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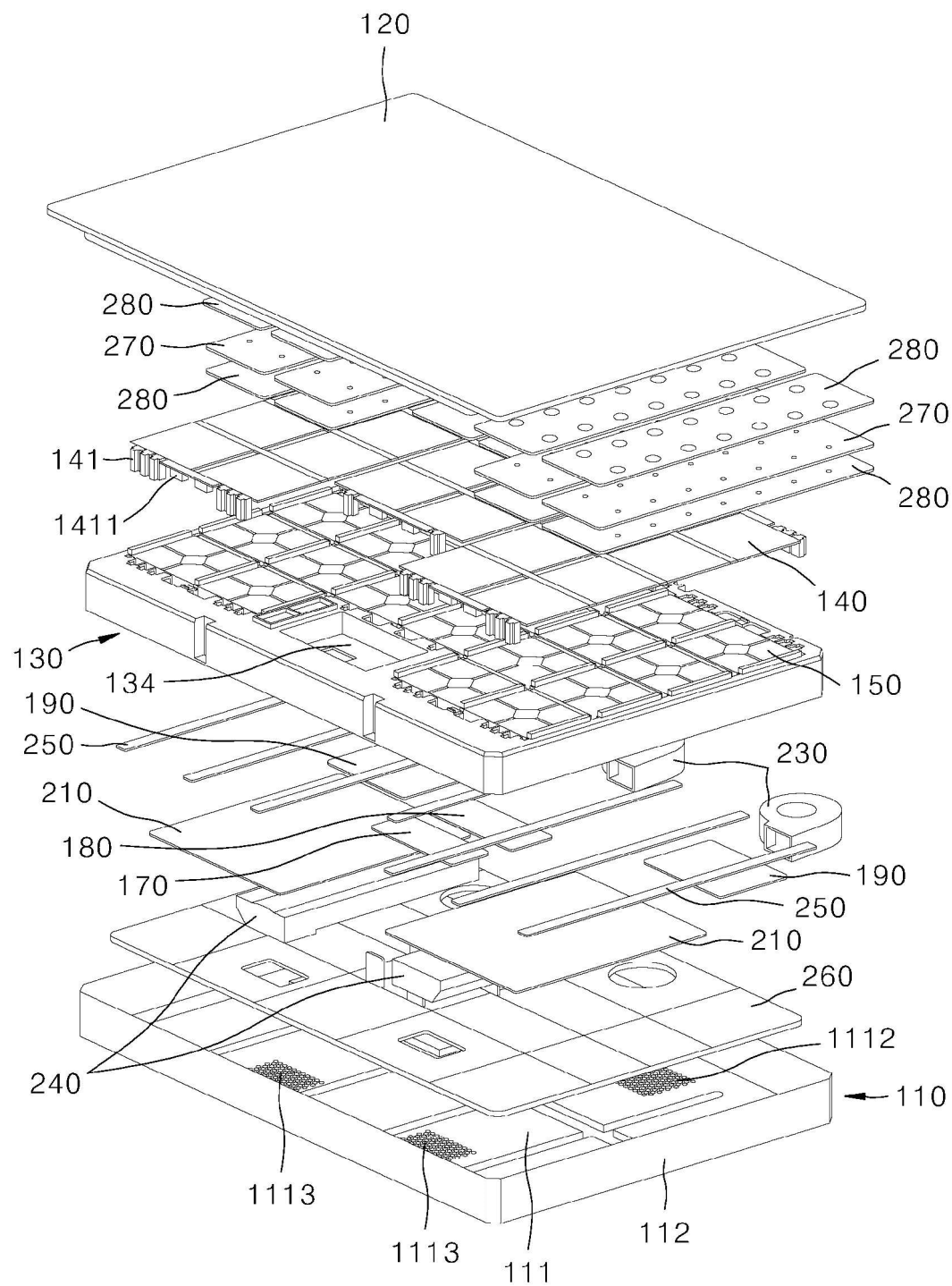
(54) **ELECTRIC RANGE**

(57) An embodiment of an electric range may include multiple ferrite modules disposed on an upper supporter, disposed beneath multiple coil substrates, and disposed at positions corresponding to the coil substrates. Each of the ferrite modules includes multiple ferrite cores, and the lateral ends of working coils may be disposed at the same positions as or inside the lateral ends of the ferrite cores.

The working coils and the ferrite cores may have a rectangular outer shape. A first length defined as the length between a pair of parallel outer sides of the ferrite cores may be equal to or longer than a second length defined as the length between a pair of parallel outer sides of the working coils.

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【FIG. 3】



Description

TECHNICAL FIELD

[0001] The present disclosure relates to an electric range, and more particularly, to an electric range of an induction heating type.

BACKGROUND

[0002] The content described in this section merely provides background information on the present disclosure and does not constitute prior art.

[0003] Various types of cooking appliances for heating food are used in homes or restaurants. The above-described cooking appliances comprise a gas range using gas and an electric range using electricity.

[0004] The electric range is largely divided into a resistance heating type and an induction heating type.

[0005] The electric resistance type is a method of generating heat by applying a current to a metal resistance wire or a non-metal heating element such as silicon carbide, and heating a heating target (for example, a cooking vessel such as a pot, a frying pan, and the like) by radiating or conducting the generated heat.

[0006] The induction heating type is a method of generating a magnetic field around a coil by applying high-frequency power to the coil, and heating a heating target made of a metal component by using an eddy current generated in the magnetic field.

[0007] Referring to a basic heating principle of the induction heating type, when a current is applied to a working coil, heat is generated while the heating target is induction-heated, and the heating target is heated by the generated heat.

[0008] In a general electric range, an area of a coil to which power is applied is formed to be large. In addition, an object to be heated is heated only when the object is placed at a position overlapping the coil having the large area.

[0009] Accordingly, since the coil of the electric range occupies a large area, a heating region corresponding to a small number of coils having a large area is provided on an upper portion of the electric range.

[0010] Since the heating region is large and the number thereof is small, a small number of heating regions is provided in a cover plate of the electric range having a limited area. In addition, since an area of each heating region is large, even when a plurality of heating regions is provided in the electric range, a region not heated between the heating regions occupies a large area.

[0011] Due to such a structure, a space in which the heating target can be placed in the electric range becomes narrow, and even when a small-sized object is heated, one heating region having a large area is entirely used, so that power consumption may increase. This causes inconvenience to a user.

[0012] In order to compensate for such disadvantages,

a coil having a plate-shaped structure with a small area may be disposed in the electric range. When a plurality of coils having a small area is disposed in the electric range, a space between the coils is reduced, and only a coil on which the heating target is placed operates, so that space efficiency of the electric range may be improved and power consumption may also be reduced.

SUMMARY

Technical Problems

[0013] An object of the present disclosure is to provide an electric range efficiently transmitting a magnetic field to a heating target to improve heating efficiency of the heating target.

[0014] Another object of the present disclosure is to provide an electric range improving cooling efficiency of a board provided with a heating element.

[0015] The objects of the present disclosure are not limited to the above-mentioned objects, and other objects and advantages of the present disclosure not mentioned above may be understood by the following description and will be more clearly understood by embodiments of the present disclosure. In addition, it will be readily understood that the objects and advantages of the present disclosure may be realized by means and combinations thereof set forth in the claims.

Technical Solutions

[0016] An embodiment of an electric range may comprise a plurality of ferrite modules disposed above an upper supporter, disposed below a coil board, and disposed at positions corresponding to each of a plurality of coil boards. The ferrite module comprises a plurality of ferrite cores, and a lateral direction end of a working coil may be disposed at the same position as or inward of a lateral direction end of the ferrite core.

[0017] The working coil and the ferrite core are formed to have a rectangular outer shape, and a first length defined as a length between a pair of parallel outer sides of the ferrite core may be the same as or greater than a second length defined as a length between a pair of parallel outer sides of the working coil.

[0018] An area of a rectangle defined by an outline of the ferrite core may be the same as or greater than an area of a rectangle defined by an outline of the working coil.

[0019] Accordingly, the ferrite core may block a magnetic field generated from the working coil and directed downward, thereby suppressing leakage of the magnetic field in a downward direction.

[0020] An embodiment of the electric range may comprise a heat sink coupled to a lower surface of an inverter board and disposed such that a longitudinal direction thereof is parallel to an air discharge direction of a blowing fan; an air guide disposed to surround the heat sink

and to guide a flow of air passing through the heat sink; and a lower supporter disposed below the upper supporter, accommodated in a case, and supporting the upper supporter.

[0021] The air guide may comprise an air introduction hole disposed to face an outlet of the blowing fan; a pair of side guides covering a side surface of the heat sink and spaced apart from each other; a lower guide covering a lower surface of the heat sink and respectively connected to the pair of side guides; an air discharge hole discharging air toward a bottom plate of the case; and a discharge guide forming the air discharge hole and changing a flow direction of air.

[0022] The discharge guide may comprise a pair of extension guides extending from the pair of side guides and provided as a pair; and a flow direction change guide connected to the pair of extension guides and formed as a curved surface to change a flow direction of air discharged from the air guide to the outside in a downward direction.

[0023] The air guide of one embodiment may be provided to be coupled to the inverter board. Accordingly, the air guide occupying a considerable volume may be consequently coupled to the upper supporter.

[0024] An air guide of another embodiment may be provided to be coupled to the lower supporter. Accordingly, with respect to an air guide occupying a considerable volume, in the lower supporter to which a plurality of boards, the heat sink, the blowing fan, and other components are coupled, a need to consider an arrangement space and a coupling structure of the air guide may be reduced.

Advantageous Effects

[0025] In the electric range according to the present disclosure, the first length of the ferrite core may be formed to be the same as or greater than the second length of the working coil. Accordingly, the ferrite core may block a magnetic field generated from the working coil and directed downward and direct the magnetic field again toward the heating target, thereby improving a density of the magnetic field transmitted to the heating target.

[0026] Therefore, the magnetic field may be efficiently transmitted to the heating target, and energy efficiency and heating efficiency of the electric range may be improved.

[0027] In addition, in the electric range according to the present disclosure, by coupling the air guide to a lower surface of the inverter board, the air guide occupying a considerable volume may be consequently coupled to the upper supporter.

[0028] As such, most components operated by receiving electricity and involved in an operation of the electric range, including a board, electrical components such as a blowing fan, a heat sink, an air guide, and other components, may be coupled to the upper supporter. Accord-

ingly, assembly and disassembly of the electric range may be significantly facilitated.

[0029] In addition, in the electric range according to the present disclosure, assembly of the heat sink and the air guide may be completed by coupling the lower supporter and the upper supporter in a state in which the air guide is coupled to the lower supporter and the heat sink is coupled to the upper supporter.

[0030] By coupling the air guide to the lower supporter, with respect to the air guide occupying a considerable volume, in the lower supporter to which a plurality of boards, the heat sink, the blowing fan, and other components are coupled, a need to consider an arrangement space and a coupling structure of the air guide may be reduced.

[0031] Accordingly, in the electric range, spatial arrangement of components and other design may be facilitated.

[0032] Along with the above-mentioned effects, specific effects of the present disclosure will be described together while describing specific details for carrying out the present disclosure below.

BRIEF DESCRIPTION OF DRAWINGS

[0033] The accompanying drawings constitute a part of the specification, illustrate one or more embodiments in the disclosure, and together with the specification, explain the disclosure, wherein:

FIG. 1 is a perspective view illustrating an electric range according to an embodiment;

FIG. 2 is a front view illustrating an electric range according to an embodiment;

FIG. 3 is an exploded perspective view illustrating an electric range according to an embodiment;

FIG. 4A is a plan view in which a cover plate is omitted from FIG. 1;

FIG. 4B is a view illustrating a coil board according to an embodiment;

FIG. 5 is a cross-sectional view taken along a line 5-5 of FIG. 4;

FIG. 6 is a bottom view illustrating an electric range according to an embodiment;

FIG. 7 is a view in which a case is omitted from FIG. 6;

FIG. 8 is a perspective view illustrating an upper supporter according to an embodiment;

FIG. 9 is a plan view illustrating an upper supporter according to an embodiment;

FIG. 10 is a cross-sectional view taken along a line 10-10 of FIG. 9;

FIG. 11 is a cross-sectional view taken along a line 11-11 of FIG. 9;

FIG. 12 is an exploded perspective view illustrating an upper supporter and a ferrite module;

FIG. 13 is a plan view illustrating a state in which the ferrite module is coupled to the upper supporter;

FIG. 14 is a plan view illustrating a state in which a coil board is coupled in the state of FIG. 13;

FIG. 15 is a bottom view of the upper supporter;

FIG. 16 is a view illustrating a state in which an indicator board is coupled in the state of FIG. 15;

FIG. 17 is a view illustrating a state in which various components are coupled in the state of FIG. 16;

FIG. 18 is a plan view for explaining an arrangement state of a ferrite core and a working coil according to an embodiment;

FIG. 19 is an exploded perspective view of a ferrite module according to an embodiment;

FIG. 20 is a plan view of the ferrite module illustrated in FIG. 19;

FIG. 21 is a side cross-sectional view of FIG. 20;

FIG. 22 is an exploded perspective view of a ferrite module according to another embodiment;

FIG. 23 is a plan view of the ferrite module illustrated in FIG. 22;

FIG. 24 is a side cross-sectional view of FIG. 23;

FIG. 25 is an exploded perspective view of a ferrite module according to another embodiment;

FIG. 26 is a plan view of the ferrite module illustrated in FIG. 25;

FIG. 27 is a side cross-sectional view of FIG. 26;

FIG. 28 is a view for explaining a distribution of a magnetic field when a lateral direction end of a working coil is at the same position as a lateral direction end of a ferrite core;

FIG. 29 is a view for explaining a distribution of a magnetic field when a lateral direction end of a work-

ing coil is located inward of the ferrite core relative to a lateral direction end of the ferrite core;

FIG. 30 is a view for explaining a distribution of a magnetic field when a lateral direction end of a working coil protrudes more outward of the electric range than a lateral direction end of a ferrite core;

FIG. 31 is a perspective view illustrating a lower portion of an upper supporter according to an embodiment;

FIG. 32 is a bottom view of an upper supporter according to an embodiment;

FIG. 33 is an exploded perspective view illustrating some of components coupled to the upper supporter;

FIG. 34 is an exploded perspective view illustrating FIG. 33 viewed from another direction;

FIG. 35 is a perspective view illustrating a state in which a lower supporter and a case are coupled;

FIG. 36 is a perspective view illustrating a state in which a lower supporter and a case are separated;

FIG. 37 is a bottom view of FIG. 35;

FIG. 38 is a plan view of a lower supporter according to another embodiment;

FIG. 39 is a perspective view of a lower supporter according to another embodiment;

FIG. 40 is a plan view of a ferrite module according to an embodiment;

FIG. 41 is a cross-sectional view of FIG. 40;

FIG. 42 is a perspective view of FIG. 41;

FIG. 43 is a plan view of a ferrite module according to another embodiment;

FIG. 44 is a cross-sectional view of FIG. 43;

FIG. 45 is a perspective view of FIG. 44;

FIG. 46 is a perspective view of a ferrite core according to another embodiment;

FIG. 47 is a plan view of FIG. 46;

FIG. 48 is a front view of FIG. 46;

FIG. 49 is a perspective view of a ferrite module according to another embodiment;

FIG. 50 is a plan view of FIG. 49;

FIG. 51 is a cross-sectional view taken along a line 29-29 of FIG. 50;

FIG. 52 is an exploded perspective view illustrating an upper supporter and a ferrite module;

FIG. 53 is a cross-sectional view illustrating a state in which the upper supporter and the ferrite module are assembled;

FIG. 54 is an enlarged view of portion 32 of FIG. 53; and

FIG. 55 is an exploded perspective view of some components of the electric range in which an insulating plate is illustrated.

DETAILED DESCRIPTION

[0034] The above-described aspects, features and advantages are specifically described hereafter with reference to accompanying drawings such that one having ordinary skill in the art to which the disclosure pertains can embody the technical spirit of the disclosure easily. In the disclosure, detailed description of known technologies in relation to the subject matter of the disclosure is omitted if it is deemed to make the gist of the disclosure unnecessarily vague. Hereafter, preferred embodiments according to the disclosure are specifically described with reference to the accompanying drawings. In the drawings, identical reference numerals can denote identical or similar components.

[0035] The terms "first", "second" and the like are used herein only to distinguish one component from another component. Thus, the components are not to be limited by the terms. Certainly, a first component can be a second component, unless stated to the contrary.

[0036] Throughout the disclosure, unless specifically stated to the contrary, each component may be singular or plural.

[0037] In the disclosure, singular forms comprise plural forms as well, unless explicitly indicated otherwise. In the present application, terms such as "constitute" or "comprise" should not be interpreted as necessarily including all of the various components or steps described in the disclosure, but should be interpreted as meaning that some of the components or steps may not be included, or that additional components or steps may be further included.

[0038] Throughout the disclosure, the terms "A and/or B" as used herein can denote A, B or A and B, and the terms "C to D" can denote C or greater and D or less, unless stated to the contrary.

[0039] Throughout the disclosure, "upper," "lower," or "up-down direction" refers to an upper side, a lower side, or an up-down direction of the electric range in a state in

which the electric range is installed for normal use. "Both lateral directions" or "lateral direction" refers to a direction orthogonal to the up-down direction. Both lateral directions or lateral direction may include "left-right direction" and "front-rear direction," and the left-right direction and the front-rear direction are orthogonal to each other.

[0040] FIG. 1 is a perspective view illustrating an electric range according to an embodiment. FIG. 2 is a front view illustrating an electric range according to an embodiment. FIG. 3 is an exploded perspective view illustrating an electric range according to an embodiment.

[0041] An electric range according to an embodiment may heat a heating target by an induction heating method. In this case, the heating target may be, for example, a cooking vessel containing a metal material such as stainless steel, iron, and the like.

[0042] The induction heating method is a method of generating a magnetic field around a working coil 140a by applying high-frequency power to the working coil 140a, and heating a heating target made of a metal component by using an eddy current generated by the generated magnetic field.

[0043] That is, the working coil 140a and a ferrite material are disposed to be adjacent to each other, and when high-frequency power is applied to the working coil 140a, the working coil 140a may generate a magnetic field.

[0044] When a magnetic field is generated around the working coil 140a in this manner and a heating target is placed within a region of the generated magnetic field, an eddy current is induced in the heating target by the magnetic field, and Joule's heat is generated by the eddy current so that the heating target may be heated. As a cooking vessel, which is the heating target, is heated, food contained in the heating target may be heated and cooked.

[0045] An electric range of an embodiment may comprise a case 110, a cover plate 120, an upper supporter 130, a coil board 140, and a ferrite module 150.

[0046] The case 110 may function to protect components constituting the electric range. For example, the case 110 may be provided of an aluminum material, but is not limited thereto. Meanwhile, the case 110 may be thermally insulated to suppress heat generated by the coil board 140 from being released to the outside.

[0047] Components constituting the electric range may be accommodated in the case 110, and an upper portion is open, but the open portion may be closed by the cover plate 120. The case 110 may be formed in a box shape by processing a plate-shaped material as a whole.

[0048] The case 110 may comprise a bottom plate 111 and a side wall 112. The bottom plate 111 may form a bottom surface of the case 110. The bottom plate 111 may support internal components of the electric range.

[0049] The side wall 112 may be bent from the bottom plate 111 to form a space for accommodating components. The side wall 112 may be bent from an edge of the bottom plate 111 in an upper direction to form a side

surface of the electric range.

[0050] The side walls 112 may be disposed on respective sides of the bottom plate 111 generally formed in a rectangular shape. The side wall 112 may reinforce rigidity of the entire case 110. That is, the side wall 112 formed to be bent from the bottom plate 111 may suppress the plate-shaped bottom plate 111 from being bent or damaged due to a weight of internal components or an external force.

[0051] In addition, the cover plate 120 may be coupled to an upper portion of the side wall 112. As the case 110 and the cover plate 120 are coupled in this manner, an interior of the case 110 is closed, and a space in which various components are disposed may be provided inside the case 110.

[0052] The cover plate 120 is coupled to an upper end of the case 110, and the heating target may be disposed on an upper surface thereof. The cover plate 120 may close an open upper portion of the case 110 to protect components accommodated in the case 110.

[0053] A heating target may be placed on an upper surface of the cover plate 120, and a magnetic field generated in the coil board and the ferrite module 150 may pass through the cover plate 120 to reach the heating target. The cover plate 120 may be provided of, for example, a material including ceramic, but is not limited thereto.

[0054] The cover plate 120 may be formed of, for example, a glass material and may be manufactured to be transparent or translucent so that light emitted from the indicator board 250 passes therethrough.

[0055] An input interface 160 for receiving an input from a user may be installed in the electric range. The input interface 160 is installed to overlap a specific region of the cover plate 120 and may display a specific image.

[0056] For example, the input interface 160 may be embedded flat in the cover plate 120 or may be installed to contact a lower surface of the cover plate 120.

[0057] The input interface 160 may receive a touch input from a user, and the electric range may be driven based on the received touch input.

[0058] For example, the input interface 160 may be implemented as a module for inputting a heating intensity, a heating time, and the like desired by the user, and may be implemented as a physical button, a touch panel, or the like.

[0059] As an example, the input interface 160 may be a thin film transistor liquid crystal display (TFT LCD), but is not limited thereto.

[0060] The cover plate 120 may be provided with a cover frame 121 for coupling the upper supporter 130 and the cover plate 120. The cover plate 120 may be formed to protrude downward from the cover plate 120 at a position corresponding to a side plate 136 of the upper supporter 130 adjacent to an edge of the cover plate 120.

[0061] When the cover plate 120 is coupled to the upper supporter 130, the cover frame 121 may be disposed to surround the side plate 136 of the upper sup-

porter 130 from an outside. A hole is formed in the cover frame 121, and a protrusion may be formed in the upper supporter 130 at a position corresponding to the hole.

[0062] Accordingly, at a position where the cover frame 121 and the side plate 136 of the upper supporter 130 overlap each other in a lateral direction, the protrusion of the upper supporter 130 is inserted into the hole of the cover frame 121 so that the cover plate 120 and the upper supporter 130 may be coupled to each other.

[0063] The upper supporter 130 may be accommodated in the case 110. The upper supporter 130 is accommodated in the case 110, and various components used for operation of the electric range may be coupled thereto.

[0064] The coil board 140 and the ferrite module 150 forming a magnetic field may be disposed above the upper supporter 130. In addition, various circuit boards used to operate the electric range and a cooling device for cooling the circuit boards may be disposed below the upper supporter 130.

[0065] As many components are disposed as described above, the upper supporter 130 may have a complex shape. Accordingly, the upper supporter 130 may be easily manufactured in a complex shape by injection molding a plastic material, for example. A detailed structure of the upper supporter 130 will be described below in detail.

[0066] The coil board 140 is disposed above the upper supporter 130, is provided as a plurality of coil boards spaced apart from each other in a lateral direction, and a working coil 140a may be printed thereon.

[0067] A general working coil 140a is manufactured by winding a coil in a spiral manner. In the case of the working coil 140a, the entire working coil 140a may be enlarged in order to wind the coil. A large working coil 140a decreases space efficiency of a heating region of the electric range and increases power consumption.

[0068] In the embodiment, the coil board 140 on which the working coil 140a is printed may be used. In the coil board 140, the working coil 140a may be provided by being printed on the coil board 140 rather than by being wound.

[0069] When the working coil 140a is printed, the working coil 140a may be densely printed in a small area, and may also be printed to form multiple layers in an up-down direction of the board.

[0070] Accordingly, when the working coil 140a is printed on the coil board 140, compared with a method of winding the working coil 140a, the area of the coil board 140 may be reduced and the length of the working coil 140a may be sufficiently extended. Accordingly, the coil board 140 having the working coil 140a with a small area may be manufactured.

[0071] In addition, since the coil board 140 has a thin-film form, the coil board 140 on which the working coil 140a is provided may have a very slim form compared with a method of winding the working coil 140a.

[0072] Accordingly, in the embodiment, by using the

coil board 140 on which the working coil 140a is printed, a volume occupied by the working coil 140a may be reduced and a total length of the working coil 140a may be sufficiently extended. Accordingly, the entire electric range may be manufactured in a slim form.

[0073] As illustrated in FIG. 3, compared with a method of winding the working coil 140a, in the embodiment, a large number of coil boards 140 having a small area may be disposed in the electric range. Accordingly, a plurality of working coils 140a may be densely disposed on an upper portion of the electric range.

[0074] The coil board 140 may be arranged without a gap with an adjacent coil board 140 compared with a method of winding the working coil 140a. Due to such a structure, a plurality of coil boards 140 may be densely disposed in the electric range without an empty space.

[0075] Accordingly, since an empty space without the working coil 140a may be minimized in a region in which the coil boards 140 are disposed, a large number of heating targets may be simultaneously heated, and space efficiency of the electric range may be improved.

[0076] In addition, since the working coil 140a is printed on the coil board 140, the working coil 140a does not necessarily need to be disposed in a circular shape, and for example, corresponding to a shape of a rectangular coil board 140, the working coil 140a may have a substantially rectangular shape and may be printed in a spiral form.

[0077] Due to the above-described structure, when combined as a whole, the working coil 140a having a very long total length may be provided. In addition, the working coils 140a may be densely disposed on the coil board 140, and each of the working coils 140a may operate independently while being separated from each other.

[0078] Accordingly, only the working coils 140a located at a portion at least partially overlapping the heating target may operate to form a magnetic field, and the remaining working coils 140a may not operate. Due to such a structure, a user may freely place the heating target anywhere on the cover plate 120.

[0079] Accordingly, convenience is provided to the user, and since the working coils 140a not overlapping the heating target do not operate, power consumption may be significantly reduced.

[0080] The ferrite modules 150 may be disposed above the upper supporter 130, disposed below the coil board 140, and provided as a plurality of ferrite modules disposed at positions corresponding to each of the plurality of working coils 140a.

[0081] Since the working coils 140a are printed on the coil board 140, when high-frequency power is applied to the working coils 140a, a magnetic field is formed around the ferrite modules 150 and the coil board 140, and the formed magnetic field may form an eddy current in the heating target.

[0082] The ferrite modules 150 may be disposed below the coil board 140 in a number corresponding to positions

corresponding to the working coils 140a. In the embodiment, the ferrite modules 150 may be provided to have a rectangular shape as a whole.

[0083] The ferrite modules 150 may be formed by insert molding a ferrite material and a plastic material. In this case, in one ferrite module 150, the ferrite material may be disposed as a plurality of pieces spaced apart from each other. The ferrite module 150 will be described in detail below.

[0084] Various boards provided with various control elements and electric circuits for operation of the electric range may be provided in the electric range. The boards may be provided as a main board 170, an Electro Magnetic Interference (EMI) filter 190, an Switched Mode Power Supply (SMPS) board 180, an inverter board 210, a resonant board 220, and an indicator board 250.

[0085] The main board 170 may be provided with a controller for controlling the electric range. The main board 170 may receive power from an external power source and may be provided to communicate with an external device by wire or wirelessly.

[0086] The EMI filter 190 may suppress electromagnetic interference generated by electricity. The EMI filter 190 may receive AC power from the external power source. In addition, the EMI filter 190 may reduce noise (that is, Electro Magnetic Interference (EMI)) of the received AC power and may provide the AC power with reduced noise to the SMPS board 180.

[0087] The SMPS board 180 may supply electricity to the electric range. The SMPS board 180 may receive the AC power with reduced noise from the EMI filter 190. In addition, the SMPS board 180 may rectify the supplied AC power into DC power and may provide the rectified DC power to the inverter board 210.

[0088] The inverter board 210 may apply a resonant current to the working coil 140a. The inverter board 210 may comprise an inverter part applying the resonant current to the working coil 140a through a switching operation. A plurality of inverter parts may be provided, and the switching operation of the inverter part may be controlled by the controller provided in the main board 170.

[0089] Here, the inverter part may receive the DC power from the SMPS board 180 and may apply the resonant current to the working coil 140a by performing the switching operation based on the received DC power.

[0090] The inverter part may comprise two switching elements, and the two switching elements may be alternately turned on and turned off by a switching signal provided from the controller. A high-frequency AC current (that is, a resonant current) may be generated by the switching operation of the two switching elements, and the generated high-frequency AC current may be applied to the working coil 140a.

[0091] The inverter board 210 according to an embodiment, referring to FIG. 3 and FIG. 7, may comprise a resonant capacitor. That is, the inverter board 210 shown in FIG. 3 is a form in which the inverter part and the

resonant capacitor are integrated.

[0092] The inverter board 210 according to another embodiment, referring to FIG. 17, may comprise only the inverter part without comprising the resonant capacitor. In such a case, a separate resonant board 220 provided with a resonant capacitor may be provided in the electric range.

[0093] Hereinafter, the resonant board 220 and the resonant capacitor will be described first. The resonant capacitor is electrically connected to the inverter part and begins resonance when a resonant current is applied to the working coil 140a by the switching operation of the inverter part.

[0094] When the resonant capacitor resonates, a current flowing in the working coil 140a connected to the resonant capacitor increases. That is, through such a process, an eddy current may be induced in the heating target disposed above the working coil 140a connected to the resonant capacitor.

[0095] A plurality of resonant capacitors may be provided. In an integrated type in which the inverter part and the resonant capacitor are entirely provided on the inverter board 210, the resonant capacitor may be disposed on the inverter board 210 to be spaced apart from the inverter part.

[0096] Of course, when the inverter board 210 and the resonant board 220 are separated from each other and exist separately, the resonant capacitor may be provided on the resonant board 220.

[0097] The indicator board 250 may comprise a light source. The light source may be provided, for example, in a form in which a plurality of LEDs are aligned in a line.

[0098] The indicator board 250 may be turned on when the electric range operates to inform a user whether a heating part operates. In addition, the indicator board 250 may also inform the user of an operating state of the electric range by changing a lighting pattern, a color, and the like of the plurality of LEDs.

[0099] The electric range may comprise a lower supporter 260 disposed above the bottom plate 111 of the case 110. The lower supporter 260 is disposed below the upper supporter 130, is accommodated in the case 110, is disposed below boards coupled to a lower surface of the upper supporter 130, and may support the upper supporter 130.

[0100] The lower supporter 260 is formed in a plate shape, and holes may be respectively formed at portions corresponding to an inlet hole 1112 and an outlet hole 1113 so that air flows through the inlet hole 1112 and the outlet hole 1113 formed in the bottom plate 111 to be described later.

[0101] A plurality of boards, the blowing fan 230, the heat sink 240, the ferrite modules 150, and the coil board 140 are disposed on the upper supporter 130, and the upper supporter 130 may support loads of these components. Since a plurality of components are coupled to the upper supporter 130, deformation in which the upper supporter 130 sags downward may occur due to loads

of these components.

[0102] Accordingly, the lower supporter 260 is disposed below the upper supporter 130 to support the upper supporter 130 to which the plurality of components are coupled, thereby suppressing the upper supporter 130 from sagging downward.

[0103] When the electric range is assembled, the lower supporter 260 may be disposed at a position spaced apart from the upper supporter 130 in an up-down direction by a distance sufficient to support relatively bulky elements provided on the various boards, the blowing fan 230 larger in volume than other components, and the heat sink 240.

[0104] On an upper surface of the lower supporter 260, protrusions for supporting the upper supporter 130 or components coupled to the lower surface of the upper supporter 130 may protrude upward. Meanwhile, on an upper surface of the bottom plate 111 of the case 110, protrusions for supporting the lower supporter 260 may protrude upward.

[0105] Various boards may be disposed above the lower supporter 260. Accordingly, it is necessary to electrically insulate the boards capable of contacting the lower supporter 260 from the bottom plate 111 of the case 110 made of a material such as aluminum to prevent electric leakage and electrical short.

