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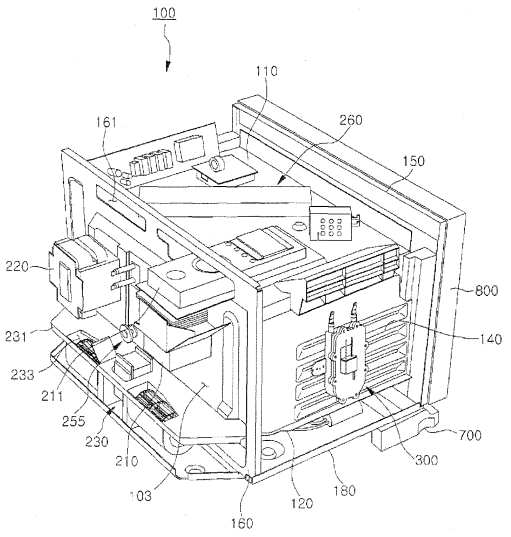
(54) COOKING APPARATUS

(57) A cooker is provided. The cooker includes a cavity having a cooking chamber, at least one electric component installed in the cavity, a steam generator installed in the cavity, the steam generator supplying steam into the cooking chamber, a cooling fan generating an airflow for cooling the electric component and an airflow introduced into the cooking chamber, and a duct guiding air sucked into the cooking chamber by the cooling fan to circulate the inside of the cooking chamber and discharged to the outside of the cooking chamber, the duct condensing steam contained in the air discharged to the outside of the cooking chamber. Thus, a phenomenon in which the steam supplied into the cooking chamber is discharged together with air for ventilating the inside of the cooking chamber is prevented.

【Figure 2】



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Description

[Technical Field]

[0001] The present disclosure relates to a cooker, and more particularly, to a cooker that cooks a food using steam.

[Background Art]

[0002] Cookers are home appliances that heat a food using electricity or gas. In recent, cookers in which a steam function for supplying steam into a food is added to supplement moisture which is evaporated during the cooking of the food are being put on the market.

[Disclosure]

[Technical Problem]

[0003] However, steam supplied into the cooking chamber may be discharged into the cooker.

[Technical Solution]

[0004] Embodiments provide a cooker capable of preventing steam supplied into a cooking chamber from being discharged into the cooker.

[0005] In one embodiment, a cooker includes: a cavity having a cooking chamber; at least one electric component installed in the cavity; a steam generator installed in the cavity, the steam generator supplying steam into the cooking chamber; a cooling fan generating an airflow for cooling the electric component and an airflow introduced into the cooking chamber; and a duct guiding air sucked into the cooking chamber by the cooling fan to circulate the inside of the cooking chamber and discharged to the outside of the cooking chamber, the duct condensing steam contained in the air discharged to the outside of the cooking chamber.

[0006] The details of one or more embodiments are set forth in the accompanying drawings and the description bellow. Other features will be apparent from the description and drawings, and from the claims.

[Advantageous Effects]

[0007] According to the embodiment, a phenomenon in which the steam supplied into the cooking chamber is discharged together with air for ventilating the inside of the cooking chamber may be prevented.

[Description of Drawings]

[0008]

Fig. 1 is a perspective view of a cooker according to an embodiment.

Fig. 2 is a perspective view of a cooker according to an embodiment when viewed from another angle.

Fig. 3 is an exploded perspective view of a cooker according to an embodiment.

Fig. 4 is a perspective view of a steam generator according to an embodiment.

Fig. 5 is an exploded perspective view of a steam generator according to an embodiment.

Fig. 6 is an exploded perspective view of a steam generator according to an embodiment when viewed from another angle.

Fig. 7 is a cross-sectional view of a steam generator according to an embodiment.

Fig. 8 is a longitudinal sectional view of a steam generator according to an embodiment.

Fig. 9 is an exploded perspective view of a tank housing, a water supply tank, and a water supply pump according to an embodiment.

Fig. 10 is a schematic block diagram of a cooker according to an embodiment.

Fig. 11 is a rear view illustrating an airflow in a cooker according to an embodiment.

Fig. 12 is a plan view illustrating an airflow in a cooker according to an embodiment.

Fig. 13 is a right side view illustrating an airflow in a cooker according to an embodiment.

Fig. 14 is a left side view illustrating an airflow in a cooker according to an embodiment.

Fig. 15 is a plan view illustrating an airflow in a cooker according to an embodiment.

[Best Mode]

[0009] Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings.

[0010] Fig. 1 is a perspective view of a cooker according to an embodiment. Fig. 2 is a perspective view of a cooker according to an embodiment when viewed from another angle. Fig. 3 is an exploded perspective view of a cooker according to an embodiment.

[0011] Referring to Figs. 1 to 3, a cooking chamber 101 is defined inside a cavity 100 of a cooker. The cooking chamber 101 is a space in which a food is cooked.

[0012] The cavity 100 includes an upper plate 110, a bottom plate 120, a rear plate 130, and two side plates 140. The upper plate 110 and the bottom plate 120 define a top surface and a bottom surface of the cavity 100, respectively. Also, the rear plate 130 defines a rear surface of the cavity 100, and the side plates 140 define both side surfaces of the cavity 100.

[0013] Although not shown, the upper plate 110 and the side plate 140 cover an out case. Thus, the out case may have an approximately '⊏' shape in cross-section.

[0014] Thus, substantially, the cavity 100 has a polyhedral shape with a front surface opened. Also, the upper plate 110 and the bottom plate 120 define a ceiling and a bottom surface of the cooking chamber 101, respec-

tively. Also, the rear plate 130 and the side plates 140 define a rear surface and both side surfaces of the cooking chamber 101.

[0015] An irradiation opening (not shown) and a porous part (not shown) and a porous portion (not shown) are defined in the upper plate 110. The irradiation opening serves as an entrance through which a microwave generated in a magnetron 210 (described later) is irradiated into the cooking chamber 101. Also, energy, i.e., light and heat of a halogen heater (described later) 260 is transmitted into the cooking chamber 101 through the porous part (not shown).

[0016] A plurality of suction holes (not shown) and a plurality of discharge holes (not shown) are defined in the rear plate 130. The suction holes are passages through which air is sucked from the inside of cooking chamber 101 to the inside of a convection chamber (described later). The discharge holes are passages through which air is discharged from the inside of the convection chamber to the inside of the cooking chamber 101. That is to say, the cooking chamber 101 and the convection chamber substantially communicate with each other through the suction holes and the discharge holes.

[0017] A plurality of cooking chamber exhaust holes (not shown) is defined in one of the side plates 140, i.e., in the current embodiment, the right side plate 140 when viewed from the perspective of Fig. 1. The cooking chamber exhaust holes serve as exits through which air is exhausted into the cooking chamber 101 together with the microwave through the irradiation opening. A steam injection hole (not shown) is defined in one of the side plate 140, i.e., in the current embodiment, the left side plate 140 when viewed from the perspective of Fig. 1. Steam generated in a steam generator 300 (described later) is supplied into the cooking chamber 101 through the steam injection hole.

[0018] A front plate 150 and a back plate 160 are disposed on a front end and the rear surface of the cavity 100, respectively. Substantially, a back surface of the front plate 150 is fixed to front ends of the upper plate 110, the bottom plate 120, and the side plates 140. A portion of a front surface of the back plate 160 is fixed to a portion of a rear surface of the rear plate 130. The front plate 150 and the back plate 160 extend to the outside of the cavity 100 in left and right directions.

[0019] A communication opening 161 is defined in an upper end of the back plate extending upward from the upper plate 110. An upper portion of the cavity 100 and an electric component chamber (described later) 103 communicate with each other through the communication opening 161.

[0020] Referring to Fig. 3, a convection cover 163 and an insulator 165 are disposed on a rear surface or the back plate 160. The convection cover 163 is fixed to a rear surface of the rear plate 130 to define the convection chamber between the rear surface of the rear plate 130 and the front surface thereof. The insulator 165 is fixed to the rear surface of the rear plate 130 to cover the convection cover 163.

[0021] A back cover 170 is disposed on the rear surface of the back plate 160. The back cover 170 is fixed to the rear surface of the back plate 160 to cover a portion of the back plate 160 including at least the communication opening 161. A plurality of air intake holes 171 is defined in lower ends of both side surfaces of the back plate 180. The air intake holes 171 serve as entrances through which air is sucked into the cooker by an operation of a cooling fan (described later) 230.

[0022] Also, a base plate 180 is disposed on a lower portion of the cavity 100. A top surface of the base plate 180 is fixed to lower ends of the front plate 150, the back plate 160, and the back cover 170. An exhaust hole 181 is defined in the base plate 180 forwardly spaced a predetermined distance from the lower end of the back plate 160. The exhaust hole 181 serves as an exit through which the air flowing inside the cooker by the operation of the cooling fan 230 is exhausted to the outside. For example, the exhaust hole 181 may have an oblong shape in a left-right direction on the whole. Also, condensed water formed by condensing the steam contained in the air exhausted through the cooking chamber exhaust hole may be discharged to the outside through the exhaust hole 181. Although not shown, legs (not shown) are disposed on edges of an under surface of the base plate 180.

[0023] A housing mount part 183 is disposed on the base plate 180. A portion of the base plate 180 corresponding to a front side of the exhaust hole 181 is concaved upward to form the housing mount part 183. A tank housing 400 (described later) is disposed on the housing mount part 183. A through hole (not shown) is defined in a rear end of the housing mount part 183.

[0024] Referring again to Fig. 2, the electric component chamber 103 is defined between the rear surface of the back plate 160, the front surface of the back cover 170, and the top surfaces of the base plate 180. Substantially, the electric component chamber 103 is defined at a rear side of the cooking chamber 101. A plurality of electric components and the cooling fan 230 for cooling the electric components are installed in the electric component chamber 103.

