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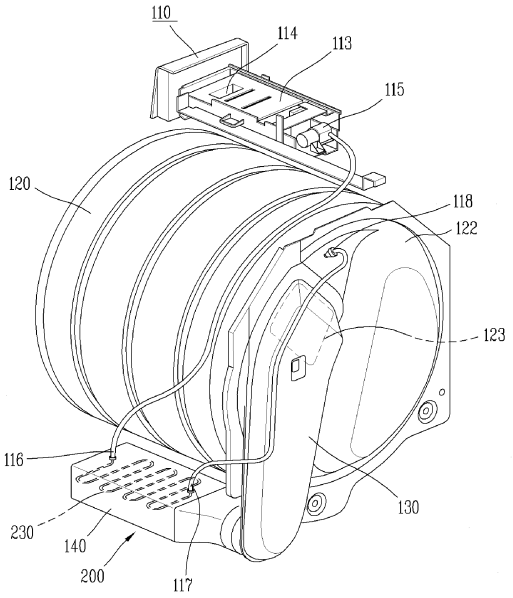
(54) CLOTHES DRYER HAVING A STEAM GENERATOR USING A HOT AIR HEATER

(57) A dryer having a steam generator having high energy efficiency and incurring a low fabrication cost is disclosed. The dryer includes: a drum rotatably mounted in the interior of a main body and accommodating the laundry; a duct guiding air supplied to the drum; a heater assembly provided within the duct and heating air supplied to the drum; and a steam generator disposed to be adjacent to the heater assembly and generating steam to be supplied to the drum by using heat generated by the heater assembly.

FIG. 2



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Description

1. Field of the Invention

[0001] The present invention relates to a clothes dryer and, more particularly, to a dryer having a steam generator generating steam by using heat of a hot air heater which heats air into the interior of a drum of the dryer.

2. Description of the Related Art

[0002] In general, a dryer is a device for drying the laundry by evaporating moisture of the laundry by supplying hot air to the interior of a drum when the laundry, which has been completely washed and spin-dried, is put into the drum.

[0003] As for the configuration of the dryer, the dryer includes a drum therein into which the laundry is put, a driving motor for driving the drum, a blow fan blowing air into the drum, and a heating unit for heating air introduced into the drum. The heating unit may be a resistance heater generating heat by using an electrical resistance or a burner generating heat by burning gas.

[0004] Air discharged from the drum of the dryer includes moisture of the laundry within the drum, so it is in a state of high temperature and high moisture. Here, dryers can be classified according to how the air of high temperature and high moisture (or hot and humid air) is processed. Namely, dryers may be divided into a condensing type dryer in which hot and humid air is circulated, rather than being discharged to the outside, and heat-exchanged with external air at a condenser to condense moisture included in the hot and humid air, and an exhaust-type dryer in which air in a high temperature and high moisture which comes out after passing through a drum is directly discharged to the outside.

[0005] The laundry put into the dryer after being completely washed includes a greater amount of creases, and such creases are not removed in a dry process, so after the laundry is dried, it must be ironed out. Also, besides the creases remaining after the washing operation, while the clothes are kept in storage in a closet, the clothes are creased or smell, or germs propagate in clothes, or the like. Thus, in order to solve such problems, a steam generator is installed in the clothes dryer to jet steam to the clothes being dried in the interior of the drum to remove creases or smell from the clothes or perform a sterilization function

[0006] In general, the steam generator installed in the dryer includes a header therein, apart from a heater generating hot air supplied to the drum. In detail, the steam generator includes a container for accommodating a certain amount of water and a heater provided in the container and heating water accommodated in the container. As the heater generates heats, water within the steam generator is heated to be steamed, and the generated steam is supplied to the interior of the drum. Also, the steam generator includes a reservoir temporarily storing water to be supplied to the container.

[0007] The related art steam generator of the dryer directly heats supplied water by using the heater separately provided therein to generate steam. In this case, however, when the heater is exposed to the outside of water as the amount of water stored in the steam generator is reduced due to the generation of steam, the heater may be overheated. Thus, for the reasons of security, the heater must be constantly immersed in water. Namely, water stored in the interior of the container of the steam generator must be maintained at a minimum water level at which the heater is constantly immersed therein. For this reason, the steam generator includes a waver level sensor for detecting whether or not stored water is reduced to reach the minimum waver level, and when water is reduced to reach the minimum water level, water is automatically supplied from the reservoir to the container of the steam generator.

[0008] Thus, since the related art steam generator requires the additional member such as the water level sensor for sensing a water level, the structure and the fabrication process of the steam generator are complicated. Also, since the heater for generating steam is installed in the heater for generating hot air, the structure and fabrication process are also complicated and a larger amount of energy is required to operate the dryer.

SUMMARY OF THE INVENTION

[0009] Therefore, in order to address the above matters, the various features described herein have been conceived.

[0010] An aspect of the present invention provides a dryer having a steam generator which has a simple structure and can be easily fabricated.

[0011] Another aspect of the present invention provides a dryer capable of improving energy efficiency by generating steam by using hot air heater for heating air, without using any additional heater for generating steam.

[0012] According to an aspect of the present invention, there is provided a dryer including: a drum rotatably mounted in the interior of a main body; a duct guiding air supplied to the drum; a heater assembly provided within the duct and heating air supplied to the drum; and a steam generator generating steam to be supplied to the drum by using heat generated by the heater assembly.

[0013] The steam generator may be a metal pipe bent zigzags near the heater assembly, and may receive radiant heat and convective heat from the heater assembly. The steam generator may be disposed in the vicinity of an air discharge portion of the heater assembly, or may be formed to surround the heater assembly.

[0014] The dryer may further include: a steam hose having one end connected to the steam generator and guiding steam discharged from the steam generator; and a nozzle provided at the other end of the steam hose and jetting steam to the drum.

[0015] The steam hose may be installed to be in con-

tact with the duct, and the steam generator may be formed of an aluminum pipe or a copper pipe.

