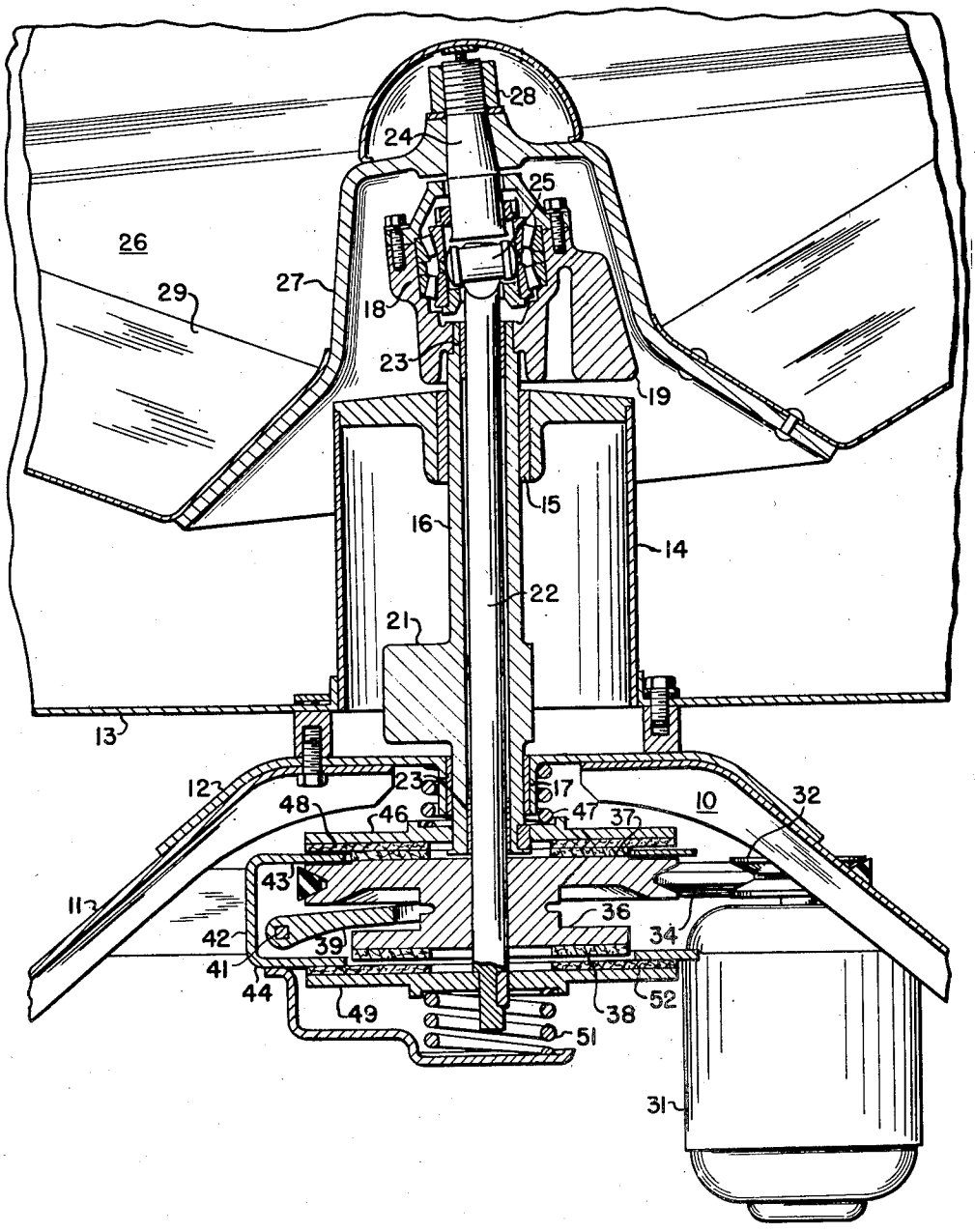
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WASHING MACHINE

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WASHING MACHINE

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This invention relates to washing machines, and more particularly to an improved drive means for washing machines of the type having a clothes container adapted to be wobbled for washing clothes and to be rotated for extracting liquid from the clothes.

The drive means to be described is particularly adaptable to a washing machine of the type disclosed in a copending U. S. application, Serial No. 619,849, filed April 25, 1946, in the name of James Blaine Kirby and entitled, "Washing Machine."

