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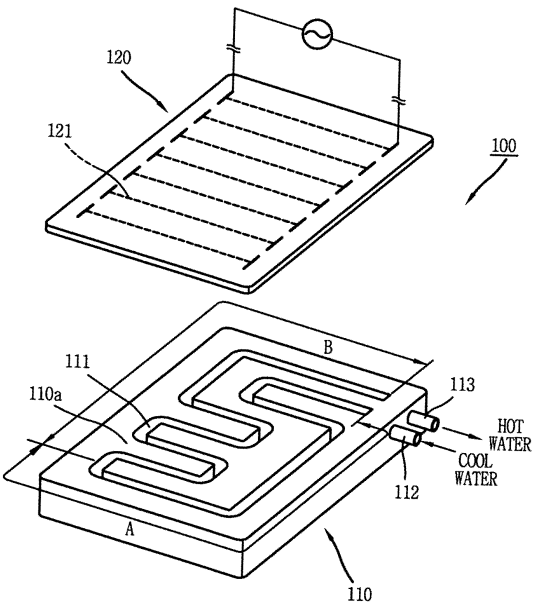
(54) HEATER AND HOT WATER SUPPLY APPARATUS

(57) Disclosed are a heater and hot water supplying device having the same. A temperature stabilizing unit is formed by arranging an inlet and an outlet of a water container close to each other. Under this configuration, cool water introduced into a water path of the water container via the inlet serves to cool hot water to be discharged via the outlet of the water container. This may prevent the hot water from being overheated to temperature more than a preset value. As a result, this may prevent damage of thermal lines of a heating element, due to overheating, the overheating occurring as water inside the water container is overheated.

FIG. 2



EP 2 489 966 A2

Description

Technical Field

[0001] The present invention relates to a heater for supplying hot water provided in a refrigerator or water purifier, and a hot water supplying device capable of preventing a heater from being reversely heated by hot water, and a refrigerator having the same.

Background Art

[0002] Generally, a refrigerator serves as an apparatus for storing food items in a fresh or frozen state for a predetermined time as a refrigerant repeatedly passes through a refrigerating cycle for compression, condensation, expansion and evaporation. Such refrigerator is considered as one of necessities.

[0003] A recent large-sized refrigerator is provided with a dispenser through which ice or water stored therein is taken out without causing a user to open a door. This may prevent cool air inside the refrigerator from leaking to the outside, and may enhance a user's convenience. Especially, a dispenser for supplying hot water (hereinafter, will be referred to as hot water supplying dispenser) is being widely used at an office or other public facility, because it allows a user to conveniently make a cup of tea thereby.

[0004] In a refrigerator having the hot water supplying dispenser, a hot water pipe is connected to a hot water taking-out pipe and a water supply pipe of the dispenser. And, a heater for heating the hot water pipe is installed at the door.

[0005] In the conventional refrigerator, once water is supplied through a water supply pipe connected to a water source, the water is introduced to the hot water pipe via a switching valve of the water supply pipe. Then, the water is instantaneously heated via the heater, and is discharged to the dispenser via the hot water taking-out pipe.

[0006] The heater may be formed in various manners. Recently, a so-called 'heat plate contact type heater' is being developed. In the heat plate contact type heater, a water container of a wide box shape has an opening covered by a heat plate having thermal lines therein, so that water contained in the water container can be heated by contacting the heat plate. In order to uniformly heat the water contained in the water container, a water path is formed in a zigzag shape in the water container so as to increase a contact area between the water contained in the water container and the heat plate.

[0007] However, the heater of the hot water supplying dispenser has the following problems.

[0008] Firstly, since an inlet and an outlet of the water path are provided at both sides of the water container, a distance between the inlet and the outlet is long. Therefore, if the outlet of the water path is blocked, steam is generated from the water path. This may cause water to heat the heat plate, resulting in damage of the thermal lines. Generally, the heater of the dispenser is designed to discharge hot water at temperature of about 95°C. If the heater discharges hot water at temperature more than 100°C, a heat jumping phenomenon occurs from the heater. This may cause the thermal lines to have drastic temperature increase, resulting in damage of the thermal lines.

