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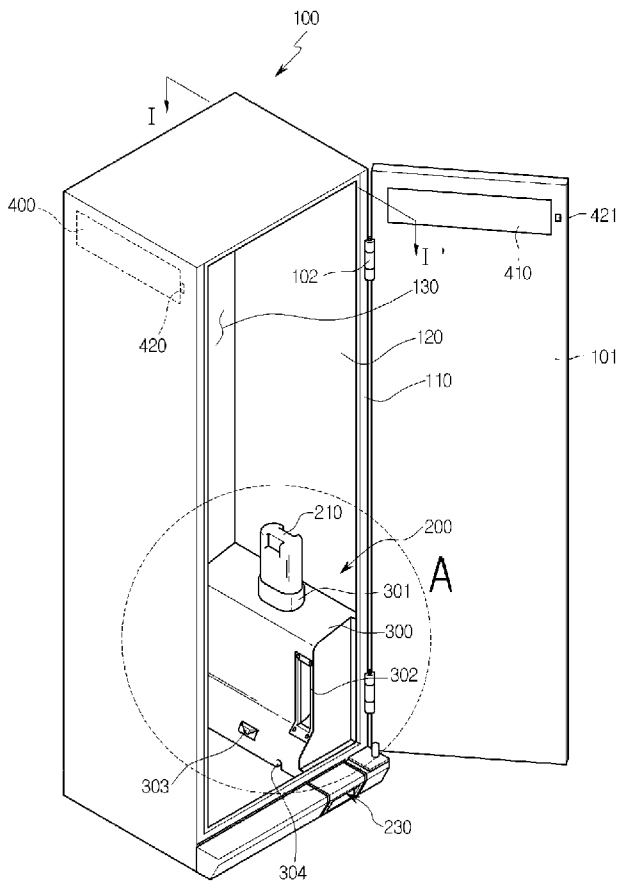
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(54) Title: CLOTHES REFRESHING APPARATUS AND METHOD FOR CONTROLLING THE SAME



(57) Abstract: A clothes refreshing apparatus is provided. The clothes refreshing apparatus includes a case; a door selectively opening or closing the case; a clothes receiving compartment formed in the case and receiving clothes; a steam generator supplying steam to the clothes in the clothes receiving compartment; and a heater heating an upper space of the case to prevent steam from being condensed, the steam being supplied into the case.

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Description

CLOTHES REFRESHING APPARATUS AND METHOD FOR CONTROLLING THE SAME

Technical Field

[1] The present invention relates to a clothes refreshing apparatus.

Background Art

[2] A clothes refreshing apparatus is an electric appliance that stores clothes therein and has a refreshing function for removing smells or wrinkles on the clothes.

[3] Specifically, the clothes refreshing apparatus eliminates wrinkles and/or smells on the clothes stored therein by using steam and hot air. Since odor particles and wrinkles, which make the clothes dirty, are removed by using the refreshing function, the clothes in the clothes refreshing apparatus may look as if they are freshly ironed.

[4] Additionally, the clothes refreshing apparatus may use a condensing method or a discharging method according to the refreshing function. Specifically, the condensing method circulates steam inside the clothes refreshing apparatus to refresh the clothes. The discharging method refreshes the clothes by using steam and then discharges the steam.

[5] The clothes refreshing apparatus includes an inner case for forming a clothes receiving compartment, and a steam generator for generating steam. The steam generator includes a heater. An additional water supplying line or a water tank is connected to the steam generator for supplying water. The supplied water is heated by the heater and then is changed into steam. The steam is supplied into the clothes receiving compartment to remove smell particles or wrinkles of the clothes therein.

Disclosure of Invention

Technical Problem

[6] Accordingly, the present invention is directed to a clothes refreshing apparatus and a method for controlling the same that substantially obviate one or more problems due to limitations and disadvantages of the related art.

[7] An object of the present invention is to provide a clothes refreshing apparatus preventing steam from being condensed during a clothes refreshing process and a method for controlling the same.

[8] Another object of the present invention is to provide a clothes refreshing apparatus including a slim external appearance.

[9] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from

practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

Technical Solution

[10] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, there is provided a clothes refreshing apparatus including: a case; a door selectively opening or closing the case; a clothes receiving compartment formed in the case and receiving clothes; a steam generator supplying steam to the clothes in the clothes receiving compartment; and a heater heating an upper space of the case to prevent steam from being condensed, the steam being supplied into the case.

[11] In another aspect of the present invention, there is provided a clothes refreshing apparatus including: a main body formed of an external case and an inner case, and having a clothes receiving compartment in the body; a door installed on a front of the main body to be rotatable; a heater installed on an inner side of the main body to prevent steam from being condensed; and a refreshing unit supplying steam or hot air into the clothes receiving compartment.

[12] In further another aspect of the present invention, there is provided a method of controlling a clothes refreshing apparatus, the method including: turning on a heater to prevent steam from being condensed in a clothes receiving compartment, the steam being supplied during a clothes refreshing process; detecting temperature around a heater installed portion by using a temperature sensor; and turning on or off the heater according to the detected temperature.

Advantageous Effects

[13] According to a clothes refreshing apparatus and a method for controlling the same, a condensed water can be prevented, which is formed on the inner circumference of a clothes receiving space or the inner circumference of a door in the clothes refreshing apparatus during a clothes refreshing process.

[14] Additionally, since condensed water does not occur in a clothes receiving space, dry efficiency for clothes improves and a major cause for bacterial propagation can be removed.

[15] Moreover, since a plate-type heater is provided in the clothes refreshing apparatus, a clothes receiving space expands and the external appearance of the clothes refreshing apparatus becomes slim.

[16] Additionally, according to a clothes refreshing apparatus and a method for controlling the same, since turning on or off of a plate-type heater is performed at an appropriate point, durability of the heater improves and power consumption reduces.

[17] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

Brief Description of the Drawings

[18] FIG. 1 is a frontal perspective view of a clothes refreshing apparatus according to the present invention;

[19] FIG. 2 is a cutaway perspective view of a rear structure of a clothes refreshing apparatus according to the present invention;

[20] FIG. 3 is a partial sectional view taken along line I-I of FIG. 1;

[21] FIG. 4 is a partial perspective view of when a refreshing unit is mounted on a clothes refreshing apparatus according to the present invention;

[22] FIG. 5 is an exploded perspective view of a refreshing unit;

[23] FIG. 6 is a block diagram of flows of water and steam in a refreshing unit according to the present invention;

[24] FIG. 7 is a sectional view of a plate-type heater installation according to a first embodiment of the present invention;

[25] FIG. 8 is a sectional view of a plate-type heater installation according to a second embodiment of the present invention;

[26] FIG. 9 is a flowchart illustrating a refreshing process in a clothes refreshing apparatus according to the present invention;

[27] FIG. 10 is a graph illustrating temperature T in a clothes receiving compartment according to time t during a refreshing process;

[28] FIG. 11 is a flowchart illustrating a process controlling a plate-type heater during a steam supplying process;

[29] FIG. 12 is a flowchart illustrating a process controlling a plate-type heater according to the present invention; and

[30] FIG. 13 is a flowchart illustrating a process controlling a plate-type heater according to the present invention.

