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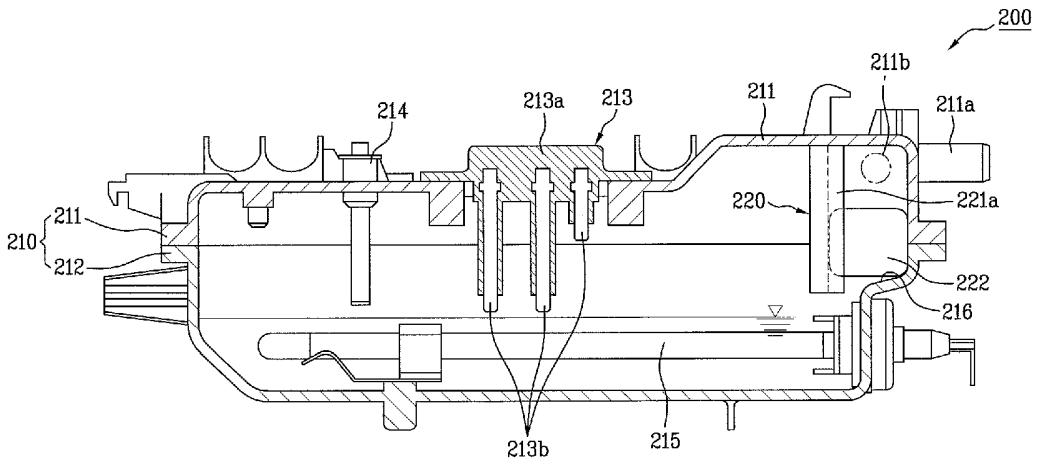


(57) Abstract: Disclosed is a laundry device having a steam generator, which prevents water from being excessively supplied to a case and steam generated from the case from adversely flowing toward a water supply valve, and removes overpressure due to steam generated in the case. A water oversupply prevention unit for preventing the water from being excessively supplied to the case is a hollow floater, which moves vertically according to the amount of the water supplied to the case to open and close a water supply hole. A backflow prevention unit for preventing steam generated from the case from adversely flowing toward the water supply hole is a check valve, which allows the water to be supplied only to the inside of the case, prevents the steam generated from the case from flowing toward the water supply valve, and is installed between a water supply hole and the water supply valve. An air exhauster for removing Overpressure due to steam generated in the case is a relief valve, which is opened to remove overpressure due to steam ' generated in the case and is installed in a sub pipe branched from a steam supply pipe. Thereby, the steam generator is effectively operated, thus lengthening the lifespan of the laundry device and improving the reliability of the laundry device.

WO 2006/126803 A2

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Description

LAUNDRY DEVICE

Technical Field

[1] The present invention relates to a laundry device, and more particularly, to a laundry device having a steam generator, which prevents washing water, supplied to the inside of the steam generator, and/or steam, generated from the steam generator, from adversely flowing toward a water supply valve, and removes overpressure generated in the steam generator.

Background Art

[2] Generally, a laundry device is a general term used for apparatuses for washing clothing and bedding.

[3] The laundry device include a washing machine having only a washing function, a washing machine having washing and drying functions, and a drying machine having only a drying function.

[4] The washing machines are divided into pulsator washing machines, in which laundry is washed using a water current generated by rotating a plate-shaped pulsator, and drum washing machines, in which laundry is washed using a fall of washing water supplied to a horizontally-laid drum and the laundry and friction therebetween caused by rotating the drum.

[5] Compared to the pulsator washing machine, the drum washing machine prevents the laundry from being entangled, and reduces the amounts of the washing water and a detergent used, thereby being increasingly used these days.

[6] In order to more effectively wash the laundry, the drum washing machine performs a soaking operation. In the soaking operation, a large amount of the washing water is consumed and a separate structure for sterilizing the laundry is not provided in the drum washing machine.

[7] A recent drum washing machine, which has a heater for heating washing water to perform a boiling operation, is proposed. However, the drum washing machine requires excessively large amounts of the washing water and electric power to perform the boiling operation, thus not being preferably used.

[8] Hereinafter, with reference to FIG. 1, a drum washing machine having a steam generator to solve the problems of the above drum washing machine will be described.

[9] The drum washing machine 10 comprises a cabinet 11 forming the external appearance of the washing machine, a cylindrical tub 12 horizontally supported in the

cabinet 11 for storing washing water, a drum 13 rotatably installed in the tub 12, a driving motor (not shown) for driving the drum 13, and at least one steam generator 20 for supplying steam to the inside of the drum 13.

[10] Water supply valves 14 connected to an external water pipe for supplying the washing water to the inside of the tub 12 are provided at one side of the drum washing machine 10.

[11] A water supply hole 21 connected to one water supply valve 14 of the drum washing machine 10 through a water supply pipe 15 is formed through one side of the steam generator 20, and a discharge hole 22 connected to a steam supply pipe 16 so that the steam generated from the steam generator 20 is supplied to the inside of the drum 13 is formed through the other side of the steam generator 20.

[12] Hereinafter, with reference to FIG. 2, a structure of the steam generator 20 of the drum washing machine 10 will be described.

[13] As shown in FIG. 2, the steam generator 20 comprises a lower case 20a having a space for storing water, an upper case 20b connected to the upper surface of the lower case 20a, a water level sensor 23 for sensing the level of the water stored in the steam generator 20, a heater 24 for heating the water stored in the steam generator 20, and a temperature sensor 25 for measuring the temperature of the water heated by the heater 24 and the temperature of generated steam. The lower case 20a and the upper case 20b form the external appearance of the steam generator 20.

[14] When water is supplied to the inside of the steam generator 20 through the water supply pipe, the water level sensor 23 senses the level of the supplied water, and suitably adjusts the level of the water.

[15] The supplied water is heated by the heater 24 installed in the steam generator 20. When the heated water is boiled, steam is generated from the steam generator 20.

[16] Then, the temperature sensor 24 senses the temperature of the water so that the optimum temperature of the water supplied to the inside of the steam generator 20 can be maintained.

[17] The generated steam is discharged to the inside of the drum 13 through the steam supply pipe 16 connected to the steam generator 20.

[18] However, the steam generator 20 of the drum washing machine 10 has several problems, as follows.

[19] First, when an excessively large amount of water is supplied to the steam generator 20 due to malfunction of the water level sensor 23, the water supplied to the steam generator 20 is discharged to the inside of the drum 13 through the discharge hole 22

formed through one side of the steam generator 20.

[20] Thereby, a controller of the drum washing machine 10 makes an error regarding the water supply, thus causing the drum washing machine 10 not to effectively perform a washing operation.

[21] Second, when foreign substances accumulate on the exposed portion of the steam supply pipe 16 connected to the drum 13 or steam of a high temperature is continuously discharged to the inside of the drum 13, the pressure in the drum 13 is elevated, thereby generating back pressure toward the steam generator 20.

[22] Then, the steam, which is discharged to the inside of the drum 13, adversely flows toward the inside of the steam generator 20, and the adversely flown steam together with the existing steam in the steam generator 20 flows again toward the water supply valve 14 through the water supply hole 21.

[23] The adversely flown steam of a high temperature contacts the water supply valve 14, thereby damaging the water supply pipe 15 and the water supply valve 14.

[24] Third, when the steam adversely flows from the drum 13 to the steam generator 20, the steam cannot be discharged to the outside of the steam generator 20 and is retained in the steam generator 20, thereby increasing the pressure in the steam generator 20 and the pressure in the steam supply pipe 16 and thus expanding the steam generator 20 and the steam supply pipe 16.

[25] Thereby, the cases 20a and 20b of the steam generator 20 are damaged, or a joint between the water supply pipe 15 and the water supply hole 21 and a joint between the steam supply pipe 16 and the discharge hole 22 are damaged, thereby being incapable of maintaining an airtight state between the water supply pipe 15 and the water supply hole 21 and an airtight state between the steam supply pipe 16 and the discharge hole 22.

Disclosure of Invention

Technical Problem

[26] An object of the present invention devised to solve the problem lies on a laundry device, which prevents an excessively large amount of water from being supplied to the inside of a steam generator.

[27] Another object of the present invention lies on a laundry device, which prevents steam in a steam generator from leaking toward a water supply valve through a water supply hole when back pressure is generated from a drum.

[28] Yet another object of the present invention lies on a laundry device, which removes

overpressure generated in a steam generator due to back pressure generated from a drum so as to prevent damage to the steam generator and damage to a joint between a steam supply pipe and a discharge hole.

