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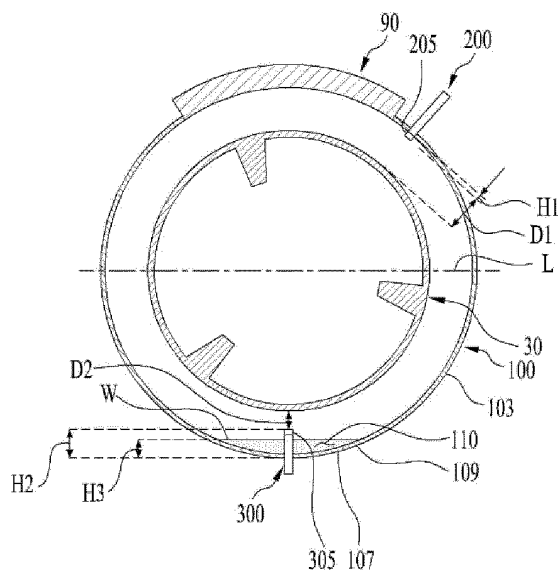
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(54) **LAUNDRY TREATING APPARATUS**

(57) A laundry treating apparatus is disclosed. A laundry treating apparatus according to one embodiment of the present disclosure comprises: a cabinet; a tub provided inside the cabinet; a drum rotatably provided inside the tub and accommodating clothes; and a first temperature measurement unit and a second temperature measurement unit that are provided in the tub and measure air temperature inside the tub during a drying cycle for drying the clothes, wherein a water storage space for receiving water is formed on the bottom surface of the tub, the first temperature measurement unit is spaced apart from the water storage space and measures the temperature of dry air, the second temperature measuring unit is provided in the water storage space, and a protruding end protruding from the bottom surface of the tub toward the drum to measure temperature faces the drum, wherein the protruding end is exposed to air during the drying cycle.

【FIG. 6】



Description

TECHNICAL FIELD

[0001] The present disclosure relates to a laundry treating apparatus, and more particularly to a laundry treating apparatus capable of performing a drying cycle for drying laundry.

BACKGROUND ART

[0002] A laundry treating apparatus is an apparatus for performing various treatments on laundry, such as washing or drying laundry, and includes a washing machine, a dryer, and a refresher (styler).

[0003] The laundry treating apparatus may be classified into a top-loading type laundry treating apparatus and a front-loading type laundry treating apparatus based on a method of loading laundry into a drum, and may include a cabinet defining the appearance thereof.

[0004] A washing machine capable of performing a washing process of laundry may remove contaminants from laundry, such as clothing and bedding, introduced into a drum. The washing process of laundry may include a washing cycle, a rinsing cycle, a spin-drying cycle, and a drying cycle.

[0005] The drying cycle of laundry is a cycle for removing moisture from laundry to dry the laundry, wherein hot air is provided to the inside of a tub in which the drum in which the laundry is received is located such that moisture of the laundry is vaporized through phase change and transferred from the laundry to the air, whereby the moisture of the laundry may be removed.

[0006] Meanwhile, as the drying cycle of laundry proceeds, the amount of moisture present in the laundry or the heating condition required in the tub may change, and therefore the drying cycle of laundry is preferably performed while checking the drying condition of the laundry.

[0007] Reference Document KR 10-2020-0087032 discloses a laundry treating apparatus capable of performing a drying cycle of laundry received in a drum. The laundry treating apparatus of the reference document includes an upper temperature sensor and a lower temperature sensor configured to measure the temperature in a tub during the drying cycle of laundry, and the drying cycle is performed while reflecting temperature values measured by the temperature sensors.

[0008] In the laundry treating apparatus of the reference document, however, a heater configured to heat water is provided in a water storage space configured to receive water in a lower part of the tub, and the lower temperature sensor is configured to measure the temperature of the water in the water storage space heated by the heater, whereby the lower temperature sensor is not suitable for measuring the temperature of air in the tub during the drying cycle.

[0009] For example, the lower temperature sensor of

the reference document is configured to measure the temperature of the water in the water storage space, whereby the height of the lower temperature sensor from a bottom surface of the water storage space is limited and the lower temperature sensor is in contact with the water remaining in the water storage space during the drying cycle, and therefore the temperature of the air may not be accurately measured.

[0010] Furthermore, in the laundry treating apparatus of the reference document, a part of the tub is cooled using coolant during the drying cycle to dehumidify the air, and therefore the coolant after cooling the tub is stored in the water storage space, but the water storage limit of the water storage space is reduced to expose the lower temperature sensor of the reference document, which is located adjacent to the bottom surface of the water storage space, causing frequent operation of a drainage pump or difficulty in adjustment of the water level.

[0011] Meanwhile, the lower temperature sensor of the reference document is provided on a front surface of the tub to facilitate measurement of the temperature of the water heated by the heater, and therefore the water storage limit is reduced due to the distance from the deepest part of the water storage space where a drainage hole is located.

[0012] Therefore, it is important in the technical field of the present disclosure to develop a structure capable of efficiently measuring and utilizing the temperature of the air in the tub to increase efficiency of the drying cycle and furthermore to conveniently and effectively measure the temperature of wet air.

DISCLOSURE

TECHNICAL TASK

[0013] Embodiments of the present disclosure provide a laundry treating apparatus capable of efficiently performing a drying cycle by measuring the temperature of air in a tub.

[0014] In addition, embodiments of the present disclosure provide a laundry treating apparatus capable of effectively and conveniently measuring the temperature of dry air and wet air in the tub.

[0015] In addition, embodiments of the present disclosure provide a laundry treating apparatus capable of effectively checking the value of humidity in a tub and using the same during a drying cycle.

[0016] In addition, embodiments of the present disclosure provide a laundry treatment apparatus capable of conveniently and accurately checking the temperature of wet air in a tub.

[0017] Furthermore, embodiments of the present disclosure provide a laundry treatment apparatus capable of measuring the temperature of wet air while effectively increasing the water storage capacity of a water storage space provided in a tub.

TECHNICAL SOLUTIONS

[0018] An embodiment of the present disclosure includes a first temperature measurement unit and a second temperature measurement unit. The first temperature measurement unit measures the temperature of dry air in the tub at an upper side of the tub, and the second temperature measurement unit measures the temperature of wet air in the tub at a lower side of the tub.

[0019] In the embodiment of the present disclosure, a heating unit configured to provide an electromagnetic field into a tub in a cabinet may be provided, thereby eliminating the need for a separate air introduction structure configured to introduce heated air into the tub.

[0020] In the embodiment of the present disclosure, coolant may be provided to an inner surface of the tub to cool a part of the tub, and air in the tub may be dehumidified using a condensation effect of water vapor, thereby omitting a separate structure configured to dehumidify air outside the tub.

[0021] In the embodiment of the present disclosure, the second temperature measurement unit may be located in a water storage space configured to receive the coolant and condensate in the tub, whereby the second temperature measurement unit may measure the temperature of the wet air in the tub.

[0022] In addition, a protruding end of the second temperature measurement unit may protrude from a bottom surface of the tub toward the drum, and the protruding end, the temperature of which is directly measured, may be exposed above the water surface of the water storage space, whereby the temperature of wet air that has reached saturated water vapor pressure may be measured and the water storage capacity of the water storage space may be effectively increased.

[0023] A laundry treating apparatus according to an embodiment of the present disclosure as described above includes a cabinet, a tub, a drum, a first temperature measurement unit, and a second temperature measurement unit.

[0024] The tub is provided in the cabinet, and the drum is rotatably provided in the tub and receives laundry. Each of the first temperature measurement unit and the second temperature measurement unit is provided in the tub and measures the temperature of air in the tub during a drying cycle for drying laundry.

[0025] A water storage space configured to receive water is formed on a bottom surface of the tub, the first temperature measurement unit is spaced apart from the water storage space to measure the temperature of dry air, the second temperature measurement unit is provided in the water storage space, a protruding end protruding from the bottom surface of the tub toward the drum such that the temperature of the protruding end is measured faces the drum, and the protruding end is exposed to air during the drying cycle.

[0026] The laundry treating apparatus may further include a controller provided in the cabinet, the controller

being configured to derive a humidity value in the tub from measurement values of the first temperature measurement unit and the second temperature measurement unit and to perform the drying cycle by reflecting the humidity value.

[0027] The laundry treating apparatus may further include a drainage unit provided in the cabinet, the drainage unit being in communication with the water storage space, the drainage unit being configured to discharge water in the water storage space to the outside of the tub, and the controller may control the drainage unit such that the water level of the water storage space is lower than the protruding end of the second temperature measurement unit during the drying cycle.

[0028] The laundry treating apparatus may further include a cooling unit provided in the cabinet, the cooling unit being configured to cool at least a part of the tub during the drying cycle, and in the at least a part of the tub cooled by the cooling unit during the drying cycle, moisture in the air may be condensed to produce condensate and the condensate may be collected in the water storage space.

[0029] The cooling unit may supply coolant into the tub to cool the at least a part of the tub, and the condensate and the coolant may be received in the water storage space.

[0030] The laundry treating apparatus may further include a cooling valve provided in the cabinet, the cooling valve being configured to control the flow of coolant provided to the cooling unit, a drainage unit provided in the cabinet, the drainage unit being in communication with the water storage space, the drainage unit being configured to discharge water in the water storage space to the outside of the tub, and a controller configured to control the cooling valve or the drainage unit such that the water level of the water storage space is lower than the protruding end of the second temperature measurement unit during the drying cycle.

[0031] The controller may derive the amount of condensate generated in the tub from the amount of coolant provided to the tub from the cooling unit and may derive the water level of the water storage space from the total amount of the coolant and the condensate.

[0032] The tub may include a front surface having a tub opening configured to allow the inside and the outside of the tub to communicate with each other therethrough, a rear surface located opposite the front surface, and a tub circumferential surface connecting the front surface and the rear surface to each other between the front surface and the rear surface, the tub circumferential surface including the bottom surface, and the bottom surface of the tub may correspond to the lowermost surface of the tub circumferential surface.

[0033] A part of the tub circumferential surface of the tub may be depressed downward to form the water storage space and the bottom surface, the tub circumferential surface may include a water storage circumferential surface located at the circumference of the water storage

space and defining the water storage space together with the bottom surface, and the second temperature measurement unit may be spaced apart from the water storage circumferential surface in the water storage space.

[0034] The tub may include a drainage hole formed in the water storage space, the drainage hole being configured to discharge water. The second temperature measurement unit may be located adjacent to the drainage hole.

[0035] The tub may include a front portion including a front surface and a part of a tub circumferential surface and a rear portion including a rear surface and the remaining part of the tub circumferential surface, a coupling line where the front portion and the rear portion are coupled to each other may be formed, and the second temperature measurement unit may be located between the drainage hole and the coupling line.

[0036] The first temperature measurement unit may include a protruding end facing the drum, the temperature of the protruding end being measured, and the distance between the protruding end of the second temperature measurement unit and the drum may be less than the distance between the protruding end of the first temperature measurement unit and the drum.

[0037] The laundry treating apparatus may further include a cooling unit provided in the cabinet, the cooling unit being configured to supply coolant into the tub to cool at least a part of the tub during the drying cycle, wherein, in the at least a part of the tub cooled by the coolant during the drying cycle, moisture in the air may be condensed to produce condensate, the coolant and the condensate may be received in the water storage space, and the measurement value of the second temperature measurement unit may be higher than the measurement value of the first temperature measurement unit before the coolant is supplied into the tub by the cooling unit.

[0038] The tub may include a front surface having a tub opening configured to allow the inside and the outside of the tub to communicate with each other therethrough, a rear surface located opposite the front surface, and a tub circumferential surface connecting the front surface and the rear surface to each other between the front surface and the rear surface, the tub circumferential surface including the bottom surface, and the first temperature measurement unit and the second temperature measurement unit may be provided at the tub circumferential surface.

[0039] The first temperature measurement unit may be provided at an upper part of the tub circumferential surface, and the second temperature measurement unit may be provided at the bottom surface located at a lower part of the tub circumferential surface.

[0040] The heating unit may be provided at an upper end of the tub circumferential surface, and the first temperature measurement unit may be located spaced apart from the heating unit.

[0041] The first temperature measurement unit may be

located between a horizontal center line passing through the center of the tub and the heating unit.

[0042] The heating unit may provide an electromagnetic field into the tub, and the drum may be heated by induced current generated by the electromagnetic field, whereby air in the tub may be heated.

[0043] Meanwhile, a laundry treating apparatus according to an embodiment of the present disclosure includes a cabinet, a tub provided in the cabinet, a drum rotatably provided in the tub, the drum being configured to receive laundry, and a first temperature measurement unit and a second temperature measurement unit provided in the tub, each of the first temperature measurement unit and the second temperature measurement unit being configured to measure the temperature of air in the tub during a drying cycle for drying the laundry, wherein a water storage space configured to receive water is formed on a bottom surface of the tub, the first temperature measurement unit is spaced apart from the water storage space, the first temperature measurement unit being configured to measure the temperature of dry air, the second temperature measurement unit is provided in the water storage space, at least a part of the second temperature measurement unit being exposed to above a water surface to measure the temperature of wet air during the drying cycle, and the shortest distance between the second temperature measurement unit and the drum is less than the shortest distance between the first temperature measurement unit and the drum.

[0044] Meanwhile, a laundry treating apparatus according to an embodiment of the present disclosure includes a cabinet, a tub provided in the cabinet, the tub having a water storage space configured to receive water formed on a bottom surface, a drum rotatably provided in the tub, the drum being configured to receive laundry, a heating unit provided in the tub, the heating unit being configured to heat air in the tub during a drying cycle for drying the laundry, a first temperature measurement unit and a second temperature measurement unit provided in the tub, each of the first temperature measurement unit and the second temperature measurement unit being configured to measure the temperature of the air in the tub during the drying cycle, a drainage unit provided in the cabinet, the drainage unit being in communication with the water storage space, the drainage unit being configured to discharge water in the water storage space, and a controller configured to control the heating unit to perform the drying cycle and to control the drainage unit to adjust the water level of the water storage space, wherein the first temperature measurement unit is spaced apart from the water storage space, the first temperature measurement unit being configured to measure the temperature of dry air, the second temperature measurement unit is provided in the water storage space, the second temperature measurement unit being configured to measure the temperature of wet air, and the controller controls the drainage unit during the drying cycle to adjust the water level of the water storage space such that a

protruding end of the second temperature measurement unit, the temperature of which is measured, is exposed to the air above the water surface.

