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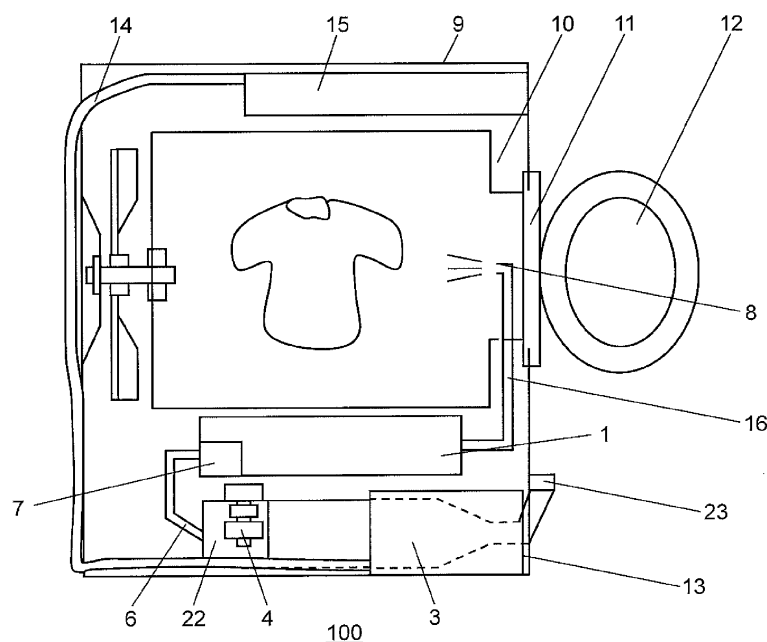
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(54) **Laundry dryer**

(57) There is provided a laundry dryer 100 including a rotary drum 10 that accommodates laundry; a steam unit 1 that supplies steam into the rotary drum 10; a tank 3 that stores water to be supplied to the steam unit 1; a water supply port that supplies the water to the tank 3; a water detection unit 4 that detects the water inside the tank 3; a first notification unit that performs a first notification

prompting water supply to the tank 3; and a controller 4 that is configured to cause the first notification unit to perform the first notification based on a signal transmitted from the water detection unit 4, during a period from power supply until an operation is started, unless the water inside the tank 3 reaches a predetermined water level.

FIG. 1



Description**BACKGROUND OF THE INVENTION****FIELD OF THE INVENTION**

[0001] The present invention relates to a laundry dryer which dries wet laundry.

BACKGROUND ART

[0002] In recent years, a laundry dryer has been proposed which includes a device supplying steam to laundry in order to press wrinkles out of the laundry (for example, refer to European Patent Unexamined Publication No. 2317004). In such a laundry dryer, it is necessary to supply water to a steam unit in order to generate the steam. A transparent water level display unit is disposed in front of a main body so as to enable a user to visually and directly check a water level when the user manually supplies the water.

[0003] In such a laundry dryer in the related art, it is necessary for the user to visually check the water level when supplying the water. If the user does not visually check the water level, the user may not realize that the steam unit is not filled with the water sufficiently enough and thus a sufficient amount of steam cannot be produced. When supplying the water, the user needs to supply the water while visually checking the water level display unit, thereby causing a problem of inefficient workability.

SUMMARY OF THE INVENTION

[0004] The present invention is made in view of the above-described problem in the related art and aims to provide a laundry dryer which can prompt a user to supply water so as to be able to obtain a sufficient amount of steam and which improves workability in water supply by eliminating a need to visually check a water level of the display unit while supplying the water to the unit.

[0005] A laundry dryer of the present invention includes a rotary drum that accommodates laundry; a steam unit that supplies steam into the rotary drum; a tank that stores water to be supplied to the steam unit; a water supply port that supplies the water to the tank; a water detection unit that detects the water inside the tank; a first notification unit that performs a first notification prompting water supply to the tank; and a controller that is configured to cause the first notification unit to perform the first notification based on a signal transmitted from the water detection unit, during a period from power supply until an operation is started, unless the water inside the tank reaches a predetermined water level.

[0006] According to this configuration, it is possible to certainly store the water required for obtaining a sufficient amount of steam in the tank by prompting a user to supply the water. It is possible to improve workability in the water

supply since the user does not need to visually check the water level display unit while supplying the water to the unit.

BRIEF DESCRIPTION OF THE DRAWINGS**[0007]**

Fig. 1 schematically illustrates a cross-sectional configuration in a side view of a laundry dryer according to an embodiment of the present invention.

Fig. 2 is a perspective view illustrating a schematic configuration of the laundry dryer according to the embodiment of the present invention.

Fig. 3 is a side view illustrating a schematic configuration of a tank according to the embodiment of the present invention.

Fig. 4 illustrates state transition of a water level inside the tank from power supply until an operation is started in the laundry dryer according to the embodiment of the present invention.

Fig. 5 is a flowchart illustrating a notification process performed by a first notification unit in the laundry dryer according to the embodiment of the present invention.

Fig. 6 is a flowchart illustrating a notification process performed by a second notification unit in the laundry dryer according to the embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0008] Hereinafter, an embodiment of the present invention will be described with reference to the drawings. The present invention is not limited to the embodiment.

[0009] Fig. 1 schematically illustrates a cross-sectional configuration in a side view of laundry dryer 100 according to the embodiment of the present invention.

[0010] As illustrated in Fig. 1, rotary drum 10 which accommodates laundry is disposed inside main body 9 of laundry dryer 100. Opening 11 through which a user loads and unloads the laundry from front of main body 9 is formed in front (front surface side) of rotary drum 10. Door 12 for opening and closing opening 11 is installed in front of main body 9.

