

**May 6, 1930.**

W. V. ORR

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## CENTRIFUGAL DRIER

Filed May 6, 1929

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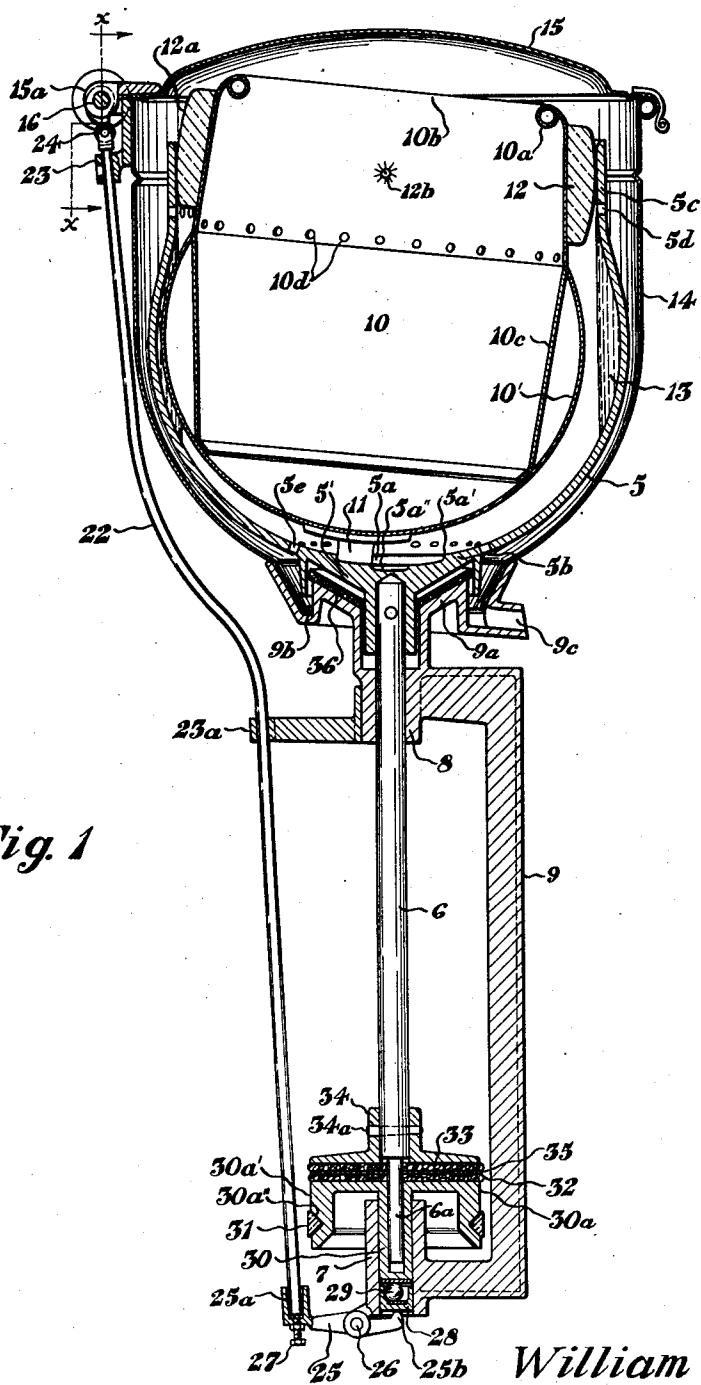


