252 are engaged to rotate the shafts 210 and 212 so that the receptacle 205 is rotated about its axis and also revolved through its orbital path. Preferably the water is recirculated and continuously supplies to the clothes through the nozzle 269 or

the like. When the washing is completed the supply of water is discontinued and the clothes are dried. The drying operation can be effected either by continuing the rotation and orbital revolution of the basket used in washing, or by disconnecting the clutch 251 and simply rotating the basket 205 about its axis by means of the shaft 210.

In Fig. 5 of the drawings a modified embodiment of the invention is shown. In this modification a housing 280 is mounted upon a supporting frame 281 and is provided with a front closure 282 through which the clothes may be inserted and removed. The housing has a smaller opening 283 in its rear wall through which extends a horizontal shaft 284 which supports a cylindrical container 285 which has a central opening 286 at its front end aligned with the front closure 282. The peripheral wall of the container 285 has perforations 287 and short ribs 288 against which the clothes are adapted to rub during the washing operation. The shaft 284 is supported in a bearing 289 at the upper end of a standard 290 forming part of the supporting frame, and upon this bearing adjacent the standard there is mounted a disc-like weight 291 which serves to dampen vibrations in the frame. The shaft 284 is journaled eccentrically in a tubular shaft 292 which is rotatably mounted on the bearing portion 289 of the standard, the tubular shaft 292 having bearings 293 in which the shaft 284 is mounted. Pulleys 295 and 294 are mounted on the shaft 284 and tubular shaft 292 rearwardly of the standard 290 and these pulleys are driven from a suitable driving mechanism by means of belts 296 and 297. The belt 296 imparts continuous rotation to the container 285 and the shaft 284 driven by the belt 297 imparts a continuous orbital movement to the container. As in the modifications previously described, the orbital movement of the container causes periodic acceleration and retardation of the peripheral speed of the container wall against which the clothes are held by centrifugal force, causing vibratory movement of the container with respect to the clothes and a scrubbing action of the clothes against the ribbed interior surface of the container.

It is to be understood that variations and modifications of the specific devices herein shown and described for purposes of illustration, may be made without departing from the spirit of the invention.

I claim:

1. In a washing machine, the combination of a base, a pedestal flexibly supported by the base, a shaft rotatably supported by the pedestal, a clothes container supported by the pedestal and mounted to be rotated by said shaft, inertia means fixed to said pedestal adjacent said container with its center of mass coincident with the axis of said pedestal, resilient restraining means between said base and said pedestal yieldably resisting lateral movement of said pedestal with respect to said base, and means for rotating said shaft and said container.

2. In a washing machine, the combination of a base, a pedestal supported by the base with freedom for lateral movement of the upper end thereof, a shaft rotatably supported by the pedestal, a clothes container supported by the pedestal and mounted to be rotated by said shaft, inertia means fixed to said pedestal adjacent said container with its center of mass coincident with the axis of said pedestal, resilient restraining

means between said base and said pedestal yieldably resisting lateral movement of said pedestal with respect to said base, and means for rotating said shaft and said container.

3. In a washing machine, the combination of a base, a pedestal supported by the base with freedom for lateral movement of the upper end thereof, a shaft rotatably supported by the pedestal, a clothes container supported by the pedestal and mounted to be rotated by said shaft, an annular weight fixed to and surrounding said pedestal adjacent said container, resilient restraining means between said base and said pedestal yieldably resisting lateral movement of said pedestal with respect to said base, and means for rotating said shaft and said container.

4. In a washing machine, the combination of a base, a pedestal mounted on the base by means including a flexible mounting permitting gyration of said pedestal with respect to said base, a shaft rotatably supported by the pedestal, a clothes container supported by the pedestal and mounted to be rotated by said shaft, inertia means fixed to said pedestal adjacent said container with its center of mass coincident with the axis of said pedestal, resilient restraining means between said base and said pedestal yieldably resisting gyration of said pedestal with respect to said base, and means for rotating said shaft and said container.

5. In a washing machine, the combination of a base, a pedestal mounted on the base by means including a flexible mounting permitting gyration of said pedestal with respect to said base, a shaft rotatably supported by the pedestal, a clothes container supported by the pedestal and mounted to be rotated by said shaft, inertia means fixed to said pedestal adjacent said container with its center of mass coincident with the axis of said pedestal, resilient restraining means connected to said base and connected to said pedestal between said flexible mounting and said inertia means yieldably resisting gyration of said pedestal with respect to said base, and means for rotating said shaft and said container.

6. In a washing and extracting machine, the combination of a base, a pedestal supported by the base by means including a flexible mounting permitting lateral movement of the upper end of said pedestal, a hollow shaft supported by the pedestal, a second shaft within said hollow shaft, a clothes container and extractor supported by the pedestal and connected to be operated by said shafts, inertia means fixed to said pedestal adjacent said container with its center of mass coincident with the axis of said pedestal, resilient restraining means between said base and said pedestal yieldably resisting lateral movement of said pedestal with respect to said base, and means for controlling said shafts to wash or extract the clothes in said container.