Mode for the Invention

[31] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[32] A specific embodiment of the present invention will be described based on a condensing type, but the present invention is not limited to a condensing type and may be applied to a discharging type.

[33] FIG. 1 is a frontal perspective view of a clothes refreshing apparatus according to the

present invention.

[34] Referring to FIG. 1, a clothes refreshing apparatus 100 includes a main body providing a clothes receiving compartment therein, a door 101 mounted on the front of the main body for rotation, and a refreshing unit 200 disposed on one side of the main body to provide steam and hot air. Specifically, the main body includes an external case 110 forming an external appearance and an internal case 120 disposed inside the external case 110. The external case 110 and the internal case 120 are combined, being spaced a predetermined interval apart from each other. A heat insulator may be inserted in the space between the external case 110 and the internal case 120 to minimize heat exchange between the clothes receiving compartment 130 and the outside. Hereinafter, a structure with an insulator will be described. A shelf for stacking clothes or a hanger for hanging clothes may be provided into the clothes receiving compartment 130.

[35] On the other hand, the refreshing unit 200 in the clothes refreshing apparatus 100 is disposed on the side bottom of the main body. Specifically, a portion of the side of the inner case 120 is recessed toward the clothes receiving compartment 130, and thus a mechanical room 300 is formed being spaced apart from the external case 110. The refreshing unit 200 is received in the mechanical room 300. The water tank 210 is disposed on the side of the inner case 120 forming the mechanical room 300. A discharge port 302 for discharging dry air, a steam discharge port 303 for discharging steam, and a drain hole 304 for draining a condensed water falling down to the bottom of the clothes receiving compartment 130 are disposed on the side of the inner case 120 forming the mechanical room 300. The water tank 210 is inserted into a support sleeve 301 that protrudes in a cylindrical shape from the inner case 120. A drain tank 230 is provided on the bottom of the mechanical room 300 to collect the condensed water. The front of the drain tank 230 can be seen on the front bottom of the clothes refreshing apparatus 100. Accordingly, a user can withdraw the drain tank toward the front.

[36] Additionally, the door 101 is attached to one side edge of the main body to be rotatable by using a hinge 102.

[37] Specifically, heaters such as preferably plate-type heaters 400 and 410 are mounted on the side of the inner case 120 and the inner surface of the door 101. Temperature sensors 420 and 421 are mounted around the plate-type heaters 400 and 410. An upper space of the inner case 120 with the heater is a place where a portion of supplied steam is easily condensed. The heater is installed to remove the condensation phenomenon. More specifically, the temperature sensors 420 and 421 sense temperature around a place with the heater, and controls of turning on or off the heater. Description related to this will be made in more detail with reference to the drawings.

[38] Additionally, a condensing unit 122 of FIG. 2 is provided at the rear of the main body. The condensing unit 122 condenses flowing steam supplied into the clothes receiving compartment 130. Description for this will be described with reference to the drawings.

[39] FIG. 2 is a cutaway perspective view of a rear structure of a clothes refreshing apparatus according to the present invention. FIG. 3 is a partial sectional view taken along line I-I of FIG. 1.

[40] Referring to FIGS. 2 and 3, a structure for condensing steam is provided at the rear of the main body in the clothes refreshing apparatus 100. Specifically, a condensing unit 122, where steam and air are falling, is formed between the rear of the external case 110 and the rear of the internal case 120. A steam discharge port 123 is formed at an upper rear of the inner case 120 to discharge steam supplied to the clothes receiving compartment.

[41] More specifically, the upper rear of the inner case 120 having the steam discharge port 123 is slanted toward the bottom with a predetermined angle such that the discharged steam smoothly flows into the condensing unit 122.

[42] Here, the steam is in a vapor state and easily ascends toward the top. Therefore, the steam discharge port 123 may be formed on the top of the clothes refreshing apparatus 100.

[43] On the other hand, a partition wall 125 is horizontally formed on the top of the inner case 120, and prevents the steam discharged into the steam discharge port 123 from flowing toward the front of the main body.

[44] Moreover, a guide rib 126 is formed long from the both ends of the partition wall 125 to the rear of the inner case 120. Specifically, the guide rib 126 guides the steam discharged into the steam discharge port 123 to smoothly fall toward the bottom of the condensing unit 122. The top of the partition wall 125 and the guide rib 126 closely contacts with the external case 110, thereby preventing the steam from being leaked into the outside.

[45] Additionally, the condensing unit 122 is space where the steam discharged through the steam discharge port 123 falls and is condensed.

[46] The steam flowing into the condensing unit 122 through the steam discharge unit 123 falls from the top to the bottom of the condensing unit 122 and is condensed. Since the steam is in a high temperature of a vapor state, the steam exchanges heat between external air and the steam by using heat conductivity through the external case 110. To improve heat conductivity efficiency, a plurality of condensation pins 111 are arranged in the inner circumference of the external case 110. The condensation pins 111 may be formed, when a corresponding portion of the external case 110 is recessed toward the inside, or the outer circumference of the external case 110 is flat and its inner cir-

cumference protrudes through a forming process. The size of heat exchange area increase due to the condensation pins 111 and also a condensation path lengthens.

[47] That is, the condensation pins 111 are formed slanted toward the bottom, and arranged alternately on the left and right of the external case 110. Since a path through which the steam descends has a zigzag shape, a condensation path becomes longer compared to a straight line shape. Since the condensation path becomes longer, a heat exchange occurs longer time.

[48] Additionally, a condensation pin 121 identical to the condensation pin 111 of the external case 110 is formed on the inner case 120 such that the flow of the discharged steam can be guided.

[49] On the other hand, the condensing unit 122 has a shape in which the steam is concentrated to one point in the bottom due to the guide rib 126.

[50] Specifically, the bottom of the guide rib 126 is formed curved toward the edge of one side of the internal case 120. Two guide ribs 126 extends from the both ends of the partition wall 125 toward the bottom and meets each other at the edge of the inner case 120. A condensed water discharge port 251 is formed at the point where the guide ribs 126 meet each other. The condensed water discharge port 251 is connected to the drain tank 230 through a hose. A guide duct 250 is provided around the point where the two guide ribs 126 meet to guide the descending steam toward a drying duct 240 constituting the refreshing unit 200. A suction port 244 of the drying duct 240 is connected to the guide duct 250 such that a portion of the steam flows into the drying duct 240 during a steam supplying process. The suction port 244 is a path where dry air circulates during a drying process. Structures and functions of the drying duct 240 and the guide duct 250 will be described in more detail with reference to drawings.

[51] FIG. 4 is a partial perspective view of when a refreshing unit is mounted on a clothes refreshing apparatus according to the present invention. FIG. 5 is an exploded perspective view of a refreshing unit.

[52] Referring to FIGS. 4 and 5, the refreshing unit 200 of the present invention includes a water tank 210 supplying water for generating steam, a steam generator 220 generating steam with the water from the water tank 210, a drain tank 230 collecting remaining water in the water tank 210 and the steam generator 220 and condensed water generated during a steam supplying process, and a drying duct 240 supplying a high temperature of air during a drying process. The refreshing unit 200 is received in the mechanical room 300.

