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BALANCING MEANS FOR ROTATABLE CYLINDERS

Filed June 25, 1957

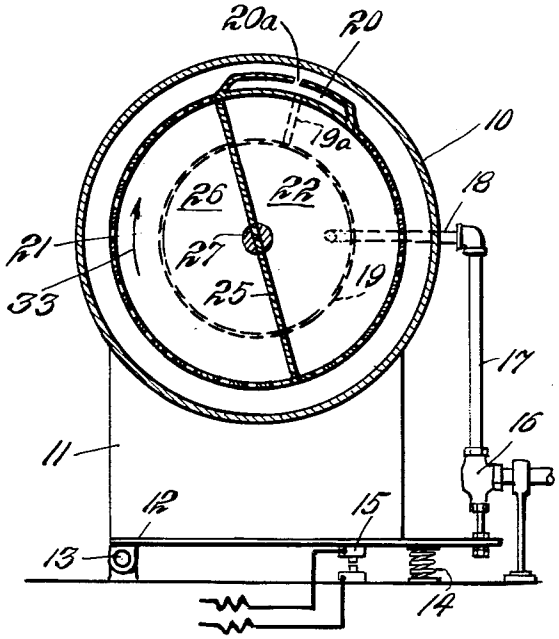


Fig. 1

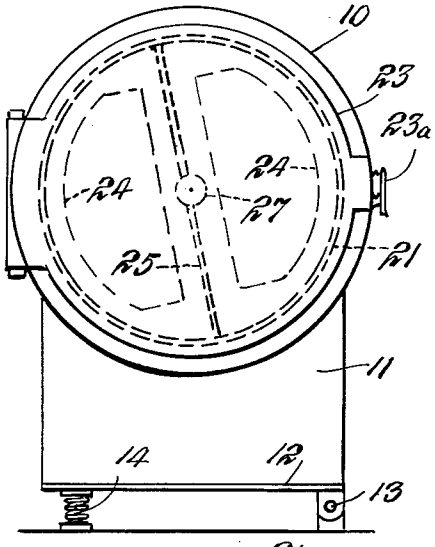


Fig. 2

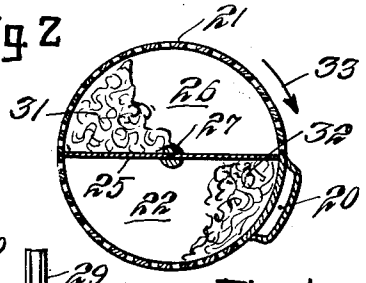


Fig. 4

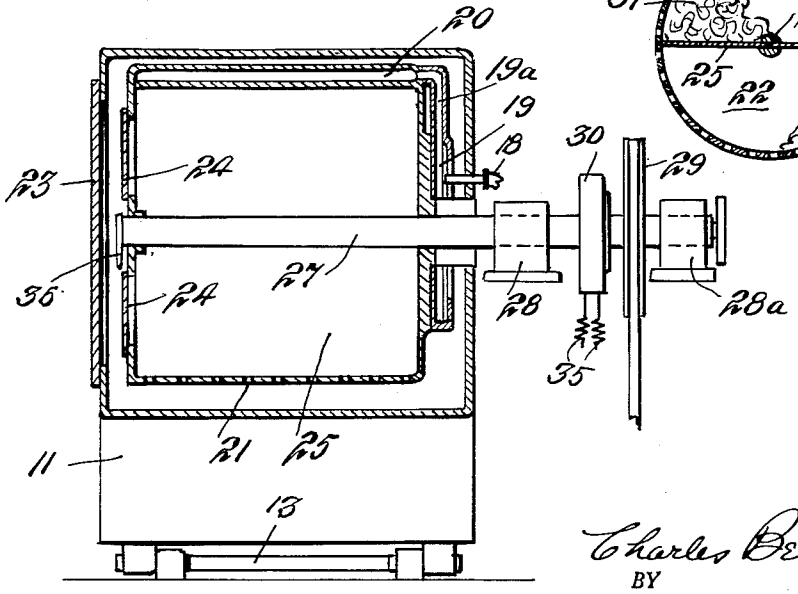


Fig. 3

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BALANCING MEANS FOR ROTATABLE CYLINDERS

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6 Claims. (Cl. 210—144)

This invention relates to balancing means for a rotatable cylinder such as is used in conventional washing or dry cleaning machines. This application is a continuation in part of my prior abandoned application Serial No. 624,279, filed November 26, 1956.