7. In a combined washer and extractor a vertical supporting shaft, a bearing member mounted on said shaft and having its axis out of alignment with the shaft axis, a receptacle mounted on the bearing member to turn about the axis of said member, means for driving said shaft, means for releasably holding said receptacle against rotation while said shaft is rotating, and a counterweight at the upper end of said shaft for impeding lateral vibration.

8. In a combined washer and extractor a vertical supporting shaft, a bearing member mounted on said shaft and having its axis out of alignment with the shaft axis, a receptacle mounted on the

bearing member, means for driving said shaft, and a counterweight at the upper end of said shaft with a center of mass coincident with the shaft axis for impeding lateral vibration.

9. In a combined washer and extractor a vertical supporting shaft, a bearing member mounted on said shaft and having its axis out of alignment with the shaft axis, a receptacle mounted on the bearing member to turn about the axis of said member, means for driving said shaft, and a counterweight at the upper end of said shaft for impeding lateral vibration.

10. In a combined washer and extractor a vertical supporting shaft, a bearing member mounted on said shaft with its axis out of alignment with the shaft axis, a receptacle mounted on the bearing member to turn about the axis of said member, a second shaft, a driving connection between said receptacle and said second shaft, means for driving said supporting shaft, means for releasably holding said second shaft against rotation, and a counterweight at the upper end of said first shaft for impeding lateral vibration.

11. In a combined washer and extractor a rotatable support, a receptacle carried by said support and mounted thereon to rotate about an axis that is inclined with respect to the axis of rotation of said support, means for rotating said support, means for releasably holding said receptacle against rotation, and a counterweight mounted at said support adjacent said receptacle with a relative axis of rotation parallel to the axis of rotation of said support.

12. In a machine of the character described a support mounted to rotate about a vertical axis, a liquid holding receptacle carried by said support and mounted thereon for rotation about an axis that intersects said vertical axis at a small angle to the vertical, a shaft, a driving connection between said receptacle and shaft, a brake for releasably holding said shaft against rotation, means for driving said supporting member to impart an orbital movement to the receptacle and to simultaneously apply torque thereto, and a counterweight mounted relatively close to the intersection of said axes for impeding lateral vibration.

13. In a machine of the character described a support mounted to rotate about a vertical axis, a liquid holding receptacle carried by said support and mounted thereon for rotation about an axis that intersects said vertical axis at a small angle to the vertical, means for holding said receptacle against rotation, means for driving said supporting member to impart an orbital movement to the receptacle and to simultaneously apply torque thereto, and a counterweight mounted relatively close to the intersection of said axes for impeding lateral vibration, said counterweight having a center of mass coincident with the said vertical support axis.

14. In a machine of the character described a support mounted to rotate about a vertical axis, a liquid holding receptacle carried by said support and mounted thereon for rotation about an axis that intersects said vertical axis at a small angle to the vertical, a brake for restraining rotation of said receptacle, means for driving said support, and a counterweight mounted relatively close to the intersection of said axes for impeding lateral vibration.

15. In a machine of the character described, an upright tubular shaft, a receptacle mounted upon the upper end of said shaft for rotation about an axis inclined at a small angle to the vertical, a second shaft within said tubular shaft and flexibly connected to said receptacle to rotate therewith, means for driving said tubular shaft, a brake for restraining rotation of said second shaft and receptacle, and a counterweight at the upper end of said first shaft for impeding lateral vibration.

16. An extractor drive comprising a drive shaft, a receptacle connected to said shaft and free to turn bodily with the shaft or to turn with respect to the shaft about an axis inclined with respect to the shaft axis, means to restrain the rotation of the receptacle, and a counterweight at the portion of said shaft adjacent to the connection with said receptacle for impeding lateral vibration.

17. In a machine of the character described, an upright shaft, a container mounted thereon, a universal support for said shaft comprising a horizontal cross bar in which said shaft is mounted, a horizontal shaft normal to said cross bar, a sleeve having diverging arms rotatably mounted on said shaft and adapted to receive the cross bar between their outer ends, pivots disposed horizontally and at right angles to the horizontal shaft connecting the ends of the cross bar to said arms, means for driving the shaft including a pulley attached thereto below said cross bar, a disc-shaped weight having a central bearing in which the upper end of said shaft is received, and springs connecting said weight to the frame for normally holding the weight in a horizontal position.

18. In a combined washer and extractor, a clothes container having a peripheral wall provided with liquid discharge passages, the container having a central re-entrant bottom portion, a tubular upright supporting shaft, a bearing mounted in the upper end of the supporting shaft with its axis disposed at a small fixed angle to the axis of the supporting shaft, a stub shaft mounted in the bearing and fixed to the container re-entrant portion, the arrangement being such that the axis of the stub shaft intersects the axis of the supporting shaft at the central zone of the container, a non-rotatable tubular post encasing the tubular shaft and providing bearing support therefor, and a rubber collar associated with the tubular post limiting the gyratory movement of the tubular shaft during operation of the machine.

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