[0106] Therefore, the lower supporter 260 may be formed of an electrically insulating material and may be disposed between the bottom plate 111 of the case 110 and the boards to electrically insulate the boards from the bottom plate 111. The lower supporter 260 may be formed of, for example, an electrically insulating material such as MICA or a plastic material.

[0107] The electric range may comprise a heat insulating material 270 and a MICA sheet 280. The heat insulating material 270 is disposed between the upper supporter 130 and the cover plate 120 to suppress heat transfer from the heating target to the upper supporter 130.

[0108] Heat generated as the heating target is heated may pass through the cover plate 120 and be transmitted to the upper supporter 130 disposed inside the electric range and to various components coupled thereto.

[0109] Such heat transfer heats the inside of the electric range and, particularly, may adversely affect operation of the electric range when transmitted to the various boards. Accordingly, by disposing the heat insulating material 270 between the cover plate 120 and the upper supporter 130 to suppress heat transfer from the heating target to the inside of the electric range, heating of internal components may be prevented, thereby improving operational performance of the electric range.

[0110] The heat insulating material 270 may be formed of, for example, a carbon material having good heat insulating performance even when manufactured with a relatively small thickness, but is not limited thereto.

[0111] The heat insulating material 270 is formed in a plate shape and is provided as a plurality of heat insulating materials to cover the coil board 140. The heat

insulating material 270 may be separated from each other in a left-right direction of the electric range as a whole and may be integrally formed in a front-rear direction. That is, a longitudinal direction of one heat insulating material 270 may be disposed parallel to a front-rear direction of the electric range.

[0112] The MICA sheet 280 is disposed between the upper supporter 130 and the cover plate 120 and may be disposed at at least one of a position above the heat insulating material 270 or a position below the heat insulating material 270.

[0113] In the embodiment shown in FIG. 3, the MICA sheet 280 is disposed both above and below the heat insulating material 270. In another embodiment, the MICA sheet 280 may be disposed only at one of a position above or below the heat insulating material 270.

[0114] The MICA sheet 280 may be provided in a shape corresponding to the heat insulating material 270. Accordingly, the MICA sheet 280 may be separated from each other in the left-right direction of the electric range as a whole and may be integrally formed in the front-rear direction. That is, a longitudinal direction of one heat insulating material 270 may be disposed parallel to the front-rear direction of the electric range.

[0115] The MICA sheet 280 is formed of a MICA material and, together with the heat insulating material 270, may suppress heat transfer from the heating target to the upper supporter 130 inside the electric range. In addition, the MICA sheet 280 is disposed to contact the heat insulating material 270 and may suppress the heat insulating material 270 from being damaged by an impact.

[0116] In particular, since the heat insulating material 270 of a carbon material is weak to impact and is easily damaged, the MICA sheet 280 may support the heat insulating material 270 to suppress damage of the heat insulating material 270 and increase durability of the heat insulating material 270.

[0117] Meanwhile, the heat insulating material 270 and the MICA sheet 280 may be formed to have a shorter length than others at a portion where the input interface 160 is disposed so as not to cover the input interface 160, and may avoid the input interface 160.

[0118] FIG. 4A is a plan view in which the cover plate 120 is omitted from FIG. 1. FIG. 4B is a view illustrating the coil board 140 according to an embodiment. FIG. 5 is a cross-sectional view taken along line 5-5 of FIG. 4A. FIG. 6 is a bottom view illustrating the electric range according to an embodiment.

[0119] Heating elements that generate heat during operation of the electric range may be mounted on the various boards.

[0120] For example, switching elements responsible for on/off control in the electric range generate a large amount of heat. Accordingly, such elements require forced cooling to suppress stoppage or failure of operation of the electric range due to overheating.

[0121] For this purpose, the electric range may comprise a blowing fan 230 and a heat sink 240. The blowing

fan 230 and the heat sink 240 may cool the heated various boards and other components.

[0122] The blowing fan 230 may be coupled to the lower surface of the upper supporter 130 and may be disposed at a position spaced apart from the boards. The blowing fan 230 may be provided to face the heat sink 240 and discharge air. The blowing fan 230 may be electrically connected to the main board 170, and operation thereof may be controlled by the controller provided in the main board 170.

[0123] The heat sink 240 may be disposed below the upper supporter 130, and a longitudinal direction thereof may be disposed parallel to an air discharge direction of the blowing fan 230. The heat sink 240 may be coupled to the lower surface of the inverter board 210.

[0124] In the embodiment, since the inverter boards 210 are provided as a pair spaced apart from each other, the heat sinks 240 may be provided as a pair to be respectively coupled to the inverter boards 210. Corresponding to the pair of heat sinks 240, the blowing fans 230 may be provided as a pair respectively disposed at positions corresponding to the pair of heat sinks 240.

[0125] A plurality of cooling fins are formed on the heat sink 240, and an air flow path through which air passes in a direction parallel to a longitudinal direction thereof may be formed therein. Accordingly, air discharged from an outlet of the blowing fan 230 cools the heat sink 240 while passing through an outer surface and the internal air flow path of the heat sink 240, and thus the inverter board 210 may be effectively cooled.

[0126] The heat sink 240 may be coupled to the inverter board 210 to increase a heat dissipation area of the inverter board 210 so that the inverter board 210 is effectively cooled by air flowing by the blowing fan 230.

[0127] Since the inverter board 210 is provided with an inverter part, which is a switching element, the inverter part consumes a relatively large amount of power and thus may be heated to a higher temperature than other elements. Accordingly, the heat sink 240 may be coupled to the inverter board 210 to effectively cool the inverter part.

[0128] Meanwhile, since air flowing by the blowing fan 230 flows over an entire lower side of the lower supporter 260, boards other than the inverter board 210 are also cooled by the forced flowing air, and an inside of the electric range may be cooled as a whole.

[0129] As shown in FIG. 6, the bottom plate 111 of the case 110 may comprise an inlet hole 1112 and an outlet hole 1113. The inlet hole 1112 is formed at a position corresponding to the blowing fan 230, and air may be introduced from the outside.

[0130] The outlet hole 1113 is formed at a position corresponding to an air discharge portion of the heat sink 240, and air may be discharged. The outlet hole 1113 may be formed at a position adjacent to an outlet of the air flow path formed in the heat sink 240. Since the heat sinks 240 and the blowing fans 230 are each formed as a pair, the inlet holes 1112 and the outlet holes 1113 may also each

be formed as a pair correspondingly.

[0131] The working coil 140a may be formed in multiple layers on the coil board 140. For example, a sensing coil for sensing the heating target may be printed on an uppermost portion of the coil board 140, and a plurality of working coils 140a may be disposed below the sensing coil to respectively form layers.

[0132] FIG. 4B illustrates a cross section of a portion of the coil board 140 where the working coil 140a disposed below the sensing coil is located.

[0133] In FIG. 4B, the working coil 140a has an overall rectangular outer shape and is formed in a spiral shape. Due to such a structure, while having a shape corresponding to the rectangular seating groove 131 and the ferrite module 150, the working coil 140a may be densely printed so that a total length of the working coil 140a may be increased.

[0134] However, in another embodiment, the working coil 140a may be formed to have a polygonal, circular, or elliptical outer shape.

[0135] As described above, one working coil 140a shown in FIG. 4B may be provided as a plurality of working coils to form layers while being spaced apart from each other in an up-down direction on the coil board 140. However, for clarity of description, hereinafter, a plurality of working coils 140a overlapping in the up-down direction and forming a plurality of layers may be referred to as one identical working coil 140a.

[0136] As shown in FIG. 4B, a plurality of working coils 140a may be disposed on one coil board 140 in a lateral direction of the coil board 140.

[0137] In FIG. 4B, for example, one coil board 140 on which two working coils 140a in a left-right direction and four working coils 140a in a front-rear direction are printed is illustrated. However, the present disclosure is not limited thereto, and the size of the coil board 140 and the number of the working coils 140a printed on one coil board 140 may be changed in consideration of an overall shape or size of the electric range and ease of assembly or disassembly.

[0138] Meanwhile, a through hole 1419 may be formed between adjacent working coils 140a on one coil board 140. A first piece 1321 of the upper supporter 130 may be fitted into the through hole 1419. As the first piece 1321 is fitted into the through hole 1419, the coil board 140 may be positioned at a designed position. The through hole 1419 may have a shape corresponding to the first piece 1321 and a slit 1323 of the upper supporter 130.

[0139] In addition, due to such a structure, the slit 1323 formed in the first piece 1321 is not blocked by the coil board 140, and light emitted from the indicator board 250 may pass through a slit 1323 hole of the upper supporter 130 and transmit through the cover plate 120.

[0140] One working coil 140a may be disposed at a position corresponding to one ferrite module 150 and may overlap each other in an up-down direction. That is, one working coil 140a may be disposed to correspond to one ferrite module 150.

[0141] At this time, a coil boundary part 1412 may be provided between adjacent working coils 140a. The coil boundary part 1412 is disposed such that a longitudinal direction thereof crosses a longitudinal direction of the through hole 1419, and of course, the through hole 1419 is not formed in the coil boundary part 1412.

[0142] A lower surface of the coil board 140 is supported by the second piece 1322, and at this time, the coil boundary part 1412 may be disposed at a position corresponding to the second piece 1322 of the boundary rib 132.

[0143] In FIG. 5, a flow direction of air is illustrated by arrows. When the blowing fan 230 operates, air from the outside may be introduced into the interior of the electric range through the inlet hole 1112. A portion of the introduced air may pass through an outer surface of the heat sink 240 and an air flow path formed inside the heat sink 240, and the remaining portion of the introduced air may be diffused throughout the interior of the case 110 of the electric range.

[0144] Air that has forcibly flowed inside the case 110 may be discharged to the outside through the outlet hole 1113. In particular, the inverter board 210 to which the heat sink 240 is coupled may be well cooled by the forced flow of air. Accordingly, the inverter part, which is a switching element heated to a high temperature, may be effectively cooled by the heat sink 240 and the air.

[0145] In the embodiment, the blowing fan 230 is coupled to the lower surface of the upper supporter 130, the heat sink 240 is coupled to the inverter board 210, and the inverter board 210 is coupled to the lower surface of the upper supporter 130. As a result, since both the blowing fan 230 and the heat sink 240, which are cooling devices, are coupled to the upper supporter 130, a separate structure for coupling the blowing fan 230 and the heat sink 240 may not be provided in the case 110.

[0146] Accordingly, a supporting structure of the electric range may be simplified as a whole, thereby simplifying a structure of the electric range and reducing manufacturing costs.

[0147] In addition, since structures in contact with the blowing fan 230 and the heat sink 240 are omitted from the case 110, assembly and disassembly of the case 110 may be facilitated, and maintenance of the electric range may be facilitated.

[0148] FIG. 7 is a view in which the case 110 is omitted from FIG. 6. FIG. 8 is a perspective view illustrating the upper supporter 130 according to an embodiment. FIG. 9 is a plan view illustrating the upper supporter 130 according to an embodiment.

[0149] FIG. 10 is a cross-sectional view taken along a line 10-10 of FIG. 9. FIG. 11 is a cross-sectional view taken along a line 11-11 of FIG. 9.

[0150] The upper supporter 130 may comprise a flat plate 135 disposed in a direction parallel to a lateral direction of the electric range and side plates 136 bent downward from edges of the flat plate 135. The ferrite modules 150 and the coil board 140 are disposed on the

flat plate 135, and the side plates 136 may support the flat plate 135 at the edges of the flat plate 135.

[0151] The upper supporter 130 may comprise seating grooves 131 and boundary ribs 132.

[0152] The seating grooves 131 are formed by recessing the flat plate 135, are arranged to be aligned with each other in a left-right direction and a front-rear direction of the upper supporter 130, and may be provided as a plurality of seating grooves so that each of the plurality of ferrite modules 150 is seated therein. The seating grooves 131 are generally formed in a rectangular shape, and accordingly, the coil board 140 and the ferrite module 150 having rectangular shapes may be fitted into the seating grooves 131.

[0153] The boundary ribs 132 form boundaries of the plurality of seating grooves 131, are provided to protrude from an upper surface of the upper supporter 130, and may be provided as a plurality of boundary ribs.

[0154] The boundary ribs 132 may comprise a first piece 1321 and a second piece 1322. A longitudinal direction of the first piece 1321 may be arranged in a lateral direction. A longitudinal direction of the second piece 1322 may be arranged in a direction intersecting the longitudinal direction of the first piece 1321.

[0155] Referring to FIG. 4A, the longitudinal direction of the first piece 1321 may be arranged in a front-rear direction, and the longitudinal direction of the second piece 1322 may be disposed in a left-right direction. Since the first piece 1321 and the second piece 1322 are arranged such that the longitudinal directions thereof intersect each other, the upper surface of the upper supporter 130 may be formed in a grid pattern as a whole.

[0156] Slits 1323 may be formed in the first piece 1321. The slit 1323 is formed to pass through the upper supporter 130 and may be formed in a narrow and elongated hole shape. The indicator board 250 may be disposed at a position corresponding to a position where the slit 1323 is formed in the upper supporter 130.

[0157] Accordingly, since the first piece 1321 and the slit 1323 have longitudinal directions parallel to a front-rear direction of the upper supporter 130, the indicator board 250 may also have a longitudinal direction parallel to the front-rear direction of the upper supporter 130.

[0158] In the indicator board 250, the light source emits light upward, and the emitted light passes through the slit 1323 and transmits through the glass cover plate 120 so that a user may see the emitted light.

[0159] Since the slit 1323 and the indicator board 250 are disposed such that longitudinal directions thereof are parallel to the front-rear direction of the upper supporter 130 and are spaced apart from each other, the user may see emitted light that is elongated in the front-rear direction and spaced apart in a left-right direction as a whole.

[0160] The first piece 1321 may be formed to have a relatively greater height, and the second piece 1322 may be formed to have a height lower than that of the first piece 1321. Since the slit 1323 is formed in the first piece 1321 and light passing through the slit 1323 needs to be

clearly visible to the user without being diffused, the first piece 1321 may be formed relatively high so that the light is not diffused until passing through an upper surface of the cover plate 120.

[0161] The heat insulating material 270 and the MICA sheet 280 disposed above the first piece 1321 are separated from each other at the slit 1323, and thus the heat insulating material 270 and the MICA sheet 280 do not cover the slit 1323, so that light passing through the slit 1323 may directly reach the cover plate 120.

[0162] The second piece 1322 is formed to have a relatively lower height, and the heat insulating material 270 and the MICA sheet 280 may be disposed above the second piece 1322. The heat insulating material 270 or the MICA sheet 280 may be disposed such that a longitudinal direction thereof is parallel to the front-rear direction of the upper supporter 130.

[0163] Accordingly, the heat insulating material 270 and the MICA sheet 280 may be integrally disposed in the front-rear direction of the upper supporter 130 and may be disposed to be separated from each other in the left-right direction. The heat insulating material 270 and the MICA sheet 280 may be separated from each other with the first piece 1321 as a boundary.

[0164] That is, the plurality of heat insulating materials 270 and MICA sheets 280 may be separated from each other by the first piece 1321 and may be disposed above the second piece 1322. Accordingly, the second piece 1322 may be formed to have a relatively low height to define a space in which the heat insulating material 270, the MICA sheet 280, and the coil boundary part 1412 of the coil board 140 are disposed.

[0165] The ferrite module 150 may comprise a ferrite core 151 and a core fixing part 152. When high-frequency power is applied to the working coil 140a printed on the coil board 140, a magnetic field may be formed around the working coil 140a, and the formed magnetic field may induce an eddy current in the heating target. The ferrite core 151 may guide the formed magnetic field upward toward the heating target. The ferrite module 150 may comprise a plurality of ferrite cores 151.

[0166] The core fixing part 152 may mount the ferrite core 151 and may fix the ferrite core 151 in the seating groove 131. The core fixing part 152 may be coupled to the upper supporter 130 and may be formed by insert molding with the ferrite core 151 to fix the ferrite core 151.

[0167] The core fixing part 152 forms an outer shape of the ferrite module 150 and may be formed generally in a rectangular shape. Meanwhile, the ferrite core 151 may be formed as a plurality of pieces and may be coupled to the core fixing part 152 by insert molding. Accordingly, the ferrite module 150 may have an overall rectangular shape.

[0168] Meanwhile, in another embodiment, the ferrite module 150 may not comprise the core fixing part 152, and the ferrite core 151 may be directly coupled to the seating groove 131 of the upper supporter 130.

[0169] That is, the upper supporter 130 may comprise

a plurality of seating grooves 131 disposed to be spaced apart from each other, and the ferrite core 151 may be seated in the seating groove 131 so as to contact the upper supporter 130.

[0170] In this case, when the ferrite core 151 is directly coupled to the seating groove 131, the core fixing part 152 may be omitted, thereby reducing cost and enabling the electric range to be manufactured in a slimmer form.

[0171] In one embodiment, the ferrite core 151 disposed in one seating groove 131 may be formed as a plurality of pieces, and each piece may be provided to be attached to the seating groove 131. Each piece may be attached to the seating groove 131, for example, by an adhesive, thereby maintaining a state in which the piece is disposed at a designed position.

[0172] In another embodiment, the ferrite core 151 disposed in one seating groove 131 may be formed as a single piece and may be provided to be attached to the seating groove 131. For example, the ferrite core 151 provided as a single body may be attached by an adhesive, thereby being stably fixed in the seating groove 131.

[0173] Since the core fixing part 152 is not used, the ferrite core 151 does not need to be divided into a plurality of pieces to fix the ferrite core 151 and the core fixing part 152 to each other, and thus the ferrite core 151 may be manufactured as a single piece.

[0174] When the ferrite core 151 is formed as a single piece, compared with a case in which the ferrite core 151 is formed as a plurality of pieces, manufacturing may be facilitated, manufacturing time may be reduced, and cost may be reduced.

[0175] FIG. 12 is an exploded perspective view illustrating the upper supporter 130 and the ferrite module 150. FIG. 13 is a plan view illustrating a state in which the ferrite module 150 is coupled to the upper supporter 130. FIG. 14 is a plan view illustrating a state in which the coil board 140 is coupled in the state of FIG. 13.

[0176] As illustrated in FIGS. 12 to 14, first, the ferrite module 150 may be mounted in the seating groove 131 formed on the upper portion of the upper supporter 130. Next, after the ferrite module 150 is mounted, the coil board 140 may be mounted on the upper supporter 130. Through this sequence, mounting of the coil board 140 on the upper supporter 130 may be completed.

[0177] The coil board 140 and the ferrite module 150 may be provided to be supported by the boundary rib 132 in a state of being placed in the seating groove 131.

[0178] Each ferrite module 150 may be independently inserted into each seating groove 131. When each ferrite module 150 is inserted into the seating groove 131, a side surface of the ferrite module 150 may be stably supported by the first piece 1321 and the second piece 1322 of the boundary rib 132.

[0179] When the coil board 140 is placed on the upper portion of the upper supporter 130, a lower surface of the coil board 140 may be supported by the second piece 1322 of the boundary rib 132. At this time, the coil boundary part 1412 of the coil board 140 may be posi-

tioned on an upper surface of the second piece 1322.

[0180] The first piece 1321 of the boundary rib 132 may be fitted into the through hole 1419 of the coil board 140. Accordingly, the coil board 140 may be positioned at a designed location and may be supported by the first piece 1321, thereby suppressing lateral movement thereof relative to the upper supporter 130.

[0181] In order to stably mount the coil board 140 on the upper supporter 130, a board coupling part 141 may be provided. The board coupling part 141 may be coupled to the coil board 140 and may couple the coil board 140 to the upper supporter 130. The board coupling part 141 may be integrally formed with the coil board 140 or may be separately manufactured and coupled to the coil board 140.

[0182] The board coupling part 141 may be formed to protrude from a longitudinal end of the coil board 140. The protruding board coupling part 141 may be coupled to the upper supporter 130 by a fastening member such as a screw bolt.

[0183] Connection pins 1411 may be provided at an edge of the coil board 140. When the coil board 140 is mounted on the upper supporter 130 by the board coupling part 141, the connection pin 1411 may contact a terminal formed on the upper supporter 130, and accordingly the connection pin 1411 and the terminal of the upper supporter 130 may be electrically connected to each other.

[0184] The terminal of the upper supporter 130 may be electrically connected to other electrical components by a cable or the like.

[0185] In the embodiment, the ferrite module 150 may be easily and stably mounted on the upper supporter 130 by the seating groove 131 formed on an upper portion of the upper supporter 130 and the boundary rib 132 formed to surround the seating groove 131.

[0186] Further, since the first piece 1321 is fitted into the coil board 140, when the coil board 140 is mounted on the upper supporter 130, the coil board 140 may be positioned at a designed location and does not move in a lateral direction of the upper supporter 130, that is, in a left-right direction and a front-rear direction of the upper supporter 130, thereby allowing the coil board 140 to be easily assembled to the upper supporter 130.

[0187] The electric range may comprise an input interface 160 seated on the upper portion of the upper supporter 130. The input interface 160 may be coupled to the upper supporter 130. For this purpose, the upper supporter 130 may be formed such that an upper surface thereof is recessed downward and may comprise an insertion groove 134 into which the input interface 160 is inserted.

[0188] The insertion groove 134 may be provided in a generally rectangular shape to correspond to the rectangular input interface 160. The insertion groove 134 and the input interface 160 may be disposed at a front central portion of the electric range so that a user can easily perform an input from the user's standpoint.

[0189] A hole through which a cable or the like may pass may be formed at a bottom of the insertion groove 134 for electrical connection between the input interface 160 and other components.

[0190] FIG. 15 is a bottom view of the upper supporter 130. FIG. 16 is a view illustrating a state in which the indicator board 250 is coupled in the state of FIG. 15. FIG. 17 is a view illustrating a state in which various components are coupled in the state of FIG. 16.

[0191] Various boards may be coupled to a lower surface of the upper supporter 130. These boards may be coupled, for example, by fastening members such as screw bolts.

[0192] The main board 170 may be coupled to the lower surface of the upper supporter 130 and may comprise a controller configured to control the electric range.

[0193] The SMPS board 180 may be coupled to the lower surface of the upper supporter 130 and may supply power to the electric range. The SMPS boards 180 may be provided as a pair to supply power to the plurality of working coils 140a.

[0194] The EMI filter 190 may be coupled to the lower surface of the upper supporter 130 and may suppress electromagnetic interference generated by electricity. Since the EMI filter 190 is electrically connected to the SMPS boards 180, the EMI filters 190 may be provided as a pair to respectively correspond to the pair of SMPS boards 180.

[0195] The inverter board 210 may be coupled to the lower surface of the upper supporter 130 and may apply a resonant current to the working coil 140a. The inverter boards 210 may also be provided as a pair to supply resonant current to the plurality of working coils 140a.

[0196] Meanwhile, as shown in FIG. 17, an electric range may be provided in which the inverter board 210 and the resonant board 220 are separated from each other. The resonant board 220 may be coupled to the lower surface of the upper supporter 130, may be disposed separately from the inverter board 210, and may comprise a resonant capacitor.

[0197] As described above, various boards required for operation of the electric range may be provided on the lower surface of the upper supporter 130. At this time, the boards may be disposed at positions spaced apart from each other on the lower surface of the upper supporter 130.

[0198] The boards may be coupled to the lower surface of the upper supporter 130 in an inverted state. That is, among elements provided on each board, elements occupying a relatively large volume may be arranged to be positioned below the board.

[0199] Due to such a structure, the various boards may be easily coupled to the lower surface of the upper supporter 130 without obstruction.

[0200] Meanwhile, the indicator boards 250 may be coupled to the lower surface of the upper supporter 130, may be provided as a plurality of indicator boards spaced apart from each other, and may comprise a light source.

The indicator board 250, unlike the other boards, may be disposed at a position partially overlapping with another board.

[0201] The indicator board 250 may be formed in a bar shape, and a longitudinal direction thereof may be arranged parallel to a lateral direction of the upper supporter 130.

[0202] Referring to FIGS. 15 and 16, the slits 1323 formed in the upper supporter 130 may be formed such that a longitudinal direction thereof is parallel to a front-rear direction of the upper supporter 130, and may be aligned in a single row in the front-rear direction. Further, the slits 1323 may be disposed to be spaced apart from each other in a left-right direction of the upper supporter 130.

[0203] The indicator board 250 may be disposed at a position overlapping with the slits 1323 through which light passes. Accordingly, the indicator board 250 may be disposed on the lower surface of the upper supporter 130 so as to cover the slits 1323.

[0204] Thus, the indicator boards 250 may be provided as a plurality of indicator boards, each having a longitudinal direction parallel to the front-rear direction of the upper supporter 130 and being spaced apart from each other in the left-right direction of the upper supporter 130.

[0205] Except for the indicator board 250, the various boards for operating the electric range described above may be coupled to the lower surface of the upper supporter 130 so as to be spaced apart from each other. Even boards provided as a pair may have respective pieces spaced apart from each other.

[0206] In addition, a blowing fan 230 constituting a cooling device may be disposed on the lower surface of the upper supporter 130 at a position spaced apart from the boards. Meanwhile, the heat sink 240 constituting the cooling device may be coupled to the upper supporter 130 in a state of being coupled to a lower surface of the inverter board 210.

[0207] In the embodiment, the ferrite module 150 and the coil board 140 may be coupled to an upper portion of the supporter, and various boards for operating the electric range and the cooling device may be coupled to a lower surface of the supporter.

[0208] As described above, most components, including boards that operate by receiving electrical power and are involved in operation of the electric range, electrical components such as the blowing fan 230, and other components, may be coupled to the upper supporter 130. Accordingly, assembly and disassembly of the electric range may be significantly facilitated.

[0209] That is, when assembling the electric range, the ferrite module 150, the coil board 140, and the input interface 160 may first be assembled on the upper portion of the upper supporter 130, and various boards and the cooling device may be assembled on the lower surface of the upper supporter 130.

[0210] Next, after disposing the heat insulating material 270 and the MICA sheet 280 above the upper supporter

ter 130, and disposing the lower supporter 260 below the upper supporter 130, the cover plate 120 and the case 110 may be coupled, thereby completing assembly of the electric range.

[0211] At this time, since the case 110 does not comprise a support structure for supporting components coupled to the upper supporter 130, it is not necessary to match those components to a support structure, and thus assembly of the case 110 may become very easy.

[0212] Similarly, when disassembling the electric range for repair, if the case 110 and the cover plate 120 are disassembled and the lower supporter 260 is disassembled, the upper supporter 130 to which various components are coupled may be directly accessed, and a defective component may be easily replaced.

[0213] In addition, since the ferrite modules 150 are separated from each other and respectively inserted into the seating grooves 131 of the upper supporter 130, only a defective ferrite module 150 may be replaced, thereby facilitating repair work of the electric range.

[0214] Meanwhile, referring to FIGS. 15 to 17, assembly of various components on the lower surface of the upper supporter 130 may be performed in the following order. First, the indicator board 250 may be coupled to the lower surface of the upper supporter 130 so as to cover the slit 1323 at a position where the slit 1323 is formed.

[0215] Next, various boards and the blowing fan 230 may be disposed at designed positions on the lower surface of the upper supporter 130 and may be coupled to the upper supporter 130. At this time, the heat sink 240 may be coupled to the inverter board 210. Of course, except for the heat sink 240 and the indicator board 250, the various boards may be coupled to the lower surface of the upper supporter 130 at positions spaced apart from each other.

[0216] Next, a cable coupling operation for electrical connection between the various electrical components and for electrical connection with an external power source may be performed.

[0217] Further, disassembly may be performed in a reverse order of the above-described assembly process.

[0218] FIG. 18 is a plan view for explaining an arrangement state of the ferrite core 151 and the working coil 140a according to an embodiment.

[0219] The ferrite core 151 may comprise a plurality of separate ferrite pieces spaced apart from each other. Accordingly, for convenience of description, an outline FL of the entire ferrite core 151 in which the ferrite pieces are disposed is illustrated by a solid line in FIG. 18.

[0220] Meanwhile, since the working coil 140a is disposed inside the coil board 140, it may not be visible in a plan view of the ferrite module 150. Accordingly, for convenience of description, an outline WL of the working coil 140a is illustrated by a phantom line in FIG. 18.

[0221] When alternating current is applied to the working coil 140a, a magnetic field may be generated around the working coil 140a by electromagnetic interaction. Such a magnetic field may reach the heating target

and may generate Joule heat in the heating target.

[0222] The ferrite core 151 may be disposed below the working coil 140a and may increase density of the magnetic field generated by the working coil 140a. In addition, the ferrite core 151 may suppress leakage of the magnetic field to below the ferrite core 151 so that the magnetic field may rise toward the heating target positioned above.

[0223] That is, among the magnetic field generated in the working coil 140a, the magnetic field transmitted to below the working coil 140a may be blocked by the ferrite disposed below the working coil 140a, and leakage thereof to below the ferrite may be suppressed.

[0224] However, since the entire ferrite core 151 comprises a plurality of ferrite pieces spaced apart from each other, a slight magnetic field leakage may occur through gaps between the ferrite pieces. Such leakage of the magnetic field through the gaps may be unavoidable.

[0225] Nevertheless, among the magnetic field generated at an outer side of the working coil 140a, a magnetic field directed downward from the working coil 140a may leak to below the ferrite core 151 if the ferrite core 151 does not block it. Due to such leakage, density of the magnetic field directed toward the heating target may decrease, and as a result, thermal efficiency of the electric range may be reduced.

[0226] Meanwhile, as shown in FIG. 4B, the working coil 140a may be formed in an overall rectangular shape and may be formed in a spiral shape in which an empty space is formed at a central portion.

[0227] At this time, an eddy current may be generated at an inner edge of the working coil 140a (that is, an end of the working coil 140a toward the central portion) and at an outer edge (that is, an outer periphery of the working coil 140a) due to a physical phenomenon of current.

[0228] At the inner edge of the working coil 140a, since the ferrite core 151 is disposed below the working coil 140a so that the working coil 140a and the ferrite core 151 overlap each other, the ferrite core 151 may suppress leakage, in a downward direction, of a magnetic field generated by the eddy current.

[0229] However, at the outer periphery of the working coil 140a, if the ferrite core 151 is not disposed below the working coil 140a, downward leakage of a magnetic field generated by normal current and eddy current flowing in the working coil 140a may not be suppressed.

[0230] In particular, at the outer periphery of the working coil 140a, normal current and eddy current may be generated together so that a total amount of current may increase compared to other portions of the working coil 140a, and accordingly magnitude of the magnetic field may increase. If such an increased magnetic field leaks downward from the ferrite core 151, energy efficiency and heating efficiency of the electric range may be reduced.

[0231] Accordingly, in the embodiment, a structure for suppressing downward leakage of a magnetic field generated by current and eddy current at the outer periphery of the working coil 140a is proposed.

[0232] In the embodiment, a lateral end of the working coil 140a may be disposed at the same position as, or inward of, a lateral end of the ferrite core 151.

[0233] For example, the working coil 140a and the ferrite core 151 may each have an outer periphery formed in a polygonal shape. For example, the working coil 140a and the ferrite core 151 may be formed in a rectangular shape, a pentagonal shape, a hexagonal shape, or the like.

[0234] At this time, an area defined by an outline of the ferrite core 151 may be formed to be equal to or greater than an area defined by an outline of the working coil 140a.

[0235] In the present specification, for example, a case in which the working coil 140a and the ferrite core 151 are formed in a rectangular shape will be described.

[0236] An area of a rectangle defined by the outline FL of the ferrite core 151 may be equal to or greater than an area of a rectangle defined by the outline WL of the working coil 140a.