[0016] The steam generator may include a first generator disposed at an upper side of the heater assembly and a second generator disposed at a lower side of the heater assembly.

[0017] The steam generator may further include a third generator connecting the first and second generators and disposed to be adjacent to a side portion of the heater assembly. The third generator may be disposed to be adjacent to a side portion of the heater assembly from which heated air is discharged.

[0018] The steam generator may further include an auxiliary generator disposed within the duct such that it is connected with the steam generator, and re-heating steam discharged from the steam generator.

[0019] The auxiliary generator may extend up to a discharge hole of the duct communicating with the drum along the duct. A nozzle may be mounted at the end of the auxiliary generator in order to jet steam to the interior of the drum from the discharge hole, and the auxiliary generator may be configured as a metal pipe extending elongatedly along the duct.

[0020] The dryer may further include: a steam hose connected to the steam generator and guiding steam discharged from the steam generator; and a nozzle provided to the end of the steam hose and jetting steam to the interior of the drum, wherein the nozzle may be installed at a rear supporter rotatably supporting a rear end portion of the drum, or at the duct.

[0021] The auxiliary generator may extend up to the discharge hole of the duct communicating with the drum, and the nozzle may be mounted at the end of the auxiliary generator to jet steam to the interior of the drum from the discharge hole.

[0022] The dryer may further include: a reservoir storing water supplied to the steam generator; and a water supply hose guiding water from the reservoir to the steam generator, wherein the reservoir is configured as a cartridge detachably installed at a drawer which is installed at a front upper portion of the main body such that it can be drawn out. The dryer may further include: a pump or a valve for opening and shutting the water supply hose.

[0023] According to embodiments of the present invention, since the steam generator can generate steam without having to use an additional heater for generating steam, the component required for the manufacturing process can be reduced to simplify the structure and facilitate the fabrication. Also, since steam is generated by using heat of the heater assembly in the interior of the dryer, required energy is reduced.

[0024] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

FIG. 1 is a perspective view of a dryer having a steam generator according to an embodiment of the present invention;

FIG. 2 is a perspective view of a steam generator according to a first embodiment of the present invention;

FIG. 3 is a detailed partial perspective view of the steam generator according to the first embodiment of the present invention;

FIG. 4 is a partial perspective view of a modification of the steam generator according to the first embodiment of the present invention;

FIG. 5 is a perspective view of a steam generator according to a second embodiment of the present invention; and

FIG. 6 is a detailed partial perspective view of the steam generator according to the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0026] A dryer according to embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[0027] FIG. 1 is a perspective view of a dryer having a steam generator according to an embodiment of the present invention. FIG. 2 is a perspective view of a steam generator according to a first embodiment of the present invention. FIG. 3 is a detailed partial perspective view of the steam generator according to the first embodiment of the present invention.

[0028] With reference to FIG. 1, a clothes dryer 100 according to an embodiment of the present invention includes a main body including a front cover 101, a side cover 102, a rear cover (not shown), and a top plate (not shown), and a drum 120 installed within the main body. The drum 120 is rotatably installed within the main body and accommodates the laundry to be dried. Further, the clothes dryer 100 includes a door 104 mounted on a front surface of the front cover 101 and opening and closing an opening of the drum 120, and a control panel 103 provided at an upper portion of the front cover 101 including various buttons for inputting dry conditions. The drum 120 has a shape of a hollow cylinder with front and rear end portions opened. Namely, openings are formed at the front and rear end portions of the drum 120. The drum 120 is supported by a front supporter (not shown0 installed at a front portion in the interior of the main body and a rear supporter 122 (See FIG. 2) installed at a rear portion in the interior of the main body. In detail, an opening communicating with the opening of the front end portion of the drum 120 is formed at the front supporter, and a rim is formed at an outer circumferential portion of the opening. An inner circumferential surface of the rim of

the front supporter rotatably supports an outer circumferential surface of the front end portion of the drum 120. The opening of the front end portion of the drum 120 communicates with an outer side of the main body through the opening of the front supporter, and is opened and closed by the door 104. A user may open the door 104 and put the laundry into the drum 120 through the openings of the front end portion of the drum 120 and the front supporter. Also, the rear supporter 122 includes a recess, and an inner circumferential surface of the recess rotatably supports an outer circumferential surface of the rear end portion of the drum 120. Thus, the front supporter and the rear supporter 122 are stopped, while the drum 120 can be supported by the stopped supporters such that it can be relatively rotatable.

[0029] Although an internal structure of the dryer is not illustrated in detail, but the clothes dryer may include a blow fan for circulating air in the interior of the drum 120, and a heat exchanger is provided at a lower portion of the dryer and heat exchanges with air circulated in the interior of the dryer to condense moisture included in the circulated air. Air discharged from the drum 120 is introduced again into the interior of the drum 120, and here, in order to allow air discharged from the drum 120 to be introduced into the drum 120 again, a duct is provided. As described above, since the front supporter and the rear supporter 122 are fixed, a suction portion and a discharge portion of the duct cannot be connected to the drum 120, so the suction portion and a discharge portion of the duct may be connected to the fixed front supporter and the rear supporter 122 so as to communicate with the interior of the drum 120. Also, a heater assembly 200 for heating air introduced into the drum 120 is provided in the interior of the duct. As shown in FIG. 2, the duct may include an intermediate duct 140 and a rear duct 130. Various adjunctive devices such as a heat exchanger, a blow fan, or the like, as well as the heater assembly 200, may be installed in the intermediate duct 140. FIG. 2 shows merely a portion of the intermediate duct 140 accommodating the heater assembly 200, and like the heater assembly 200, the heat exchanger and the blow fan may also be installed in the intermediate duct 140. The rear duct 130 is connected with the intermediate duct 140 and is also connected to the rear supporter 122 so as to communicate with the drum 120. In detail, the rear supporter 122 includes an opening 123 communicating with a rear end portion of the opened drum 120, and the end of the rear duct 130 is connected with the opening 123. Accordingly, the rear duct 130 supplies air dried by the heat exchanger within the intermediate duct 140 and heated by the heater assembly 200 into the drum 120 through the opening 123. Also, although not shown, a front duct may be connected in front of the intermediate duct 140 and sucks air within the drum 120 having a relatively high humidity and a relatively low temperature according to drying of the laundry. The heater assembly 200 may be configured as a resistance coil heater using electrical resistance heat or may be configured as a burner generating heat by burning gas. Hereinafter, the use of a resistance coil heater will be taken as an example, but it is natural that the embodiment of the present invention can also be applicable to a burner. Also, the disposition of the foregoing duct structure, the heat exchanger, and the heater assembly have been described based on the condensing type dryer, but the dryer according to an embodiment of the present invention may have a duct structure according to an exhaust-type dryer and a corresponding disposition of relevant components thereof. In actuality, the condensing type dryer and the exhaust-type dryer are discriminated only based on how air is circulated, so it can be understood that a steam generator and relevant components to be described hereinafter can be applicable to an exhaust-type dryer without any additional deformation.