*Fig. 1*

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2 Sheets-Sheet 2

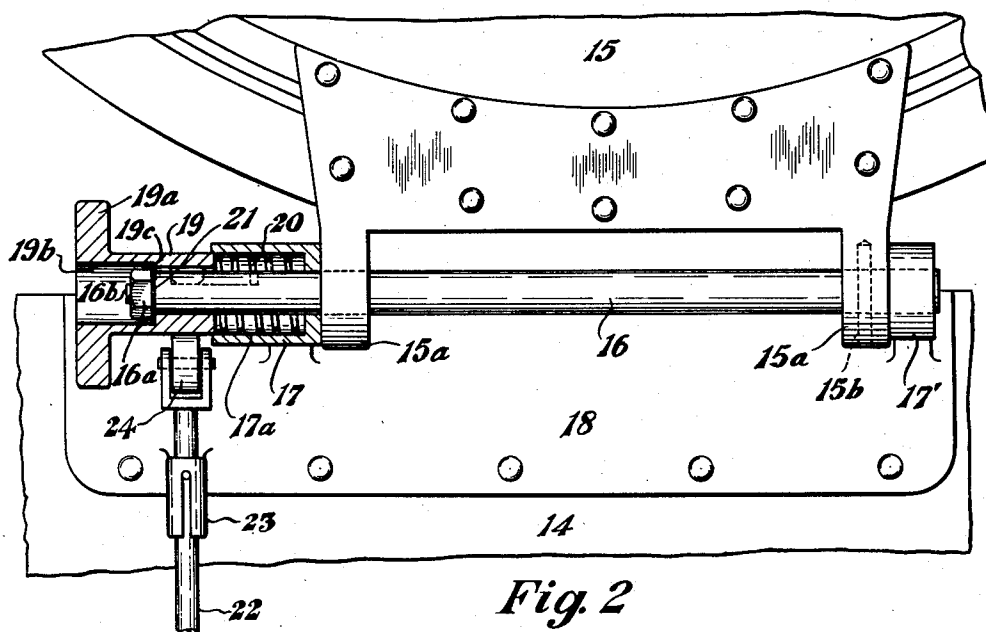
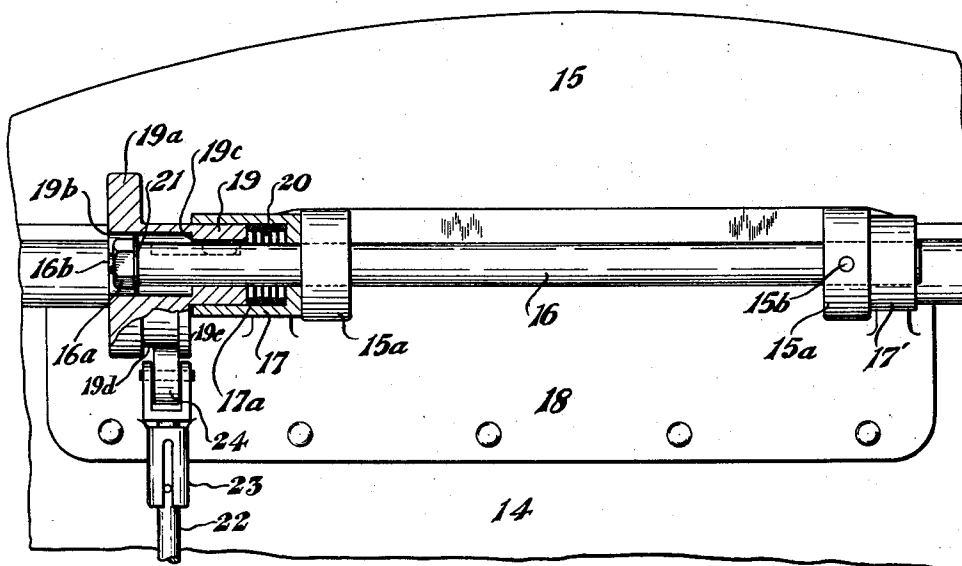
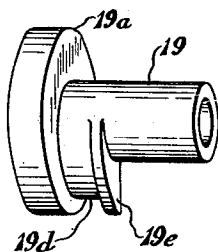


*Fig. 3*

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## UNITED STATES PATENT OFFICE

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## CENTRIFUGAL DRIER

Application filed May 6, 1929. Serial No. 360,665.

The invention relates to a machine or apparatus for drying wet clothes by centrifugal action in a rapidly rotating receptacle, and one object of the improvement is to equalize the weight of the receptacle and its contents, so that it will rotate without any wobbling or undesirable vibrations.

In machines or apparatus of this type, the rotating receptacle is frequently mounted on the upper end of a vertical shaft or spindle, and in order to obtain the best results it is desirable, if not necessary, to rotate the receptacle at some 1200 R. P. M.

In practice, however, it has been found that when placing wet clothes in the receptacle, there is sometimes such a difference in the weight thereof at different points more or less remote from the axis, as to cause the receptacle to vibrate on its axis to such an extent as will seriously impair if not destroy the machine, especially when it is rotated at a speed of from 900 R. P. M. and upwards.

This difficulty is avoided by the present improvement, in which the clothes receptacle is mounted for tilting to a limited extent by the differential weight of clothes therein, within a surrounding vessel shaped to form a spherical-zone annular groove or channel, into which water extracted from the clothes is thrown by centrifugal force to form a balancing water wheel, which is adapted to be displaced at one side or another by a tilting of the clothes receptacle, to equalize the differential weight of the clothes and the tilted receptacle.

Another object of the improvement is to provide means which may be actuated by closing the lid of the apparatus for starting a rotation of the spindle on which the clothes receptacle is mounted, and by which the rotation will be automatically stopped by an opening of the lid; but which cannot possibly be actuated without first opening and then closing the lid.