Disclosure

Technical Problem

[0009] Therefore, an object of the present invention is to provide a hot water supplying device capable of preventing overheating of a heater by properly cooling hot water to be discharged, using low-temperature water introduced into the heater.

Technical Solution

[0010] According to an aspect of the present invention, there is provided a heater, including a water container formed with at least one water line having an inlet and outlet through which water flows; and a heating element combined with the water container to apply heat to the water flowing through the water line of the water container, wherein the water line is formed such that a first section from the inlet to the middle thereof is heat-exchanged with a second section from the middle to the outlet thereof.

[0011] In order to accomplish another objective of the present invention, there is provided a hot water supply apparatus in which a dispenser is further provided to dispense hot water without opening the door, wherein a heater provided within the hot water supply apparatus to apply heat to the water has the foregoing configuration.

Advantageous Effects

[0012] In the heater and hot water supplying device according to embodiments of the present invention, the temperature stabilizing unit is formed by arranging an inlet and an outlet of a water container close to each other. Under this configuration, cool water introduced into a water path of the water container via the inlet serves to cool hot water to be discharged via the outlet of the water container. This may prevent the hot water from being overheated to temperature more than a preset value. As a result, this may prevent damage of thermal lines of a heating element, due to overheating, the overheating occurring as water inside the water container is overheated..

Description of Drawings

[0013]

FIG. 1 is a frontal view of a refrigerator having a heater according to the present disclosure;
FIG. 2 is a disassembled perspective view of the heater of the refrigerator of FIG. 1;
FIG. 3 is an assembled perspective view of the heater of FIG. 2;
FIG. 4 is a planar view of the heater of FIG. 2;
FIG. 5 is a planar view showing another embodiment of the heater of FIG. 2; and
FIGS. 6 and 7 are frontal views showing other embodiments of the heater of FIG. 1.

Best Modes

[0014] Description will now be given in detail of a heater and hot water supplying device having the same according to an embodiment, with reference to the accompanying drawings.

[0015] FIG. 1 is a frontal view of a refrigerator having a heater according to the present disclosure, FIG. 2 is a disassembled perspective view of the heater of the refrigerator of FIG. 1, FIG. 3 is an assembled perspective view of the heater of FIG. 2, and FIG. 4 is a planar view of the heater of FIG. 2.

[0016] As shown, a refrigerator having a heater for a dispenser according to the present disclosure comprises a freezing chamber door 1 configured to open and close a freezing chamber, a cooling chamber 2 configured to open and close a cooling chamber, a water supply pipe 3 configured to supply water from the outside, a heater 100 disposed in the freezing chamber door 1, and configured to heat water supplied from the water supply pipe 3, and a dispenser 4 configured to discharge hot water heated by the heater 100 or cool water.

[0017] A switching valve 7 configured to distribute water supplied from the water supply pipe 3 to a cool water pipe 5 or a hot water pipe 6 is provided at an upper end of the water supply pipe 3.

[0018] The heater 100 may be installed above or below the dispenser according to a type of the refrigerator. In this embodiment, the heater is installed below the dispenser.

[0019] As shown in FIGS. 2 and 3, the heater 100 includes a water container 110 having a water path 111 including an inlet 112 and an outlet 113, and a heating element 120 coupled to the water container 110 so that water flowing along the water path 111 of the water container 110 can be heated.

[0020] The water container 110 is formed in a rectangular parallelepiped shape. And, the water path 111 is formed on one side surface of the water container 110, i.e., a contact surface 110a in a zigzag shape, or a spiral shape (not shown). The inlet 112 and the outlet 113 of the water path 111 are formed on the same side surface of the water container 110 close to each other, so that water introduced into the inlet can be heat-exchanged with water discharged from the outlet 113.