[0011] Wet laundry is dried inside rotary drum 10. Dehumidification water tank 13 which temporarily stores dehumidification water separated from steam generated by drying is installed below rotary drum 10. The dehumidification water stored in dehumidification water tank 13 is supplied to and stored in discharging tank 15 disposed above rotary drum 10 via dehumidification hose 14.

[0012] Steam unit 1 which generates the steam to be supplied into rotary drum 10 is disposed below rotary drum 10. Steam unit 1 has a steam heater which heats the water supplied into steam unit 1 and momentarily generates hot steam of 100°C or higher. A chamber which vaporizes the supplied water and a temperature

sensor which detects a temperature of an outer shell configuring the chamber are disposed inside steam unit 1.

[0013] The steam generated by steam unit 1 is supplied from steam generation port 8 into rotary drum 10 through steam supply pipe 16. In this manner, the hot steam is supplied to the laundry accommodated inside rotary drum 10, thereby enabling laundry dryer 100 to reduce wrinkles and demonstrate a deodorizing effect.

[0014] Tank 3 is disposed in a lower portion of main body 9. Tank 3 stores the water to be used in generating the steam in steam unit 1. Tank 3 and steam unit 1 are connected to each other by water supply pipe 6. The water stored in tank 3 is supplied into steam unit 1 through water supply pipe 6 by steam pump 7. The steam generated inside steam unit 1 is discharged from steam generation port 8 to rotary drum 10 through steam supply pipe 16.

[0015] Fig. 2 is a perspective view illustrating a schematic configuration of laundry dryer 100 according to the embodiment of the present invention.

[0016] As illustrated in Fig. 2, operation display unit 20 for an operation and a display is disposed above opening 11, on a front surface side of main body 9 of laundry dryer 100. A user performs power supply on main body 9 by using operation display unit 20. The user, when selecting an operation course such as a course of generating the steam or a course of drying, sets the course while checking the display on operation display unit 20. Operation display unit 20 is configured to display a state of a water level inside tank 3.

[0017] Buzzer 19 which is a sound generation unit generating a sound is disposed inside main body 9. Buzzer 19 notifies the user of operating conditions of main body 9 and the state of the water level inside tank 3.

[0018] As another device which notifies the user of the state of the water level inside tank 3, laundry dryer 100 includes first light emission unit 41 disposed in an upper portion of main body 9 and second light emission unit 42 disposed near water supply port 23 in a lower portion of main body 9. First light emission unit 41 and second light emission unit 42 are configured to have a light emitter such as an LED. Water supply port 23 which supplies the water to tank 3 is disposed in a left side lower portion in a front view of main body 9.

[0019] Controller 43 disposed inside main body 9 performs input and output controls to operation display unit 20, an output control to buzzer 19, first light emission unit 41 and second light emission unit 42, and controls in each process based on the operation course set by operation display unit 20.

[0020] Fig. 3 is a side view illustrating a schematic configuration of tank 3 according to the embodiment of the present invention.

[0021] As illustrated in Fig. 3, tank 3 has water storage unit 21 and hose joint 22. Hose joint 22 connects water storage unit 21 and water supply pipe 6 to each other. Water detection unit 4 is disposed inside hose joint 22.

[0022] The water supplied from water supply port 23

is stored in water storage unit 21. The water stored in water storage unit 21 is supplied into steam unit 1 via water supply pipe 6 by steam pump 7.

[0023] Water detection unit 4 has a function of detecting the water level inside water storage unit 21. More specifically, water detection unit 4 detects whether or not the water inside water storage unit 21 reaches a predetermined water level (water level which enables a sufficient amount of steam to be supplied to the laundry during the course of generating the steam), and has a float switch. Water detection unit 4 outputs a signal relating to the detected state of the water level to controller 43. Based on the signal transmitted from water detection unit 4, controller 43 operates operation display unit 20, buzzer 19, first light emission unit 41 and second light emission unit 42, and notifies the user of the state of the water level inside tank 3.

[0024] In the present embodiment, an example has been described where water detection unit 4 is configured to have the float switch, but the present invention is not limited to this example. For example, water detection unit 4 may be configured to use an electrode switch which detects a water level based on a change in a resistance value between electrodes. Even in this case, it is possible to obtain the same effect.

[0025] Hereinafter, with regard to laundry dryer 100 configured as described above, an operation and action thereof will be described.

[0026] After switching on a power source of laundry dryer 100, a user operates operation display unit 20 to set an operation course. When the user selects the course of generating the steam, controller 43 determines whether the water level of the water inside tank 3 is equal to or higher than the predetermined water level, or alternatively is lower than the predetermined water level, based on the signal transmitted from water detection unit 4.

[0027] When obtaining the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is lower than the predetermined water level, since there is a possibility that a sufficient amount of steam cannot be generated in one course, controller 43 gives a notification (first notification) to the user so as to prompt the water supply. When giving the first notification, controller 43 operates any one of operation display unit 20, buzzer 19, first light emission unit 41 and second light emission unit 42, thereby calling the user's attention. In this manner, a first notification unit which gives the first notification to the user so as to prompt the water supply includes at least one of operation display unit 20, buzzer 19, first light emission unit 41 and second light emission unit 42.

[0028] On the other hand, when obtaining the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is equal to or higher than the predetermined water level, since a sufficient amount of steam can be generated in one course, controller 43 does not give the first notification to the user so

as to prompt the water supply, and displays on operation display unit 20 that the water level inside tank 3 is sufficient.

