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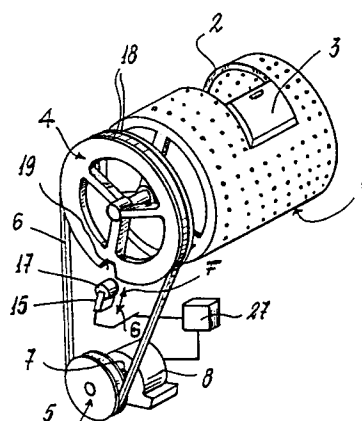
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I-2105 Comerio (Varese)(IT)(54) **Device for halting a drum in the loading and unloading position in a top-loading washing machine.**

(57) A top-loading washing machine comprises a drum (1) provided with an aperture (2) having its own closure element (3), said drum (1) being driven by an electric motor (8) via a usual linkage comprising a belt (6) and pulleys (4, 5).

According to the invention, the pulley (4) associated with the drum (1) has in its peripheral edge (18) a recess (19) arranged to cooperate with a movable member (15) which can assume at least two working positions, in one of which it is inserted into said recess (19) and in the second of which it is spaced therefrom, said movable member (15) cooperating with sensor means (27) arranged to operate on said motor (8) to halt it on sensing that one of said working positions has been attained by the movable member (15), said recess (19) being positioned advantageously such that the said halting of the motor (8) and thus of the rotation of the drum (1) takes place when this latter has its aperture (2) in the loading and unloading position.

**FIG.1****EP 0 483 909 A1**

This invention relates to a device for halting a drum in the loading and unloading position in a top-loading washing machine containing the drum, which is provided with an aperture having its own closure element and is driven by an electric motor via a linkage comprising a belt and pulleys.

Various devices for obtaining this result are already known. Such devices are of the most widely varying types and although they attain their object they have various drawbacks.

One of these is the imperfect centering of the drum aperture, due for example to excessive unbalance of the load placed in the drum. A further drawback is the sometimes high constructional cost of known devices.

An object of the present invention is to provide a device of the aforesaid type which is operationally reliable and provides precise halting of the drum in the loading and unloading position.

A further object is to provide a device of the aforesaid type which is of low cost, of simple construction and can be fitted to washing machines of known construction with only slight modification to them.

These and further objects which will be apparent to the expert of the art by a device fitted to a washing machine of the aforesaid type, characterised in that the pulley associated with the drum has in its peripheral edge a recess arranged to cooperate with a movable member which can assume at least two working positions, in one of which it is inserted into said recess and in the second of which it is spaced therefrom, said movable member cooperating with sensor means arranged to operate on said motor to halt it on sensing that one of said working positions has been attained by the movable member, said recess being positioned advantageously such that the said halting of the motor and thus of the rotation of the drum takes place when this latter has its aperture in the loading and unloading position.

The present invention will be more apparent from the accompanying drawing, which is provided by way of non-limiting example and in which:

Figure 1 is a schematic perspective view of certain of the essential components of a washing machine comprising the device of the invention;

Figure 2 is a schematic front view of the washing machine of Figure 1;

Figure 3 is a schematic partial front view of the washing machine of Figure 1 provided with a modified embodiment of the device as shown in Figure 1.

With reference to Figures 1 and 2, a washing machine comprises a drum 1 provided with a loading-unloading aperture 2 having its own closure door 3 (shown in the open position in Figure 1).

A pulley 4 is fixed to the drum in any known manner, and is connected to a second pulley 5 by a belt 6 or similar transmission member.

The pulley 5 is connected to the output shaft 7 of a usual electric motor 8 which when operated in known manner by a timer 9 rotates the drum 1 during the various wash stages of the washing machine.

According to the invention, a device is associated with said machine to halt its drum in the loading and unloading position each time the machine stops.

Said device comprises a pin 15 carrying at one end 16 a roller or wheel 17 to cooperate with the peripheral edge 18 of the pulley 4 associated with the drum 1. This pulley comprises in its edge 18 a recess 19 in a position corresponding with the aperture 2 in said drum.

The pin 15 cooperates with a coil 20 within which said pin can slide (arrows F and G of Figure 1), said coil being connected to the timer 9 via an electrical line 9A.