Technical Solution

[29] The object of the present invention can be achieved by providing a laundry device comprising a steam generator comprising a case forming a space for containing water and provided with a water supply hole and a discharge hole; a heater installed in the case; and a water oversupply prevention unit for preventing the water from being excessively supplied to the inside of the case or from adversely flowing toward the water supply hole; a water supply pipe connecting the water supply hole and a water supply valve; and a steam supply pipe connected to the discharge hole.

[30] In a further aspect of the present invention, provided herein is a laundry device comprising a steam generator comprising a case forming a space for containing water and provided with a water supply hole and a discharge hole; a heater installed in the case; and a backflow prevention unit for preventing steam generated from the case from adversely flowing through the water supply hole; a water supply pipe connecting the water supply hole and a water supply valve; and a steam supply pipe connected to the discharge hole.

[31] In another aspect of the present invention, provided herein is a laundry device comprising a steam generator comprising a case forming a space for containing water and provided with a water supply hole and a discharge hole; and a heater installed in the case; a water supply pipe connecting the water supply hole and a water supply valve; a steam supply pipe connected to the discharge hole; and an air exhauster for removing overpressure due to steam generated in the case.

Advantageous Effects

[32] The steam generator for the laundry device of the present invention has several effects, as follows.

[33] First, a water oversupply prevention unit installed in the steam generator prevents water from being excessively supplied to the steam generator, even when a water level sensor malfunctions.

[34] Thus, the water in the steam generator is not introduced into a drum, and a controller effectively controls the operation of the laundry device.

[35] Although foul water or washing water in the drum adversely flows toward the steam generator due to back pressure generated from the drum, the water oversupply

prevention unit in the steam generator closes a water supply hole, thereby preventing the foul water or the washing water from flowing to a water supply pipe through the water supply hole.

[36] Thus, since the foul water or washing water does not flow toward the water supply valve connected to the water supply hole, it is possible to prevent the pollution of water supply facilities.

[37] Second, a backflow prevention unit installed in the steam generator prevents the steam in the steam generator from leaking toward the water supply valve, even when back pressure is generated from the drum.

[38] Thus, it is possible to prevent damage to the water supply pipe and the water supply valve due to contact of steam of a high temperature.

[39] Third, an air exhauster installed in a steam supply pipe removes overpressure generated in the steam generator due to the mixing of the steam adversely flown from the drum to the steam generator and the steam existing in the steam generator, when back pressure is generated from the drum.

[40] Thus, it is possible to prevent damage to the steam generator due to the overpressure of the steam generator and damage to a joint between the steam generator and the steam supply pipe.

Brief Description of the Drawings

[41] The accompanying drawings, which are included to provide a further understanding of the invention, illustrate embodiments of the invention and together with the description serve to explain the principle of the invention.

[42] In the drawings:

[43] FIG. 1 is an exploded perspective view of a conventional drum washing machine having a steam generator;

[44] FIG. 2 is an exploded perspective view of the conventional steam generator;

[45] FIG. 3 is a plane view of a drum washing machine having a steam generator in accordance with a first embodiment of the present invention;

[46] FIG. 4 is a sectional view of the steam generator in accordance with the first embodiment of the present invention, in a state in which water is supplied to the steam generator;

[47] FIG. 5 is a sectional view of the steam generator in accordance with the first embodiment of the present invention, in a state in which the water supply to the steam generator is completed;

[48] FIG. 6 is a sectional view of a steam generator in accordance with a second

embodiment of the present invention;

[49] FIG. 7 is a sectional view taken along the line I-I of FIG. 6;

[50] FIG. 8 is a transversal sectional view of the portion "A", shown in FIG. 3, of a steam generator in accordance with a third embodiment of the present invention, in a state in which water is supplied to the steam generator;

[51] FIG. 9 is a transversal sectional view of the portion "A", shown in FIG. 3, of the steam generator in accordance with the third embodiment of the present invention, in a state in which steam flows backward;

[52] FIG. 10 is a plane view of a drum washing machine having a steam generator in accordance with a fourth embodiment of the present invention;

[53] FIG. 11 is a transversal sectional view of the steam generator in accordance with the fourth embodiment of the present invention, in a state in which water is supplied to the steam generator;

[54] FIG. 12 is a transversal sectional view of the steam generator in accordance with the fourth embodiment of the present invention, in a state in which steam flows backward; and

[55] FIG. 13 is a transversal sectional view of the steam generator in accordance with the fourth embodiment of the present invention, in a state in which the steam is discharged from the steam generator to the outside.

Best Mode for Carrying Out the Invention

[56] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[57] Hereinafter, with reference to FIGS. 3 to 5, a steam generator for a laundry device in accordance with a first embodiment of the present invention will be described.

[58] As shown in FIG. 3, the steam generator 200 of the first embodiment, to which a water supply pipe 105 and a steam supply pipe 106 are connected, is installed in a cabinet 101 of a drum washing machine 100.

[59] Preferably, the steam generator 200 is installed above the tub 102 so that a channel connected between the water supply valve 104 and the steam supply pipe 106 has a relatively short distance and the steam generator 200 is easily repaired and inspected.

[60] The steam generator 200 comprises a case 210 and a water oversupply prevention unit 220.

[61] The case 210 forms the external appearance of the steam generator 200, and stores water supplied from the water supply valve 104.

[62] Preferably, the case 210 includes an upper case 211 forming the upper portion of

the steam generator 200, and a lower case 212 forming the lower portion of the steam generator 200.

[63] A water supply hole 211a, through which water is supplied from the water supply valve 104, and a discharge hole 211b, through which steam generated from the case 210 is discharged to the outside of the case 210, are formed through the upper case 211.

[64] A water supply pipe 105 is connected between the water supply hole 211a and the water supply valve 104. The water supply pipe 105 serves to guide the water, supplied from the water supply valve 104, to the inside of the case 210.

[65] The steam supply pipe 106 is connected to the discharge hole 211b so that the steam generated from the case 210 is discharged to the inside of a drum 103.

[66] Preferably, the tip of the steam supply pipe 106 has a nozzle shape so that the steam is smoothly sprayed to the inside of the drum 103.

[67] Further, preferably, the tip of the steam supply pipe 106 for spraying the steam is exposed to the inside of the drum 103.

[68] A water level sensor 213 and a temperature sensor 214 are installed on the upper case 211.

[69] The water level sensor 213 serves to sense a water level in the case 210 so that the optimum level of the water supplied to the inside of the case 210 is always maintained.

[70] The water level sensor 213 includes a receptacle housing 213a fixed to the upper case 211 and an electrode 213b for sensing the water level.

[71] The temperature sensor 214 serves to maintain the optimum temperature of the water stored in the case 210 for generating steam, and is installed on the upper case 211.

[72] The lower case 212 is connected to the upper case 211, and forms the lower portion of the steam generator 200.

[73] A space for containing the water supplied through the water supply hole 211a is formed in the lower case 212. A heater 215 for heating the supplied water is installed in the space of the lower case 212.

[74] Preferably, a sheath heater is used as the heater 215.

[75] Further, preferably, a step 216 toward the space of the lower case 212 is formed on one side surface of the lower case 212.

[76] The water oversupply prevention unit 220 is caught by the step 216 so that the water oversupply prevention unit 220 does not excessively lowers close to the bottom surface of the case 210.

[77] The water oversupply prevention unit 20 prevents an excessively large amount of the water, supplied from the water supply valve 104, from being supplied to the inside of the case 210 or foul water, adversely flown from the drum 103, from adversely flowing again through the water supply hole 211a. The water oversupply prevention unit 220 is installed at position in the case 210 close to the water supply hole 211a.

[78] The water oversupply prevention unit 220 is a floater, which moves vertically according to the amount of the water supplied to the inside of the case 210 to open and close the water supply hole 211a.

[79] The floater includes a rib 221, which has a diaphragm shape and is vertically installed in the case 210 in such a manner that the rib 211 is separated from the inner surface of the case 210, and a switching member 222, which is interposed between the rib 221 and the inner surface of the case 210 and moves vertically according to the level of the water supplied to the inside of the case 210 to open and close the water supply hole 211a.

[80] Preferably, the switching member 222 has a hollow structure so as to maximize buoyancy.

[81] The rib 221 serves to guide the switching member 222, when the switching member 222 moves vertically in the case 210.

[82] Preferably, guide portions 221a are formed at both side ends of the rib 221, thereby preventing the switching member 222 from deviating from a moving path toward the water supply hole 211a.

[83] Further, preferably, the guide portions 221a are bent to partially surround the switching member 222.

[84] The rib 221 is installed perpendicularly from the top surface of the case 210 in such a manner that the lower end of the rib 221 is separated from the bottom surface of the case 210.