[0237] That is, referring to FIG. 18, in a plan view, the outline WL of the working coil 140a may be formed to be equal to or smaller than the outline FL of the ferrite core 151. Further, in a plan view, the outline WL of the working coil 140a may be disposed at the same position as the outline FL of the ferrite core 151 or may be entirely positioned within an inner region of the outline FL of the ferrite core 151.

[0238] In other words, in an up-down direction of the electric range, a region in which the working coil 140a is disposed may entirely overlap a region in which the ferrite core 151 is disposed.

[0239] With respect to the above-described structure, each shape of the ferrite module 150 having various structural configurations will be described in detail below. First, the ferrite module 150 will be described.

[0240] FIG. 19 is an exploded perspective view of the ferrite module 150 according to an embodiment. FIG. 20 is a plan view of the ferrite module 150 illustrated in FIG. 19. FIG. 21 is a side cross-sectional view of FIG. 20.

[0241] Since the working coil 140a is disposed inside the coil board 140, the working coil 140a may not be visible when the coil board 140 is viewed from the outside. However, for clarity of description, in FIG. 19 and the subsequent drawings, the coil board 140 is illustrated as a cross-sectional view of a layer in which the working coil 140a is formed.

[0242] In the cross-sectional views of FIGS. 19 to 21, an outer end of the working coil 140a is illustrated by a hidden line. The actual working coil 140a may be disposed in a plurality of layers in a up-down direction within the coil board 140.

[0243] Referring to FIG. 19, in a first type ferrite module 150, a plurality of ferrite cores 151 having identical shapes may be radially disposed with respect to a center of the ferrite module 150 and may be spaced apart from each other.

[0244] In the first type ferrite module 150, the core

fixing part 152 may comprise covers that cover corners of the ferrite cores 151 and may comprise partition walls that space the respective ferrite cores 151 apart from each other.

[0245] As described above, such a ferrite module 150 may be manufactured by insert molding the ferrite cores 151 made of a ferrite material and the core fixing part 152 made of a plastic material. The same applies to a second type or a third type ferrite module 150 described below.

[0246] FIG. 22 is an exploded perspective view of a ferrite module 150 according to another embodiment. FIG. 23 is a plan view of the ferrite module 150 illustrated in FIG. 22. FIG. 24 is a side cross-sectional view of FIG. 23.

[0247] Referring to FIG. 22, in a second type ferrite module 150, a plurality of ferrite cores 151 having different sizes, shapes, and areas may be disposed to be spaced apart from each other.

[0248] In the second type ferrite module 150, the core fixing part 152 may extend from an edge toward the ferrite cores 151 and may comprise an upper support part 1521 covering a portion of an upper surface of each ferrite core 151. The upper support part 1521 may fix the ferrite cores 151 to the core fixing part 152.

[0249] FIG. 25 is an exploded perspective view of a ferrite module 150 according to another embodiment. FIG. 26 is a plan view of the ferrite module 150 illustrated in FIG. 25. FIG. 27 is a side cross-sectional view of FIG. 26.

[0250] Referring to FIG. 25, in a third type ferrite module 150, the ferrite cores 151 may be similar overall in size, shape, and area to the ferrite cores 151 of the second type. However, in the third type, the core fixing part 152 may comprise protruding support parts 1522 protruding from an edge toward the ferrite cores 151, and the protruding support parts 1522 may be formed at positions corresponding to the respective ferrite cores 151.

[0251] Meanwhile, in the third type, each ferrite core 151 may be formed with a groove into which the protruding support part 1522 is inserted at one end thereof. Accordingly, the ferrite module 150 may be formed by coupling the protruding support parts 1522 of the core fixing part 152 with the grooves of the ferrite cores 151.

[0252] Hereinafter, an arrangement structure of the working coil 140a and the ferrite core 151 will be described in detail with reference to FIGS. 19 to 21. The description is equally applicable to the types of ferrite modules 150 illustrated in FIGS. 22 to 27.

[0253] As described above, the ferrite module 150 may comprise a core fixing part 152 coupled to the upper supporter 130, formed by insert molding with the ferrite cores 151, and fixing the ferrite cores 151.

[0254] Referring to FIG. 21, an area of a rectangle defined by the outline FL of the ferrite core 151 may be formed to be smaller than an area of a rectangle defined by an outline of the core fixing part 152.

[0255] This is because the core fixing part 152 may be

formed with side walls 112 accommodating the ferrite cores 151 at an outer side thereof. Accordingly, an outer end of the ferrite core 151 may be disposed at a position further inward of the ferrite module 150 compared to an outer contour of the core fixing part 152.

[0256] In the embodiment, since the outer end of the ferrite core 151 is required to be disposed at the same position as the outline WL of the working coil 140a or to protrude further outward of the ferrite module 150, an outer end of the core fixing part 152 may ultimately be formed to protrude further outward than the outer end of the ferrite core 151 and the outline WL of the working coil 140a.

[0257] In the embodiment, when a plurality of ferrite cores 151 are disposed, widths of the plurality of ferrite cores 151 may be provided to be equal to or greater than a width of the working coil 140a. A case in which the working coil 140a and the ferrite core 151 are formed in a rectangular shape will be described in detail.

[0258] For example, the working coil 140a and the ferrite core 151 may each have an outer periphery formed in a rectangular shape. At this time, referring to FIG. 21, a first length L1 defined as a length between a pair of parallel outer sides of the ferrite core 151 may be equal to or greater than a second length L2 defined as a length

between a pair of parallel outer sides of the working coil 140a. **[0259]** That is, the first length L1 may be equal to or greater than the second length L2. Accordingly, at one side of the ferrite module 150, due to a difference between the second length L2 and the first length L1, a separation distance G may be formed between the outline WL of the working coil 140a and an outer end of the ferrite core 151. Of course, when the first length L1 and the second length L2 are equal, the separation distance G may be mathematically zero.

[0260] Due to such a structure, the ferrite core 151 disposed below the working coil 140a may block, among the magnetic field generated by the working coil 140a, a magnetic field directed downward from a region of the outline WL of the working coil 140a.

[0261] The magnetic field blocked by the ferrite core 151 may rise upward and be transmitted to the heating target, thereby allowing current to flow in the heating target and generating Joule heat.

[0262] Hereinafter, behavior of the magnetic field will be described based on simulation results. The drawings illustrated in FIGS. 28 to 30 show, in contour form, distributions of magnetic fields generated under respective conditions through simulation. The contents of FIGS. 28 and 29 relate to embodiments of the present disclosure.

[0263] FIG. 28 is a view for explaining a distribution of a magnetic field when a lateral end of the working coil 140a is located at the same position as a lateral end of the ferrite core 151. FIG. 28 corresponds to a case in which the first length L1 and the second length L2 are equal.

[0264] As shown in FIG. 28, when the first length L1 and the second length L2 are equal, most of the magnetic

field generated by normal current and eddy current flowing at an outer periphery of the working coil 140a may be suppressed from leaking downward by the ferrite core 151 and may rise to be transmitted to the heating target 10.

[0265] However, a portion of the magnetic field formed toward a lateral side at an outer end of the working coil 140a may not be blocked by the ferrite core 151 and may leak downward. Nevertheless, compared to the structure illustrated in FIG. 30, leakage of the magnetic field at the outer end of the working coil may be effectively suppressed.

[0266] FIG. 29 is a view for explaining a distribution of a magnetic field when a lateral end of the working coil 140a is positioned inward of a lateral end of the ferrite core 151. FIG. 29 corresponds to a case in which the first length L1 is greater than the second length L2.

[0267] As shown in FIG. 29, when the first length L1 is greater than the second length L2, all or substantially most of the magnetic field generated by normal current and eddy current flowing at the outer periphery of the working coil 140a may be suppressed from leaking downward by the ferrite core 151 and may rise to be transmitted to the heating target 10.

[0268] The magnetic field generated at the outer periphery of the working coil 140a, including a magnetic field formed toward a lateral side at an outer end of the working coil 140a, may be blocked by the ferrite core 151 disposed below, and leakage thereof in a downward direction may be prevented.

[0269] Accordingly, the structure illustrated in FIG. 29 may more efficiently cause the magnetic field to rise toward the heating target 10 compared to the structure illustrated in FIG. 28.

[0270] FIG. 30 is a view for explaining a distribution of a magnetic field when a lateral end of the working coil 140a protrudes further outward of the electric range than a lateral end of the ferrite core 151. FIG. 30 corresponds to a case in which the first length L1 is shorter than the second length L2. The content illustrated in FIG. 30 is provided for comparison with the embodiment of the present disclosure.

[0271] As shown in FIG. 30, when the first length L1 is shorter than the second length L2, the magnetic field generated by normal current and eddy current flowing at the outer periphery of the working coil 140a is not blocked by the ferrite core 151 and thus may leak downward. In this case, compared to the cases illustrated in FIGS. 28 and 29, downward leakage of the magnetic field may be more severe, and energy efficiency and heating efficiency of the electric range may be reduced.

[0272] In the embodiment, the first length L1 of the ferrite core 151 may be formed to be equal to or greater than the second length L2 of the working coil 140a. Accordingly, the ferrite core 151 may block the magnetic field generated by the working coil 140a and directed downward and may redirect the magnetic field toward the heating target, thereby increasing density of the mag-

netic field delivered to the heating target.

[0273] Therefore, the magnetic field is efficiently transmitted to the heating target, and energy efficiency and heating efficiency of the electric range may be improved.

[0274] FIG. 31 is a perspective view illustrating a lower side of the upper supporter 130 according to an embodiment. FIG. 32 is a bottom view of the upper supporter 130 according to an embodiment.

[0275] The electric range according to the embodiment may comprise an inverter board 210, a blowing fan 230, a heat sink 240, an air guide 310, and a lower supporter 260.

[0276] The inverter board 210 may be coupled to a lower surface of the upper supporter 130 and may apply a resonant current to the working coil 140a. The blowing fan 230 may be coupled to the lower surface of the upper supporter 130. The heat sink 240 may be coupled to a lower surface of the inverter board 210 and may be disposed such that a longitudinal direction thereof is parallel to a discharge direction of air from the blowing fan 230.

[0277] The air guide 310 may be disposed to surround the heat sink 240 and may guide flow of air passing through the heat sink 240. The lower supporter 260 may be disposed below the upper supporter 130, may be received in the case 110, and may support the upper supporter 130.

[0278] Other components are as described above, and the air guide 310 will be described in more detail below. The air guide 310 may guide flow of air discharged from the blowing fan 230, and the heat sink 240 may be disposed inside the air guide 310.

[0279] The air guide 310 may surround the heat sink 240 and may allow air to flow inside and around the heat sink 240, thereby effectively cooling the heat sink 240, and thus overheating of a board to which the heat sink 240 is coupled may be effectively suppressed.

[0280] FIG. 33 is an exploded perspective view illustrating some components coupled to the upper supporter 130. FIG. 34 is an exploded perspective view illustrating FIG. 33 viewed from another direction. The air guide 310 may comprise an air inlet hole 311, side guides 312, a lower guide 313, an air discharge hole 314, and a discharge guide 315.

[0281] The air inlet hole 311 may be disposed to face an outlet of the blowing fan 230. At one end of the air guide 310 where the air inlet hole 311 is formed, the air guide 310 may be coupled to an end of the blowing fan 230 where the outlet is formed. Accordingly, air discharged from the blowing fan 230 may flow into the air guide 310 and toward the heat sink 240 through the air inlet hole 311.

[0282] The side guides 312 may cover side surfaces of the heat sink 240 and may be provided as a pair spaced apart from each other. The lower guide 313 may cover a lower surface of the heat sink 240 and may be connected to the pair of side guides 312.

[0283] The side guides 312 and the lower guide 313

may be integrally formed to accommodate the heat sink 240 and may form a flow path for air flowing around the heat sink 240. Holes into which fastening members such as screws are fastened may be formed in the side guides 312 to couple the side guides 312 to the heat sink 240.

[0284] A longitudinal direction of the side guides 312 and the lower guide 313 may be disposed to be parallel to a longitudinal direction of the heat sink 240. Accordingly, the heat sink 240 may be accommodated in an internal space formed by the side guides 312 and the lower guide 313.

[0285] The air discharge hole 314 may be configured to discharge air toward the bottom plate 111 of the case 110. The air discharge hole 314 may be disposed at a position corresponding to an air outlet 262 of the lower supporter 260. Air discharged from the air discharge hole 314 may be discharged to outside of the electric range through the air outlet 262 and a outlet hole 1113 formed in the bottom plate 111 of the case 110 disposed below the lower supporter 260.

[0286] A discharge direction at the air discharge hole 314 may be formed in a downward direction of the electric range. Air may flow in a lateral direction of the electric range inside the air guide 310, and a flow direction of the air may be changed to the downward direction at the air discharge hole 314. To change the flow direction of the air, the air guide 310 may comprise a discharge guide 315.

[0287] The discharge guide 315 may form the air discharge hole 314 and may change the flow direction of the air. That is, the discharge guide 315 may change a horizontal flow of air in the electric range into a downward flow of the electric range.

[0288] The discharge guide 315 may comprise extension guides 3151 and a flow direction changing guide 3152. The extension guides 3151 may extend from the pair of side guides 312 and may be provided as a pair. The extension guides 3151, together with the flow direction changing guide 3152, may form the air discharge hole 314.

[0289] Accordingly, in order for the air discharge hole 314 to have a position corresponding to the air outlet 262 of the lower supporter 260, the extension guides 3151 may be formed to be bent in at least a portion thereof.

[0290] The flow direction changing guide 3152 may be connected to the pair of extension guides 3151 and may be formed as a curved surface to change a flow direction of air discharged from the air guide 310 toward the outside into a downward direction.

[0291] When the air guide 310 is viewed from a front side of the electric range, the flow direction changing guide 3152 may form a curved surface gradually changing from a forward direction to a downward direction. Accordingly, air directed toward the front of the air guide 310 may be guided in flow direction by the flow direction changing guide 3152.

[0292] Thus, the flow direction changing guide 3152 may change a flow of air from a horizontal direction of the

electric range, that is, a forward direction, into a downward direction.

[0293] As illustrated in FIG. 32, the air guide 310 according to an embodiment may be provided to be coupled to the inverter board 210. For example, the air guide 310 may be coupled, by a fastening member, to the heat sink 240 at a position corresponding to the heat sink 240 coupled to a lower surface of the inverter board 210. Since the inverter boards 210 may be provided as a pair and the heat sinks 240 may be disposed respectively on the inverter boards 210, the heat sinks 240 may also be provided as a pair.

[0294] Compared to other boards, the inverter board 210 may have a relatively large area and may comprise a relatively large number of heat-generating elements, and thus it may be necessary to effectively suppress overheating of the inverter board 210.

[0295] Accordingly, in the embodiment, the heat sink 240 and the air guide 310 may be disposed on the lower surface of the inverter board 210 so that the inverter board 210 may be cooled by air forcibly flowed by the blowing fan 230.

[0296] In the embodiment, by coupling the air guide 310 to the lower surface of the inverter board 210, the air guide 310 occupying a considerable volume may consequently be coupled to the upper supporter 130.

[0297] As described above, most components, including boards that operate by receiving electrical power and are involved in operation of the electric range, electrical components such as the blowing fan 230, the heat sink 240, the air guide 310, and other components, may be coupled to the upper supporter 130. Accordingly, assembly and disassembly of the electric range may be significantly facilitated.

[0298] FIG. 35 is a perspective view illustrating a state in which the lower supporter 260 and the case 110 are coupled. FIG. 36 is a perspective view illustrating a state in which the lower supporter 260 and the case 110 are separated. FIG. 37 is a bottom view of FIG. 35.

[0299] The lower supporter 260 may comprise an air inlet 261 and an air outlet 262. The air inlet 261 may be formed at a position corresponding to the blowing fan 230, and air may be introduced therethrough. Since the blowing fan 230 may be disposed above the lower supporter 260, air introduced into the blowing fan 230 may be introduced from below the lower supporter 260, pass through the lower supporter 260, and flow into the blowing fan 230.

[0300] Accordingly, the air inlet 261 may be formed in the lower supporter 260, and air may pass through the lower supporter 260 via the air inlet 261 and may be introduced into the blowing fan 230.

[0301] The air outlet 262 may be formed at a position corresponding to the air discharge hole 314, and air may be discharged therethrough. Air discharged from the air discharge hole 314 of the air guide 310 may pass through the lower supporter 260 via the air outlet 262 and may be discharged below the lower supporter 260.

[0302] The case 110 may comprise a bottom plate 111 and a side wall 112. The bottom plate 111 may form a bottom of the case 110, and a passage for air forcibly flowed by the blowing fan 230 may be formed therein. The side wall 112 may be bent from the bottom plate 111 to form a space for accommodating components. The side wall 112 may be bent from the bottom plate 111 to form a space for accommodating components. Other details regarding the bottom plate 111 and the side wall 112 have already been described above.

[0303] The bottom plate 111 may comprise an inlet hole 1112 and an outlet hole 1113. The inlet hole 1112 may be formed at a position corresponding to the blowing fan 230 and the air inlet 261, and air may be introduced there-through. The outlet hole 1113 may be formed at a position corresponding to the air outlet 262, and air may be discharged therethrough. Other details regarding the inlet hole 1112 and the outlet hole 1113 have already been described above.

[0304] Air forcibly flowed by the blowing fan 230 may be introduced into the electric range through the bottom plate 111 and may be discharged therefrom. Due to such a structure, it is possible to prevent a flow path of air from being exposed to a user, thereby improving aesthetic appearance of the design, and noise generated by flow of air and operation of the blowing fan 230 may be effectively reduced.

[0305] FIG. 38 is a plan view of a lower supporter 260 according to another embodiment. FIG. 39 is a perspective view of a lower supporter 260 according to another embodiment.

[0306] In another embodiment, the air guide 310 may be coupled to the lower supporter 260. Unlike the above-described embodiment in which the air guide 310 is coupled to the upper supporter 130, the air guide 310 may be coupled to the lower supporter 260.

[0307] For example, the air guide 310 may be disposed at a position corresponding to the heat sink 240 in the lower supporter 260. The air guide 310 may be coupled to an upper surface of the lower supporter 260 by a fastening member.

[0308] The heat sink 240 may be coupled to the upper supporter 130, and when the upper supporter 130 and the lower supporter 260 are coupled to each other in a state in which the air guide 310 is coupled to the lower supporter 260, the heat sink 240 may be accommodated in an internal space of the air guide 310.

[0309] In the embodiment, assembly of the heat sink 240 and the air guide 310 may be completed by coupling the lower supporter 260 and the upper supporter 130 in a state in which the air guide 310 is coupled to the lower supporter 260 and the heat sink 240 is coupled to the upper supporter 130.

[0310] By coupling the air guide 310 to the lower supporter 260, a need to consider a placement space and a coupling structure of the air guide 310 in the lower supporter 260, to which a plurality of boards, the heat sink 240, the blowing fan 230, and other components are

coupled, may be reduced even though the air guide 310 occupies a considerable volume.

[0311] Accordingly, spatial arrangement of components and other design aspects of the electric range may be facilitated.

[0312] FIG. 40 is a plan view of a ferrite module 150 according to an embodiment. FIG. 41 is a cross-sectional view of FIG. 40. FIG. 42 is a perspective view of FIG. 41. The ferrite module 150 illustrated in FIG. 40 may comprise a first-type ferrite core 151. The first-type ferrite core 151 and a core fixing part 152 corresponding thereto will be described in detail.

[0313] The first-type ferrite core 151 may comprise a first ferrite 1511 and a second ferrite 1512. The first ferrites 1511 may be provided as a plurality of first ferrites, each disposed at a corner of the core fixing part 152 having a rectangular shape. The second ferrites 1512 may be provided as a plurality of second ferrites, at least one being disposed between the plurality of first ferrites 1511.

[0314] The first ferrite 1511 may be formed in a plate shape having a predetermined thickness and may have an overall rectangular prism shape. The second ferrite 1512 may have a thickness identical or similar to that of the first ferrite 1511 and may be provided as a rod-shaped hexahedral shape having a smaller volume than the first ferrite 1511.

[0315] For example, the first ferrite 1511 may be formed in a square shape, and the second ferrite 1512 may be formed in a rectangular shape. At this time, a length of a long side of the second ferrite 1512 may be formed to correspond to a length of one side of the first ferrite 1511.

[0316] However, shapes of the first ferrite 1511 and the second ferrite 1512 are not limited thereto and may be formed in various other shapes. Further, in the embodiment, two types of ferrites having different shapes are provided in one ferrite module 150; however, the present disclosure is not limited thereto, and three or more types of ferrites having different shapes may also be provided in one ferrite module 150.

[0317] In the embodiment, the ferrite core 151 may comprise a plurality of ferrites having identical or different shapes disposed therein and may be insert molded with the core fixing part 152 to form the ferrite module 150. Due to the insert molding, a specific shape of the core fixing part 152 supporting and fixing the ferrite core 151 may be various, and such various structures of the core fixing part 152 may be easily formed.

[0318] Accordingly, ferrites having various sizes and shapes may be combined to easily manufacture a shape corresponding to the seating groove 131 of the upper supporter 130 as a whole, thereby improving productivity of the ferrite module 150.

[0319] The second ferrite 1512 may be disposed between the plurality of first ferrites 1511 so as to be spaced apart from the first ferrites 1511. Due to such a structure, when an outer contour is considered, the first ferrites

1511 and the second ferrites 1512 may have an overall substantially rectangular shape.

[0320] For example, as described above, when the outer contour is considered, the working coil 140a may have an overall substantially rectangular shape. Accordingly, the ferrite core 151 may be provided in an overall rectangular shape by combining the first ferrites 1511 and the second ferrites 1512, thereby corresponding in shape to the rectangular working coil 140a.

[0321] Accordingly, magnetic field generation efficiency in the working coil 140a and the ferrite core 151 may be improved. That is, as a ratio of overlap between the working coil 140a and the ferrite core 151 increases, an intensity of the generated magnetic field increases. In the embodiment, since shapes of outer contours of the working coil 140a and the ferrite core 151 correspond to each other in a rectangular shape, the magnetic field generation efficiency may be improved compared to a case in which the shapes of the outer contours are different.

[0322] Some of the second ferrites 1512 may be disposed between the plurality of first ferrites 1511, and the plurality of second ferrites 1512 may be disposed spaced apart from each other.

[0323] When the ferrite module 150 has an overall rectangular shape, lengths of the ferrite module 150 in a left-right direction and a front-rear direction may be different. In such a case, the first ferrites 1511 and the second ferrites 1512 may need to be disposed so that the ferrite core 151 has an overall rectangular shape.

[0324] In the embodiment, when the square-shaped first ferrites 1511 are disposed at corners of the core fixing part 152, as illustrated in FIG. 40, since the ferrite module 150 has a rectangular shape having a left-right side longer than a front-rear side, a considerable gap SS may be formed between the first ferrites 1511 along the left-right side.

[0325] In the gap SS, a plurality of second ferrites 1512, for example two second ferrites 1512, may be disposed spaced apart from each other, so that an outer contour of the ferrite core 151 may have a generally rectangular shape.

[0326] In the case of the first type, the core fixing part 152 may comprise a bottom plate 1521, a bent part 1522, and a first extension part 1523. The bottom plate 1521 may form a lower portion of the core fixing part 152 and may close the lower portion of the core fixing part 152. Lower surfaces of the first ferrites 1511 and the second ferrites 1512 may be stably supported by the bottom plate 1521.

[0327] The bent part 1522 may be bent from an end of the bottom plate 1521. The bent part 1522 may extend upward from the bottom plate 1521 to form a space in which the first ferrites 1511 and the second ferrites 1512 are disposed.

[0328] The first extension part 1523 may be bent and extended from the bent part 1522 and may cover a portion of upper surfaces of the first ferrite 1511 and

the second ferrite 1512. The first extension part 1523 may be formed at an upper portion of the core fixing part 152 along sides forming an outer contour of the core fixing part 152.

[0329] The first extension part 1523 may cover a portion of the upper surfaces of the first ferrite 1511 and the second ferrite 1512 to prevent the first ferrite 1511 and the second ferrite 1512 from being separated from the core fixing part 152.

[0330] The first ferrite 1511 may be provided to have a larger area than the second ferrite 1512. Since the second ferrite 1512 has a rectangular shape and has a smaller area than the first ferrite 1511, the second ferrites 1512 may be disposed at appropriate positions and in an appropriate number between the first ferrites 1511 so that the entire ferrite core 151 may have a shape corresponding to a rectangular working coil 140a.

[0331] The core fixing part 152 corresponding to the first-type ferrite core 151 may comprise fixing walls 1525 to stably fix the first ferrite 1511 and the second ferrite 1512 so that the first ferrite 1511 and the second ferrite 1512 do not deviate from designed positions.

[0332] The fixing walls 1525 may be formed to protrude from the bottom plate 1521, may be disposed between the first ferrite 1511 and the second ferrite 1512, and may be disposed to surround at least portions of edges of the first ferrite 1511 and the second ferrite 1512.

[0333] The fixing walls 1525 may contact at least portions of side surfaces of the first ferrite 1511 and the second ferrite 1512 to fix positions of the respective ferrites and couple the ferrites to the core fixing part 152. The fixing walls 1525 may be formed to contact side surfaces of the ferrites without covering upper surfaces of the ferrites.

[0334] Meanwhile, upper surfaces of the fixing walls 1525 may be formed higher than upper surfaces of the ferrites. Additionally, an upper surface of the first extension part 1523 may also be formed higher than the upper surfaces of the ferrites.

[0335] Due to such a structure, in the ferrite module 150, an insulation space TT may be formed at portions where the upper surfaces of the ferrites are exposed, by a height difference between the upper surfaces of the ferrites and upper surfaces of the fixing walls 1525 and the first extension part 1523.

[0336] The insulation space TT may prevent the ferrite core 151 and the coil board 140 from directly contacting each other and may electrically insulate the ferrite core 151 and the coil board 140 from each other. When the ferrite module 150 and the coil board 140 are assembled, the first extension part 1523 and the insulation space TT may be disposed between the ferrite core 151 and the coil board 140 so that the ferrite core 151 and the coil board 140 may not directly contact each other.

[0337] Accordingly, the first extension part 1523 and the insulation space TT may electrically insulate the ferrite core 151 and the coil board 140 from each other, thereby suppressing deterioration in magnetic field gen-

eration efficiency due to direct contact between the ferrite core 151 and the coil board 140.

[0338] The core fixing part 152 may comprise fastening protrusions 1528. The fastening protrusions 1528 may allow the ferrite module 150 to be fixedly coupled with the upper supporter 130 in a state where the ferrite module 150 is seated in the seating groove 131.

[0339] The core fixing part 152 may comprise fastening protrusions 1528 protruding from outer surfaces of the bent parts 1522 and coupled to the upper supporter 130. The fastening protrusions 1528 may, for example, protrude from outer surfaces of a pair of bent parts 1522 disposed at positions facing each other, and a plurality of the fastening protrusions 1528 may also be provided on one bent part 1522.

[0340] In a wall forming the seating groove 131 in the upper supporter 130, holes or grooves into which the fastening protrusions 1528 are fitted may be formed in shapes and numbers corresponding to the fastening protrusions 1528 at positions corresponding to the fastening protrusions 1528.

[0341] The fastening protrusions 1528 may be coupled to holes or grooves formed in the upper supporter 130 by shape fitting or interference fitting. Accordingly, the ferrite module 150 including the core fixing part 152 may be easily attached to or detached from the upper supporter 130.

[0342] FIG. 43 is a plan view of the ferrite module 150 according to another embodiment. FIG. 44 is a cross-sectional view of FIG. 43. FIG. 45 is a perspective view of FIG. 44. The ferrite module 150 illustrated in FIG. 43 may comprise a second-type ferrite. The second-type ferrite core 151 and the corresponding core fixing part 152 will be described in detail. Hereinafter, descriptions overlapping with those already described above may be omitted.

[0343] In the second type, a plurality of ferrite cores 151 having identical or similar shapes to each other may be provided. The plurality of ferrite cores 151 may be spaced apart from each other with respect to a center of the core fixing part 152 and may be radially disposed.

[0344] The ferrite module 150 including the second-type ferrite core 151 may be generally formed in a square shape. Accordingly, an outline shape of the seating groove 131 in which the ferrite module 150 is seated may also be generally formed in a square shape.

[0345] The ferrite core 151 may be provided as a plurality of pieces, and the ferrite cores 151 may be radially arranged as a whole so as to form one entire ferrite core 151. Hereinafter, the ferrite core 151 may refer to each of the plurality of pieces.

[0346] In the second type, the ferrite cores 151 may be provided in shapes identical or extremely similar to each other. Since identical ferrite cores 151 are disposed to be spaced apart from each other with respect to the center of the core fixing part 152, the ferrite cores 151 may be disposed as a whole in a radial shape that is symmetrical in both a left-right direction and a front-rear direction.

[0347] The ferrite cores 151 may be provided in a

polygonal shape. In one embodiment, the ferrite cores 151 may be formed in a rectangular shape, and more specifically may be formed in a square shape.

[0348] In another embodiment, the ferrite cores 151 may be formed in a triangular shape, and more specifically may be formed in an equilateral triangular shape. The coil board 140 may be formed in a polygonal shape, and for example, when the coil board 140 has a pentagonal or hexagonal shape, the ferrite cores 151 may be formed in a triangular shape.

[0349] The second-type ferrite core 151 may be formed in one of a first type in which a portion of an upper surface is covered by the core fixing part 152, or a second type including at least one inclined part 1514 formed at a corner and configured to be fixed to the core fixing part 152.

[0350] As illustrated in FIG. 43, in the case of the first type, the core fixing part 152 may comprise a bottom plate 1521 and bent parts 1522 bent from ends of the bottom plate 1521. The bottom plate 1521 and the bent parts 1522 are as described above.

[0351] In the first type, the core fixing part 152 may comprise second extension parts 1524, a cover part 1526, and first partition walls 1527. The second extension parts 1524 may be bent and extended from the bent parts 1522 and may cover parts of upper surfaces of the ferrite cores 151.

[0352] The second extension parts 1524 may be formed at an upper portion of the core fixing part 152 along sides forming an outer contour of the core fixing part 152. The second extension parts 1524 may cover parts of the upper surfaces of the respective ferrite cores 151 so as to prevent the ferrite cores 151 from being separated from the core fixing part 152.

[0353] The cover part 1526 may be formed at a central portion of the core fixing part 152 and may cover parts of upper surfaces of corner portions of the ferrite cores 151. The cover part 1526, together with the second extension parts 1524, may serve to prevent the ferrite cores 151 from being separated from the core fixing part 152.

[0354] The cover part 1526 may fix corner portions of the ferrite cores 151 so that the ferrite cores 151 may be stably and firmly coupled to the core fixing part 152.

[0355] The first partition wall 1527 may protrude from the bottom plate 1521, may connect the bent part 1522 and the cover part 1526, and may be disposed between the plurality of ferrite cores 151 to separate the ferrite cores 151 from each other.

[0356] FIG. 46 is a perspective view of the ferrite core 151 according to another embodiment. FIG. 47 is a plan view of FIG. 46. FIG. 48 is a front view of FIG. 46. The ferrite module 150 illustrated in FIG. 46 may comprise a second-type ferrite core 151. The second-type ferrite core 151 and the corresponding core fixing part 152 will be described in detail.

[0357] As illustrated in FIG. 46, in the case of the second type, the ferrite core 151 may be formed in a rectangular shape and may have an appearance similar

to that of the first-type ferrite core 151 except for an inclined part 1514 and a chamfered part 1515.

[0358] The inclined parts 1514 may be provided as a pair respectively formed at corners positioned to correspond to each other in a diagonal direction of the ferrite core 151. A portion of the core fixing part 152 may cover the inclined parts 1514, and accordingly the ferrite core 151 may be fixed to the core fixing part 152.