[0029] As will be described below, when obtaining the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is equal to or higher than the predetermined level, after starting the first notification, controller 43 completes the first notification and notifies that the water inside tank 3 is sufficient (second notification) to the user. In the second notification, controller 43 operates any one of operation display unit 20, buzzer 19, first light emission unit 41 and second light emission unit 42, thereby calling the user's attention. In this manner, the second notification unit which performs the notification indicating that the water level inside tank 3 is equal to or higher than the predetermined water level includes at least one of operation display unit 20, buzzer 19, first light emission unit 41 and second light emission unit 42.

[0030] As described above, according to the present embodiment, when the water is not sufficiently stored inside tank 3 after switching on the power source, it is possible to give the first notification to the user so as to prompt the water supply. In this manner, it is possible to certainly store the water inside tank 3 such that the water level is equal to or higher than the predetermined level, thereby enabling a sufficient amount of steam to be generated in one course. The generated steam is sufficiently supplied to the laundry inside rotary drum 10, and thus, the laundry has less wrinkles.

[0031] Fig. 4 illustrates the state transition of the water level inside tank 3 from power supply until an operation is started in laundry dryer 100 according to the embodiment of the present invention.

[0032] First, when starting the power supply (t0), it is assumed that controller 43 obtains the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is lower than the predetermined water level. This state represents that the water is insufficiently stored inside steam unit 1. "State A" in Fig. 4 indicates such a state where the water level inside tank 3 is lower than the predetermined water level and the water is insufficiently stored.

[0033] On the other hand, when starting the power supply (t0), it is assumed that controller 43 obtains the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is equal to or higher than the predetermined water level. This state represents a state where a sufficient amount of steam can be generated in one course. "State B" in Fig. 4 indicates such a state where the water level inside tank 3 is equal to or higher than the predetermined water level and the water is sufficiently stored.

[0034] As illustrated by "pattern 1" in Fig. 4, upon starting the power supply, when obtaining the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is lower than the predetermined water level, controller 43 determines the state as

"state A". Controller 43 performs the first notification during a period of "state A", thereby calling the user's attention to the water supply. Thereafter, at time t1, it is assumed that controller 43 obtains the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is equal to or higher than the predetermined water level. In this case, controller 43 determines the state as a state where the water is supplied to tank 3 and a sufficient amount of steam can be generated during one course ("state B"), and completes the first notification.

[0035] Next, as illustrated by "pattern 2", upon starting the power supply, when obtaining the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is lower than the predetermined water level, controller 43 determines the state as "state A". Controller 43 performs the first notification during the period of "state A", thereby calling the user's attention to the water supply. Thereafter, at time t1, when obtaining the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is equal to or higher than the predetermined water level, controller 43 determines the state as a state where the water is supplied to tank 3 and a sufficient amount of steam can be generated during one course ("state B"), and completes the first notification. Up to here, "pattern 2" is the same as "pattern 1". Thereafter, at time t2, it is assumed that controller 43 obtains the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is lower than the predetermined water level. Even in this case, controller 43 determines the state as a state where the water level inside tank 3 is equal to or higher than the predetermined water level and the water is sufficiently stored ("state B"), and does not perform the first notification.

[0036] The reason why such a control is performed in "pattern 2" is because there is a possibility that when the user supplies the water through water supply port 23, since the water in tank 3 rises up in waves, the signal output from water detection unit 4 may be repeatedly transited between the signal indicating that the water level is equal to or higher than the predetermined water level and the signal indicating that the water level is lower than the predetermined water level. In this manner, in some cases, in spite that the water level inside tank 3 is actually equal to or higher than the predetermined water level, the water level is erroneously detected as if the water level is lower than the predetermined water level since the water surface falls down in waves. In this case, it is desirable not to perform the notification prompting the water supply. Accordingly, in the present embodiment, during a period after controller 43 starts the first notification by using the first notification unit until time t3 when the water is supplied to reach the predetermined water level and then the operation is started, controller 43 is adapted not to perform the first notification in a case where the water level does not reach the predetermined water level again.

[0037] Next, "pattern 3" in Fig. 4 will be described. In this case, when controller 43 determines the state as "state B" upon starting the power supply, controller 43 does not perform the first notification during a period of "state B". Thereafter, at time t1 during a period from time t0 of the power supply until time t3 of starting the operation, when obtaining the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is lower than the predetermined water level, controller 43 determines the state as "state A" where the water is insufficient, and performs the first notification. This is because it is considered that an operation of steam unit 1 which generates the steam causes the water level to be lower than the predetermined water level.

[0038] In this manner, according to laundry dryer 100 of the present embodiment, it is possible to accurately detect the storage amount of the water inside tank 3 without any erroneous detection. Therefore, it is possible to secure a predetermined amount of water inside tank 3, thereby realizing laundry dryer 100 which can sufficiently obtain the steam.

[0039] Fig. 5 is a flowchart illustrating a notification process performed by the first notification unit in laundry dryer 100 according to the embodiment of the present invention. Fig. 5 illustrates a relationship between a preset operation course and the first notification in laundry dryer 100.

[0040] As illustrated in Fig. 5, if a user turns on the power source (S1), controller 43 determines whether or not the water level inside tank 3 is lower than the predetermined level by using water detection unit 4 (S2). When the water level inside tank 3 reaches the predetermined level (S2, NO), controller 43 determines the state as "state B" described above where the water is sufficiently stored, and does not perform the first notification (S6).