As was set forth in my above mentioned prior application, a washing machine cylinder requires balancing during the centrifugal extraction period if the cylinder is to be rotated at such high speeds as to expedite drying of the clothing. In such prior application, I disclose an automatic means of causing the wet clothing to concentrate at one portion of the cylinder so that the point of imbalance would be substantially predetermined. Accordingly, means for counterbalancing were thus simplified because only one counterbalance tank, in fixed position, was required. This counterbalance tank was disposed opposite to the predetermined site of imbalance.

According to the present invention, I apply the idea of using only one counterbalance tank in an otherwise conventional two-pocket washing machine. Two-pocket washing machines are widely used at the present time and they constitute a single cylinder divided by a longitudinal partition into two elongated semi-cylindrical pockets each provided with its own loading door. The general practice is to weigh an equal quantity of clothing to be inserted in each pocket in the expectation that satisfactory balance will thereafter ensue. However, this system is faulty in that what appears to be equal weights in both pockets may soon turn out to be considerably unequal. One of the reasons therefor is that silks, woolens, and cottons all absorb varying amounts of water so that it is almost impossible to accurately equalize weight distribution by the above mentioned system.

As above stated, I employ my system of utilizing a single counterbalancing tank, the tank being disposed along a selected peripheral site of one pocket of the two-pocket machine. While the cylinder is stationary, prior to putting the machine in operation, I deliberately overload the other pocket by simply inserting more clothing therein. After washing, when the cylinder commences high speed rotation for the centrifugal extraction period, the initial deliberately created imbalance will produce vibration through centrifugal forces. I utilize such vibration to trigger off corrective action such as has been disclosed in various U.S. patents to Leo M. Kahn, e.g., Patent No. 2,534,269. In this way, liquid is applied to the counterbalance tank is order to correct the imbalance. Accordingly, it will be recognized that my system requires only the employment of a single counterbalance tank on a conventional two-pocket machine with, of course, means to introduce liquid to the counterbalance tank in accordance with either my above mentioned co-pending application or with the above mentioned Kahn patent. The counterbalancing tank is specifically disposed to counteract the centrifugal forces created when the clothing shifts at the onset of high speed rotation.

The invention will be further understood from the following description and drawings in which:

Figure 1 is a transverse cross-sectional view of a two-pocket machine equipped so as to practice the present invention, the view being taken looking from the rear of the machine;

Figure 2 is a front view of the machine but with the external balancing elements omitted for clarity of illustration;

Figure 3 is a longitudinal cross-sectional view through the improved machine with the external balancing elements omitted for clarity of illustration; and

Figure 4 illustrates the movement of the clothing in each pocket as the cylinder commences high speed rotation.

The machine comprises a conventional shell **10** to which is secured the conventional base **11** mounted on a platform **12**. For the purpose of translating mechanical vibration into electrical signals, platform **12** is provided with a pivotal support **13** on one side and spring supports **14** on the other. Accordingly, when the structure vibrates, it will pivot slightly about pivot **13** and will correspondingly cause the springs **14** to vibrate. This will produce closing of the microswitch **15** in accordance with the degree of vibration and will thereupon actuate an electrical circuit (not shown) which will introduce weight compensation liquid through valve **16** into pipes **17** and **18** to the feed ring **19**, pipe **19***a* and thence to the peripheral tank **20**. Tank **20** is formed on the outer wall of perforated, hollow cylinder **21**. It extends the full length of semi-cylindrical pocket **22** along one corner edge thereof for reasons which will appear hereinafter. It is to be understood that such application of counterbalance liquid is not broadly new as was set forth in my prior application. The system is generally that disclosed in the above mentioned Kahn patent and other patents referred to therein.