[0025] In more detail, the magnetron 210 is installed in the electric component chamber 103. The magnetron 210 oscillates the microwave irradiated into the cooking chamber 101. Also, a high voltage transformer 220 is installed in the electric component chamber 103. The high voltage transformer 200 applies a high voltage current to the magnetron 210. Also, a wave guide 211 for guiding the microwave oscillated by the magnetron 210 into the cooling chamber 101 is installed on the top surface of the cavity 100, i.e., the upper plate 110.

[0026] The cooling fan 230 is installed inside the electric component chamber 103 corresponding to a lower side of the magnetron 210 and the high voltage transformer 220. The cooling fan 230 generates an airflow circulating inside the cooking chamber 101. The cooling

fan 230 includes two fans and one fan motor for driving the fans. A sirocco fan in which air is sucked in an axial direction and exhausted in a circumference direction may be used as the fans. In each of the fans, an air intake part disposed on an end of the axial direction is disposed adjacent to the air intake hole 171, and an exhaust part disposed on a portion of a circumference thereof is disposed facing upward. Thus, the cooling fan 230 sucks air through the air intake hole 171 and discharges the sucked air upwardly, i.e., toward the electric component chamber 103.

[0027] An air barrier 231 is installed in the electric component chamber 103 to prevent the air discharged from the cooling fan 230 from being sucked again into the cooling fan 230. The air barrier 231 substantially partitions the electric component chamber 103 into a region in which the electric components including the magnetron 210 and the high voltage transformer 220 are installed and a region in which the cooling fan 230 is installed. A discharge opening 233 corresponding to the exhaust part of the cooling fan 230 is defined in the air barrier 231.

[0028] An upper heater 240 is installed in an upper side of the cooking chamber 101. The upper heater 240 supplies heat for radiatively heating the food within the cooking chamber 101. A sheathe heater may be used as the upper heater 240.

[0029] Referring again to Fig. 3, a convection heater 251 and a convection fan 253 are installed inside the convection chamber. The convection heater 251 supplies heat for convectively heating the food within the cooking chamber 101. The convection fan 253 generates an airflow circulating inside the cooking chamber 101 and the convection chamber. In more detail, when the convection fan 253 is driven, air passes through the suction hole and the discharge hold to circulate inside the cooking chamber 101 and the convection chamber. Thus, the heat of the convection heater 251 is convected into the cooking chamber 101 by the convection fan 253. The convection fan 253 may be operated according to whether the steam generator 300 is operated, regardless of an operation of the convection heater 251. The description about this will be described later.

[0030] A convection motor 255 is installed inside the electric component chamber 103. The convection motor 255 provides a driving force for driving the convection fan 253. The convection motor 255 is cooled by the cooling fan 230. Thus, a motor shaft (not shown) of the convection motor 255 sequentially passes through the back plate 160, the insulator 163, and the convection cover 165 and then is coupled to the convection fan 253 disposed inside the convection chamber.

[0031] Referring to Figs. 1 and 2, the halogen heater 260 is installed on the upper plate 110. The halogen heater provides light and heat into the cooking chamber 101 through the porous part. The halogen heater 260 is covered by a reflector and a heater cover. Also, a lamp 290 for illuminating the inside of the cooking chamber 101 is installed on the upper plate 110.

[0032] Referring to Fig. 1, an exhaust duct 270 is disposed on the right side plate 140 having the cooking chamber exhaust hole when viewed from the perspective of Fig. 1. The exhaust duct 270 guides the air discharged through the cooking chamber exhaust hole, i.e., the air circulating inside the cooking chamber 101 and then discharged to the outside of the cooking chamber 101 into the exhaust hole 181. For this, the exhaust duct 270 has a polyhedral shape with a surface opened. In addition, the exhaust duct 270 is disposed on the side plate 140 to cover the cooking chamber exhaust hole. A discharge hole 271 is defined in a bottom surface of the exhaust duct 270.

[0033] The steam contained in the air discharged to the outside of the cooking chamber 101 is condensed in the exhaust duct 270 to form condensed water. For this, the exhaust duct 270 has a gradually decreased flow cross-sectional area in which the air discharged to the outside of the cooking chamber 101 flows. For example, when a portion of the discharge hole 271 is covered, the substantially same effect as the decrease of the flow cross-sectional area may be expected. In the current embodiment, a shield rib 273 for covering a portion of the discharge hole 271 is disposed on the exhaust duct 270. The shield rib 273 inclinedly extends downward from a side of the exhaust duct 270 corresponding to the discharge hole 172 toward the exhaust hole 181

[0034] Referring again to Fig. 3, a guide duct 280 is disposed on a bottom surface of the base plate 180. The guide duct 280 guides the air discharged to the outside of the cooker through the exhaust hole 181 in a predetermined direction. In the current embodiment, the guide duct 280 has a polyhedral shape with an approximate top surface and both side surfaces opened to guide the air discharged through the exhaust hole 181 in both side directions of the cooker.

[0035] The condensed water in which the air discharged to the outside of the cooking chamber 101 is condensed while flowing into the exhaust duct 270 may be collected in the guide duct 280. The condensed water collected in the guide duct 280 may be vaporized by the air discharged through the exhaust hole 181 or flow downward through both ends of the guide duct 280.

[0036] Referring to Fig. 2, the steam generator 300 is installed on the right side plate 140 corresponding to a side opposite to the exhaust duct 270 when viewed from the perspective of Fig. 2. The steam generator 300 generates steam supplied into the cooking chamber 101. The description with respect to the steam generator 300 will be described later.

[0037] Referring to Fig. 3, a tank housing 400 is installed below the base plate 180, and more particularly, the housing mount part 183. The tank housing 400 may have a polyhedral shape with at least front surface opened. In the current embodiment, the tank housing 400 has a polyhedral shape with a front surface and top surface opened.

[0038] Also, a water supply tank 500 is installed to take

in or out the inside or outside of the tank housing 400. Steam water supplied into the steam generator 300 is stored in the water supply tank 500.

[0039] A water supply pump 600 is disposed between the bottom plate 120 and the base plate 180. The water supply pump 600 pumps the steam water stored in the water supply tank 500 into the steam generator 300.

[0040] A condensed water tray 700 is installed on a front end of a bottom surface of the base plate 180. The condensed water tray 700 collects the condensed water discharged into a space between the front surface of the cavity 100, i.e., the front surface of the front plate 150 and a back surface of a door (described later) 800. A front surface of the condensed water tray 700 may be flush with a front surface of the door 800 in a state where the door 800 covers the cooking chamber 101. A through opening 701 through which the water supply tank 500 taking in or out the inside or outside of the tank housing 400 is defined in the front surface of the condensed water tray 700.

[0041] Referring again to Figs. 1 and 2, the cooking chamber 101 is selectively covered by the door 800. For example, the door 800 may be opened or closed in a pull-down manner in which an upper end thereof is rotated centered about a lower end thereof to open or close the cooking chamber 101.

[0042] Hereinafter, the steam generator constituting the cooker according to an embodiment will be described in detail with reference to accompanying drawings.

[0043] Fig. 4 is a perspective view of a steam generator according to an embodiment. Fig. 5 is an exploded perspective view of a steam generator according to an embodiment. Fig. 6 is an exploded perspective view of a steam generator according to an embodiment when viewed from another angle. Fig. 7 is a cross-sectional view of a steam generator according to an embodiment. Fig. 8 is a longitudinal sectional view of a steam generator according to an embodiment.

[0044] Referring to Figs. 4 to 6, the steam generator 300 generates steam supplied into the cooking chamber 101 as described above. The steam generator 300 includes a heating chamber 310, a steam heater 360, a temperature sensor 370, and an overheating prevention part 380.

[0045] In more detail, a heating space 301 in which the steam water is stored is defined in the heating chamber 310. The heating chamber 310 is fixed to a side of the cavity 100, i.e., the left side plate 140 when viewed from the respective of Fig. 1. The heating chamber 310 includes a chamber body 320 and a chamber cover 330. The heating space 301 is defined by the chamber body 320 and the chamber cover 330. Although the heating space 301 is not limited to a configuration and size thereof, the heating space 301 may have a vertically cross-sectional area greater than a horizontally cross-sectional area. This is done because of a reason for improving re-heating efficiency of the steam generated by the heating of the steam heater 360. The description about this will be described again in descriptions with respect to the steam heater 360.

[0046] For example, the chamber body 320 may have a polyhedral shape in which a portion of a surface is opened, but the configuration of the chamber body 320 is not limited thereto. That is, the chamber body 320 may have other shapes if the chamber cover 320 and the chamber body 320 define the heating space 301.

[0047] A plurality of steam discharge holes 321 is defined in the chamber body 320. The steam is supplied into the cooking chamber 101 through the steam discharge holes 321. In the current embodiment, the steam is horizontally discharged through the steam discharge hole 321, and then is supplied into the cooking chamber 101. The steam discharge hole 321 is defined in an upper end of the other surface of the chamber body 320 corresponding to a side opposite to an opened surface of the chamber body 320 to communicate with the heating space 301. Although it is not necessary that the steam discharge hole 321 is defined in the upper end of the other surface of the chamber body 320, the steam discharge hole 321 should be disposed above at least water supply hole (described later). The steam discharge hole 321 communicates with the steam injection hole defined in the cooking chamber 101 in a state where the heating chamber 310 is fixed to the side plate 140.

[0048] Also, a second packing seat rib 322 and a steam guide rib 323 are disposed on the other surface of the chamber body 320 having the steam discharge hole 321. The second packing seat rib 322 has at least close loop shape in which the steam discharge hole 321 is defined therein. A portion of the other surface of the chamber body 320 protrudes to form the second packing seat rib 322. The steam guide rib 323 protrudes from an inner surface of a second packing seat groove 324 corresponding to an outer circumference of the steam discharge hole 321.

[0049] Substantially, the second packing seat groove 324 is defined between the second packing seat rib 322 and the steam guide rib 323. A second packing member 350 (described later) is seated on the second packing seat groove 324.

[0050] Referring to Fig. 5, a plurality of flow interference parts 325 is disposed on the chamber body 320. The flow interference parts 325 interfere with the discharge of the steam through the steam discharge hole 321. In more detail, the steam interfering with the discharge toward the steam discharge hole 321 by the flow interference parts 325 may be re-heated by the steam heater 360.

