(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 518 202 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
31.10.2012 Bulletin 2012/44

(51) Int Cl.:
D06F 33/02 *(2006.01)* ***D06F 35/00*** *(2006.01)*
D06F 58/28 *(2006.01)*

(21) Application number: **12164698.8**

(22) Date of filing: **19.04.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **29.04.2011 TR 201104209**

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(54) Drum test method

(57) The present invention discloses an error detection method for a washing and/or drying machine (M). Said method comprises the steps of starting the test operation (10) by means of detecting the usage of the control elements (1, 2) in a determined order and/or combination via said electronic control unit in a software manner; rotating the drum (5) firstly at a direction in a predetermined rotational speed for a predetermined time, then rotating at an opposite direction of the rotated direction (14) by means of operating the motor (4); detecting whether there is an error in the rotation of the drum (5) (15); if an error is detected, sending an error signal to the warning means (6) (17) and ending the test operation (19); if an error is not detected completing the test operation (19).

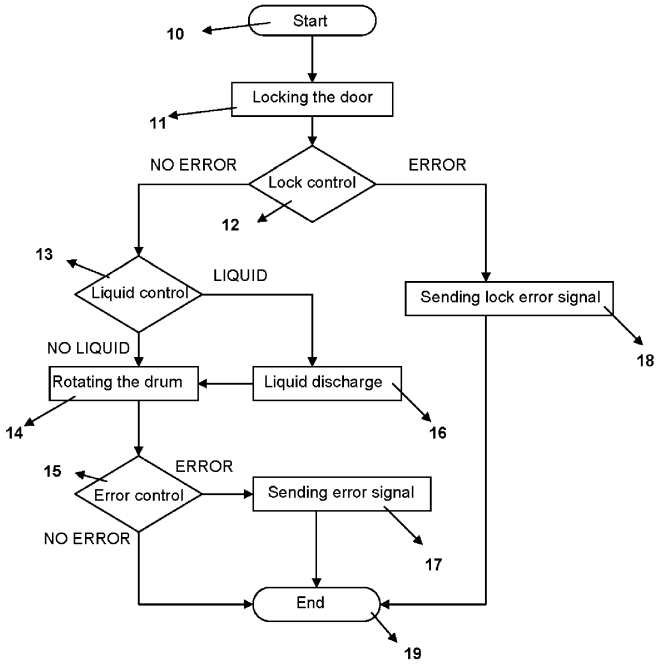

Figure - 3

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Description

Technical Field

[0001] The present invention relates to a method which tests the operation of washing and drying machines.

Prior Art

[0002] In electronic home appliances, one or more pieces of the home appliance can get damages due to usage mistakes or environmental factors. As a result, problems, such as unable to function or insufficient functioning of the home appliance, are faced. In the prior art, when a piece of the home appliance is failed, the home appliance is taken to the technical service in order to detect which piece has problem and to solve the problem.

[0003] The patent document no KR20070056288A discloses a motor failure detection method and system for a washing machine. The washing machine comprises a system which measures the rotation speed of the motor and shows the measured value on a display. Thanks to said system, the rotation speed of the motor is controlled; thus it can be controlled whether the motor has a problem or not.

[0004] The other patent document no WO2008154711A2 of the state of art discloses a washing machine which can be operated with a delay pre-determined by the user. In said machine, the user determines a delay time for the operation of the machine via a button. Said button also can be used for setting the machine in a test mode. The water valves, the motor and the pump of the machine are tested in the test mode.

Brief Description of the Invention

[0005] The present invention discloses an error detection method for a washing and/or drying machine comprising at least one control element; at least one warning means; at least one drum in which laundries are placed; at least one motor giving motion to said drum; at least one electronic control unit arranging the operation of the machine; and at least one door for placing the laundries into the drum. Said method comprises the steps of starting the test operation by means of detecting the usage of the control elements in a determined order and/or combination via said electronic control unit in a software manner; rotating the drum firstly at a direction in a predetermined rotational speed for a predetermined time, then rotating at an opposite direction of the rotated direction by means of operating the motor; detecting whether there is an error in the rotation of the drum by controlling the rotational speed of the motor via electronic control unit; if an error is detected, sending an error signal to the warning means and ending the test operation; if an error is not detected, completing the test operation.

Objectives of the Invention

[0006] The aim of the invention is to develop a method for testing the motor and the drum of a machine in washing and/or drying machines.

[0007] Another aim of the invention is to develop a method for detecting the motor and drum error in the washing and/or drying machines without taking the machine to the technical service.