At its other end 21, distant from the end 16, the pin 15 is provided with a collar 22 which retains one end 23 of a compression spring 24 mounted about said pin.

The other end 25 of the spring 24 cooperates with the coil 20 (or with a support member for it).

The end 23 of the pin 15 cooperates with a part 26, urged by a spring 26A, of a switch 27 connected to the power line (not shown) of the motor 8. The timer 9 is also connected to said motor 8 in known manner (for example via an electrical line 30).

The device of the invention is fitted in any known manner within the usual cabinet of the washing machine.

During the usual operation of said machine the pin 15 is kept distant from the pulley 4.

This is achieved by not allowing the timer 9 to power the coil 20, so that the spring 24 by acting on the end 21 of the pin 15 and reacting against the coil itself (or its support) maintains said pin 15 in the position shown in Figures 1 and 2, ie distant from the pulley 4.

On termination of the wash cycle, the timer 9 in known manner causes the motor 8 to rotate the drum at a very low speed (eg. 15 r.p.m.). At the same time the coil is powered with direct current so that the electromagnetic field generated within it draws the pin 15 close to the pulley 4.

In this manner the roller 17 reaches the edge 18 of said pulley and presses against it.

This situation lasts until the recess 19 reaches the roller 17. At this point, the roller penetrates into said recess and the motor 8 is halted.

This happens as a consequence of the movement of the pin 15 towards the pulley 4. By this movement, the end 21 of the pin 15 approaches the coil 20 to thus operate the switch 27.

Consequently, the switch interrupts the power feed to the motor 8 in known manner, so that it stops.

As the rotational speed of the drum is very low the stopping of the motor 8 results in virtually instantaneous stoppage of said drum.

As the recess 19 is provided in a position corresponding with the loading and unloading position of the aperture 2, this latter comes to rest in a position allowing these operations to be comfortably carried out by the user.

It should be noted that during said operations the drum 1 is retained in the loading and unloading position either by coupling means of known type or by the pin 15. In this latter case, the timer 9 powers the coil 20 until power is totally switched off from the washing machine. This powering of the coil 20 enables the pin 15 to overcome the action of the spring 24 which would otherwise tend to return it to its initial position distanced from the pulley 4.

To maintain the pin 15 in the position in which the roller 17 cooperates with the recess 19, a permanent magnet can be associated with the end 16 of said pin (in proximity to the roller 17) to cooperate with another permanent magnet associated with the pulley 4 at said recess.

In this manner, the coil 20 is powered only for the time required to halt the motor 8. After power is switched off from the coil 20, the pin is retained at the pulley 4 by the cooperation between said permanent magnets.

In addition, whereas when said magnets are not provided the roller 17 separates from the recess 19 (by the action of the spring 24) only when the machine power is switched off, when the magnets are provided this separation is achieved by feeding a short current pulse to the coil 20. This current will be of opposite polarity to that which moves the pin 15 towards the pulley 4.

An embodiment of the invention has been described in which the movement of the pin 15 is achieved by powering a coil provided about it.

However, a further embodiment can comprise two superposed coils arranged about the pin, the first coil being powered by the timer 9 to draw the pin to the pulley 4, and the second coil being powered by the timer to withdraw it.

The actuator for moving the pin 15 can be of a type other than the described electromagnetic type.

One of such actuators is shown in Figure 3. In this figure parts corresponding to those of Figures 1 and 2 are indicated by the same reference numerals.

In Figure 3 the pin 15 is connected to one end 40 of an arm 44 pivoted at 42 to a fixed support element 43.

On the other end 44 of the arm 41 there rests the end 45 of a compression spring 46 advantageously arranged about a centering element 47 carried by said end 44.

The other end 48 of the spring 46 cooperates with a movable element 49 connected to a thermal actuator 50.

This latter can be of the known type containing a PTC (positive temperature coefficient) resistor which, when powered under the control of the timer 9 in any known manner, causes the element 49 to move towards the arm 41.

In this respect, it will be assumed that a wash cycle has just terminated.