[0030] FIG. 2 schematically shows a steam generator along with other relevant components according to a first embodiment of the present invention. As illustrated, a drawer 110 is provided to be drawn out from the front cover 101 of the dryer main body, and a cartridge 113 which corresponds to a reservoir for storing water is detachably mounted on the drawer 110. The drawer 110 is installed at an upper portion of the front cover 101 of the dryer such that it is drawn out to a front side of the main body. Preferably, the drawer 110 is installed at the side of the control panel 103 of the upper portion of the front cover. A handle 114 is provided to the cartridge 113, and the user can easily detach the cartridge 113 from the drawn drawer 110 or mount the cartridge 113. Also, the heater assembly 220 for heating air introduced to the interior of the drum is provided in the intermediate duct 140 positioned at a lower portion of the clothes dryer. A steam generator 230 is provided near the heater assembly 230 in the interior of the intermediate duct 140. The steam generator 230 converts water into steam upon receiving heat from the heater assembly. The cartridge 113 and the steam generator 230 are connected by a water supply hose 116, and a pump 115 is provided to the water supply hose 116. Water stored in the cartridge 113 is supplied through the water supply hose 116 to the steam generator 250 so as to be converted into steam. The pump 115 opens and shuts the water supply hose 116 to adjust the amount of water supplied from the cartridge 113 to the steam generator 230. Namely, when steam is required to be generated, the pump 115 opens the water supply hose 116 to supply water to the steam generator 230. Then, the water supplied to the steam generator is converted into steam.

[0031] In the present embodiment, the case in which the pump is used to adjust the amount of water supplied to the steam generator 230 is taken as an example, but the present invention is not necessarily limited thereto. Namely, a valve may be provided at the water supply hose 116, and the amount of water supplied to the steam generator may be adjusted by opening and shutting the hose. As shown in FIG. 2, in the present embodiment, the cartridge 113 is provided at the left upper portion and

the steam generator is provided at the right lower portion based on the front side of the dryer. Thus, water supplied to the steam generator 230 may also be adjusted by the valve by using the difference in height between the cartridge 113 and the steam generator 230.

[0032] In FIG. 3, the steam generator 230 according to the first embodiment of the present invention is illustrated along with the heater assembly 200 in detail. First, the heater assembly 200 may basically include a heating unit, and the heating unit includes a support 201 and a resistance coil 202 wound on or around the support 201. The support 201 is made of an insulating material with respect to electricity and heat, and the resistance coil 202 generates heat by using electrical resistance. A plurality of heating units may be configured to constitute a resistance coil 202.

[0033] In FIG. 3, the steam generator 230 and the heater assembly 200 according to a first embodiment of the present invention are illustrated in detail. First, the heater assembly 200 basically includes a heating unit, and the heating unit includes a support body 201 and a resistance coil 202 wound on or around the support body 201. The support body 201 is made of an insulating material with respect to electricity and heat, and the resistance coil 202 generates heat by using an electrical resistance. A plurality of heating units constitute a single heater assembly 200. As shown in FIG. 5, the heater assembly 200 may further include a support plate 203 to which the heating units are inserted, and the heating units can be stably fixed within the duct by virtue of the support plate 203. The steam generator 230, which changes water into steam upon receiving heat from the heater assembly 200, is further provided in the interior of the duct 140. The steam generator 230 is a metal pipe having a certain diameter and positioned at one portion of the heater assembly 200. In the present embodiment, the steam generator 230 is disposed zigzags at an upper portion of the heater assembly 200. However, the configuration in which the steam generator 230 is disposed is not limited thereto, and the steam generator 230 may be disposed zigzags at the upper portion and both side faces of the heater assembly 200. The steam generator 230 formed of a metal pipe may be advantageously formed of a copper pipe in terms of heat transmission.

[0034] An inlet 231 and an outlet 232 may be provided at both end portions of the steam generator 230 and protruded from the outer side of the duct. The inlet 231 is a passage through which water from the cartridge 113 is introduced to the interior of the steam generator 230, and the outlet 232 is a passage through which steam generated by the steam generator 230 is discharged. The water supply hose 116 is connected to the inlet 231 to allow water stored in the cartridge 113 to flow into the steam generator 230 therealong, and the steam hose 117 is connected to the outlet 232 to allow steam generated by the steam generator to be discharged therealong. In consideration of the temperature of the steam flowing to the interior of the steam hose 117, the steam hose 117 is preferably formed of a metal pipe. The steam generator 230 heats water stored therein to convert the water into steam upon indirectly receiving heat generated by the heater assembly by a convective heat through air or upon directly receiving heat generated by the heater assembly through radiation. As mentioned above, the steam generator 230 is a metal pipe having a small diameter, so a small amount of water flows in the steam generator. Also, the steam generator 230 is disposed zigzags, it has a considerably large electric heating area. Thus, the small amount of water flowing in the steam generator 230 can be quickly heated and converted into steam. The steam generator 230 may be formed of a copper pipe or aluminum pipe in order to enhance a heat transfer coefficient.