Description of the Drawings

[0008] Exemplary embodiments of an exemplary washing machine and washing and/or drying machine test method of the present invention are shown in figures wherein;

Figure 1 is a perspective view of the washing machine.

Figure 2 is a cross section view of the washing machine.

Figure 3 is a flow chart of the test method.

[0009] The parts in the figures are individually enumerated and the corresponding terms of reference numbers are given as follows:

Machine	(M)
Control element	(1, 2)
Door	(3)
Motor	(4)
Drum	(5)
Warning means	(6)
Start	(10)
Locking the door	(11)
Lock control	(12)
Liquid control	(13)
Rotating the drum	(14)
Error control	(15)
Liquid discharge	(16)
Sending error signal	(17)
Sending lock error signal	(18)
End	(19)

Description of the Invention

[0010] In drum type washing and/or drying machines, machine pieces can be failed depending on the user mistakes or environmental factors. Especially, the drum of the machine and the motor giving motion to the drum can be failed by being affected to the environmental factors since they are movable pieces. For this reason, the present invention develops a method which detects possible errors that can be occurred in the drum and the motor in the drum type machines.

[0011] The washing and/or drying machine (M), which

is exemplified as a washing machine in figures 1 and 2, comprises at least one control element (1, 2) which can be preferably at least one button or switch and which sets and/or controls operation of the machine (M); at least one warning means (6) which informs the user about the operation of the machine (M); at least one drum (5) in which laundries to be washed are placed; at least one motor which gives motion to the drum (5); and at least one door (3) for placing the laundries into the drum (5). Said warning means (6) can comprise at least one speaker informing the user by sound and/or at least one indicator (such as display, light) raising awareness of the user by vision.

[0012] With the method of the invention, after the door (3) of the machine is closed, by means of using control elements in a predetermined order and/or combination, the motor test operation, an exemplary flow chart of which is shown in figure 3, is started (10). Said order and/or combination are/is detected by at least one electronic control unit (not shown in figures) in a software manner which is placed in the machine (M) and arranges the operation of the machine (M). In said test operation, by means of operating the motor (4), it is ensured that the drum (5) moves in clockwise or counterclockwise direction in a predetermined rotational speed (preferably at a 45-55 cycle range per minute, specifically 53 cycles) for a predetermined time (preferably 30-90 seconds, specifically 60 seconds) (14). Then, the motor is operated again and it is ensured that the drum (5) is moved at the opposite direction of the first direction preferably at the same rotational speed and for the same time period (14). During said movements, whether there is an error in the rotation of the drum (5) is controlled (15). The motor (4) sends signal to the electronic control unit after each rotation and according to the sending frequency of the signal; the control unit determines the speed of the motor. Even if the determined speed is different from the predetermined speed, an error is detected. When an error is detected, by sending a warning signal to the warning means (6), an error in the motor (4) or drum (5) is indicated (17) and the test operation is ended (19). If an error is not detected in the drum (5) rotation, the test operation is completed (19). During the test operation which automatically detects the error, the noise, which may occur while the drum moves, is controlled by the tester; and the error, which cannot be detected automatically, can also be observed.

[0013] In a preferred embodiment of the invention, after the test operation starts (10), locking the door (3) of the machine (M) is performed (11). Thus, it is controlled whether the door (3) is locked or not (12). If the door (3) is not locked, a lock error signal is sent to the warning means (6) therefore a lock error is indicated (18) and the test operation is ended (19). Otherwise, lack of any lock error is followed by the step of rotating the drum (14).

[0014] In another preferred embodiment of the invention, after the door (3) lock is controlled (12), if there is not a lock error, it is controlled whether the drum (5) has liquid therein (13). Said controlling can be done by a liquid detector to be added in the machine (M) or by a liquid height detector present in the machine (M). If the liquid is detected in the drum (5), said liquid is discharged (16) preferably by a pump and the step of rotating the drum (14) is initiated. If there is not liquid in the drum (5), the drum is rotated directly (14).

[0015] In an alternative embodiment of the invention, the machine (M) is taken to the test mode by a remote control method preferably over a network. If errors are detected in the machine (M) as a result of the test, said errors are sent to the tester over the network. Thus; it is ensured that an error occurred in the machine (M) is remotely detected.

[0016] In the method of the invention, the test operation can be done only when and where the authorized people want thanks to the fact that the control elements (1, 2) are used in a certain order and/or combination for taking the machine (M) in the test mode. Thus; it is both ensured that the machine (M) is tested in the environment it stays (i.e. at home) and taking the machine (M) in a test mode by unauthorized people is prevented.

