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R. R. CANDOR

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DOMESTIC APPLIANCE

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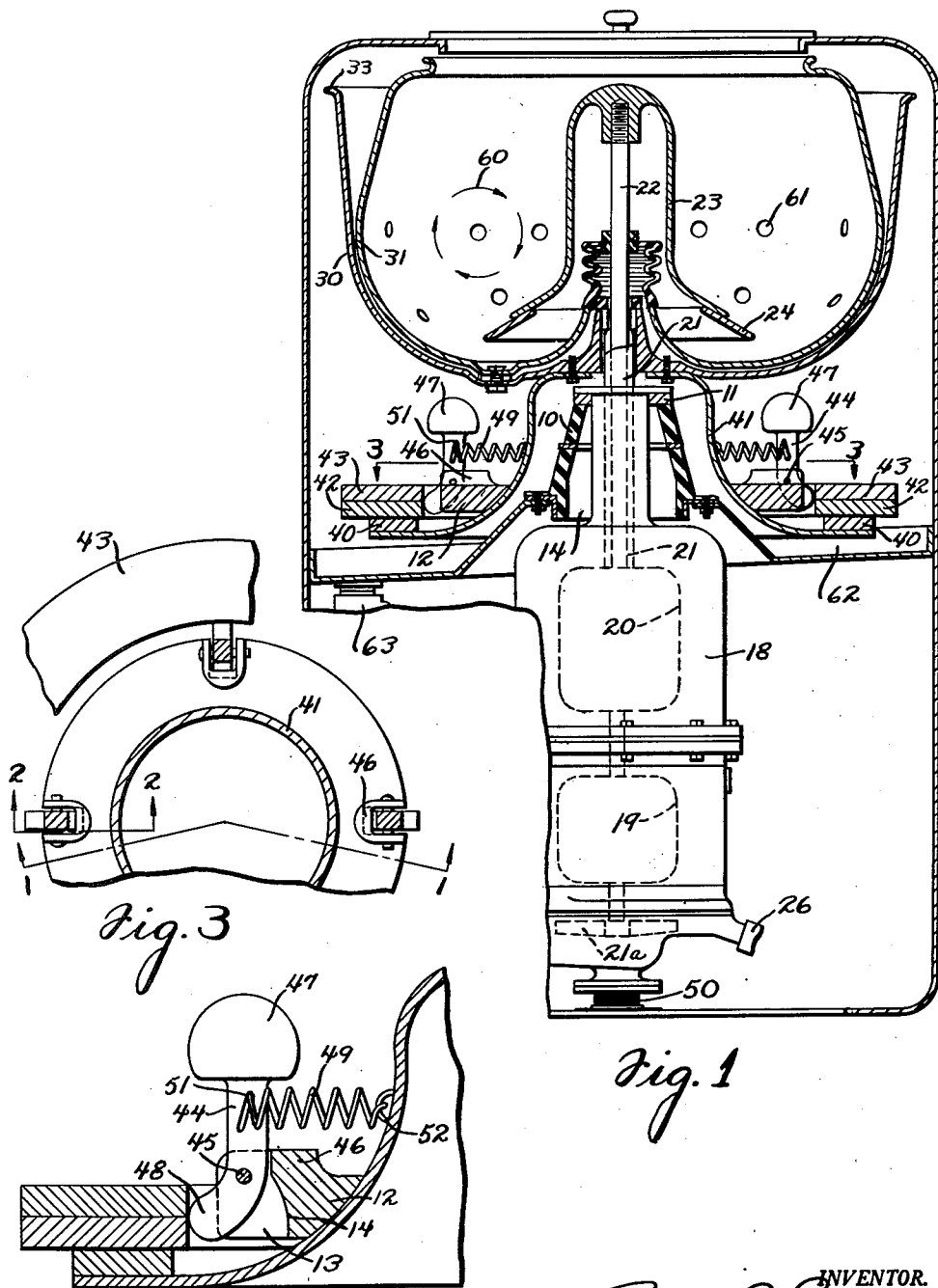


Fig. 1

Fig. 2

Fig. 3

INVENTOR.
ROBERT R. CANDOR
BY
Spencer Hardman & Felt
Attorneys

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DOMESTIC APPLIANCE

Robert R. Candor, Oakwood, Ohio, assignor to
General Motors Corporation, Dayton, Ohio, a
corporation of Delaware

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13 Claims. (Cl. 74—573)

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This invention relates to domestic appliances, and more particularly to counterbalancing means for a rotatable device, such as a centrifugal washing machine.

An object of this invention is to provide counterbalancing loose rings, or weights, which are locked in place to rotate with the device in coaxial relationship while the device rotates below critical speed, and which are released to rotate loosely with the device above critical speed automatically to counterbalance the device above critical speed.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a vertical cross-section of a washing machine embodying my invention, taken along the line 1—1 of Fig. 3;

Fig. 2 is an enlarged cross-section taken along the line 2—2 of Fig. 3; and

Fig. 3 is a horizontal cross-section taken along the line 3—3 of Fig. 1.

