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(71) Applicant: **E.M.W. Energy Co., Ltd.**
Geumcheon-gu, Seoul 153-803 (KR)

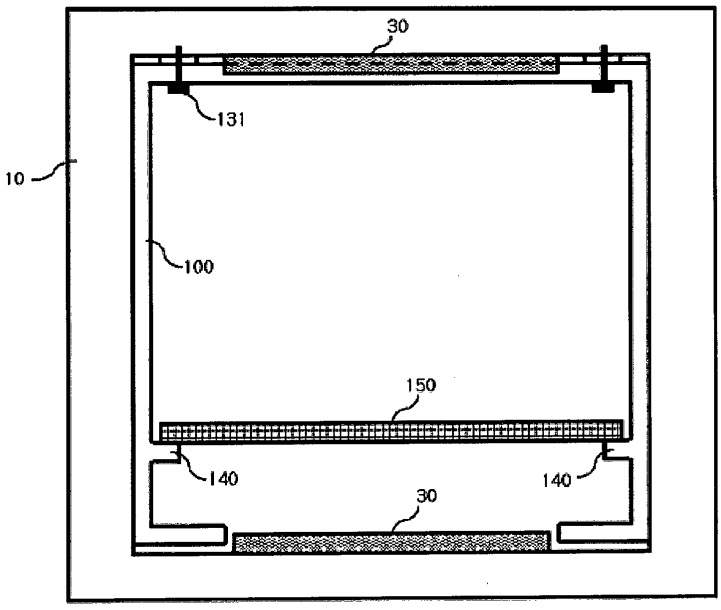
(72) Inventors:
- **RYOU, Byung Hoon**
  Seoul 137-040 (KR)
- **KONG, Jae Kyung**
  Seoul 137-790 (KR)

(74) Representative: **Thoma, Michael et al**
Lorenz - Seidler - Gossel
Widenmayerstraße 23
80538 München (DE)

(54) CAVITY FOR A HEAT-PROCESSING DEVICE, A HEAT-PROCESSING DEVICE COMPRISING SAME, AND AN AUXILIARY IMPLEMENT FOR THE HEAT-PROCESSING DEVICE

(57) The present invention relates to a cavity for a heat-processing device, to a heat-processing device comprising same, and to an auxiliary implement for the heat-processing device. One embodiment of the present invention concerns a cavity which is contained on the inside of the main body of a heat-processing device and constitutes a space where an article to be processed is heated, wherein the cavity of the heat-processing device comprises: a porous oxide layer which is formed by means of an anodizing reaction on at least some of the surface of the cavity; and a catalyst layer which is formed by causing a catalyst source solution to be supported on at least some of the surface of the oxide layer.

[FIG. 6]



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Description

[Technical Field]

[0001] The present invention relates to a cavity of a heating and cooking apparatus, a heating and cooking apparatus including the same, and an auxiliary utensil for a heating and cooking apparatus, and more particularly, a technique of removing an odor generated upon heating and cooking foods.

[Background Art]

[0002] A heating and cooking apparatus is an apparatus for heating and cooking foods. The heating and cooking apparatus may be an oven, a microwave oven, or the like. In recent times, a heating and cooking apparatus to which principles of both the oven and the microwave oven are applied has also appeared.

[0003] An oven is a cooking apparatus for uniformly heating foods from the outside using thermal conduction of radiant heat from air heated in the oven or an oven wall by a heat source. Heating structures of ovens include the following examples. First, a structure heated by natural convection of air heated by a heat source installed at a lower portion thereof and radiant heat from a heated inner wall of the oven is provided. Second, the heated air is circulated by a fan attached to the inside of the structure to transfer heat through forced convection. Third, heaters are attached at upper and lower or left and right sides of the inside so that foods are heated by radiant heat from the heaters. Of course, other heating structures may be employed in addition to the above-mentioned structures.

[0004] A microwave oven is a cooking apparatus for heating foods by radiating microwaves. When the microwaves are applied to the foods, water molecules of the foods are moved and the movement is rapidly transferred to surrounding water molecules to rapidly heat the entire foods. Unlike the oven, the microwave oven is characterized by heating the foods themselves.

[0005] Meanwhile, when foods such as fishes or barbecued meats are cooked in the heating and cooking apparatus, particular odors generated from cooking objects remain in the heating and cooking apparatus and the odors may permeated into other foods cooked thereafter. In addition, the particular odors generated from the cooking objects leak to the outside, and thus the odors do not disappear for a long time and cause unpleasant feelings.

[Summary of Invention]

[Technical Problem]

[0006] In order to solve these problems, an object of the present invention is to provide a cavity of a heating and cooking apparatus capable of easily removing an odor generated from a cooking object, a heating and cooking apparatus including the same, and an auxiliary utensil for a heating and cooking apparatus.

[Solution to Problem]

[0007] In order to achieve the aforementioned objects, according to an embodiment of the present invention, there is provided a cavity of a heating and cooking apparatus included in a main body of the heating and cooking apparatus and configured to form a space in which a cooking object is heated, which includes: a porous oxide layer formed on at least a portion of a surface of the cavity through an anodizing reaction; and a catalyst layer formed by submerging at least the portion of the surface of the oxide layer in a catalyst mother liquid.