[0041] On the other hand, in step S2, when controller 43 obtains the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is lower than the predetermined water level (S2, YES), controller 43 determines the state as "state A", and proceeds to step S3. Subsequently, based on the operation course selected by the user, controller 43 determines whether or not the user selects the course in which the user uses the steam (S3).

[0042] In step S3, when determining that the user does not select the course for using the steam (S3, NO), controller 43 does not perform the first notification since it is not necessary to generate the steam (S6).

[0043] On the other hand, if in step S2, controller 43 obtains the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is lower than the predetermined water level and determine the state as "state A", and if in step S3, controller 43 determines that the user selects the course for using the steam, controller 43 determines whether or not it is before the operation is started (S4).

[0044] In step S4, if controller 43 determines that it is before the operation is started (S4, YES), controller 43

starts the first notification during a period of "state A" and calls the user's attention to the water supply (S5).

[0045] In step S2, even when controller 43 obtains the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is lower than the predetermined water level, and in step S4, when controller 43 determines that it is after the operation is started (S4, NO), controller 43 does not perform the first notification (S6). This is because controller 43 has already obtained the signal transmitted from water detection unit 4 which indicates that the water level inside tank 3 is equal to or higher than the predetermined water level before the operation is started, and the operation is supposed to start in a state where the water is stored as much as possible which generates the sufficient steam in one course. In this case, controller 43 does not perform the first notification after the operation is started.

[0046] In this manner, in the present embodiment, before the course for generating the steam is operated, when the water level inside tank 3 is lower than the predetermined water level and the water is insufficiently stored, controller 43 causes the first notification unit to give the first notification to the user so as to prompt the water supply.

[0047] Since the steam cannot be sufficiently obtained during a period of the first notification prompting the water supply, controller 43 may control a drying operation not to be started. In this manner, since the drying operation is controlled not to be started during the period of the first notification prompting the water supply, it is not possible to start the operation in a state where a predetermined amount of water is not secured inside tank 3. Therefore, in order to start the operation, it is necessary to secure the predetermined amount of water, thereby enabling a configuration to be realized in that when starting the operation, the sufficient steam is necessarily generated in one course.

[0048] Fig. 6 is a flowchart illustrating a notification process performed by the second notification unit in laundry dryer 100 according to the embodiment of the present invention. Fig. 6 illustrates a relationship between the water level inside tank 3 and the second notification after starting the first notification prompting the water supply.

[0049] As illustrated in Fig. 6, in "state A" where the water level inside tank 3 is lower than the predetermined water level and the water is insufficiently stored, it is assumed that controller 43 gives the first notification to the user in order to prompt the water supply (S10). At this time, controller 43 determines whether or not water detection unit 4 has transmitted the signal indicating that the water level inside tank 3 is equal to or higher than the predetermined water level (S11).

[0050] In step S11, when controller 43 obtains the signal indicating that the water level inside tank 3 is equal to or higher than the predetermined water level (S11, YES), controller 43 completes the first notification prompting the water supply, and gives the second notification indicating that the water is sufficiently stored in-

side tank 3 to the user (S12).

[0051] In the present embodiment, when the first notification unit and the second notification unit are used in common, it is necessary to perform the notification to understand a difference between the first notification and the second notification. For example, when operation display unit 20 is used in performing the notification, it is possible to distinguish the first notification as a display of "supply" from the second notification as a display of "fill". When using buzzer 19, a tone or the like is changed for the first notification and the second notification. When using first light emission unit 41 and second light emission unit 42, an emission color, a blinking pitch or the presence or absence of lighting is changed for the first notification and the second notification.

[0052] In general, a user supplies the water while observing water supply port 23 when manually supplying the water. At this time, buzzer 19 for example is sounded as the second notification unit. This sound of buzzer 19 enables the user to easily understand that the water inside tank 3 reaches the predetermined water level. This enables the user to supply the water in a state of observing water supply port 23 without observing operation display unit 20 or the like, thereby improving workability. Even by allowing the second notification to be performed using second light emission unit 42 disposed near water supply port 23, it is possible to easily notify the user that the water inside tank 3 reaches the predetermined water level.

[0053] In this manner, according to the present embodiment, by way of the sound of buzzer 19 or the display on second light emission unit 42, the user can easily understand that the water level in tank 3 is equal to or higher than the predetermined water level. Accordingly, it is possible to prevent an erroneous operation such as overflow from water supply port 23 caused by oversupply of the water. In particular, since the notification is performed by way of buzzer 19, it is not necessary for the user to observe the display when supplying the water, thereby enabling the user to focus on the water supply work. Accordingly, it is possible to prevent the erroneous operation, thereby further improving the workability.

[0054] As described above, laundry dryer 100 of the present embodiment includes rotary drum 10 which accommodates laundry, steam unit 1 which supplies steam into rotary drum 10, and tank 3 which stores water to be supplied to steam unit 1. In addition, laundry dryer 100 includes water supply port 23 which supplies the water to tank 3, water detection unit 4 which detects the water inside tank 3, the first notification unit which performs the first notification prompting the water supply to tank 3, and controller 43 which is configured to cause the first notification unit to perform the first notification based on the signal transmitted from water detection unit 4, during the period from the power supply until the operation is started, if the water inside tank 3 does not reach the predetermined water level.

[0055] According to this configuration, the user can

supply a proper amount of water to tank 3, can certainly store the water required for generating a sufficient amount of steam during one course in tank 3, and can generate the sufficient amount of steam.