A machine embodying features of my invention may include a rotatable device or receptacle 30 which is rotatably supported on the flexible support or collar 10. The device 30 may be rotated by means of a motor 19, carried in a casing 18 together with a transmission 20. The casing 18 is supported on the support or rubber collar 10 by means of a platform 11. The transmission 20 rotates the sleeve 21, which is fixedly secured to the receptacle 30. A snubber 50 is provided.

If the machine is a centrifugal washing machine, the receptacle 30 may be provided with an inner perforated cup 31 inside of which is an agitator 23 supported on a vertically reciprocable shaft 22. If desired, the agitator 23 may have a flexible rim 24 to impart a toroidal circulation to the liquid in the receptacle 30.

All of the foregoing parts may be substantially identical with similar parts disclosed in the patent to Kendall Clark 2,366,236, patented January 2, 1945.

My novel counterbalancing means may include a frictional platform 40 which is fixedly connected with the receptacle 30 by means of the inverted funnel-shaped support 41. A plurality of counterbalancing elements such as loose rings or weights 42 and 43 rest on the platform 40 and are adapted to rotate with the receptacle 30 by reason of the friction between the parts.

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Means are provided to lock the rings 42 and 43 in coaxial relation with the device while it rotates below critical speed and to release the rings when the device rotates above critical speed. To this end, a plurality of levers 44 are fulcrumed at 45 on lugs 46 carried by the support 41. These levers are provided with centrifugal weights 47 at their upper end, while their lower ends 48 engage the rings 42 and 43 to maintain the rings in coaxial relationship while the device rotates below critical speed. A ring 12 is fixed to the support 41, and carries the lugs 46, and is slotted at 13 to receive the lower ends 48 of the levers. The inner surfaces 14, of the slots 13, form limiting stops for the levers 44.

Snap-acting means are provided to hold the levers 44 in locking relationship while the device rotates below critical speed, and to release the levers when the device rotates above critical speed. To this end a plurality of springs 49 are secured to the eyelets 52 on the support 41, and are slidably hooked in the slots 51 in the arms 44 which are thereby biased in their holding position. The angle of the slots 51 is such that the springs 49 are at the upper end of the slots 51 while the device is stationary or rotating below critical speed. As the device accelerates above critical speed, the arms 44 fly outwardly a slight distance, until the slots 51 pass their vertical position, at which time the springs 49 snap to the lower end of the slots 51, thus reducing the leverage of the springs 49 relatively to the fulcrums 45. This causes the levers 44 to fly outward to their outermost position to release the rings 42 and 43, so that the rings are effective to counterbalance the receptacle 30 above the critical speed.

Loose rings, similar to rings 42 and 43, but without locking means, have been used heretofore; but they are objectionable because they tend to fly out in the same direction as the center of gravity of the unbalanced load below critical speed. This aggravates the total unbalanced load below critical speed and causes an aggravated vibration at critical speed. The centrifugal levers 44 prevent the rings 42 and 43 from flying out below critical speed and this overcomes the objection heretofore present in the use of loose rings.

In the operation of the device, clothes and liquid are placed in the receptacles 30 and 31. The motor and transmission 20 are energized to reciprocate the agitator 23 vertically, thus creating a toroidal circulation of liquid, as indicated by the arrows 60. After a suitable length of time, the

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motor and transmission are energized to rotate the receptacles 30 and 31. Liquid then flows through the openings 61 and over the rim 33 of the outer receptacle 30 to the sump 62 from whence it flows through a pipe 63 to the pump 21 and thence through the discharge pipe 26. The clothes in the receptacle 31 are quite likely to be in an unsymmetrical condition, and this creates an unbalanced load in the receptacle. As the receptacles accelerate, they reach a critical speed, established by the period of vibration on the flexible support 10. During this acceleration the levers 44 maintain the rings 42 and 43 locked in coaxial relationship. The basket continues to accelerate above critical speed at which time the levers 44 release the rings 42 and 43 and allow them to counterbalance the unbalanced load. These rings automatically arrange themselves in counterbalancing relationship to the unbalanced load above the critical speed, as is well known in the art.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims.

What is claimed is as follows:

1. A machine comprising a rotatable device, a support for said device upon which said device has a critical speed of rotation, means for rotatably accelerating said device from below said critical speed, through said critical speed and above said critical speed, counterbalancing rings loosely carried to rotate coaxially and individually non-coaxially with said device, and a lever structure biased to lock said rings in coaxial relation to said device while said device rotates below and at said critical speed said structure including means to cause release of said rings for individual non-coaxial rotation when said device rotates above said critical speed.