This object is attained in the present improvement by mounting the vertical spindle for limited endwise movement, with vertically movable friction driving means and friction brake means for starting and stopping rotation of the spindle; and by provid-

ing a stationary case around the rotating parts, with a lid hinged at one side thereof having a normally inactive cam on the hinge pintle arranged to be rendered active by manual means during the closing of the lid, to depress a plunger and operate a lever for raising the driving means and releasing the brake means by a closing of the lid, and automatically permitting a release of the driving means and an engagement of the brake means by a subsequent opening of the lid.

The improvement is illustrated in the accompanying drawings forming part hereof, in which—

Figure 1 is a vertical axial section of the apparatus, showing all the parts in operating position;

Fig. 2, a section as on line  $x-x$ , Fig. 1, when the lid is opened;

Fig. 3, a section as on line  $x-x$ , Fig. 1, when the lid is closed; and

Fig. 4, a perspective view of the cam sleeve. Similar numerals refer to similar parts throughout the drawings.

The apparatus includes a spherical vessel 5, made of cast, stamped or spun metal or the like, which is secured to the upper end of an upright spindle 6 mounted for limited endwise movement in a lower bearing 7 and an upper bearing 8 on a frame 9 adapted to be secured as by bolting to the side of a washing machine or other support.

The clothes receptacle 10 is made of sheet metal or the like, and is mounted within and surrounded on the sides and bottom by the spherical vessel 5, in which it is supported by an axial pin or post 11 bearing in a socket 5<sup>a</sup> in the bottom 5<sup>b</sup> of the vessel, and the ring 12 made of friction composition or the like, around the upper end of the receptacle bearing against the substantially cylindric rim portion 5<sup>c</sup> of the surrounding vessel.

The upper end of the receptacle may be finished by an inturned bead 10<sup>a</sup> which forms an opening 10<sup>b</sup> through which clothes may be placed into and removed from the receptacle.

The exterior wall 10<sup>c</sup> of the lower part of the receptacle is spherical in form corresponding to but of less diameter than the spherical wall of the vessel 5, so as to permit a lateral

movement of the spherical portion of the receptacle within the spherical vessel.

Within the spherical portion of the outer wall 10' is provided an inner wall 10<sup>c</sup> which is inclined outward from below upward in the form of an inverted truncated cone, and immediately above the upper end of the inner wall is provided an annular series of apertures 10<sup>d</sup> for the discharge of water from the receptacle into the vessel.

A similar annular series of apertures 5<sup>d</sup> is provided in the wall of the vessel 5 at the bottom of the cylindric rim portion 5<sup>c</sup> thereof immediately above the enlarged spherical portion, below which the spherical wall of the vessel forms an enlarged spherical-zone channel adapted to receive a body of water in the form of a balance wheel 13 when the water is thrown outward by centrifugal action.

The face 12<sup>a</sup> of the bearing rim 12 is rounded to form a spherical zone on a center 12<sup>b</sup> in the axis of the receptacle, so that the receptacle may be tilted or gyrated to a limited extent by a lateral movement of the bottom post 11 within the socket 5<sup>a</sup> in the bottom of the vessel.

The rim 5<sup>a'</sup> of the socket forms a stop to limit the lateral movement of the foot post 11, and the central portion 5<sup>a''</sup> of the socket is preferably recessed slightly to form a rim for normally retaining the post in central position, but permitting it to ride upward and outward in response to a substantial lateral pressure caused by the differential weight of the clothes in the receptacle.

In the operation of the apparatus, a batch of wet clothes is placed in the receptacle, and if there is not sufficient water in the clothes for the purpose of the present invention, additional water may be poured into the receptacle; after which the spindle is rotated in the manner presently to be described, and the rotation of the vessel secured thereon rotates the receptacle by its ring bearing contacts therewith until a speed of some 1200 R. P. M. is attained.

In this operation, the water is centrifugally extracted, and is thrown outward against the inverted conical zone 10<sup>c</sup> in the wall of the receptacle, and the inclination thereof carries the water upward, whence it is discharged through the annular series of apertures 10<sup>d</sup> into the surrounding spherical vessel; whereupon the water is thrown centrifugally outward into the channel formed by the spherical zone in the side of the vessel to form a liquid balance wheel, as at 13; whence an excess of water is thrown outward through the annular series of apertures 5<sup>d</sup> above the channel, or when the speed is reduced, the water will find its way downward and outward through the annular series of apertures 5<sup>e</sup> around the bottom portion of the vessel.