My invention is practiced in the following manner:

First, the hinged outer door **23** of the machine is opened by unlocking latch **23***a* and then the hinged pocket doors **24** are likewise opened to provide access to the pockets. It will be understood that these elements are conventional as is the solid dividing partition **25** which forms the two pockets. Although, in conventional practice as was above described the operator attempts to load each pocket equally, he now will deliberately deposit more clothing into pocket **26** and further, he will not be required to exercise particular care in this respect. In other words, he need merely visually or mentally determine that he is overloading pocket **26**. Of course, he can actually weigh the load so as to predetermine the amount of overweight. He can also, if he prefers, put more liquid absorbent clothing into pocket **26** with the knowledge that it will thereafter tend to become the heavier pocket. If in the event he overloads the pocket to a degree incapable of correction, the machine may incorporate a cut-off switch to avoid potential injury to the machine as explained in the above mentioned Kahn patent.

After having loaded both pockets **22** and **26**, the washing or tumbling action will be instituted through rotation of shaft **27** in bearings **28** and **28***a* as by pulley **29** and clutch **30**. Balance at this time is of very little importance. Thereafter, as is conventional, the machine goes into high speed operation in order to produce the maximum extent of centrifugal liquid extraction. It will be found that the machine will initially vibrate due to the imbalance created by the deliberate initial overloading. Such vibration will be followed by closure of the microswitch **15** as above described and liquid will then be applied to the counterbalance tank **20** until balance has been achieved. When the degree of vibration is so slight as not to cause closure of the microswitch **15**, the balance may be considered satisfactory.

As diagrammatically shown in Figure 4, the load of clothes 31 in pocket 26 exceeds the load of clothes 32 in pocket 22. Figure 4 illustrates the disposition of the respective loads when the cylinder is in its high speed rotation phase. It will be observed that arrow 33 indicates that the cylinder is moving in a clockwise direction. Accordingly, at the onset of high speed rotation, the load of clothes 31 is impelled or becomes disposed by inertia, in the opposite corner of the pocket 26. It is for this reason that the counterbalance tank 20 is formed at a corner edge of the pocket 22. In this way, it serves to counterbalance clothing 31 by being physically opposite thereto.

Further, it will be observed that counterbalance tank 20 only extends from one side of partition 25 and its front wall is aligned with and terminates at such partition without extending into the region of pocket 26. Its arcuate extent is illustrated to be about 45 degrees. The purpose of such disposition and extent is to equalize centrifugal forces created by the load 31 which obviously is confined to one side of the partition 25 and which tends to concentrate itself in the opposite corner edge of the pocket 26 at the onset and during the duration of high speed rotation.

It may be noted that the illustrated machine lends itself to increased advantages such as by employing the cylinder 21 itself as a weighing device. For this purpose, the cylinder is rendered free wheeling by disengaging the clutch 30. For example, clutch 30 may be a magnetic clutch which is actuated by the electrical wires 35. When disengaged, the cylinder 21 may swing freely in the bearing 28, the cylinder being thus rendered freely swingable about its axis of cylindrical configuration. Accordingly, the operator may simply load the pockets whereupon a greater weight in pocket 26 will cause the cylinder to swing and tilt somewhat in the position illustrated in Figure 1, the cylinder assuming an angular position depending upon the different weights of clothing in the respective pockets. In order to provide visual determination thereof, an indicator 36 which is fixed to the shaft will disclose to the operator the tilted position of the partition 25. It will be understood that partition 25 will tilt pursuant to the disparity in the loads of the two pockets. If for example, there were five pounds in each pocket, the partition 25 would be vertical. However, if pocket 26 has an excess of 2 or 3 pounds the partition 25 will tend to tilt into the position illustrated in Figure 1.

As a modification, it will further be understood that indicator 36, being elongated, may be angularly off-set relative to the position of partition 25 instead of being parallel therewith. The reason for this is that the operator may be instructed to fill both pockets until the indicator 36 is vertical. However, the indicator may be so fixed to the shaft that in the vertical position of the indicator the partition 25 is actually tilted. This disposition of the indicator 36 is suggested so that the operator need not himself determine the correct position of indicator 36 except that he need only note whether or not it is vertical. Of course, after the pockets have been properly loaded and cleaning is to be commenced, the wires 35 will serve to close the magnetic clutch 30 so that the motor, not shown, will drive the cylinder for the conventional washing and damp drying action.