[0056] Controller 43 is configured not to perform the first notification during a period after the first notification unit starts the first notification until the water is supplied to tank 3, the water level in tank 3 reaches the predetermined water level, and the operation is started, unless the water inside tank 3 reaches the predetermined water level again.

[0057] This configuration can prevent the erroneous detection of the water level which results from the water surface waving in tank 3 during the water supply or from vibrations of main body 9. Therefore, this configuration improves detection accuracy, thereby enabling the user to supply the water without any mistake.

[0058] Controller 43 is configured not to start the operation during the period when the first notification unit performs the first notification.

[0059] This configuration prompts the user to supply the water when the water supply is needed in tank 3 and allows the user to start the operation after the water is sufficiently stored in tank 3. Therefore, it is possible to generate a sufficient amount of steam.

[0060] There is further provided the second notification unit which performs the notification indicating that the water level inside tank 3 is equal to or higher than the predetermined water level. Controller 43 is configured to cause the second notification unit to perform the second notification, during the period the first notification unit performs the first notification, when detecting that the water level inside tank 3 is equal to or higher than the predetermined water level. This configuration allows the second notification to be performed in order to stop the water supply when the water is properly supplied into tank 3, thereby enabling a proper amount of water to be stored inside tank 3.

[0061] The second notification unit is configured to include at least any one of the sound generation unit and the light emission unit disposed near the water supply port.

[0062] According to this configuration, the user does not need to supply the water while visually checking the water level display unit. Since the second notification is performed when the proper amount of water is supplied, the workability for the user is improved during the water supply and the water is sufficiently stored inside tank 3.

[0063] If the second notification unit is configured to have buzzer 19, the user does not need to visually check the water level display unit while supplying the water while, thereby enabling the user to focus on the water supply. Therefore, it is possible to prevent the erroneous operation, thereby improving the workability.

[0064] As described above, according to laundry dryer 100 of the present embodiment, it is possible to notify the user of a necessity of the water supply depending on a situation of water storage inside tank 3. Therefore, the

user can secure a proper amount of water in tank 3 while easily carrying out the water supply work.

[0065] As described above, according to the present invention, it is possible to certainly store the water required for obtaining a sufficient amount of steam in the tank by prompting the user to supply the water. Since the user does not need to visually check the water level display unit while supplying the water, there is an advantageous effect in that workability in the water supply becomes efficient. Accordingly, the present invention is not limited to the laundry dryer which dries wet laundry or the washing and drying machine which has the drying function. For example, the present invention can also be effectively applied to uses in a household appliance and a business appliance which have the tank for storing the water in advance, such as humidifiers and microwaves with a steaming function.

Claims

1. A laundry dryer comprising:

a rotary drum that accommodates laundry;
 a steam unit that supplies steam into the rotary drum;
 a tank that stores water to be supplied to the steam unit;
 a water supply port that supplies the water to the tank;
 a water detection unit that detects the water inside the tank;
 a first notification unit that performs a first notification prompting water supply to the tank; and
 a controller that is configured to cause the first notification unit to perform the first notification based on a signal transmitted from the water detection unit, during a period from power supply until an operation is started, unless the water inside the tank reaches a predetermined water level.

2. The laundry dryer of Claim 1, wherein the controller is configured not to perform the first notification during a period after the first notification is started by the first notification unit until the water is supplied to the tank, the water inside the tank reaches the predetermined water level and the operation is started, unless the water inside the tank reaches the predetermined water level again.

3. The laundry dryer of Claim 1 or 2, wherein the controller is configured not to start the operation during a period the first notification is performed by the first notification unit.

4. The laundry dryer of any one of Claims 1 to 3, further comprising:

a second notification unit which notifies that a water level inside the tank is equal to or higher than the predetermined water level, wherein the controller is configured to cause the second notification unit to perform the second notification, during a period the first notification is performed by the first notification unit, if it is detected that the water level inside the tank is equal to or higher than the predetermined water level.

5. The laundry dryer of Claim 4, wherein the second notification unit includes at least any one of a sound generation unit and a light emission unit disposed near the water supply port.