[53] Specifically, the water tank 210 stores a predetermined amount of water therein and supplies the water to the steam generator 220. The water tank 210 is received in a support sleeve 301 of the case 240 to be removable. Accordingly, when the water stored in the water tank 210 is depleted, the water tank 210 can be easily separated for

re-supplying.

[54] Moreover, the steam generator 220 receives the water from the water tank 210 to generate steam. Specifically, the steam generator 220 includes a heater 221 to changes the water into the steam by using the heat generated from the heater 221. The water is supplied from the water tank 210 to the steam generator 220 through a predetermined supply path, i.e., a hose. Additionally, a water supply port 223 connected to the water tank 210 through the hose, a steam discharge port 222 for discharging the steam, and a drain port 224 for draining the remaining water are formed on one side of the steam generator 220, respectively. Here, the water supply port 223 and the steam discharge port 222 are provided on the top of the steam generator 220. The drain port 224 is provided on the bottom of the steam generator 220.

[55] Additionally, the drain tank 230 is a place where the remaining water in the steam generator 220, condensed water in the condensing unit 122, and the condensed water falling into the bottom of the clothes refreshing compartment 130 are concentrated. The condensed water is collected in the drain tank 230 along the drain path such as a hose connected to each of drain tanks 230.

[56] Specifically, a first connection port 233 connected to the drain port 224 of the steam generator 220, a second connection port 234 connected to a drain hole 304 in the bottom of the clothes refreshing compartment 130, and a third connection port 235 connected to a condensed water discharge port 251 provided to the lower portion of the condensing unit 122 are formed on one side of the drain tank 230, respectively. In other methods, a cluster is separately provided to collect the water drained through the steam generator 220 and the drain hole 304, and the cluster is connected to the drain tank 230 through the hose. An additional connection port that directly connecting the water tank 210 and the drain tank 230 may be further formed on one side of the drain tank 230 or the clusters.

[57] On the other hand, bacterial proliferation occurs when water remains stagnant long period of time in a storage chamber 231 of the drain tank 230. Furthermore, a portion of the polluted water in the drain tank 230 is vaporized and then may be delivered into the clothes in the clothes receiving compartment 130. Accordingly, the drain tank 230 may be emptied after a predetermined time or periodically.

[58] To satisfy these needs, the drain tank 230 may be mounted on the main body bottom of the clothes refreshing apparatus 100 in a drawer type. Then, the drain tank 230 can be easily detached such that the drain tank 230 is easily emptied. A grip groove 232 is formed on the front of the drain tank 230 such that the drain tank 230 can be easily withdrawn.

[59] Additionally, the drying duct 240 heats and circulates air inside the clothes refreshing compartment 130. Specifically, the drying duct 240 includes a fan installation unit 241

for providing a drying fan, a heater installation unit 242 having a drying heater 245, and a discharge unit 243 discharging a high temperature of air. The discharge unit 243 is connected to the discharge port 302 formed on the side of the inner case 120 constituting the mechanical room 300. A suction port 244 is formed on the front of the fan installation unit 241, and the suction port 244 is connected to the guide duct 250.

[60] According to the above structure, when the drying fan and the drying heater 245 in the drying duct 240 operate, air in the clothes refreshing apparatus 130 is discharged through a steam discharge port 123 formed on the top of the inner case 120. The discharged air ascends along the condensing unit 122 and flows into the guide duct 250. The air flowing into the drying duct 240 is suctioned into the drying duct 240 thorough the suction port 244 of the drying duct 240. The suctioned air is heated to a high temperature by using the drying heater 245. Then, an air circulating process is repeated, so that the heated air is discharged into the clothes receiving compartment 130 again through the discharge unit 243 and the discharge port 302.

[61] On the other hand, the water tank 210, the steam generator 220, and the drain tank 230 are sequentially stacked. Due to this stacked structure, space that the mechanical room 300 occupies reduces such that available space in the clothes receiving compartment 130 increases.

[62] Additionally, according to above-stacked structure, the flow of water in the refreshing unit 200 falls naturally by means of gravity. Accordingly, an additional device is not required for generating the flow of water in the refreshing unit 200. Furthermore, the overall size of the refreshing unit 200 is reduced.

[63] FIG. 6 is a block diagram of flows of water and steam in a refreshing unit according to the present invention.

[64] According to an embodiment of the present invention, the remaining water in the water tank 210 is collected into the drain tank 230 through the steam generator 220. This will be described in more detail.

[65] Referring to FIG. 6, the water is supplied from a water supplying source to the water tank 210, and the supplied water is supplied to the steam generator 220. A control valve is mounted between the water tank 210 and the steam generator 220. A water level sensor 225 is installed inside the steam generator 220 such an appropriate amount of water can be supplied to the steam generator 220. Although not illustrated, the control valve may be installed on a path connecting the water supplying source and the water tank 210, and the water level sensor may be mounted inside the water tank 210. Additionally, a temperature sensor 226 is mounted inside the steam generator 220 thereby preventing the steam generator 220 from being overheated when a heater continuously operates without sufficient water. The drain port 224 of the steam generator 220 and the first connection port 223 of the drain tank 230 are connected to each other

through a hose.

[66] According to the above structure, the water stored in the water tank 210 is supplied to the steam generator 220 through the water supply port 223. The supplied water is heated and the steam is generated by an operation of the heater 221 inserted in the steam generator 220. The generated steam is spread out the clothes receiving compartment 130 through the steam discharge ports 222 and 303.

[67] Moreover, once the steam supplying process is completed, the remaining water in the steam generator 220 is discharged through the drain port 224. The drained water is stored in the storage chamber 231 through the first connection port 233 of the drain tank 230.

[68] On the other hand, condensed water is discharged through the condensed water discharge port 251 during a steam supplying process. The condensed water is formed when a portion of the steam falls along the condensing unit 122. The discharged condensed water is collected in the storage chamber 231 through the third connection port 235 of the drain tank 230. Then, a user can withdraw the drain tank 230 for disposal of water.

[69] FIG. 7 is a sectional view of a plate-type heater installation according to a first embodiment of the present invention.

[70] Referring to FIG. 7, the main body of the clothes refreshing apparatus 100 includes an external case 110, an inner case 120 in the external case 110, and a heat insulator disposed between the inner case 120 and the external case 110. The heat insulator 140 can be applied according to products. The plate-type heater 420 can be mounted to be exposed to the inner surface of the inner case 120, i.e., the clothes receiving compartment 130.

[71] Specifically, the plate-type heater 420 may be mounted on the side top of the inner case 120 or on the ceiling of the inner case 120.

[72] More specifically, the plate-type heater 420 is disposed on the inner surface of the inner case 120 and is mounted to be level with the inner surface of the inner case 120. When the plate-type heater 400 is installed, the thickness of the inner case 120 is minimized. Therefore, the slimness of the main body can be achieved.

[73] Moreover, since the plate-type heater 400 is installed on the inner surface of the inner case 120 in the clothes receiving compartment 130, moisture condensation can be directly prevented. Accordingly, the preventing of the moisture condensation can be more easily achieved.

[74] On the other hand, a temperature sensor 420 is mounted on the side of the plate-type heater 400. That is, a predetermined temperature is maintained without overheat in the inner case 120 by detecting the temperature of the inner case 120 through the temperature sensor 420. Then, the temperature sensor 420 may be installed in the inner

case 120, which is similar to the plate-type heater 400.