[0035] A nozzle 118 is provided at the end of the steam hose 117 to jet steam to the drum 120. As shown in FIG. 2, the nozzle 118 may be installed on a rear supporter 122 supporting the drum 120 at a rear end. When the temperature of steam flowing in the interior of the steam hose 117 is lowered, steam may be condensed on an inner wall of the steam hose 117. In order to prevent this, as shown in FIG. 2, the steam hose 117 may be installed to be close to an outer wall of the rear duct 130, a passage through which hot air heated by the heater flows into the drum. Preferably, the steam hose 117 is attached to the rear duct 130 to thus receive high temperature heat from the rear duct 130. Also, in order to prevent internal condensation upon receiving heat of the rear duct 130, the steam hose may be fabricated in the form of a metal pipe having a good heat transfer coefficient. The nozzle 118 provided at the end of the steam hose 117 is installed at the rear supporter 122 supporting the rear side of the dryer drum 120, and steam is jetted to the interior of the drum through the opened rear end portion of the drum 120 from the nozzle 118.

[0036] FIG. 4 shows another embodiment of an installation of the nozzle 118. Also, in FIG. 4, in order to prevent steam passing through the interior of the steam hose 117 from being condensed, the steam hose 117 is installed to be tightly attached to the rear duct 130. Also, the nozzle 118 is installed at an upper side of the rear duct 130 and installed to be close to an entrance, i.e., an opening unit 123, through which hot air is introduced into the drum. According to this configuration, the steam hose 117 and the nozzle 118 can continuously receive heat from the rear duce 130, and accordingly, steam flowing in the interior of the steam hose 117 can be prevented from being condensed.

[0037] FIG. 5 is a perspective view of a steam generator according to a second embodiment of the present invention, and FIG. 6 is a detailed partial perspective view of the steam generator according to the second embodiment of the present invention. The steam generator according to the second embodiment of the present invention will now be described with reference to FIGS. 5 and 6.

[0038] As shown in FIGS. 3 to 6, air within the intermediate duct 140 is first introduced to the front side of the heater assembly 200, and while air is passing through

the heater assembly 200, air is sequentially heated by the heating units of the heater assembly 200. Thereafter, the heated air is discharged from the rear side of the heater assembly 200. In consideration of such a heating process, air, which is introduced in a state of not having been heated, absorbs a great quantity of heat from the front portion, compared with the rear portion of the heater assembly 200. Thus, the rear portion of the heater assembly 200 retains relatively a great quantity of heat which can be used for heating. Meanwhile, since air heating is completed at the rear portion of the heater assembly 200 in actuality, air at the rear portion has a considerably high temperature compared with air at the front portion of the heater assembly 200. Thus, air at the rear portion has a greater quantity of thermal energy which can heat a different object, compared with the air at the front portion of the heater assembly 200. For this reason, the rear portion, i.e., an air discharge portion, of the heater assembly 200, has both a high capability of indirectly supplying thermal energy to the steam generators 230 and 330 by a convection current by using air having high temperature around it and a high capability of directly supplying thermal energy to the steam generators 230 and 330 by radiation of thermal energy from the heater assembly 200. Thus, the steam generator 300 according to the second embodiment of the present invention is configured to be disposed only at the rear portion, i.e., only in the vicinity of the air discharge portion, of the heater assembly 200. The steam generator 330 according to the second embodiment of the present invention can effectively, efficiently generate steam by using high heating capability of the rear portion (i.e., the discharge portion) of the heater assembly. Also, compared with steam generator 220 extending over the entirety of the heater assembly 200 according to the first embodiment of the present invention, the steam generator 300 has a structure which is simpler and easier to be fabricated, and accordingly, the fabrication cost and productivity can be increased.

[0039] Also, the steam generator 300 may be configured to cover the heater assembly 200 to have a higher heating efficiency. In detail, as shown in FIG. 6, the steam generator 300 basically includes a first generator 331 disposed at an upper side of the rear portion (i.e., the discharge portion) of the heater assembly 200. Namely, the first generator 331 is disposed to be spaced part from the upper surface of the rear portion (discharge portion). Also, the steam generator 330 may include a second generator 332 disposed at a lower side of the rear portion (discharge portion) of the heater assembly 200. In other words, the second generator 332 is disposed to be spaced apart from the lower surface of the rear portion (discharge portion0. The first and second generators 331 and 332 use both upper and lower rear portions of the heater assembly having the highest heating capabilities, thereby significantly increasing the heating efficiency. In addition, the steam generator 300 may include a third generator 333 connecting the first and second generators 331 and 332 and disposed to be adjacent to a side portion of the rear portion of the heater assembly 200. The third generator 333 may be disposed to be adjacent to a left portion or a right portion of the rear portion of the heater assembly 200. However, as illustrated, it is advantageous for the third generator 333 to be disposed to be adjacent to the side portion of the rear portion (discharge portion), i.e., the rear end portion, of the heater assembly from which air having the highest temperature is directly discharged, in order to increase the heating efficiency. Like the first embodiment as described above, the steam generator 330, namely, the first to third generators 331, 332, and 333, may be formed of metal pipes bent zigzags to be parallel to the surface of the facing heater assembly 200. Accordingly, when water is supplied through an inlet 335, the water is immediately converted into steam through the first to third generators 331 to 333 and discharged through an outlet 336.

[0040] When the afore-mentioned content is considered, the steam generator 330 covers the portion having the highest heating capabilities of the heater assembly 200, while increasing the electric heating area. For this reason, the heating efficiency of the steam generator 330 according to the second embodiment can be maximized.