ADVANTAGEOUS EFFECTS

[0045] According to embodiments of the present disclosure, it is possible to provide a laundry treating apparatus capable of efficiently performing a drying cycle by measuring the temperature of air in a tub.

[0046] In addition, according to embodiments of the present disclosure, it is possible to provide a laundry treating apparatus capable of effectively and conveniently measuring the temperature of dry air and wet air in the tub.

[0047] In addition, according to embodiments of the present disclosure, it is possible to provide a laundry treating apparatus capable of effectively checking the value of humidity in a tub and using the same during a drying cycle.

[0048] In addition, according to embodiments of the present disclosure, it is possible to provide a laundry treatment apparatus capable of conveniently and accurately checking the temperature of wet air in a tub.

[0049] Furthermore, according to embodiments of the present disclosure, it is possible to provide a laundry treatment apparatus capable of measuring the temperature of wet air while effectively increasing the water storage capacity of a water storage space provided in a tub.

DESCRIPTION OF DRAWINGS

[0050]

FIG. 1 is a perspective view showing a laundry treatment apparatus according to an embodiment of the present disclosure.

FIG. 2 is a sectional view showing the inside of the laundry treating apparatus according to the embodiment of the present disclosure.

FIG. 3 is a perspective view showing a tub of the laundry treating apparatus according to the embodiment of the present disclosure.

FIG. 4 is an exploded view showing a heating unit of the laundry treating apparatus according to the embodiment of the present disclosure.

FIG. 5 is a view showing a water storage space formed in the tub so as to be depressed in accordance with an embodiment of the present disclosure.

FIG. 6 is a view showing a water storage space formed in the tub so as not to be depressed in accordance with an embodiment of the present disclosure.

FIG. 7 is a view schematically showing a first temperature measurement unit and a second temperature measurement unit when viewing the tub from the side in the embodiment of the present disclosure.

FIG. 8 is a view showing the first temperature meas-

urement unit viewed from the outside of the tub in the embodiment of the present disclosure.

FIG. 9 is a sectional view of the first temperature measurement unit taken along line A-A of FIG. 8.

FIG. 10 is a view showing the second temperature measurement unit viewed from the outside of the tub in the embodiment of the present disclosure.

FIG. 11 is a sectional view of the second temperature measurement unit taken along line B-B of FIG. 10.

FIG. 12 is a graph showing measurement values of the first temperature measurement unit and the second temperature measurement unit during a drying cycle in the embodiment of the present disclosure.

FIG. 13 is a graph schematically showing a change in water level of the water storage space during the drying cycle in the embodiment of the present disclosure.

BEST MODE FOR DISCLOSURE

[0051] Now, embodiments of the present disclosure will be described in detail with reference to the accompanying drawings such that the embodiments of the present disclosure can be easily implemented by a person having ordinary skill in the art to which the present disclosure pertains.

[0052] However, the present disclosure may be implemented in many different forms and is not limited to the embodiments described herein. In order to clearly illustrate the present disclosure in the drawings, parts not pertinent to the description have been omitted, and similar parts throughout the specification have been designated by similar reference numerals.

[0053] In this specification, duplicate descriptions of the same components will be omitted.

[0054] It will be understood that, when a component is referred to as being "connected to" or "coupled to" another component in this specification, the component may be directly connected to or coupled to the other component, or intervening components may be present. In contrast, when a component is referred to as being "directly connected to" or "directly coupled to" another component, there are no intervening components present.

[0055] In addition, the terms used in this specification are provided only to explain specific embodiments, but are not intended to restrict the present disclosure.

[0056] Also, in this specification, a singular representation may include a plural representation unless it represents a definitely different meaning from the context.

[0057] It will be further understood that the terms "comprises", "has" and the like, when used in this specification, specify the presence of stated features, numbers, steps, operations, components, parts, or combinations thereof, but do not preclude the presence or addition of one or more other features, numbers, steps, operations, components, parts, or combinations thereof.

[0058] In addition, as used herein, the term "and/or" includes any combination of a plurality of listed items or

any one of the plurality of listed items. As used herein, "A or B" may include A, B, or both A and B.

[0059] FIG. 1 is a perspective view showing the appearance of a laundry treating apparatus 1 according to an embodiment of the present disclosure. Referring to FIG. 1, the laundry treating apparatus 1 according to the embodiment of the present disclosure includes a cabinet 10. The cabinet 10 may be a component that defines the appearance of the laundry treating apparatus 1.

[0060] The cabinet 10 may have a space defined therein, and a tub 100 and a drum 30, which will be described later, may be provided in the space. The cabinet 10 may have various shapes, such as a cylindrical shape and a polyprismatic shape.

[0061] Although FIG. 1 shows a cabinet 10 having a hexahedral shape, the present disclosure is not necessarily limited thereto, and for convenience of description, the cabinet 10 will be described hereinafter based on the hexahedral shape shown in FIG. 1 unless otherwise mentioned.

[0062] The cabinet 10 may be made of a plurality of plates joined together, molded so as to have a corresponding shape by casting, or made of a single piece of material bent or curved.

[0063] When the cabinet 10 includes a plurality of plates, the plurality of plates may include a front plate 11, a rear plate, a side plate, a lower plate, and an upper plate, and the plurality of plates may be coupled to form the cabinet 10.

[0064] FIG. 1 shows a front plate 11 including a laundry opening 15. However, this is for convenience of description, and the front plate 11 is not necessarily limited to a plate having the laundry opening 15. For example, the laundry opening 15 may be provided in the upper plate.

[0065] Referring to FIG. 1, the laundry opening 15 may correspond to a through-hole formed through the front plate 11, and may allow the inside and the outside of the cabinet 10 to communicate with each other therethrough. The inside of the cabinet 10 may be exposed to the outside through the laundry opening 15.

[0066] A user may introduce or withdraw laundry into or out of the cabinet 10 through the laundry opening 15. That is, the laundry opening 15 may correspond to a passageway for laundry to be moved into and out of the cabinet 10.

[0067] The tub 100 and the drum 30 may be located at the rear of the laundry opening 15, and a tub 100 gasket configured to prevent leakage of water may be provided between the tub 100 and the drum 30 and the laundry opening 15.

[0068] The front plate 11 may be provided with a laundry door 17 configured to open and close the laundry opening 15. The laundry door 17 may be rotatably coupled to the front plate 11, and may be brought into tight contact with the front plate 11 to close the laundry opening 15 or may be moved away from the front plate 11 to open the laundry opening 15.

[0069] Meanwhile, the cabinet 10 may be provided with

a control panel that is exposed to the outside, and at least a part of a detergent supply device 80 configured to allow the user to store a detergent therein may be exposed to the outside of the cabinet 10.

[0070] The control panel may be configured to inform the user of a laundry treating process or to receive an operation signal from the user. For example, the control panel may provide various kinds of information to the user through a display, a speaker, or the like, and may receive an operation signal from the user through a microphone, a button, or the like.

[0071] In FIG. 1, the control panel and the laundry opening 15 are shown as being provided at the front plate 11 but may also be provided at the side plate or the upper plate.

[0072] Meanwhile, FIG. 2 is a sectional view showing the inside of the laundry treating apparatus 1 according to the embodiment of the present disclosure. FIG. 2 corresponds to a view of the interior of the cabinet 10 when viewed from the side.

[0073] Referring to FIG. 2, the embodiment of the present disclosure may include a tub 100 and a drum 30 provided in the cabinet 10. The tub 100 may be installed in the cabinet 10, may receive water therein, and may include a tub opening 105 facing the laundry opening 15.

[0074] The drum 30 may be rotatably installed in the tub 100, and may receive laundry therein. The drum 30 may include a drum opening 35 facing the laundry opening 15 and the tub opening 105.

[0075] FIG. 2 shows a front-loading type laundry treating apparatus 1 in which the laundry opening 15, the tub opening 105, and the drum opening 35 all face the front of the cabinet 10, but the present disclosure is not necessarily limited thereto, and for convenience of description, the following description will be based on the front-loading type laundry treating apparatus unless otherwise mentioned.

[0076] The tub 100 is provided in the cabinet 10, and may have various shapes, such as a cylindrical shape and a polyprismatic shape. For convenience of description, the following description will be based on the cylindrical tub 100.

[0077] The tub 100 may have a cylindrical shape with an approximately circular section and may include a front surface 101 in which the tub opening 105 is formed, a rear surface 102 opposite the front surface 101, and a tub circumferential surface 103 located between the front surface 101 and the rear surface 102.

[0078] The tub 100 may have a space defined therein, and the inside and the outside of the tub 100 may communicate with each other through the tub opening 105. That is, the inner space of the tub 100 may be exposed to the outside of the tub 100 through the tub opening 105.

[0079] The drum 30 is provided in the tub 100, and may have various shapes, such as a cylindrical shape and a polyprismatic shape. For convenience of description, the following description will be based on the cylindrical drum 30.

[0080] The drum 30 may have a cylindrical shape with an approximately circular section, and the drum opening 35 may be formed in one surface facing the front surface 101 of the tub 100. The drum 30 may have a space defined therein, and the inside and the outside of the drum 30 may communicate with each other through the drum opening 35. The inner space of the drum 30 may be exposed to the outside of the drum 30 through the drum opening 35.

[0081] The drum 30 may be provided in the tub 100 such that the drum opening 35 faces the tub opening 105, and the tub 100 may be provided in the cabinet 10 such that the tub opening 105 faces the laundry opening 15. That is, the laundry opening 15, the tub opening 105, and the drum opening 35 may be aligned in one direction so as to face each other.

[0082] Laundry introduced into the cabinet 10 from the outside of the cabinet 10 through the laundry opening 15 may pass through the tub opening 105 and the drum opening 35 and may be received in the drum 30. That is, the tub opening 105 and the drum opening 35 may be a passageway for movement of laundry together with the laundry opening 15.

[0083] The tub 100 may receive water therein, and the drum 30 may have through-holes formed in a circumferential surface thereof. When water is supplied into the tub 100 during a treatment process for treating laundry, therefore, the water may be provided into the drum 30 through the through-holes of the drum 30, whereby the laundry and the water may come into contact with each other.

[0084] Meanwhile, the cabinet 10 may be provided therein with a water source connection unit 40 connected to an external water source 50 to receive water from the external water source 50. The external water source 50 refers to an object that supplies water from outside of the cabinet 10 to the water source connection unit 40.

[0085] The water source connection unit 40 may deliver water supplied from the external water source 50 to various components in the cabinet 10. The water source connection unit 40 may include at least one valve configured to control the flow of water as needed.

[0086] The tub 100 may be directly connected to the water source connection unit 40 to receive water, or may receive water and a detergent from the detergent supply device 80 that receives water from the water source connection unit 40, as shown in FIG. 2.

[0087] Meanwhile, the drum 30 may be rotatably provided in the tub 100. The cabinet 10 may be provided therein with a driving unit 70 configured to provide rotational force for the drum 30, and the driving unit 70 may be provided between the tub 100 and the cabinet 10.

[0088] Referring to FIG. 2, in the embodiment of the present disclosure, the tub 100 may be fixed in the cabinet 10, the driving unit 70 may be installed at the rear surface 102 of the tub 100, the drum 30 may be coupled to a rotary shaft extending through the tub 100, and the driving unit 70 may provide rotational force to the drum

30 via the rotary shaft.

[0089] Meanwhile, the tub 100 gasket may be provided between the tub 100 and the front plate 11. When water is provided into the tub 100 for a treatment process of laundry, such as a washing cycle or a rinsing cycle, the water in the tub 100 may flow to the outside of the cabinet 10 or to the inside of the cabinet 10 and the outside of the tub 100 through the tub opening 105.

[0090] If the water in the tub 100 flows to the outside of the tub 100, the other components may be corroded or deteriorated, hygiene may be reduced, and other components may malfunction.

[0091] In the embodiment of the present disclosure, therefore, the tub 100 gasket configured to prevent the water in the tub 100 from flowing to the outside of the tub 100 may be provided between the front plate 11, in which the laundry opening 15 is formed, and the tub 100.

[0092] The cabinet 10 may be provided therein with a heating unit 90 coupled to the tub 100 to heat air in the tub 100 during the drying cycle, and a detailed description of the heating unit 90 will follow.

[0093] Meanwhile, the embodiment of the present disclosure may include a cooling unit 95 configured to cool air during the drying cycle. The cooling unit 95 may be of various types. For example, the cooling unit 95 may use a heat pump system or coolant.

[0094] FIG. 2 shows a cooling unit 95 using coolant in accordance with an embodiment of the present disclosure. Referring to FIG. 2, the cooling unit 95 may be connected to the water source connection unit 40 via a cooling channel 96.

[0095] The water source connection unit 40, the cooling channel 96, and/or the cooling unit 95 may be provided with a cooling valve 97 configured to control the flow of water from the water source connection unit 40 to the cooling unit 95. The cooling valve 97 may be opened to allow water flow and closed to block water flow.

[0096] The cooling unit 95 may be configured to cool at least a part of the tub 100 using coolant during the drying cycle for drying laundry. For example, as shown in FIG. 2, the cooling unit 95 may provide coolant to at least a part of the rear surface 102 or the tub circumferential surface 103 in the tub 100 to cool the at least a part of the rear surface 102 or the circumferential surface 103 of the tub 100.

[0097] During the drying cycle, air heated by the heating unit 90, i.e., hot air, may contact at least a part of the tub 100 cooled by the coolant, whereby moisture in the air may be condensed in the form of water droplets, and the condensed water may be collected in the water storage space 110 of the tub 100 together with the coolant.

[0098] Meanwhile, the water storage space 110 may be provided in the tub 100. The water storage space 110 may be provided in a lower part of the tub 100 in consideration of the weight of water. For example, the water storage space 110 may be defined on a bottom surface 107 of the tub 100.