[75] According to this embodiment, although only the plate-type heater 400 and the temperature sensor 420 in the inner case 120 are described, this can be identically applied to the plate-type heater 140 and the temperature sensor 421 in the rear of the door 101.

[76] FIG. 8 is a sectional view of a plate-type heater installation according to a second embodiment of the present invention.

[77] Referring to FIG. 8, the plate-type heater 401 is recessed and mounted on the rear of the inner case 120.

[78] Specifically, since the plate-type heater 401 is installed on the rear of the inner case 120, the front of the inner case 120 may have a neat appearance. Moreover, moisture penetrates through an interface between the plate-type heater 401 and the inner case 120 such that malfunction of the plate-type heater 401 can be prevented. Since the heat insulator 140 is inserted between the external case 110 and the inner case 120, the heat from the plate-type heater 401 does not leak toward the outside.

[79] FIG. 9 is a flowchart illustrating a refreshing process in a clothes refreshing apparatus according to the present invention.

[80] Referring to FIG. 9, once a clothes refreshing process begins, a preheating process is performed to heat the inside of the clothes receiving compartment to a predetermined temperature in operation S110. This is illustrated in a section A of FIG. 10. Specifically, the preheating process is a preliminary process that heats the clothes receiving compartment 130 to an appropriate temperature before supplying steam, thereby minimizing steam condensation.

[81] When the preheating process is completed and the clothes receiving compartment 130 reaches the predetermined temperature, a steam supplying process is performed in operation 120. This is illustrated in a section B of FIG. 10.

[82] In the steam supplying process, a heating process for heating water that is supplied into the steam generator 220 and a steam injecting process for injecting the generated steam into the clothes receiving compartment 130 are performed continuously. Specifically, the temperature of the clothes receiving compartment 130 rises again during time for heating water to generate steam. When a steam supplying time reaches a predetermined time, the steam supplying process is terminated and then the next process is performed. During the steam supplying process, a portion of the water in the steam generator 220 is converted into steam and then supplied.

[83] On the other hand, once the steam supplying process is performed, a first drying process is performed in operation S130, and this is illustrated in a section C of FIG. 10.

[84] Specifically, the first drying process removes moisture in the clothes and humidity in the clothes receiving compartment 130 during the steam supplying process, thereby

removing smells and wrinkles in the clothes.

[85] Once the first drying process begins, the drying duct 240 operates, and then air heated by the drying heater 245 circulates in the clothes receiving compartment and the condensing unit 122. An inner temperature of the clothes receiving compartment 130 rises due to a high temperature air that is supplied into the clothes receiving compartment 130.

[86] When the first drying process is completed, a steam re-supplying process is performed in operation S140, and this is illustrated in a section D of FIG. 10.

[87] Specifically, the remaining water in the steam supplying process is re-heated and is supplied into the inside of the clothes receiving compartment 130 during the steam re-supplying process in operation S140. During the steam re-supplying process, since the clothes receiving compartment 130 is already heated in a high temperature, an amount of water condensation is less than that of the steam supplying process 120. During the steam re-supplying process, an inner temperature of the clothes receiving compartment 130 falls temporarily and rises again when the water is heated.

[88] During the steam re-supplying process, all the remaining water in the steam generator 220 is converted into steam and then supplied into the clothes receiving compartment 130.

[89] On the other hand, once the steam re-supplying process is completed, a re-drying process is further performed in operation S150, and this is illustrated in a section E of FIG. 10.

[90] In the re-drying process, since an inner temperature of the clothes receiving compartment 130 is heated closed to that of hot air from the drying duct 240, a temperature rise of the clothes receiving compartment 130 is relatively weak.

[91] When the re-drying process is terminated, all the processes for refreshing clothes are completed, and then a draining process is performed. According to a user selection, a user can dump the water in the storage chamber 231 after withdrawing the drain tank 230.

[92] On the other hand, a power is applied to the drying duct 240 during the first drying process and the re-drying process, such that air in the condensing unit 122 flows into the drying duct 240. The flowing air heated by the drying heater 245 of the drying duct 240 is converted into hot air, and then is discharged through the discharge ports 243 and 302. The discharged hot air dries the clothes in the clothes receiving compartment 130.

[93] Additionally, the water supplied to the supply tank 210 is supplied into the steam generator 220 during the steam supplying process and the steam re-supplying process. The supplied water is heated by the heater 221 of the steam generator 220 to generate high temperature steam. The generated steam is supplied into the clothes receiving

compartment 130 through the team discharge ports 222 and 303.

[94] A portion of the steam supplied to the clothes receiving compartment 130 penetrates into the clothes, and the other portion flows into the condensing unit 122 through the steam discharge port 123. The flowing steam passes through the condensing unit 122 and exchanges heat with an external air using the rear of the external case 122 as a heat exchanging layer. During this process, the temperature of the steam rises and then condensation is generated. The generated condensed water falls along the condensation pins 111 and 121 and then is collected in the condensed water discharge port 251. The condensed water in the condensed water discharge port 251 is connected into the drain tank 230.

[95] FIG. 11 is a flowchart illustrating a process controlling a plate-type heater during a steam supplying process.

[96] Referring to FIG. 11, the plate-type heater operates during the steam supplying process, thereby preventing water from being condensed on the top of the inner case 120.

[97] Specifically, once steam is supplied in operation S121, a controller detects a steam supplying time. In operation S122, it is determined that the detected steam supplying time reaches a predetermined time T or not. When the detected steam supplying time reaches a predetermined time T, the plate-type heater is turned on in operation S123. Then, it is determined that the steam supplying process is completed or not in operation 124. When the steam supplying process is finished, the plate-type heater is turned off in operation 125. According to the above controlling method, condensed water of the clothes receiving compartment can be prevented before supplying the steam into the condensing unit 122.

[98] On the other hand, after one or two minutes have passed since the steam is supplied to the clothes receiving compartment 130, the steam can be condensed on the inner surface of the inner case 120. Accordingly, the predetermined time T may be set with one or two minutes.

[99] FIG. 12 is a flowchart illustrating a process controlling a plate-type heater according to the present invention.

[100] The next drying process includes first drying and re-drying processes.

[101] Referring to FIG. 12, once the first drying and re-drying processes begin, the drying fan and the drying heater 245 are turned on in operation S131, and the plate-type heater is simultaneously turned on in operation S132. In operation S133, it is determined that the drying is completed or not. When the drying is completed, the drying fan, the drying heater, and the plate-type heater are all turned off in operation S134.

[102] Since the plate-type heater is simultaneously turned on during the drying process, an inner temperature of the clothes receiving compartment 130 reaches the predetermined

temperature promptly, thereby reducing a drying time for the clothes and the clothes receiving compartment 130.

[103] FIG. 13 is a flowchart illustrating a process controlling a plate-type heater according to the present invention.

[104] Referring to FIG. 13, the plate-type heater is appropriately turned on or off according to a surface temperature of the inner case 120, and also overheat and the heat damage need to be prevented.