[0008] The oxide layer may be formed through an anodizing reaction of a metal layer after the metal layer is formed on at least the portion of the surface of the cavity.

[0009] An opening section may be further formed in at least one surface of the cavity facing a heater of the heating and cooking apparatus such that radiant heat transferred from the heater passes therethrough.

[0010] The cavity may be configured to be detachable from the heating and cooking apparatus.

[0011] A pair of sliding sections may be formed at left and right sides or upper and lower sides of the cavity so that the cavity is detachable from the heating and cooking apparatus.

[0012] According to an embodiment of the present invention, there is provided a heating and cooking apparatus provided with a cavity formed in a main body thereof and configured to form a space in which a cooking object is heated, which includes: a porous oxide layer formed on at least a portion of a surface of the cavity through an anodizing reaction; and a catalyst layer formed by submerging at least the portion of the surface of the oxide layer in a catalyst mother liquid, wherein, when the heating and cooking apparatus is used, odor-causing molecules generated from the cooking object cause a catalyst reaction on the catalyst layer to be decomposed.

[0013] The heating and cooking apparatus may further include: a pair of sliding sections formed at left and right sides or upper and lower sides of the cavity; and sliding guide sections formed inside a main body of the heating and cooking apparatus so that the sliding section are seated thereon, wherein the cavity is configured to be detachable from the heating and cooking apparatus.

[0014] According to an embodiment of the present invention, there is provided an auxiliary utensil for a heating and cooking apparatus provided in the heating and cooking apparatus and configured to remove an odor generated from a cooking object, which includes: a porous oxide layer formed on at least a portion of a surface of the auxiliary utensil through an anodizing reaction; and a catalyst layer formed by submerging at least the portion of the surface of the oxide layer in a catalyst mother liquid, wherein, when the heating and cooking apparatus is

used, odor-causing molecules generated from the cooking object cause a catalyst reaction on the catalyst layer to be decomposed.

[0015] The auxiliary utensil may be a tray configured to support the cooking object.

[0016] The auxiliary utensil may be attached to the inside of a cavity configured to form a space in which the cooking object is heated.

[Advantageous Effects of Invention]

[0017] According to an embodiment of the present invention, it is possible to provide a cavity of a heating and cooking apparatus capable of easily removing an odor generated from a cooking object, a heating and cooking apparatus including the same, and an auxiliary utensil for a heating and cooking apparatus.

[0018] According to an embodiment of the present invention, a temperature condition appropriate for catalyst reaction can be satisfied by an internal temperature of the heating and cooking apparatus without necessity of additionally providing a separate heater for arrival at a temperature which causes the catalyst reaction.

[Brief Description of Drawings]

[0019]

FIG. 1 is a cross-sectional view showing an embodiment of a heating and cooking apparatus in the related art;

FIG. 2 is a view for describing a process of generating an anodizing reaction in a first embodiment of a cavity of a heating and cooking apparatus according to the present invention;

FIG. 3 is a view for individually describing steps of the anodizing reaction;

FIG. 4 is a view showing a second embodiment of the cavity of the heating and cooking apparatus according to the present invention;

FIG. 5 is a view showing a third embodiment of the cavity of the heating and cooking apparatus according to the present invention;

FIG. 6 is a cross-sectional view showing a heating and cooking apparatus in a state in which the third embodiment of the cavity of the heating and cooking apparatus according to the present invention is coupled;

FIG. 7 is a view showing a fourth embodiment of the cavity of the heating and cooking apparatus according to the present invention;

FIG. 8 is a cross-sectional view showing a heating and cooking apparatus in a state in which the fourth embodiment of the cavity of the heating and cooking apparatus according to the present invention is coupled; and

FIG. 9 is a cross-sectional view showing a state in which an embodiment of an auxiliary utensil for a heating and cooking apparatus according to the present invention is used.

[Description of Embodiments]

[0020] Hereinafter, various embodiments according to the present invention will be described in detail with reference to the accompanying drawings. However, specific description of the related art and a configuration thereof which may blur the spirit of the present invention will be omitted.

[0021] In addition, in description of the present invention, a reference of upper, lower, left and right sides is not absolute but merely describes a reference of the drawing for the purpose of easy description of the present invention. In addition, it will be understood that geometric or mathematical expressions such as "parallel" or "vertical" used herein does not strictly mean an ideal parallel or vertical state but may mean a substantial parallel or vertical state within an actually configurable range.

[0022] Further, in description of the present invention with reference to the accompanying drawings, components configured to perform the same function are designated by the same reference numerals.

[0023] FIG. 1 is a side cross-sectional view of an embodiment of a heating and cooking apparatus in the related art.

[0024] According to the heating and cooking apparatus shown in FIG. 1, a cavity 100 is included in a main body 10. The cavity 100 is configured to provide a space in which a cooking object is heated. The cavity 100 is generally formed of a thermally resistant material. Accordingly, a metallic material may be used.