[0051] The respective flow interference parts 325 protrude from the inner surface of the chamber body 320 to vertically partition a portion of the heating space 301, and simultaneously, to horizontally cover the portion of the heating space 301. The flow interference parts 325 include vertically disposed guide parts 325A and interference parts 325B, each horizontally extending from an upper end of the guide part 325A. Thus, the flow inter-

ference part 325 has a 'T' shape or a 'ㄱ or ㄱ' shape in longitudinal section on the whole. Also, the flow interference part 325 is disposed on the inner surface of the chamber body 320. In more detail, the flow interference part 325 is disposed on the inner surface of the chamber body 320 corresponding to a lower side of the steam discharge hole 321. In the current embodiment, the flow interference parts 325 are disposed below the steam discharge hole 321 in vertical two rows. At this time, the guide parts 325A the flow interference parts 325 having the vertical two rows are respectively disposed in a region in which the guide parts 325A do not vertically overlap with each other. Also, the interference parts 325B of the flow interference parts 325 are horizontally spaced from each other.

[0052] Referring to Figs. 5 and 7, a contact rib 326 is disposed on a surface of the chamber body 320 adjacent to an edge of the heating space 301. The contact rib 326 protrudes to form a portion of a surface of the chamber body 320 in a close loop shape on the whole.

[0053] Also, a first packing seat groove 327 is defined in a surface of the chamber body 320 corresponding to the outside of the contact rib 326. A first packing member 340 (described later) is seated on the first packing seat groove 327. The first packing seat groove 327 is depressed to form a portion of a surface of the chamber body 320 in a close loop shape on the whole, thereby surrounding the contact rib 326.

[0054] A mount flange 328 is disposed at a side of an edge surface of the chamber body 320. The mount flange 328 extends from the side of the edge surface of the chamber body 320 to the outside of the chamber body 320. The mount flange 328 is provided for installing the overheating prevention part 380.

[0055] A contact part 326 is disposed on the inner surface of the chamber body 320. The contact part 326 may increase a contact area between the steam water stored in the heating space 301 and the chamber body 320 to effectively transmit the heat of the steam heater 360 to the steam water stored in the heating space 301. In the current embodiment, a portion of the inner surface of the chamber body 320 is depressed to form the contact part 326. Alternatively, a portion of a back surface of the chamber cover 330 may be depressed to form the contact part 326.

[0056] The chamber cover 330 is coupled to the chamber body 320. Here, since the back surface of the chamber cover 330 is closely attached to the opened surface of the chamber body 320, the heating space 301 is substantially defined.

[0057] The water supply hole is defined in the chamber cover 330. In the current embodiment, the water supply hole 331 is defined in a central portion of the chamber cover 330. The water supply hole 331 may be defined in any position of the chamber cover 330 corresponding to an upper side from the bottom surface of the heating space 301 and a lower side of the steam discharge hole 321. However, the water supply hole 331 supplies the steam water into the heating space 301 in a direction which does not cross at least discharge direction of the steam through the steam discharge hole 321, i.e., in a direction parallel to each other.

[0058] A water supply tube 332 is disposed on the chamber cover 330. The steam water is supplied into the heating space 301 through the water supply tube 332. In the current embodiment, the water supply tube 332 has an approximately '¬' shape. The water supply tube 332 passes through a side of the chamber cover 330 corresponding to the lower side of the steam discharge hole 321, for example, the central portion of the chamber cover 330. Here, the water supply tube 332 has an end passing through the water supply hole 331 and exposed to the inside of the heating space 301 in a state where the chamber cover 330 is coupled to the chamber body 320 (substantially, the end of the water supply tube 332 may define the water supply hole 331). Also, the water supply tube 332 has the other end extending to the outside of the heating space 301 and connected to a second water supply tube 603 (described later). In the current embodiment, although the water supply tube 332 is used for supplying the steam water into the heating space 301, it is not limited thereto. For example, the water supply hole 331 may be defined in only the chamber cover 330, and a water supply tube for supplying water into the water supply hole 331 may be connected to the water supply hole 331.

[0059] Referring to Fig. 6, the barrier part 333 is disposed on the back surface of the chamber cover 330. The barrier part 333 prevents the steam water supplied into the heating space 301 through the water supply tube 332 and dropping by gravity from colliding with and spring up a side of the heating space 301, i.e., the chamber body and/or a side of the chamber body 320. For this, the barrier part 333 extends toward the inner surface of the chamber body 320 from the back surface of the chamber cover 330 corresponding to a lower side of an end of the water supply tube 332 exposed to the inside of the heating space 301 to horizontally cover a portion of the heating space 301. Thus, since a dropping distance of the steam water supplied into the heating space 301 through the water supply tube 332 is substantially decreased, the spring-up of the dropping steam water may be reduced.

[0060] Also, an overflow prevention part 334 is disposed on the back surface of the chamber cover 330. The overflow prevention part 334 prevents the steam water stored in the heating space 301 from overflowing through the steam discharge hole 321 due to boiling. For this, the overflow prevention part 334 covers a portion of the inside of the heating space 301 corresponding between an end of the water supply tube 332 exposed to the inside of the heating space 301 and the flow interference part 325.

[0061] The overflow prevention part 334 substantially partitions the heating space 301 into two regions. Hereinafter, a portion of the heating space 301 corresponding to a lower side of the overflow prevention part 334 will

be referred to as a saturation region 301A, and a portion of the heating space 301 corresponding to an upper side of the overflow prevention part 334 will be referred to as an overheating region 301B. The saturation region 301A and the overheating region 301B will be described together with the steam heater 360.

[0062] A contact groove 335 is defined in the back surface of the chamber cover 330. A potion of the back surface of the chamber cover 330 is depressed to the contact groove 335, thereby being assembled with the contact rib 326. Thus, the contact rib 326 is inserted into the contact groove in a state where the chamber cover 330 is coupled to the chamber body 320.

[0063] Referring again to Fig. 5, a sensor mount part 336 is disposed on a front surface of the chamber cover 330. In the current embodiment, although the sensor mount part 336 has an approximately hexahedral 1 shape protruding from the front surface of the chamber body 320 and the water supply tube 332 passes through the sensor mount part 336, the present invention is not limited to the configuration of the sensor mount part 336. A sensor insertion hole 337 in which the temperature sensor 370 is inserted is defined in the sensor mount part 336.

[0064] Also, a drain hole 338 is defined in the chamber cover 330. The drain hole 338 discharges the steam water supplied into the heating space 301. A portion of the chamber cover 330 is cut to form the drain hole 338. Here, the drain hole 338 is disposed above the water supply hole 331. Thus, a water level of the steam water supplied into the heating space 301 through the water supply hole 331 is maintained in a position less than that of at least the drain hole 338.

[0065] A discharge tube 339 is connected to the drain hole 338. The steam water discharged to the outside of the heating space 301 through the drain hole 338 flows into the discharge tube 339. The discharge tube 339 has an end connected to the drain hole 338. The steam water discharged to the outside of the heating space 301 through the drain hole 338 flows into the discharge tube 339, and then is discharged to the outside of the heating space 301. Here, the steam water discharged through the drain hole 338 and flowing into the discharge tube 339 is discharged in a space in which the steam is discharged through the steam discharge hole 321, i.e., the inside of the cooking chamber. The steam water discharged through the drain hole 338 and flowing into the discharge tube 339 may return to a water supply tank 410 (described later) in which the steam water supplied into the heating space 301 through the water supply hole 331 is stored or be discharged to the outside and disused.

[0066] Referring to Figs. 5 and 7, the first packing member 340 is disposed between the chamber body 320 and the chamber cover 330. The first packing member 340 prevents the steam water stored in the heating space 301 from leaking. Substantially, the first packing member 340 contacts the back surface of the chamber body 320 when the back surface of the chamber cover 330 is closely attached to a surface of the chamber body 320 in a state where the first packing member 340 is seated on the first packing seat groove 327.

[0067] Referring to Figs. 4 and 5, the second packing member 350 is seated on the second packing seat groove 324. The second packing member 350 prevents saturation steam or overheated steam supplied into the cooking chamber 101 through the steam discharge hole 321 and the steam injection hole from leaking through a gap between the side plate 140 and the chamber body 320. The second packing member 350 is disposed corresponding to the second packing seat groove 324. A communication hole 351 corresponding to the steam guide rib 323 is defined in the second packing member 350. Thus, in a state where the second packing member 350 is seated on the second packing seat groove 324, an edge of the second packing member 350 is closely attached to the second packing seat rib 322 and the steam guide rib 323 is inserted into the communication hole 351.

[0068] The steam heater 360 heats the steam water stored in the heating space 301 to generate steam supplied into the cooking chamber 101. For this, the steam heater 360 is inserted into the chamber body 320 and is disposed adjacent to both ends and the bottom surface of the heating space 301. Thus, the steam heater 360 has a 'U' shape on the whole. Heat of the steam heater 360 is transmitted into the steam water stored in the heating space 301 through the chamber body 320 and the chamber cover 330.

[0069] The steam heater 360 may heat the steam water stored in the heating space 301 to generate the saturation steam, and then heat the saturation steam to generate the overheated steam. In more detail, a portion of the steam heater 360 adjacent to the saturation region 301A heats the steam water to generate the saturation steam. Also, a portion of the steam heater 360 adjacent to the overheating region 301B re-heats the generated saturation steam to generate the overheated steam. The (saturation) steam generated by the steam heater 360 may be supplied into the cooking chamber 101, or the overheated steam generated by re-heating the saturation steam may be supplied into the cooking chamber 101 according to an amount of steam water stored in the heating space 301 or an output of the steam heater 360.

[0070] The temperature sensor 370 is inserted into the sensor mount part 336, i.e., the sensor insertion hole 337. The temperature sensor 370 detects a temperature of the steam water stored in the heating space 301, substantially, a temperature of the heating chamber 310. For example, a thermistor may be used as the temperature sensor 370.