[85] Hereinafter, with reference to FIGS. 4 and 5, a function of the steam generator 200 in accordance with the first embodiment will be described.

[86] As shown in FIG. 4, the switching member 222 descends on the step 216 of the switching member 222 due to the load of the switching member 222.

[87] In this state, the switching member 222 cannot move in all directions due to the inner surface of the case 210, the rib 221, and the guide portions 221a formed on the rib 221.

[88] That is, the switching member 222 is vertically elevated by buoyancy due to the water supplied to the inside of the case 210, or is vertically lowered by the load of the

switching member 222 when the supplied water is decreased.

[89] The water is continuously supplied from the water supply valve 104 to the inside of the case 210 through the water supply hole 211a.

[90] Simultaneously, as shown in FIG. 5, the switching member 222, which is supported by the step 216 in the case 210, is gradually elevated due to the water continuously supplied to the inside of the case 210.

[91] The switching member 222 is elevated to a position just below the water supply hole 211a, and does not completely close the water supply hole 211a.

[92] Then, the water level sensor 213 senses that the level of the water in the case 210 is the optimum water level, and a controller stops the water supply from the water supply valve 104.

[93] However, in case that the water level sensor 213 malfunctions in the above state, although a proper amount of the water is supplied to the inside of the case 210, the water supply is not stopped but is continuously carried out.

[94] Thereafter, the amount of the water supplied to the inside of the case 210 is increased, and the switching member 222 is elevated by the buoyancy and completely closes the water supply hole 211a.

[95] Thereby, although the water level sensor 213 malfunctions, the water supply to the inside of the case 210 is stopped.

[96] The water oversupply prevention unit 20 serves not only to prevent water from being excessively supplied to the inside of the case 210 through the water supply hole 211a but also to prevent foul water, adversely flown from the drum 103, from flowing toward the water supply valve 104 when back pressure is generated in the drum 103.

[97] That is, the water in the case 210 is increased by the foul water adversely flown through the discharge hole 211b, and elevates the switching member 222, thereby closing the water supply hole 211a.

[98] Thereafter, when the supply of the proper amount of the water to the inside of the case 210 is completed, as described above, the heater 215 installed in the case 210 heats the water in the case 210, and continuously generates steam.

[99] The generated steam is discharged to the inside of the drum 103 through the discharge hole 211b and the steam supply pipe 106.

[100] Hereinafter, with reference to FIGS. 6 and 7, a steam generator in accordance with a second embodiment of the present invention will be described.

[101] For the reference, parts of the steam generator of the second embodiment are substantially the same as those in the first embodiment except for a water oversupply

prevention unit. The parts of the steam generator of the second embodiment, which are substantially the same as those in the first embodiment, are denoted by the same reference numerals even through they are depicted in different drawings, and a detailed description thereof will thus be omitted because it is considered to be unnecessary.

[102] Now, the water oversupply prevention unit installed in the steam generator of the second embodiment will be described.

[103] As shown in FIG. 6, the water oversupply prevention unit 320 comprises a switching member 321 for opening and closing the water supply hole 211a, a hinge 322 installed at one side of the inner surface of the case 210, and a floater bar 323 having one end rotatably installed on the hinge 322 and the other end connected to the switching member 321.

[104] Preferably, the switching member 321 is hinged to the other end of the floater bar 323 so that the switching member 321 smoothly opens and closes the water supply hole 211a.

[105] Hereinafter, with reference to FIG. 7, a function of the steam generator 200 in accordance with the second embodiment will be described.

[106] When water is supplied to the inside of the case 210 through the water supply hole 211a, the surface of the water slowly ascends.

[107] When the surface of the water ascends, the switching member 321, which is supported by the step 216 in the case 210, is gradually elevated due to the buoyancy.

[108] The switching member 321 is rotated centering on the hinge 322 installed on the inner surface of the case 210, and is slowly elevated.

[109] Thereafter, when the water level sensor 213 senses that the level of the water in the case 210 is the optimum water level, the controller stops the water supply from the water supply valve 104.

[110] Here, the switching member 321 does not completely close the water supply hole 211a.

[111] However, in case that the water supply is not stopped but is continuously carried out due to the malfunction of the water level sensor 213, the switching member 321 is elevated by the buoyancy, and completely closes the water supply hole 211a.

[112] Thereby, it is possible to prevent the oversupply of the water to the inside of the case 210, and the water is not discharged to the inside of the drum 103 through the discharge hole 211b.

[113] Thereafter, when the supply of the proper amount of the water to the inside of the case 210 is completed, as described above, the heater 215 installed in the case 210

heats the water in the case 210, and continuously generates steam.

[114] The generated steam is discharged to the inside of the drum 103 through the discharge hole 211b and the steam supply pipe 106.

[115] Hereinafter, with reference to FIGS. 8 and 9, a steam generator in accordance with a third embodiment of the present invention will be described.

[116] For the reference, parts of the steam generator of the third embodiment, which are substantially the same as those in the first and second embodiments, are denoted by the same reference numerals even through they are depicted in different drawings, and a detailed description thereof will thus be omitted because it is considered to be un-necessary.

[117] The steam generator 200 comprises the case 210 containing water and provided with the water supply hole 211a connected to the water supply pipe 105 and the discharge hole 211b connected to the steam supply pipe 106, the heater 215 for heating the water, and a backflow prevention unit 230.

[118] The backflow prevention unit 230 prevents steam generated from the case 210 from leaking toward the water supply valve 104.

[119] Preferably, the backflow prevention unit 230 is a check valve for causing the water to flow only in one direction. More preferably, the backflow prevention unit 230 is installed between the water supply hole 211a and the water supply pipe 105.

[120] The check valve includes a main body 231 forming the external appearance of the check valve, and a switching unit installed in the main body 231.

[121] The switching unit includes a channel member 232 provided with an inlet 232a for transferring the water, supplied to the main body 231, to the water supply hole 211a, a shielding member 233 for selectively shielding the inlet 232a, and a spring 234 for elastically supporting the shielding member 233.

[122] Preferably, the diameter of the inlet 232a of the channel member 232 for passing the water is smaller than the diameter of the opposite end of the channel member 232.

[123] As shown in FIG. 8, the channel member 232 is inclined so that the diameter of the channel member 232 is decreased from one end thereof close to the water supply hole 211a to the other end thereof close to the water supply pipe 105.

[124] This structure allows the shielding member 233 to smoothly shield the inlet 232a.

[125] Preferably, the shielding member 233 has a spherical shape so that the shielding member 233 at the inclined inner surface of the channel member 232 selectively shields the inlet 232a.

[126] Although not shown in the drawings, the check valve may be directly installed in

the water supply hole 211a or the water supply pipe 105.

[127] Hereinafter, with reference to FIGS. 8 and 9, a function of the steam generator 200 in accordance with the third embodiment will be described.

[128] FIG. 8 illustrates the steam generator 200 in a state in which water is supplied to the steam generator 200.

[129] As shown in FIG. 8, when the water is supplied from the water supply valve 104 to the steam generator 200, the water passes through the check valve along the water supply pipe 105 and is contained in the case 210.

[130] The shielding member 233 is pushed toward the water supply hole 211a by the pressure of the water supplied from the water supply valve 104, and thus opens the inlet 232a of the channel member 232.

[131] Thereby, the water is continuously supplied from the water supply valve 104 to the inside of the case 210 through the inlet 232a.

[132] Thereafter, when the water supply is stopped, as shown in FIG. 9, the shielding member 233 is returned to its original position by the restoring force of the spring 234 supporting the shielding member 233, and thus closes the inlet 232a.

[133] The heater 215 heats the water contained in the case 210, thus generating steam. Th e steam is discharged to the inside of the drum 103 through the discharge hole 211b.

[134] The steam is continuously discharged to the inside of the drum 103, and the temperature in the drum 103 is raised by the steam of a high temperature.

[135] Then, the pressure in the drum 103 is raised also, and back pressure toward the steam generator 200 may be generated.

[136] In case that the back pressure is generated in the drum 103, the steam discharged to the inside of the drum 103 adversely flows toward the inside of the steam generator 200 along the steam supply pipe 106.

[137] The steam in the steam generator 200 adversely flows continuously toward the water supply valve 104 through the water supply hole 211a.

[138] However, the backflow prevention unit 230, i.e., the check valve, which is installed between the water supply hole 211a and the water supply pipe 105, blocks the steam, and prevents the steam from adversely flowing toward the water supply valve 104.

[139] Since the inlet 232a of the backflow prevention unit 230 is closed by the spherical shielding member 233.

[140] Hereinafter, with reference to FIGS. 10 to 13, a steam generator in accordance with a fourth embodiment of the present invention will be described.