[0025] The heating and cooking apparatus may include a heater 30. When the heater 30 is provided, the cooking object is heated by radiant heat therefrom. As shown, while a pair of heaters 30 may be provided at upper and lower sides, according to cases, the pair of heaters 30 may be provided at left and right sides or one heater 30 may be provided at a lower side or an upper side only.

[0026] The heating and cooking apparatus may include a blower fan 41 to cause convection of heat generated from the heater 30. The blower fan 41 is rotated about a rotary shaft 42 to form an air flow, and the formed air flow is conveyed into the cavity 100 through a ventilation hole 43 to accelerate a convection phenomenon of the heat.

[0027] A door 20 may be installed in the front of the heating and cooking apparatus, and a door handle 21 may be further installed to open/close the door.

[0028] Hereinafter, various embodiments of the present invention will be described with reference to the structure of the above-mentioned heating and cooking apparatus. However, the structure of the above-mentioned heating and cooking apparatus is merely one example of various structures of the heating and cooking apparatus, and employed for the convenience of descrip-

tion. Accordingly, the scope of protection of the present invention is not limited thereto.

[0029] First, an anodizing reaction will be described in detail with reference to FIGS. 2 and 3.

[0030] The anodizing is an oxidation phenomenon generated in an anode reaction. According to the anodizing reaction, a process of growing an oxide or nitride film on a metal surface using an electrolytic reaction may be performed. In the anodizing reaction, fine variations in shape or crystalline structure of the metal surface may occur, and an example of the anodizing will be described as follows.

[0031] When a direct current flows through an electrolyte, hydrogen is generated from a cathode metal, and oxygen is generated from an anode metal (aluminum (Al), titanium (Ti), zinc (Zn), magnesium (Mg), niobium (Nb), and so on). Here, the formed oxygen reacts with the anode metal to form a metal oxide film. In this process, the electrolyte finely dissolves the generated oxide film. Here, when a dissolution speed is balanced with a forming speed of the oxide film, a plurality of pores having a diameter of 10 to 150 nm are formed in the anode metal surface.

[0032] When these pores are formed, the electrolyte and current may come in contact with a metal substrate disposed under the oxide film. As a result, a film having a thickness substantially larger than that of the oxide formed by a natural oxidation reaction of the metal may be formed. The oxide film formed through the above-mentioned method will be referred to as an oxide layer.

[0033] Meanwhile, the oxide layer has various kinds of properties according to process conditions. In general, as a lower concentration of electrolyte and a higher level of current or voltage are used, a thicker film is formed.

[0034] Before the anodizing reaction is performed, the anode metal may be etched with an alkaline solution to remove the oxide remaining on the surface, and desmutting may be performed with a subacidic solution to remove an insoluble material.

[0035] FIG. 2 shows a process of generating an anodizing reaction in a first embodiment of a cavity of a heating and cooking apparatus according to the present invention. As shown in FIG. 2, a conductive wire 200 may be disposed in the cavity 100 to perform the anodizing reaction. The cavity 100 is formed of a metallic material, and the conductive wire 200 is formed of the same metallic material as the cavity 100. A negative current is applied to the conductive wire 200 and a positive current is applied to the cavity 100, and an electrolyte is added to the cavity 100 and the conductive wire 200 so that a porous oxide layer is formed on at least a portion of the surface of the cavity 100 to which the positive current is applied.

[0036] The metallic material that constitutes the cavity 100 may be any one of aluminum (Al), titanium (Ti), zinc (Zn), magnesium (Mg), and niobium (Nb).

[0037] Meanwhile, the entire cavity 100 is not formed of the same metallic material but a separate metal layer may be formed only on the surface of the cavity 100 and then the anodizing reaction may be performed. That is, after the metal layer is coated on the surface of the cavity 100 through a deposition method or the like, the anodizing reaction may be generated on the metal layer to form the porous oxide layer.

[0038] FIG. 3 shows a process of separately forming a metal layer 112 on a surface 111 of the cavity 100 and then forming a porous oxide layer 113. FIG. 3(a) shows the metal layer 112 formed on the surface 111 of the cavity 100 through a deposition method or the like. The metal layer 112 may have a thin film shape. When the anodizing reaction is performed using the metal layer 112 as an anode, the oxide layer 113 is formed as shown in FIG. (b). When the reaction is continued, a plurality of pores are formed in the oxide layer 113 to form a porous oxide layer 113 as shown in FIG. 3(c).

[0039] Hereinabove, the method of forming the oxide layer through the anodizing reaction has been described. Hereinafter, a method of forming a catalyst layer and a function of the catalyst layer will be described.

[0040] After the porous oxide layer is formed through the anodizing reaction, the layer may be submerged in a catalyst mother liquid and then dried to form the catalyst layer. The catalyst layer may be formed of platinum (Pt), rhodium (Rh), or the like.

[0041] Odor-causing molecules generated from the cooking object react with the catalyst layer to be changed into carbon dioxide and water. Of course, contaminants which should not be contained in foods can also be removed through chemical combustion by the catalyst reaction along with the odor-causing molecules.