[0071] The overheating prevention part 380 is mounted on the mount flange 328. The overheating prevention part 380 prevents the steam heater 360 from being overheated. For example, when the steam water stored in the heating space 301 and detected by the temperature sensor 370 has a temperature greater than a preset safety temperature, the overheating prevention part 380 in-

tercepts a power supplied into the steam heater 360 to prevent the steam heater 360 from being overheated. For example, a thermostat may be used as the overheating prevention part 380.

[0072] Hereinafter, the tank housing, the water supply tank, and the water supply pump, which constitute the cooker according to an embodiment, will be described in detail with reference to accompanying drawing.

[0073] Fig. 9 is an exploded perspective view of a tank housing, a water supply tank, and a water supply pump according to an embodiment.

[0074] Referring to Fig. 9, the tank housing 400, the water supply tank 500, and the water supply pump 600 supply the steam water into the heating chamber 310. In more detail, when the water supply tank 500 is inserted into the tank housing 400 in a state where the steam water is stored in the water supply tank 500, the steam water stored in the water supply tank 500 is supplied into the heating space 301 of the heating chamber 310 by the water pump 600.

[0075] A through hole 401 is defined in a rear surface of the tank housing 400. A tank pipe (described later) 525 passes trough the through hole 401. A connection tube 403 and a third packing member 405 are disposed on the rear surface of the tank housing 400 corresponding to a rear side of the through hole 401. The connection tube 403 connects the tank pipe 525 to a first water supply tube 601. The connection tube 403 passes through the through hole of the housing mount part 183 to extend to a space between the tank pipe 525 and the first water supply tube 601 in a state where the connection tube 403 is fixed to the rear surface of the tank housing 400. The third packing member 405 prevents the steam water from leaking through a gap between the tank pipe 525 and the connection tube 403.

[0076] The water supply tank 500 includes a tank body 510, a tank cap 520, and a tank handle 530. A water storage space 501 in which the steam water supplied into the heating chamber 310 is stored is defined by the tank body 510 and the tank cap 520.

[0077] The tank body 510 has an approximately polyhedral shape with a top surface opened. In the current embodiment, although the tank body 510 has a flat hexahedral shape with the top surface opened, the present invention is not limited to the configuration of the tank body 510. However, the tank body 510 should have a configuration and size capable of taking in or out the inside or outside of the tank housing 400.

[0078] The tank cap 520 is detachably coupled to the tank body 510 to cover the opened top surface of the tank body 510. A water supply hole 521 for supplying the steam water into the water storage space 501 is defined in the tank cap 520. The water supply hole 521 is selectively covered by a water supply cap 523.

[0079] The tank pipe 525 is disposed on the tank cap 520. The tank pipe 525 has an end disposed inside the water storage space 501 and spaced a predetermined distance from a bottom surface of the tank body 510. Also, the tank pipe 525 has the other end extending backwardly from the tank cap 520. The tank pipe 525 passes through the through hole 401 and is inserted into the connection tube 403 in a state where the water supply tank 500 is mounted on the inside of the tank housing 400.

[0080] The tank handle 530 is fixed to a front surface of the tank body 510. The tank handle 30 is grasped by a user hand to allow the water supply tank 500 to take in or out the inside or outside of the tank housing 400. In a state where the water supply tank 500 is mounted on the inside of the tank housing 400, a front surface of the tank handle 530 may be flush with the front surfaces of the condensed water tray 700 and the door 800.

[0081] The water supply pump 600 is connected to the connection tube 403 by the first water supply tube 601 and is connected to the water supply tube 332 by the second water supply tube 603. Thus, when the water supply pump 600 is operated, the steam water stored in the water supply tank 500 is pumped, and then supplied into the heating chamber 310.

[0082] Hereinafter, a configuration of the cooker according to an embodiment will be described in detail with reference to accompanying drawings.

[0083] Fig. 10 is a schematic block diagram of a cooker according to an embodiment.

[0084] Referring to Fig. 10, controllable components for cooking a food within the cooking chamber 101 may be the upper heater 240, the halogen heater 260, the convection heater 251, the convection fan 253, the magnetron 210, the steam heater 360, and the water supply pump 600. The temperature sensor 370 and the overheating prevention part 380 are used for preventing the steam heater 360 from being overheated. The various components are controlled by a controller C. In case where the upper heater 240, the halogen heater 260, the convection heater 251, and the magnetron 210 are used separate from the steam generator 300 to cook the food within the cooking chamber 101, i.e., in case where the steam is not supplied into the cooking chamber 101, it does not become an object of attention of the present invention. Thus, functions of the controller C in case where the steam is supplied into the cooking chamber 101 will be described below.

[0085] The controller C operates at least one of the upper heater 240 and the halogen heater 260 in case where the steam heater 360 is operated to supply the steam into the cooking chamber 101. This is done for preventing the steam supplied into the cocking chamber 101 from being transferred to the halogen heater 260 through the porous part for transmitting light and heat of the halogen heater 260 into the cooking chamber 101, in particular, an encapsulation part of the halogen heater 260. Here, an operation time of the at least one of the upper heater 240 and the halogen heater 260 partially overlaps an operation time of the at least stem heater 360. Also, an operation of at least one of the upper heater 240 and the halogen heater 260 and an operation of the

at least steam heater 360 are finished at the same time, or the operation of at least one of the upper heater 240 and the halogen heater 260 is finished after the operation of the at least steam heater 360 is finished. Thus, since the steam is vaporized by the operation of at least one of the upper heater 240 and the halogen heater 260, it may prevent the steam from being transferred to the halogen heater 260 through the porous part.

[0086] The controller C operates the convection motor 225 irrelevant to an operation of the convection heater 251 in case where the steam heater 360 is operated to supply the steam into the cooking chamber 101. This is done for allowing the steam supplied into the cooking chamber 101 to uniformly circulate inside the cooking chamber 101. That is, since the convection fan 253 is operated by the convection motor 255, air circulates inside the cooking chamber 101, and thus, the steam substantially circulates. Here, an operation time of the convection motor 255 partially overlaps the operation time of the steam heater 360. Also, an operation of the convection motor 255 and an operation of the at least steam heater 360 are finished at the same time, or the operation of the convection motor 255 is finished after the operation of the at least heater 360 is finished. Also, in case where the convection heater 251 is used for cooking the food within the cooking chamber 101, the convection motor is operated also.

[0087] Hereinafter, an effect of the cooker according to an embodiment will be described in detail.

[0088] First, a process of cooking the food using the steam in the cooker according to an embodiment will be described.

[0089] In case where the food is cooked using the steam, at least one of various heating sources for heating the food within the cooking chamber 101 is operated to supply energy into the cooking chamber 101. Then, the steam generator 300 is operated to supply the steam into the cooking chamber.

[0090] When the steam generator 300 is operated, at least one of the upper heater 240 and the halogen heater 260 of the heating sources is operated. Thus, a phenomenon in which the steam leaking through the porous part is transferred to the encapsulation part of the halogen heater 260 is prevented. Also, the convection motor 255 for operating the convection fan 253 is operated irrelevant to the operation of the convection heater 251, and thus, air inside the cocking chamber 101 circulates. Thus, the steam supplied into the cooking chamber 101 may be uniformly spread into the cooking chamber 101.

[0091] To supply the steam into the cooking chamber 101, first, the water supply pump 600 is operated to supply the steam water stored in the water supply tank 500 into the inside of the heating chamber 310, i.e., the heating space 301. At this time, the steam water stored in the water supply tank 500 is supplied into the heating space 301 through the water supply hole 331 by the operation of the water supply pump 600. However, the steam water supplied into the heating space 301 through the water supply hole 331 collides with the barrier part 333 disposed below the water supply hole 331 before it collides with the bottom surface of the heating space 301. Thus, it may prevent the steam water supplied into the heating space 301 from colliding with and excessively spring up the bottom surface of the heating space 301.

[0092] The steam water is supplied into the heating space 301 by the water supply pump 600, and simultaneously, the steam heater 360 is operated to heat the steam water stored in the heating space 301. At this time, the heat of the steam heater 360 is transmitted into the steam water stored in the heating space 301 through the heating chamber 310. In the current embodiment, since an contact area between the heating chamber 310 and the steam water is increased by the contact part 326 disposed on the inner surface of the heating chamber 310 corresponding to the heating space 301, the heat of the steam heater 360 may be further effectively transmitted into the steam water stored in the heating space 301. Also, the overflow prevention part 334 may prevent the steam water stored in the heating space 301 heated by the steam heater 360 from boiling over and thus being discharged through the steam discharge hole 321.

[0093] The steam heater 360 is operated to heat the steam water stored in the heating space 301, thereby generating the saturation steam and the overheated steam. In more detail, the saturation steam is generated by the heating of the steam water in a lower portion of the heating space 301 partitioned by the overflow prevention part 334, i.e., the saturation region 301A, and the overheated steam is generated by the heating of the saturation steam transferred from the saturation region 301A to the overheating region 301B. At this time, since the flows of the saturation steam or overheated steam interferes with the flow interference part 325 in the overheating region us, the steam water is further effectively heated by the steam heater 360.

[0094] The generated (saturation and overheated) steam is supplied into the cooking chamber 101 through the steam discharge hole 321 and the steam injection hole. Here, the second packing member 350 prevents the steam discharged through the steam discharge hole 321 from leaking through a gap between a side surface of the cavity 100 and a surface of the heating chamber 310.

[0095] Thus, the food may be effectively cooked using the steam within the cooking chamber 101. For example, in a process of cooking the food by the heating source in the cooking chamber 101, it may prevent the food form being dried by the vaporization of the moisture.

[0096] When the steam water is excessively supplied into the heating space 301 or the steam water supplied into the heating space 301 boils by the heating of the steam heater 360, the steam water within the heating space 301 is discharged through the drain hole 338. In more detail, when the steam water is excessively supplied into the heating space 301, the steam water supplied into the heating space 301 is discharged to the out-

side through the drain hole 338. Also, the steam water boiling by the heating of the steam heater 360 within the heating space 301 is discharge also through the drain hole 338. Thus, it may prevent the steam water within the heating chamber 310 from being discharged into the cooking chamber through the steam discharge hole 338. Also, the steam, water discharged through the drain hole 338 flows into the discharge tube 339 and is discharged.