[141] As shown in FIG. 10, the steam generator 200 of the fourth embodiment, to which

the water supply pipe 105 and the steam supply pipe 106 are connected, is installed in the cabinet 101 of the drum washing machine 100.

[142] Preferably, the steam generator 200 is installed above the tub 102 so that a channel connected between the water supply valve 104 and the steam supply pipe 106 has a relatively short distance and the steam generator 200 is easily repaired and inspected.

[143] For the reference, parts of the steam generator of the fourth embodiment, which are substantially the same as those in the first, second, and third embodiments, are denoted by the same reference numerals even through they are depicted in different drawings, and a detailed description thereof will thus be omitted because it is considered to be unnecessary.

[144] The steam generator 200 comprises the case 210 containing water and provided with the water supply hole 211a connected to the water supply pipe 105 and the discharge hole 211b connected to the steam supply pipe 106, the heater 215 for heating the water, and an air exhauster 400.

[145] The air exhauster 400 serves to discharge steam to the outside of the steam generator 200 when overpressure in the steam generator 200, the water supply pipe 105, and the steam supply pipe 106 is generated due to the steam, thus removing the overpressure. The air exhauster 400 is installed in the steam supply pipe 106.

[146] The air exhauster 400 includes a sub pipe 410 branched from the steam supply pipe 106, a relief valve 420 installed at the end of the sub pipe 410, and an air exhaust pipe 430 connected to the relief valve 420.

[147] Preferably, the end of the air exhaust pipe 430 for exhausting steam is connected to a drain channel (not shown) of a laundry device having the steam generator 200 so that the steam is discharged to the outside of the laundry device.

[148] Hereinafter, with reference to FIGS. 11 to 13, a function of the steam generator 200 in accordance with the fourth embodiment will be described.

[149] FIG. 11 illustrates the steam generator 200, in a state in which water is supplied from the water supply valve 104, installed at the outside of the case 210, to the inside of the case 210.

[150] The water is supplied from the water supply pipe 105, connected to the water supply valve 104, to the inside of the case 210.

[151] Thereafter, when a proper amount of water is supplied to the inside of the case 210, the water level sensor 213 (FIG. 4) senses the water level in the case 210 and transmits the sensed water level to the controller, and the controllers stops the water supply from the water supply valve 104.

[152] The heater 215 heats the water supplied to the inside of the case 210, thus generating steam.

[153] Now, with reference to FIG. 12, a flowing route of the steam generated from the steam generator 200 will be described.

[154] As shown in FIG. 12, the steam is discharged to the inside of the drum 103 along the steam supply pipe 106.

[155] The steam flows along the steam supply pipe 106, and flows also along the sub pipe 410 branched from the steam supply pipe 106.

[156] Since an outlet 411 of the sub pipe 410 is closed by the relief valve 420 connected to the sub pipe 410, the steam is retained in the sub pipe 410.

[157] Thereafter, the steam generated from the case 210 is continuously discharged to the inside of the drum 103 through the steam supply pipe 106.

[158] By the above repetitive process, the temperature in the drum 103 is raised, and thus the pressure in the drum 103 is raised also.

[159] Thereby, back pressure toward the steam supply pipe 106 is generated from the drum 103.

[160] When the back pressure is generated, the steam, which was discharged to the drum 103 through the steam supply pipe 106, adversely flows toward the inside of the case 210.

[161] Here, the steam adversely flows toward the inside of the case 210 along the steam supply pipe 106 and the inside of the sub pipe 410 branched from the steam supply pipe 106.

[162] The total amount of the steam in the case 210 is increased, thus generating overpressure in the steam generator 200.

[163] Further, the total amount of the steam in the steam supply pipe 106 and the water supply pipe 105 is increased, thus generating overpressure in the steam supply pipe 106 and the water supply pipe 105.

[164] Then, as shown in FIG. 13, pressure having at least a designated intensity is applied to the relief valve 420, thus opening the relief valve 420.

[165] Simultaneously, the steam in the case 210 and the steam supply pipe 106 flows toward the air exhaust pipe 430 through the relief valve 420.

[166] The steam, discharged through the air exhaust pipe 430, is discharged to the outside of the laundry device, such as a drum washing machine, through the drain channel connected to the air exhaust pipe 430.

[167] After the overpressure in the steam generator 200 and the steam supply pipe 106 is

removed by discharging the steam to the outside, the relief valve 420 is closed.

[168] The steam generator of the fourth embodiment removes the overpressure in the steam generator and the steam supply pipe, thus preventing damage to the steam generator due to expansion of the case and damage to a joint between the steam supply pipe and the discharge hole.

[169] Although not described in the description and not shown in the drawings, the water oversupply prevention unit, the backflow prevention unit, and the air exhauster of the above embodiments may be simultaneously installed.

Industrial Applicability

[170] The present invention provides a laundry device having a steam generator, which prevents water from being excessively supplied from a water supply valve to the steam generator, steam, generated from the steam generator, from adversely flowing toward the water supply valve, and prevents damage to the steam generator due to overpressure.

[171] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

[1] A laundry device comprising:
a steam generator comprising:
a case forming a space for containing water and provided with a water supply hole and a discharge hole;
a heater installed in the case; and
a water oversupply prevention unit for preventing the water from being excessively supplied to the inside of the case or from adversely flowing toward the water supply hole;
a water supply pipe connecting the water supply hole and a water supply valve; and
a steam supply pipe connected to the discharge hole.

[2] The laundry device as set forth in claim 1, wherein the water oversupply prevention unit is installed inside the case.

[3] The laundry device as set forth in claim 1, wherein the water oversupply preventing unit is a floater moving vertically, according to the amount of the water supplied to the case, to open and close the water supply hole.

[4] The laundry device as set forth in claim 3, wherein the floater comprises:
a rib having a diaphragm shape, and vertically installed in the case in such a manner that the rib is separated from the inner surface of the case; and
a switching member interposed between the rib and the inner surface of the case, and moving vertically, according to the level of the water supplied to the inside of the case, to open and close the water supply hole.

[5] The laundry device as set forth in claim 4, wherein the inner surface of the case facing the rib is stepped so that the switching member does not excessively descend.

[6] The laundry device as set forth in claim 4, wherein both side ends of the rib are bent so that the switching member does not deviate from a movable range for opening and closing the water supply hole.

[7] The laundry device as set forth in claim 4, wherein the rib is installed perpendicularly from the top surface of the case in such a manner that the lower end of the rib is separated from the bottom surface of the case.

[8] The laundry device as set forth in claim 3, wherein the floater comprises:
a switching member for opening and closing the water supply hole;

a hinge installed on the inner surface of the case; and

a floater bar having one end rotatably installed on the hinge and the other end connected to the switching member.

[9] The laundry device as set forth in claim 8, wherein the other end of the floater bar is hinged to the switching member.

[10] The laundry device as set forth in claim 8, wherein the inner surface of the case facing the rib is stepped so that the switching member does not excessively descend.

[11] The laundry device as set forth in claim 4 or 8, wherein the switching member has a hollow structure.

[12] A laundry device comprising:

a steam generator comprising:

a case forming a space for containing water and provided with a water supply hole and a discharge hole;

a heater installed in the case; and

a backflow prevention unit for preventing steam generated from the case from adversely flowing through the water supply hole;

a water supply pipe connecting the water supply hole and a water supply valve; and

a steam supply pipe connected to the discharge hole.

[13] The laundry device as set forth in claim 12, wherein the backflow prevention unit is installed outside the case.

[14] The laundry device as set forth in claim 13, wherein the backflow prevention unit is a check valve.

[15] The laundry device as set forth in claim 14, wherein the check valve is installed between the water supply hole and the water supply pipe.

[16] A laundry device comprising:

a steam generator comprising:

a case forming a space for containing water and provided with a water supply hole and a discharge hole; and

a heater installed in the case;

a water supply pipe connecting the water supply hole and a water supply valve;

a steam supply pipe connected to the discharge hole; and

an air exhauster for removing overpressure due to steam generated in the case.