During the rapid rotation of the vessel

and the receptacle therein, a sufficient differential in the weight of the clothes in the receptacle will tilt the same by throwing its bottom outward in the direction of the excessive weight, whereupon the spherical-zone periphery thereof will enter the water wheel in the corresponding side of the vessel and displace a sufficient amount of water therefrom to equalize the differential weight of the receptacle and its contents, and thereby prevent a wobbling or vibration of the parts superposed on the spindle.

A stationary case 14, preferably made of sheet metal, is provided around the vessel, and may be secured to an annular supporting bracket 9<sup>a</sup> formed or mounted on top of the bracket 9 around the upper end of the spindle 6; in which bracket is formed an annular trough 9<sup>b</sup> provided with an outlet 9<sup>c</sup> for receiving and delivering the water discharged into the case from the rapidly rotating vessel.

The stationary case 14 is provided with a lid 15 hinged by ears 15<sup>a</sup> secured as by a pin 15<sup>b</sup> on a pintle 16 journaled in bearings 17 and 17' secured as by a bracket 18 to the side of the case.

The bearing 17 is extended outward and recessed to form an annular socket 17<sup>a</sup> for receiving one end of a sleeve 19 feathered for endwise movement on the pintle, the inward movement of which sleeve is resisted by a coiled compression spring 20 in the socket around the pintle.

The outer end of the sleeve 19 is provided with a disk handle or button 19<sup>a</sup> and is also recessed to form the socket 19<sup>b</sup> for receiving a nut 16<sup>a</sup> screwed on an axial bolt 16<sup>b</sup> extending from the end of the pintle, and a washer 21 is clamped by the nut against the end of the pintle for bearing on the bottom 19<sup>c</sup> of the socket 19<sup>b</sup>, and stopping the outward movement of the sleeve 19.

A cam 19<sup>d</sup> is provided on the outer end of the sleeve 19 immediately inside of the disk handle or button, and a flange 19<sup>e</sup> is provided on the inner side of the cam for the purpose presently to be described.

A plunger rod 22 is mounted for endwise movement in bearings 23 and 23<sup>a</sup> formed or secured respectively on the bracket 18 and the bearing 8, upon the upper end of which rod is mounted a roller wheel 24 for riding alternately the cylindric sleeve and upon the cam protruding therefrom, when the same is in its outward and inward positions.

The lower end of the plunger rod is supported on the outer end of a lever 25 pivoted at 26 to the lower end of the bearing 7, the lower end of the rod being seated in a cup 25<sup>a</sup> and adjustably supported by a take-up screw 27 on the end of the lever.

The inner end of the lever 25 is extended upward to form a finger 25<sup>b</sup> for centrally supporting a sleeve cup 28 in the lower end

of the bearing 7; and a ball 29 is located in the cup, upon which rests the lower end of a sleeve shank 30 slidably journaled in the bearing 7, on the upper end of which sleeve is formed or secured the drive wheel 30<sup>a</sup> having a depending flange 30<sup>a''</sup> on its rim provided with a V-socket 30<sup>a'''</sup> by which the wheel may be continuously rotated by a belt 31 from any suitable source of power.

Upon the upper side of the wheel 30<sup>a</sup> is located a disk 32 made of friction material, upon which may bear a friction disk 33 secured to the lower end of the spindle 6 as by the flange sleeve 34 and the pin 34<sup>a</sup> on the lower end portion of the spindle; and a thin steel washer disk 35 may be interposed between the friction disks to ease the starting of the spindle.

A reduced end 6<sup>a</sup> of the spindle extends downward and is slidably journaled in the sleeve shank 30 of the driving wheel, and by raising the driving wheel as by a depression of the plunger rod 22, the friction disk 32 and the washer disk 35 will be elevated to bear upward against the friction disk 33, so as to rotate the spindle.

The conical disk 36 is secured to the bracket 9<sup>a</sup> around the sleeve shank 5', by which the vessel 5 is secured on the upper end of the spindle; and the bottom 5<sup>b</sup> of the vessel is conically shaped to seat and bear upon the conical disk 36 as a brake to stop the rotation of the vessel.

The parts are so proportioned and arranged that the bottom of the vessel will normally bear upon the conical disk when the drive wheel and the friction disk thereon are in normal position freely below the friction disk 33 on the spindle; and that when the drive wheel is raised, its friction disk or the washer disk when used, will bear upward against the friction disk on the spindle, and will raise the spindle to elevate the conical bottom of the vessel clear above the conical disk 36, so that the vessel may be freely rotated by the drive wheel.