[0359] In insert molding, an injection material made of plastic may flow into an upper side of the inclined parts 1514 and may be hardened to form a first cover 1529 and a second cover 1531 to be described later, and accordingly the ferrite core 151 may be stably coupled and fixed to the core fixing part 152 by the first cover 1529 and the second cover 1531.

[0360] chamfered parts 1515 may be formed in the ferrite core 151 at corners where the plurality of ferrite cores 151 face each other. The chamfered parts 1515 may be formed at corners where the inclined parts 1514 are formed.

[0361] Accordingly, when the plurality of ferrite cores 151 are disposed, as illustrated in FIG. 47, a rhombus-shaped space may be formed at a central portion of the entire ferrite core 151.

[0362] By insert molding, an injection material integrally formed with the bottom plate 1521 may be accumulated in the rhombus-shaped space so that the ferrite core 151 may be firmly supported. Such an injection material may be connected to a second cover 1531 to be described later.

[0363] FIG. 49 is a perspective view of the ferrite module 150 according to another embodiment. FIG. 50 is a plan view of FIG. 49. FIG. 51 is a cross-sectional view taken along line 51-51 in FIG. 50.

[0364] As illustrated in FIG. 49, in the case of the second type, the core fixing part 152 may comprise a bottom plate 1521 and bent parts 1522 bent from ends of the bottom plate 1521. The bottom plate 1521 and the bent parts 1522 are as described above.

[0365] The core fixing part 152 corresponding to the second-type ferrite core 151 may comprise a first cover 1529, a second cover 1531, and second partition walls 1532.

[0366] The first cover 1529 may be formed at corners of the core fixing part 152 and may be provided to cover the inclined parts 1514, thereby fixing the ferrite core 151. The second cover 1531 may be formed at a central portion of the core fixing part 152 and may be provided to cover the inclined parts 1514 where the chamfered parts 1515 are formed, thereby fixing the ferrite core 151.

[0367] The first cover 1529 and the second cover 1531 may be disposed at ends of the ferrite core 151 in a diagonal direction of the ferrite core 151 and may fix corner portions of the ferrite core 151, respectively, thereby allowing the ferrite core 151 to be stably and firmly coupled to the core fixing part 152.

[0368] inclined parts 1514 may be respectively formed in the ferrite core 151 at positions corresponding to the

first cover 1529 and the second cover 1531. By the first cover 1529 and the second cover 1531 covering the inclined parts 1514 to couple the ferrite core 151 to the core fixing part 152, heights of the ferrite core 151 and the core fixing part 152 may become similar, and thus an upper surface of the ferrite module 150 may have a substantially flat shape.

[0369] Since the upper surface of the ferrite module 150 is provided to be flat, the coil board 140 may be easily and stably arranged on an upper side of the ferrite module 150.

[0370] The second partition walls 1532 may protrude from the bottom plate 1521, may connect the bent parts 1522 and the second cover 1531, and may be disposed between the plurality of ferrite cores 151 to separate the ferrite cores 151 from each other.

[0371] The second partition walls 1532 formed between the respective ferrite cores 151 may contact side surfaces of the respective ferrite cores 151 to more firmly couple the ferrite cores 151 to the core fixing part 152. In addition, the second partition walls 1532 may restrict the respective ferrite cores 151 from moving in a lateral direction of the core fixing part 152. Accordingly, the partition walls may maintain the ferrite cores 151 in respective designed positions and may suppress positional deviation of the ferrite cores 151.

[0372] FIG. 52 is an exploded perspective view of the upper supporter 130 and the ferrite module 150. FIG. 53 is a cross-sectional view in a state in which the upper supporter 130 and the ferrite module 150 are assembled. FIG. 54 is an enlarged view of portion 32 of FIG. 53.

[0373] The core fixing part 152 may be formed in a rectangular shape. The core fixing part 152 may comprise fitting protrusions 1533 protruding outward from the core fixing part 152 from the bent parts 1522 at corners of the core fixing part 152 and fitted into the upper supporter 130.

[0374] The upper supporter 130 may comprise a plurality of seating grooves 131 in which respective ferrite modules 150 are seated.

[0375] The fitting protrusions 1533 may be provided to allow the ferrite module 150 to be stably mounted in the seating groove 131 and to suppress the ferrite module 150 from deviating in position or being separated from the seating groove 131 due to external impact.

[0376] Since the fitting protrusions 1533 are arranged at respective corners of the rectangular core fixing part 152, for example, four fitting protrusions 1533 may be provided in total. The fitting protrusions 1533 may be formed in the core fixing part 152 of all embodiments described above.

[0377] The upper supporter 130 may be provided with fitting grooves 137 into which the fitting protrusions 1533 are fitted at positions corresponding to the fitting protrusions 1533. The fitting grooves 137 may be formed by a portion of the upper supporter 130 being recessed at corner portions of the seating groove 131 having a rectangular outline.

[0378] The fitting protrusions 1533 and the fitting grooves 137 may be coupled to each other by shape fitting. When the fitting protrusions 1533 are coupled to the fitting grooves 137, rotation or lateral movement of the core fixing part 152 may be effectively restricted so that the core fixing part 152 may maintain a state of being positioned at a designed location.

[0379] Accordingly, even when an external impact is applied to the electric range, the ferrite module 150 does not easily deviate from its position due to the external impact, and thus assembly performance and performance of the electric range may be improved.

[0380] A gap SS may be formed between a bottom surface of the seating groove 131 and a lower surface of the ferrite module 150. Such a gap SS may be implemented by designing a structure of the fitting protrusions 1533 as follows.

[0381] That is, referring to FIG. 54, a first distance L1 from a lower surface of the fitting protrusions 1533 to the lower surface of the ferrite module 150 may be formed smaller than a second distance L2 from a lower surface of the fitting grooves 137 to the bottom surface of the seating groove 131.

[0382] Accordingly, the bottom surface of the seating groove 131 and the lower surface of the ferrite module 150 do not contact each other, and the gap SS may be formed therebetween. The gap SS may improve assembly performance when the ferrite module 150 is inserted into the seating groove 131.

[0383] Lower surfaces of the plurality of ferrite modules 150 and bottom surfaces of the plurality of seating grooves 131 may not be positioned at the same height, and portions of the surfaces may also be non-uniform. This is because there may be processing errors in the ferrite modules 150 and the seating grooves 131.

[0384] If the bottom surface of the seating groove 131 and the lower surface of the ferrite module 150 contact each other, the ferrite module 150 may be inclined with respect to the seating groove 131 due to the above-described processing errors, or heights of the plurality of ferrite modules 150 assembled in the seating grooves 131 may become different from each other. This may cause assembly defects and deterioration in performance of the electric range.

[0385] Accordingly, by forming the gap SS between the lower surface of the ferrite module 150 and the bottom surface of the seating groove 131 so that the lower surface of the ferrite module 150 and the bottom surface of the seating groove 131 are assembled without contacting each other, occurrence of inclination of the ferrite module 150 due to contact may be suppressed, and heights of the plurality of ferrite modules 150 assembled in the seating grooves 131 may be made uniform. Accordingly, assembly defects and deterioration in performance of the electric range may be suppressed.

[0386] For example, the gap SS may be provided to be approximately 0.5 mm in a up-down direction of the electric range.

[0387] FIG. 55 is an exploded perspective view of some components of the electric range in which the insulating plate 310 is illustrated.

[0388] As described above, in the ferrite module 150 including the second-type ferrite core 151, the first cover 1529 and the second cover 1531 cover the inclined parts 1514 so that heights of the ferrite core 151 and the core fixing part 152 become similar, and thus the upper surface of the ferrite module 150 may have a substantially flat shape.

[0389] Accordingly, in another embodiment, a structure in which the upper surface of the core fixing part 152 is formed higher than the upper surface of the ferrite core 151 to form the insulation space TT is difficult to implement in the second type.

[0390] For this reason, in the ferrite module 150 including the second-type ferrite core 151, the insulation space TT of other embodiments may not be formed. Since the insulation space TT is not provided, the ferrite core 151 and the coil board 140 may contact each other, and thus magnetic field generation efficiency may be reduced.

[0391] In the embodiment, an insulating plate 310 may be provided in the second type to electrically insulate the ferrite core 151 and the coil board 140. The electric range may comprise the insulating plate 310 disposed between the coil board 140 and the ferrite module 150 and formed of an electrically insulating material.

[0392] The insulating plate 310 may be made of, for example, polyimide, silicon, MICA, or a material including at least some of these materials. However, the material is not limited thereto.

[0393] For example, a thickness of the insulating plate 310 may be provided to be approximately 0.5 mm in a up-down direction of the electric range.

[0394] In the embodiment, the insulating plate 310 may be disposed between the coil board 140 and the ferrite module 150 to electrically insulate them so as to prevent the coil board 140 and the ferrite core 151 from being electrically connected and thereby prevent deterioration in magnetic field generation efficiency.

[0395] In addition, an upper surface and a lower surface of the insulating plate 310 may contact the coil board 140 and the ferrite module 150, respectively. Due to such a structure, the coil board 140 may be effectively cooled.

[0396] When electricity is applied to the coil board 140 and the coil board 140 operates, the coil board 140 may be heated due to current. At this time, heat generated in the coil board 140 may be transmitted to the relatively cooler ferrite module 150 by conduction through the insulating plate 310.

[0397] Accordingly, the insulating plate 310 may function as a heat transfer medium by conduction to effectively cool the coil board 140 and may suppress deterioration in performance of the electric range due to overheating of the coil board 140.

[0398] Although the present disclosure has been described above with reference to the illustrated drawings by way of example, it is apparent that the present dis-

closure is not limited to the embodiments and drawings disclosed in the present specification, and that various modifications may be made by a person having ordinary skill in the art within the scope of the technical idea of the present disclosure. In addition, even if the operational effects according to the configuration of the present disclosure are not explicitly described when describing the above embodiments of the present disclosure, predictable effects resulting from the configuration must also be recognized.

Claims

1. An electric range comprising:

a case;

an upper supporter accommodated in the case; a plurality of coil boards disposed above the upper supporter, spaced apart from each other, and having a working coil printed thereon; and a plurality of ferrite modules disposed above the upper supporter, disposed below the coil boards, and disposed at positions corresponding to the plurality of coil boards, respectively, wherein the ferrite modules comprise a plurality of ferrite cores, and

a lateral end of the working coil is disposed at the same position as a lateral end of the ferrite core or inside the lateral end of the ferrite core.

2. The electric range according to claim 1,

wherein the working coil and the ferrite cores have outer peripheries formed in polygonal shapes, and

when a plurality of the ferrite cores are disposed, a width of the plurality of ferrite cores is provided to be equal to or greater than a width of the working coil.

3. The electric range according to claim 1,

wherein the working coil and the ferrite cores have outer peripheries formed in polygonal shapes, and

an area formed by an outline of the ferrite cores is formed to be equal to or greater than an area formed by an outline of the working coil.

4. The electric range according to claim 3,

wherein the ferrite module comprises a core fixing part coupled to the upper supporter, formed by insert molding with the ferrite core, and fixing the ferrite core, and

an area of a rectangle formed by an outline of the ferrite core is formed to be smaller than an area

- of a rectangle formed by an outline of the core fixing part.
5. The electric range according to claim 1,
- 5 wherein the upper supporter comprises a plurality of seating grooves disposed to be spaced apart from each other and aligned, and the ferrite cores are seated in the seating grooves and disposed to contact the upper supporter.
- 10 6. The electric range according to claim 5, wherein the ferrite core disposed in one of the seating grooves is formed as a plurality of pieces, and each of the pieces is provided to be attached to the seating groove.
- 15 7. The electric range according to claim 5, wherein the ferrite core disposed in one of the seating grooves is formed as a single piece and is provided to be attached to the seating groove.
- 20 8. The electric range according to claim 1,
- 25 wherein the ferrite module comprises a core fixing part coupled to the supporter, formed by insert molding with the ferrite core, and fixing the ferrite core, and the ferrite core is formed in one of:
- 30 a first type in which ferrites having different areas are combined; or a second type in which a plurality of ferrites having identical shapes are radially disposed with respect to a center of the ferrite module.
- 35 9. The electric range according to claim 8, wherein, in the first type, the ferrite core comprises:
- 40 a plurality of first ferrites respectively disposed at corners of the core fixing part having a rectangular shape; and a plurality of second ferrites in which at least one is disposed between the plurality of first ferrites.
- 45 10. The electric range according to claim 8,
- 50 wherein, in the second type, the ferrite cores are provided as a plurality of ferrite cores, the plurality of ferrite cores are spaced apart from each other and radially disposed with respect to a center of the core fixing part, and the ferrite cores are formed in one of:
- 55 a first type in which a portion of an upper surface is provided to be covered by the core fixing part; or a second type comprising at least one inclined part formed at a corner and configured to fix the ferrite core to the core fixing part.
11. The electric range according to claim 10,
- wherein, in the ferrite core, chamfered parts are formed at corners where the plurality of ferrite cores face each other, and the chamfered parts are formed at corners where the inclined parts are formed.
12. An electric range comprising:
- a case;
- an upper supporter accommodated in the case;
- a plurality of coil boards disposed above the upper supporter, spaced apart from each other, and having a working coil printed thereon;
- a plurality of ferrite modules disposed above the upper supporter, disposed below the coil boards, and disposed at positions corresponding to the plurality of coil boards, respectively;
- an inverter board coupled to a lower surface of the upper supporter and configured to apply a resonant current to the working coil;
- a blowing fan coupled to the lower surface of the upper supporter;
- a heat sink coupled to a lower surface of the inverter board and having a longitudinal direction disposed in a direction parallel to an air discharge direction of the blowing fan; and
- an air guide disposed to surround the heat sink and configured to guide a flow of air passing through the heat sink.
13. The electric range according to claim 12, further comprising:
- a lower supporter disposed below the upper supporter, accommodated in the case, and configured to support the upper supporter.
14. The electric range according to claim 13, wherein the air guide comprises:
- an air inlet hole disposed to face an outlet of the blowing fan;
- a pair of side guides covering side surfaces of the heat sink and spaced apart from each other;
- a lower guide covering a lower surface of the heat sink and respectively connected to the pair of side guides;
- an air discharge hole configured to discharge air toward a bottom plate of the case; and
- a discharge guide configured to form the air

discharge hole and change a flow direction of the air.

15. The electric range according to claim 14,
wherein the discharge guide comprises: 5

a pair of extension guides extending from the pair of side guides; and
a flow direction changing guide connected to the pair of extension guides and formed in a curved surface to change a flow direction of air discharged from the air guide to the outside. 10

16. The electric range according to claim 15,
wherein the air guide is coupled to one of the inverter board and the lower supporter. 15

17. The electric range according to claim 12,
wherein the ferrite module comprises a ferrite core, and
a lateral end of the working coil is disposed, in an up-down direction, at the same position as a lateral end of the ferrite core or inside the lateral end of the ferrite core. 20
25

18. The electric range according to claim 17,
wherein the working coil and the ferrite core have outer peripheries formed in rectangular shapes, and
a first length defined by a length between a pair of parallel outer sides of the ferrite core is provided to be equal to or greater than a first length defined by a length between a pair of parallel outer sides of the working coil. 30
35

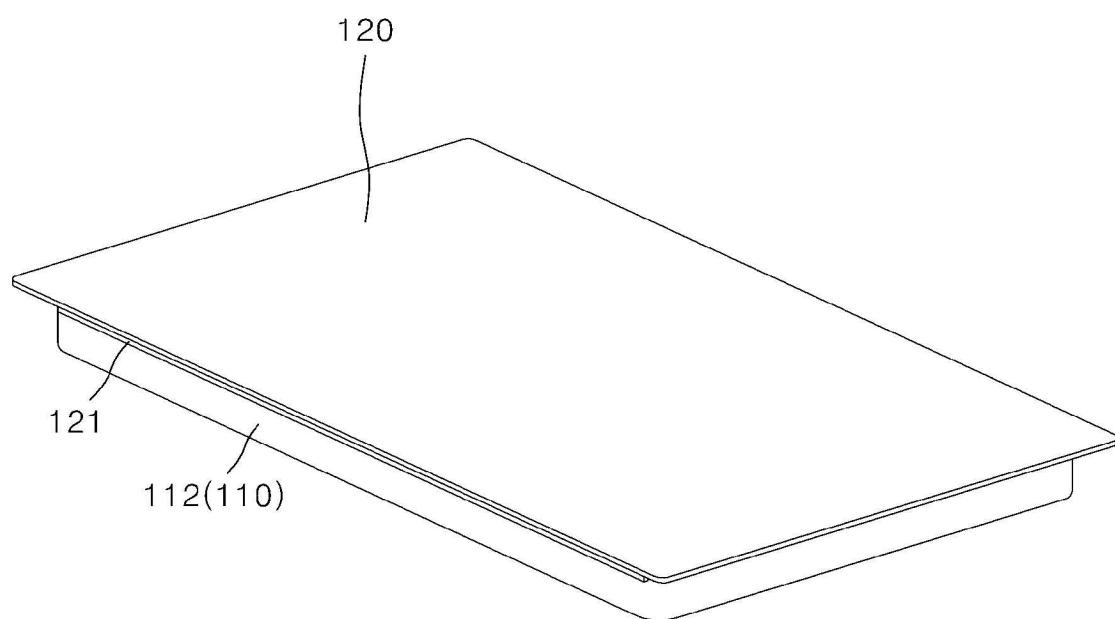
40

45

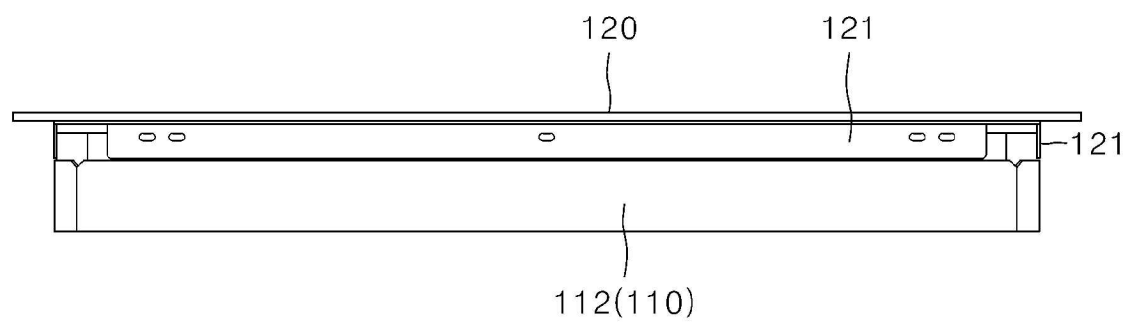
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55