[17] The laundry device as set forth in claim 16, wherein the air exhauster is installed

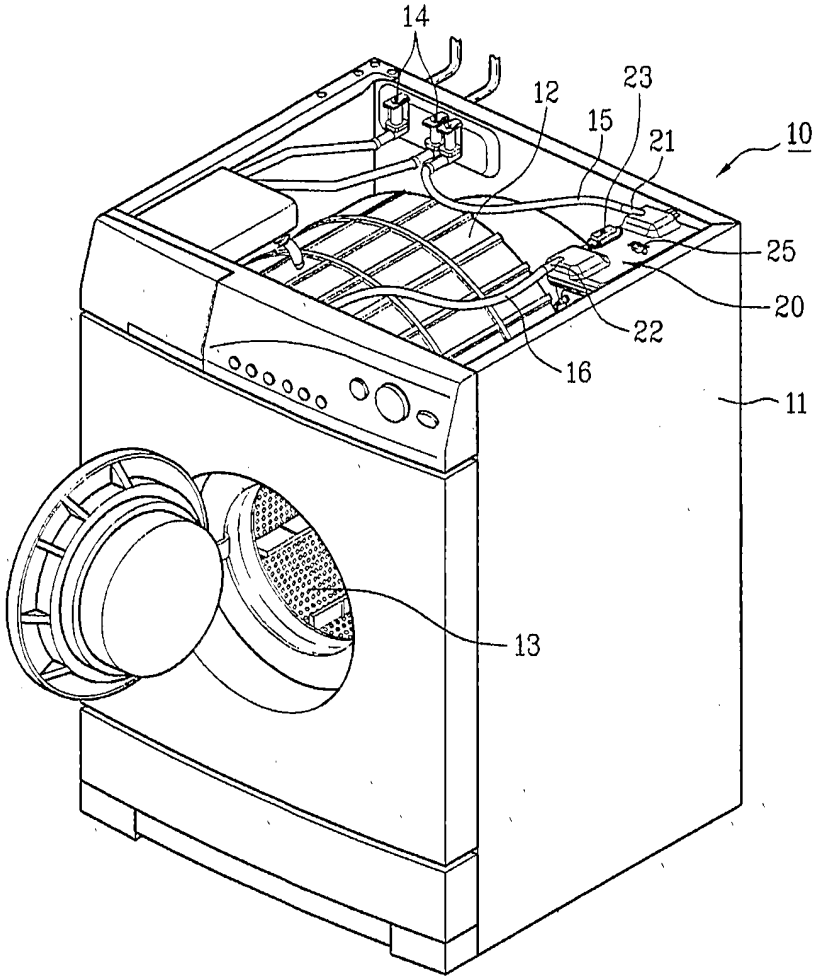
in the steam supply pipe.

[18] The laundry device as set forth in claim 17, wherein the air exhauster comprises:
a sub pipe branched from the steam supply pipe; and
a relief valve installed in the sub pipe.

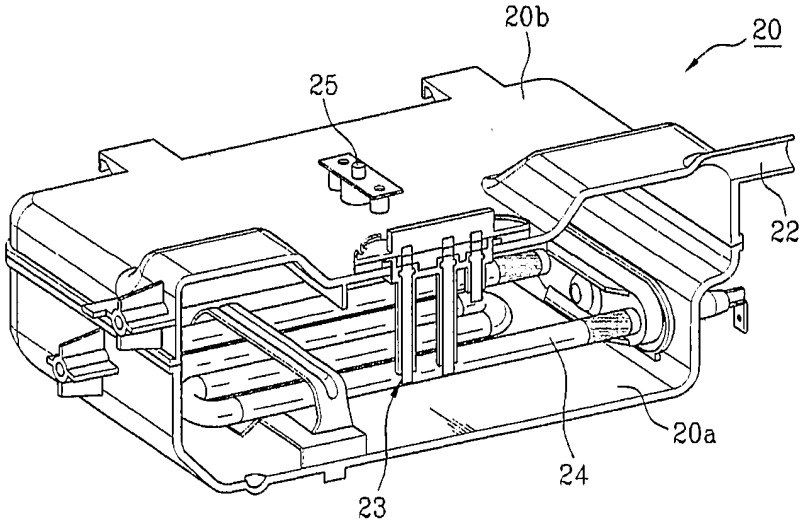
[19] The laundry device as set forth in claim 18, wherein the air exhauster further comprises an air exhaust pipe having one end connected to the relief valve and the other end connected to a drain channel of the laundry device.

[20] A laundry device comprising:
a steam generator comprising:
a case forming a space for containing water and provided with a water supply hole and a discharge hole;
a heater installed in the case;
a water oversupply prevention unit for preventing the water from being excessively supplied to the inside of the case or from adversely flowing toward the water supply hole; and
a backflow prevention unit for preventing steam generated from the case from adversely flowing through the water supply hole;
a water supply pipe connecting the water supply hole and a water supply valve;
a steam supply pipe connected to the discharge hole; and
an air exhauster for removing overpressure due to steam generated in the case.

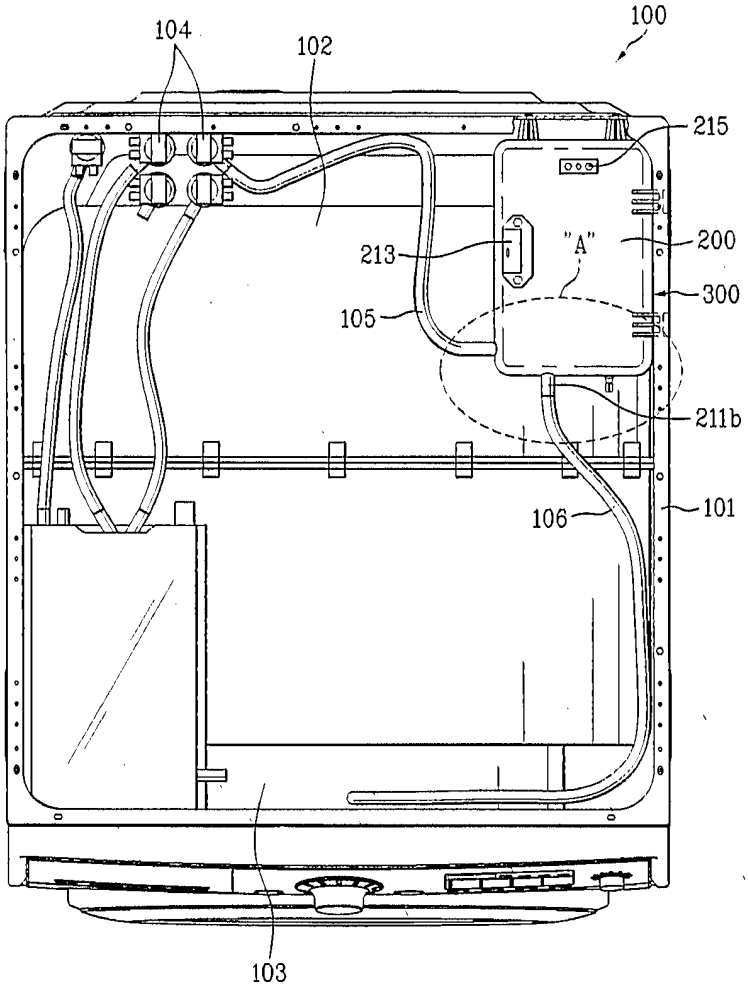
[Fig. 1]



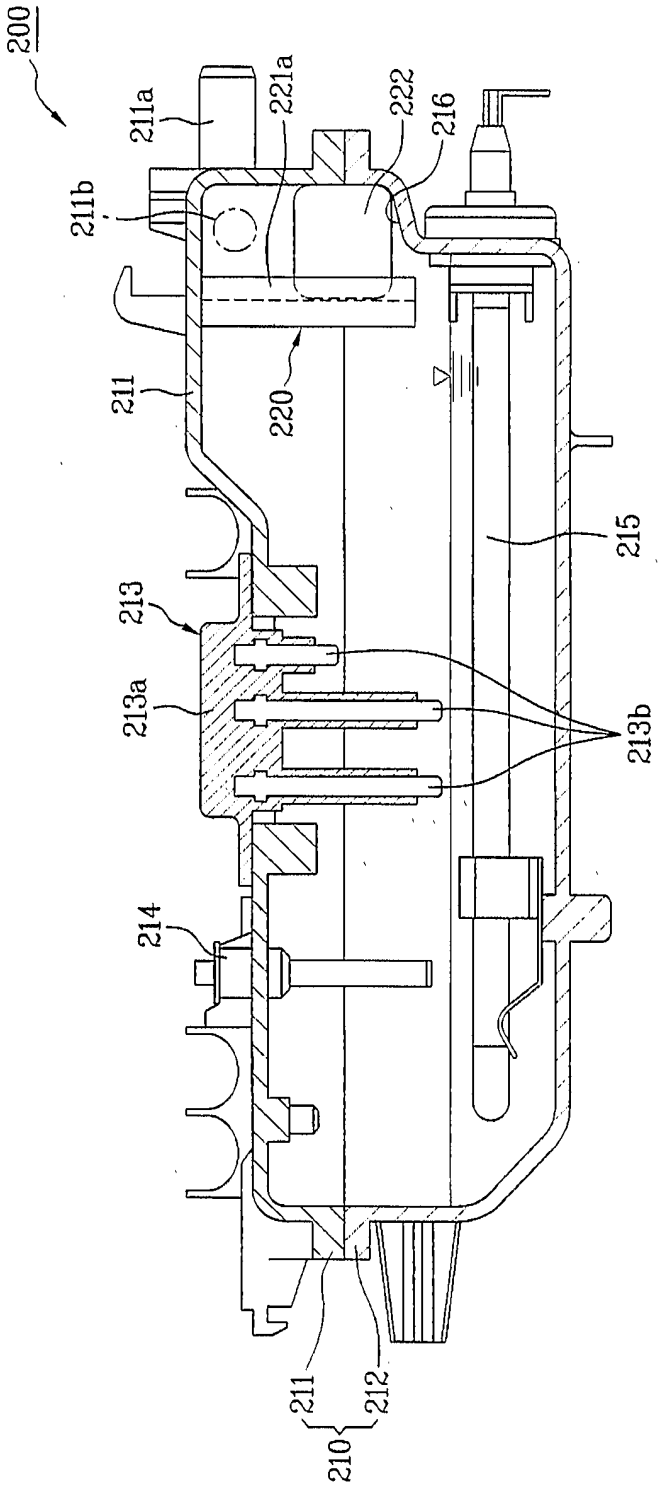
[Fig. 2]