[105] Specifically, when the plate-type heaters 400 and 410 are turned on during the drying process or the steam supplying process in operation S200, the temperature around heat installation region is detected by the temperature sensors 420 and 421 mounted on one side of the inner case 120 in operation S210. Here, the temperature around the heater installation region is the temperature of an inner case surface around an area where the plate-type heater is mounted.

[106] More specifically, it is determined that the temperature detected by the temperature sensors 420 and 421 is more than the predetermined temperature T or not in operation S220. When the detected temperature is higher than the predetermined temperature T, the plate-type heater is turned off in operation S230. The temperature sensor continuously detects the temperature around the heater installation region in operation S240, and then it is determined whether the detected temperature is below the predetermined temperature T1 or not in operation S250. When the detected temperature is below the predetermined temperature T1, it is determined that a corresponding course is completed or not in operation S260. When the corresponding course is completed, a process of controlling the plate-type heater is completed. Contrarily, when the corresponding course is still in progress, the turning on of the plate-type hater repeats.

[107] According to the above controlling method, the temperature of the inner case with the plate-type heater is maintained at the predetermined temperature T1, thereby preventing the condensed water from being generated and simultaneously preventing the heater for being overheated.

[108] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Industrial Applicability

[109] According to a clothes refreshing apparatus and a method for controlling the same, a condensed water can be prevented, which is formed on the inner circumference of a clothes receiving space or the inner circumference of a door in the clothes refreshing apparatus during a clothes refreshing process.

Claims

[1] A clothes refreshing apparatus comprising:
a case;
a door selectively opening or closing the case;
a clothes receiving compartment formed in the case and receiving clothes;
a steam generator supplying steam to the clothes in the clothes receiving compartment; and
a heater heating an upper space of the case to prevent steam from being condensed, the steam being supplied into the case.

[2] The clothes refreshing apparatus according to claim 1, wherein the heater is provided to one of the case and the door.

[3] The clothes refreshing apparatus according to claim 1, wherein the heater comprises a plate-type heater recessively installed to be level with one of the case and the door.

[4] The clothes refreshing apparatus according to claim 1, further comprising a temperature sensor installed around the heater and detecting a temperature on a region where the heater is installed.

[5] The clothes refreshing apparatus according to claim 4, wherein the heater is continuously turned on or off according to a temperature value detected by the temperature sensor.

[6] The clothes refreshing apparatus according to claim 1, further comprising at least one of a drying duct, a water tank, and a drain tank, the drying duct supplying hot air into the clothes receiving compartment, the water tank supplying water into the steam generator, the drain tank collecting condensed water generated during a clothes refreshing process and remaining water in the steam generator.

[7] A clothes refreshing apparatus comprising:
a main body formed of an external case and an inner case, and having a clothes receiving compartment in the body;
a door installed on a front of the main body to be rotatable;
a heater installed on an inner side of the main body to prevent steam from being condensed; and
a refreshing unit supplying steam or hot air into the clothes receiving compartment.

[8] The clothes refreshing apparatus according to claim 7, wherein the heater is recessively installed on one of an inner surface and an outer surface of the inner case.

[9] The clothes refreshing apparatus according to claim 8, wherein the heater is a

plate-type and is recessed to be level with the inner case.

[10] The clothes refreshing apparatus according to claim 7, wherein the heater is mounted on one of a side and a ceiling of the inner case.

[11] The clothes refreshing apparatus according to claim 7, further comprising a heater recessively installed on a rear of the door.

[12] The clothes refreshing apparatus according to claim 7, further comprising a temperature sensor disposed on a point adjacent to the heater.

[13] The clothes refreshing apparatus according to claim 7, wherein the heater is installed on an upper space of the main body.

[14] The clothes refreshing apparatus according to claim 7, further comprising a heat insulator interposed between the inner case and the external case.

[15] A method of controlling a clothes refreshing apparatus, the method comprising:
turning on a heater to prevent steam from being condensed in a clothes receiving compartment, the steam being supplied during a clothes refreshing process;
detecting temperature around a heater installed portion by using a temperature sensor; and
turning on or off the heater according to the detected temperature.

[16] The method according to claim 15, wherein the clothes refreshing process comprises:
preheating the clothes receiving compartment to a predetermined temperature;
supplying steam into the clothes receiving compartment; and
drying an inside space of the clothes receiving compartment and the clothes therein,
wherein a condensation preventing process through the turning on or off of the heater is performed in at least one of the preheating process, the steam supplying process, and the drying process.

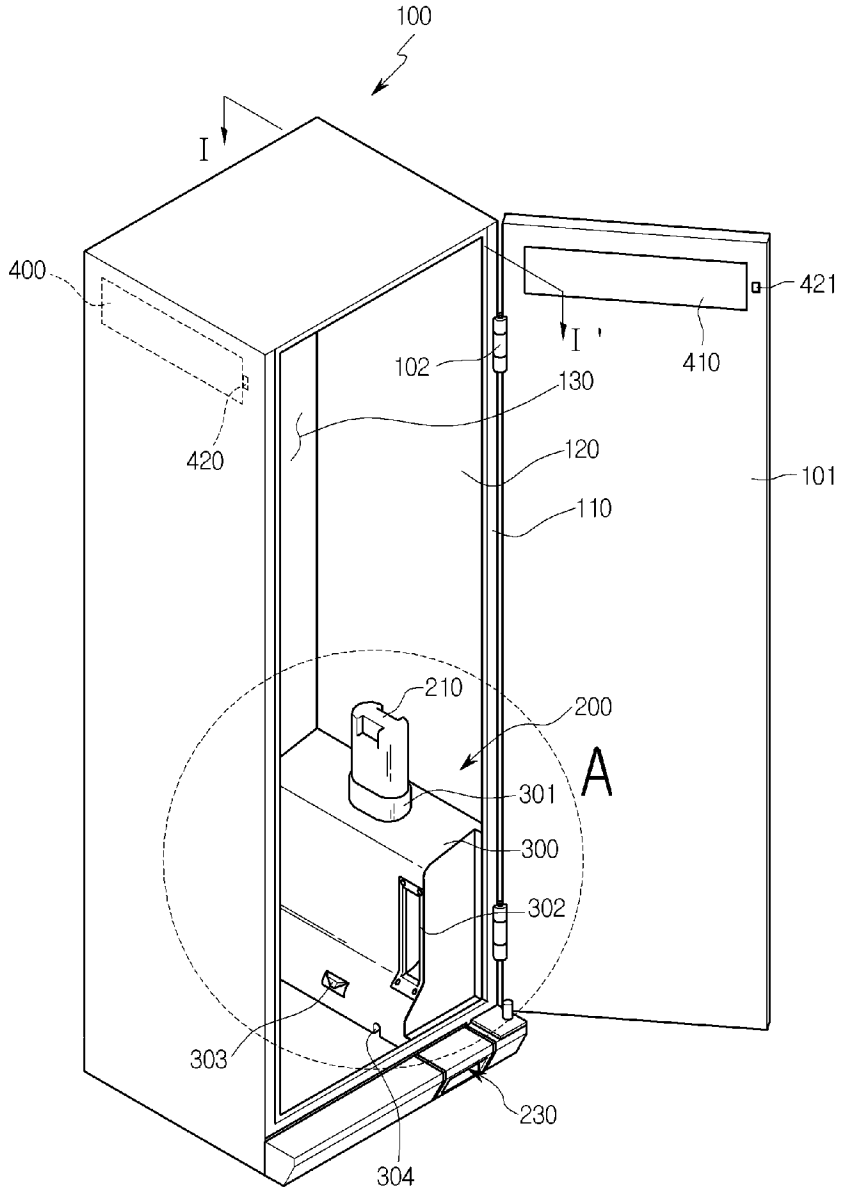
[17] The method according to claim 16, wherein the heater is turned on after a pre-determined time since the steam is supplied when the condensation preventing process is performed during the steam supplying process.