[0097] Next, an airflow in the cooker according to an embodiment will be described in detail with reference to accompanying drawings.

[0098] Fig. 11 is a rear view illustrating an airflow in a cooker according to an embodiment, any 12 is a plan view illustrating an airflow in a cooker according to an embodiment. Fig. 13 is a right side view illustrating an airflow in a cooker according to an embodiment, and Fig. 14 is a left side view illustrating an airflow in a cooker according to an embodiment. Fig. 15 is a plan view illustrating an airflow in a cooker according to an embodiment.

[0099] Referring to Fig. 11, when the cooling fan 230 is operated, air is sucked into the cooker, more particularly, a space (hereinafter, for convenience of explanation, referred to as a "first passage" between the back plate 160 and the back cover 170 through the air intake hole 171. The air sucked into the cooker is discharged from the cooling fan 230 to flow upward. Here, the air barrier 231 prevents the air discharged from the cooling fan 230 from being sucked again into the cooling fan 230.

[0100] The air discharged from the cooling fan 230 cools various electric components, i.e., the magnetron 210 and the high voltage transformer 220 while flowing into the first passage. A portion of the air cooling the magnetron 210 and the high voltage transformer 220 is guided by the wave guide 211 transmitting the microwave oscillated by the magnetron 210 into the cooking chamber 101, and then is transferred to the inside of the cooking chamber 101 through the cooking chamber exhaust hole.

[0101] Referring to Fig. 12, the air transferred into the cooking chamber 101 circulates inside the cooking chamber 101 and is discharged to the outside through the cooking chamber exhaust hole. The air discharged to the outside of the cooking chamber 101 flows into a space (hereinafter, for convenience of explanation, referred to as a "second passage" between the side plate 40 and the exhaust duct 270. The air flowing into the second passage is substantially guided downward by the exhaust duct 270 and is discharged through the discharge hole 271. Here, since a flow cross-sectional area of the second passage is substantially decreased by the shield rib 273 disposed above the discharge hole 271, the steam contained in the air flowing into the second passage is condensed to generate condensed water. The air discharged through the discharge hole 271 and the condensed water flow into a fourth passage (described latter) .

[0102] Referring to Figs. 13 and 14, a portion of the air cooling the magnetron 210 and the high voltage transformer 220 is guided into a space between the top surface of the upper plate 110 and the bottom surface of the out case through the communication opening 161. The air guided into the space between the top surface of the upper plate 110 and the bottom surface of out case collides with the back surface of the front plate 150 and is guided into a space between outer surfaces of the both side plates 140 and the side surface of the out case. Hereinafter, the space between the top surface of the upper plate 110 and the bottom surface of the out case and between the outer surfaces of the side plates 140 and the side surface of the out case is referred to as a "third passage". The air flowing into the third passage cools the halogen heater 260 installed on the upper plate 110, particularly, the encapsulation part of the halogen heater 260 and also cools the steam generator 300 installed on the side plate 140.

[0103] Referring to Fig. 15, the air and condensed water flowing into the second and third passages are transferred into a space (hereinafter, for convenience of explanation, referred to as a "fourth passage" between the bottom plate 120 and the base plate 180. The air and condensed water transferred into the fourth passage are discharged to the outside of the cooker through the exhaust hole 181. The air discharged through the exhaust hole 181 is guided by the guide duct 280 to flow into both sides of the cooker. Also, the condensed water discharged through the exhaust hole 181 may be collected in the guide duct 280 and vaporized by the air discharged through she exhaust hole 181.

[0104] As described above, the cooker according to the embodiment may expect following effects.

[0105] In the current embodiment, the food is cooked using steam generated by the steam generator in the cooking chamber. Thus, since the steam is supplied into the food during cooking, the food may be further effectively cooked.

[0106] Also, in the current embodiment, the steam supplied into the cooking chamber is discharged together with the air for ventilating the inside of the cooking chamber to flow into the exhaust duct. Then, the steam is condensed, and thus discharged in the condensed water form. Thus, since the steam supplied into the cooking chamber is discharged to the outside of the cooking chamber, the damage of the various electric components may be minimized.

[0107] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be ap-

parent to those skilled in the art.

Claims

1. A cooker comprising:

   a cavity having a cooking chamber;
   at least one electric component installed in the cavity;
   a steam generator installed in the cavity, the steam generator supplying steam into the cooking chamber;
   a cooling fan generating an airflow for cooling the electric component and an airflow introduced into the cooking chamber; and
   a duct guiding air sucked into the cooking chamber by the cooling fan to circulate the inside of the cooking chamber and discharged to the outside of the cooking chamber, the duct condensing steam contained in the air discharged to the outside of the cooking chamber.

2. The cooker according to claim 1, wherein the air flowing by the cooling fan is sucked into the cooking chamber together with a microwave.

3. The cooker according to claim 1, wherein the steam generator is cooled by the air flowing by the cooling fan.

4. The cooker according to claim 3, wherein the air flowing by the cooling fan cools the steam generator after cooling the electric component.

5. The cooker according to claim 1, wherein the cooling fan is disposed on a lower end of a rear surface of the cavity corresponding to a rear side of the cooking chamber.

6. The cooker according to claim 1, wherein the electric component is disposed on an upper portion of a rear surface of the cavity corresponding to a rear side of the cooking chamber.

7. The cooker according to claim 1, wherein the electric component comprises at least one of a magnetron generating a microwave irradiated into the cooking chamber and disposed in a rear side of the cooking chamber, a high voltage transformer providing high voltage current to the magnetron, and a fan motor providing a driving force for circulating the air within the cooking chamber.

8. The cooker according to claim 1, further comprising a halogen heater installed in the cavity, the halogen heater providing light and heat into the cooking chamber.

9. The cooker according to claim 8, wherein the halogen heater is cooled by the air, which flows by the cooling fan to cool the electric component.

10. The cooker according to claim 1, wherein the steam generator and the duct are installed on both side surfaces of the cavity, respectively.

11. The cooker according to claim 1, wherein a portion of an air discharge hole of the duct through which air discharged and guided to the outside of the cooking chamber is discharged to the outside of the duct is covered to reduce a flow cross-sectional area of the duct, thereby condensing steam contained in the air flowing inside the duct.

12. The cooker according to claim 1, wherein the duct comprises:

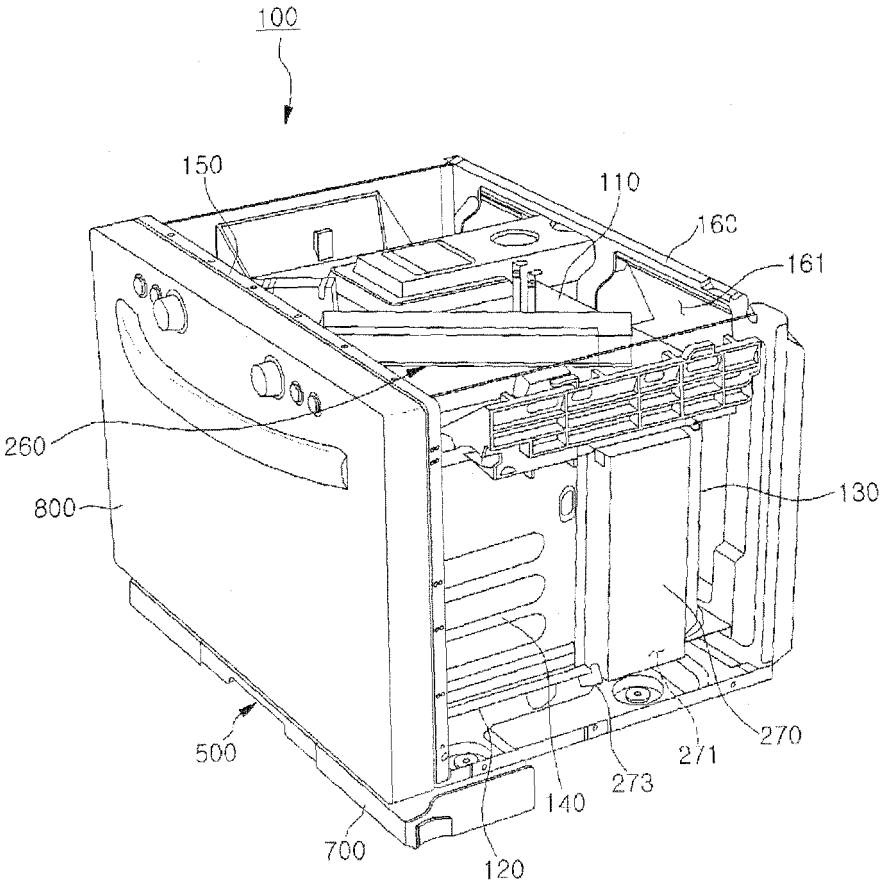
    an air discharge hole through which air discharged to the outside of the cooking chamber and guided by the duct is discharged to the outside of the duct; and
    a shield rib covering a portion of the air discharge hole.

13. The cooker according to claim 1, wherein air discharged to the outside of the cooking chamber and guided by the duct and condensed water generated by condensing steam through the duct are discharged through an exhaust hole defined in a base plate disposed at a lower portion of the cavity.