[0042] In order for the odor-causing molecules or contaminants to easily cause the catalyst reaction, the following two conditions should be satisfied. First, the catalyst layer should have a large surface area to increase possibility of collision with the molecules. Second, a temperature condition appropriate for the catalyst reaction should be maintained at a temperature of 200 to 250 °C. In the case of the first condition, as the catalyst layer is formed on the porous oxide layer, a surface area of the catalyst layer can be increased. This is the reason for using the anodizing reaction in the present invention. In the case of the second condition, while a separate heater may be further provided to satisfy the temperature condition, since a heating and cooking apparatus such as an oven can easily arrive at the temperature range of 200 to 250 °C, the effect of the present invention can be enhanced.

[0043] Hereinafter, second to fourth embodiments of the cavity of the heating and cooking apparatus according to the present invention will be described with reference to FIGS. 4 to 8.

[0044] According to the second embodiment of the cavity of the heating and cooking apparatus according to the present invention shown in FIG. 4, a structure including an opening section formed at a lower surface of the cavity 100 to enable direct transfer of the radiant heat

transferred from the heater included in the heating and cooking apparatus is shown. In this case, the radiant heat transferred from the heater can be easily transferred into the cavity 100. Of course, since an installation position of the heater may be an upper side or a left or right side, the opening section is not formed at only a lower side of the cavity 100 but may be formed in at least one surface of the cavity 100 facing the heater.

[0045] According to the third embodiment of the cavity of the heating and cooking apparatus according to the present invention shown in FIG. 5, a structure in which opening sections are formed at both of upper and lower surfaces is provided. When the cavity 100 is manufactured using a mold, the cavity 100 may be easily manufactured by separately forming left and right halves as a two-stage structure and coupling the halves. When the separated cavities 100 are coupled, a connecting member 120 may be used to fix the cavities.

[0046] Meanwhile, the cavity 100 may be configured to be detachable from the heating and cooking apparatus. While the detachable structure may employ various kinds of structures, a structure in which a thread groove 130 is formed in the cavity 100 as shown in FIG. 5 and coupled to the main body 10 of the heating and cooking apparatus by a bolt 131 as shown in FIG. 6 may be employed.

[0047] A protrusion 140 may be further formed at an inner surface of the cavity 100 to support a tray 150 configured to support a cooking object.

[0048] According to the fourth embodiment of the cavity of the heating and cooking apparatus according to the present invention shown in FIG. 7, a pair of sliding sections 160 are formed at left and right sides of the cavity 100 to be more easily detached from the heating and cooking apparatus. The sliding sections 160 may be formed at upper and lower sides of the cavity 100 rather than the left and right sides.

[0049] As shown in FIG. 8, sliding guide sections 11 on which the sliding sections 160 can be seated may be formed in the main body 10 of the heating and cooking apparatus such that the cavity 100 can be easily attached or detached. When the cavity 100 can be easily separated from the main body 10, since the cavity 100 can be separately cleaned and managed, more sanitary management becomes possible.

[0050] Hereinafter, an embodiment of an auxiliary utensil for a heating and cooking apparatus according to the present invention will be described with reference to FIG. 9.

[0051] According to the embodiments, while the catalyst layer is formed on the cavity 100 itself to cause the catalyst reaction, the auxiliary utensil for the heating and cooking apparatus, which will be described below, is separately manufactured from the cavity 100 to provide a deodorization function.

[0052] A porous oxide layer is formed on at least a portion of the auxiliary utensil through the anodizing reaction. A catalyst layer is formed on the portion by submerging at least the portion of the surface of the oxide layer in a catalyst mother liquid and drying the portion. The auxiliary utensil may be disposed in the cavity 100 such that the odor-causing molecules generated from the cooking object cause the catalyst reaction on the catalyst layer to be decomposed when the heating and cooking apparatus is driven.

[0053] Here, as shown in FIG. 9, the auxiliary utensil may be the tray 150 configured to support the cooking object. That is, since the tray 150 is also heated, even when the catalyst layer is formed on the tray 150, the catalyst reaction will be performed to provide a deodorization function.

[0054] Meanwhile, as shown in FIG. 9, the auxiliary utensil may be separately manufactured as a structure 170 attached to the inside of the cavity 100. According to the above-mentioned structure, since formation of the oxide layer is easier than the anodizing reaction of the entire cavity 100, advantages in a manufacturing process can be provided.

[0055] Hereinabove, the embodiments of the present invention have been described with reference to the accompanying drawings. Here, terms or words used in the specification and claims should not be construed by their conventional or dictionary definitions but should be construed with meanings and concepts in line with the technical spirit of the present invention.

[0056] Accordingly, the embodiments described herein and configurations shown in the drawings are merely related to exemplary embodiments of the present invention and do not represent the entire spirit of the present invention. Accordingly, it will be apparent that various equivalents and variants may be made to be displaced with the embodiments.

Claims

1. A cavity of a heating and cooking apparatus included in a main body of the heating and cooking apparatus and configured to form a space in which a cooking object is heated, which comprises:

   a porous oxide layer formed on at least a portion of a surface of the cavity through an anodizing reaction; and
   a catalyst layer formed by submerging at least the portion of the surface of the oxide layer in a catalyst mother liquid.