[18] The method according to claim 16, wherein the turning on or off of the heater is terminated when each of the processes is completed.

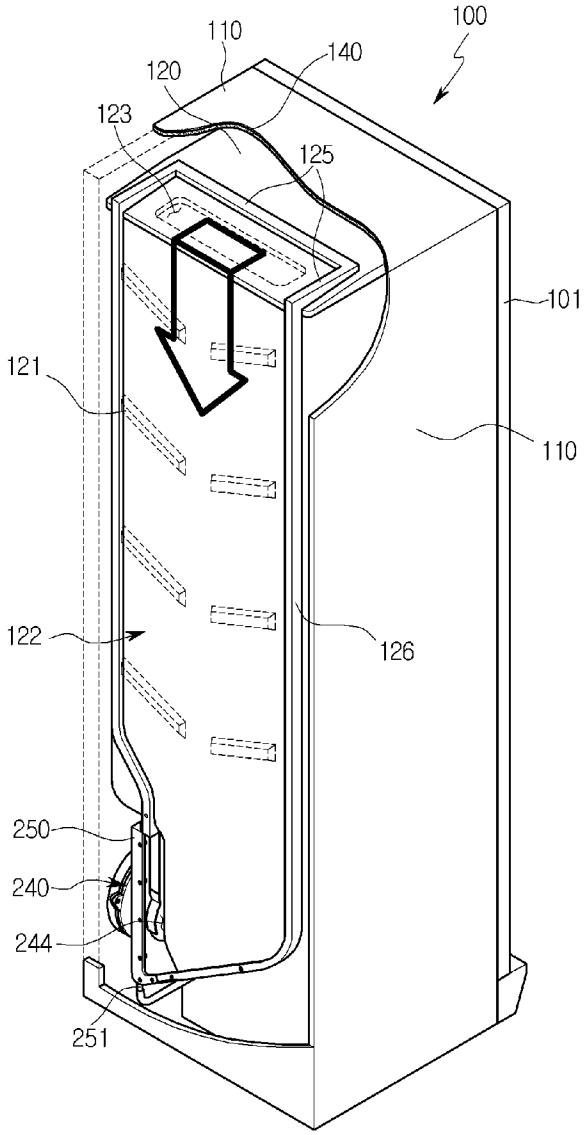
[19] The method according to claim 16, wherein the heater is turned on at the beginning of the preheating process or the drying process when the condensation preventing process is performed during the preheating process or the drying process.

[20] The method according to claim 16, wherein the steam supplying process and the drying process are alternately performed.

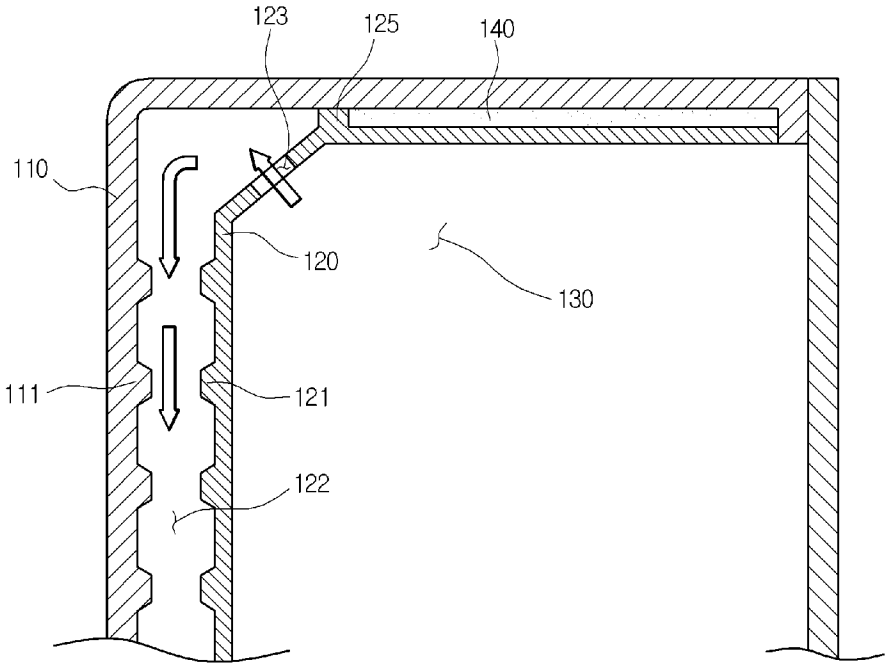
[Fig. 1]


100
I
400
420
421
I '
410
102
130
120
101
110
210
200
A
301
300
302
303
230
304

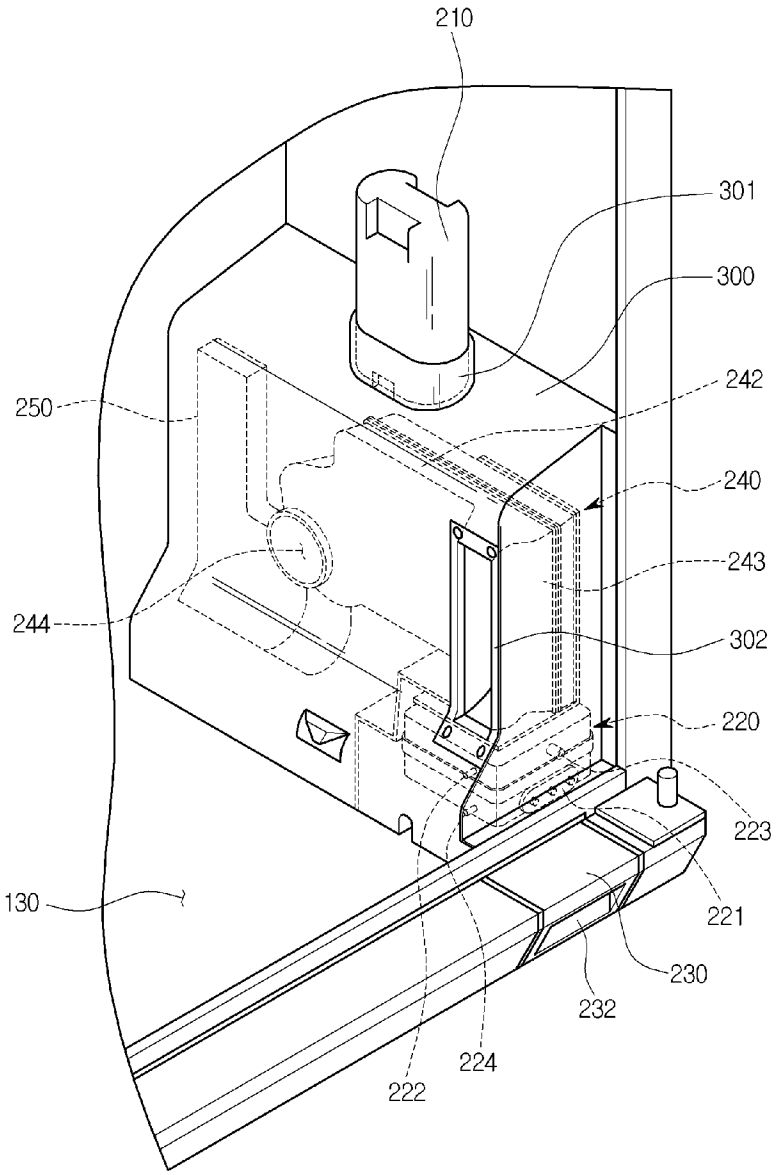
[Fig. 2]