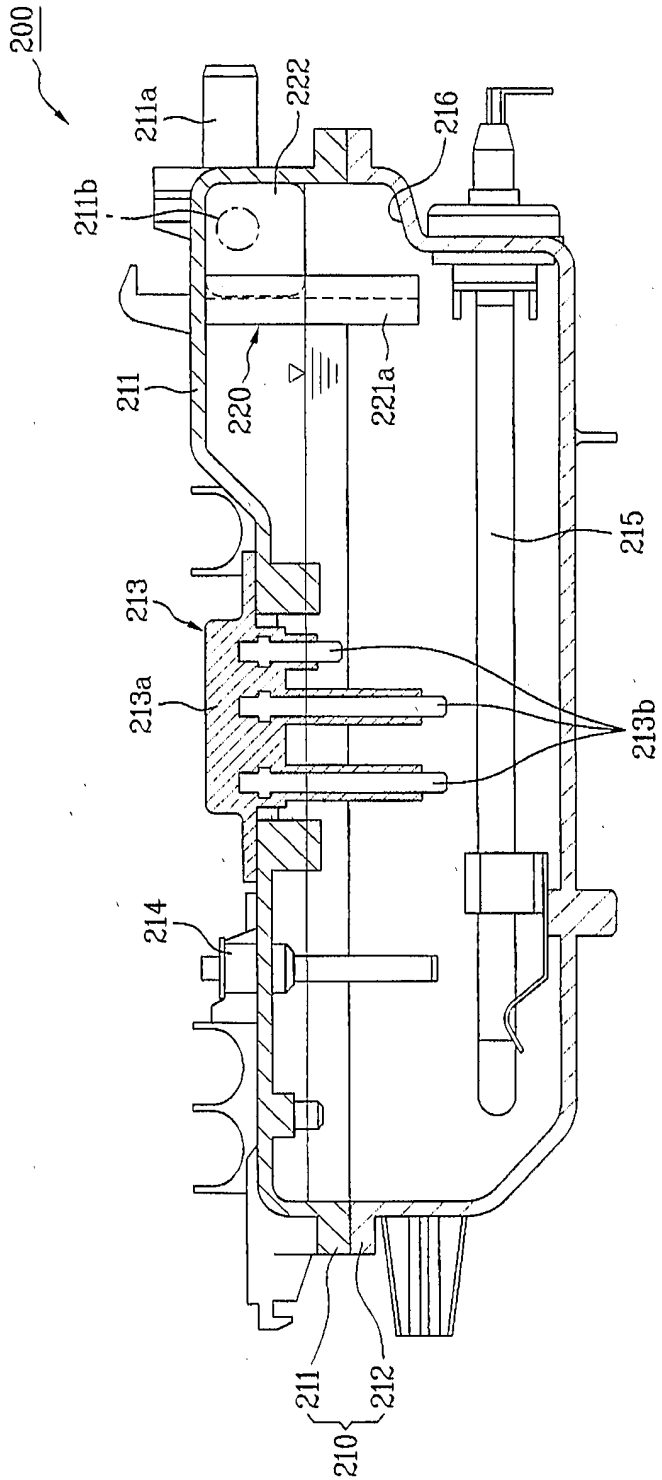
[Fig. 3]



[Fig. 4]


200
211a
221a
222
216
211b
220
211
215
213
213a
213b
214
211
212
210

[Fig. 5]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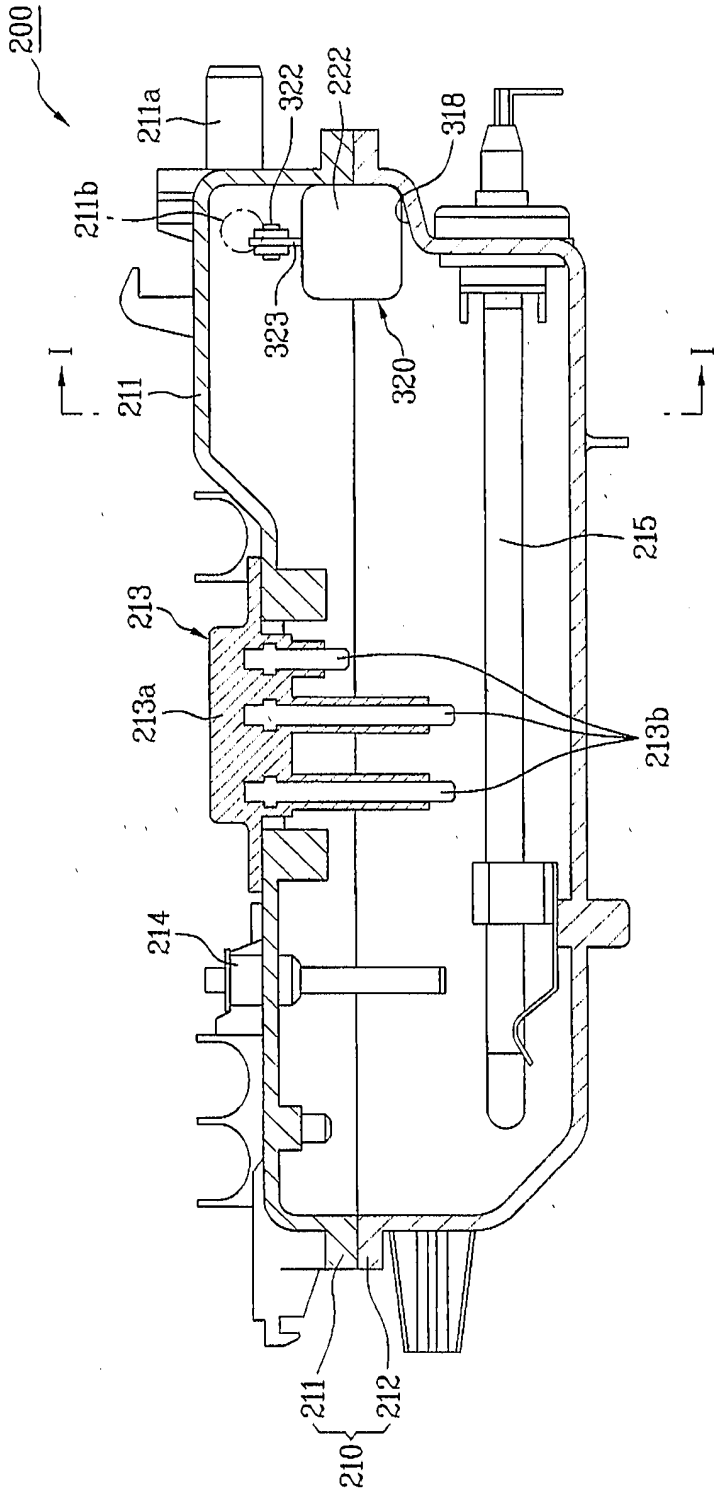
221a
215
213
213a
213b
214
211
212
210