As disclosed in the aforesaid application, a clothes container or basket is mounted with its axis disposed at a slight angle to the vertical and a universal joint connects the basket and an inner vertical shaft. The basket is free to rotate or may be held against rotation by applying brake means associated with said inner shaft. An outer tubular shaft coaxial with the inner shaft is continuously rotated while the machine is in operation. The outer shaft rotates the outer race of an inclined ball or the like bearing coaxially aligned with the basket axis, the inner race of the bearing being connected to the basket, whereby when the basket is held against rotation by applying the brake means to the inner shaft a wobbling action is imparted to the basket. This wobbling action effects washing of articles contained in the basket in a manner more fully described in the aforesaid application. Upon release of the inner shaft, the basket will gradually attain the speed of the continuously rotating outer shaft due to the tendency of the inclined bearing to carry the basket with it. The basket side walls have openings therein whereby spinning of the basket will cause liquid to be removed from the articles by centrifugal force and discharged through the basket openings.

The wobbling action imparted to the basket during the washing period in a machine of this type creates an unbalanced load on the machine due to the tendency to successively lift the machine at each point of support, resulting in an unstable condition which may cause the machine to walk. It has previously been proposed to stabilize the machine by fixing a weight to the outer shaft in the zone of the inclined bearing or optionally employing two weights, the second weight being fixed to the outer shaft adjacent its lower end.

Although the weights affixed to the outer shaft as described substantially increased the stability of the machine during the washing period, the weights continued to rotate during spinning of the basket, since they were fixed to the continuously rotating outer shaft. This created an undesirable unbalance during spinning of the basket due to the diametrically opposite weights spaced along the drive means and the forces due to the rotating weights were not absorbed as by the wobbling action of the basket during the washing period.

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The present invention overcomes the aforementioned disadvantage of the counterbalance means by employing a drive means wherein the outer shaft and weights are rotated during washing to counteract the wobbling action, but this shaft is held against rotation during spinning of the basket. The inner shaft is employed to hold the basket against rotation during the washing period and is rotated to effect spinning of the basket.

It is a primary object of the invention to provide a washing machine having improved drive means including counterbalance means adapted to be intermittently rotated.

Another object of the invention is to provide an improved drive means for washing machines of the type employing a clothes container adapted to have a wobbling action imparted thereto for washing articles and to be rotated for removing liquid from articles disposed in said container.

Other objects of the invention and the invention itself will become increasingly apparent from a consideration of the following description and drawing, wherein:

Figure 1 is a fragmentary, vertical, sectional view of a washing machine employing the improved drive means.

Referring to the drawing, I have indicated generally at 10 a frame comprising a plurality of legs 11 and a top plate 12. Supported by and secured to the frame is a tub 13 having a central opening in the base thereof from which extends a member 14 of inverted cup form which is rigidly secured to the tub base. The top member 14 has a bearing 15 mounted therein which receives a tubular shaft 16.

The central portion of frame top plate 12 forms a mounting for a second bearing 17 which receives the lower portion of shaft 16. Integrally secured to the top of shaft 16 is the outer race 18 of a double roller bearing which has its axis inclined at a slight angle such as 4° to the vertical or to the axis of shaft 16. The race 18 has a counterweight 19 integral therewith and disposed at the high side of the bearing. A second counterweight 21 is secured to shaft 16 diametrically opposite counterweight 19, the weight 21 being spaced downwardly from counterweight 19

a substantial distance or as close to the supporting surface for the machine as is practical.

An inner solid shaft 22 is rotatably mounted relative to shaft 16 through spaced bearings 23. The upper end of shaft 22 is connected to a stub shaft 24 through a universal joint generally indicated at 25, the axis of the stub shaft being inclined from the vertical or the axis of shaft 22 at a slight angle such as 4°. A clothes container or basket 26 has a central re-entrant portion 27 of generally inverted cup form and stub shaft 24 projects through and is locked to basket portion 27 by a nut 28. The basket is provided with ribs 29.