2. The cavity of the heating and cooking apparatus according to claim 1, wherein the oxide layer is formed through an anodizing reaction of a metal layer after the metal layer is formed on at least the portion of the surface of the cavity.

3. The cavity of the heating and cooking apparatus according to claim 1, wherein an opening section is

further formed in at least one surface of the cavity facing a heater of the heating and cooking apparatus such that radiant heat transferred from the heater passes therethrough.

4. The cavity of the heating and cooking apparatus according to claim 1, wherein the cavity is configured to be detachable from the heating and cooking apparatus.

5. The cavity of the heating and cooking apparatus according to claim 4, wherein a pair of sliding sections are formed at left and right sides or upper and lower sides of the cavity so that the cavity is detachable from the heating and cooking apparatus.

6. A heating and cooking apparatus provided with a cavity formed in a main body thereof and configured to form a space in which a cooking object is heated, which comprises:

a porous oxide layer formed on at least a portion of a surface of the cavity through an anodizing reaction; and
a catalyst layer formed by submerging at least the portion of the surface of the oxide layer in a catalyst mother liquid,
wherein, when the heating and cooking apparatus is used, odor-causing molecules generated from the cooking object cause a catalyst reaction on the catalyst layer to be decomposed.

7. The heating and cooking apparatus according to claim 6, further comprising:

a pair of sliding sections formed at left and right sides or upper and lower sides of the cavity; and sliding guide sections formed inside a main body of the heating and cooking apparatus so that the sliding section are seated thereon,
wherein the cavity is configured to be detachable from the heating and cooking apparatus.

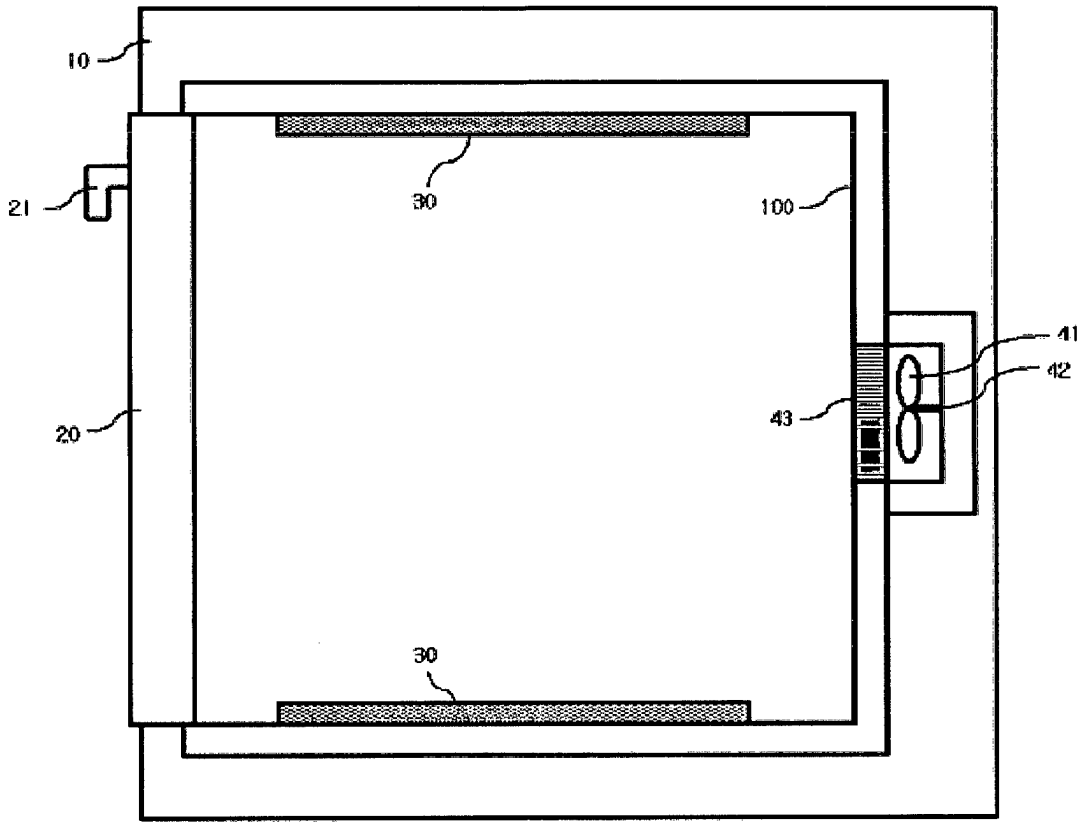
8. An auxiliary utensil for a heating and cooking apparatus provided in the heating and cooking apparatus and configured to remove an odor generated from a cooking object, which comprises:

a porous oxide layer formed on at least a portion of a surface of the auxiliary utensil through an anodizing reaction; and
a catalyst layer formed by submerging at least the portion of the surface of the oxide layer in a catalyst mother liquid,
wherein, when the heating and cooking apparatus is used, odor-causing molecules generated from the cooking object cause a catalyst reaction on the catalyst layer to be decomposed.