It will be understood that tank 20 may be provided with a conventional bleeder opening 20*a* as described in my above mentioned patent application so that the counterforce exerted by the tank will keep pace with the changes in weight distribution as extraction proceeds.

There has been shown what are now considered preferred embodiments of the invention but it is obvious that numerous changes and omissions may be made without departing from its spirit. For example, tank 20 may well be disposed within the cylinder at the corner edge illustrated. Thus, it may be formed on the cylinder inner wall surface. An advantage thereof is that it allows greater space in pocket 26 to permit relative overloading. Further, it is not essential, particularly in larger capacity machines, to confine the tank 20 to one side of the partition 25 as long as the bulk thereof is so disposed so as to assure more counterbalancing force at one side of the partition.

It will also be noted that the spring support 14 is merely illustrative and may be omitted as in rigidly mounted machines which nevertheless sufficiently transmit vibration forces to a microswitch as mentioned in the above Kahn patent.

What is claimed is:

1. In a cleaning machine comprising a rotatable hollow cylinder divided by a solid longitudinal partition into two semi-cylindrical pockets, the provision of a single counterbalancing tank formed on said cylinder, said tank being disposed adjacent to a corner edge of one of said pockets, means to render said cylinder freely swingable about its axis of cylindrical configuration whereby the cylinder will assume an angular position depending upon the different weights of clothing in the respective pockets so that the other of said pockets may be initially filled with a greater weight of clothing than said one pocket, means to rotate said cylinder at centrifugal extraction speeds, and means responsive to vibration caused by said greater weight to inject liquid into said tank while said cylinder is rotating, said tank terminating short of the other pocket.

2. A device according to claim 1 and wherein said tank extends from said corner edge along the outer surface of said cylinder to an extent of approximately 45 degrees.

3. In a cleaning machine comprising a rotatable hollow cylinder divided by a solid longitudinal partition into two semi-cylindrical pockets, the provision of a single counterbalancing tank formed on said cylinder and constituting the sole such tank on said cylinder, said tank extending parallel to the longitudinal axis of the cylinder, said tank having a front wall which is substantially in alignment with one edge of said partition, said tank extending arcuately from its said front wall angularly along the surface of said cylinder for approximately 45 degrees, means to render said cylinder freely swingable about its axis of cylindrical configuration whereby the cylinder will assume an angular position depending upon the different weights of clothing in the respective pockets so that the other of said pockets may be initially filled with a greater weight of clothing than said one pocket, means to rotate said cylinder at centrifugal extraction speeds, and means responsive to vibration caused by said greater weight to inject liquid into said tank while said cylinder is rotating.

4. In a cleaning machine comprising a rotatable hollow cylinder divided by a partition into two pockets, the provision of a single counterbalancing tank formed on said cylinder and constituting the sole such tank on said cylinder, said tank being wholly on one side of said partition so as to be substantially opposite one of said pockets whereby an overweight in said one pocket may be counterbalanced by liquid injected into said tank, driving means to rotate said cylinder at centrifugal extraction speeds, and means responsive to vibration caused by said overweight to inject liquid into said tank while the cylinder is being rotated.

5. In a cleaning machine comprising a rotatable hollow cylinder divided into a plurality of clothes receiving pockets, the provision of a single counterbalance tank formed on said cylinder and constituting the sole such tank on said cylinder, said tank being substantially opposite one of said pockets and wholly disposed on one side of said cylinder whereby an overweight in said one opposite pocket may be counterbalanced by liquid injected into said tank, means to rotate said cylinder at centrifugal extraction speeds, and means responsive to

vibration caused by said overweight to inject liquid into said tank while the cylinder is being rotated.

6. In a cleaning machine comprising a rotatable hollow cylinder divided by a solid longitudinal partition into two semi-cylindrical pockets, the provision of a single counterbalancing tank formed on said cylinder and constituting the sole such tank on said cylinder, said tank being wholly on one side of said partition so as to be substantially opposite one of said pockets whereby an overweight in said one pocket may be counterbalanced by liquid injected into said tank, means to rotate said cylinder at centrifugal extraction speeds, and means responsive to vibration caused by said overweight to inject liquid into said tank while the cylinder is being rotated.

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