[0099] The water storage space 110 may be defined

by the bottom surface 107 of the tub 100 and a water storage circumferential surface 109 surrounding the water storage space 110. The bottom surface 107 and the water storage circumferential surface 109 of the tub 100 may correspond to a part of the tub 100. For example, the water storage circumferential surface 109 may correspond to a part of the front surface 101, the rear surface 102, and/or the tub circumferential surface 103 of the tub 100. Coolant provided by the cooling unit 95 or condensate generated during the drying cycle may be received in the water storage space 110.

[0100] A part of the tub circumferential surface 103 of the tub 100 may be depressed downward to form the water storage space 110, and the water storage circumferential surface 109 may be located around the water storage space 110. For example, a lower part of the tub circumferential surface 103 of the tub 100 may be depressed downward, whereby a downwardly expanding water storage space 110 is defined in the tub and the bottom surface 107 and the water storage circumferential surface 109 are defined.

[0101] However, the embodiment of the present disclosure is not necessarily limited thereto, and as shown in FIG. 5, the tub circumferential surface 103 may be provided in a cylindrical shape having a constant shape in a circumferential direction, whereby a part of the inner space of the tub 100 corresponds to the water storage space 110.

[0102] When a part of the tub circumferential surface 103 is not depressed downward, as shown in FIG. 5, the space in which water is stored during the drying cycle, which is a part of the inner space of the tub 100, may be defined as the water storage space 110, and the bottom surface 107 and the water storage circumferential surface 109 may be defined based on the water storage space 110.

[0103] Meanwhile, the bottom surface 107 of the tub 100 may be provided with a drainage hole 62 configured to communicate with the water storage space 110, and the water stored in the water storage space 110 may be discharged to the outside of the tub 100 through the drainage hole 62. The drainage hole 62 may be connected to a drainage unit 60 located at the outside of the tub 100.

[0104] The drainage unit 60 may include a drainage pump configured to drain water, and the drainage unit 60 may selectively drain the water in the water storage space 110 through operation of the drainage pump. The drainage unit 60 may pump water discharged from the tub 100 and may discharge the same to the outside of the cabinet 10.

[0105] Meanwhile, the tub 100 may be provided with a first temperature measurement unit 200 and a second temperature measurement unit 300 configured to measure the temperature of air. The first temperature measurement unit 200 and the second temperature measurement unit 300 may be spaced apart from each other to measure the temperature of different parts in the tub 100.

[0106] While FIG. 2 shows the first temperature meas-

urement unit 200 being provided at an upper end of the tub 100 and the second temperature measurement unit 300 being provided at a lower end of the tub 100, this is only for the purpose of illustrating the first temperature measurement unit 200 and the second temperature measurement unit 300, and the first temperature measurement unit 200 and the second temperature measurement unit 300 need not necessarily be located at the upper end or the lower end of the tub 100.

[0107] Meanwhile, the first temperature measurement unit 200 may be located in an upper part of the tub 100 to measure the temperature of dry air in the tub 100, and the second temperature measurement unit 300 may be located in a lower part of the tub 100 to measure the temperature of wet air in the tub 100.

[0108] In the present disclosure, wet air refers to air having saturated water vapor pressure, but air having water vapor pressure that is relatively close to saturated water vapor pressure due to being located close to the water surface W may also be understood as wet air. For example, air in the water storage space 110 or air adjacent to the water storage space 110 may be understood as wet air.

[0109] In the present disclosure, dry air, as opposed to wet air, refers to air having normal relative humidity, and in the present disclosure, air that is sufficiently distant from the water storage space 110 so as not to be affected by the water contained in the water storage space 110 may be understood as dry air.

[0110] In the embodiment of the present disclosure, therefore, the second temperature measurement unit 300 may be located above the water storage space 110 to measure the temperature of the wet air, and the first temperature measurement unit 200 may be located in the upper part of the tub 100 to measure the temperature of the dry air.

[0111] The temperature of the dry air and the wet air in the tub 100 may be used in checking the progress of the drying cycle during the drying cycle. For example, the difference in temperature between the dry air and the wet air may be a factor for deriving the current humidity value of the air, a detailed description of which will follow.

[0112] Meanwhile, the laundry treating apparatus 1 according to the embodiment of the present disclosure may include a controller 400. The controller 400 may be provided in or outside the cabinet 10, and may be electrically/signally connected to the water source connection unit 40, the detergent supply device 80, the driving unit 70, the drainage unit 60, the heating unit 90, the cooling unit 95, and the cooling valve 97.

[0113] That is, the controller 400 may be connected to various components that are electrically/electronically controllable in the embodiment of the present disclosure, and may be configured to control the operating state of the various components and to perform the washing cycle or the drying cycle of laundry.

[0114] Meanwhile, FIG. 3 shows the appearance of the tub 100 provided in the cabinet 10 in the embodiment of

the present disclosure. The tub 100 may include a front surface 101 including a tub opening 105, a rear surface 102 located opposite the front surface 101, and a tub circumferential surface 103 configured to connect the front surface 101 and the rear surface 102 to each other.

[0115] The heating unit 90 may be provided on the tub circumferential surface 103, and the first temperature measurement unit 200 and the second temperature measurement unit 300 may also be provided on the tub circumferential surface 103. The bottom surface 107 of the tub 100 may correspond to a part of the tub circumferential surface 103.

[0116] The first temperature measurement unit 200 may be located at an upper part of the tub circumferential surface 103, and the second temperature measurement unit 300 may be located at a lower part of the tub circumferential surface 103. Here, the upper part of the tub circumferential surface 103 or the upper part of the tub 100 means a part located above a horizontal center line L passing through the center of the section of the tub 100, and the lower part means a part located under the horizontal center line L.

[0117] Meanwhile, FIG. 4 shows a heating unit 90 according to an embodiment of the present disclosure. The heating unit 90 may be configured to heat water or air by heating the inside of the tub 100. For example, the heating unit 90 may be configured to increase the temperature of the water during the washing cycle or to increase the temperature of the air present in the tub 100 during the drying cycle.

[0118] The heating unit 90 may be provided in various types and shapes. For example, the heating unit 90 may be provided in the form of a heat pump system using a refrigerant, may be provided in the form of an electric heater that is heated by resistance due to electric current, or may be provided in the form of an electromagnetic field generator that generates an electromagnetic field to generate induced current in a target, thereby heating the target by electrical resistance.

[0119] FIG. 4 shows a heating unit 90 in the form of an electromagnetic field generator according to an embodiment of the present disclosure. Referring to FIG. 4, the heating unit 90 may include an induction coil 91 and a coil cover 92, and the tub 100 may be provided with a coil coupling portion 93 to which the heating unit 90 is coupled.

[0120] The induction coil 91 may be configured to generate an electromagnetic field when current is provided, and may be shielded from the outside by the coil cover 92. The induction coil 91 may be provided on an outer circumferential surface of the tub 100 to provide an electromagnetic field into the tub 100.

[0121] The tub 100 may be made of a material that does not generate induced current, e.g., a nonconductor, such as plastic. Consequently, an electromagnetic field provided by the heating unit 90 including the induction coil 91 does not affect the tub 100, and the electromagnetic field may pass through the tub 100 and be provided

into the tub 100.

[0122] Meanwhile, the drum 30 may be made of a material that generates induced current, e.g. a conductor, such as metal or special ceramic, unlike the tub 100. Consequently, induced current, such as eddy current, may be formed in the drum 30 by the electromagnetic field provided by the heating unit 90. With the formation of current, the drum 30, which corresponds to a resistor, may be heated.

[0123] The drum 30, which is heated by the heating unit 90, may contribute to increasing the temperature of air or water in the tub 100. For example, the heating unit 90 may heat the drum 30 to increase the temperature of washing water provided in the tub 100 during the washing cycle of laundry, or may heat the drum 30 to increase the temperature of the air in the tub 100 during the drying cycle of laundry. In the embodiment of the present disclosure, the controller 400 may be electrically/signally connected to the heating unit 90 to control the operation of the heating unit 90.

[0124] Meanwhile, FIG. 5 shows a water storage space 110 in which the tub circumferential surface 103 of the tub 100 is depressed and the inner space of the tub 100 is extended, and FIG. 6 shows a water storage space 110 in which the tub circumferential surface 103 of the tub 100 is continuously extended so as to have a circular section, wherein a part of the inner space of the tub 100 corresponds to the water storage space 110.

[0125] In addition, FIGs. 5 and 6 schematically show the first temperature measurement unit 200 and the second temperature measurement unit 300 when the tub 100 is viewed from the front, and FIG. 6 schematically shows the second temperature measurement unit 300 and the second temperature measurement unit 300 when the tub 100 is viewed from the side.

[0126] The embodiment of the present disclosure including the first temperature measurement unit 200 and the second temperature measurement unit 300 will hereinafter be described in detail with reference to FIGs. 5 to 7. First, the embodiment of the present disclosure may include the cabinet 10, the tub 100, the drum 30, the first temperature measurement unit 200, and the second temperature measurement unit 300.

[0127] The tub 100 may be provided in the cabinet 10, the drum 30 may be rotatably provided in the tub 100 and may receive laundry, and each of the first temperature measurement unit 200 and the second temperature measurement unit 300 may be provided in the tub 100 and may measure the temperature of air in the tub 100 during the drying cycle for drying laundry.

[0128] The water storage space 110 configured to receive water may be formed on the bottom surface 107 of the tub 100, the first temperature measurement unit 200 may be spaced apart from the water storage space 110 to measure the temperature of dry air, the second temperature measurement unit 300 may be provided in the water storage space 110, a protruding end 305 protruding from the bottom surface 107 of the tub 100 toward

the drum 30 such that the temperature of the protruding end is measured may face the drum 30, and the protruding end 305 may be located above the water level H3 of the water storage space 110 so as to be exposed to air during the drying cycle in order to measure the temperature of wet air.

[0129] The water storage space 110 may have various shapes. FIGs. 5 and 7 show a lower end of the tub circumferential surface 103 being depressed downward with the bottom surface 107 of the tub 100 and the water storage space 110 formed.

[0130] In addition, FIG. 6 shows an example in which the lower end of the tub circumferential surface 103 is not depressed downward, the section of the tub 100 is approximately circular, and a part of the inner space of the tub 100 corresponds to the water storage space 110.

[0131] In the embodiment of the present disclosure, the first temperature measurement unit 200 may be spaced apart from the water storage space 110 to measure the temperature of dry air. For example, the first temperature measurement unit 200 may be located in the upper part of the tub 100.

[0132] FIG. 8 shows the first temperature measurement unit 200 viewed from the outside of the tub 100 in the embodiment of the present disclosure, and FIG. 9 is a sectional view of the first temperature measurement unit 200 taken along line A-A of FIG. 8.

[0133] The first temperature measurement unit 200 may be located at the tub circumferential surface 103 in the upper part of the tub 100, and a protruding end 205 which extends through the tub circumferential surface 103 and the temperature of which is measured may be located in the tub 100.

[0134] The tub circumferential surface 103 may be provided with a measurement coupling portion 230 for insertion and coupling of the first temperature measurement unit 200, and the measurement coupling portion 230 may protrude from the tub circumferential surface 103 to the outside of the tub 100.

[0135] The first temperature measurement unit 200 may be provided with a fixing portion 210 disposed outside the tub 100 and coupled to the measurement coupling portion 230. The fixing portion 210 may be coupled to the measurement coupling portion 230 via a coupling member 220, such as a bolt, and the position of the first temperature measurement unit 200 in the tub 100 may be fixed as the fixing portion 210 is coupled and fixed to the measurement coupling portion 230.

[0136] The first temperature measurement unit 200 may be of various types. For example, the first temperature measurement unit 200 may be a mechanical/electrical/radiometric thermometer, or may be in the form of a thermistor configured to determine temperature based on electrical characteristics. The second temperature measurement unit 300 is the same.

[0137] The first temperature measurement unit 200 may include a protruding end 205 that is disposed in the tub 100, is exposed to the air, and serves as a reference

region from which the temperature is measured. That is, the temperature measurement value of the first temperature measurement unit 200 may be based on the protruding end 205.

[0138] For example, when each of the first temperature measurement unit 200 and the second temperature measurement unit 300 is in the form of a thermistor, a thermistor chip having a changing resistance value may be disposed at the protruding end 205.

[0139] The protruding end 205 of the first temperature measurement unit 200 may be fixed at a required position in the tub 100 through coupling between the measurement coupling portion 230 and the fixing portion 210, whereby accuracy of the temperature measurement value of the first temperature measurement unit 200 may be improved.

[0140] Meanwhile, FIG. 10 shows the second temperature measurement unit 300 viewed from the outside of the tub 100, and FIG. 11 is a sectional view of the second temperature measurement unit 300 taken along line B-B of FIG. 10.

[0141] The temperature may be measured at the protruding end 305 of the second temperature measurement unit 300 in the same manner as in the first temperature measurement unit 200, and the protruding end 305 of the second temperature measurement unit 300 may extend through the bottom surface 107 of the tub 100 and may be disposed in the tub 100.

[0142] The second temperature measurement unit 300 may be provided in the water storage space 110. For example, the second temperature measurement unit 300 may extend through the bottom surface 107 of the tub 100, which defines the water storage space 110, and may be located in the water storage space 110 of the tub 100.

[0143] The second temperature measurement unit 300 may extend from the bottom surface 107 of the tub 100 toward the drum 30. That is, the protruding end 305 of the second temperature measurement unit 300 may be disposed so as to face the drum 30.

[0144] The second temperature measurement unit 300 may be configured to measure the temperature of wet air generated by the water present in the water storage space 110. In the embodiment of the present disclosure, the water storage space 110 may receive water during the drying cycle.

[0145] The water received in the water storage space 110 during the drying cycle may be coolant provided by the cooling unit 95, condensate generated in a part of the tub 100 cooled by the cooling unit 95, or water intentionally stored in the water storage space 110 in order to measure wet air.