[Fig. 6]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211a
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211b
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I
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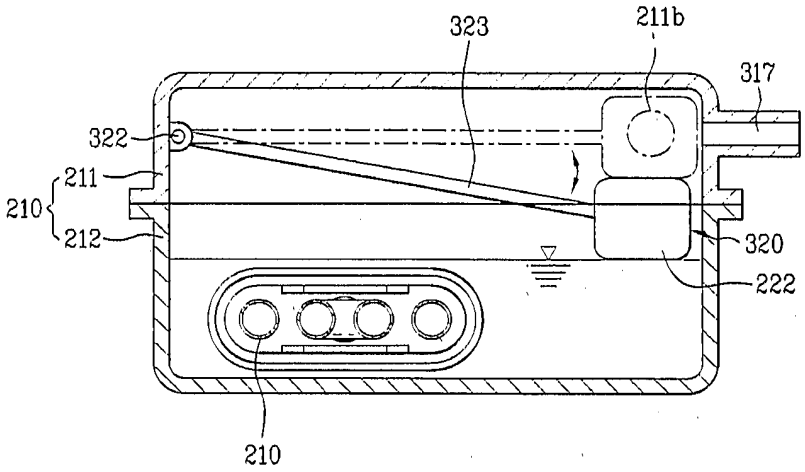
215
213
213a
213b
214
211
212
210

[Fig. 7]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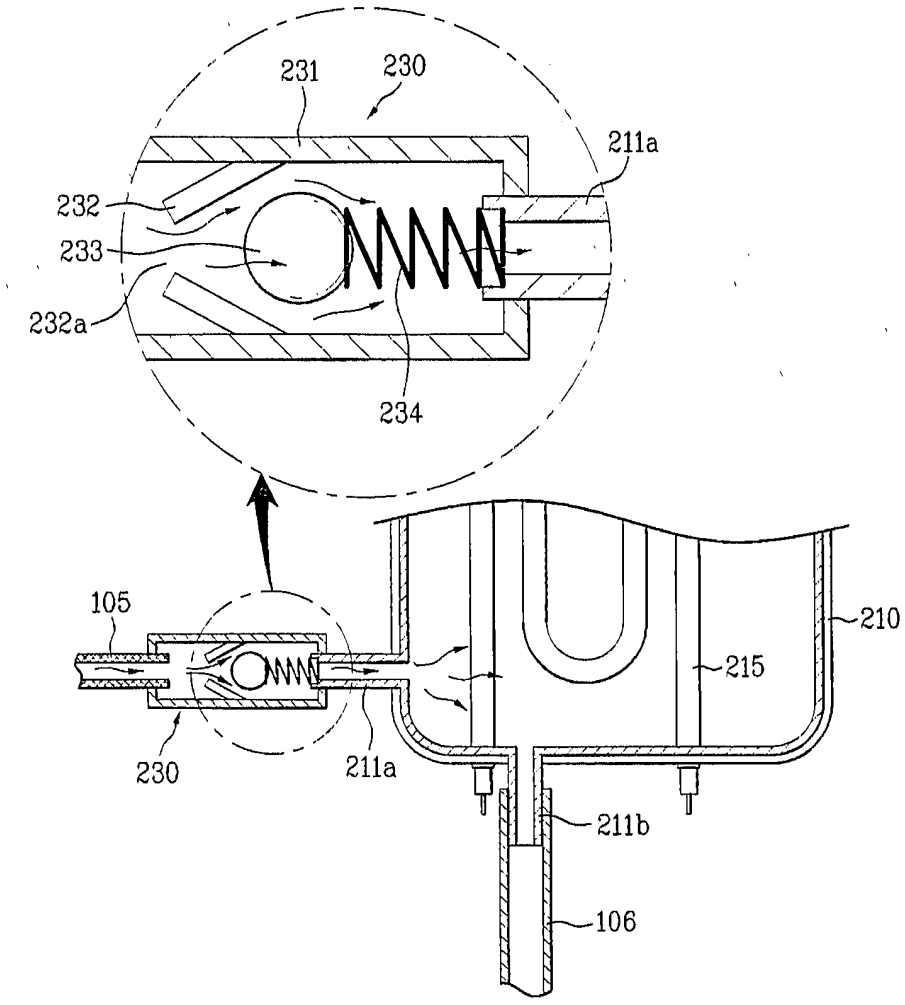
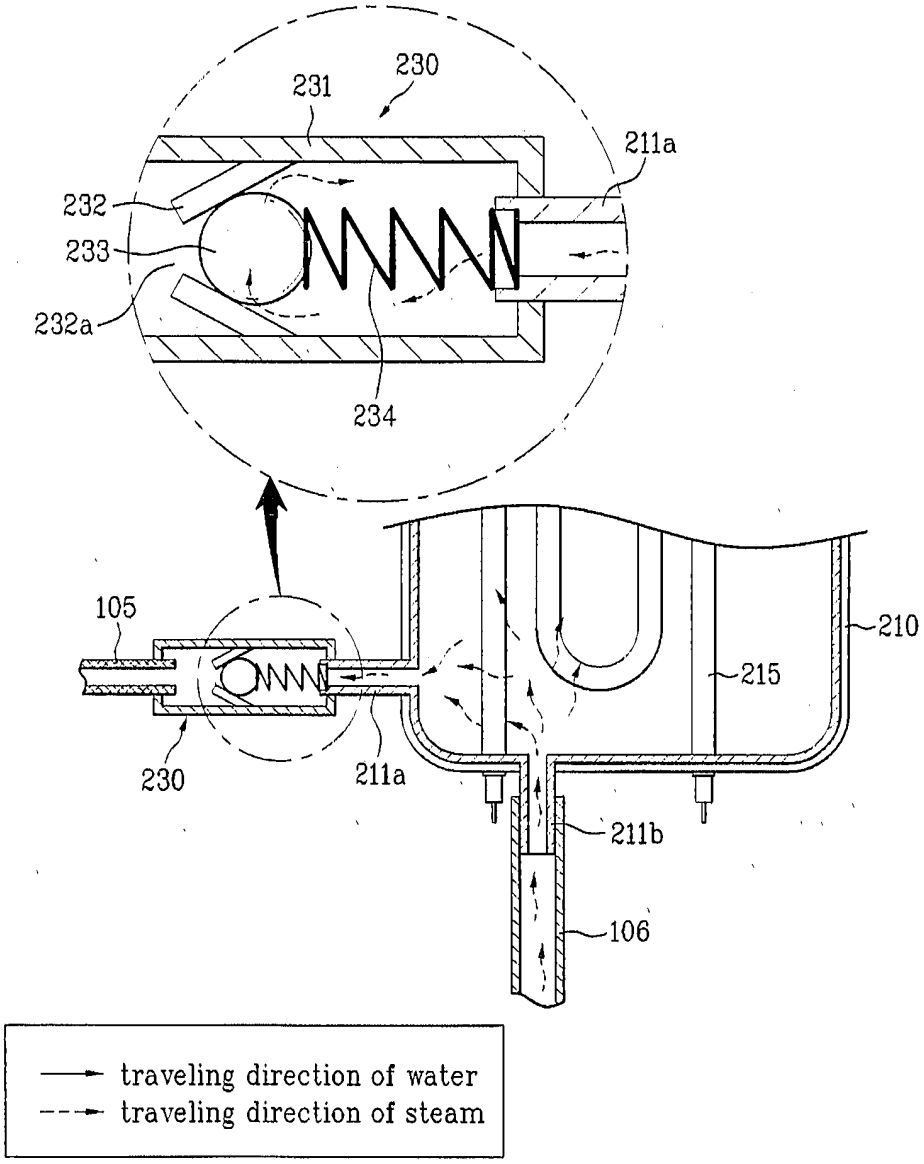
210