6. The laundry dryer of Claim 5, wherein the second notification unit is configured to have a buzzer.

FIG. 1

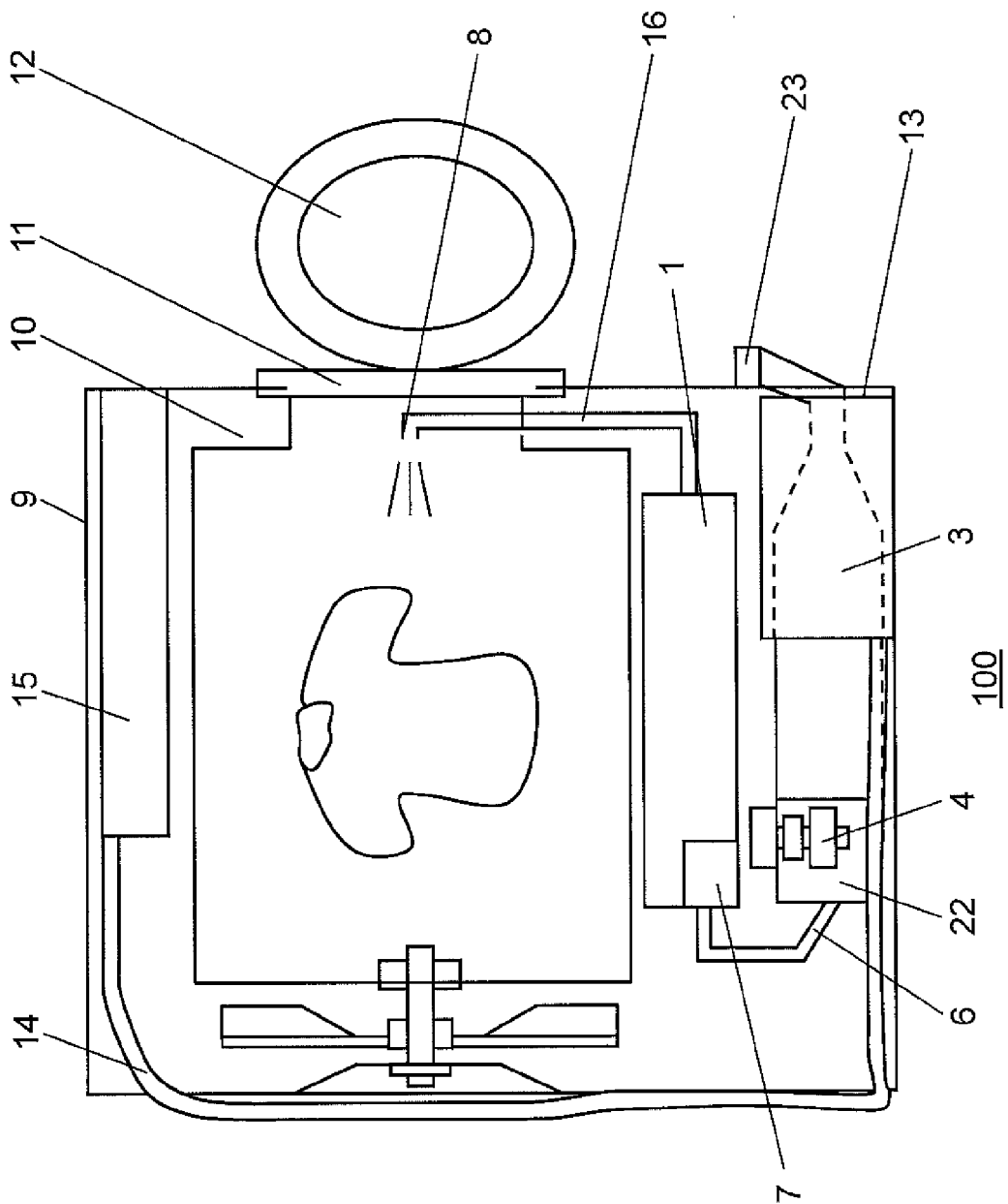


FIG. 2

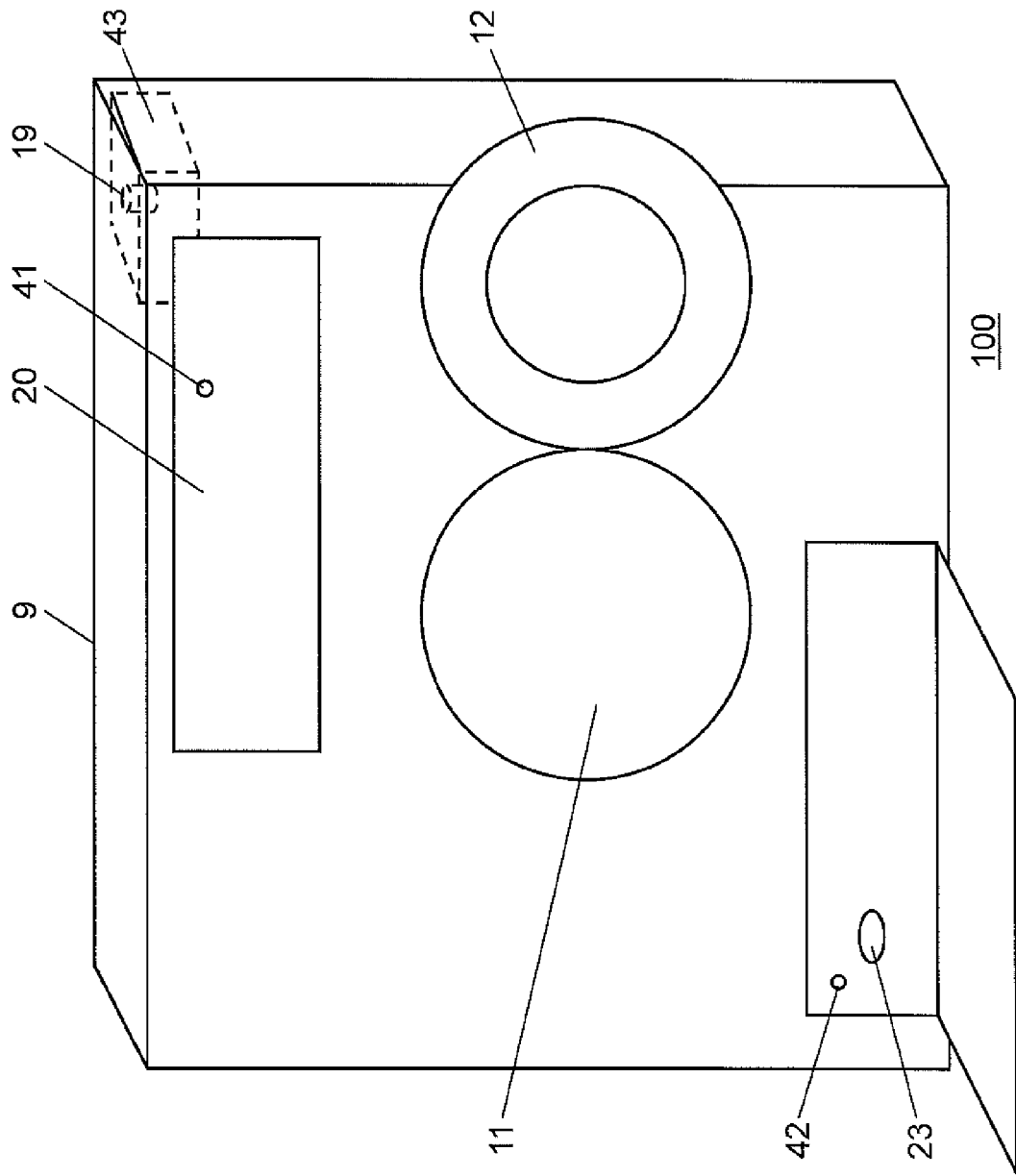


FIG. 3

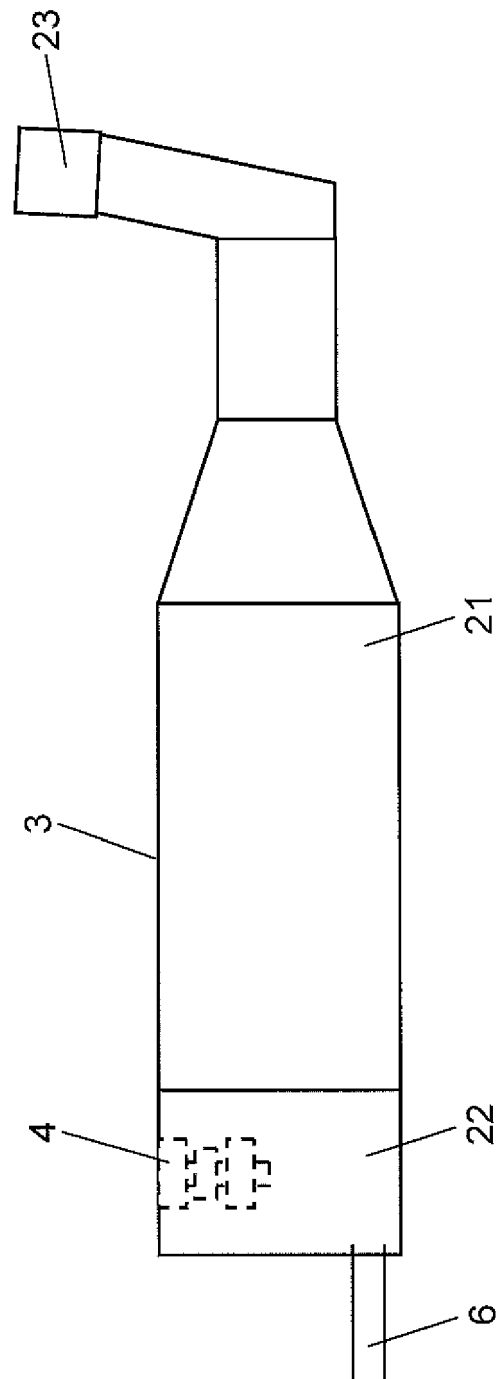


FIG. 4