Claims

1. An error detection method for a washing and/or drying machine comprising at least one control element (1, 2); at least one warning means (6) informing the user about the operation of the machine (M); at least one drum (5) in which laundries are placed; at least one motor (4) giving motion to said drum (5); at least one electronic control unit arranging the operation of the machine (M); and at least one door (3) for placing the laundries into the drum (5) **characterized by** comprising the following steps;

   - starting the test operation (10) by means of closing the door (3) and detecting the usage of the control elements (1, 2) in a determined order and/or combination via said electronic control unit;
   - by means of operating the motor (4), rotating the drum (5) firstly at a direction in a predetermined rotational speed for a predetermined time, then rotating at an opposite direction of the rotated direction (14);
   - detecting whether there is an error in the rotation of the drum (5) by controlling the rotation speed of the motor (4) via electronic control unit (15).

2. A method according to claim 1 **characterized by** comprising the steps of sending a warning signal to the warning means (6) (17) if an error is detected in the rotation of the drum (5), and ending the test operation (19).

3. A method according to claim 1 **characterized by** comprising the step of completing the test operation

(19) if an error is not detected in the rotation of the drum (5).

4. A method according to claim 1 **characterized in that** the rotational speed of the motor (4) is controlled by sending signal to the electronic control unit after each rotation of the motor (4) and detecting the rotational speed of the motor (4) according to the sending frequency of the signal via the electronic control unit.

5. A method according to claim 1 **characterized in that** the predetermined time is between 30 to 90 seconds.

6. A method according to claim 5 **characterized in that** the predetermined time is 60 seconds.

7. A method according to claim 1 **characterized in that** the predetermined speed rate is between 45 to 55 cycles per second.

8. A method according to claim 7 **characterized in that** the predetermined speed rate is 53 cycles per second.

9. A method according to claim 1 **characterized by** further comprising the step of controlling the door (3) lock (12) by means of locking the door (3) (11) of the machine (M) after the step of starting test operation (10).

10. A method according to claim 9 **characterized by** further comprising the step of controlling whether the drum (5) has liquid in the therein (13) after the lock is controlled (12).

11. A method according to claim 9 **characterized by** further comprising the step of discharging the liquid in the drum (5) if the liquid is detected in the drum (5), after the step of liquid control (13).

12. A method according to proceeding claims **characterized in that** the test operation is started with a remote control method.