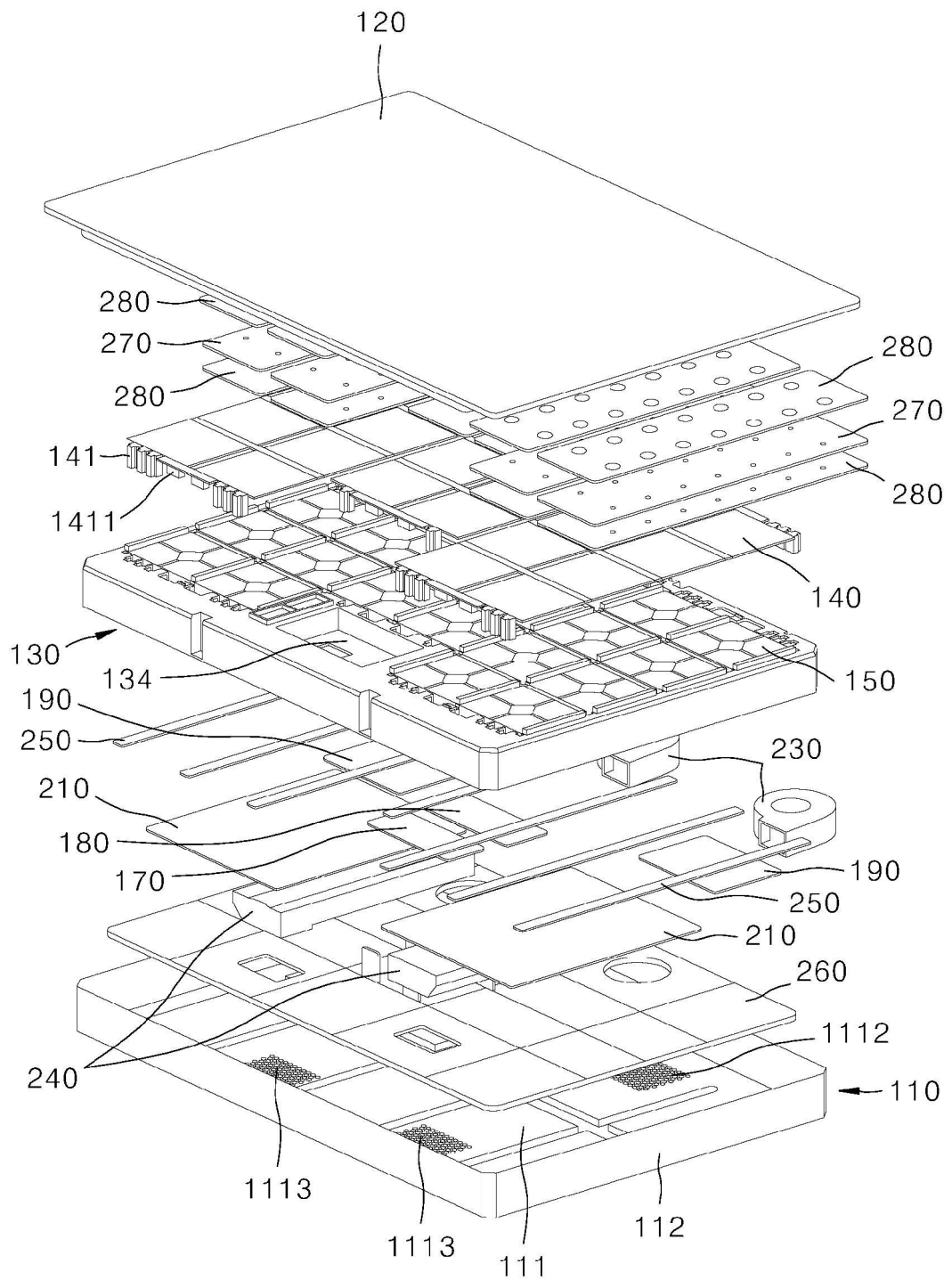
【FIG. 1】



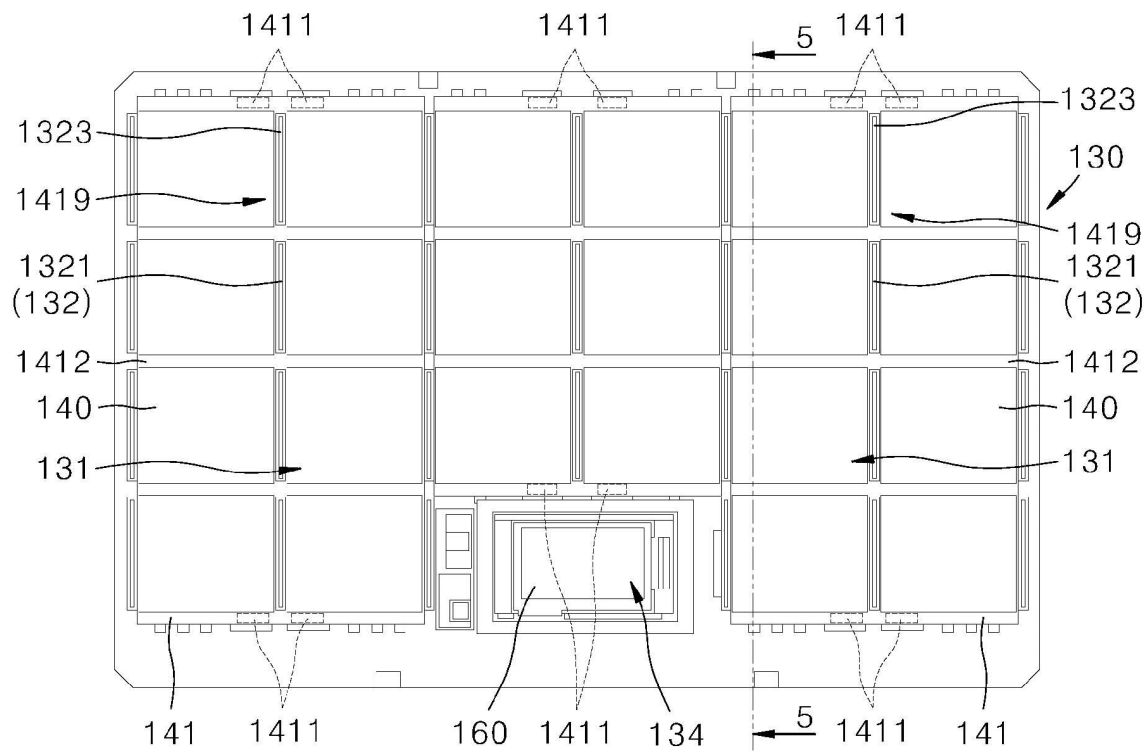
【FIG. 2】



【FIG. 3】

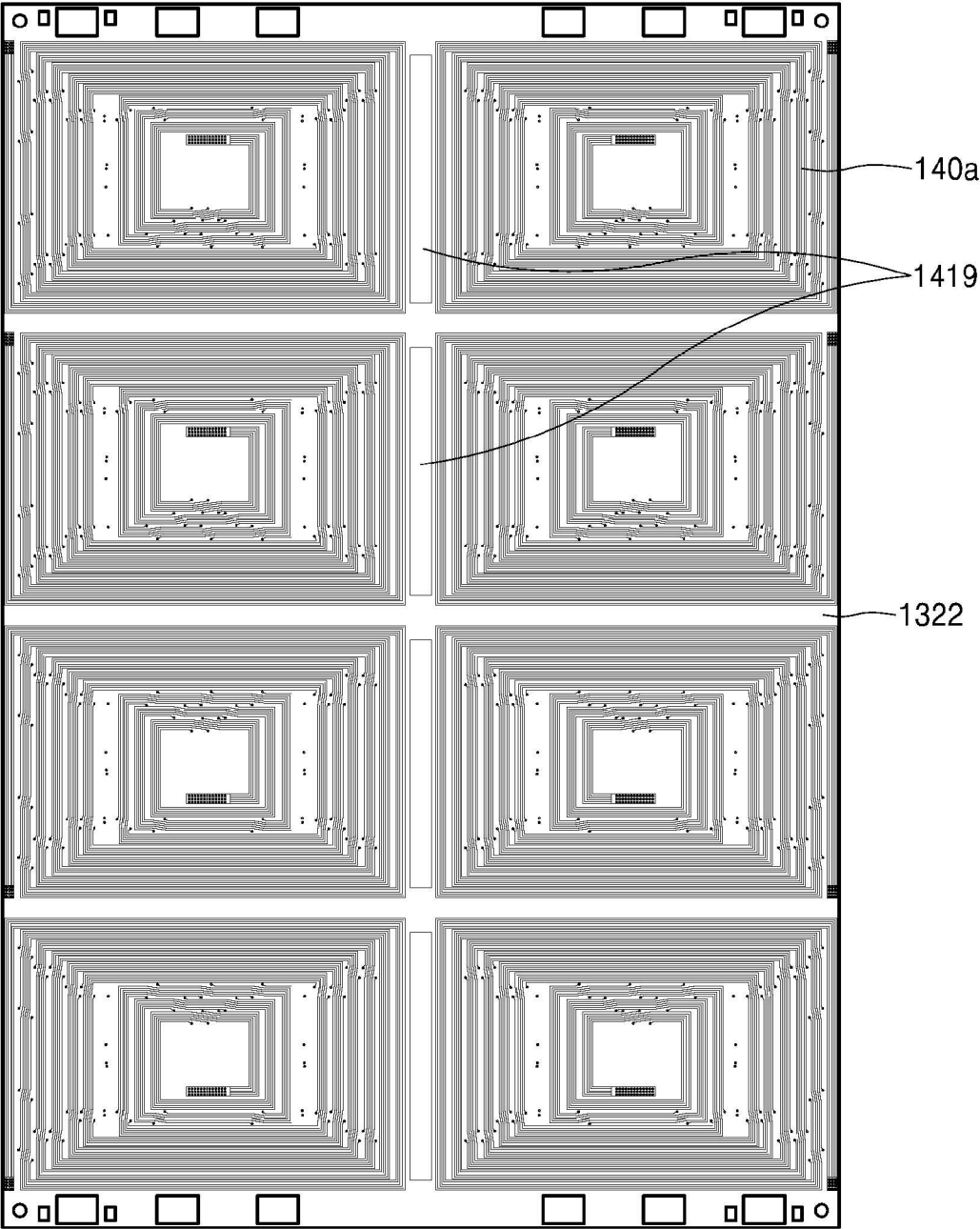


【FIG. 4a】

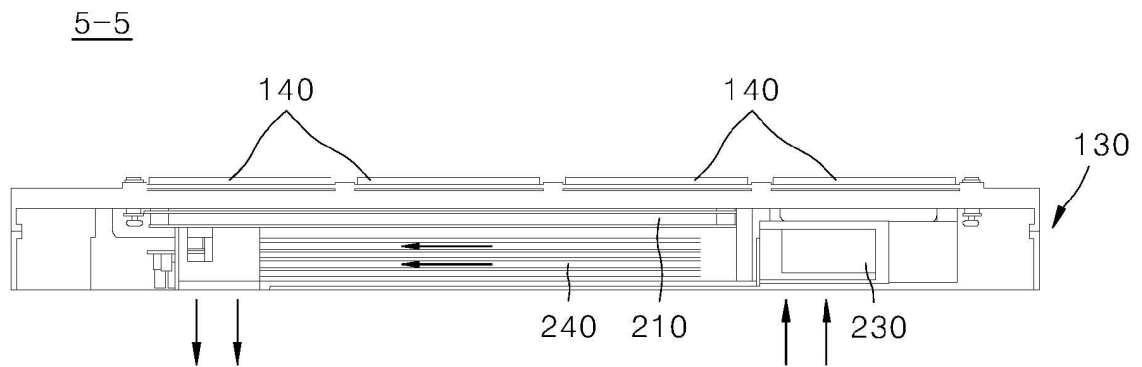


【FIG. 4b】

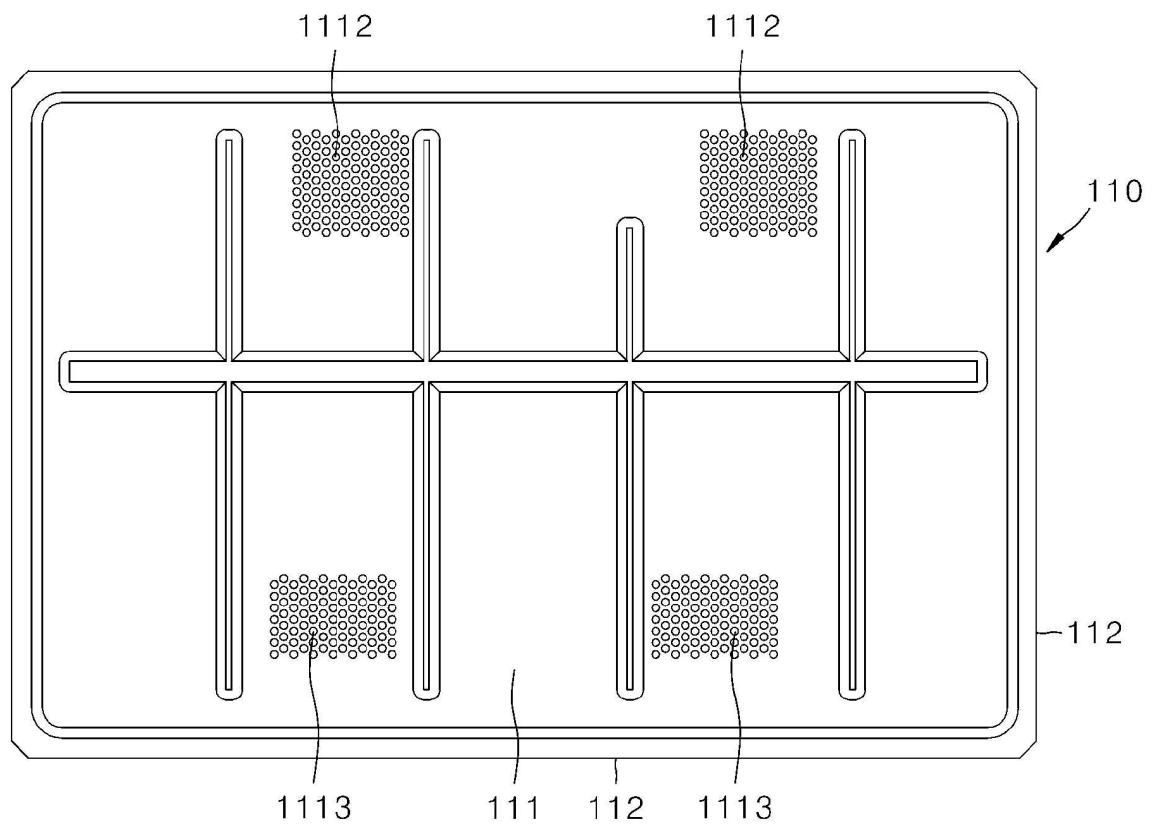
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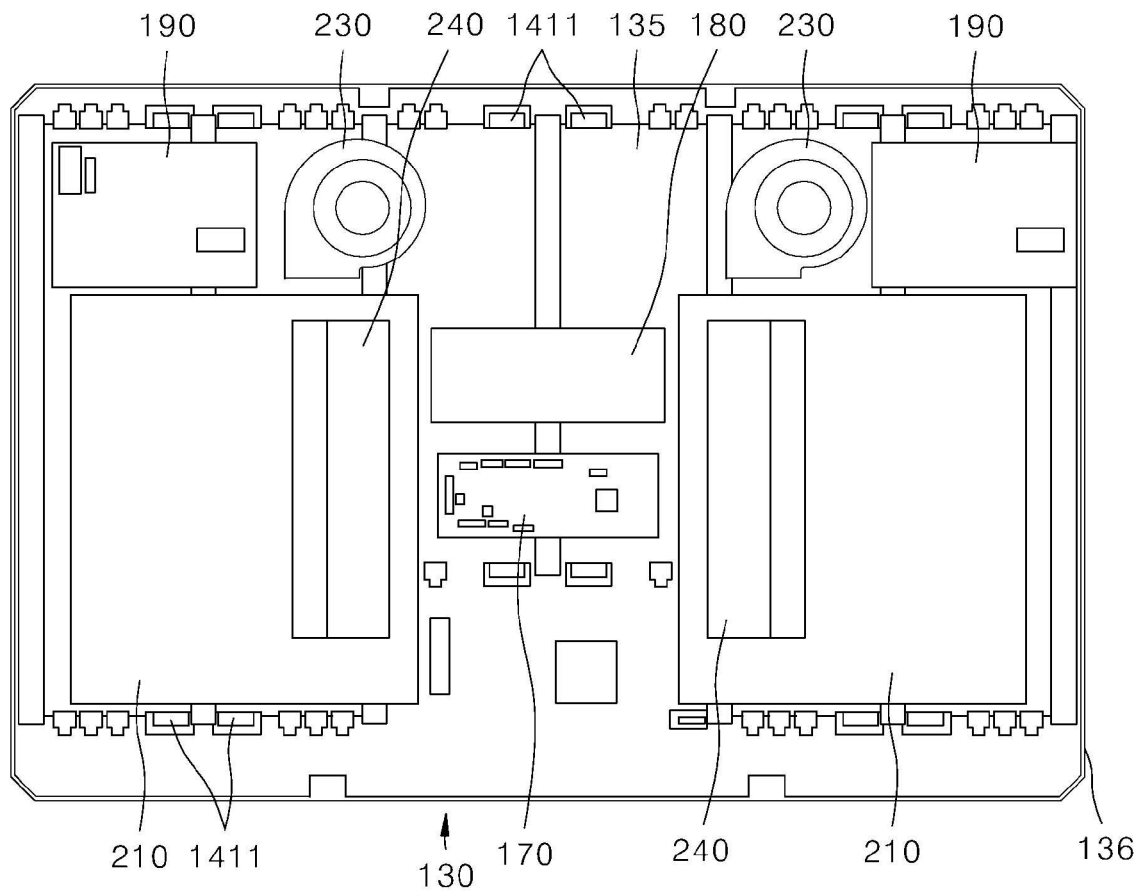
【FIG. 5】