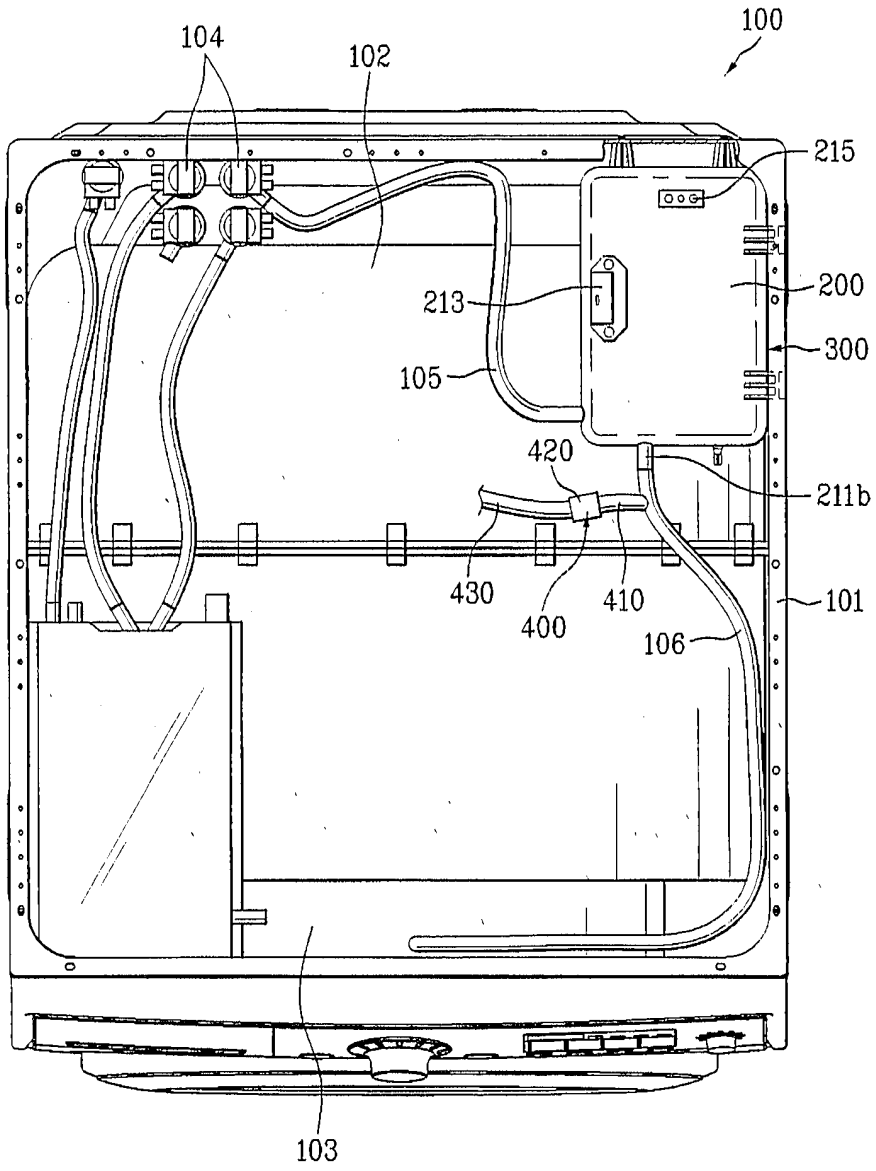
[Fig. 8]


231
230
211a
232
233
232a
234
105
210
215
230
211a
211b
106
traveling direction of water
traveling direction of steam

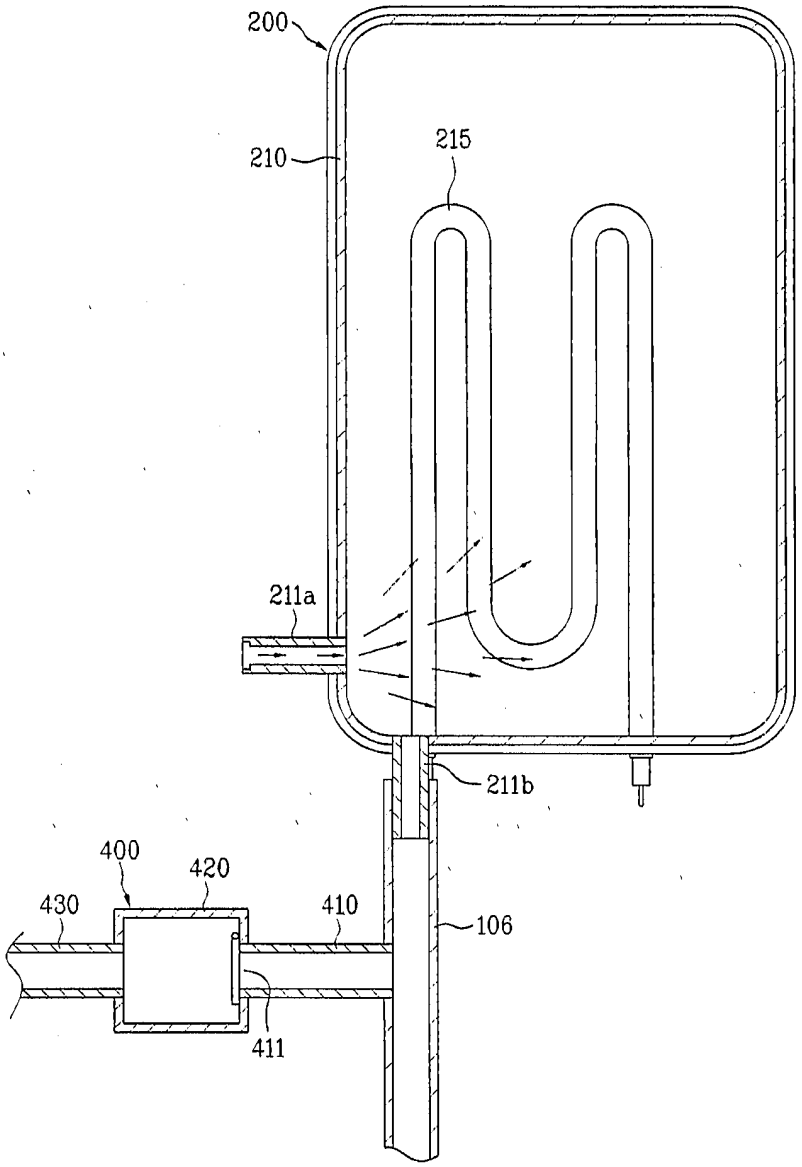
[Fig. 9]


231
230
211a
232
233
232a
234
105
210
215
230
211a
211b
106
traveling direction of water
traveling direction of steam

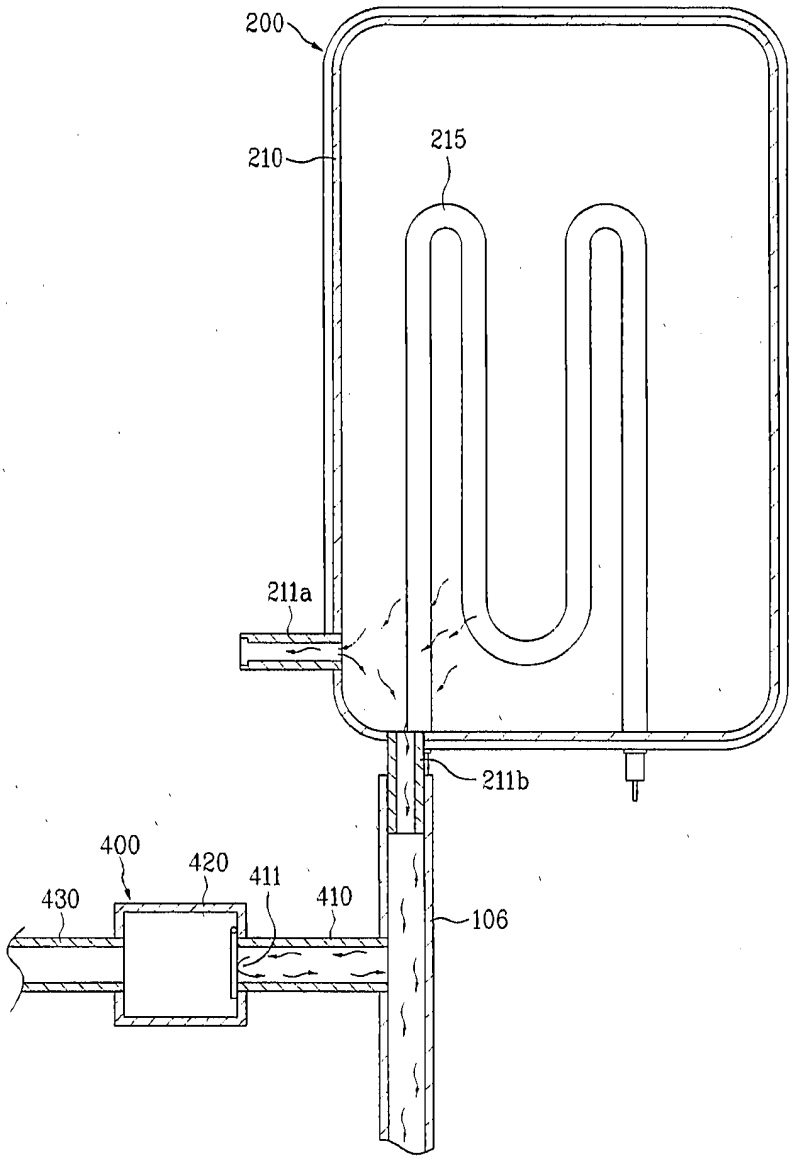
[Fig. 10]



[Fig. 11]



[Fig. 12]



[Fig. 13]