13. A method according to claim 12 **characterized in that** the test results are sent by a network.

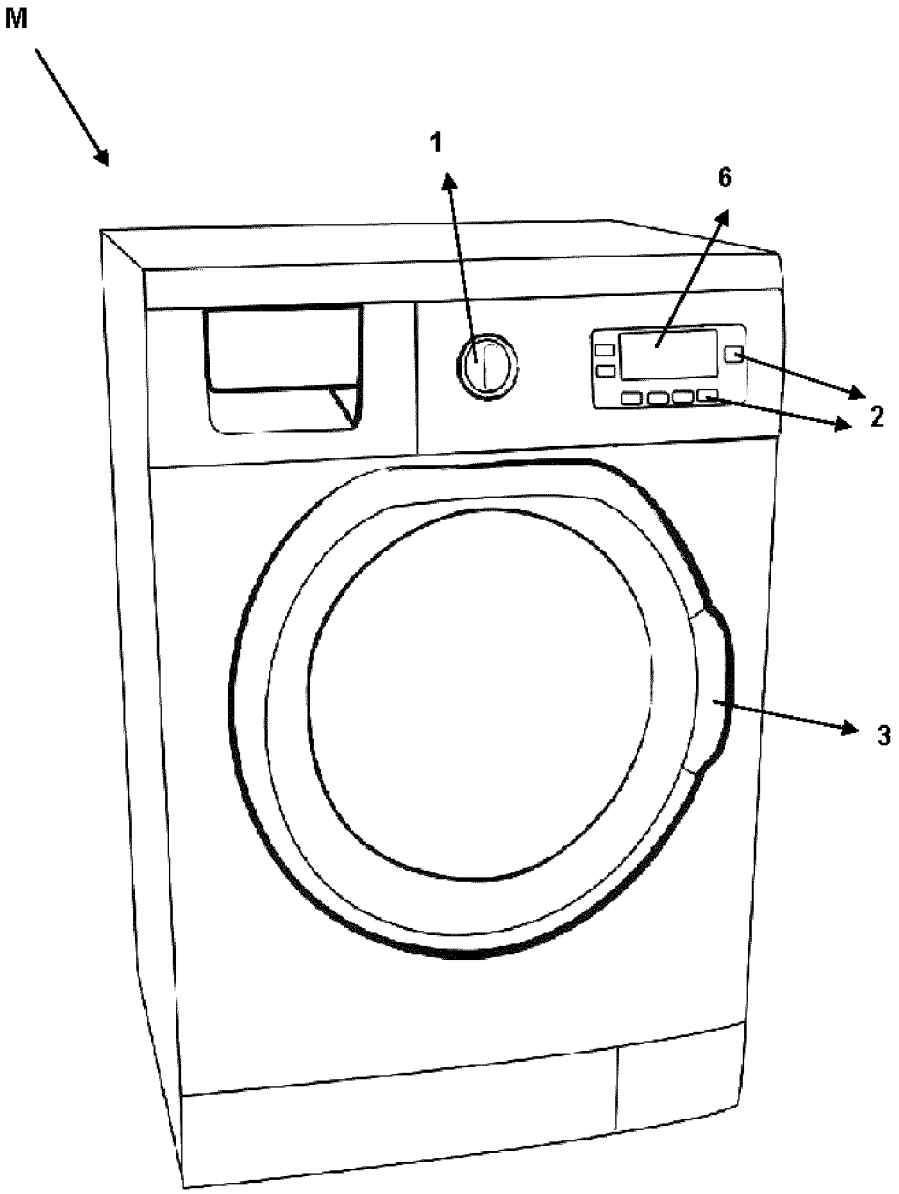

Figure - 1

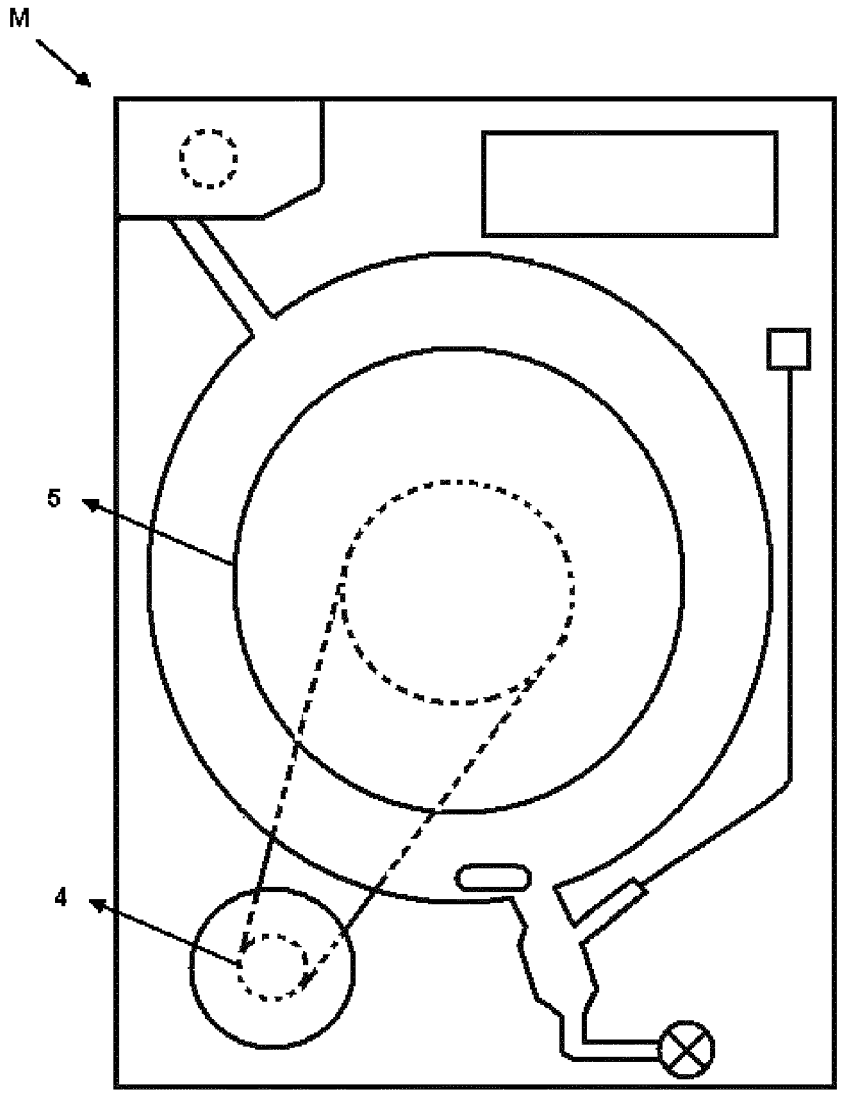

Figure - 2

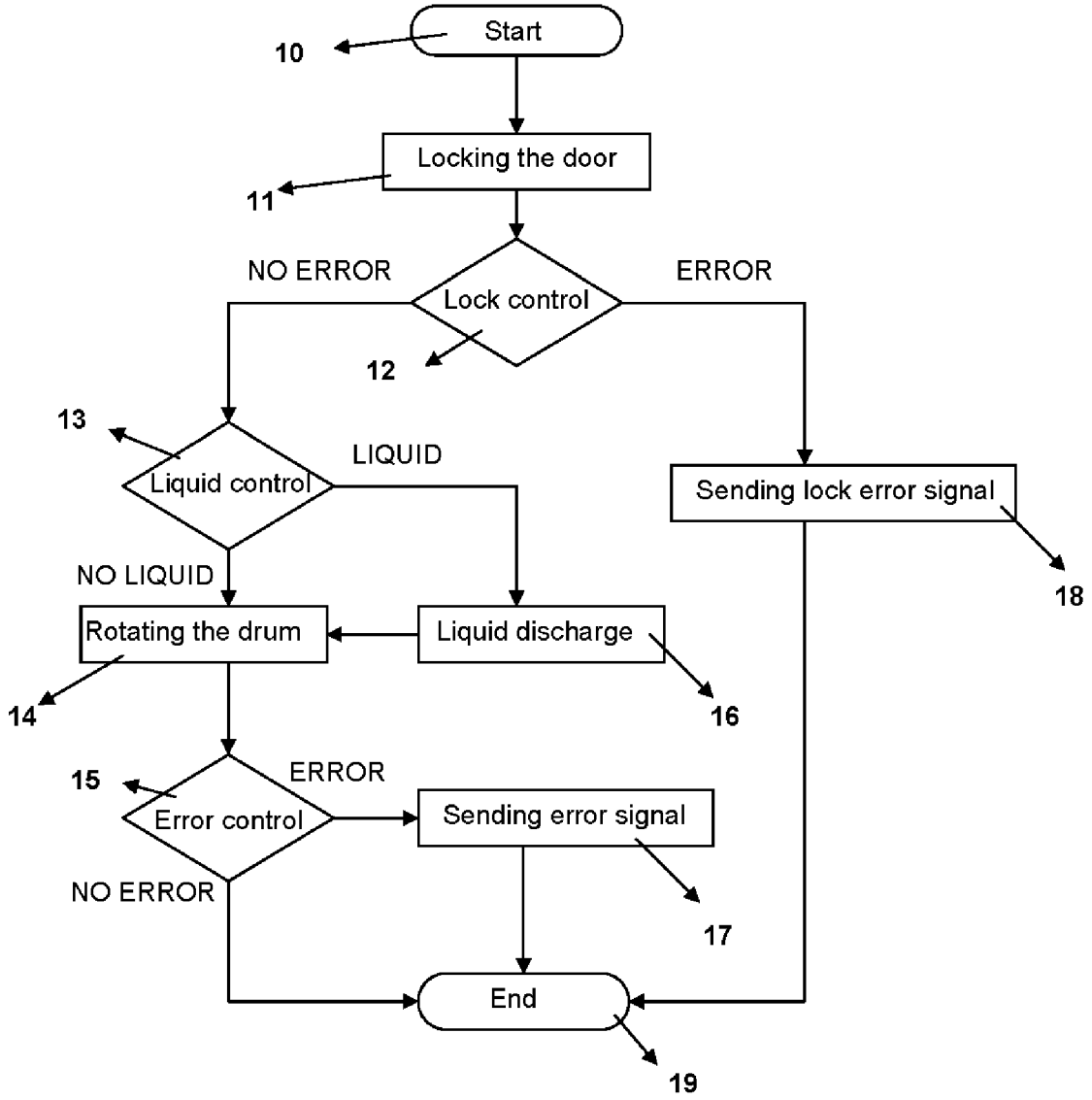
Start
10
Locking the door
11
NO ERROR
Lock control
ERROR
12
13
Liquid control
LIQUID
Sending lock error signal
18
NO LIQUID
Rotating the drum
Liquid discharge
14
16
15
ERROR
Error control
Sending error signal
NO ERROR
17
End
19

Figure - 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 20070056288 A **[0003]**
- WO 2008154711 A2 **[0004]**