2. A machine comprising a rotatable device, a support for said device upon which said device has a critical speed of rotation, means for rotatably accelerating said device from below said critical speed, through said critical speed and above said critical speed, counterbalancing rings loosely carried to rotate coaxially and individually non-coaxially with said device, and centrifugally controlled means to lock said rings in coaxial relation to said device while said device rotates below and at said critical speed and to release said rings for individual non-coaxial rotation when said device rotates above said critical speed.

3. A machine comprising a rotatable device, a support for said device upon which said device has a critical speed of rotation, means for rotatably accelerating said device from below said critical speed, through said critical speed and above said critical speed, counterbalancing rings loosely carried to rotate coaxially and individually non-coaxially with said device, and centrifugally controlled levers and springs to lock said rings in coaxial relation to said device while said device rotates below and at said critical speed and to release said rings for individual non-coaxial rotation when said device rotates above said critical speed.

4. A machine comprising a rotatable device, a support for said device upon which said device has a critical speed of rotation, a frictional platform secured to rotate with said device, counterbalancing weights loosely carried by said platform to rotate coaxially and individually non-

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coaxially with said device, and a structure actuated out of synchronism with the starting and stopping of said rotatable device to lock said weights in coaxial relation to said device while said device rotates below said critical speed and to release said weights for loose non-coaxial rotation when said device rotates above said critical speed.

5. A machine comprising a rotatable device, a support for said device upon which said device has a critical speed of rotation, a frictional platform secured to rotate with said device, counterbalancing weights loosely carried by said platform to rotate coaxially and individually non-coaxially with said device and centrifugally actuated means to lock said weights in coaxial relation to said device while said device rotates below said critical speed and to release said weights for loose non-coaxial rotation when said device rotates above said critical speed.

6. A machine comprising a rotatable device, a support for said device upon which said device has a critical speed of rotation, a frictional platform secured to rotate with said device, counterbalancing weights loosely carried by said platform to rotate coaxially and individually non-coaxially with said device, and centrifugally controlled means to lock said weights in coaxial relation to said device while said device rotates below said critical speed and to release said weights for loose non-coaxial rotation when said device rotates above said critical speed.

7. A machine comprising a rotatable device, a support for said device upon which said device has a critical speed of rotation, means for rotatably accelerating said device from below said critical speed, through said critical speed and above said critical speed, counterbalancing rings loosely carried to rotate coaxially and individually non-coaxially with said device, and centrifugally actuated snap-acting means to lock said rings in coaxial relation to said device while said device rotates below and at said critical speed and to release said rings for individual non-coaxial rotation when said device rotates above said critical speed.

8. A machine comprising a rotatable device, a support for said device upon which said device has a critical speed of rotation, means for rotatably accelerating said device from below said critical speed, through said critical speed and above said critical speed, counterbalancing rings loosely carried to rotate coaxially and individually non-coaxially with said device, and means comprising snap-acting levers to lock said rings in coaxial relation to said device while said device rotates below and at said critical speed and centrifugal means to release said rings for individual non-coaxial rotation when said device rotates above said critical speed.

9. A machine comprising a rotatable device, a support for said device upon which said device has a critical speed of rotation, a frictional platform secured to rotate with said device, counterbalancing weights loosely carried by said platform to rotate coaxially and individually non-coaxially with said device, and centrifugally actuated snap-acting means to lock said weights in coaxial relation to said device while said device rotates below said critical speed and to release said weights for loose non-coaxial rotation when said device rotates above said critical speed.

10. A machine comprising a rotatable device, a support for said device upon which said device has a critical speed of rotation, a frictional plat-

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form secured to rotate with said device, counterbalancing weights loosely carried by said platform to rotate coaxially and individually non-coaxially with said device, and means comprising snap-acting levers to lock said weights in coaxial relation to said device while said device rotates below said critical speed and centrifugal means to release said weights for loose non-coaxial rotation when said device rotates above said critical speed.

11. A machine comprising a rotatable device, means for rotatably accelerating said device, counterbalancing rings loosely carried to rotate coaxially and individually non-coaxially with said device, and speed responsive means to lock said rings in coaxial relationship during the initial stages of acceleration and to release said rings for individual non-coaxial rotation during later stages of acceleration.

12. A machine comprising a rotatable container, means for rotatably accelerating said container, counterbalancing elements loosely carried to rotate coaxially and individually non-coaxially with said container, and a device including means biased to hold said elements in coaxial relationship during the initial stages of acceleration and means for overcoming the bias of the first men-

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tioned means to release said elements for individual non-coaxial rotation during later stages of acceleration.

13. A machine comprising a rotatable device rotatable about a vertical axis, means for rotatably accelerating said device, counterbalancing rings loosely carried to rotate coaxially and individually non-coaxially with said device, and a delayed action structure locking said rings in coaxial relationship during the initial stages of acceleration, said structure comprising speed-responsive means for releasing said rings for individual non-coaxial rotation during later stages of acceleration.

ROBERT R. CANDOR.

REFERENCES CITED

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

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