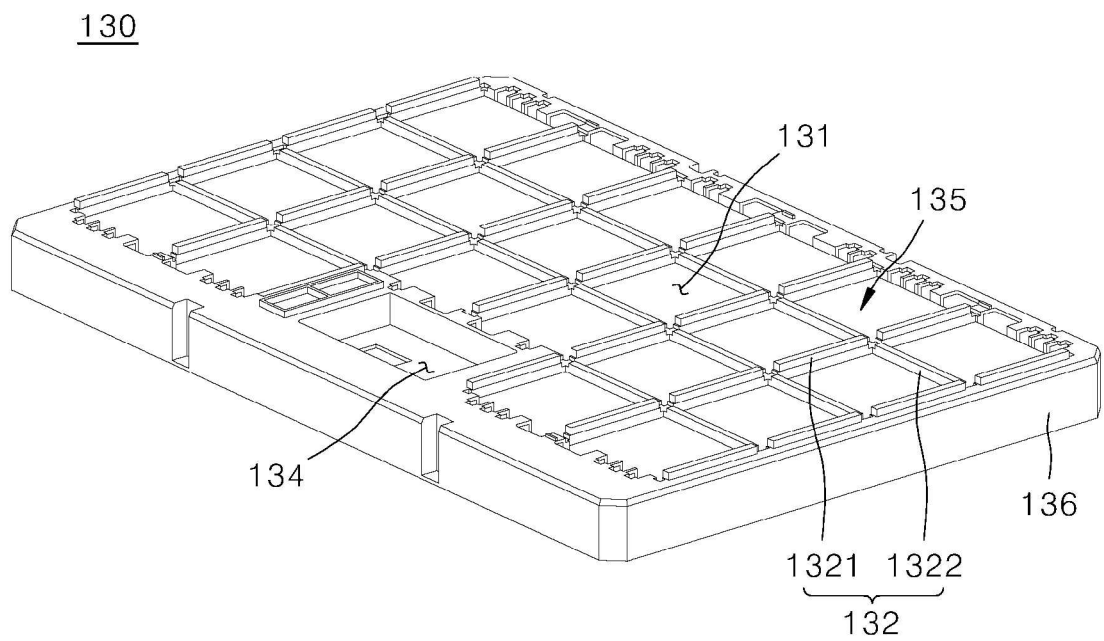
【FIG. 6】



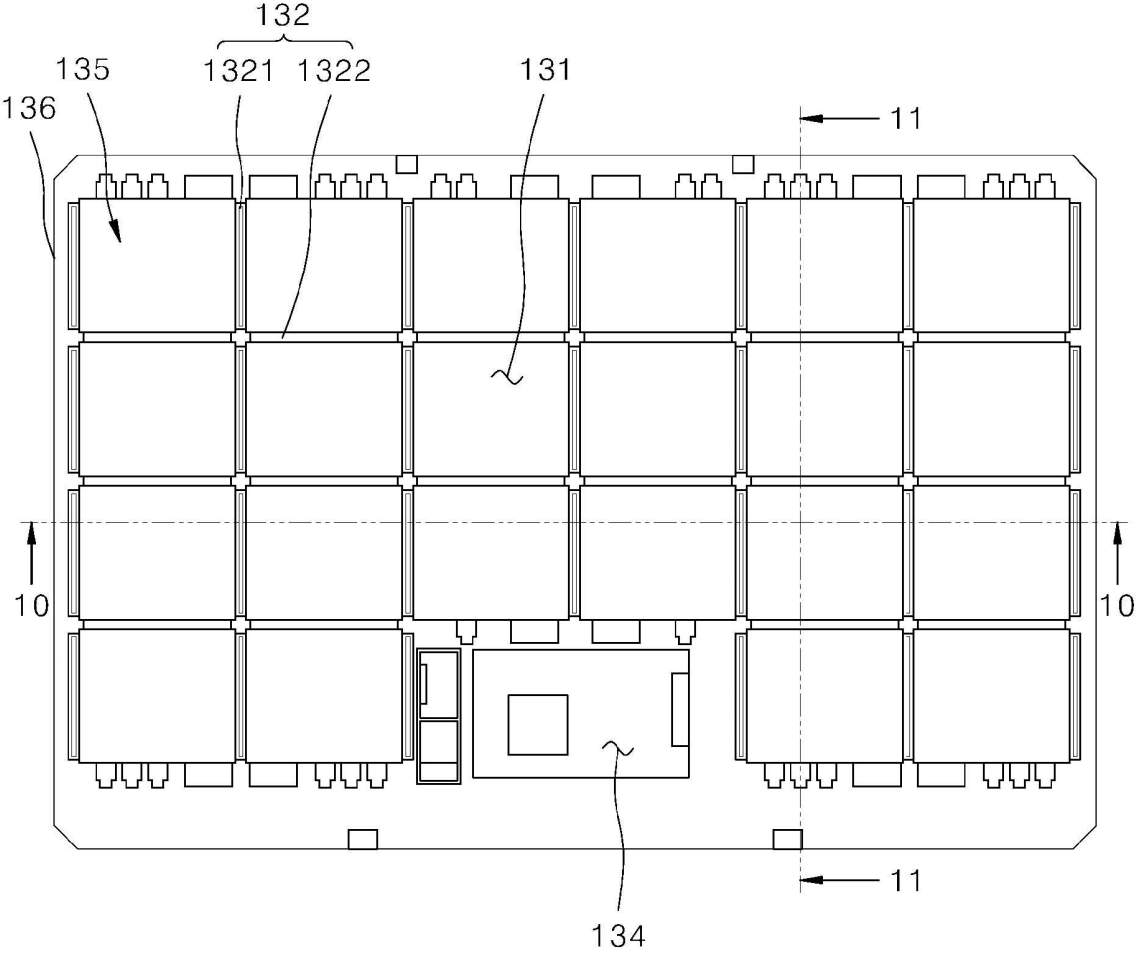
【FIG. 7】



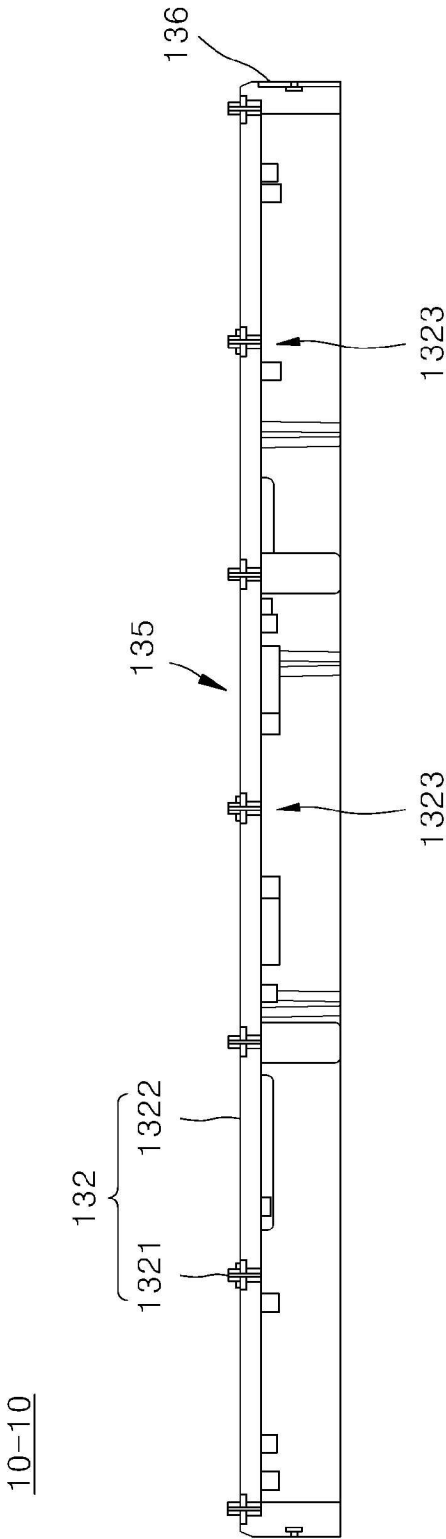
【FIG. 8】



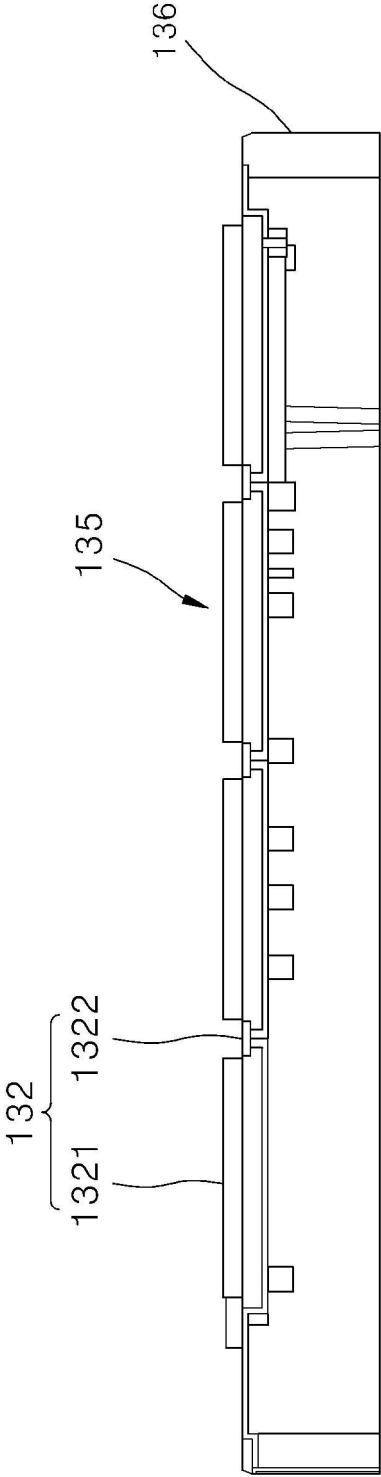
【FIG. 9】



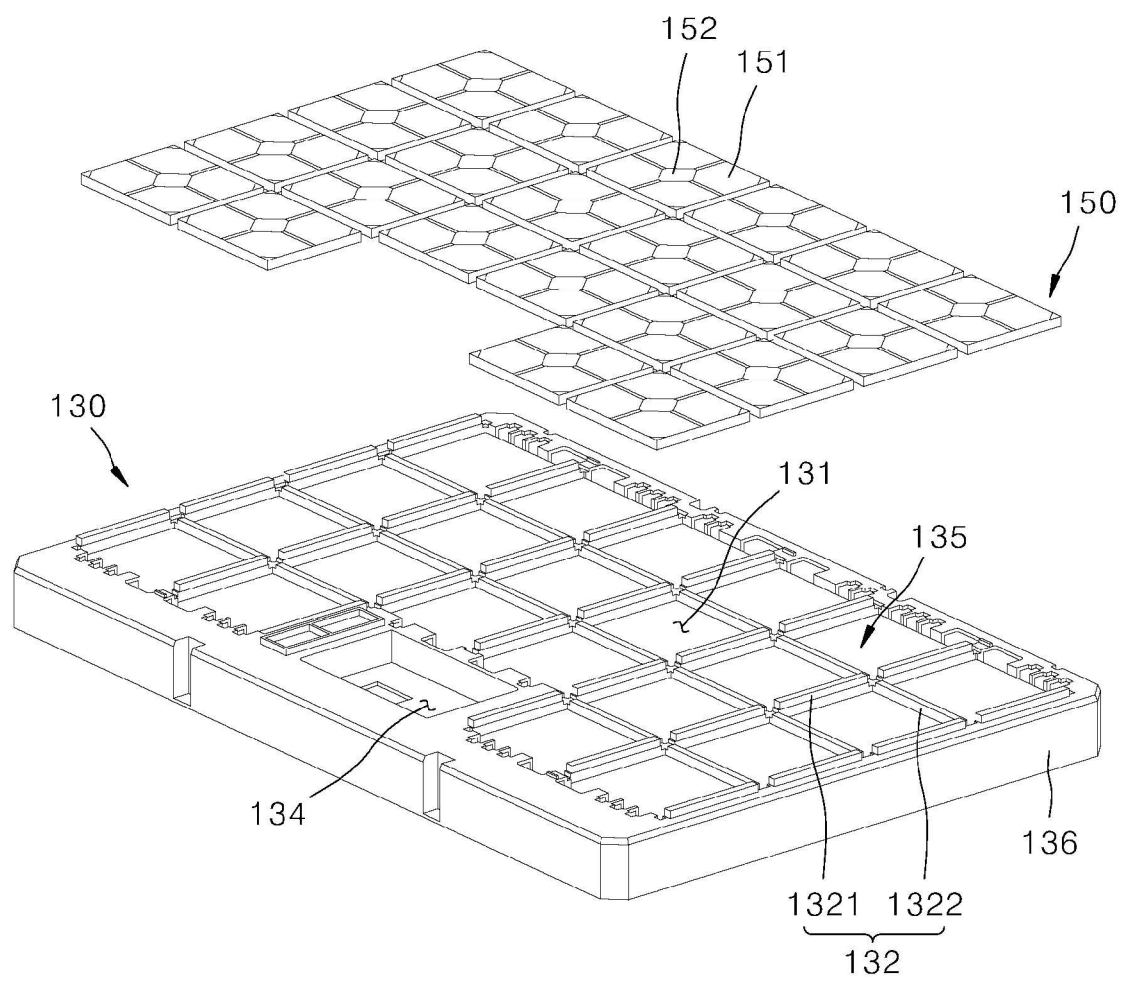
【FIG. 10】



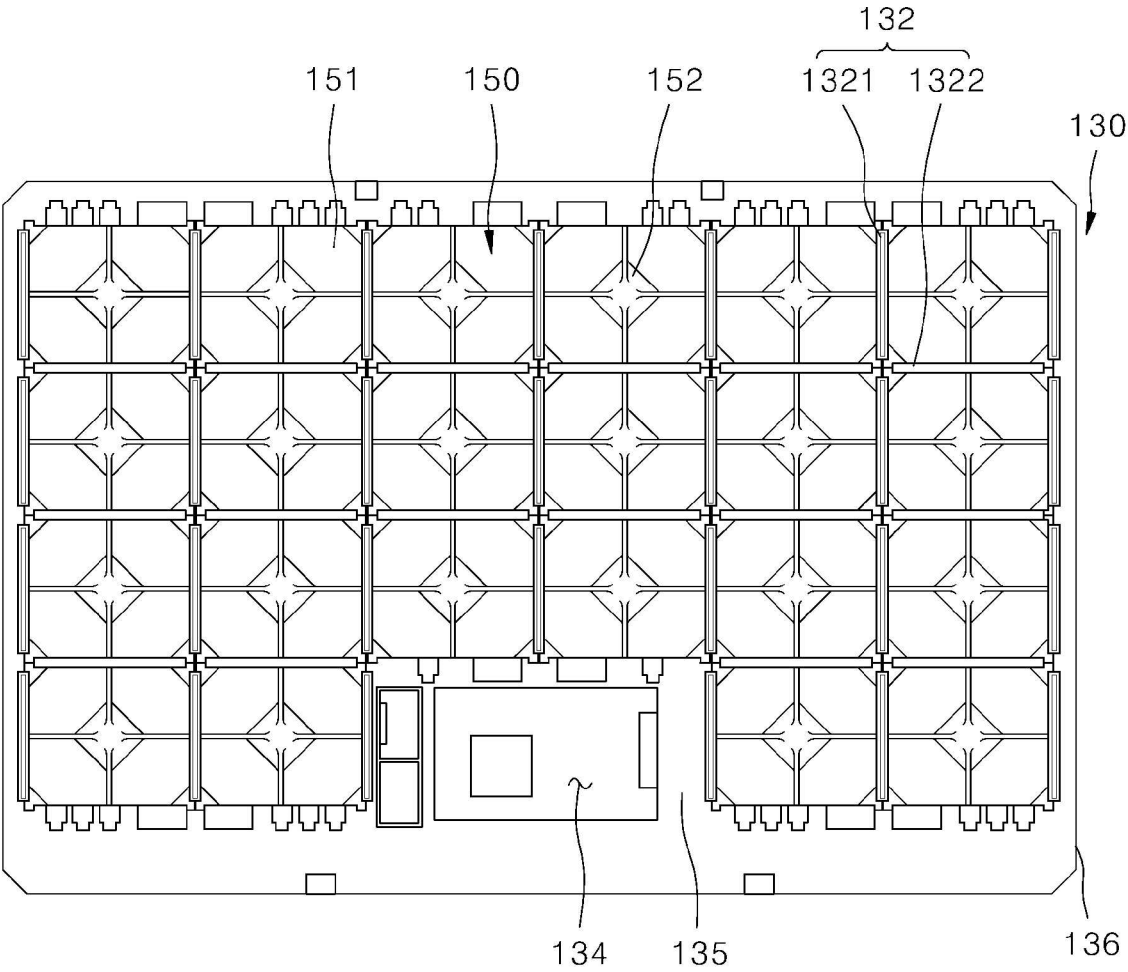
【FIG. 11】



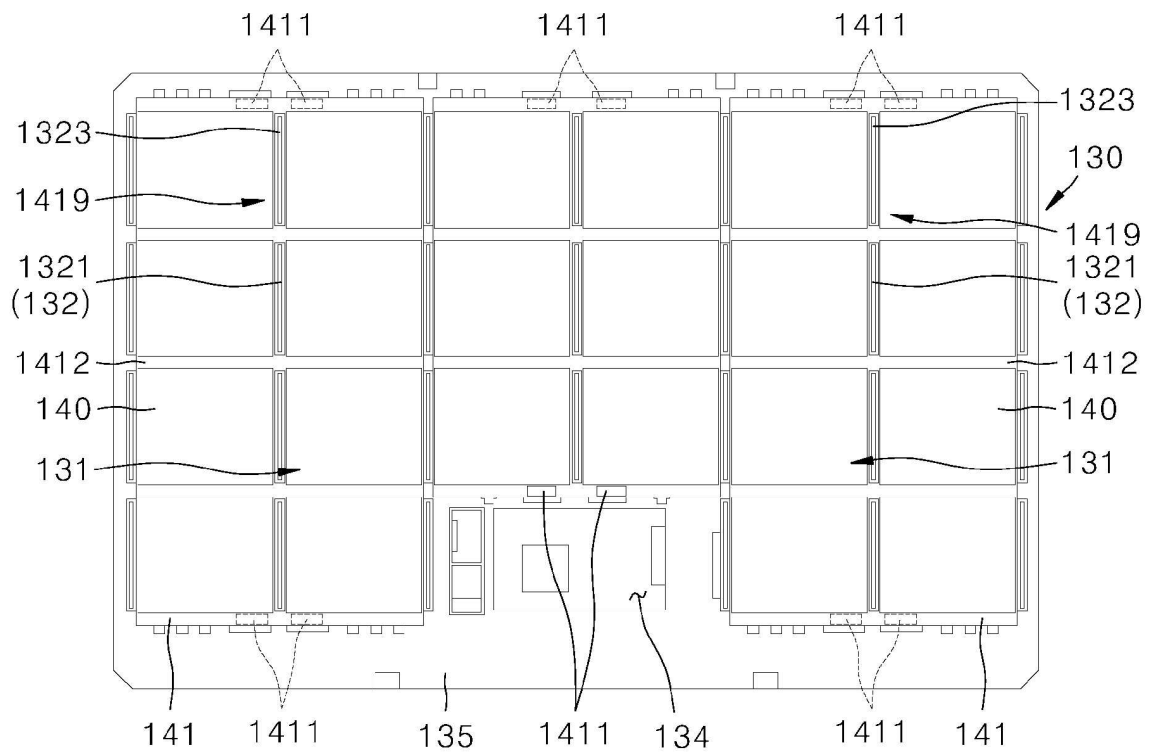
【FIG. 12】



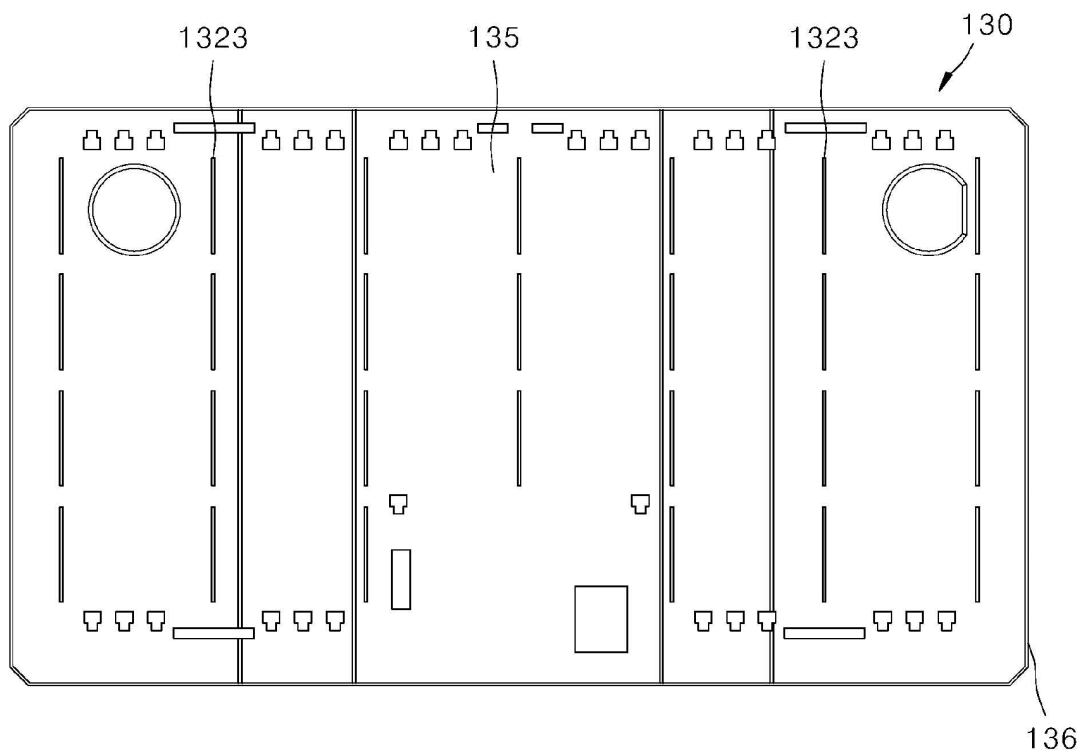
【FIG. 13】



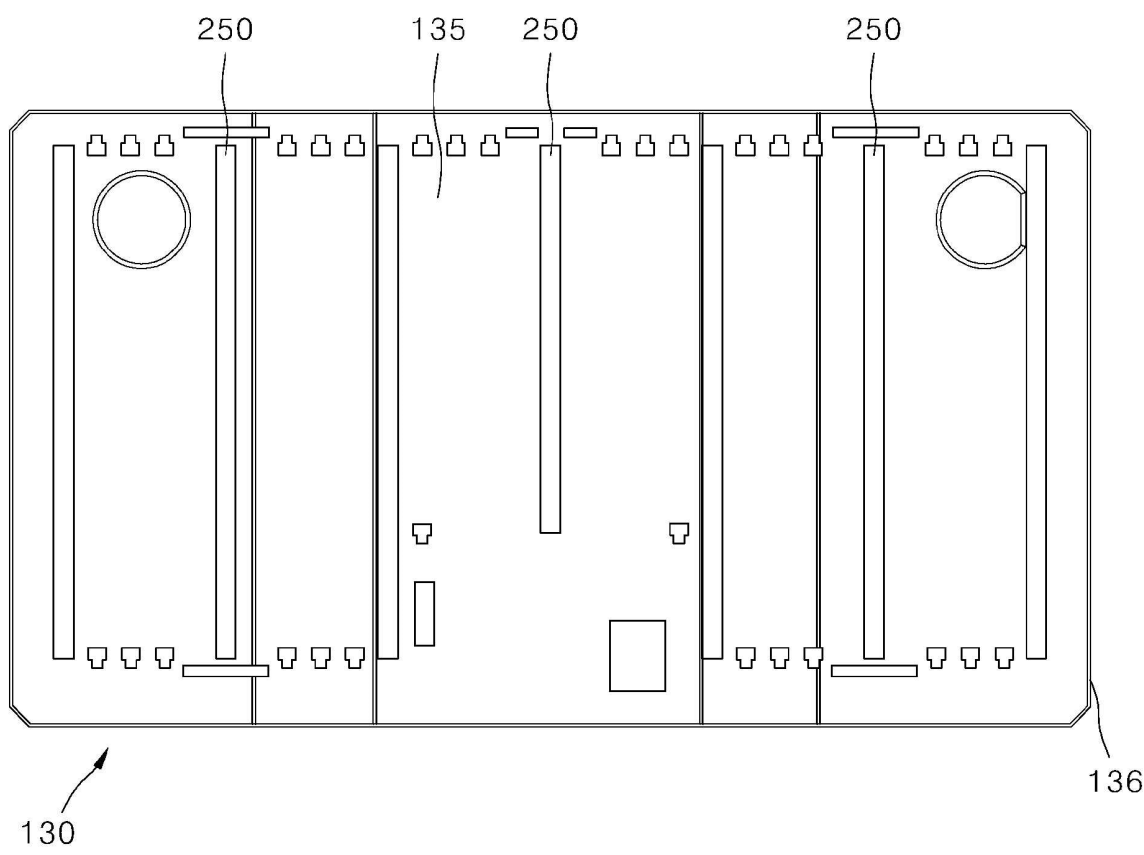
【FIG. 14】



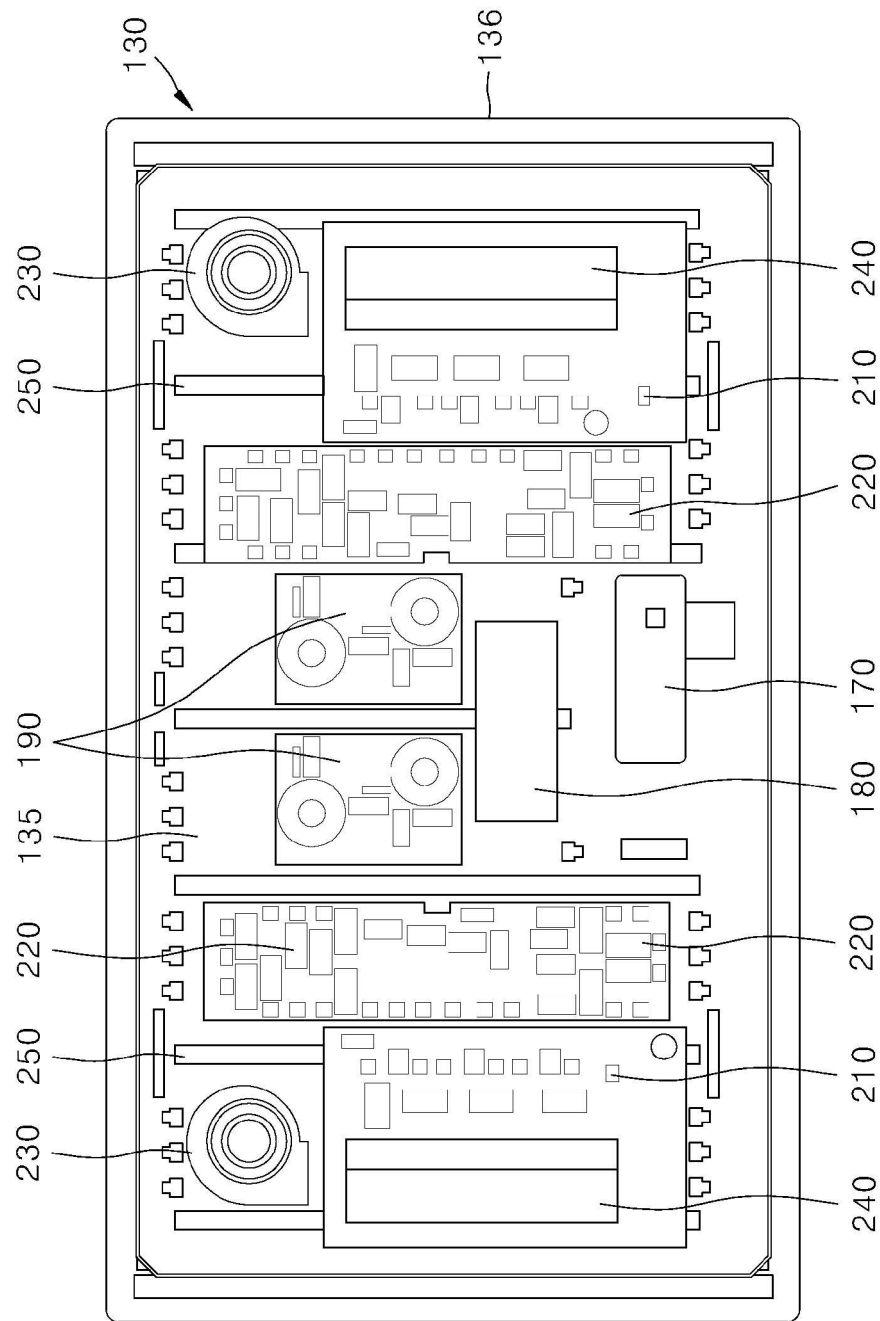
【FIG. 15】



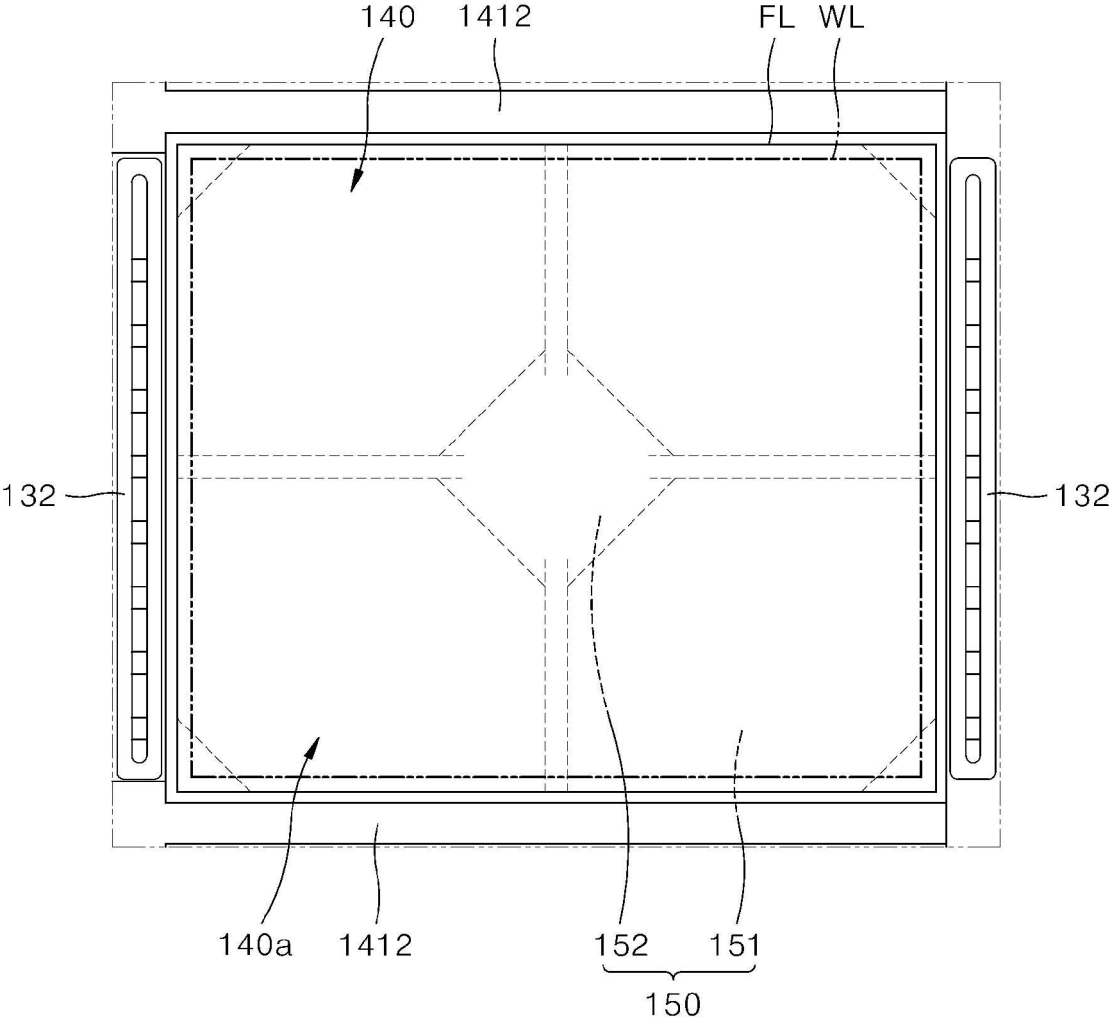
【FIG. 16】



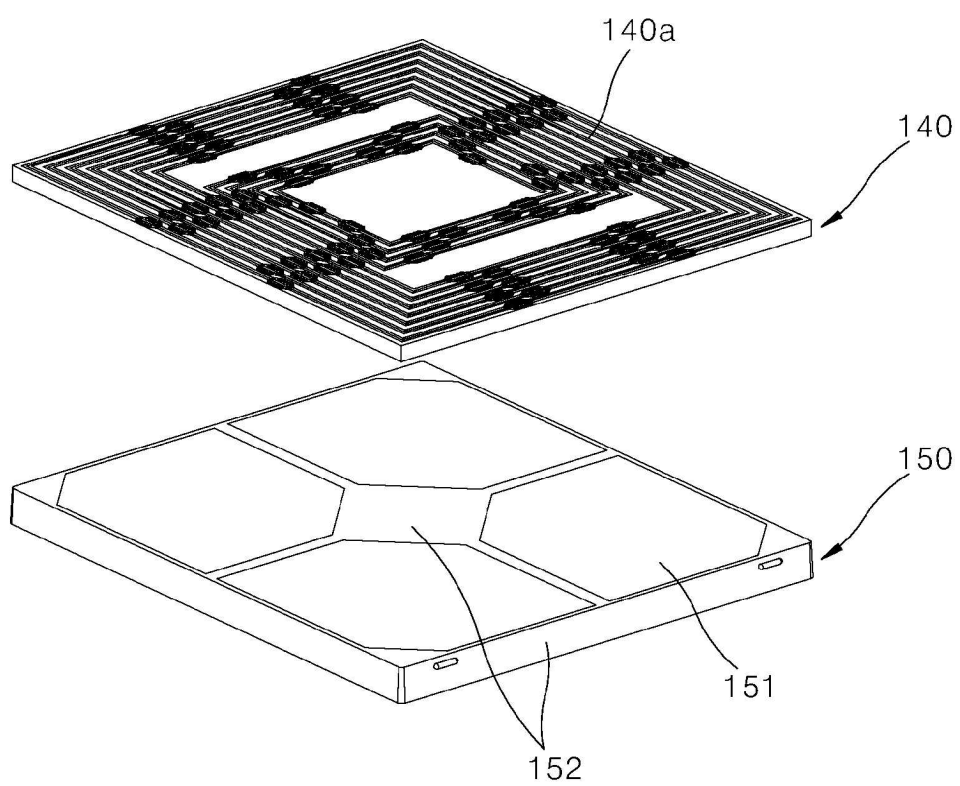
【FIG. 17】



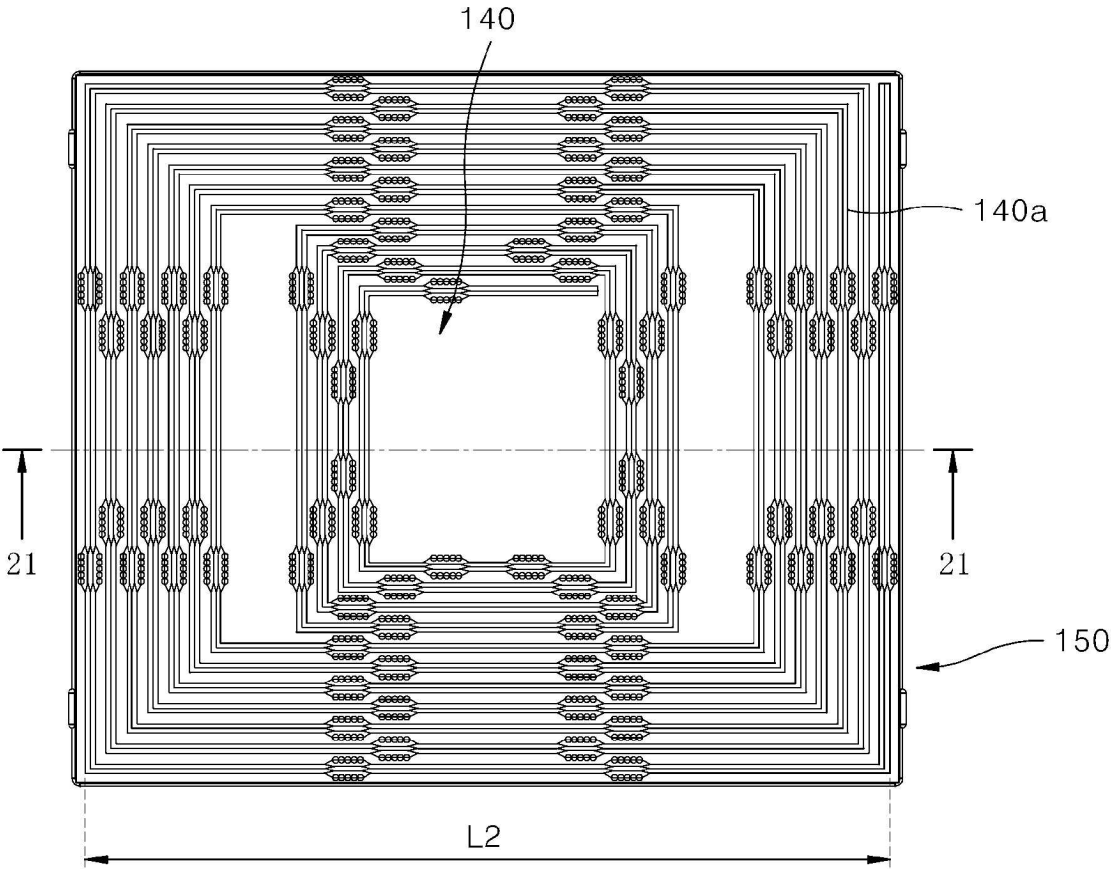
【FIG. 18】



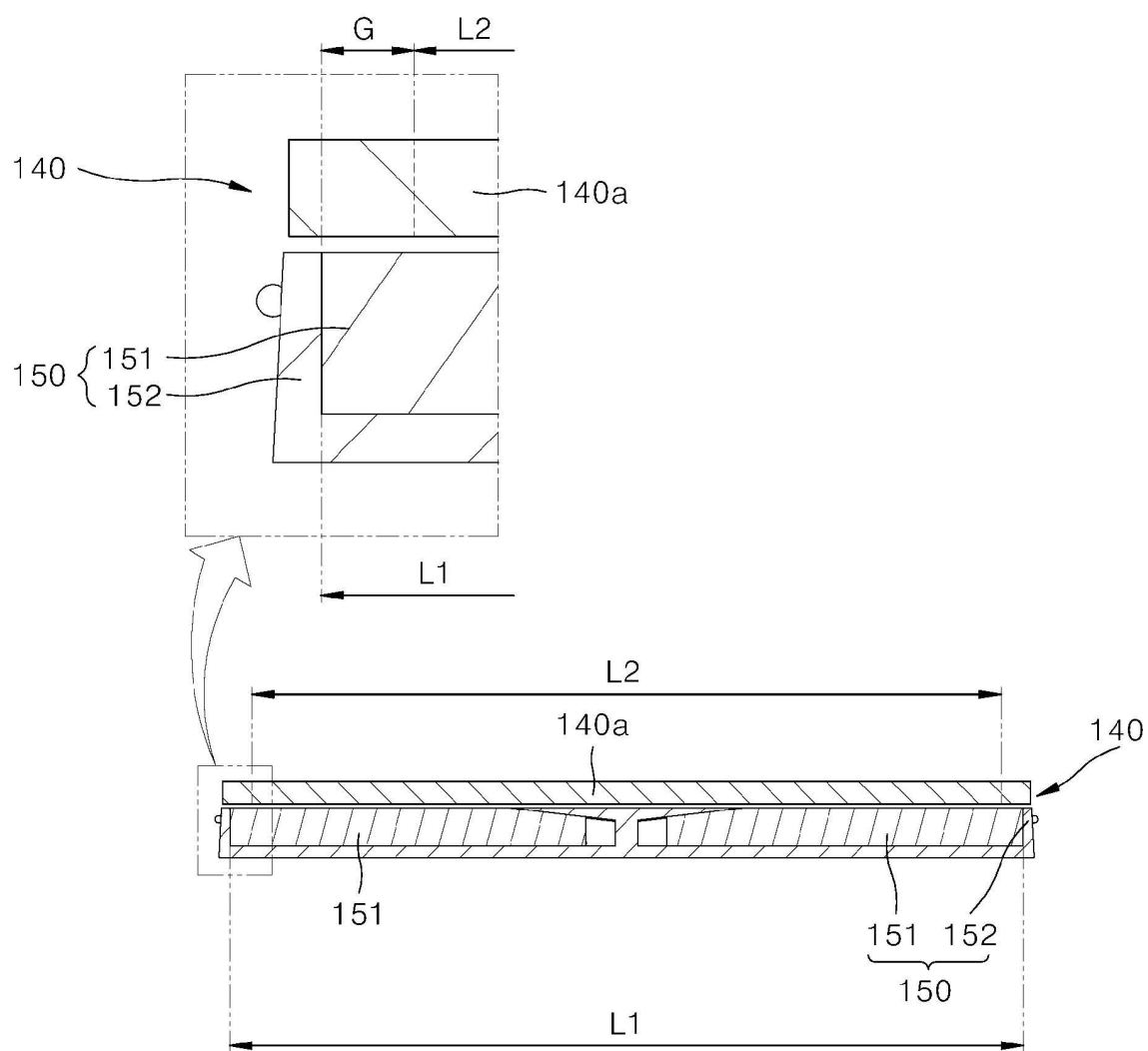
【FIG. 19】



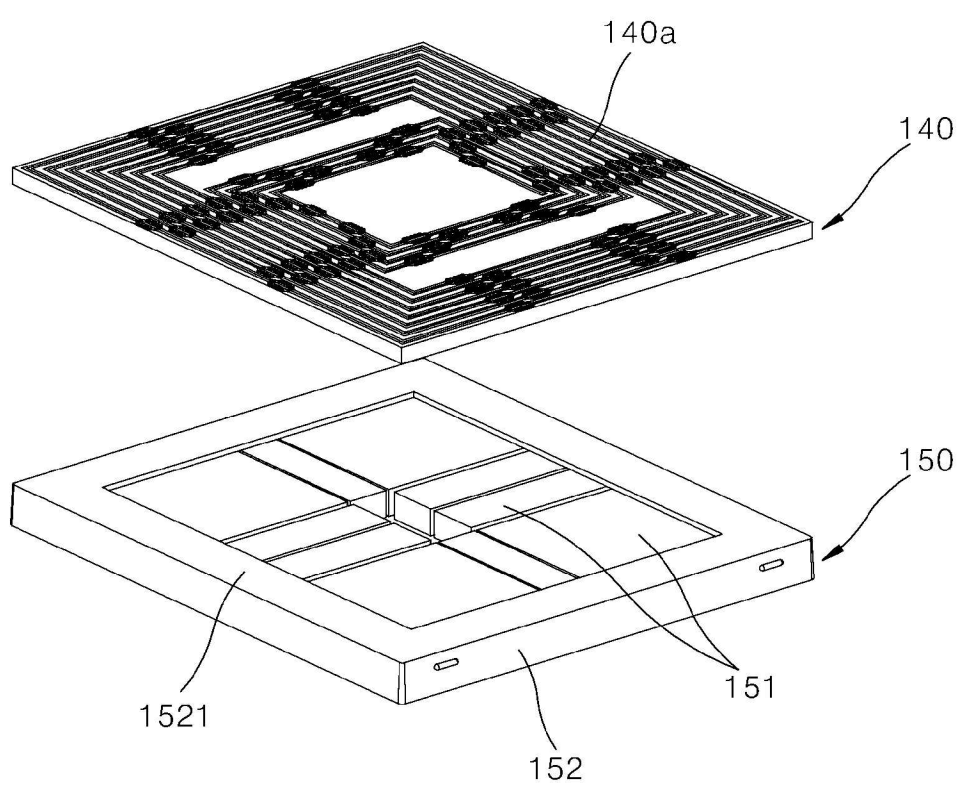
【FIG. 20】



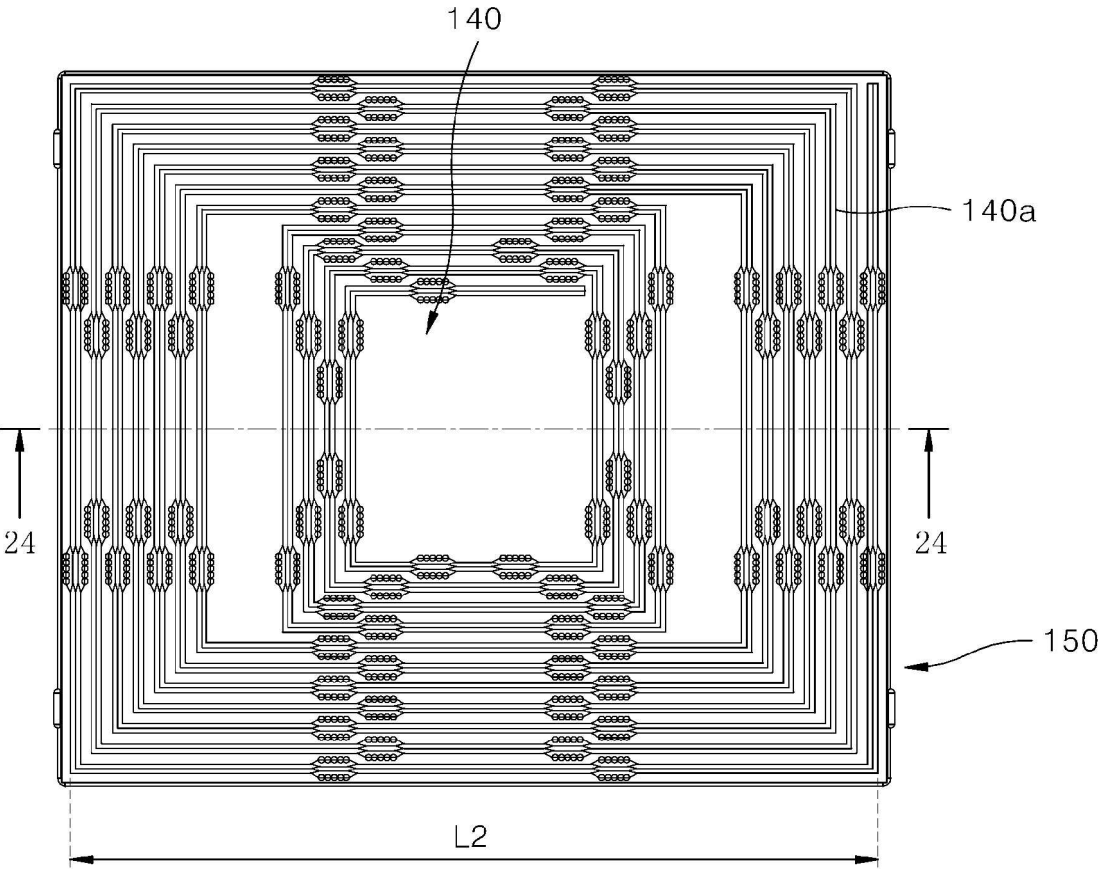
【FIG. 21】



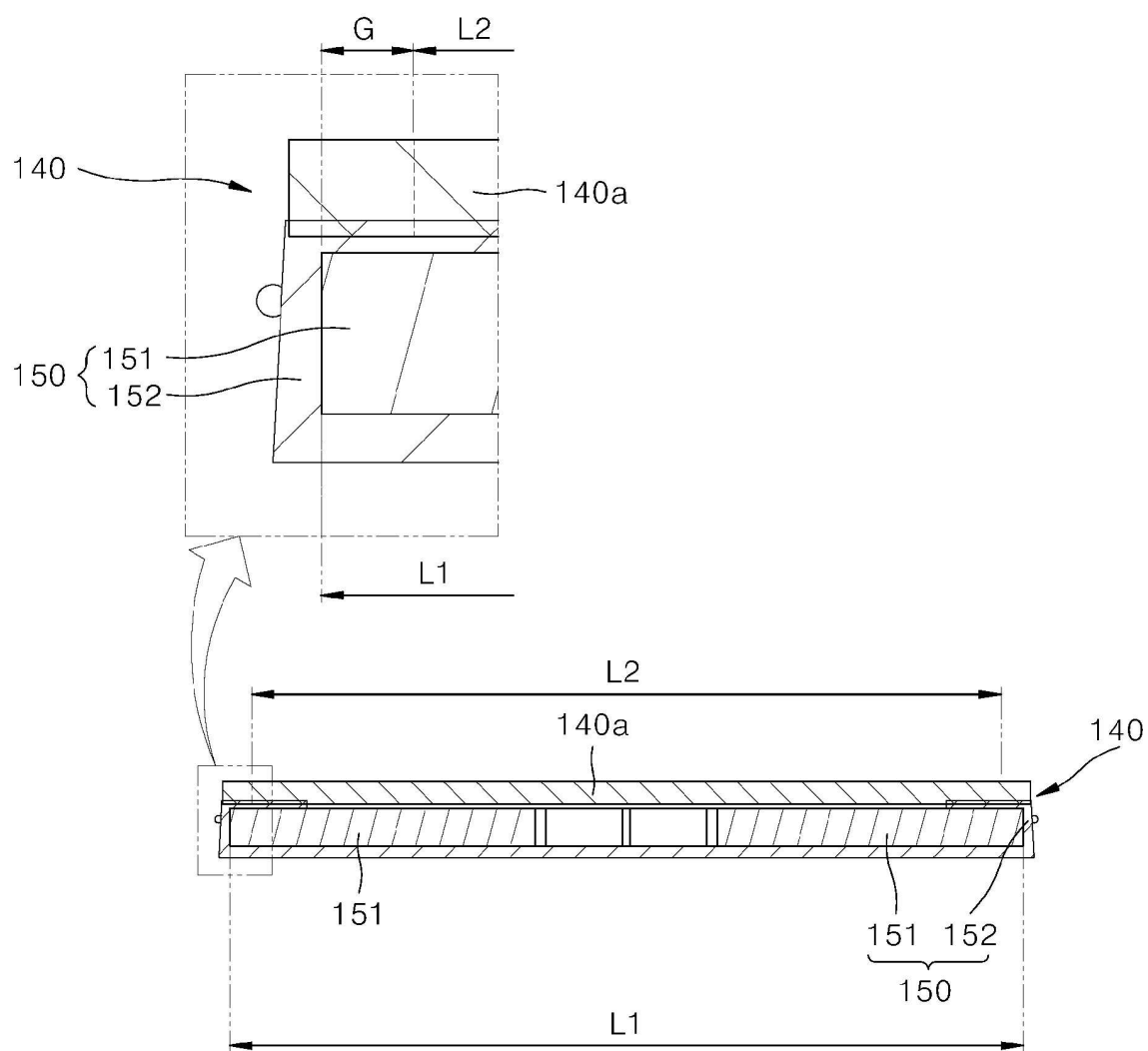
【FIG. 22】



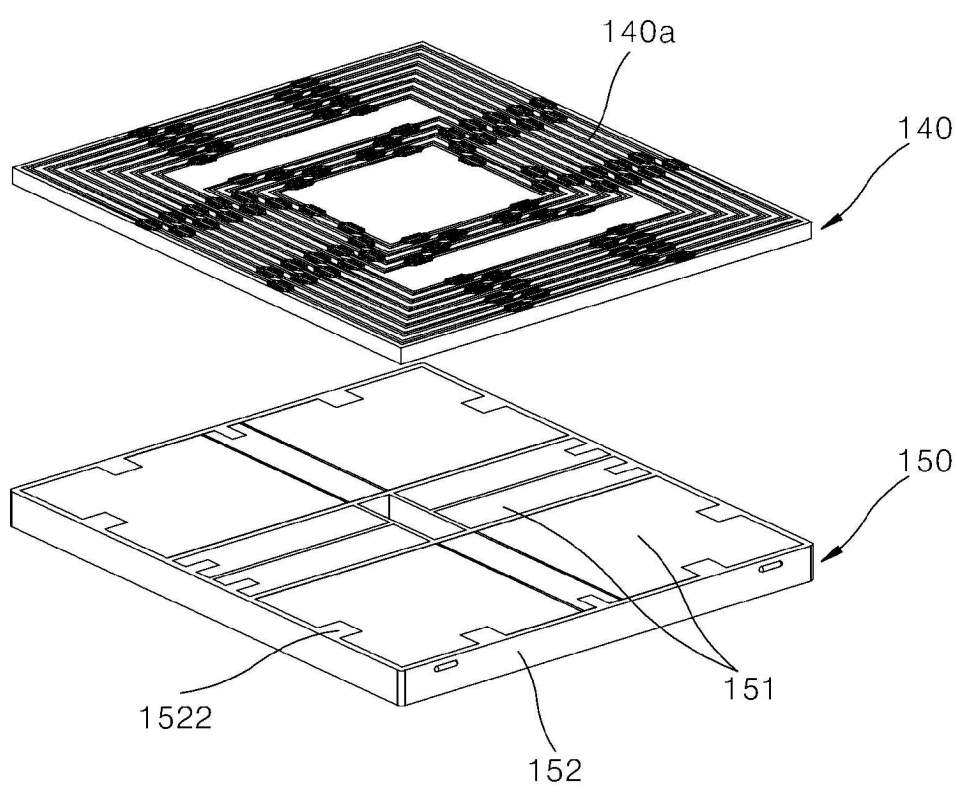
【FIG. 23】



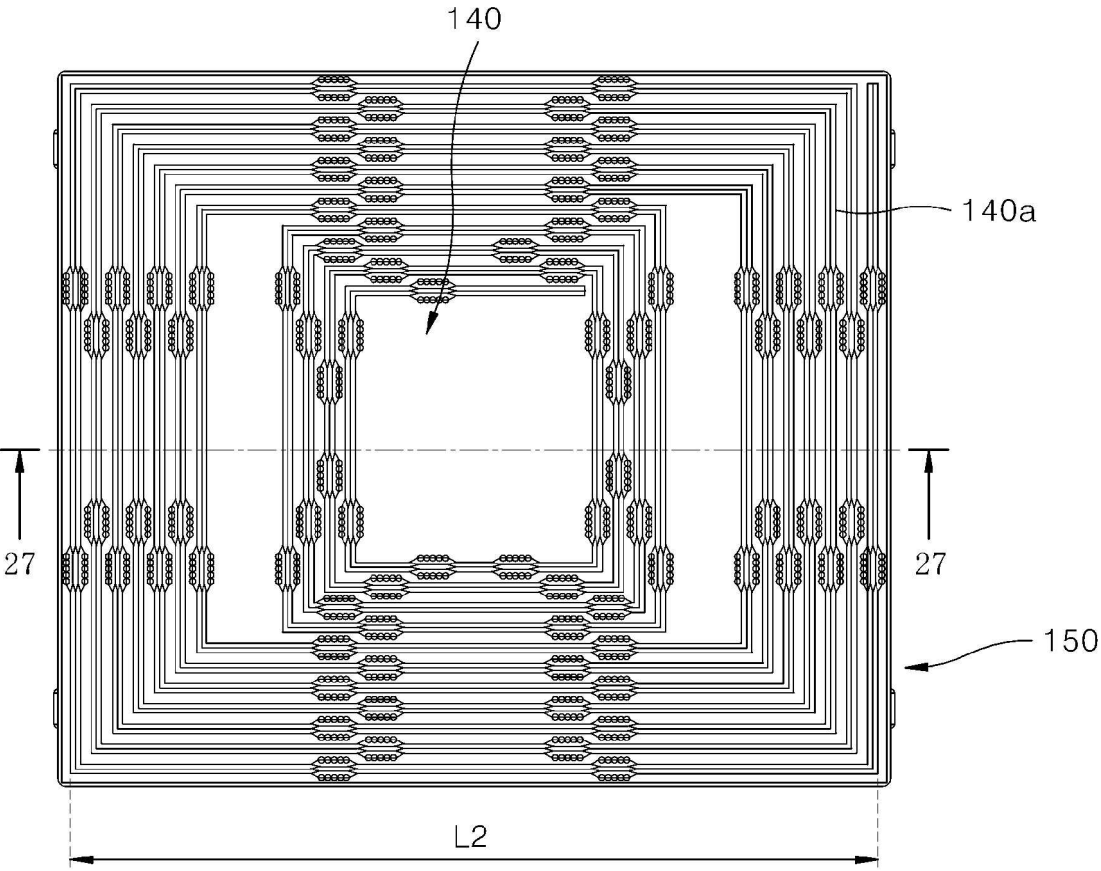
【FIG. 24】



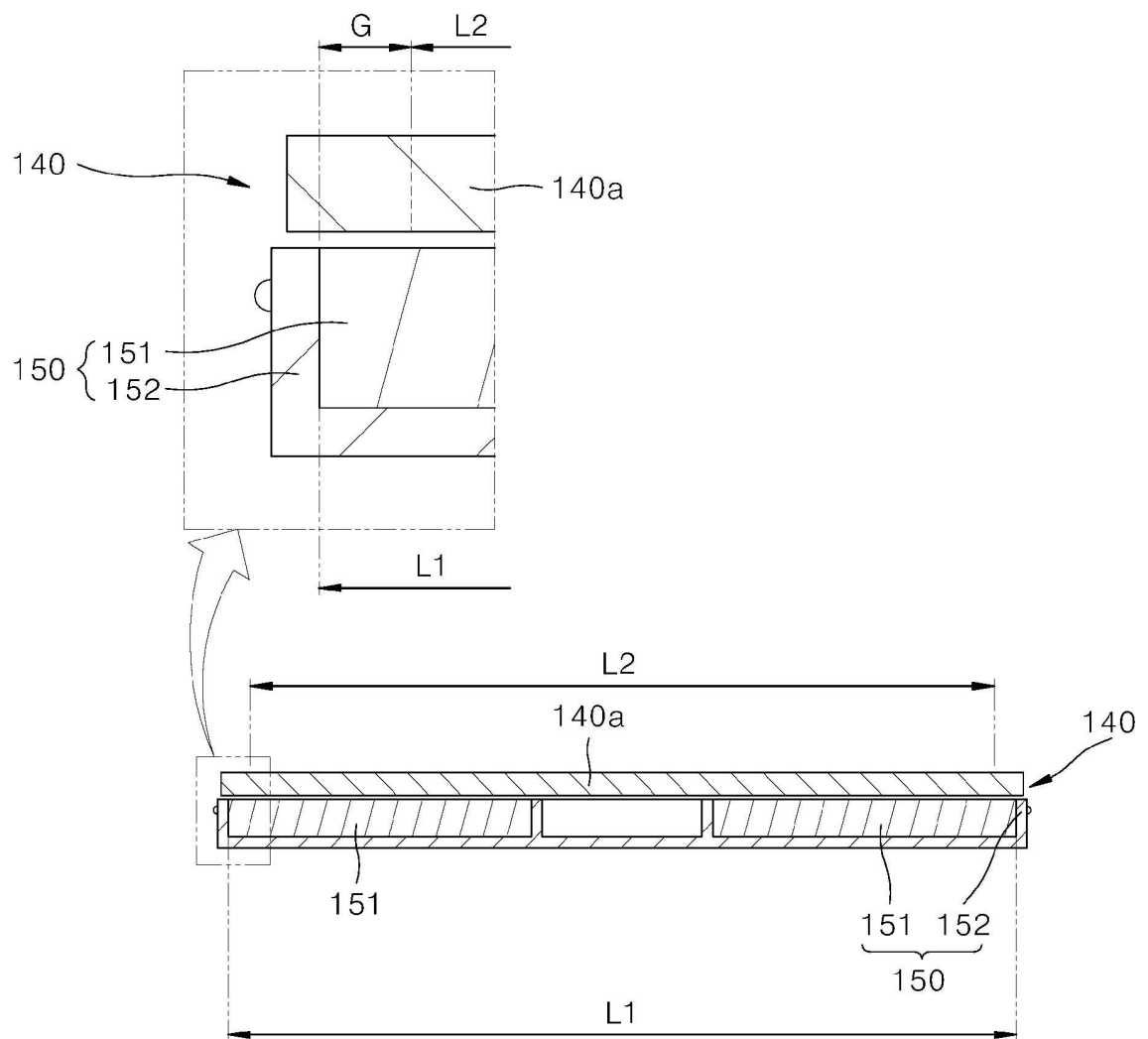
【FIG. 25】



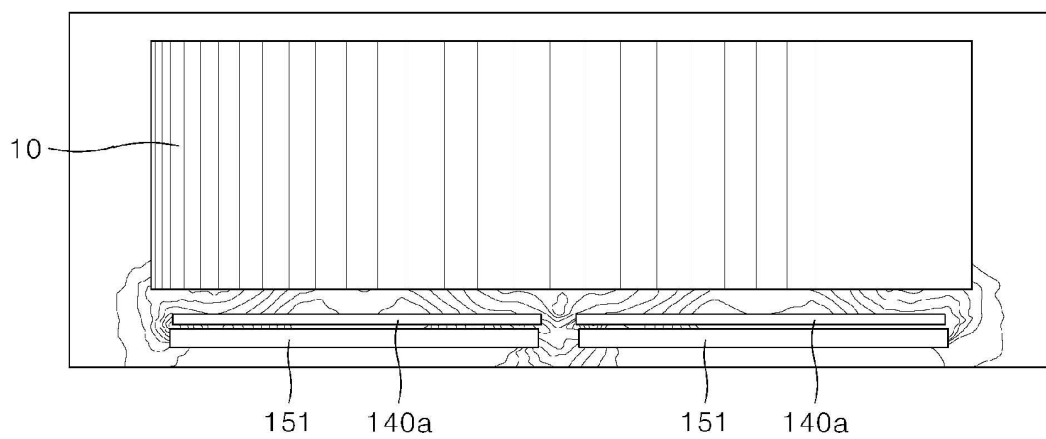
【FIG. 26】



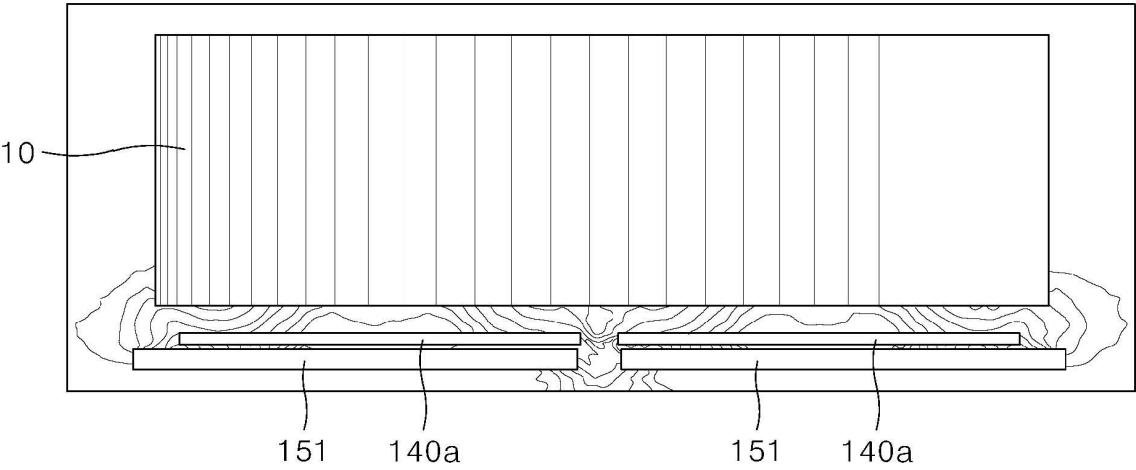
【FIG. 27】



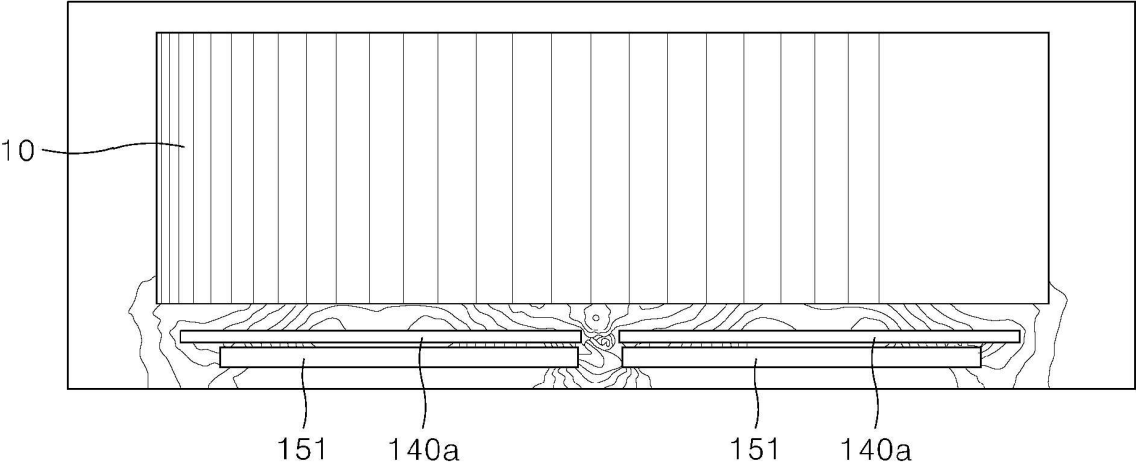
【FIG. 28】



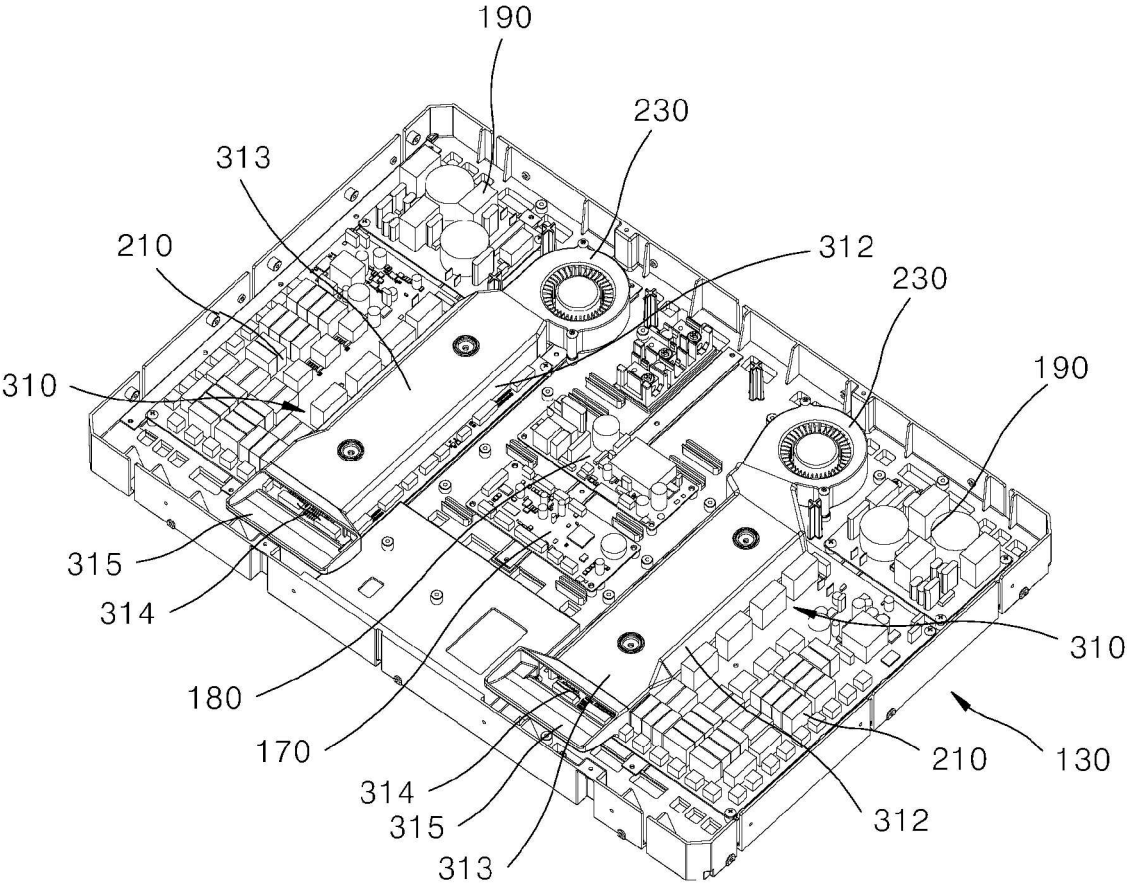