[0021] The water path 111 is formed on an entire region of the contact surface 110a, one side surface of the water container 110, so that a single water path 111 can be implemented from the inlet 112 to the outlet 113. Here, the water path 111 is formed so that a first section (A) from the inlet 112 to an intermediate portion thereof can be heat-exchanged with a second section (B) from the intermediate portion thereof to the outlet 113. More specifically, as shown in FIG. 4, the first section (A) has a bent section from the inlet 112 to a predetermined part, but has a linear section at the rest part. The linear section passes through the edge of the water container 110. The second section (B) is bent several times in a zigzag form so as to increase a contact area to the heating element 120.

[0022] Preferably, a temperature stabilizing unit 115 is implemented by forming an outlet section (D) of the second section (B) in parallel to an inlet section (C) of the first section (A), i.e., the bent section of the first section (A). This is in order to allow cool water introduced via the inlet section (C) of the first section (A) to be heat-exchanged with hot water discharged via the outlet section (D) of the second section (B).

[0023] To this end, the water path 111 may be configured such that a linear distance (L1) from the inlet 112 to the outlet 113 is shorter than a linear distance from the inlet 112 or the outlet 113 to an intermediate portion of the inlet 112 and the outlet 113. In this embodiment, a linear distance indicates a distance from the outlet to an intermediate portion of the inlet 112 and the outlet 113. Alternatively, the water path 111 may be configured such that an interval between at least part of the first section (A) and at least part of the second section (B) in a vertical direction is greater than an interval between the inlet 112 and the outlet 113 in a vertical direction.

[0024] As shown in FIGS. 2 to 4, the heating element 120 may be formed to have an area large enough to accommodate therein the entire part of the water path 111 of the water container 110. More specifically, the heating element 120 may be formed in a cubic or thin plate shape having the same area as the contact surface 110a of the water container 110. The heating element 120 may be provided with thermal lines 121 mounted therein, in correspondence to an entire area of the water path 111 of the water container 110, i.e., an area including the inlet section (C) of the first section (A) and the outlet section (D) of the second section (B). That is, the thermal lines 121 may be installed in the heating element 120 so as to have an area corresponding to the water container 110 including the temperature stabilizing unit 115.

[0025] The refrigerator having the heater according to the present disclosure has the following advantages.

[0026] Once a user selects hot water using the dispenser 4, water is guided to the inside of the refrigerator via the water supply pipe 3. Then, the water guided to the inside of the refrigerator is heated via the heater 100 disposed inside the refrigerator thus to be stored as hot water, or to be discharged out through the dispenser 4.

[0027] Here, the water path 111 is formed in a zigzag

shape so that water passing through the heater 100 can be smoothly heat-exchanged with the heater 100. This may cause the water path 111 to be blocked, or water inside the water path 111 to have temperature increase to temperature more than a preset value, i.e., 95°C. As a result, steam is generated to heat the heating element 120. This may cause the thermal lines 121 mounted in the heating element 120 to have drastic temperature increase, resulting in damage of the thermal lines 121.

[0028] In order to solve such problems, in the present invention, the temperature stabilizing unit 115 is provided by arranging the inlet 112 and the outlet 113 of the water container 110 close to each other. In this case, cool water introduced to the water path 111 of the water container 110 from the hot water pipe 6 via the inlet 112 serves to cool hot water to be discharged to a hot water taking-out pipe 8 via the outlet 113 of the water container 110. This may prevent the hot water from being overheated to temperature more than a preset value.

[0029] As a result, this may prevent damage of the thermal lines 121 of the heating element 120 due to overheating, the overheating occurring as water inside the water container 110 is overheated.

[0030] A heater according to another embodiment of the present invention will be explained.