At this point, in the manner already described, the drum 1 moves at very low speed and at the same time the timer 9 powers the PTC resistor. This generates heat which causes a usual element positioned in proximity to it (or in contact with it) to expand, and act on the element 49 to cause it to move towards the arm 41. This movement firstly only compresses the spring 46, but then causes the end 44 of said arm to lower and the end 40 to rise, consequently moving the roller 17 to the edge 18 of the pulley. At this point the motor 8 stops when the roller penetrates into the recess 19, as already described.

In one embodiment the PTC resistor is immersed in a volume of wax which, on expanding under the heat generated by said electrical member, results in said movement of the element 49.

When the motor has stopped, and provided a drum retention element of known type is incorporated, the PTC resistor is no longer powered and the element 49 is able to return to its initial position to enable the pin 15 to separate from the pulley 4.

The thermal actuator has therefore the same purpose as the "electromagnetic" coil-type actuator of Figures 1 and 2. However, it has a different operating time, even though it is reliable. In the examples of operation of the device according to the invention the case in which the drum is positioned at the end of the washing machine wash cycle has been considered. However the operation of the device is identical when the user stops the machine during washing.

In such a case, the timer 9 is modified such that after stopping the washing machine, it operates the motor 8 in any known manner to rotate

the drum at low speed and (in the already described manner) powers the device for halting the drum in the loading and unloading position.

The device of the invention is of simple construction, and can also be used on machines of usual production by slightly modifying them (for example in terms of the drum pulley).

The device is also reliable and enables the drum to be correctly halted in the loading and unloading position.

Some embodiments of the device have been described. However, other embodiments can be provided (for example in which sensor means other than a switch, such as optical sensors or the like, are used to determine when the roller has been inserted into the recess), all of which are assumed to fall within the scope of the present invention.

Claims

1. A device for halting a drum in the loading and unloading position in a top-loading washing machine containing said drum, which is provided with an aperture having its own closure element and is driven by an electric motor via a usual linkage comprising a belt and pulleys, characterised in that the pulley (4) associated with the drum (1) has in its peripheral edge (18) a recess (19) arranged to cooperate with a movable member (15) which can assume at least two working positions, in one of which it is inserted into said recess (19) and in the second of which it is spaced therefrom, said movable member (15) cooperating with sensor means (27) arranged to operate on said motor (8) to halt it on sensing that one of said working positions has been attained by the movable member (15), said recess (19) being positioned advantageously such that the said halting of the motor (8) and thus of the rotation of the drum (1) takes place when this latter has its aperture (2) in the loading and unloading position.
2. A device as claimed in claim 1, characterised in that the movable member (15) carries at one end (16) a roller (17) or similar member arranged to cooperate with the edge (18) of the pulley (4) associated with the drum (1) and with the recess (19) provided therein.
3. A device as claimed in claims 1 and 2, characterised by comprising an actuator means (27, 50) for moving the movable member from the first to the second position.

4. A device as claimed in claim 3, characterised in that the movable member is moved by an electromagnetic actuator comprising at least one electric winding (20) positioned about the movable member (15) and powered via the usual timer (9) which programs the washing machine wash stages.
5. A device as claimed in claim 3, characterised in that the actuator means is a thermal actuator (50) comprising a positive temperature control resistor operationally connected to a movable element (49) arranged to cooperate with one end (44) of an arm (41) pivoted at (42), the movable member (15) being disposed at the other end (40) of said arm (41).
6. A device as claimed in claims 4 and 5, characterised by comprising means (24, 46) for enabling the movable member (15) to return from that working position close to the pulley (4) of the drum (1), to the other working position in which said member (15) is spaced from said pulley (4).
7. A device as claimed in claims 4 and 6, characterised in that the return means are a compression spring (24) positioned about the movable member (15) between one end (21) of this latter at which a collar (22) is provided, and the electromagnetic actuator.
8. A device as claimed in claims 5 and 6, characterised in that the return means are a compression spring (46) positioned about a centering element (47) associated with that end (44) of the arm (41) with which the movable element (49) operationally connected to the thermal actuator (27) cooperates.
9. A device as claimed in claim 1, characterised in that the sensor means are a switch (27) provided with an arm (26) cooperating directly or indirectly with the movable member (15).
10. A device as claimed in claim 1, characterised in that the sensor means are optical sensors.
11. A device as claimed in claims 1 and 2, characterised in that the movable member supports a permanent magnet positioned at the end (16) carrying the roller (17), said magnet being arranged to cooperate with a corresponding permanent magnet rigid with the pulley (4) associated with the drum (1) and arranged in a position corresponding with the recess (19) provided in said pulley, in order to keep the drum (1) locked during loading and unloading.