[0146] The temperature measured by the first temperature measurement unit 200, which is spaced apart from the water storage space 110 in which water is present, may be the temperature of dry air corresponding to air in a normal state, and the temperature measured by the second temperature measurement unit 300, which is lo-

cated in the water storage space 110 in which water is present, may be the temperature of wet air corresponding to air having saturated water vapor pressure as the result of evaporation of water or air that may be treated as substantially the same.

[0147] The temperature of dry air and the temperature of wet air measured in the tub 100 during the drying cycle may provide a basis for checking the progress of the drying cycle or the dry state of laundry in a relative relationship.

[0148] In the embodiment of the present disclosure, therefore, the controller 400 may use values measured by the first temperature measurement unit 200 and the second temperature measurement unit 300 so as to be reflected when the drying cycle is performed.

[0149] For example, the controller 400 may compare and analyze the measurement values of the first temperature measurement unit 200 and the second temperature measurement unit 300 to determine entry into a constant rate period P2 in which drying efficiency of laundry during the drying cycle corresponds to the substantial maximum or entry into a decreasing rate period P3 in which drying efficiency of the laundry is decreased and drying of the laundry is sufficiently performed so as to be used when the drying cycle is performed.

[0150] Meanwhile, referring back to FIGs. 5 to 7, in the embodiment of the present disclosure, the protruding end 305 of the second temperature measurement unit 300 may be located higher than the water level H3 of the water received in the water storage space 110 during the drying cycle so as to be exposed to the air in order to measure the temperature of wet air.

[0151] As described above, the second temperature measurement unit 300 is configured to measure the temperature of wet air in the tub 100, and therefore the protruding end 305 of the second temperature measurement unit 300 is advantageously disposed adjacent to water in the water storage space 110, but if the protruding end is in direct contact with the water, the temperature of the water is measured, which is disadvantageous.

[0152] In the embodiment of the present disclosure, therefore, the second temperature measurement unit 300 is disposed on the water storage space 110 so as to be adjacent to water, which is advantageous in measuring the temperature of wet air, and the protruding end 305 of the second temperature measurement unit 300 is disposed at a height equal to or higher than at least the water level H3 of the water storage space 110 such that the temperature of the wet air can be measured accurately and efficiently.

[0153] Furthermore, the height H2 of the protruding end 305 of the second temperature measurement unit 300 may be a criterion for limiting the water capacity of the water storage space 110 during the drying cycle in order that the protruding end 305 of the second temperature measurement unit 300 is located above the water surface W.

[0154] In the embodiment of the present disclosure,

therefore, the second temperature measurement unit 300 may extend upward from the bottom surface 107 of the tub 100 toward the drum 30 such that the height H2 of the protruding end 305 of the second temperature measurement unit 300 can be conveniently adjusted, and the height H2 of the second temperature measurement unit 300 may be conveniently increased as needed to effectively increase the storage capacity limit of the water storage space 110.

[0155] Furthermore, water vapor in the air may be condensed on the surface of the second temperature measurement unit 300 in the form of water droplets, and the water droplets may flow down from the second temperature measurement unit 300 to the bottom surface 107 due to weight in the extension direction of the second temperature measurement unit 300, whereby the water droplets may be removed, which is advantageous.

[0156] In addition, the second temperature measurement unit 300 may include a measuring gasket portion 340 configured to prevent water from leaking out of the tub 100 as the second temperature measurement unit extends through the bottom surface 107 of the tub 100 in the water storage space 110 in which water is present.

[0157] Since the measuring gasket portion 340 extends through the bottom surface 107 of the tub 100 and the second temperature measurement unit 300 is inserted into the water storage space 110 of the tub 100 through the measuring gasket portion 340, leakage of water from the coupling region of the second temperature measurement unit 300 may be effectively prevented by the measuring gasket portion 340.

[0158] Furthermore, in the embodiment of the present disclosure, the second temperature measurement unit 300 protrudes upward from the bottom surface 107 of the tub 100, whereby the second temperature measurement unit is spaced apart from the circumference of the water storage space 110 and located close to the center of the water storage space 110, in which case the temperature of wet air may be measured at a point where saturated water vapor pressure is relatively stably formed by evaporation of water, thereby effectively increasing reliability of the measurement value of the second temperature measurement unit 300.

[0159] Meanwhile, FIG. 12 is a graph showing humidity values derived from measurement values of the first temperature measurement unit 200 and the second temperature measurement unit 300 in the embodiment of the present disclosure.

[0160] Referring to FIG. 12, in the embodiment of the present disclosure, the controller 400 may derive a humidity value in the tub 100 from the measurement values of the first temperature measurement unit 200 and the second temperature measurement unit 300, and may perform the drying cycle by reflecting the humidity value.

[0161] In the drying cycle of laundry, the humidity value of the air in the tub 100 is an important variable that determines the progress of the drying cycle. For example, as the evaporation rate of moisture from laundry changes

and drying efficiency changes, the humidity value in the air may also change in a certain pattern, and this may be used to determine steps of the drying cycle.

[0162] Controlling the drying cycle using the humidity value of the air in the tub 100 is more precise than controlling the drying cycle through guessing of the drying state using the temperature value of the air in the tub 100, whereby efficient control is possible.

[0163] In the graph of FIG. 12, the horizontal axis corresponds to a time axis in minutes, the left vertical axis corresponds to a temperature axis in degrees Celsius, and the right vertical axis corresponds to a humidity axis in percent.

[0164] In addition, line M1 in the graph is a measurement value of the first temperature measurement unit 200, line M2 is a measurement value of the second temperature measurement unit 300, line M3 is a humidity calculation value derived from a deviation value between the first temperature measurement unit 200 and the second temperature measurement unit 300, and line M4 is a humidity measurement value acquired using an actual humidity sensor.

[0165] Meanwhile, in the graph of FIG. 12, an increasing rate period P1 corresponding to an early stage of the drying cycle in which drying efficiency is increased, a constant rate period P2 corresponding to a middle stage of the drying cycle in which drying efficiency is maintained at the maximum value, and a decreasing rate period P3 corresponding to a late stage of the drying cycle in which the moisture of laundry is below a predetermined level, whereby drying efficiency is decreased, are shown.

[0166] In the embodiment of the present disclosure, the controller 400 may derive a humidity calculation value M3 using the measurement values of the first temperature measurement unit 200 and the second temperature measurement unit 300. The humidity calculation value M3 may be calculated in real time by a specific formula that is pre-stored in the controller 400 or may be derived by substituting the measurement values of the first temperature measurement unit 200 and the second temperature measurement unit 300 into a data map pre-stored in the controller 400.

[0167] It can be seen from the graph of FIG. 12 that the humidity calculation value M3, which is derived by the controller 400 from the measurement values of the first temperature measurement unit 200 and the second temperature measurement unit 300, follows the humidity measurement value M4, which is the result of actual measurement of the humidity, with a high degree of reliability.

[0168] Compared to determination of the progress of the drying cycle using the measurement value M1 of the first temperature measurement unit 200 or the measurement value M2 of the second temperature measurement unit 300 without changes, it is advantageous to use the humidity calculation value M3 that follows the humidity measurement value M4 with a high degree of reliability and shows substantially the same or similar results for

efficiently performing the drying cycle.

[0169] In the embodiment of the present disclosure, the controller 400 may effectively check the point in time of entering the constant rate period P2 or the point in time of entering the decreasing rate period P3 of the drying cycle with a high degree of reliability even without provision of an actual humidity sensor through the humidity calculation value M3 derived from the measurement values of the first temperature measurement unit 200 and the second temperature measurement unit 300.

[0170] Meanwhile, as described above, the embodiment of the present disclosure may further include a drainage unit 60 provided in the cabinet 10 and communicating with the water storage space 110 to discharge water in the water storage space 110 to the outside of the tub 100.

[0171] The controller 400 may control the drainage unit 60 to maintain the water level H3 of the water storage space 110 below the protruding end 305 of the second temperature measurement unit 300 during the drying cycle.

[0172] Referring to FIGs. 5 to 7, the protruding end 305 of the second temperature measurement unit 300 may have a height H2 from the bottom surface 107 of the tub 100 that is greater than or equal to the height H3 from the bottom surface 107 of the tub 100 to the water surface W in the water storage space 110 in order for the second temperature measurement unit 300 to measure the temperature of wet air rather than the temperature of water.

[0173] Meanwhile, the height relationship between the protruding end 305 of the second temperature measurement unit 300 and the water surface W is affected not only by adjustment of the height of the second temperature measurement unit 300 but also by adjustment of the amount of water stored in the water storage space 110.

[0174] That is, in the embodiment of the present disclosure, the height H2 of the protruding end 305 of the second temperature measurement unit 300 may be set in accordance with a preset water storage allowance of the water storage space 110 during the drying cycle, and the water storage allowance of the water storage space 110 may be changed in accordance with the preset height H2 of the protruding end 305 of the second temperature measurement unit 300.

[0175] The controller 400 may determine the water storage allowance of the water storage space 110 based on the height H2 of the protruding end 305 of the second temperature measurement unit 300, and may operate the drainage unit 60 to adjust the water level H3 of the water storage space 110 so as to be lower than the protruding end 305 of the second temperature measurement unit 300 if water is stored in excess of the water storage allowance.

[0176] In the embodiment of the present disclosure, therefore, the protruding end 305 of the second temperature measurement unit 300 may be reliably exposed to the air above the water surface W, whereby the temperature of wet air may be effectively measured.

[0177] Meanwhile, as described with reference to FIG. 4, the embodiment of the present disclosure may include a heating unit 90, wherein the heating unit 90 may be provided in the cabinet 10 and may heat air in the tub 100 during the drying cycle. Air stagnant in the tub 100 may be heated by the heating unit 90 during the drying cycle.

[0178] That is, the embodiment of the present disclosure may have a stagnant drying structure in which there is no air flow between the inside and the outside of the tub 100 in the drying cycle and the air in the tub 100 is heated by the heating unit 90 in a stagnant state.

[0179] In a circulating or exhaust drying structure in which air flows to the outside of the tub 100, a temperature sensor or a humidity sensor may be easily provided on an air flow channel outside the tub 100, whereas it is necessary to check the humidity value of air in the tub 100 in the stagnant drying structure.

[0180] That is, in the embodiment of the present disclosure, in the stagnant drying structure in which air is heated in the tub 100 while not flowing, the humidity value in the tub 100 may be effectively derived by using the first temperature measurement unit 200 that measures the temperature of dry air and the second temperature measurement unit 300 that measures the temperature of wet air in the water storage space 110 in which water is received.

[0181] Meanwhile, the embodiment of the present disclosure may further include a cooling unit 95, as described above with reference to FIG. 2. The cooling unit 95 may be provided in the cabinet 10 and may cool at least a part of the tub 100 during the drying cycle.

[0182] In the at least a part of the tub 100 cooled by the cooling unit 95 during the drying cycle, moisture in the air may be condensed to produce condensate, and the condensate may be collected in the water storage space 110.

[0183] That is, in the embodiment of the present disclosure, even when water is not separately stored in the water storage space 110 for use of the second temperature measurement unit 300 during the drying cycle, water may be effectively stored in the water storage space 110 by the condensate, thereby creating a measurement environment of wet air.

[0184] In addition, when a condensate removal method using the cooling unit 95 is adopted, moisture in the air may be effectively removed and the second temperature measurement unit 300 may be efficiently used even in the stagnant drying structure.

[0185] Meanwhile, the cooling unit 95 may supply coolant into the tub 100 to cool the at least a part of the tub, and the condensate and the coolant may be received in the water storage space 110.

[0186] As described above, the cooling unit 95 may be of various types, but in the embodiment of the present disclosure, the cooling unit 95 may be configured to supply coolant to an inner surface of the tub 100.

[0187] As the coolant is stored in the water storage

space 110 together with the condensate, the water storage environment of the water storage space 110 for measuring the temperature of wet air may be effectively and conveniently created.

[0188] Meanwhile, the embodiment of the present disclosure may further include a cooling valve 97 provided in the cabinet 10 and configured to control the flow of coolant provided to the cooling unit 95, a drainage unit 60 provided in the cabinet 10 and communicating with the water storage space 110 to discharge water in the water storage space 110 to the outside of the tub 100, and a controller 400 configured to control the cooling valve 97 or the drainage unit 60 such that the water level H3 of the water storage space 110 is lower than the protruding end 305 of the second temperature measurement unit 300 during the drying cycle.

[0189] That is, the controller 400 may control the cooling valve 97 to reduce the amount of coolant that is supplied before the amount of water stored in the water storage space 110 becomes above the protruding end 305 of the second temperature measurement unit 300, or may control the drainage unit 60 to drain the water in the water storage space 110, in order to effectively maintain the protruding end 305 of the second temperature measurement unit 300 exposed to the air.

[0190] Meanwhile, FIG. 13 is a graph conceptually showing a change in the water level H3 of water stored in the water storage space 110 during the drying cycle in accordance with an embodiment of the present disclosure.

[0191] Referring to FIG. 13, in the embodiment of the present disclosure, the controller 400 may derive the amount of condensate C2 generated in the tub 100 from the amount of coolant C1 provided to the tub 100 from the cooling unit 95, and may derive the water level H3 of the water storage space 110 from the total amount of coolant and condensate C1+C2.

[0192] Specifically, after at least a part of the tub 100 starts to be cooled by the cooling unit 95 during the drying cycle, the amount of condensate C2 generated on the inner surface of the cooled tub 100 may have a specific relationship with the amount of coolant C1 or with the cooling time.

[0193] FIG. 13 conceptually shows the relationship between the amount of coolant C1 and the amount of condensate C2. In FIG. 12, the horizontal axis is the time axis in minutes, and the vertical axis is the water level axis in mm.

[0194] Referring to FIG. 13, first, the point in time of coolant inflow t1 at which drying efficiency of moisture in laundry is maximized and coolant starts to be provided by the cooling unit 95 is shown.

[0195] After the point in time of coolant inflow t1, coolant is stored in the water storage space 110, and the amount of coolant C1 stored in the water storage space 110 gradually increases over time.

[0196] Meanwhile, after the point in time of coolant inflow t1, condensate generated on the inner surface of

the tub 100 due to cooling by the cooling unit 95 may be stored in the water storage space 110, and therefore the water storage amount C1+C2 of the water storage space 110 is the sum of the amount of coolant C1 and the amount of condensate C2.