【FIG. 29】



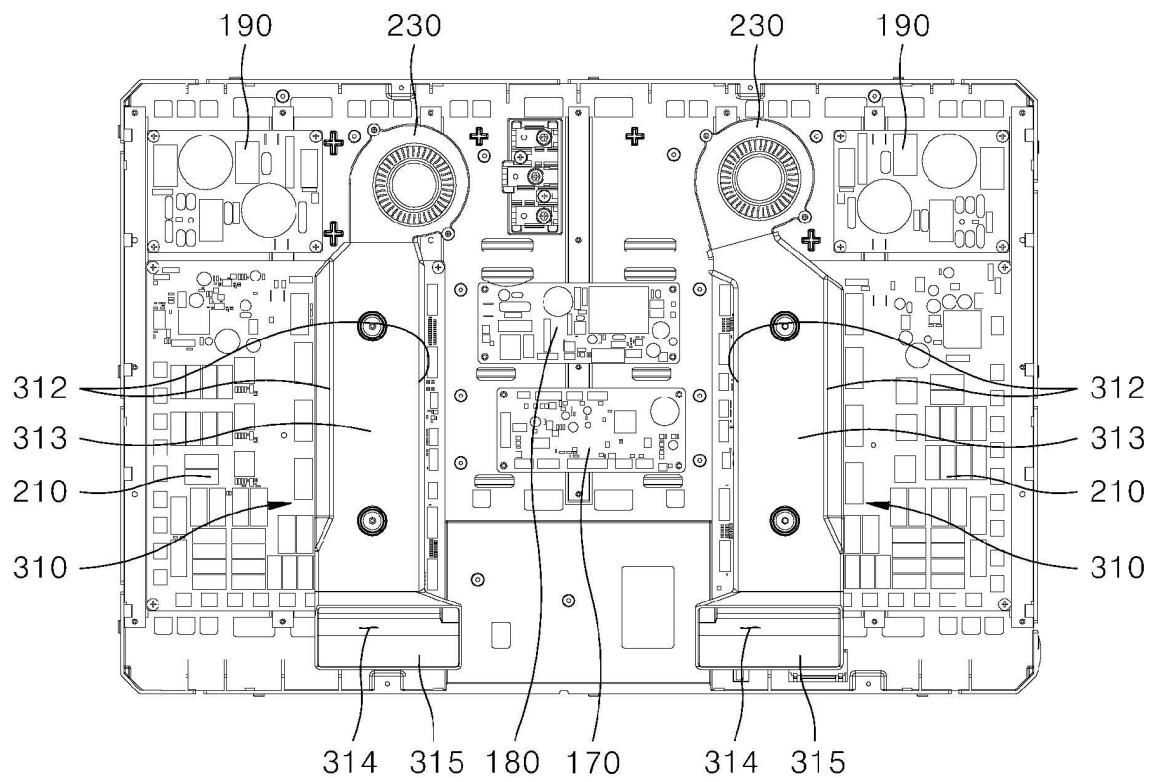
【FIG. 30】



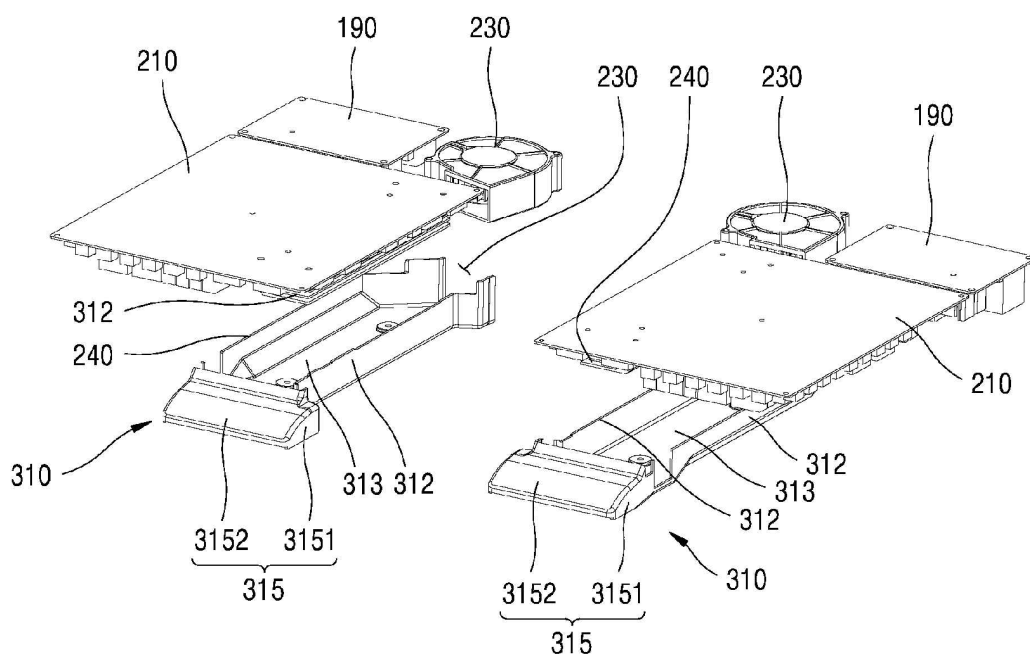
【FIG. 31】



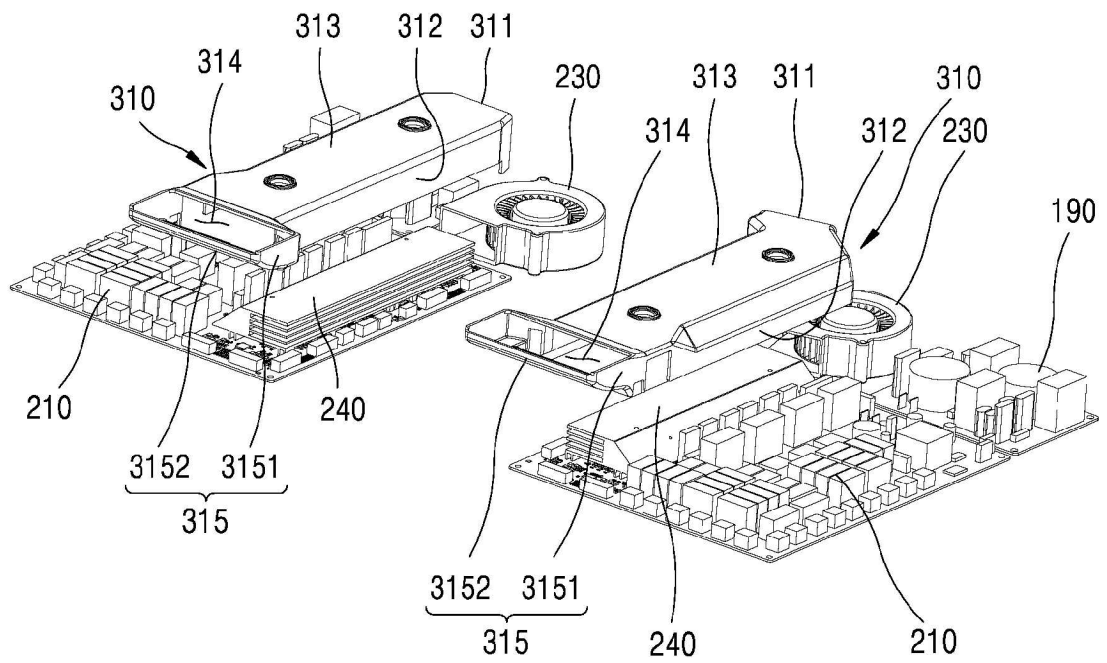
【FIG. 32】



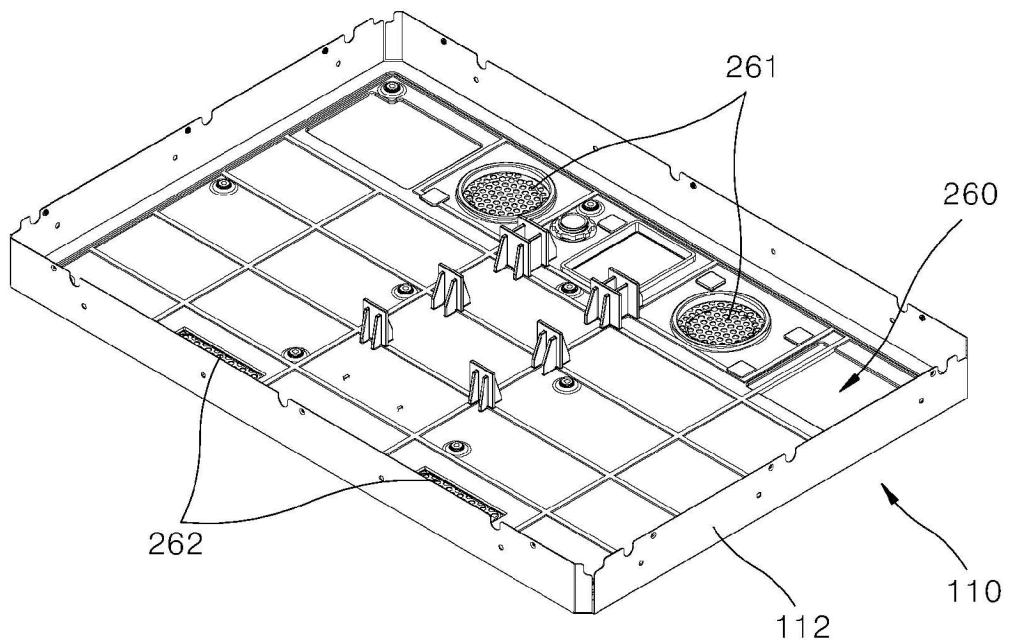
【FIG. 33】



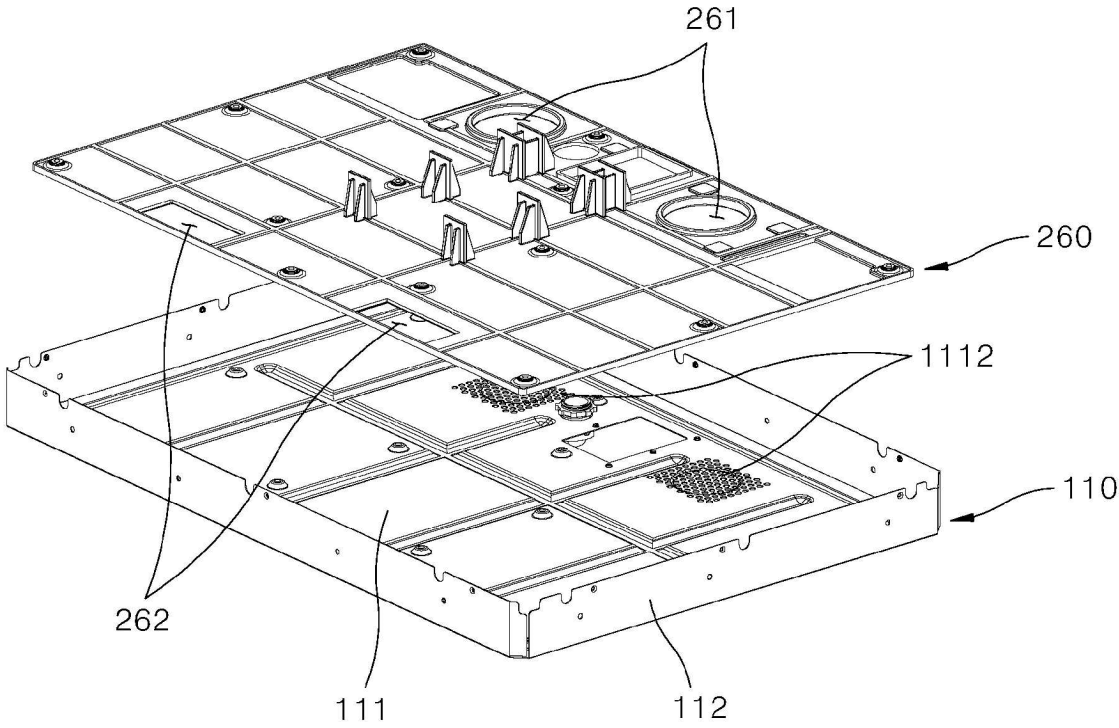
【FIG. 34】



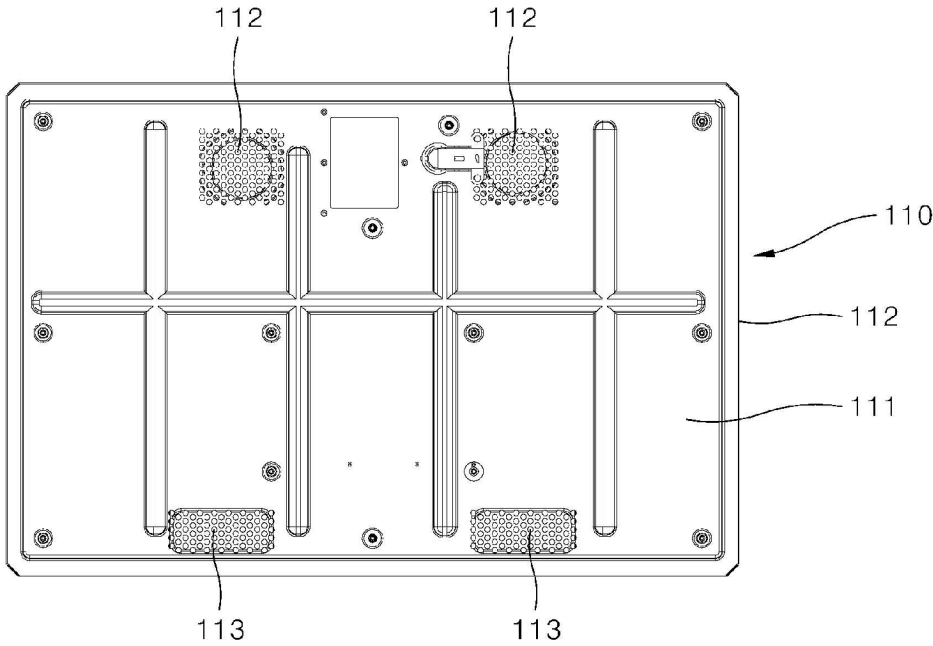
【FIG. 35】



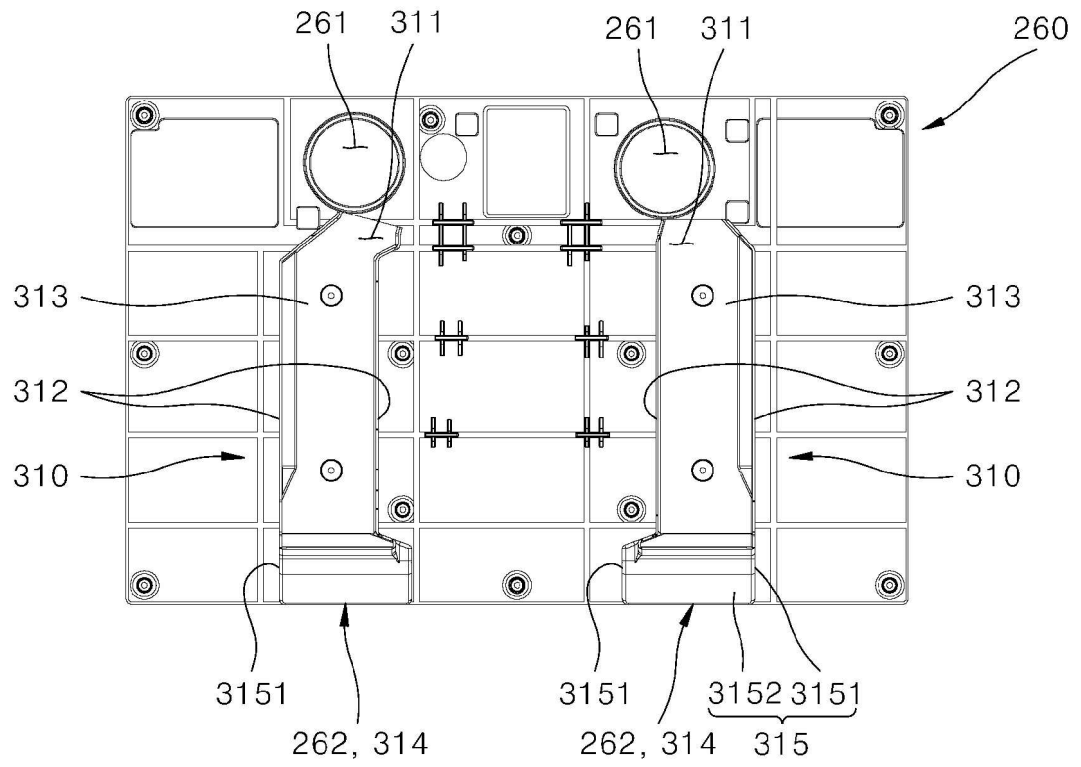
【FIG. 36】



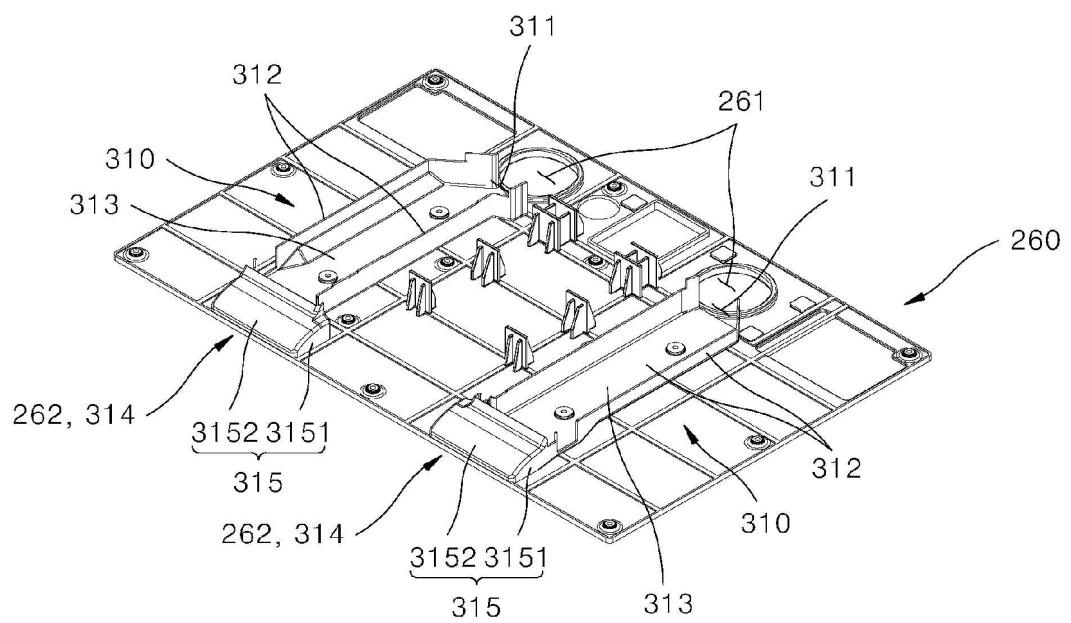
【FIG. 37】



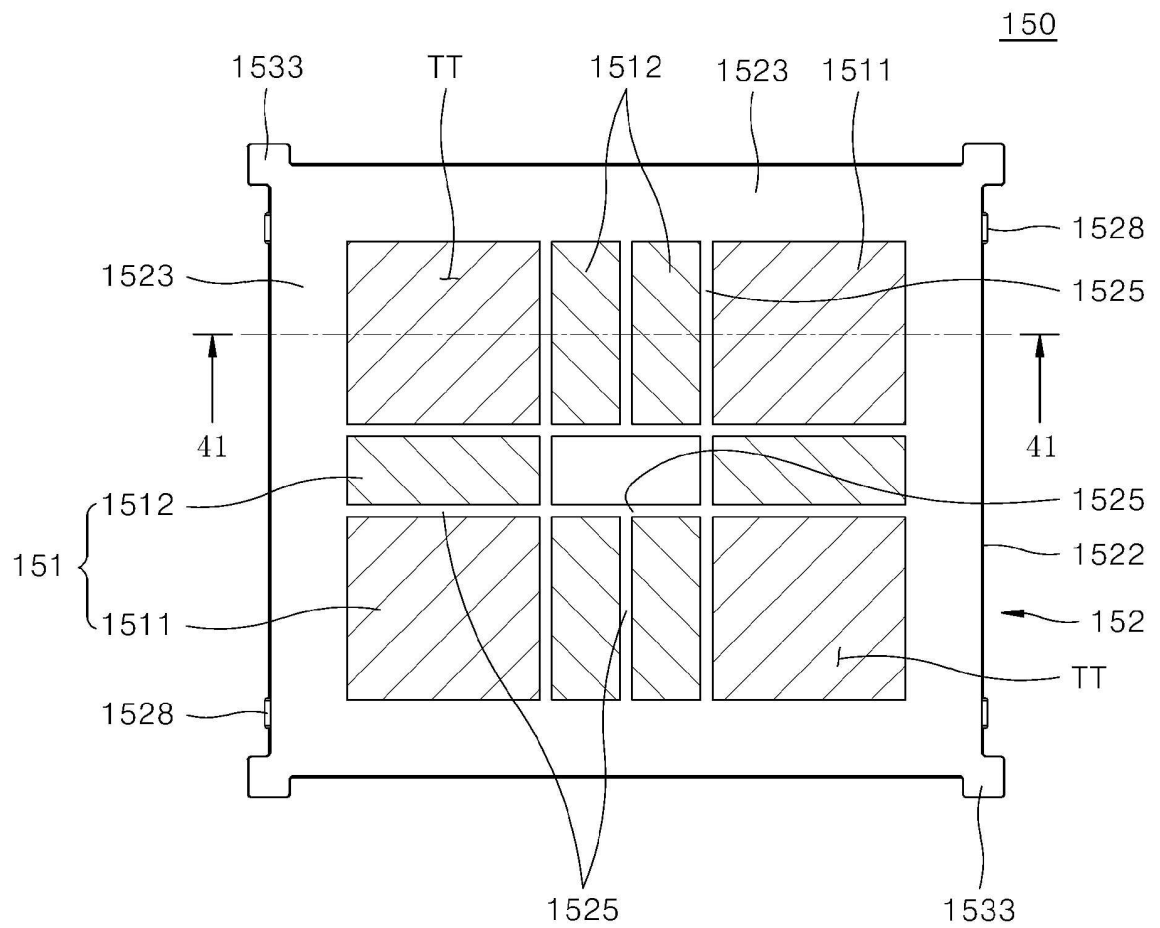
【FIG. 38】



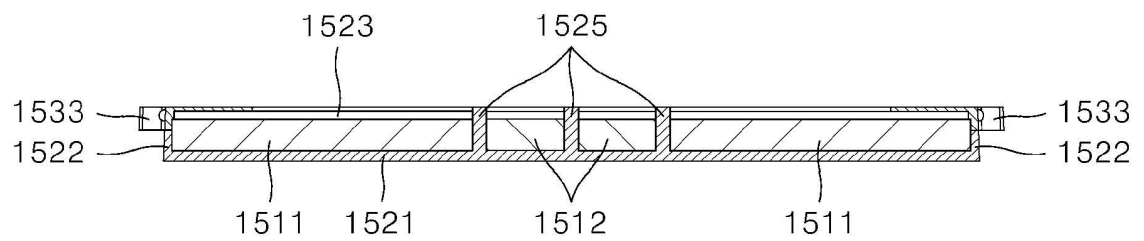
【FIG. 39】



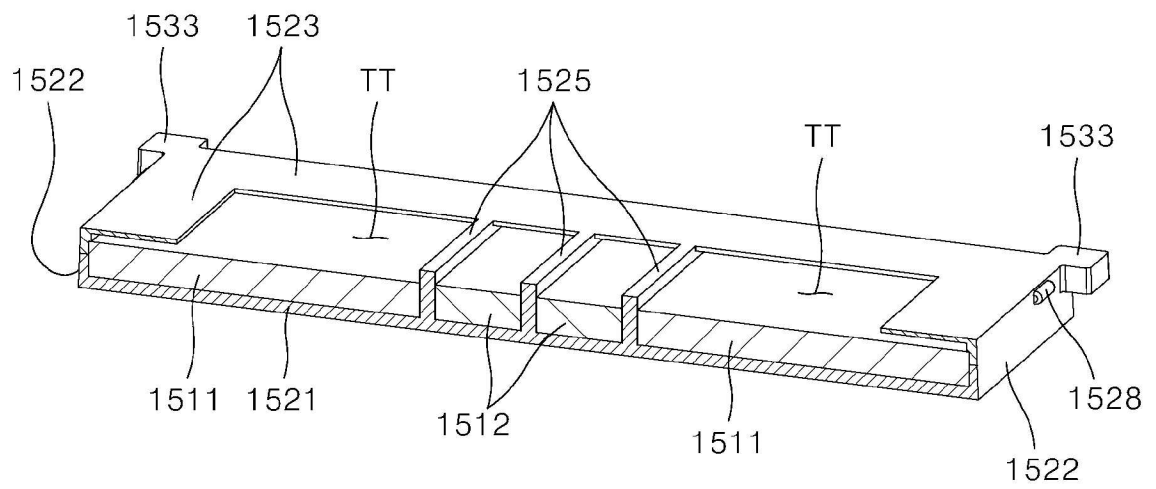
【FIG. 40】



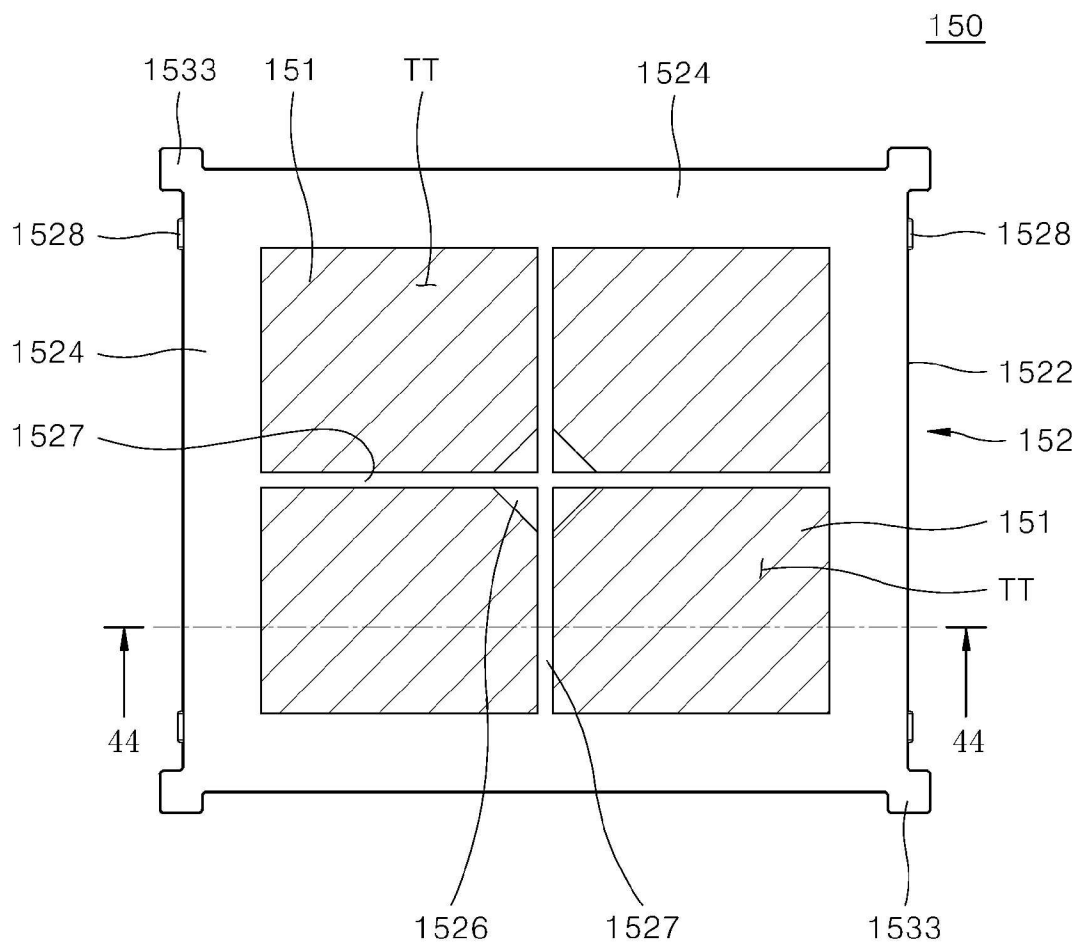
【FIG. 41】



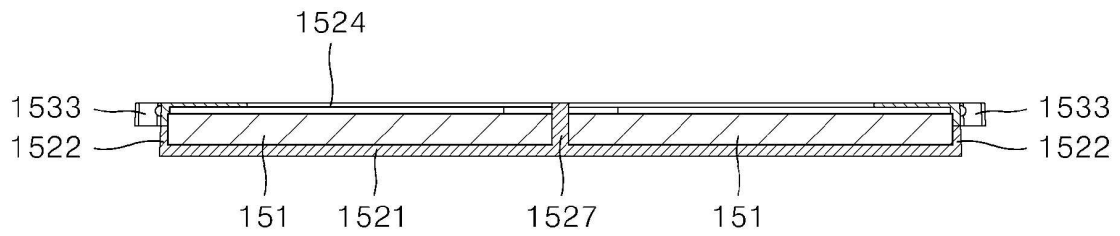
【FIG. 42】



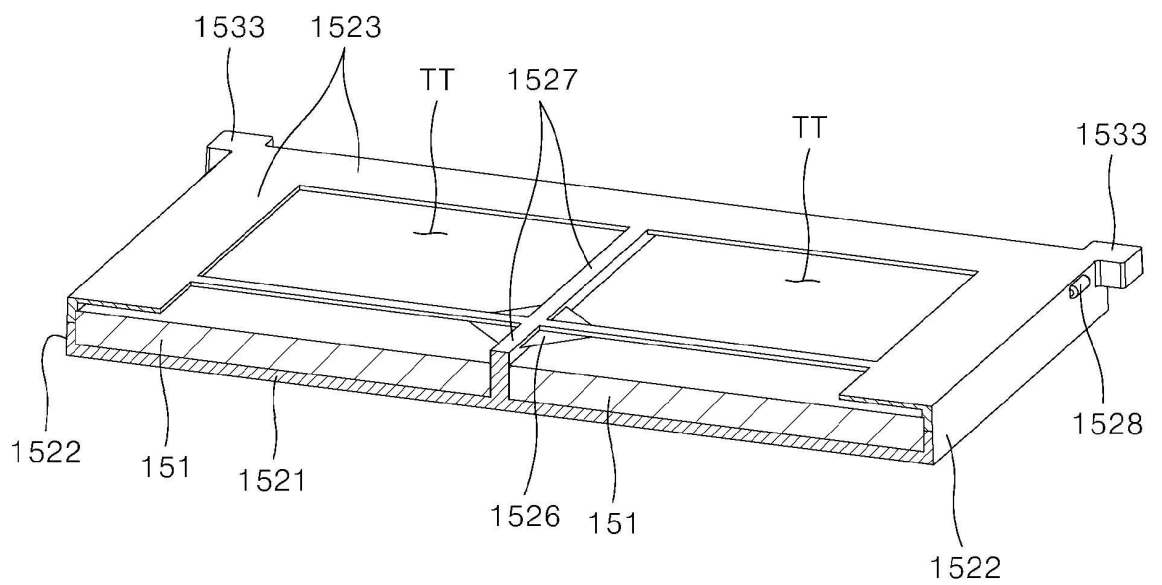
【FIG. 43】



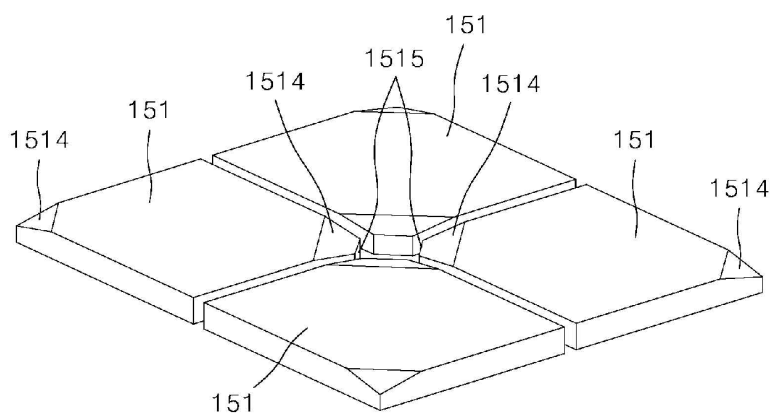
【FIG. 44】



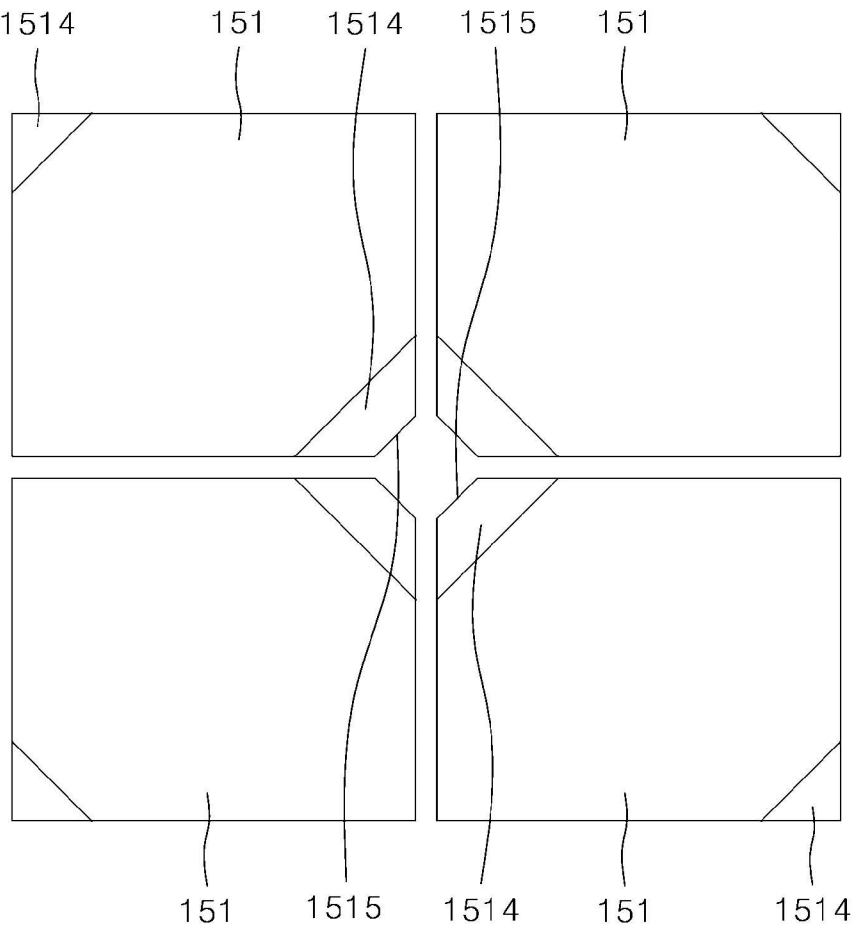
【FIG. 45】



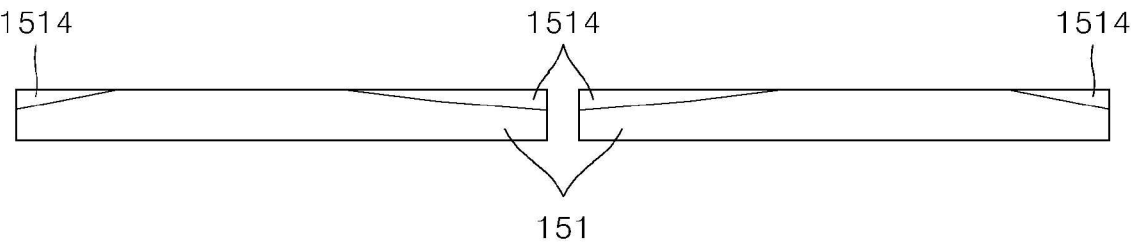
【FIG. 46】



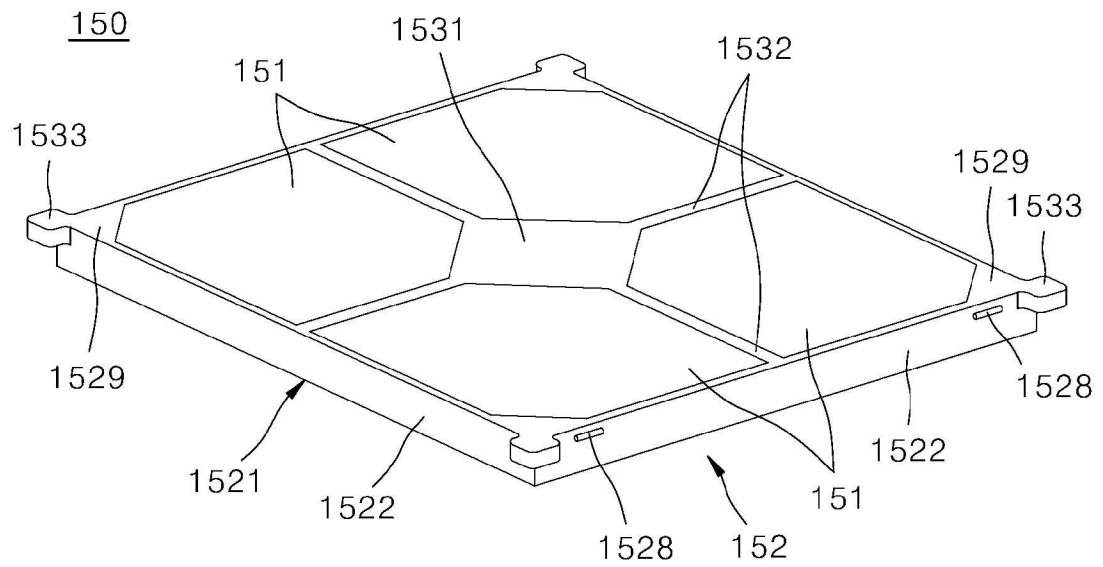
【FIG. 47】



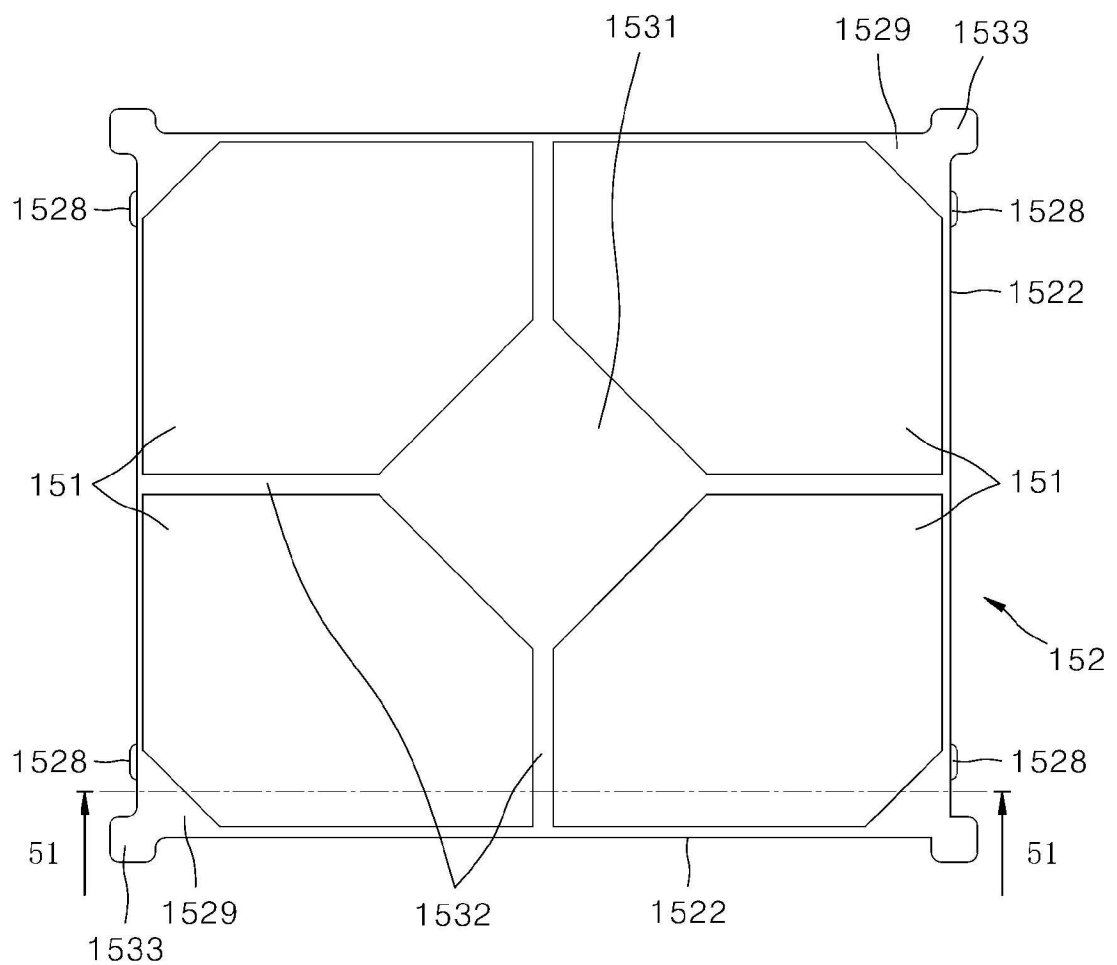
【FIG. 48】



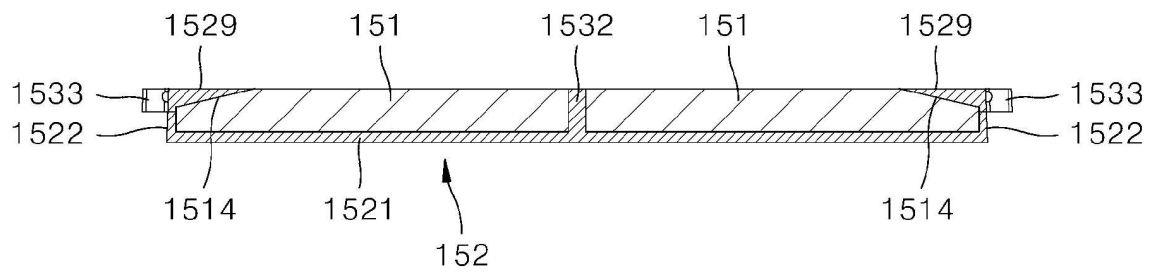
【FIG. 49】



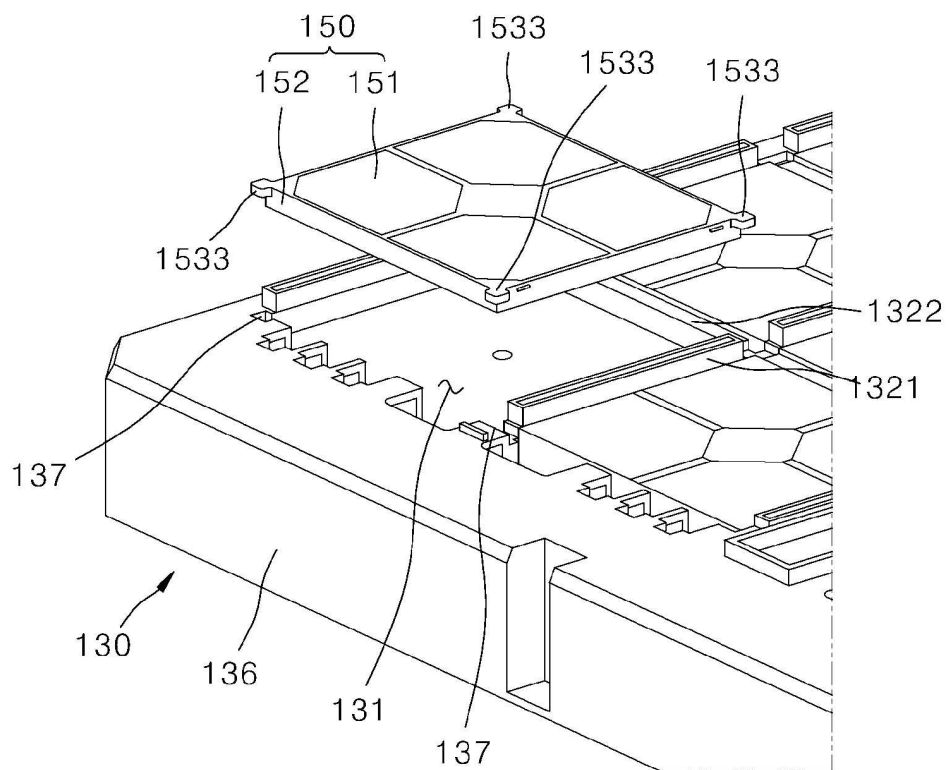
【FIG. 50】



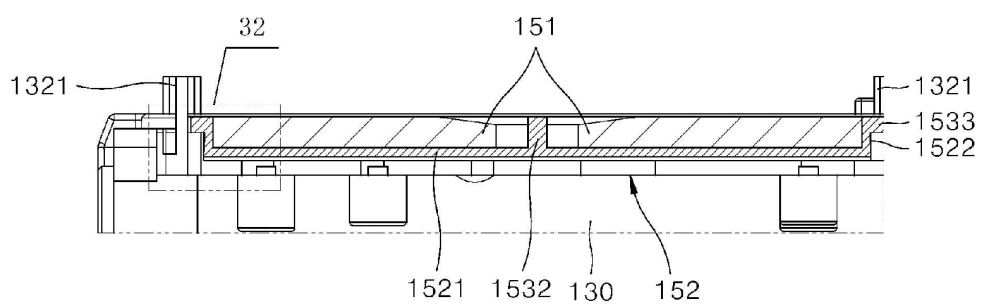
【FIG. 51】



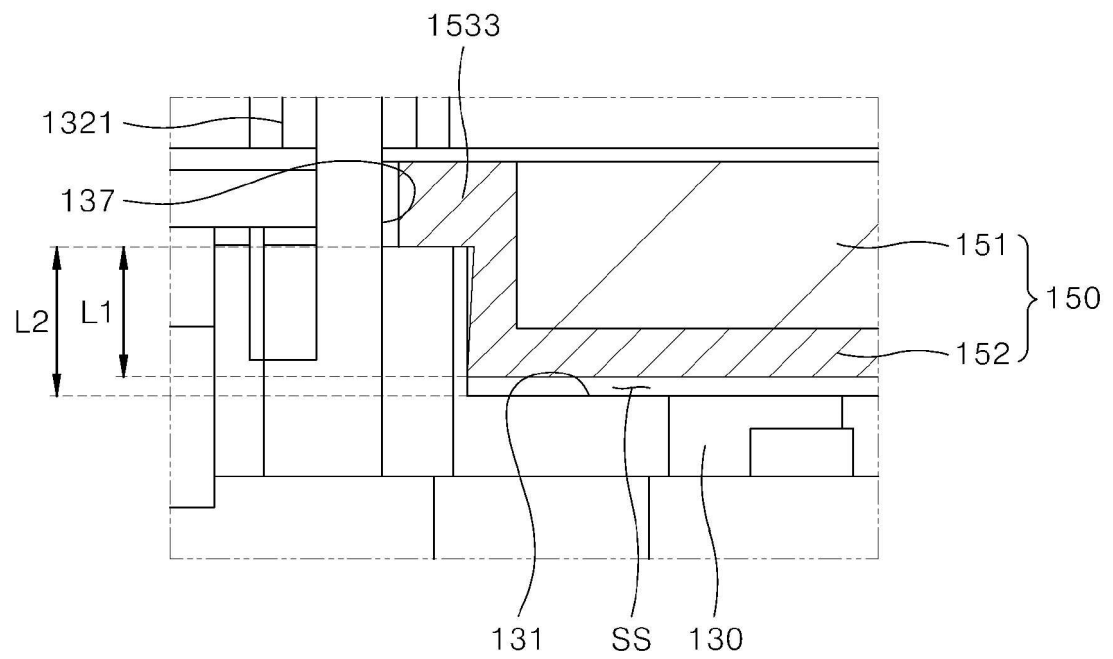
【FIG. 52】