[0031] In the aforementioned embodiment, the thermal lines 121 of the heating element 120 are arranged to correspond to the entire region of the water path 111 of the water container 110, i.e., the water path 111 including the temperature stabilizing unit 115. However, in this embodiment, as shown in FIG. 5, overheating of water is prevented by preventing the thermal lines 121 of the heating element 120 from being accommodated in part of the water path 111 of the water container 110, i.e., by allowing the temperature stabilizing unit 115 of the water path 111 not to correspond to the thermal lines 121.

[0032] To this end, the water container 110 is formed in the same shape as that of the aforementioned embodiment. However, unlike in the aforementioned embodiment, the heating element 120 is arranged such that the thermal lines mounted therein do not include the inlet section (C) and the outlet section (D) of the water container 120. Under this configuration, water inside the outlet section (D) is not rapidly heated, but slowly heated by the thermal lines 121. This may allow water to maintain a proper temperature at a section where overheating easily occurs.

[0033] A heater for a dispenser according to still another embodiment of the present invention will be explained.

[0034] In the aforementioned embodiments, the heater 100 is formed in a plate shape. However, in this embodiment, as shown in FIGS. 6 and 7, the heater 200 is formed in a tube shape.

[0035] Referring to FIG. 6, the heater 200 is formed in a tube shape where the water container 210 has an inner space 211 so as to form a water path. And, heating elements 220 are wound, in a band shape, on an outer circumferential surface of the water container 210.

[0036] An upper end of the inner space 211 of the water container 210 is open, and a cap 212 is coupled to the opening. An inlet 213 through which a hot water pipe (not shown) is communicated with the inner space 211 is formed at a central region of the cap 212. And, an outlet 214 through which a hot water taking-out pipe (not shown) is communicated with the inner space 211 is formed close to the inlet 213.

[0037] The inlet 213 is extended in a tube shape so that water introduced via the hot water pipe 6 can be guided to the bottom of the inner space 211 of the water container 210. And, an exit of the inner space 211 is inserted into the inlet 213 by a particular depth.

[0038] An entrance of the outlet 214 is positioned on the bottom surface of the cap 212 such that water introduced into the inner space 211 via the inlet 213 is sufficiently heat-exchanged with the heating element 220 at the inner space 211.

[0039] As shown in FIG. 7, in order to increase a heat transfer area between the inlet 213 and the outlet 214, a temperature stabilizing unit 215 may be implemented at the cap 212 by forming a water path 216 from the inlet 213 to the outlet 214 in a zigzag or spiral shape.

[0040] As shown in FIG. 6, the heating element 220 may be provided on an entire region of an outer circumferential surface of the water container 210, i.e., a region of the cap 212. Alternatively, as shown in FIG. 7, the heating element 220 may not be provided on the region of the cap 212.

[0041] The operation and effects of this embodiment are similar to those of the aforementioned embodiments, and thus detailed explanations thereof will be omitted.

[0042] In this embodiment, the water container is vertically installed such that a cover is positioned thereabove. This may cause hot water to rapidly upward move, resulting in a higher possibility that a heat pumping phenomenon occurs at the upside, than in the aforementioned plate-shape heater. In this embodiment, overheating of the heater can be prevented by forming the temperature stabilizing unit at the cover.

Industrial Applicability

[0043] The heater according to embodiments of the present invention may be also applicable similarly to a water purifier and the like as well as the foregoing refrigerator.

Claims

1. A heater, comprising:

a water container formed with at least one water path having an inlet and outlet through which water flows; and
a heating element combined with the water con-

tainer to apply heat to the water flowing through the water path of the water container,
wherein the water path is formed with a temperature stabilizing unit such that a first section from the inlet to the middle thereof is heat-exchanged with a second section from the intermediate portion to the outlet thereof.

2. The heater of claim 1, wherein a linear distance from the inlet to the outlet of the water path is formed to be shorter than that from the inlet or outlet to an intermediate portion of the inlet and the outlet.