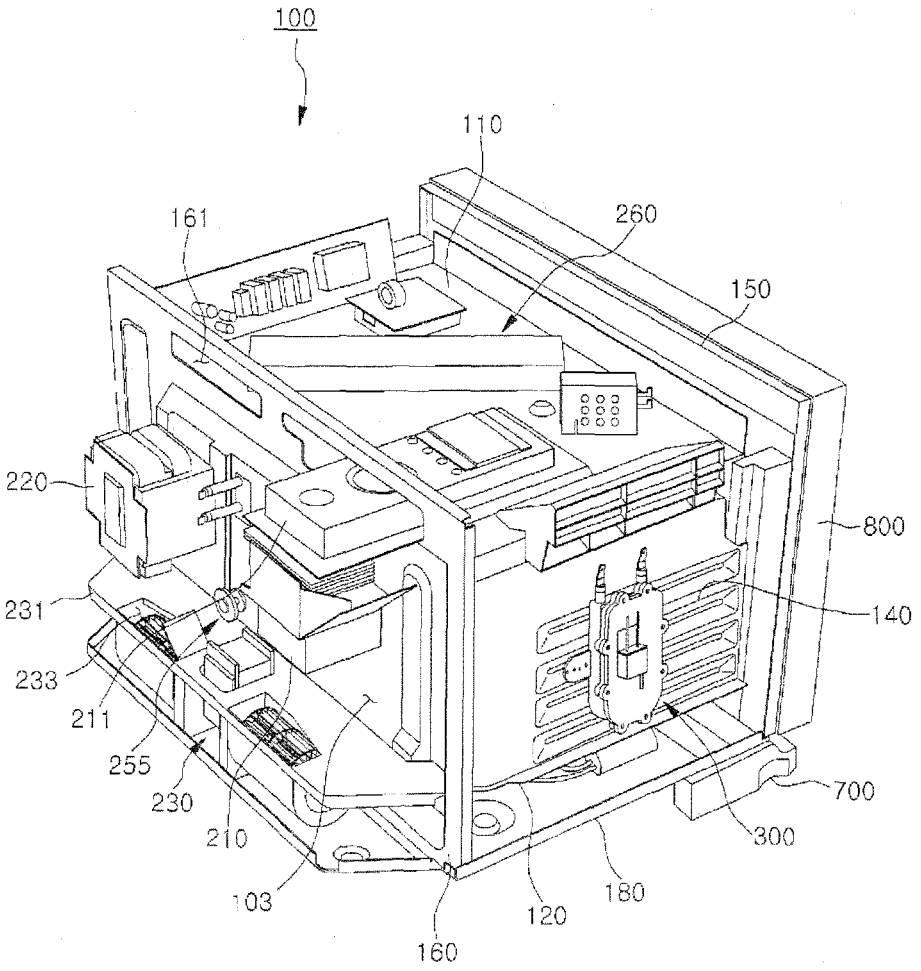
14. The cooker according to claim 13, further comprising a guide duct disposed below the exhaust hole, the guide duct guiding the air discharged through the exhaust and collecting the condensed water discharged through the exhaust hole.

15. The cooker according to claim 14, wherein the guide duct guides the air discharged through the exhaust to both sides of the cavity.

【Figure 1】



【Figure 2】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110
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233
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230
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103
160
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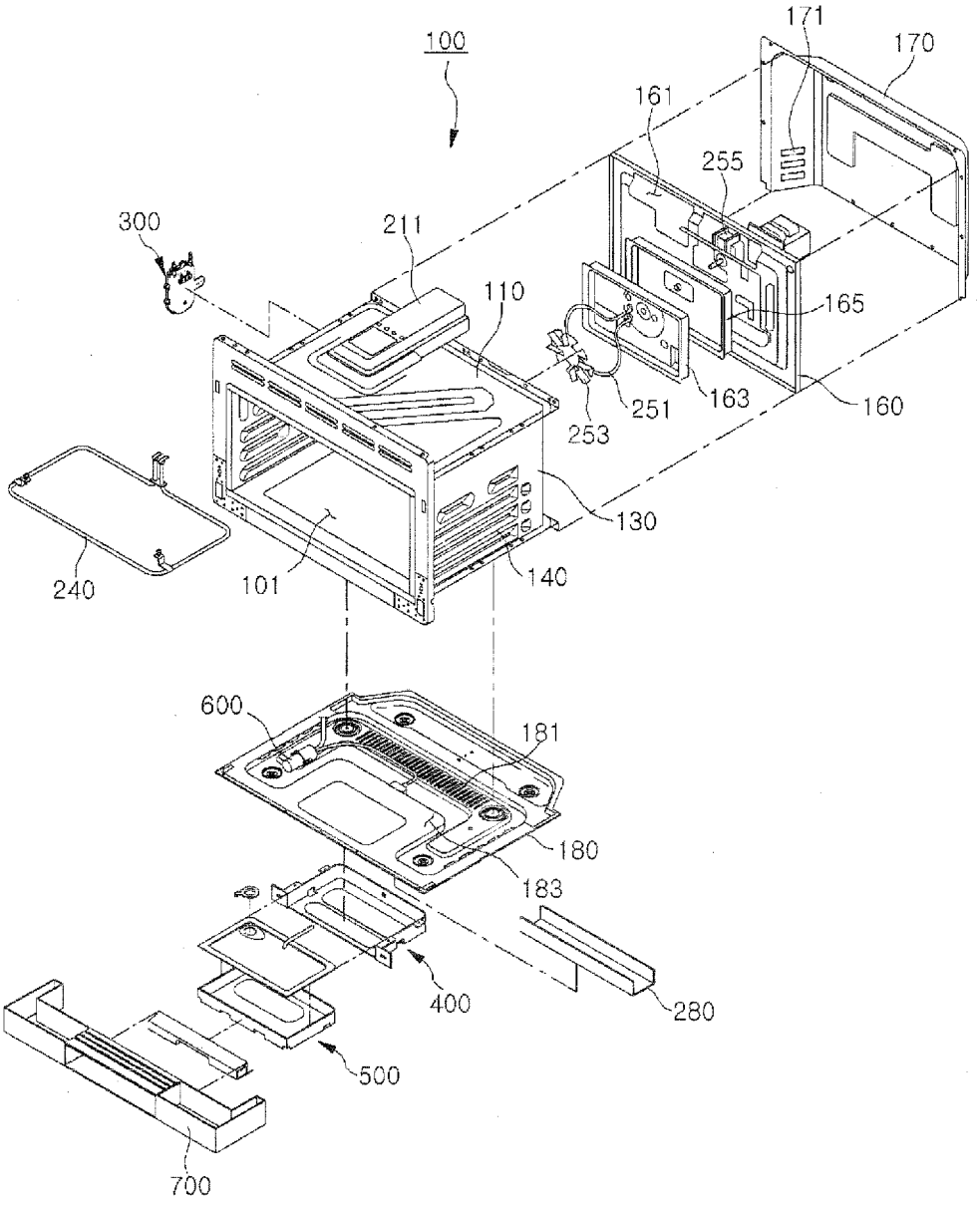
180
700
300

【Figure 3】


100
171
170
161
255
300
211
110
165
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163
160
253
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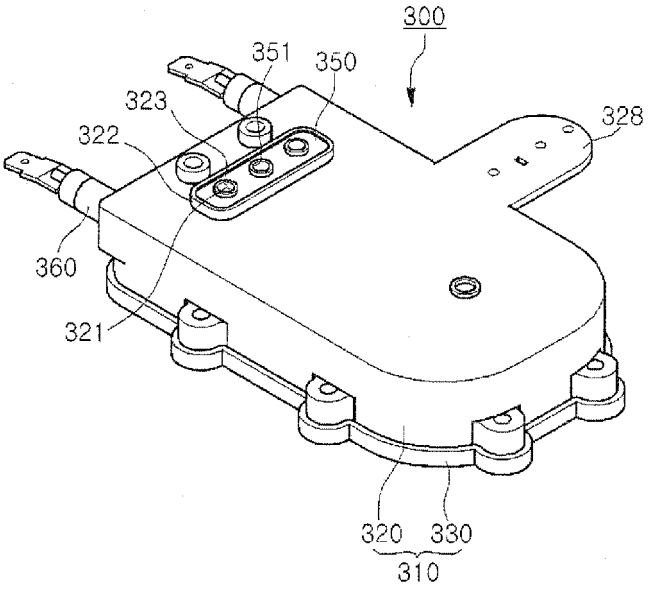
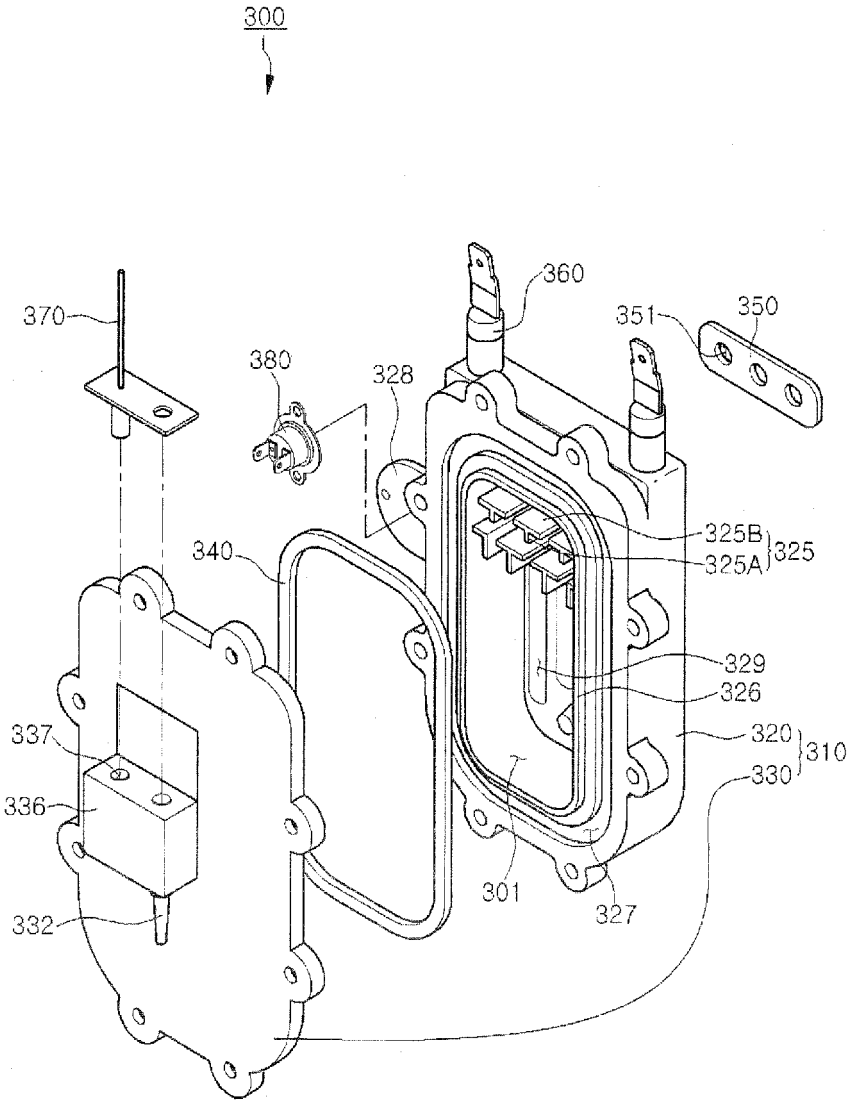
240
101
140
600
181
180
183
400
280
500
700