It will now be apparent that if inner shaft 22 is held against rotation and the outer shaft 16 is rotated, a wobbling action will be imparted to the basket, since the basket is free to rock due to the universal joint and the inclined bearing causes the stub shaft to be moved in a conical path without rotation. This wobbling action of the basket tends to successively lift each of the legs 11 from the supporting surface and unless this lifting tendency is counterbalanced, the machine is unstable and tends to walk along the supporting surface. The counterbalance is achieved through the rotating weight 19 disposed at the high side of the basket, since the centrifugal force due to rotating weight 19 exerts a pull generally at right angles to shafts 16 and 22 acting to keep each support in contact with the supporting surface as the basket wobbles. However, this force also tends to move the machine laterally at the supporting surface and this force may be compensated for by providing the second lower counterweight 21, although this weight may be omitted if there is sufficient frictional contact between the supporting surface and the supporting legs 11. As previously explained, the drive means illustrated in the aforementioned co-pending application would cause a weight, such as 19, secured to the tubular shaft to rotate continuously or both during washing and spinning of the basket. Inasmuch as the lifting tendency only occurs during wobbling of the basket, it is undesirable to have a weight, such as 19, rotate during spinning and the present invention provides a drive means whereby weight 19 will rotate during washing or wobbling of the basket but will be held against rotation during spinning of the basket.

An electric motor 31 is mounted in any suitable manner on the frame 10 and a motor drive pulley 32 is connected by a belt 34 to a driven pulley 36. Pulley 36 is continuously driven while the machine is in operation and is provided with an annular strip of friction material 37 at its upper face and a similar strip 38 at its lower face. The pulley is shiftable a slight distance vertically through engagement with a shifting fork 39 which is mounted on and secured to a shaft 41. Shaft 41 has a bearing support in a housing 42 which is fixed to frame 10 and one end of the shaft projects outwardly from the housing whereby the fork may be rocked upwardly or downwardly when desired, either manually or automatically. The fork may be rocked automatically through solenoids under control of a suitable electric timer or through hydraulic means. Housing 42 has a generally annular top flange 43 and bottom flange 44. A plate 46 is keyed to the outer tubular shaft 16 and is continuously urged downwardly through a spring 47, the lower face of plate 46 having an annular strip of friction material 48 affixed thereto. A second plate 49 is keyed to inner shaft 22 and is continuously pressed upwardly through a spring 51, the upper face of plate 49 having an annular strip of friction material 52 affixed thereto.

The operation of the drive means will now be explained. When it is desired to operate the machine, the basket will be initially wobbled to wash articles contained therein with a desired amount of washing liquid being supplied to the basket in any suitable manner. During the washing period the parts are as illustrated in the drawing wherein, the friction material 52 of lower plate 49 is held in engagement with the lower flange 44 of housing 42 so that inner shaft 22 and resultantly the basket will be prevented from rotating. The driven pulley 36 is lifted upwardly to force upper plate 46, including the friction material 48, out of contact with the upper flange 43 of housing 42 so that the outer shaft 16 is free to rotate. The friction material 37 of the driven pulley 36 engages the friction material of plate 46 which is keyed to shaft 16 so that this shaft is rotated when the motor is started. Inasmuch as the inclined bearing 18 is fixed to shaft 16 the stub shaft 24 will be caused to move in a conical path and wobble the basket. When the washing period is completed the shifting fork 39 is operated to move the driven pulley 36 downwardly whereby the frictional driving engagement between this pulley and top plate 46 will be broken and the friction material 48 of plate 46 will engage top flange 43 of housing 42 so that shaft 16 will be held against rotation. At the same time, friction material 38 of the driven pulley 36 engages the friction material 52 of the lower plate 49 to effect driving engagement therebetween and the lower plate 49 is moved out of breaking contact with the lower flange 44 of the housing whereby the inner shaft 22 will be rotated, thus, the housing of the inclined bearing will be held stationary and a spinning action will be imparted to the basket and liquid will be extracted from articles in the basket due to centrifugal force.

As a specific example, a washing machine of the type described was provided with a basket 26 weighing approximately fifteen pounds and having an approximate diameter of twenty-two inches and an approximate depth of twelve inches. The counterweight 19 had a value of approximately 9¾ inch-pounds and the counterweight 21 nine inch-pounds. These values were obtained by multiplying the mass of each counterweight by the distance in inches of its center of gravity from the axis of shaft 22. It was found that counterweights having these values provided a satisfactory counterbalance to a basket having the weight and dimensions indicated during washing or wobbling action.