3. The heater of claim 2, wherein the water path is formed with at least part of the region where a perpendicular directional interval between the first section and the second section is greater than that between the inlet and the outlet.

4. The heater of claim 1, wherein the water path is configured such that at least part of a section from the inlet to the outlet is formed in a zigzag or spiral shape.

5. The heater of claim 1, wherein the heating element is formed to accommodate at least part of the temperature stabilizing unit.

6. The heater of claim 1, wherein the heating element is formed not to accommodate the temperature stabilizing unit.

7. The heater of claim 1, wherein the water container is formed in a plate shape and the water path is formed in a groove shape at a side surface thereof, and the heating element is formed in a plate shape and combined with one side surface on which the water path of the water container is formed.

8. The heater of claim 1, wherein the water container is formed in a plate shape having an internal space, and the heating element is formed to be wound around an outer circumferential surface of the water container, and the water container is formed such that an inlet is inserted from the upper end thereof to a predetermined depth while an outlet is formed at a side of the inlet to communicate with the internal space.

9. A hot water supply apparatus in which a dispenser is further provided to dispense hot water without opening the door, wherein a heater provided within the hot water supply apparatus to apply heat to the water is made of any one of claims 1 through 8.

FIG. 1

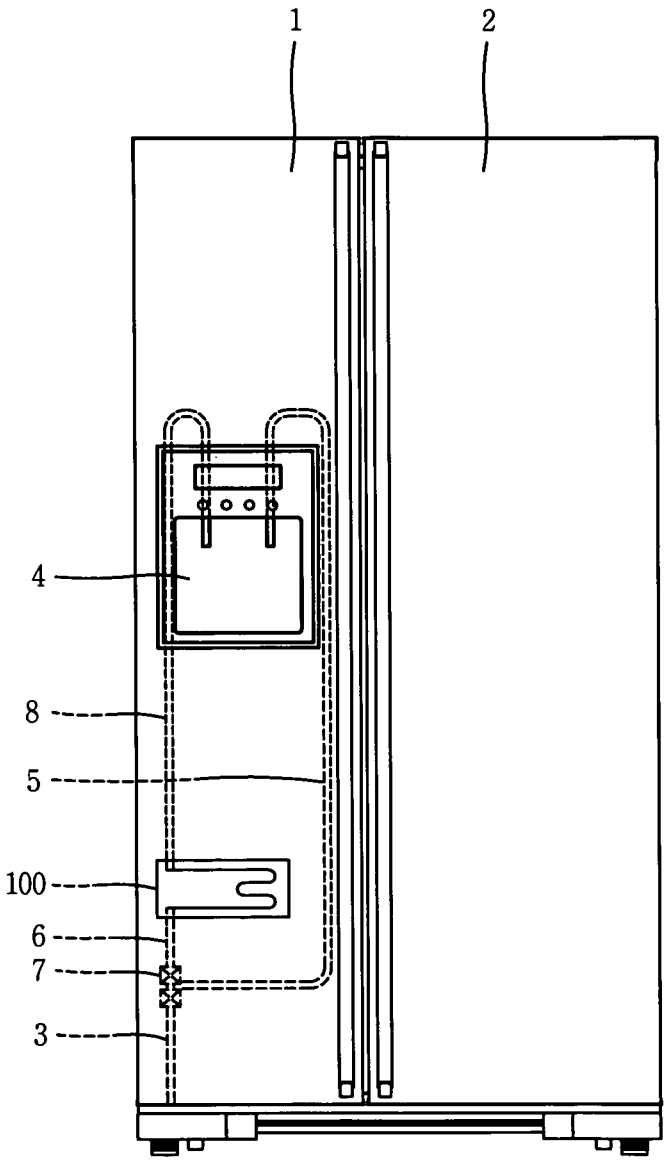


FIG. 2

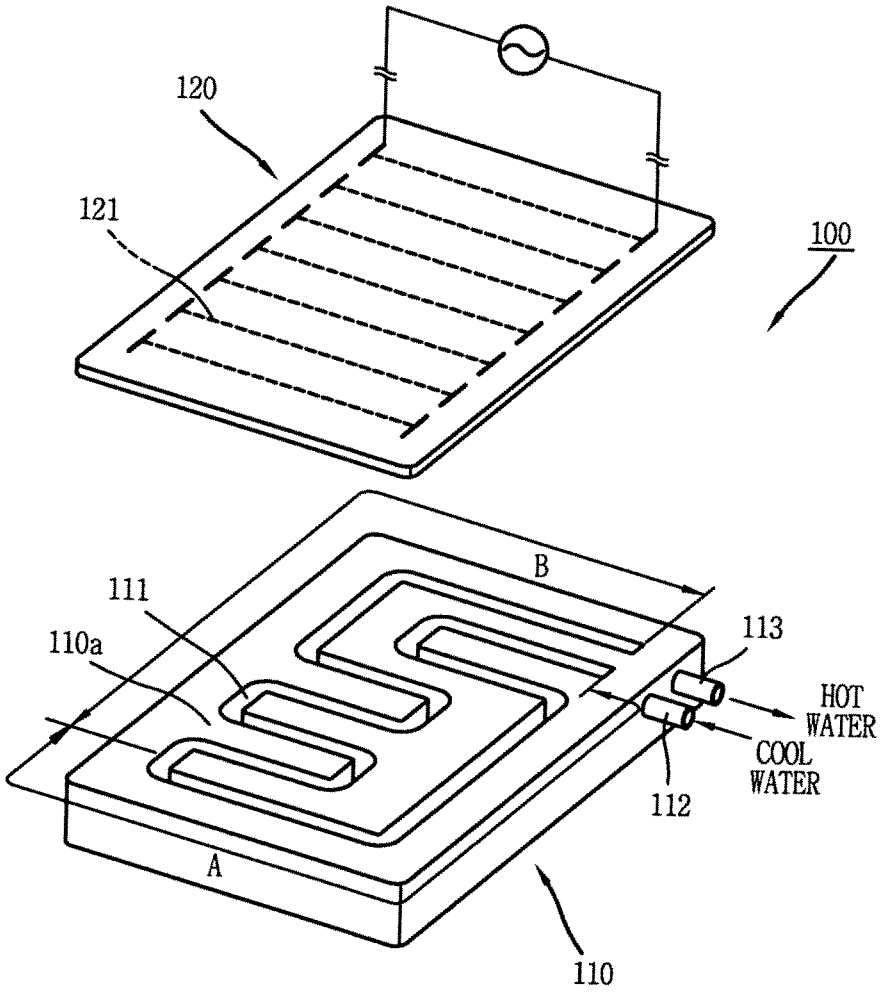


FIG. 3

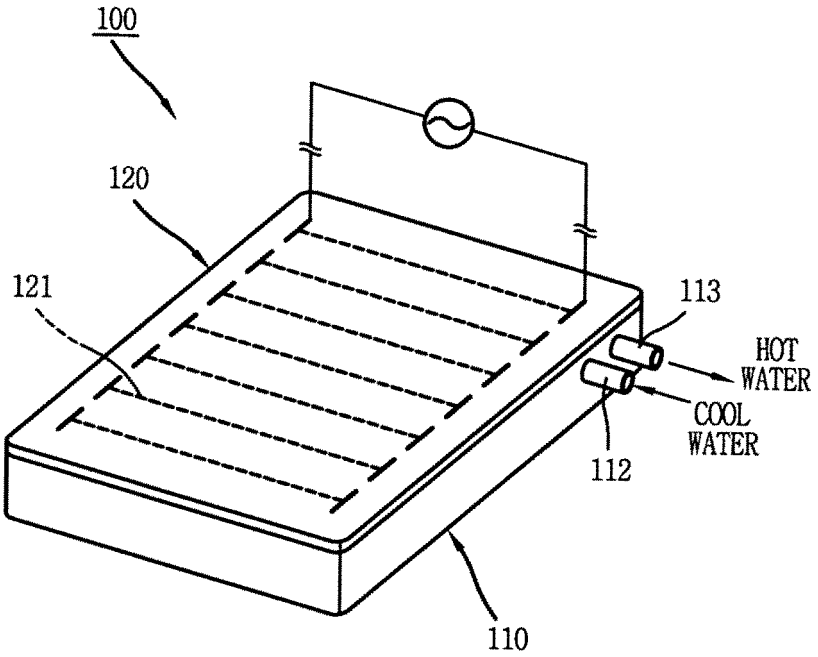


FIG. 4

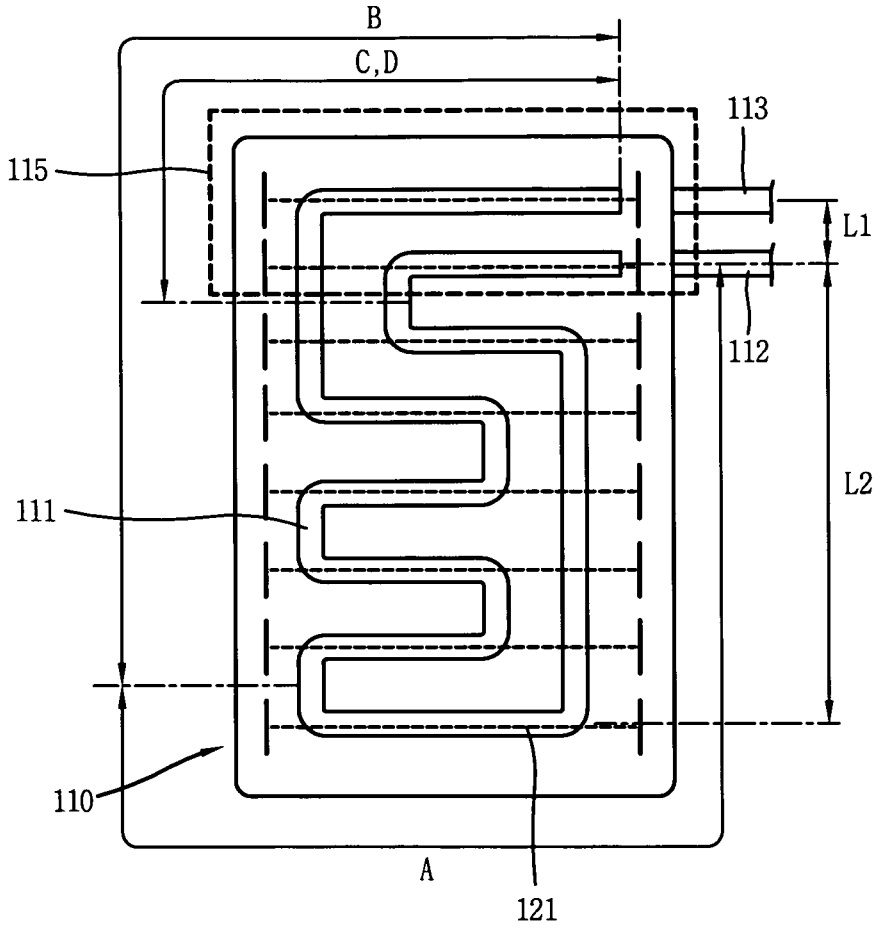


FIG. 5

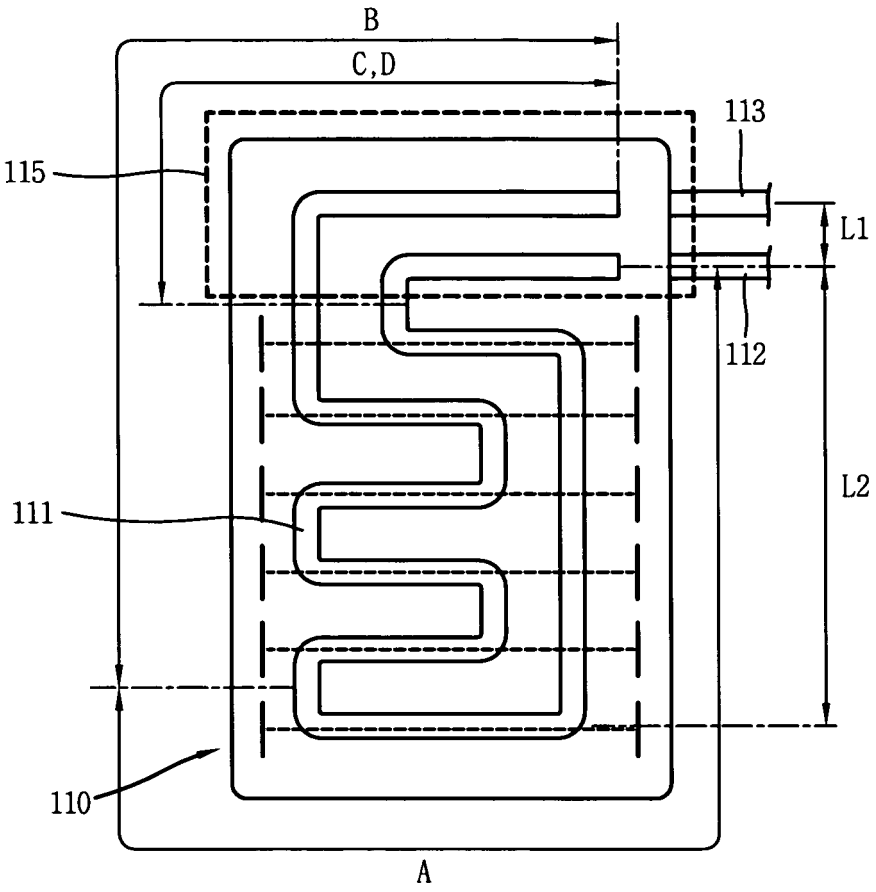


FIG. 6

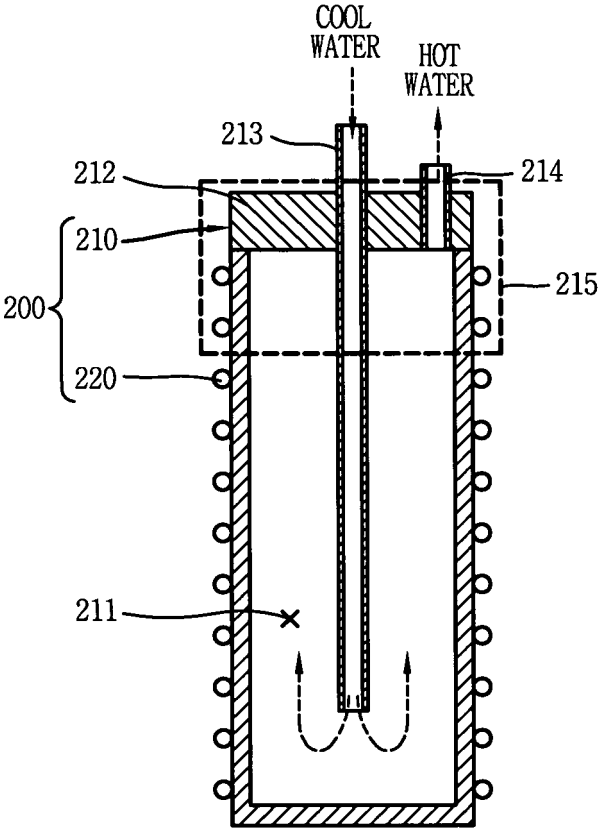


FIG. 7