[0197] Meanwhile, the controller 400 may operate the drainage pump of the drainage unit 60 to drain the water in the water storage space 110 before the water storage amount of the water storage space 110 reaches the height H2 of the protruding end 305 of the second temperature measurement unit 300, and FIG. 13 shows the point in time of drainage t2 at which the drainage unit 60 is operated.

[0198] However, FIG. 13 shows only an example to illustrate a method of controlling the water storage amount of the water storage space 110 in the present disclosure, the amount of coolant C1 or the amount of condensate C2 may have non-linear characteristics unlike FIG. 13, the point in time of drainage t2 may be variously determined, and it may be possible to ensure that a certain amount of water is still present in the water storage space 110 for smooth measurement of the second temperature measurement unit 300 as well as that no water remains in the water storage space 110 after the end of drainage.

[0199] In the embodiment of the present disclosure, the controller 400 may derive the current amount of coolant C1 from the amount or point in time of coolant provision or the amount of condensate C2 from the duration of provision even when a water level sensor configured to measure the water storage amount of the water storage space 110 is omitted, may effectively check the water storage amount of the water storage space 110, and effectively adjust the water level H3 of the water storage space 110 to keep the protruding end 305 of the second temperature measurement unit 300 exposed to the air.

[0200] Meanwhile, in the embodiment of the present disclosure, the tub 100 may include a water storage circumferential surface 109 surrounding the water storage space 110 and defining the water storage space 110 together with the bottom surface 107, and the second temperature measurement unit 300 may be provided in the water storage space 110 so as to be spaced apart from the water storage circumferential surface 109. The second temperature measurement unit 300 spaced apart from the water storage circumferential surface 109 is shown in FIGs. 2 and 3.

[0201] As described above, in the embodiment of the present disclosure, the second temperature measurement unit 300 may have a shape that protrudes from the bottom surface 107 of the tub 100 toward the drum 30, and the second temperature measurement unit 300, which is not provided on the front surface 101 or the rear surface 102 of the tub 100, may also be spaced apart from the water storage circumferential surface 109 with positional freedom.

[0202] The water storage space 110 may be provided with the drainage hole 62 described above, and in the

water storage space 110, the bottom surface 107 of the tub 100 may be recessed toward the drainage hole 62 for smooth drainage of water. That is, the drainage hole 62 may be located at the deepest part of the bottom surface 107 of the tub 100, and the deepest part may be spaced apart from the water storage circumferential surface 109.

[0203] When the second temperature measurement unit 300 is in contact with or adjacent to the water storage circumferential surface 109, therefore, the protruding end 305 of the second temperature measurement unit 300 may be exposed to the air, which is unfavorable for securing the water storage capacity of the water storage space 110.

[0204] Furthermore, as described above, water vapor generated in the water storage space 110 may be more stably present on the inside spaced apart from the water storage circumferential surface 109.

[0205] In the embodiment of the present disclosure, therefore, the second temperature measurement unit 300 may be disposed in the water storage space 110 so as to be spaced apart from the water storage circumferential surface 109, whereby it is possible to effectively increase the water storage capacity and to effectively improve the reliability of measurement of the temperature of wet air.

[0206] Meanwhile, in the embodiment of the present disclosure, the tub 100 may include a drainage hole 62, through which water is discharged, formed in the water storage space 110, and the second temperature measurement unit 300 may protrude from the circumference of the drainage hole 62 toward the drum 30. The positional relationship between the second temperature measurement unit 300 and the drainage hole 62 is shown in FIGs. 10 and 11.

[0207] As described above, the bottom surface 107 of the tub 100 in the water storage space 110 may have a recessed shape such that the drainage hole 62 becomes the deepest part for smooth drainage of water. As the second temperature measurement unit 300 is disposed on the circumference of the drainage hole 62, it is easy to measure the temperature air in a state corresponding to or substantially identical to saturated water vapor pressure even when the water storage amount of the water storage space 110 is small.

[0208] Meanwhile, in the embodiment of the present disclosure, the tub 100 may be constituted by segments coupled to each other. For example, as shown in FIGs. 10 and 11, a front portion of the tub 100 and a rear portion of the tub 100 may be coupled to each other to form a single tub 100.

[0209] The front portion of the tub 100 may include a front surface 101 of the tub 100, and may include a drainage hole 62. The rear portion of the tub 100 may include a rear surface 102 of the tub 100, and may be connected to the driving unit 70.

[0210] In such an example, the second temperature measurement unit 300 may be provided at the front por-

tion of the tub 100 where the drainage hole 62 is provided. For example, the second temperature measurement unit 300 may be located between the drainage hole 62 and a coupling line where the front and rear portions of the tub 100 are coupled to each other.

[0211] In the embodiment of the present disclosure, the tub 100 may include a front portion including a front surface 101 and a part of a tub circumferential surface 103 and a rear portion including a rear surface 102 and the remaining part of the tub circumferential surface 103, and a coupling line where the front portion and the rear portion are coupled to each other may be formed.

[0212] Meanwhile, in the embodiment of the present disclosure, the first temperature measurement unit 200 may include a protruding end 205, at which the temperature is measured, facing the drum 30, and the distance D2 between the protruding end 305 of the second temperature measurement unit 300 and the drum 30 may be less than the distance D1 between the protruding end 205 of the first temperature measurement unit 200 and the drum 30.

[0213] The distance D1 between the first temperature measurement unit 200 and the drum 30 and the distance D2 between the second temperature measurement unit 300 and the drum 30 are shown in FIGs. 5 to 7. In the embodiment of the present disclosure, the height H2 of the protruding end 305 of the second temperature measurement unit 300 may be related to the water storage capacity of the water storage space 110, and increasing the height H2 of the protruding end 305 of the second temperature measurement unit 300 may be advantageous to remedy inconvenience of frequent draining.

[0214] As described above, the second temperature measurement unit 300 having an increased height H2 of the protruding end 305 of the second temperature measurement unit 300 may be configured such that the distance D2 from the drum 30 is less than the distance D1 between the first temperature measurement unit 200 and the drum 30. Here, the distance from the drum 30 means the shortest distance.

[0215] In FIGs. 5 to 7, the protruding height H1 of the first temperature measurement unit 200 and the distance D1 from the drum 30 are shown, and the protruding height H2 of the second temperature measurement unit 300 and the distance D2 from the drum 30 are shown. The distance D1 between the first temperature measurement unit 200 and the drum 30 may be greater than the distance D2 between the second temperature measurement unit 300 and the drum 30.

[0216] In the embodiment of the present disclosure, the measurement value of the second temperature measurement unit 300 may be higher than the measurement value of the first temperature measurement unit 200 before coolant is supplied into the tub 100 by the cooling unit 95 due to the relationship between D1 and D2.

[0217] Referring to FIG. 12, it can be seen that the measurement value M1 of the first temperature meas-

urement unit 200 is lower than the measurement value M2 of the second temperature measurement unit 300 before the point in time of coolant inflow t1. The distance from the drum 30 may be reflected in the measurement values of the first temperature measurement unit 200 and the second temperature measurement unit 300 before the point in time of coolant inflow t1.

[0218] Specifically, when no water is separately stored in the water storage space 110 before the inflow of coolant through the cooling unit 95, the measurement value of the second temperature measurement unit 300 before the point in time of coolant inflow may correspond to the temperature of dry air, as in the first temperature measurement unit 200.

[0219] In addition, when the heating unit 90, which heats air by forming induced current in the drum 30 as described above, is closer to the drum 30, the measurement value of temperature of air may further increase since the drum 30 corresponds to a heating element in the tub 100.

[0220] As described above, the distance D2 between the second temperature measurement unit 300 and the drum 30 may be less than the distance D1 between the first temperature measurement unit 200 and the drum 30 in order to increase the water storage capacity of the water storage space 110, and therefore, in the embodiment of the present disclosure, the measurement value M2 of the second temperature measurement unit 300 may be higher than the measurement value M1 of the first temperature measurement unit 200 before coolant is introduced during the drying cycle.

[0221] Meanwhile, in the embodiment of the present disclosure, the tub 100 has a front surface 101 in which a tub opening 105 through which the inside and the outside of the tub 100 communicate with each other is formed, a rear surface 102 located opposite the front surface 101, and a tub circumferential surface 103 connecting the front surface 101 and the rear surface 102 to each other between the front surface 101 and the rear surface 102 and including the bottom surface 107, and the first temperature measurement unit 200 and the second temperature measurement unit 300 may be provided at the tub circumferential surface 103.

[0222] In the embodiment of the present disclosure, the first temperature measurement unit 200 and the second temperature measurement unit 300 are provided at the tub circumferential surface 103 so as to extend through the tub circumferential surface 103, whereby the distance from the drums 30 may be conveniently adjusted.

[0223] Meanwhile, the first temperature measurement unit 200 may be provided at an upper part of the tub circumferential surface 103, and the second temperature measurement unit 300 may be provided at the bottom surface 107 located on a lower part of the tub circumferential surface 103. As described above, the upper and lower parts of the tub circumferential surface 103 may be defined based on a horizontal centerline L passing

through the center of the tub 100.

[0224] In addition, the heating unit 90 may be provided at an upper end of the tub circumferential surface 103, and the first temperature measurement unit 200 may be spaced apart from the heating unit 90. Specifically, the first temperature measurement unit 200 may be located between the horizontal center line L passing through the center of the tub 100 and the heating unit 90.

[0225] In the embodiment of the present disclosure, therefore, the effective position of the heating unit 90 configured to heat the drum 30 is secured, and at the same time, the first temperature measurement unit 200 is maximally spaced away from the water storage space 110, whereby it is possible to reliably measure the temperature of dry air.

[0226] Meanwhile, as described above, the heating unit 90 provides an electromagnetic field into the tub 100, and the drum 30 is heated by induced current generated by the electromagnetic field, whereby air in the tub 100 may be heated.

[0227] In the embodiment of the present disclosure, therefore, air in the tub 100 may be effectively heated even when the air in the tub 100 is not circulated during the drying cycle, and the first temperature measurement unit 200 may reliably measure the temperature since the first temperature measurement unit is spaced apart from the heating unit 90, which generates the electromagnetic field.

[0228] Meanwhile, a laundry treating apparatus 1 according to an embodiment of the present disclosure may include a cabinet 10, a tub 100 provided in the cabinet 10, a drum 30 rotatably provided in the tub 100, the drum being configured to receive laundry, and a first temperature measurement unit 200 and a second temperature measurement unit 300 provided in the tub 100, each of the first temperature measurement unit and the second temperature measurement unit being configured to measure the temperature of air in the tub 100 during a drying cycle for drying the laundry, wherein a water storage space 110 configured to receive water may be formed on a bottom surface 107 of the tub 100, the first temperature measurement unit 200 may be spaced apart from the water storage space 110, the first temperature measurement unit being configured to measure the temperature of dry air, the second temperature measurement unit 300 may be provided in the water storage space 110, at least a part of the second temperature measurement unit being exposed to the air above the water surface W to measure the temperature of wet air during the drying cycle, and the shortest distance D2 between the second temperature measurement unit 300 and the drum 30 may be less than the shortest distance D1 between the first temperature measurement unit 200 and the drum 30.

[0229] In addition, a laundry treating apparatus 1 according to an embodiment of the present disclosure may include a cabinet 10, a tub 100 provided in the cabinet 10, the tub having a water storage space 110 configured to receive water formed on a bottom surface 107, a drum

30 rotatably provided in the tub 100, the drum being configured to receive laundry, a heating unit 90 provided in the tub 100, the heating unit being configured to heat air in the tub 100 during a drying cycle for drying the laundry, a first temperature measurement unit 200 and a second temperature measurement unit 300 provided in the tub 100, each of the first temperature measurement unit and the second temperature measurement unit being configured to measure the temperature of the air in the tub 100 during the drying cycle, a drainage unit 60 provided in the cabinet 10, the drainage unit being in communication with the water storage space 110, the drainage unit being configured to discharge water in the water storage space 110, and a controller 400 configured to control the heating unit 90 to perform the drying cycle and to control the drainage unit 60 to adjust the water level H3 of the water storage space 110, wherein the first temperature measurement unit 200 may be spaced apart from the water storage space 110, the first temperature measurement unit being configured to measure the temperature of dry air, the second temperature measurement unit 300 may be provided in the water storage space 110, the second temperature measurement unit 300 being configured to measure the temperature of wet air, and the controller 400 may control the drainage unit 60 during the drying cycle to adjust the water level H3 of the water storage space 110 such that a protruding end 305 of the second temperature measurement unit 300, the temperature of which is measured, is exposed to the air above the water surface W.

[0230] While the present disclosure has been shown and described with reference to specific embodiments, it will be apparent to those ordinary skilled in the art that various improvements and changes may be made to the present disclosure without departing from the technical ideas of the present disclosure as provided by the following claims.