100
110
140
120
123
125
101
121
110
122
126
250
240
244
251

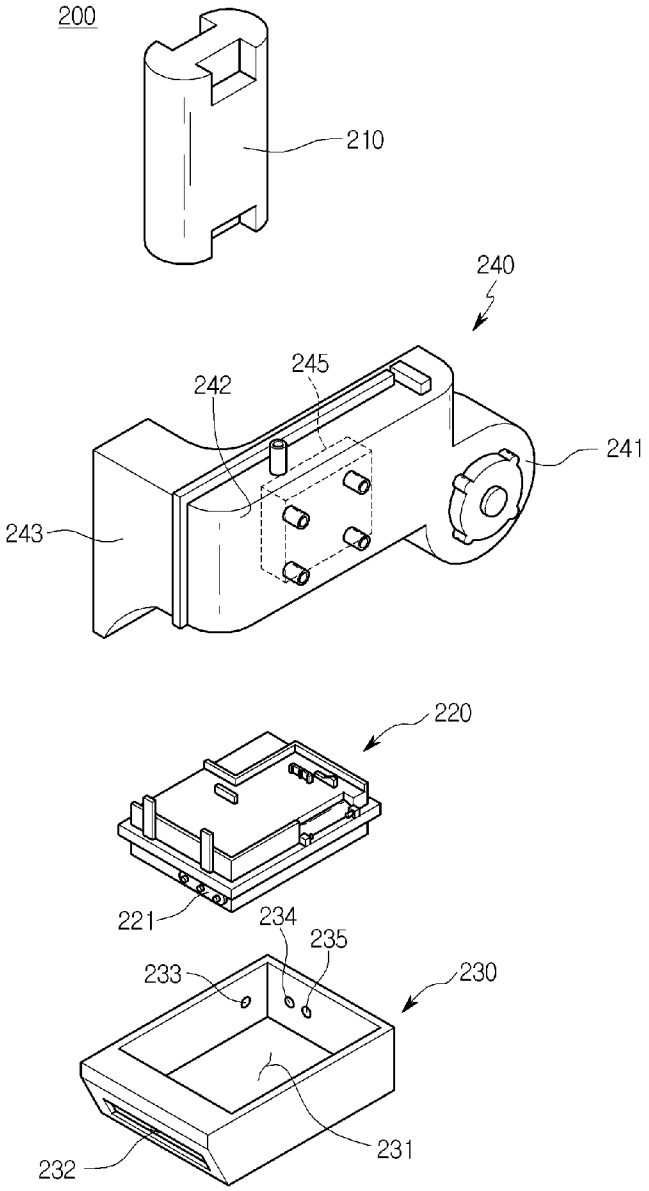
[Fig. 3]


123
125
140
110
120
130
111
121
122

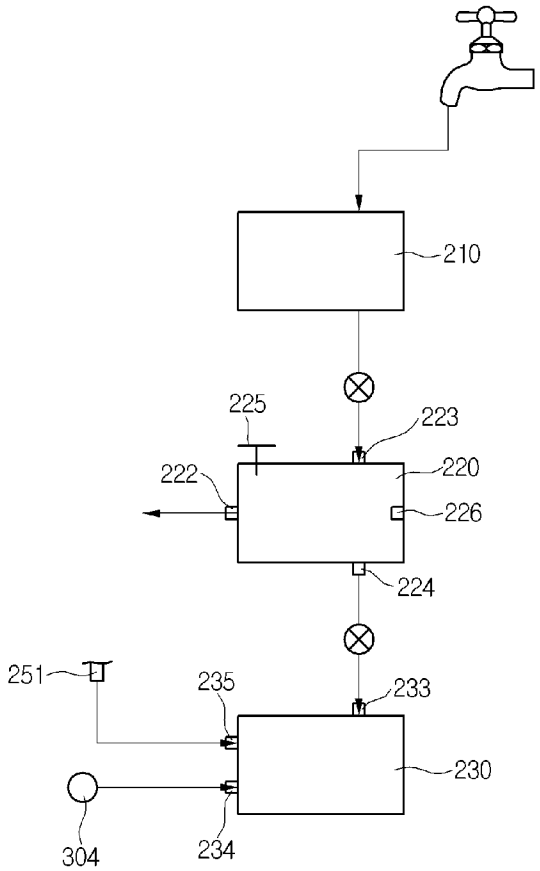
[Fig. 4]


210
301
300
242
250
240
243
244
302
220
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130
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230
232
224
222

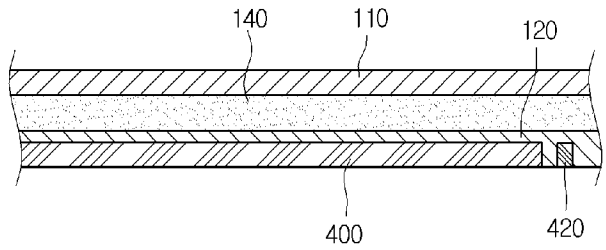
[Fig. 5]



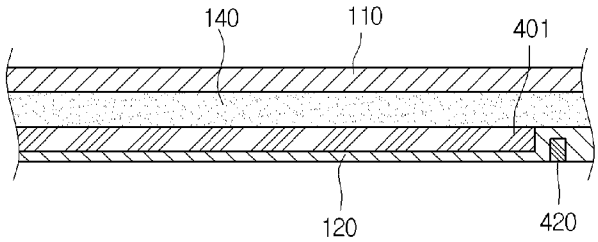
[Fig. 6]



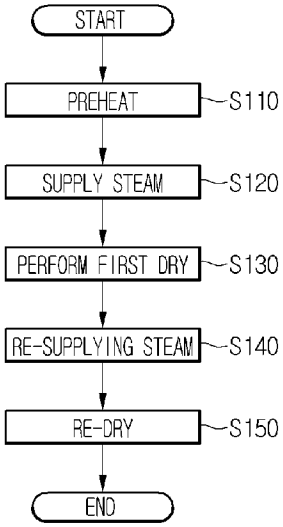
[Fig. 7]