【Figure 4】



【Figure 5】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370
380
328
360
351
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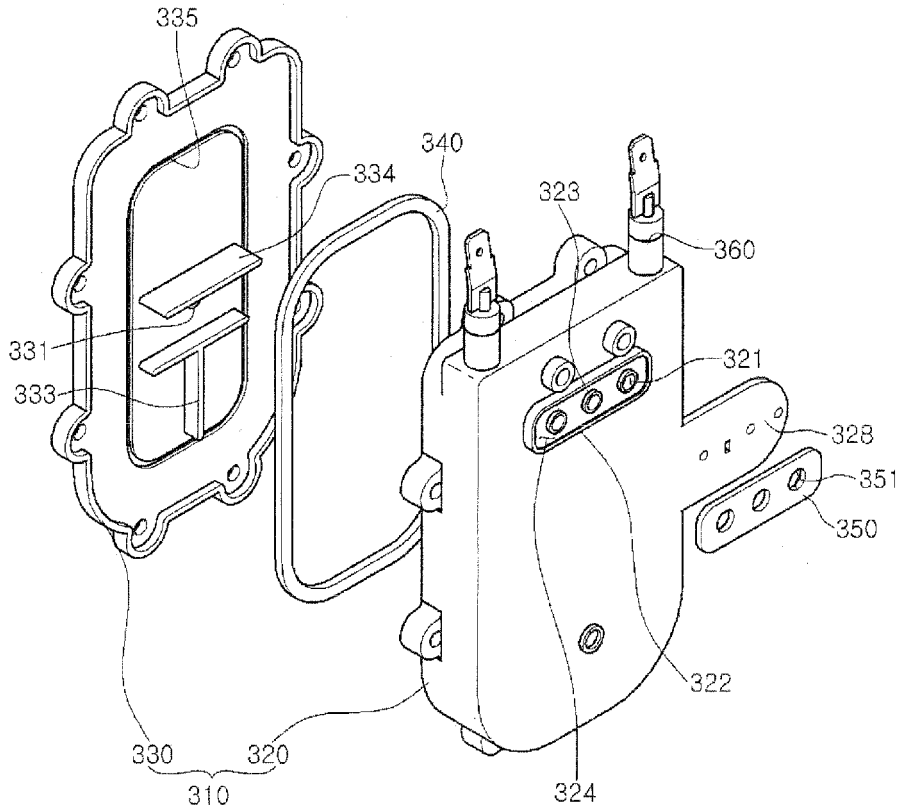
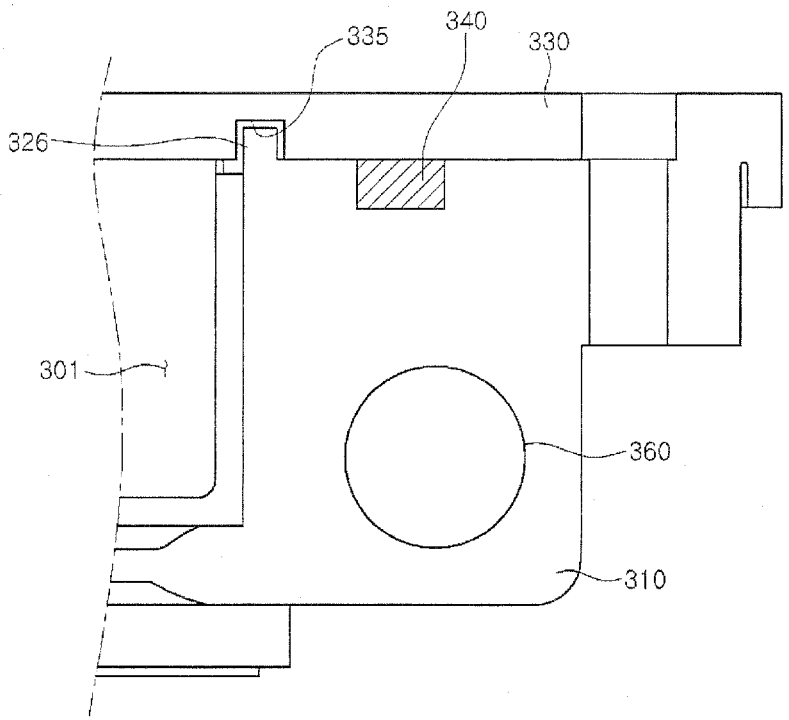
325B
325A
325
329
326
320
310
330
337
336
332
301
327