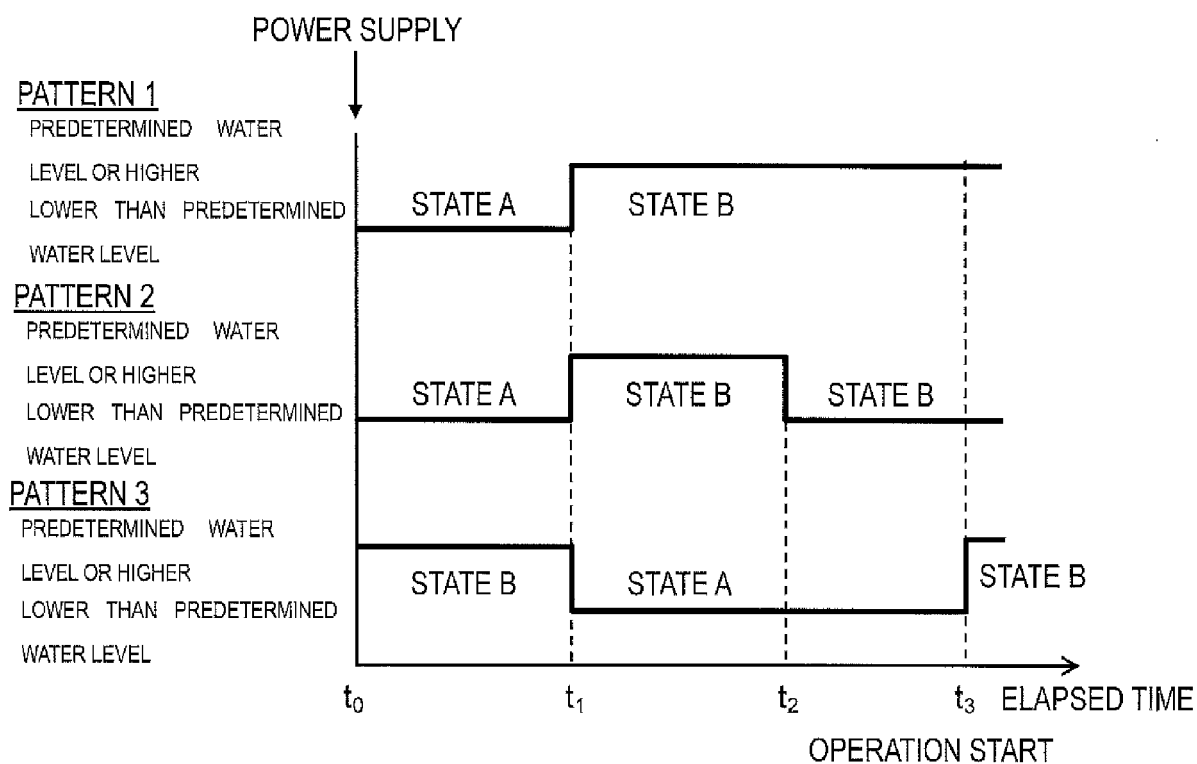


FIG. 5

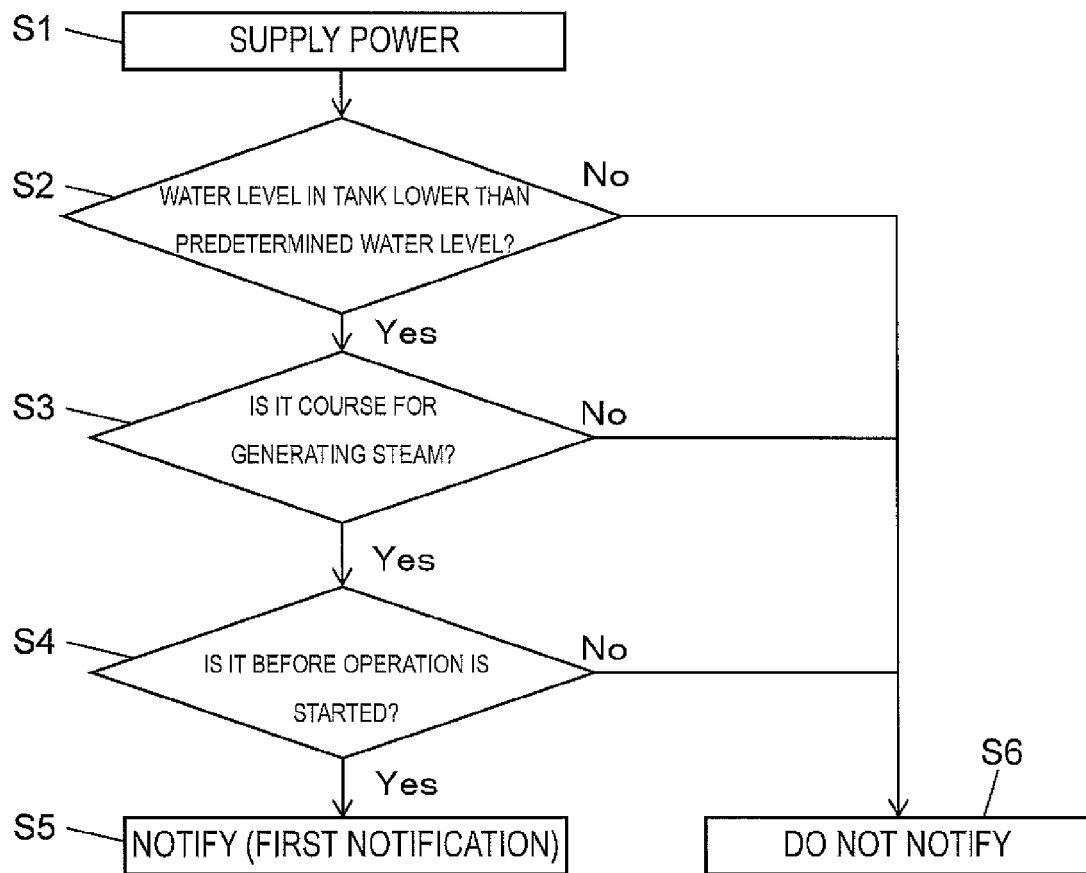
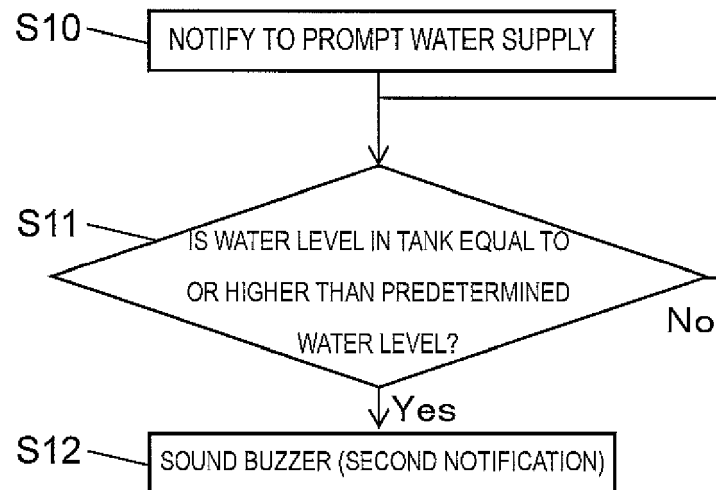


FIG. 6





EUROPEAN SEARCH REPORT

Application Number
EP 13 19 3920

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2008/075849 A2 (LG ELECTRONICS INC [KR]; BAE SANG HUN [KR]; SON CHANG WOO [KR]; CHOI C) 26 June 2008 (2008-06-26) * paragraphs [0033], [0041], [0046], [0047], [0057], [0065] - [0072], [0075], [0076], [0077]; figures 2,4,5,8-12 *	1-6	INV. D06F39/00 D06F39/08 D06F58/20 D06F58/28
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