Claims

1. A laundry treating apparatus comprising:

a cabinet;
a tub provided in the cabinet;
a drum rotatably provided in the tub, the drum being configured to receive laundry; and
a first temperature measurement unit and a second temperature measurement unit provided in the tub, each of the first temperature measurement unit and the second temperature measurement unit being configured to measure a temperature of air in the tub during a drying cycle for drying the laundry, wherein
the tub has a water storage space configured to receive water formed on a bottom surface,
the first temperature measurement unit is spaced apart from the water storage space, the

- first temperature measurement unit being configured to measure a temperature of dry air, the second temperature measurement unit is provided in the water storage space, the second temperature measurement unit having a protruding end protruding from the bottom surface of the tub toward the drum, a temperature of the protruding end being measured, the protruding end being exposed to air during the drying cycle.
2. The laundry treating apparatus of claim 1, further comprising a controller provided in the cabinet, the controller being configured to derive a humidity value in the tub from measurement values of the first temperature measurement unit and the second temperature measurement unit.
 3. The laundry treating apparatus of claim 2, further comprising:
 - a drainage unit provided in communication with the water storage space, the drainage unit being configured to discharge water in the water storage space to an outside of the tub, wherein the controller controls the drainage unit such that a water level of the water storage space is lower than the protruding end of the second temperature measurement unit during the drying cycle.
 4. The laundry treating apparatus of claim 1, further comprising:
 - a cooling unit provided in the cabinet, the cooling unit being configured to cool at least a part of the tub during the drying cycle, wherein condensate generated at the at least a part of the tub cooled by the cooling unit during the drying cycle is collected in the water storage space.
 5. The laundry treating apparatus of claim 4, wherein
 - the cooling unit supplies coolant into the tub to cool the at least a part of the tub, and the condensate and the coolant are received together in the water storage space.
 6. The laundry treating apparatus of claim 5, further comprising:
 - a cooling valve provided in the cabinet, the cooling valve being configured to control a flow of coolant provided to the cooling unit;
 - a drainage unit provided in communication with the water storage space, the drainage unit being configured to discharge water in the water storage space to an outside of the tub; and
 - a controller configured to control the cooling valve or the drainage unit such that a water level
- of the water storage space is lower than the protruding end of the second temperature measurement unit during the drying cycle.
7. The laundry treating apparatus of claim 6, wherein the controller derives an amount of condensate generated in the tub from an amount of coolant provided to the tub from the cooling unit and derives the water level of the water storage space from a total amount of the coolant and the condensate.
 8. The laundry treating apparatus of claim 1, wherein the tub comprises:
 - a front surface having a tub opening configured to allow an inside and an outside of the tub to communicate with each other therethrough;
 - a rear surface located opposite the front surface; and
 - a tub circumferential surface connecting the front surface and the rear surface to each other between the front surface and the rear surface, the tub circumferential surface comprising the bottom surface, and
 - the bottom surface of the tub corresponds to a lowermost surface of the tub circumferential surface.
 9. The laundry treating apparatus of claim 8, wherein
 - a part of the tub circumferential surface of the tub is depressed downward to form the bottom surface and the water storage space, the tub circumferential surface comprises a water storage circumferential surface defining the water storage space, and
 - the second temperature measurement unit is located spaced apart from the water storage circumferential surface.
 10. The laundry treating apparatus of claim 1, wherein the tub comprises a drainage hole located in the water storage space, the drainage hole being configured to discharge water.
 11. The laundry treating apparatus of claim 10, wherein the second temperature measurement unit is located adjacent to the drainage hole.
 12. The laundry treating apparatus of claim 10, wherein
 - the tub comprises: a front portion comprising a front surface and a part of a tub circumferential surface; and a rear portion comprising a rear surface and a remaining part of the tub circumferential surface,
 - a coupling line where the front portion and the rear portion are coupled to each other is formed,

and
the second temperature measurement unit is located between the drainage hole and the coupling line.

13. The laundry treating apparatus of claim 1, wherein

the first temperature measurement unit comprises a protruding end facing the drum, a temperature of the protruding end being measured, and a distance between the protruding end of the second temperature measurement unit and the drum is less than a distance between the protruding end of the first temperature measurement unit and the drum.

14. The laundry treating apparatus of claim 13, further comprising:

a cooling unit provided in the cabinet, the cooling unit being configured to supply coolant into the tub to cool at least a part of the tub during the drying cycle, wherein
in the at least a part of the tub cooled by the coolant during the drying cycle, moisture in air is condensed to produce condensate, the coolant and the condensate are received in the water storage space, and
a measurement value of the second temperature measurement unit is higher than a measurement value of the first temperature measurement unit before the coolant is supplied into the tub.

15. The laundry treating apparatus of claim 1, wherein the tub comprises:

a front surface having a tub opening configured to allow an inside and an outside of the tub to communicate with each other therethrough;
a rear surface located opposite the front surface; and
a tub circumferential surface connecting the front surface and the rear surface to each other between the front surface and the rear surface, the tub circumferential surface comprising the bottom surface, and
the first temperature measurement unit and the second temperature measurement unit are provided at the tub circumferential surface.

16. The laundry treating apparatus of claim 15, wherein

the first temperature measurement unit is provided at an upper part of the tub circumferential surface, and
the second temperature measurement unit is provided at the bottom surface located at a lower

part of the tub circumferential surface.

17. The laundry treating apparatus of claim 16, wherein

the heating unit is provided at an upper end of the tub circumferential surface, and
the first temperature measurement unit is located spaced apart from the heating unit.

18. The laundry treating apparatus of claim 17, wherein the first temperature measurement unit is located between a horizontal center line passing through a center of the tub and the heating unit.

19. The laundry treating apparatus of claim 1, wherein

the heating unit provides an electromagnetic field into the tub, and
the drum is heated by induced current generated by the electromagnetic field, whereby air in the tub is heated.

20. A laundry treating apparatus comprising:

a cabinet;
a tub provided in the cabinet;
a drum rotatably provided in the tub, the drum being configured to receive laundry; and
a first temperature measurement unit and a second temperature measurement unit provided in the tub, each of the first temperature measurement unit and the second temperature measurement unit being configured to measure a temperature of air in the tub during a drying cycle for drying the laundry, wherein
a water storage space configured to receive water is formed on a bottom surface of the tub, the first temperature measurement unit is spaced apart from the water storage space, the first temperature measurement unit being configured to measure the temperature of dry air, the second temperature measurement unit is provided in the water storage space, at least a part of the second temperature measurement unit being exposed to above a water surface to measure the temperature of wet air during the drying cycle, and
a shortest distance between the second temperature measurement unit and the drum is less than a shortest distance between the first temperature measurement unit and the drum.

21. A laundry treating apparatus comprising:

a cabinet;
a tub provided in the cabinet, the tub having a water storage space configured to receive water formed on a bottom surface;

a drum rotatably provided in the tub, the drum being configured to receive laundry;
a heating unit provided in the tub, the heating unit being configured to heat air in the tub during a drying cycle for drying the laundry; 5
a first temperature measurement unit and a second temperature measurement unit provided in the tub, each of the first temperature measurement unit and the second temperature measurement unit being configured to measure a temperature of the air in the tub during the drying cycle; 10
a drainage unit provided in the cabinet, the drainage unit being in communication with the water storage space, the drainage unit being configured to discharge water in the water storage space; and 15
a controller configured to control the heating unit to perform the drying cycle and to control the drainage unit to adjust a water level of the water storage space, wherein 20
the first temperature measurement unit is spaced apart from the water storage space, the first temperature measurement unit being configured to measure the temperature of dry air, 25
the second temperature measurement unit is provided in the water storage space, the second temperature measurement unit being configured to measure the temperature of wet air, and 30
the controller controls the drainage unit during the drying cycle to adjust the water level of the water storage space such that a protruding end of the second temperature measurement unit, the temperature of which is measured, is exposed to air above a water surface. 35

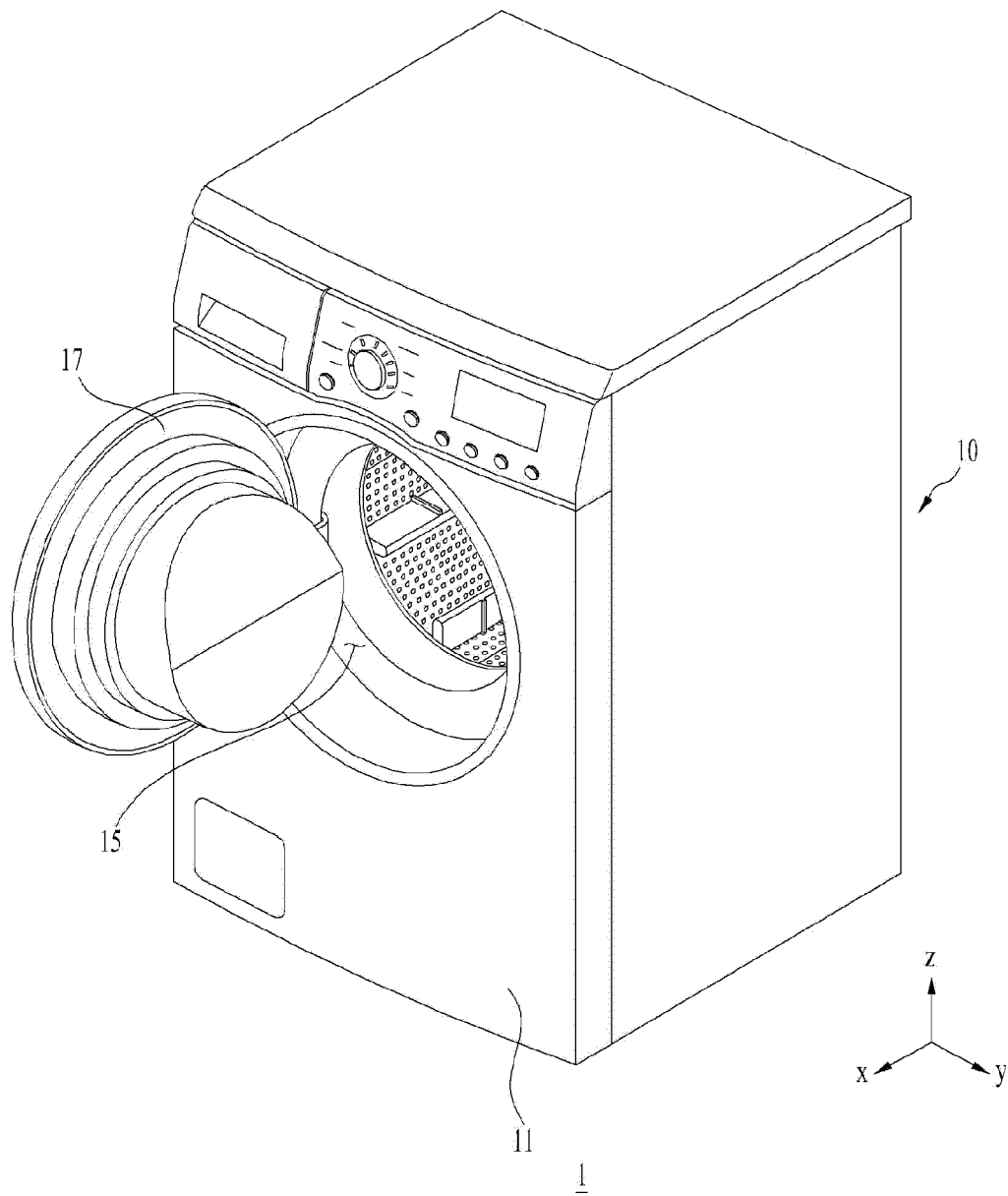
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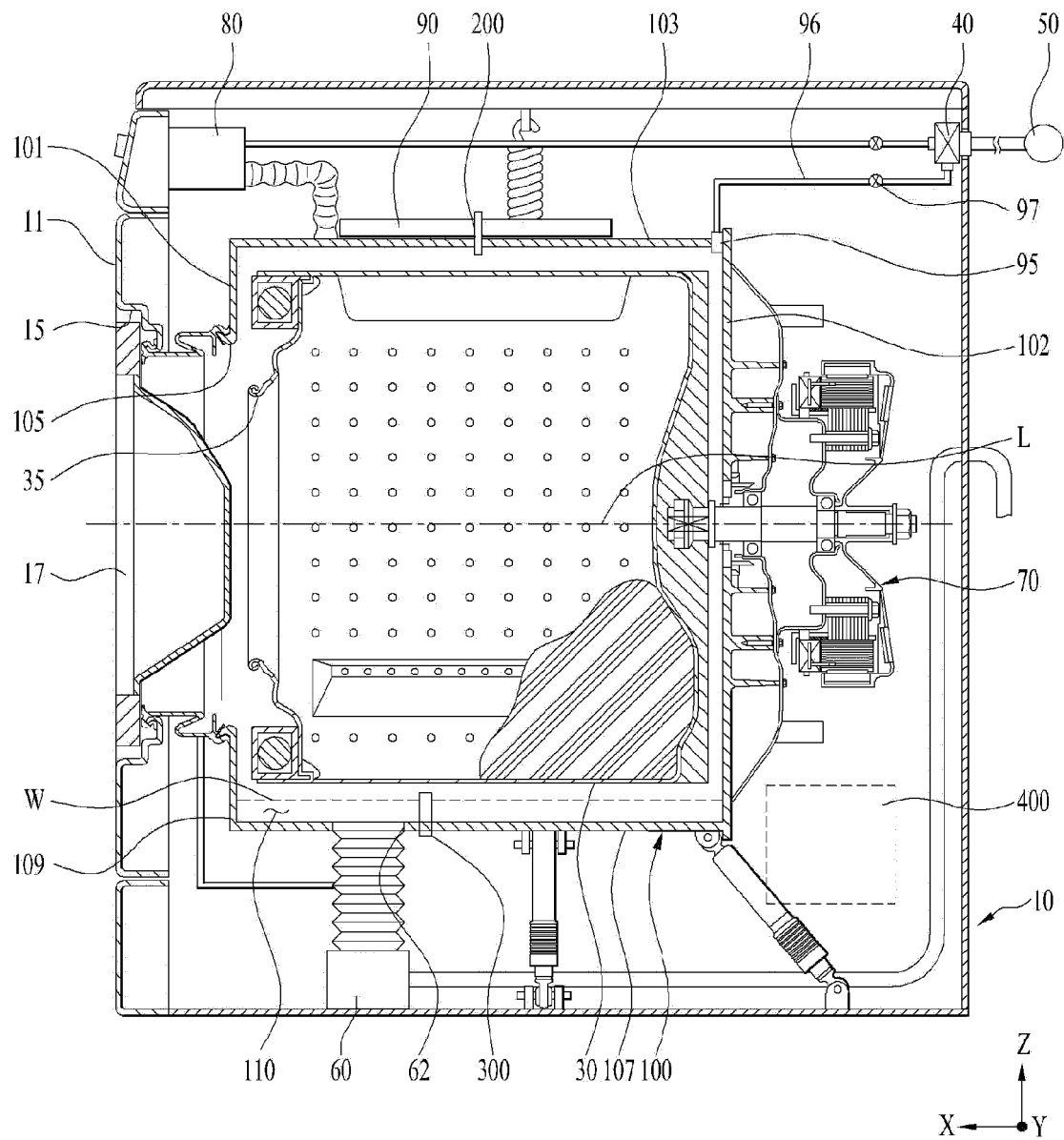
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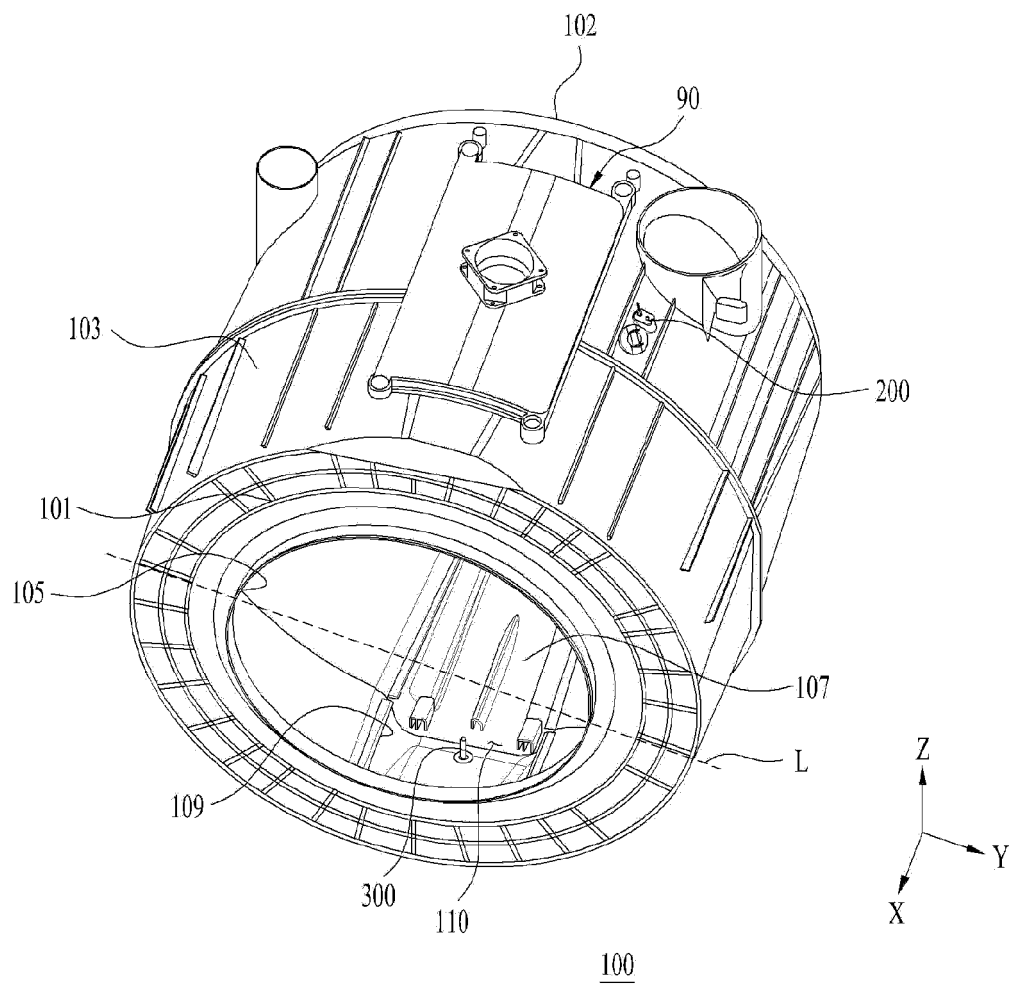
【FIG. 1】