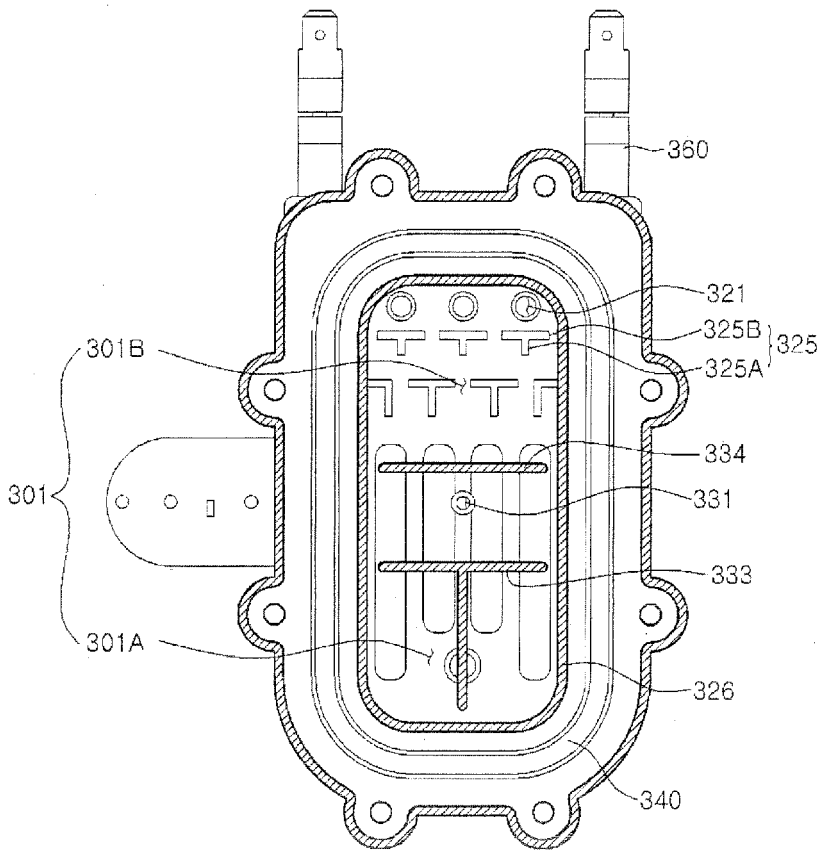
【Figure 6】



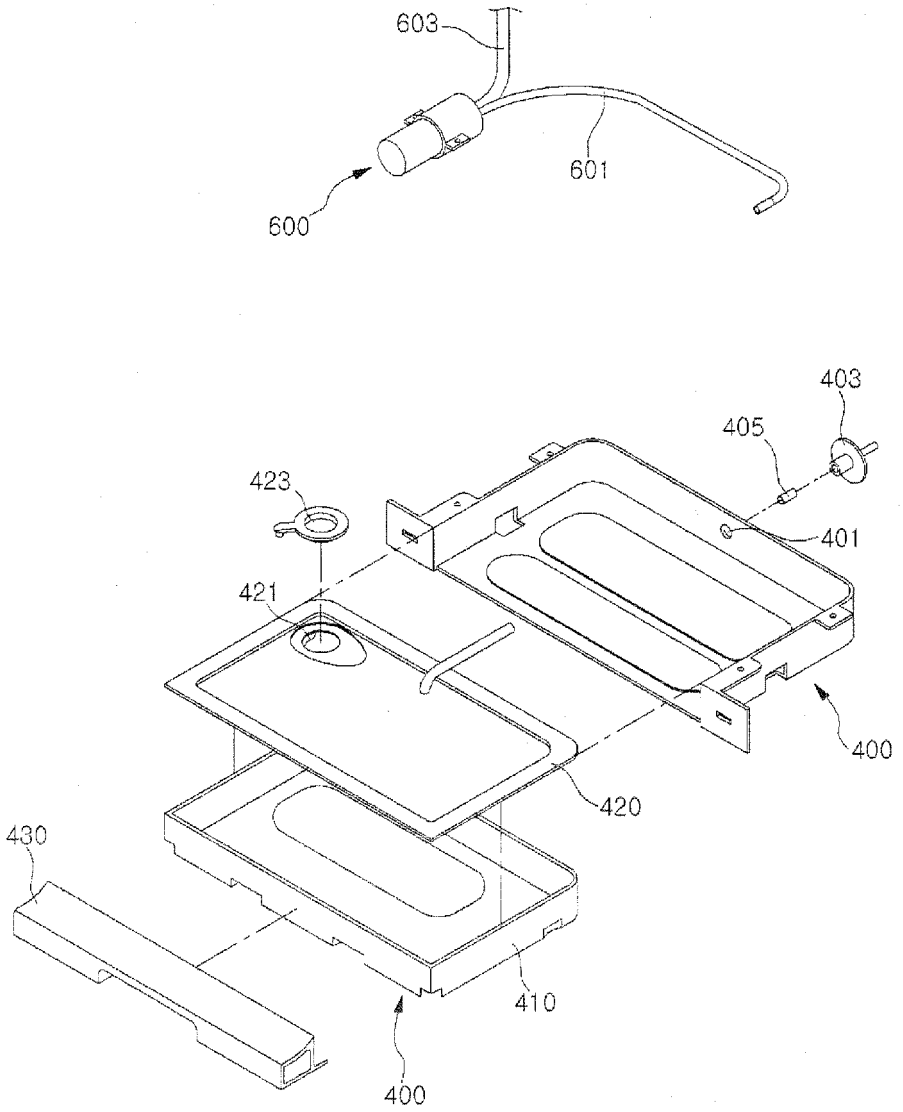
【Figure 7】



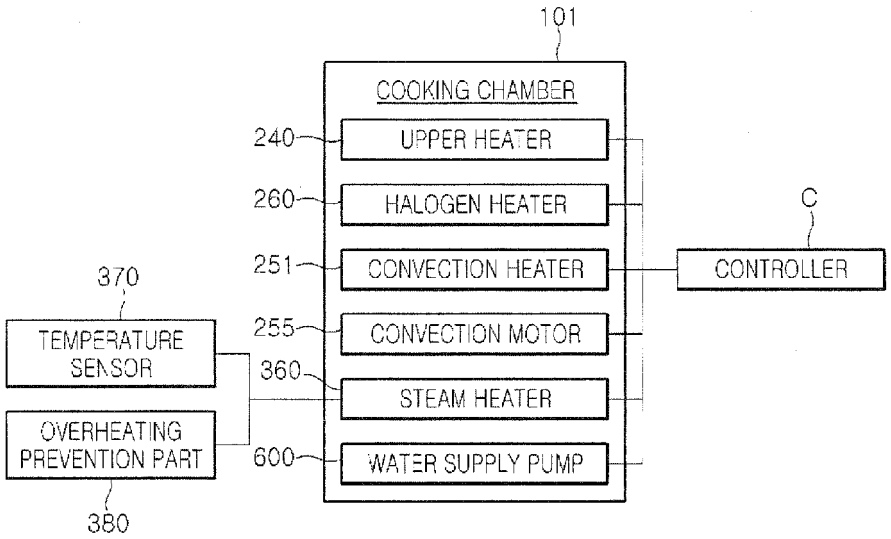
【Figure 8】



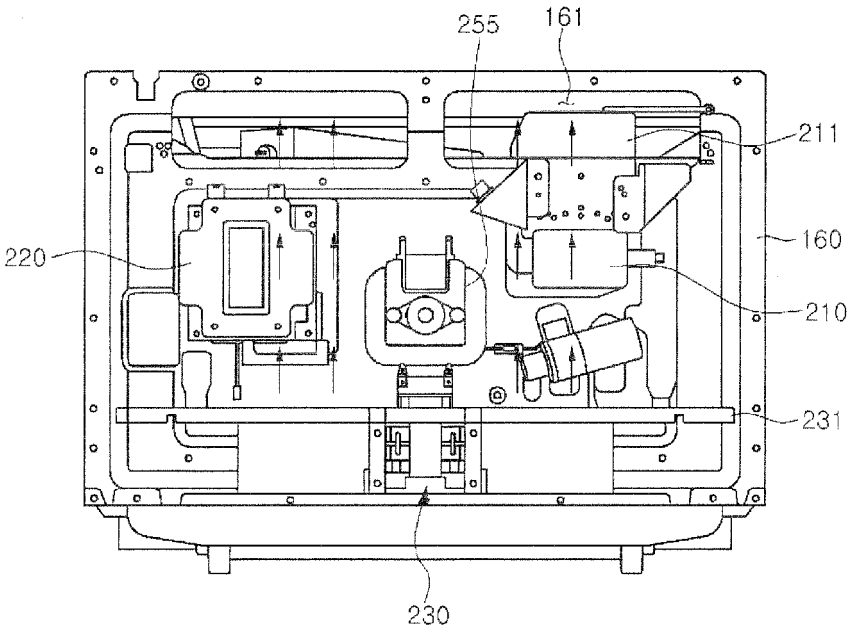
【Figure 9】



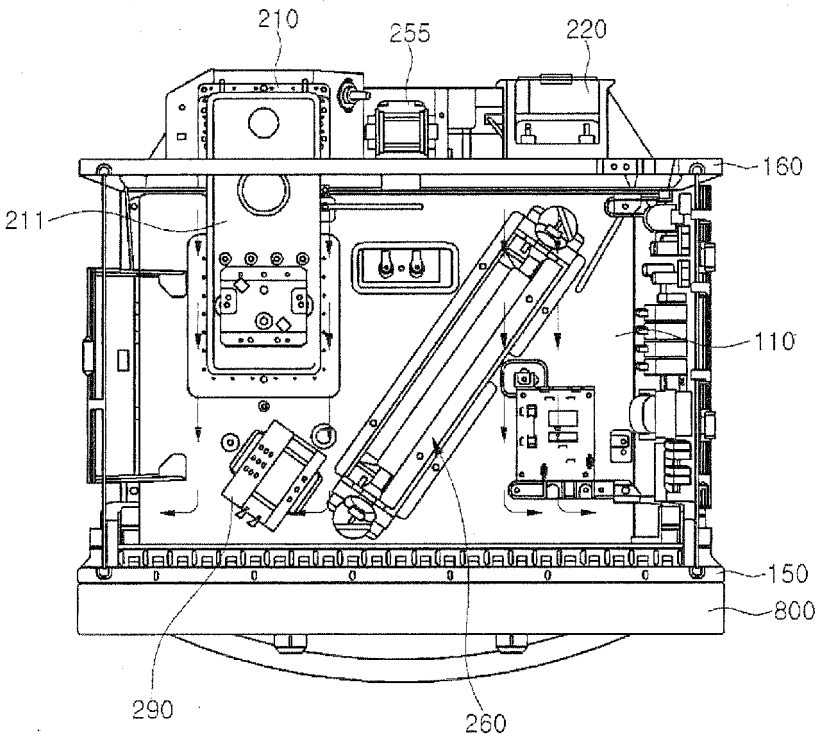
【Figure 10】



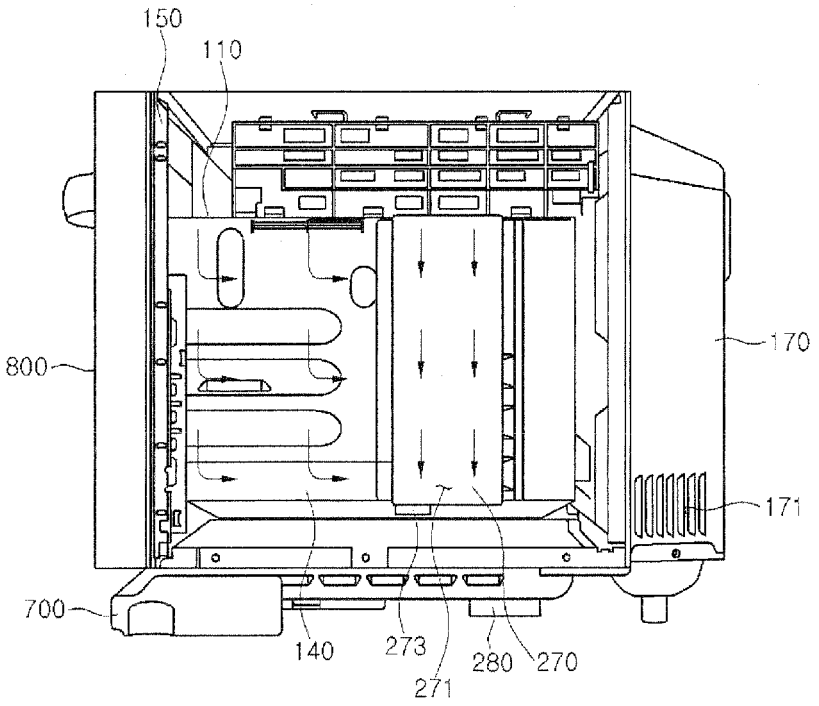
【Figure 11】



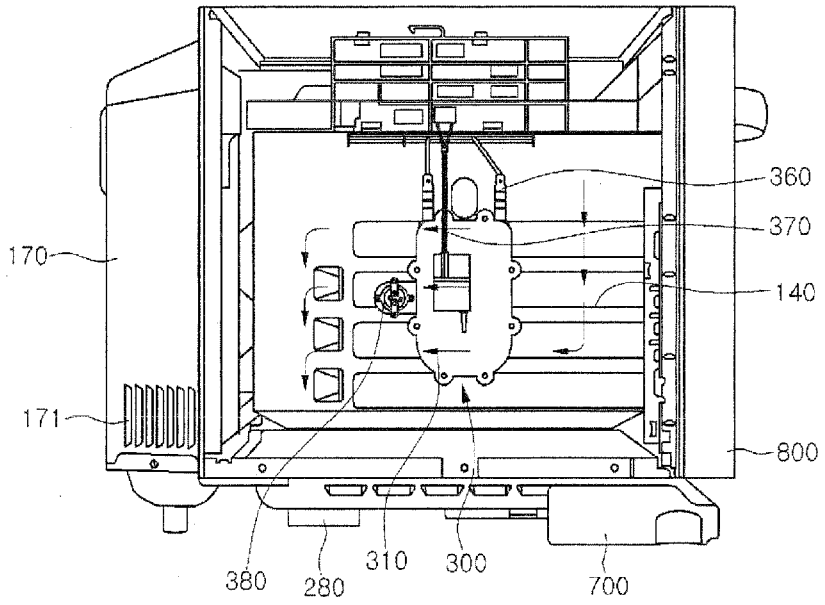
【Figure 12】



【Figure 13】



【Figure 14】



【Figure 15】