Although the drive means is illustrated as being operable by moving the pulley or drive member 36 axially, it will be apparent that the pulley can be held against axial movement and the same result achieved by moving the housing 42 or the flanges 43 and 44 axially. In this case, top flange 43 would be moved upwardly to brakingly engage plate 46 and disengage this plate from pulley 36. At the same time flange 44 would be moved upwardly to discontinue braking lower plate 49 and permit this plate to engage the drive pulley 36. Upon concurrent downward movement of the flanges 43 and 44, the top flange 43 will be moved out of braking contact with plate 46 and this plate will be spring-

pressed against drive pulley 36. At the same time the bottom flange 44 will be moved into braking contact with lower plate 49 and this plate will be moved out of driving engagement with pulley 36.

The above described drive means permits the counterweight or weights to be rotated during washing to give a desired counterbalance effect due to the lifting tendency created by the wobbling action of the basket and permits the weight or weights to be held against rotation during spinning of the basket.

It is understood that the invention is not limited to the exact details of construction shown and described, for obvious modifications will occur to persons skilled in the art.

What I claim is:

1. The combination with a washing machine of the type having a clothes container adapted to have a wobbling action imparted thereto for washing and to be rotated about its axis for extracting, of drive means for said container arranged to counterbalance forces created by the wobbling action, said drive means comprising coaxial inner and outer shafts, the inner shaft being fixed to the container and the outer shaft being rotatable while the container is held against rotation, means associated with the outer shaft and basket adapted to cause the basket axis to move in a conical path having its apex between the top and bottom of the basket when the outer shaft is driven and the inner shaft is held against rotation, means for concurrently driving the outer shaft and holding the inner shaft to effect wobbling, eccentric weight means on the outer shaft to counterbalance forces created by the wobbling action of the basket during washing, and means for concurrently driving the inner shaft and holding the outer shaft for extracting liquid from clothes in the container.

2. The washing machine as described in claim 1 and wherein the drive means includes a driving member loosely mounted coaxially of the shafts, a disc form clutch rotatably fixed to the outer shaft, a disc form clutch rotatably fixed to the inner shaft, non-rotatable brake means engageable with the clutches, and means for effecting relative axial movement between the drive member and brake means whereby one clutch may be engaged with the drive member and disengaged from the brake means and the other clutch may be concurrently disengaged from the driving member and engaged with the brake means.

3. The washing machine as described in claim 1 and wherein the drive means includes a driving member loosely mounted coaxially of the shafts, a disc form clutch rotatably fixed to the outer shaft, a disc form clutch rotatably fixed to the inner shaft, non-rotatable brake means engageable with the clutches, one clutch being disposed to engage the driving member top surface, the other clutch being disposed to engage the driving member bottom surface, spring means continuously urging both clutches towards the driving member, and means for effecting relative axial movement between the driving member and brake means whereby one clutch may be engaged with the driving member and disengaged from the brake means and the other clutch may be concurrently disengaged from the driving member and engaged with the brake means.

4. The combination with a washing machine of the type having a clothes container adapted to have a wobbling action imparted thereto for washing and to be rotated about its axis for extracting, of drive means for said container arranged to counterbalance forces created by the wobbling action, said drive means comprising coaxial inner and outer shafts, a stub shaft fixed to the basket, a universal joint disposed generally centrally of the basket interconnecting the inner shaft and stub shaft, a bearing encircling the universal joint and constraining the stub shaft to move in a conical path with the universal joint as the apex, a bearing housing fixed to the outer shaft whereby when the outer shaft is rotated and the inner shaft is held the stub shaft will be caused to move in said conical path to impart a wobbling action to the basket, means for concurrently driving the outer shaft and holding the inner shaft to effect wobbling of the basket, eccentric weight means on the outer shaft to counterbalance forces created by the wobbling action of the basket during washing, and means for concurrently driving the inner shaft and holding the outer shaft for extracting liquid from clothes in the container.

5. The combination as described in claim 4 and wherein the eccentric weight means comprises a first eccentric weight fixed to the bearing housing and disposed at the high side of the basket, and a second eccentric weight fixed to the outer shaft at a substantial distance beneath the first weight and diametrically opposite thereto.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,033,146	Motycka	Mar. 10, 1936
2,137,540	Motycka	Nov. 22, 1938
2,344,253	Kirby	Mar. 14, 1944
2,350,218	De Remer	May 30, 1944