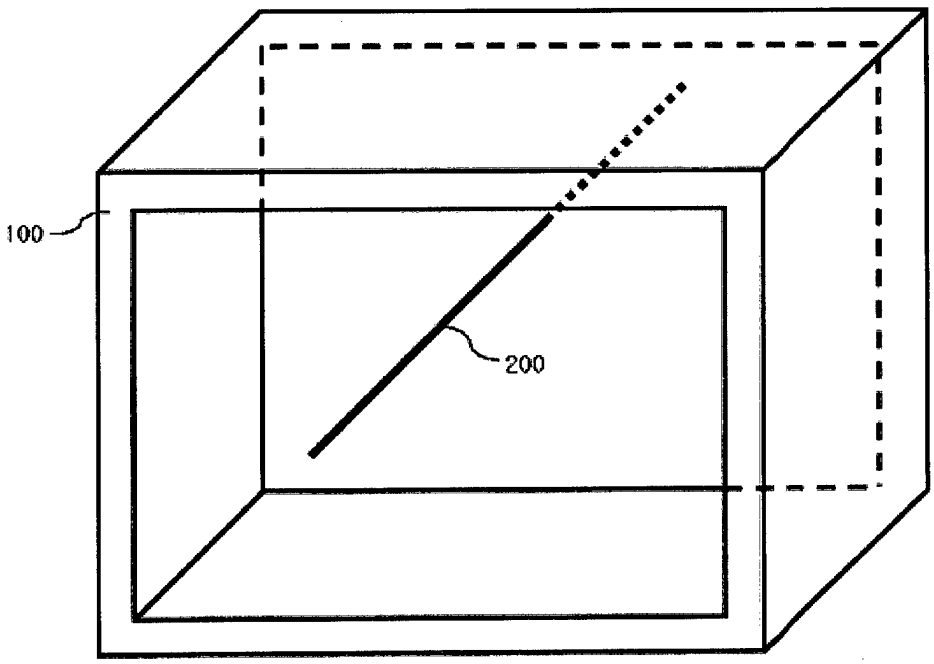
9. The auxiliary utensil for the heating and cooking apparatus according to claim 8, wherein the auxiliary utensil is a tray configured to support the cooking object.

10. The auxiliary utensil for the heating and cooking apparatus according to claim 8, wherein the auxiliary utensil is attached to the inside of a cavity configured to form a space in which the cooking object is heated.

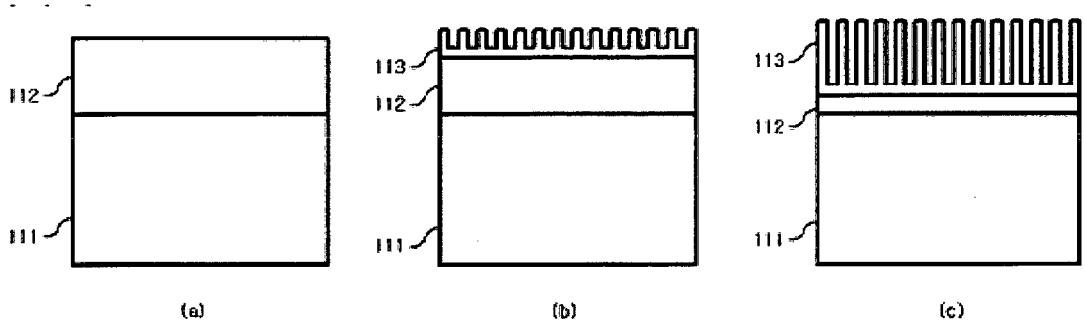
[FIG. 1]



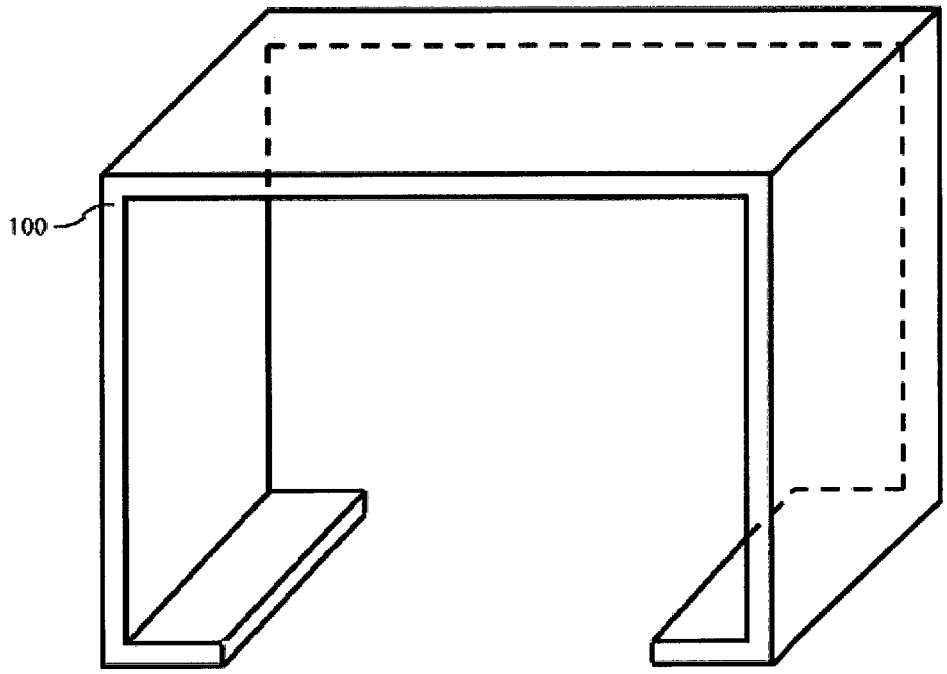
[FIG. 2]