[0041] Like the steam generator 220 according to the first embodiment, the outlet 336 is protruded from outside of the duct, and the team hose 117 may be connected along with the nozzle 118 to the outlet 336. Accordingly, the discharged steam may be supplied to the interior of the drum 120 through the steam hose 117 and the nozzle 118. However, as described above, since the steam hose 117 is exposed to the outer side of the duct, steam may be condensed due to a lowered temperature, so the amount and quality of the steam may be degraded. Thus, as shown in FIG. 5, the steam generator 220 according to the second embodiment of the present invention may further include an auxiliary generator 334. The auxiliary generator 334 is connected to the team generator 330, accurately, to the outlet 336, and disposed within the duct, i.e., the rear duct 130. In detail, the auxiliary generator 334 extends to become away from the heater assembly 200 along a direction in which heated air discharged from the heater assembly 200 flows. Namely, the auxiliary generator 334 additionally extends from the steam generator 330 along the rear duct 130, and continuously extends toward the drum 120, accurately, the discharge hole of the duct communicating with the drum 120. Like the first to third generators, the auxiliary generator 334 may be formed of metal pipes. Although the auxiliary generator 334 is illustrated to extend in a straight line, but it may be bent zigzags in order to have an increased electric heating area. Steam discharged from the steam generator 330 is re-heated by hot air flowing in the interior of the duct, while passing through the auxiliary generator 334, and is not condensed. The amount and quality of steam actually supplied to the drum 120 can be considerably increased by the auxiliary generator 334.

[0042] Meanwhile, as shown in FIG. 5, an end portion of the auxiliary generator 334 may extend to the outer side through the rear duct 130, and an outlet 337 may be formed at the end portion in order to allow steam to be discharged therethrough. In this case, like the steam generator 220 according to the first embodiment, the steam hose 117 may be connected thereto, and the nozzle 118 is provided at the end of the steam nose 117. As shown in FIG. 2, the nozzle 118 may be installed at the rear supporter 112 rotatably supporting the rear end portion of the drum 120, or may be installed at the rear duct 130 such that it is adjacent to the opening 123 of the rear supporter 122, preferably, at a portion, of the rear duct 130, communicating with the drum 120. Meanwhile, unlike that illustrated in FIG. 5, the end portion of the auxiliary generator 334 may not be protruded to the outer side of the duct, and the auxiliary generator 334 itself may extend up to the discharge hole, i.e., the opening 123, of the duct communicating with the drum 120 along the rear duct 130. In such a case, the nozzle 118 may be mounted at the end of the auxiliary generator 334 such that it can jet steam to the interior of the drum 120 from the discharge hole.

[0043] Also, like the steam generator 220 according to the first embodiment, the inlet 335 is connected to the water supply hose 116 to allow water to be introduced to the interior of the steam generator from the cartridge 113. Also, the steam generator 330 may be formed of an aluminum pipe or a copper pipe.

[0044] Hereinafter, a drying process of the dryer having the foregoing steam generator will now be described.

[0045] First, the user puts the laundry into the drum 120 and inputs a steam dry course through the input unit of the control panel to start a drying process. Then, hot and dry air heated by the heater assembly 230 is introduced to the interior of the drum 120 of the dryer, heating and drying the clothes. While the drying operation is performed or after the drying operation is completed, when a time for jetting steam to the interior of the drum arrives, the pump 115 operates to supply water stored in the cartridge 113 to the steam generators 230 and 330 through the water supply hose 116. The supplied water is changed into steam instantly or within a short time in the steam generator 220 and 230 upon receiving heat from the heater assembly 200. The steam generated in the steam generator is jetted to the interior of the drum 120 through the stem hose 117 and the nozzle 118. In this case, as for a point in time at which steam is to be jetted, the user may manually manipulate the control panel to jet steam, or the point in time at which steam is to be jetted may be automatically determined by the controller of the dryer according to the dry course selected by the user. After the dry process is performed several times in the dryer, when water stored in the cartridge 113 is consumed, the user to supplement water. In the respective embodiments of the present invention, steam is generated by using heat of the heater assembly 200, so an additional heater for generating steam is not required.

[0046] As the present invention may be embodied in several forms without departing from the characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds are therefore intended to be embraced by the appended claims.

Claims

1. A dryer comprising:

a drum rotatably mounted in the interior of a main body;
a duct guiding air supplied to the drum;
a heater assembly provided within the duct and heating air supplied to the drum; and
a steam generator generating steam to be supplied to the drum by using heat generated by the heater assembly.

2. The dryer of claim 1, wherein the steam generator is a metal pipe bent zigzags near the heater assembly, and receives radiant heat and convective heat from the heater assembly.

3. The dryer of claim 2, wherein the steam generator is disposed in the vicinity of an air discharge portion of the heater assembly.

4. The dryer of claim 3, wherein the steam generator is formed to surround the heater assembly.

5. The dryer of claim 1, further comprising:

a steam hose having one end connected to the steam generator and guiding steam discharged from the steam generator; and
a nozzle provided at the other end of the steam hose and jetting steam to the drum.

6. The dryer of claim 5, wherein the steam hose is installed to be in contact with the duct.

7. The dryer of claim 1, wherein the steam generator is formed of an aluminum pipe or a copper pipe.

8. The dryer of claim 1, wherein the steam generator comprises a first generator disposed at an upper side of the heater assembly and a second generator disposed at a lower side of the heater assembly.

9. The dryer of claim 8, wherein the steam generator

further comprises a third generator connecting the first and second generators and disposed to be adjacent to a side portion of the heater assembly.

10. The dryer of claim 9, wherein the third generator is disposed to be adjacent to a side portion of the heater assembly from which heated air is discharged.

11. The dryer of claim 8, wherein the steam generator further comprises an auxiliary generator disposed within the duct such that it is connected with the steam generator, and re-heating steam discharged from the steam generator.

12. The dryer of claim 11, wherein the auxiliary generator extends up to a discharge hole of the duct communicating with the drum along the duct, and a nozzle is mounted at the end of the auxiliary generator in order to jet steam to the interior of the drum from the discharge hole.