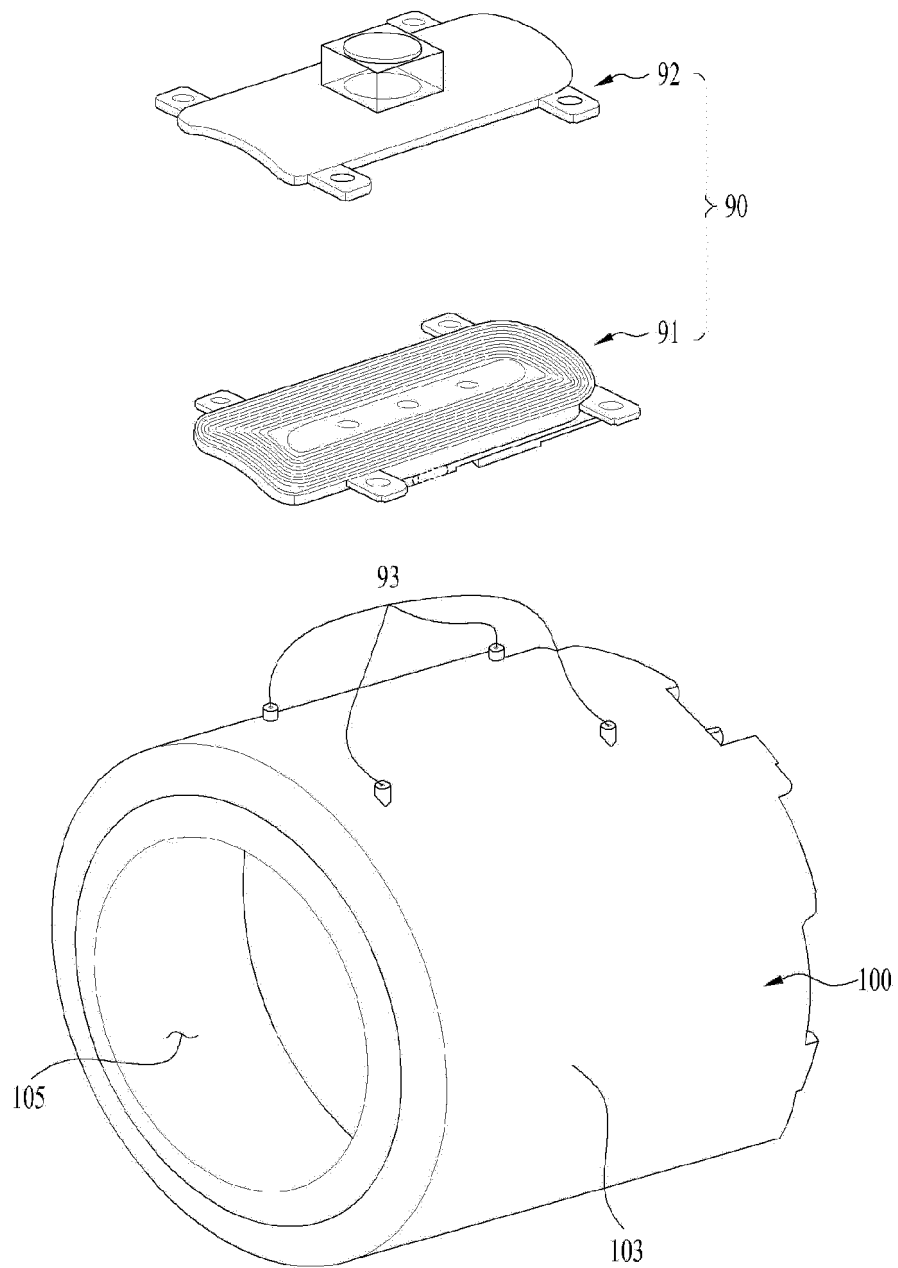
【FIG.2】



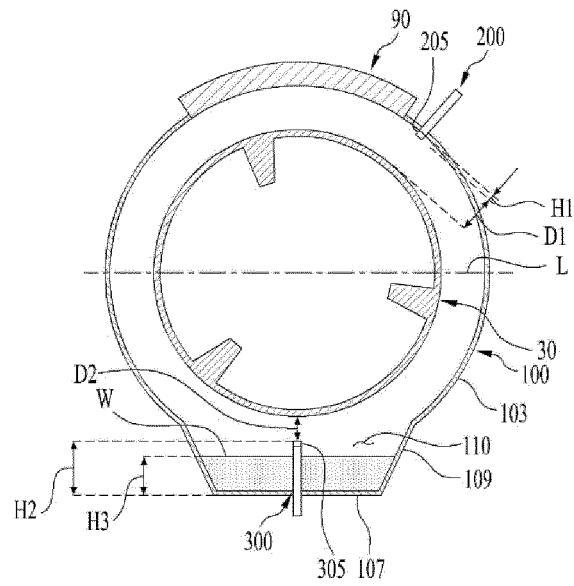
【FIG. 3】



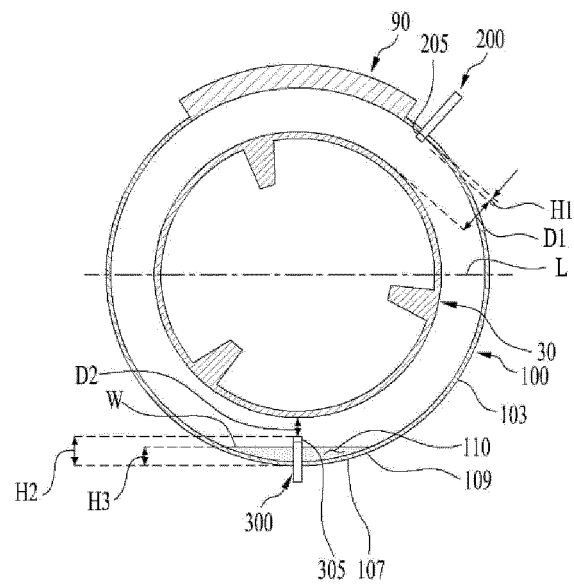
【FIG. 4】



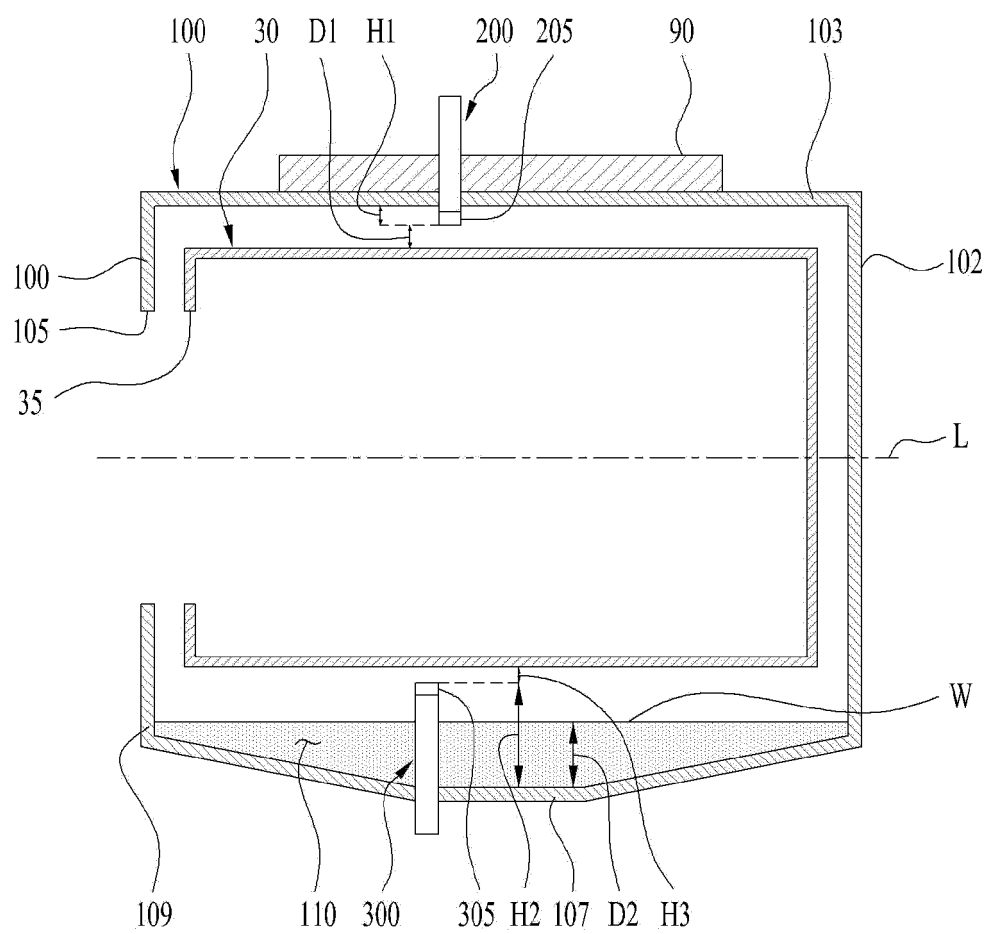
【FIG. 5】



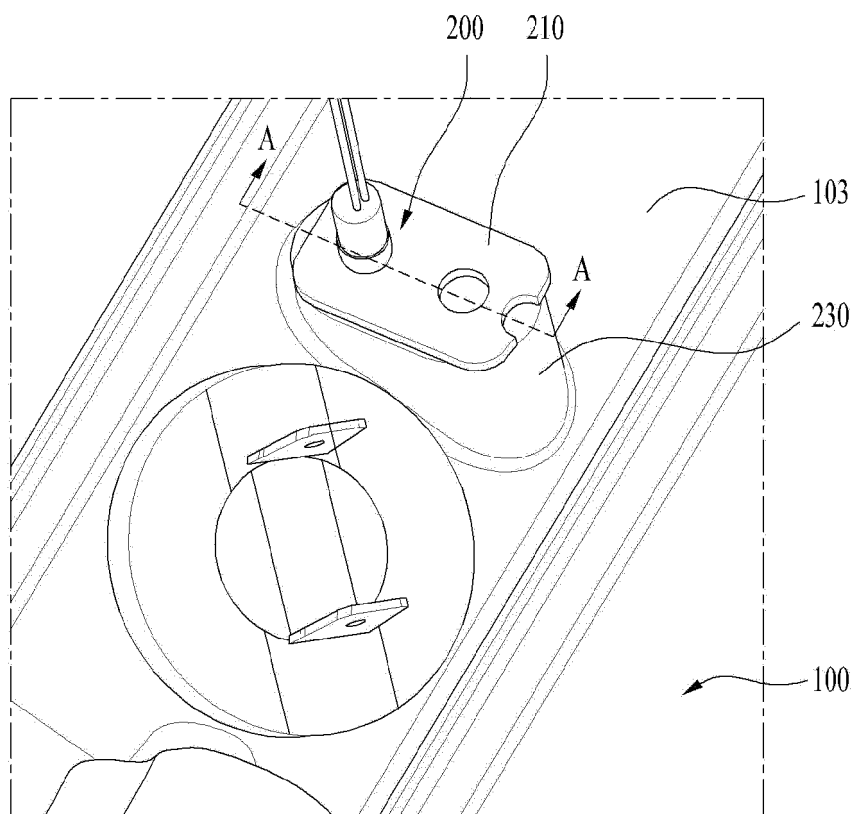
【FIG. 6】



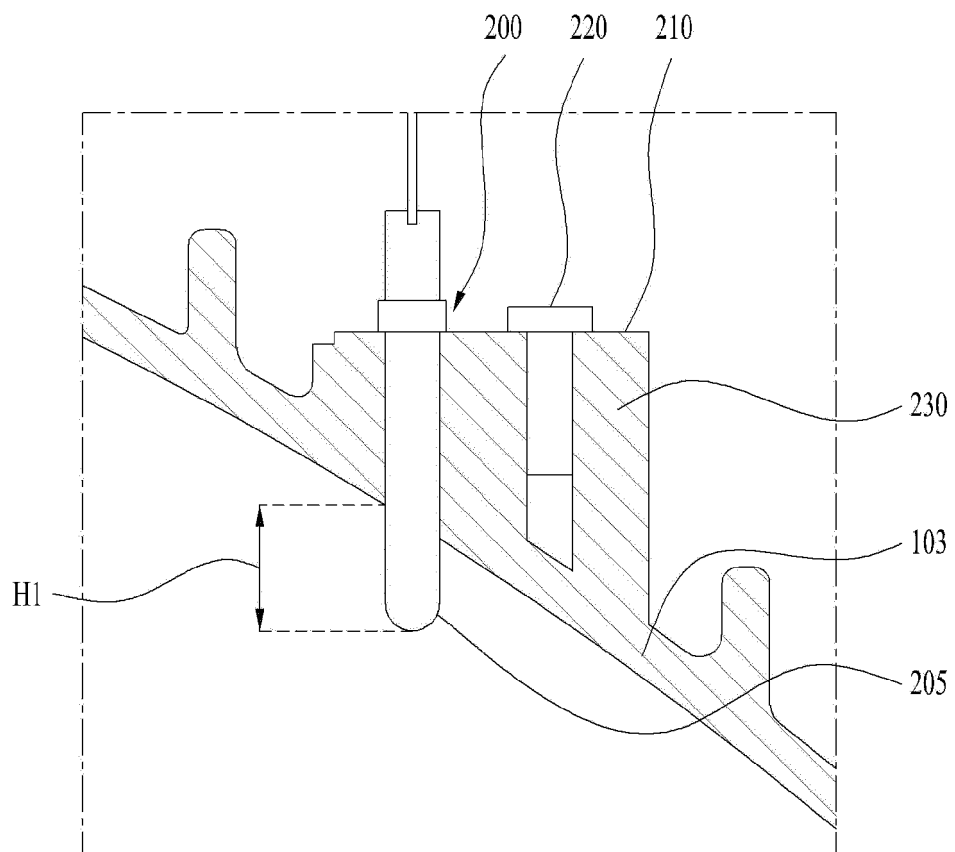
【FIG. 7】



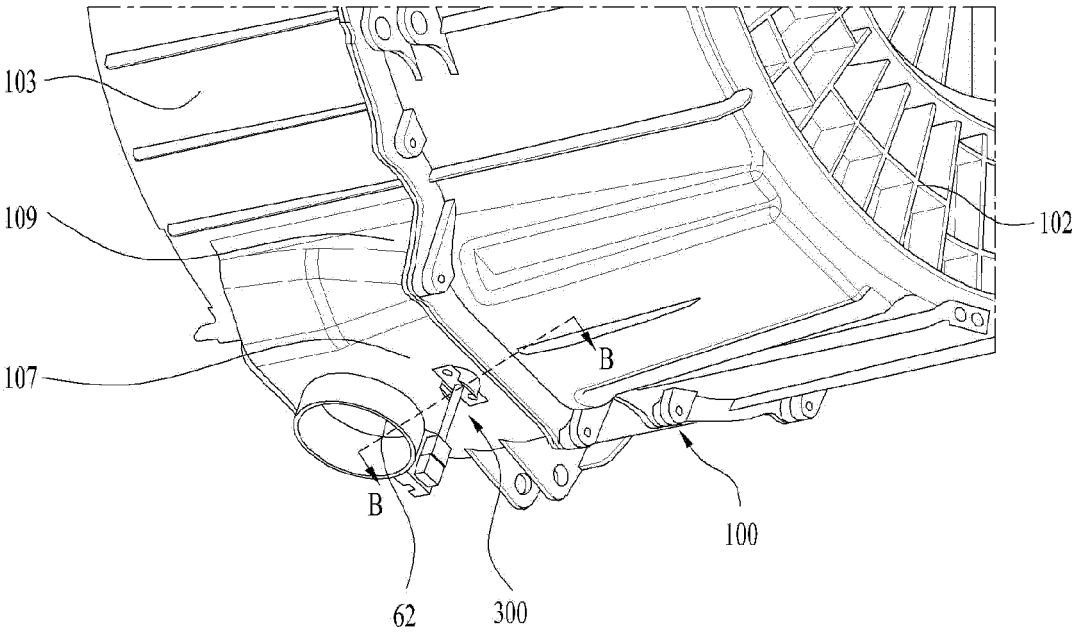
【FIG. 8】



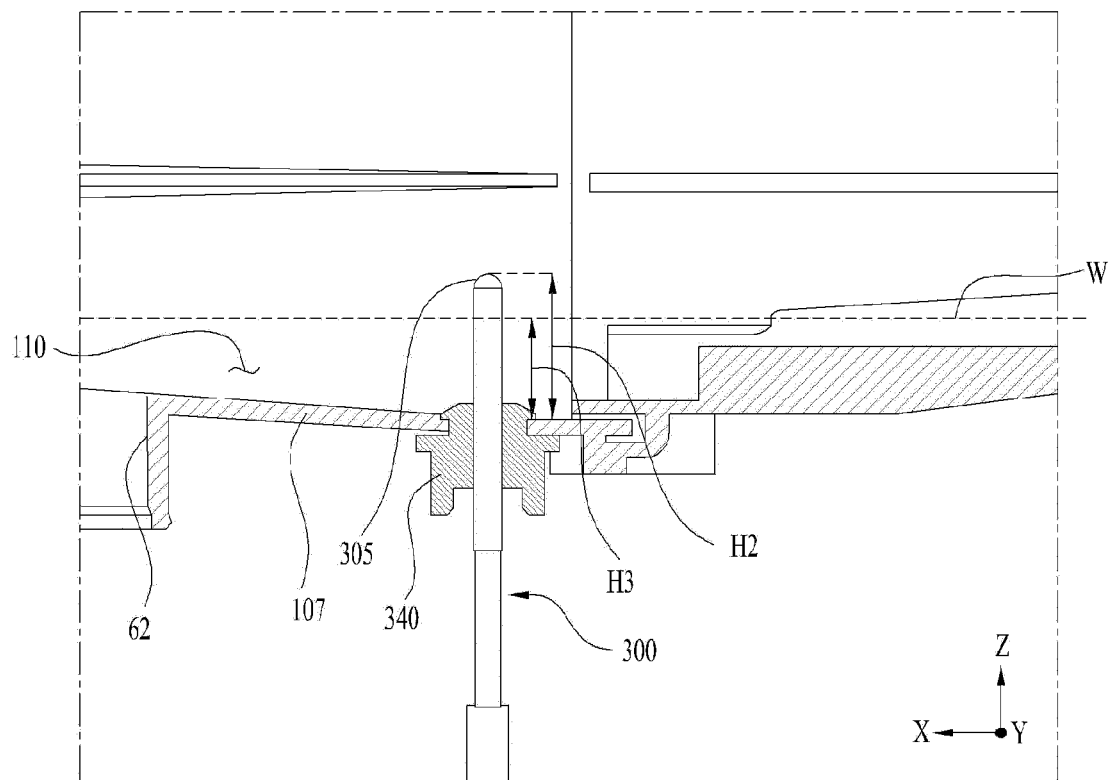
【FIG. 9】



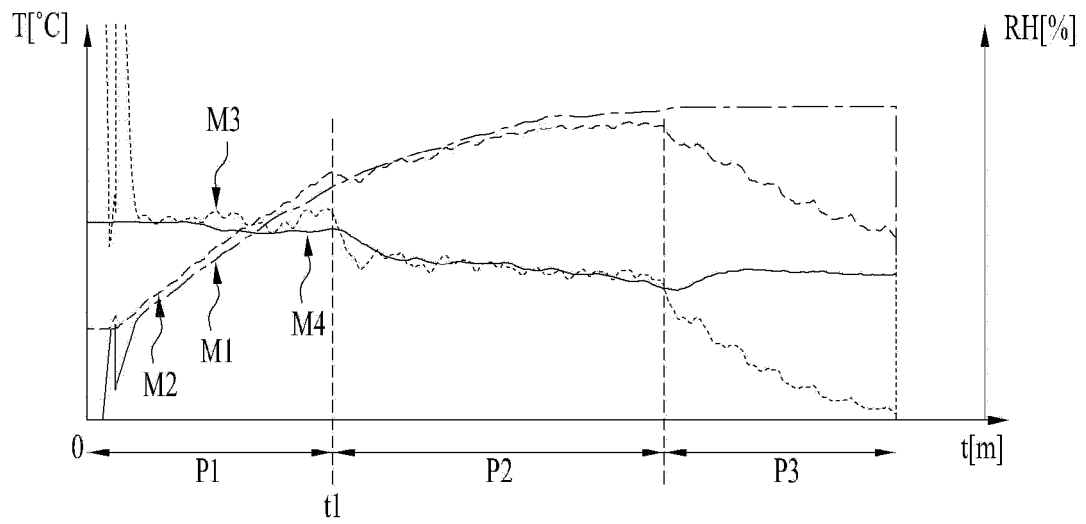
【FIG. 10】



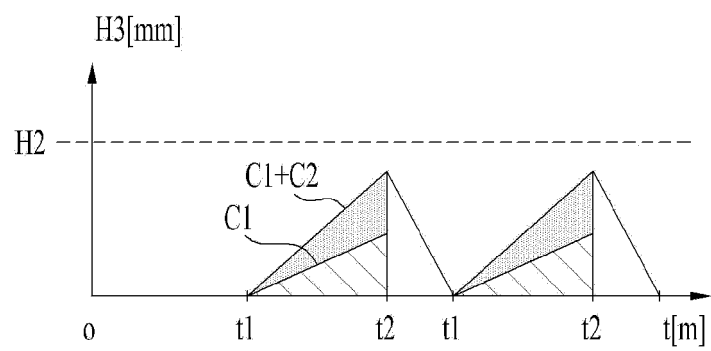
【FIG. 11】



【FIG. 12】



【FIG. 13】



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2022/016463

A. CLASSIFICATION OF SUBJECT MATTER D06F 34/26(2020.01)i According to International Patent Classification (IPC) or to both national classification and IPC																		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) D06F 34/26(2020.01); D06F 25/00(2006.01); D06F 39/04(2006.01); D06F 58/02(2006.01); D06F 58/20(2006.01); D06F 58/24(2006.01); D06F 58/28(2006.01); D06F 58/30(2020.01) Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Korean utility models and applications for utility models: IPC as above Japanese utility models and applications for utility models: IPC as above Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS (KIPO internal) & keywords: 건조기(dryer), 의류(clothes), 센서(sensor), 온도(temperature), 공기(air), 제어(control), 가열(heating)																		
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>EP 2032757 B1 (BSH HAUSGERÄTE GMBH) 20 July 2016 (2016-07-20) See paragraphs [0024]-[0026], [0028]-[0029] and [0031] and figure 1.</td> <td>1-2,4-5,8-20</td> </tr> <tr> <td>Y</td> <td></td> <td>3,6-7,21</td> </tr> <tr> <td>Y</td> <td>KR 10-2019-0121656 A (LG ELECTRONICS INC.) 28 October 2019 (2019-10-28) See paragraph [0104] and figure 4(a).