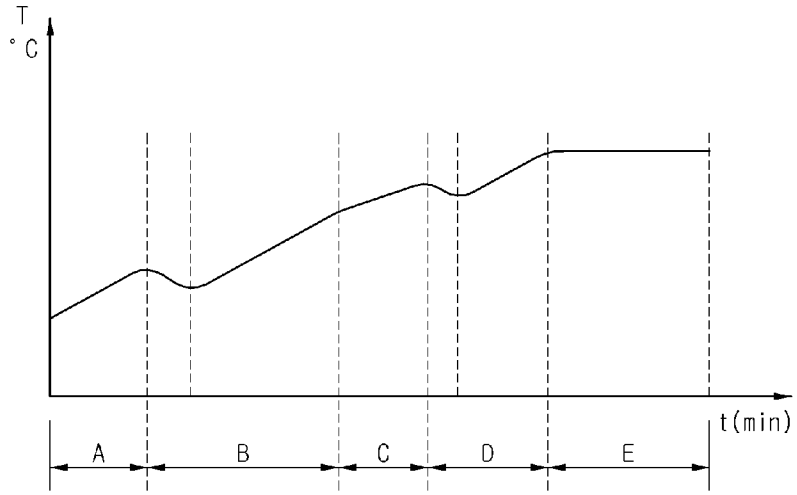
[Fig. 8]



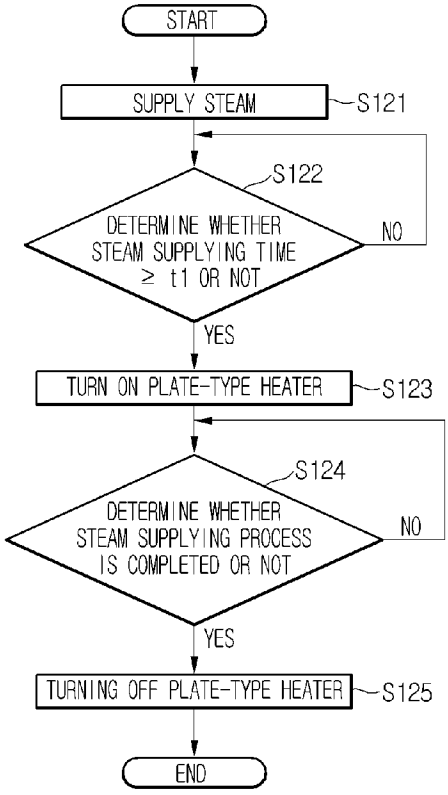
[Fig. 9]



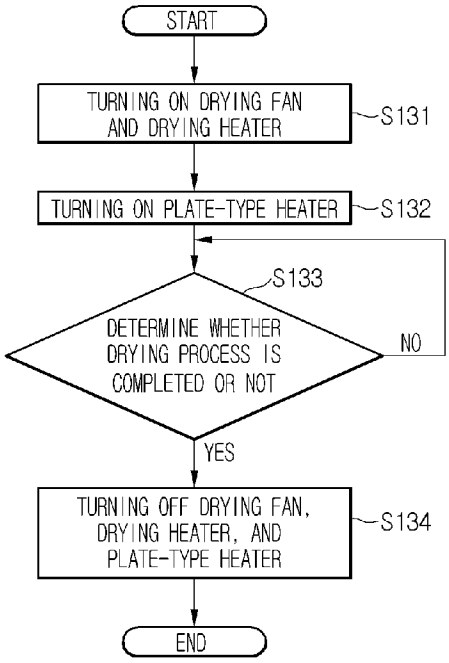
[Fig. 10]



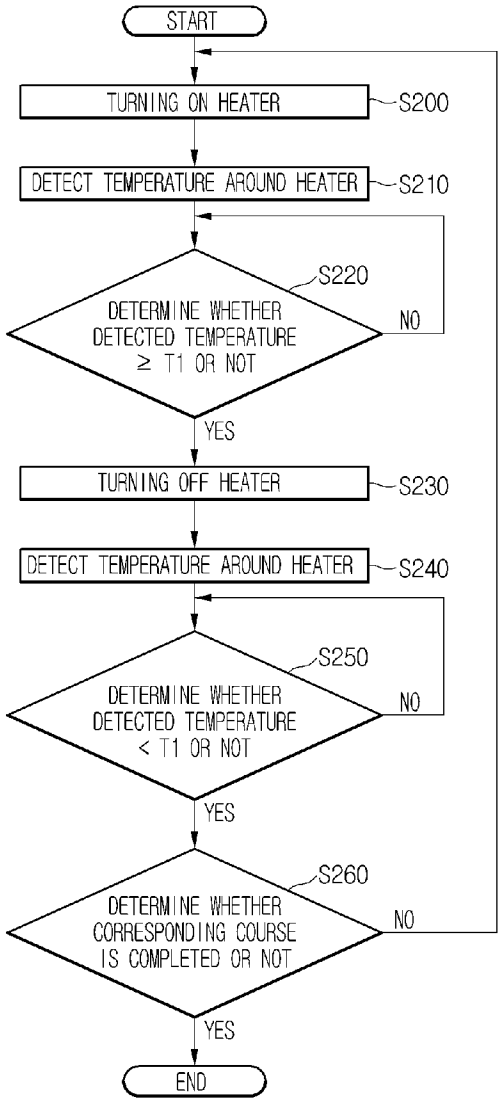
[Fig. 11]



[Fig. 12]


START
TURNING ON DRYING FAN AND DRYING HEATER
S131
TURNING ON PLATE-TYPE HEATER
S132
S133
DETERMINE WHETHER DRYING PROCESS IS COMPLETED OR NOT
NO
YES
TURNING OFF DRYING FAN, DRYING HEATER, AND PLATE-TYPE HEATER
S134
END

[Fig. 13]


START
TURNING ON HEATER
S200
DETECT TEMPERATURE AROUND HEATER
S210
S220
DETERMINE WHETHER DETECTED TEMPERATURE ≥ T1 OR NOT
NO
YES
TURNING OFF HEATER
S230
DETECT TEMPERATURE AROUND HEATER
S240
S250
DETERMINE WHETHER DETECTED TEMPERATURE < T1 OR NOT
NO
YES
S260
DETERMINE WHETHER CORRESPONDING COURSE IS COMPLETED OR NOT
NO
YES
END

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/001876

A. CLASSIFICATION OF SUBJECT MATTER

D06F 58/10(2006.01)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)

IPC8 D06F 58/10, D06F 73/00, D06F 73/02, D06C 29/00, A61L 2/04

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)

eKIPASS (KIPO internal) & keywords: "case, generator, heater, condense, steam, clothes, refreshing, and similar terms"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 04-144598 A (MATSUSHITA ELECTRIC IND. CO., LTD.) 19 May 1992 See the abstract, claim 1, and figures 1-4.	1, 7, 15
A	WO 2005-001191 A1 (ELECTROLUX HOME PRODUCTS CORPORATION N.V.) 06 January 2005 See the abstract, claim 1, and figure 3.	1, 7, 15
A	JP 11-189968 A (MIYATA YUKIO) 13 July 1999 See the abstract, claim 1, and figures 1-4.	1, 7, 15
A	US 5433919 A (HANS BALTES) 18 July 1995 See column 3, lines 14-24, and figures 1-3.	1, 7, 15

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06 JULY 2007 (06.07.2007)	**06 JULY 2007 (06.07.2007)**

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2007/001876

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