When the sleeve 19 in the lid-hinge actuating mechanism is in normal outward position, where it is held by the spring 20, as shown in Fig. 2, the lid 15 may be freely opened and closed, and the roller wheel 24 will ride freely on the cylindric inner end portion of the sleeve 19; and when it is desired to operate the apparatus, the lid being held open by one hand of the operator, the sleeve 19 is pushed inward by the other hand applied to the disk handle or button 19<sup>a</sup> which is pushed and held inward to bring the cam 19<sup>a</sup> in the path of the roller wheel 24 while the lid is being closed, so that the roller will ride on the cam 19<sup>a</sup> which pushes the plunger rod downward and actuates the lever 25 for elevating the drive wheel into operating bearing contact with the friction disk on the spindle, and raising the bottom

of the vessel above the brake disk, for rotating the vessel and the receptacle therein.

When the roller wheel rides upon the cam 19<sup>a</sup>, the flange 19<sup>e</sup> on the inner end thereof engages the inner side of the wheel and prevents the sleeve from moving outward, until the lid is again opened and the roller wheel rides upward on the cam until it is free of the flange, whereupon the spring 20 automatically pushes the sleeve outward so that the roller will ride upon the cylindric portion thereof; and in so doing, the plunger rod is pushed upward by the weight of the drive wheel and the superposed spindle and vessels, bearing on the inner end of the lever 25, and all the parts drop downward into inoperative position with the bottom of the vessel bearing on the brake disk, which stops the rotation of the vessel and the receptacle and permits the withdrawal of the clothes therefrom.

By the described construction and arrangement of the parts, it is impossible to operate the spinning or rotating parts without first opening the lid and manually holding the cam in actuating position while closing the lid; thus making it safe for an inexperienced person to operate the machine without accidentally or unintentionally starting the spinning mechanism.

Moreover, the automatic formation and maintenance of the liquid balancing wheel in the spherical-zone channel in the vessel at a substantial interval from and around the outside of the clothes receptacle and the automatic equalizing and counterbalancing of the receptacle and its contents resulting from the tilting of the receptacle and the displacement of liquid in the spherical-zone channel in the vessel; renders it possible to spin the parts at a much greater speed than would otherwise be possible on a spindle operating in fixed bearings.

And finally, the use of friction driving and brake means causes a gradual starting and stopping of the spinning parts, without any sudden straining of the bearing parts, and permits the apparatus to be safely operated by an inexperienced person.

The starting and stopping mechanism which is illustrated and described but not claimed herein, is included in the subject matter and is claimed in a companion application (Case A), filed herewith.

I claim:

1. A centrifugal apparatus including a spherical vessel rotatable on a vertical axis, a receptacle supported for rotating with a limited tilting movement within the vessel, the vessel forming a spherical-zone channel for receiving liquid, and the exterior of the receptacle forming a spherical zone for displacing liquid in the channel when the receptacle is tilted in the vessel.

2. A centrifugal apparatus including a

spherical vessel rotatable on a vertical axis, a receptacle supported for rotating with a limited tilting movement within the vessel and having an inverted conical-zone wall in its lower part with an annular series of liquid outlet apertures at the upper end thereof, the vessel forming a spherical-zone channel for receiving liquid, and the exterior of the receptacle forming a spherical zone for displacing liquid in the channel when the receptacle is tilted in the vessel.

3. A centrifugal apparatus including a spherical vessel rotatable on a vertical axis, a receptacle supported for rotating with a limited tilting movement within the vessel, the vessel forming a spherical-zone channel for receiving liquid with an annular series of outlet apertures adjacent the channel, and the exterior of the receptacle forming a spherical zone for displacing liquid in the channel when the receptacle is tilted in the vessel.

4. A centrifugal apparatus including a spherical vessel rotatable on a vertical axis, a receptacle supported for rotating with a limited tilting movement within the vessel and having an inverted conical-zone wall in its lower part with an annular series of liquid outlet apertures at the upper end thereof, the vessel forming a spherical-zone channel for receiving liquid and having an annular series of outlet apertures adjacent the channel, and the exterior of the receptacle forming a spherical zone for displacing liquid in the channel when the receptacle is tilted in the vessel.

5. A centrifugal apparatus including a spherical vessel rotatable on a vertical axis, a receptacle supported for rotating with a limited tilting movement within the vessel by a central post bearing on the bottom of the vessel and a spherical-zone rim ring bearing on the rim portion of the vessel, the vessel forming a spherical-zone channel for receiving liquid and the exterior of the receptacle forming a spherical zone for displacing liquid in the channel when the receptacle is tilted in the vessel.

In testimony that I claim the above, I have hereunto subscribed my name.

WILLIAM V. ORR.

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