</td> <td>3,6-7,21</td> </tr> <tr> <td>A</td> <td>CN 113265861 A (QINGDAO HAIER WASHING MACHINE CO., LTD. et al.) 17 August 2021 (2021-08-17) See paragraphs [0054]-[0056] and figure 2.</td> <td>1-21</td> </tr> <tr> <td>A</td> <td>JP 2011-067233 A (PANASONIC CORP.) 07 April 2011 (2011-04-07) See paragraph [0027] and figure 2.</td> <td>1-21</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	EP 2032757 B1 (BSH HAUSGERÄTE GMBH) 20 July 2016 (2016-07-20) See paragraphs [0024]-[0026], [0028]-[0029] and [0031] and figure 1.	1-2,4-5,8-20	Y		3,6-7,21	Y	KR 10-2019-0121656 A (LG ELECTRONICS INC.) 28 October 2019 (2019-10-28) See paragraph [0104] and figure 4(a).	3,6-7,21	A	CN 113265861 A (QINGDAO HAIER WASHING MACHINE CO., LTD. et al.) 17 August 2021 (2021-08-17) See paragraphs [0054]-[0056] and figure 2.	1-21	A	JP 2011-067233 A (PANASONIC CORP.) 07 April 2011 (2011-04-07) See paragraph [0027] and figure 2.	1-21
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A	JP 2011-067233 A (PANASONIC CORP.) 07 April 2011 (2011-04-07) See paragraph [0027] and figure 2.	1-21																
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Date of the actual completion of the international search 13 February 2023	Date of mailing of the international search report 14 February 2023																	
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208 Facsimile No. +82-42-481-8578	Authorized officer Telephone No.																	

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2022/016463

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Information on patent family members

International application No.

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REFERENCES CITED IN THE DESCRIPTION

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