13. The dryer of claim 11, wherein the auxiliary generator is configured as a metal pipe extending elongatedly along the duct.

14. The dryer of claim 8, further comprising:

a steam hose connected to the steam generator and guiding steam discharged from the steam generator; and
a nozzle provided to the end of the steam hose and jetting steam to the interior of the drum.

15. The dryer of claim 14, wherein the nozzle is installed at a rear supporter rotatably supporting a rear end portion of the drum, or at the duct.

16. The dryer of claim 14, wherein the auxiliary generator extends up to the discharge hole of the duct communicating with the drum, and the nozzle is mounted at the end of the auxiliary generator to jet steam to the interior of the drum from the discharge hole.

17. The dryer of claim 1, further comprising:

a reservoir storing water supplied to the steam generator; and
a water supply hose guiding water from the reservoir to the steam generator.

18. The dryer of claim 17, wherein the reservoir is configured as a cartridge detachably installed at a drawer which is installed at a front upper portion of the main body such that it can be drawn out.

19. The dryer of claim 17, further comprising:

a pump or a valve for opening and shutting the water supply hose.

20. The dryer of claim 8, wherein the steam generator is formed of an aluminum pipe or a copper pipe.

FIG. 1

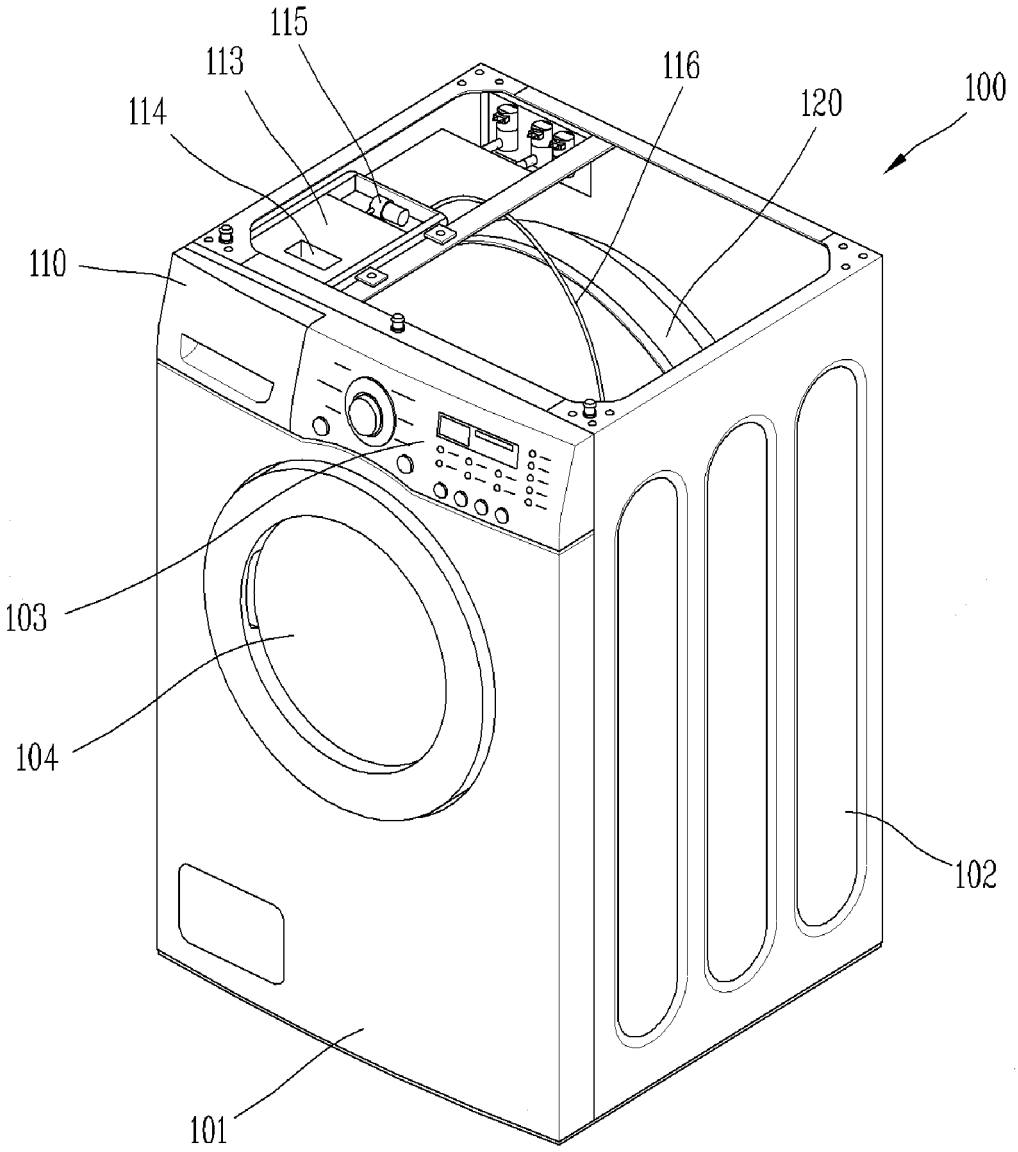

FIG. 2

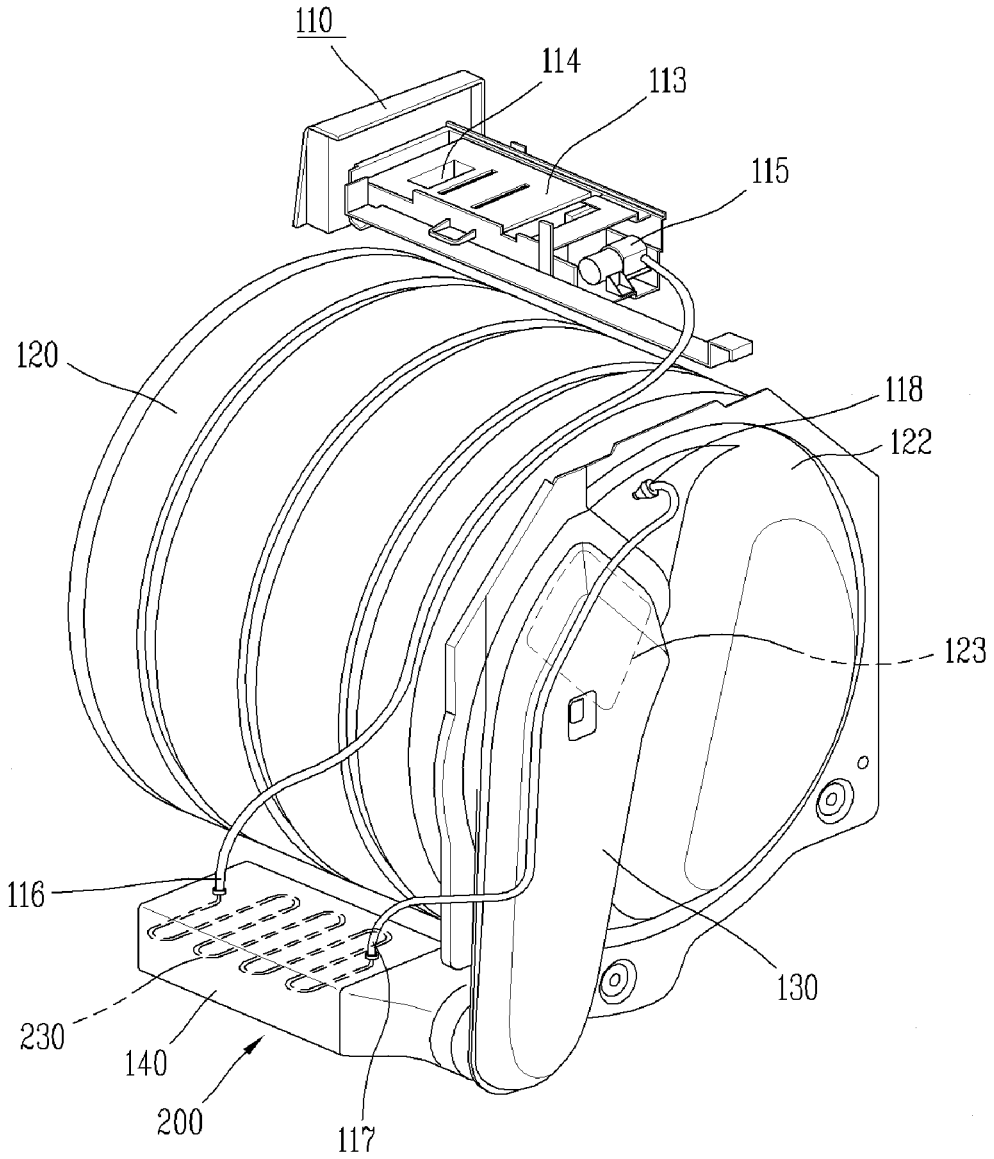

FIG. 3

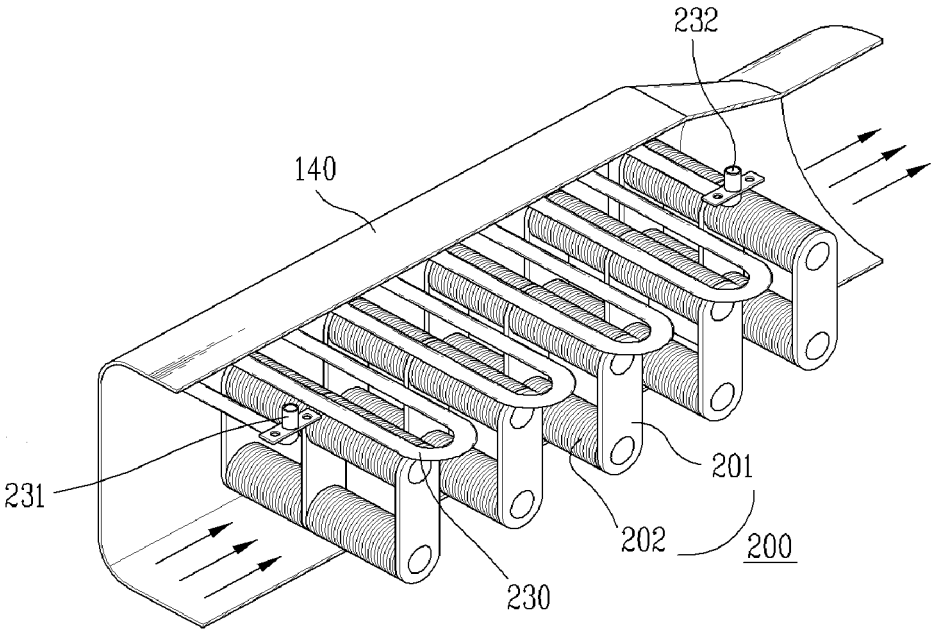

FIG. 4

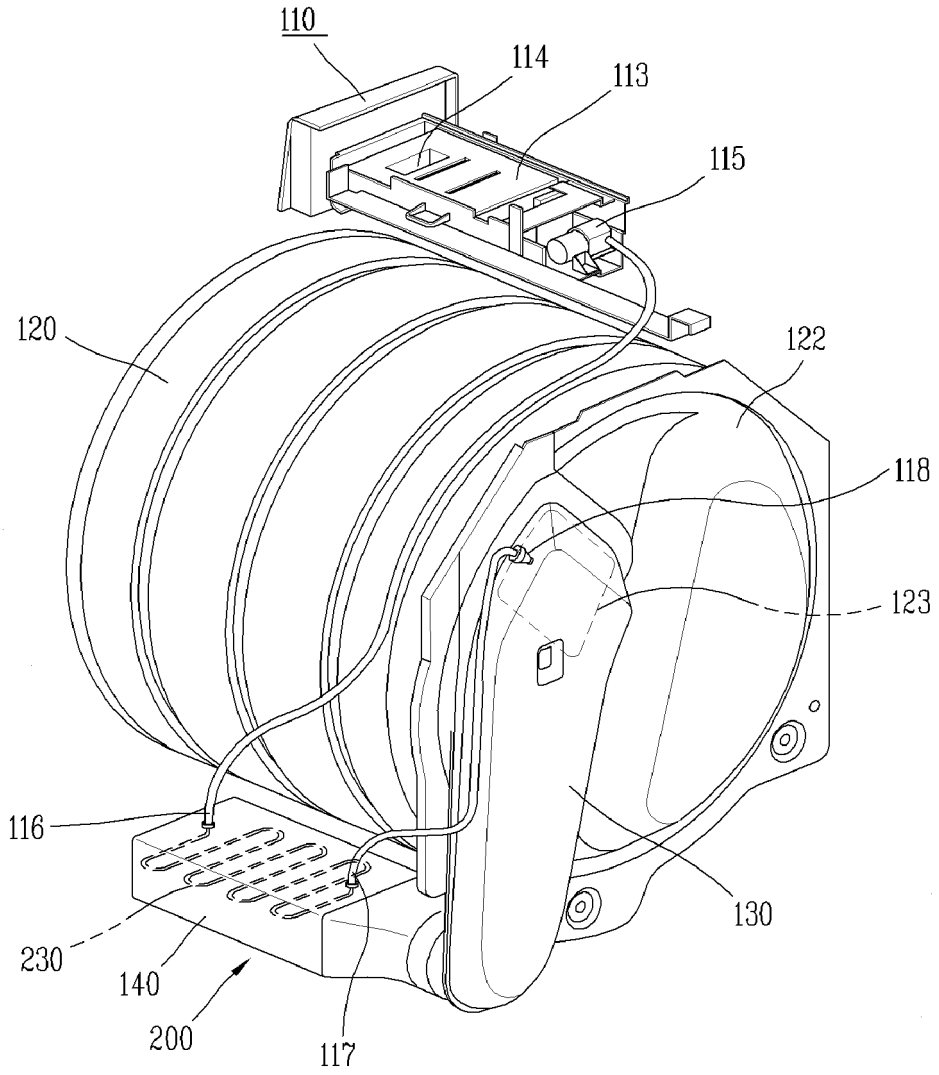

FIG. 5

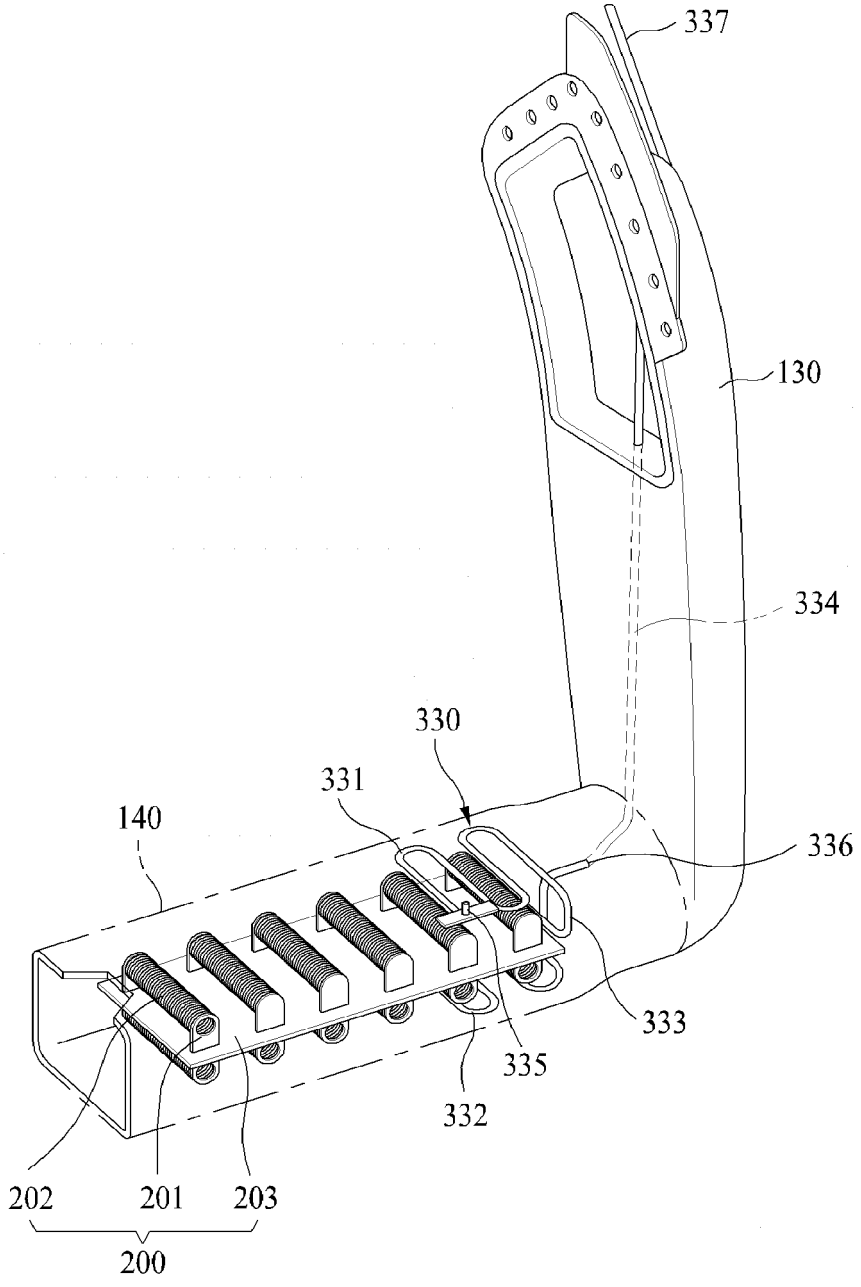

FIG. 6