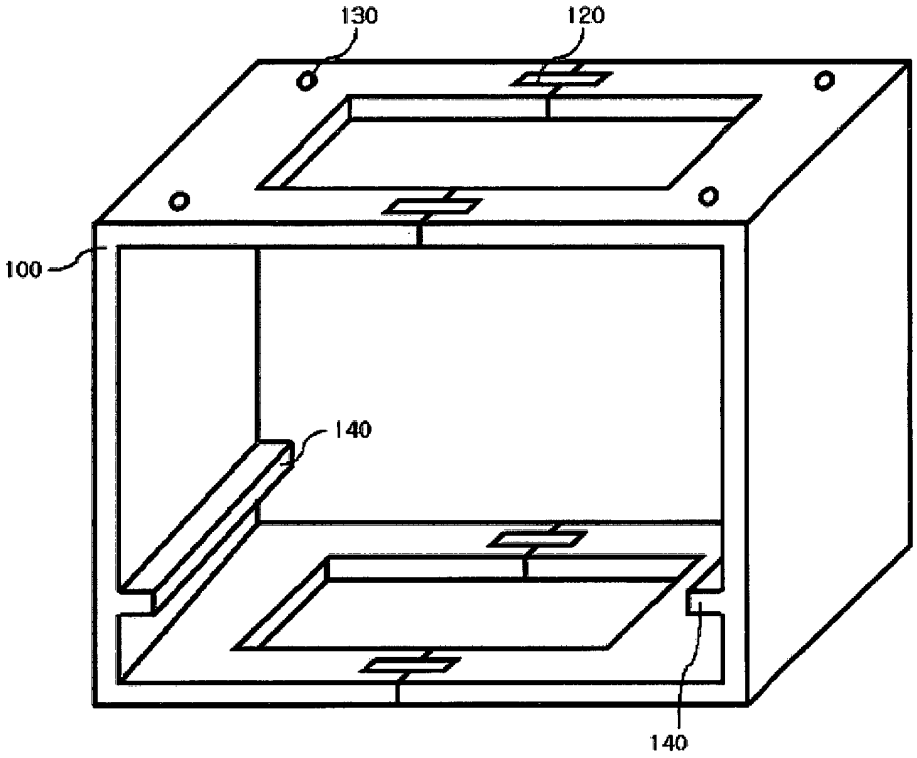
[FIG. 3]



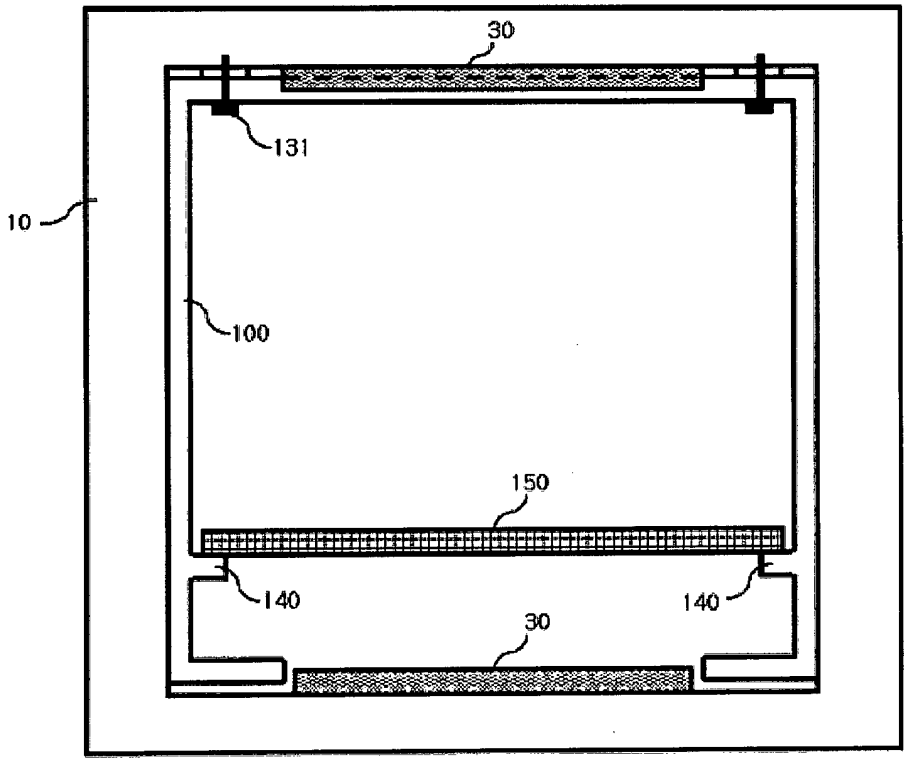
[FIG. 4]