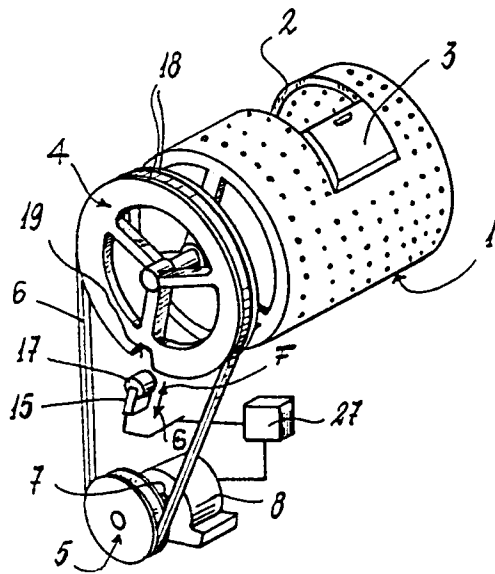


FIG.1

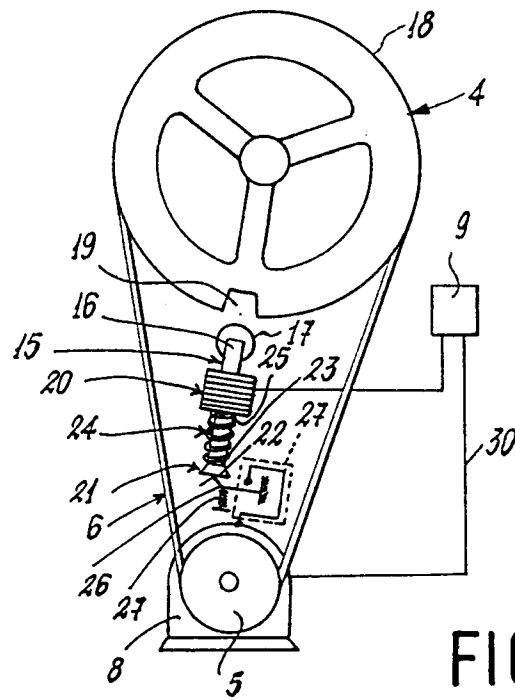


FIG.2

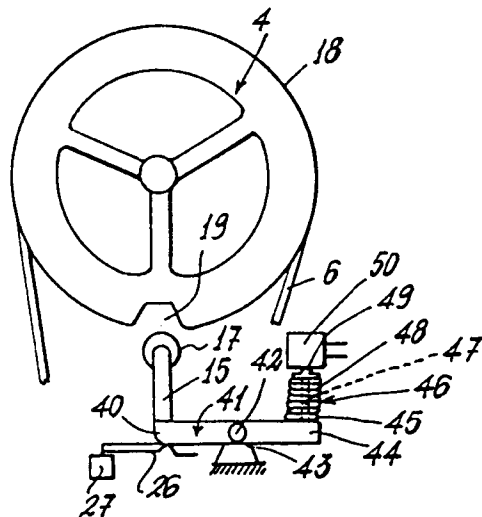


FIG.3



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EUROPEAN SEARCH REPORT

Application Number

EP 91 20 2725

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 347 393 (SMEG S.P.A.)	1-4, 6, 7, 9	D06F37/30
A	* the whole document * ---	11	
X	FR-A-2 296 719 (SOCIETE CHALECTRO. COMPAGNIE DES MACHINES A LAVER LINCOLN) * the whole document * ---	1-3, 5, 6, 8, 9	
A	FR-A-1 526 873 (SEDELEM) * the whole document * -----	1, 10	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D06F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12 FEBRUARY 1992	Examiner COURRIER G. L. A.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			