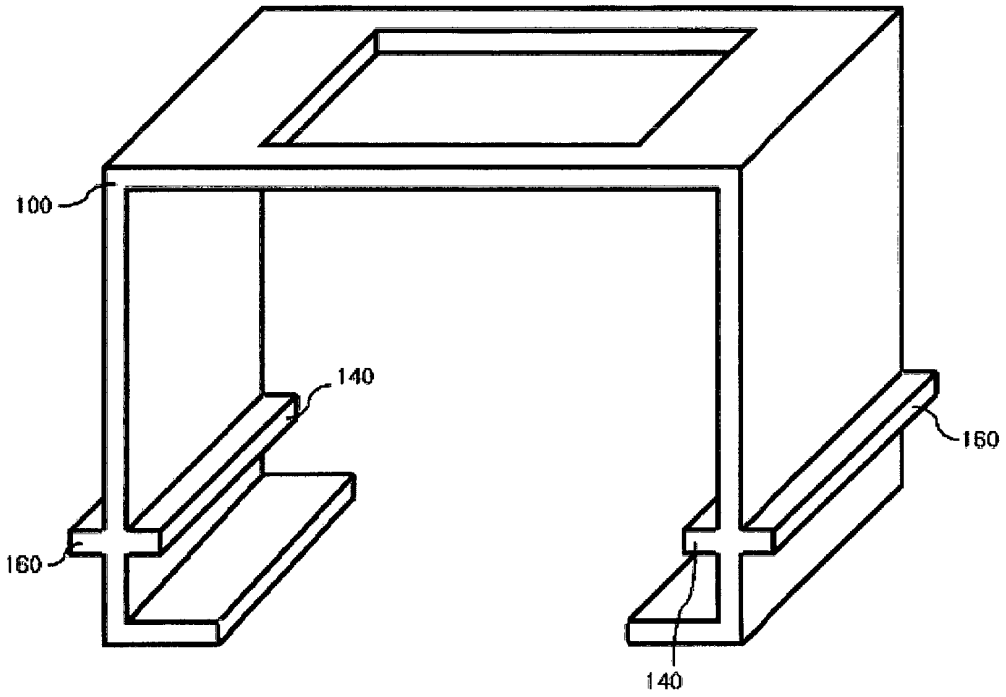
[FIG. 5]



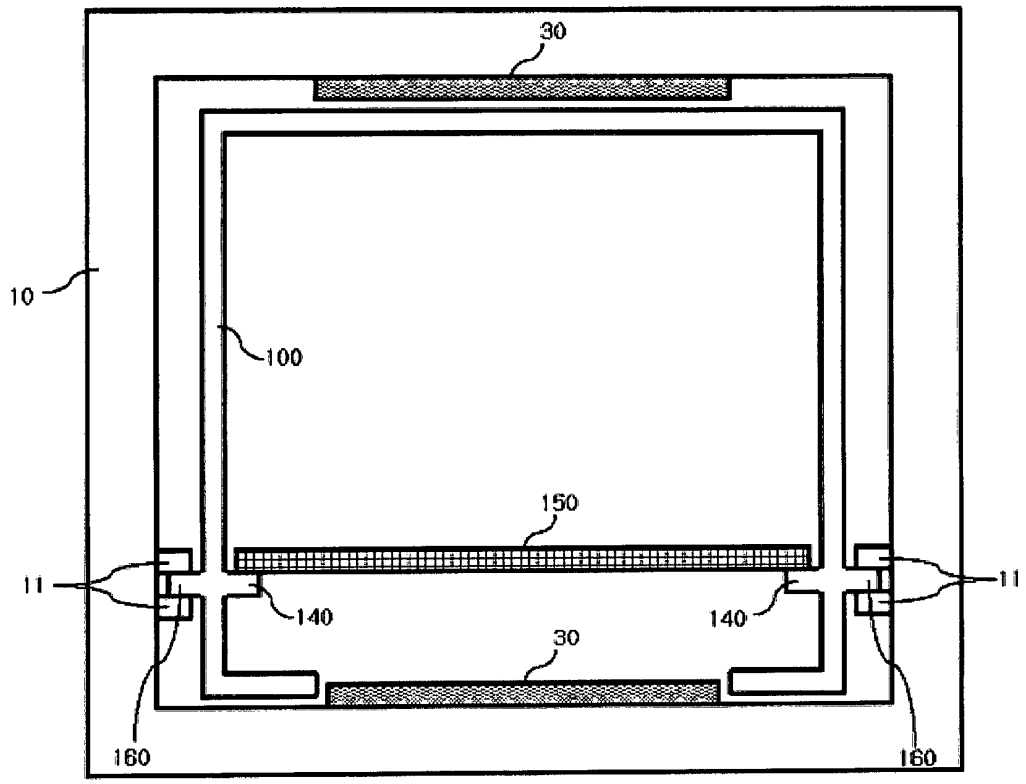
[FIG. 6]



[FIG. 7]



[FIG. 8]



[FIG. 9]