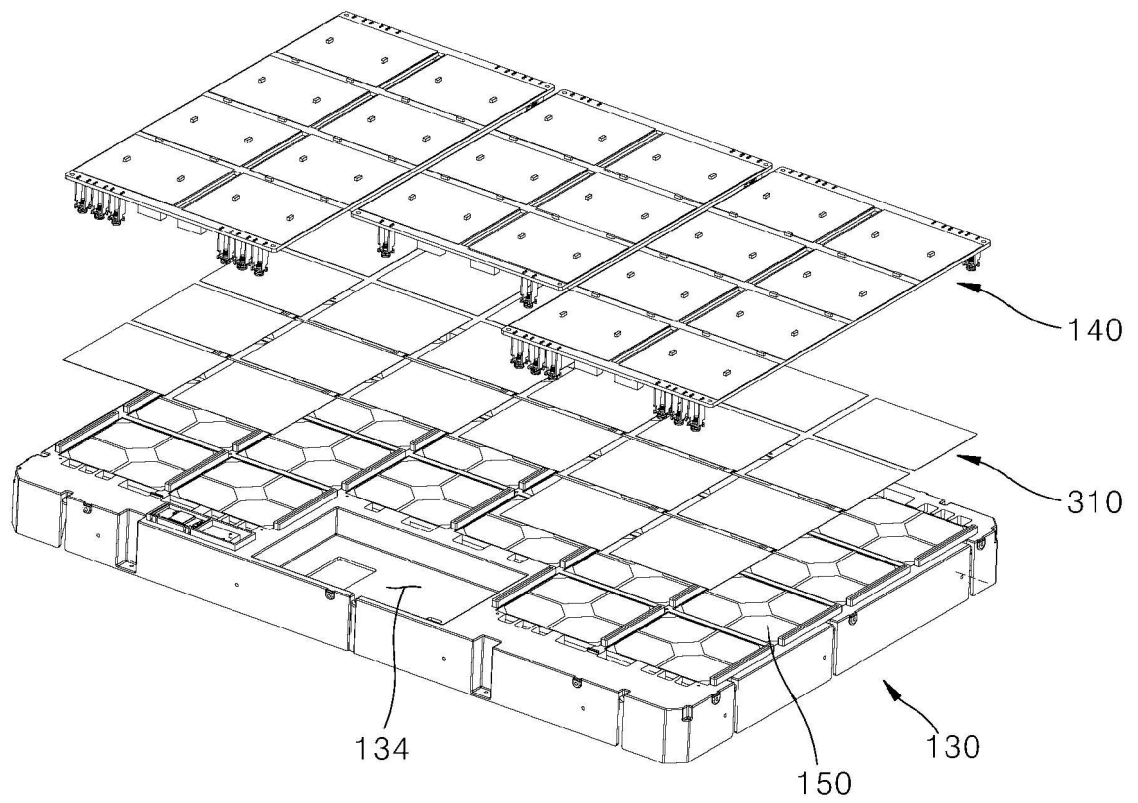
【FIG. 53】



【FIG. 54】



【FIG. 55】



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2024/014281

A. CLASSIFICATION OF SUBJECT MATTER

H05B 6/12(2006.01)i; **F24C 15/10**(2006.01)i; **F24C 15/00**(2006.01)i; **H01F 3/10**(2006.01)i; **H01F 27/26**(2006.01)i;
H01F 1/34(2006.01)i; **H01F 38/14**(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H05B 6/12(2006.01); F24C 15/00(2006.01); H01F 38/14(2006.01); H05B 6/04(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above

Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & keywords: case, supporter, working coil, coil plate, ferrite module, ferrite core, width, inverter, heatsink, fan, air guide

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2020-0129003 A (LG ELECTRONICS INC.) 17 November 2020 (2020-11-17) See paragraphs [0013]-[0160]; claim 1; and figures 4-18.	1-8,10,12-18
A		9,11
Y	JP 2021-150442 A (SHIMADA PHYS & CHEM INDUSTRY CO., LTD.) 27 September 2021 (2021-09-27) See paragraphs [0018], [0226] and [0233]; claim 29; and figures 12 and 17.	1-8,10,12-18
Y	EP 3291644 A1 (PANASONIC INTELLECTUAL PROPERTY MANAGEMENT CO., LTD.) 07 March 2018 (2018-03-07) See paragraphs [0011]-[0014]; claim 1; and figures 1-7.	1-8,10,17-18
Y	JP 2017-084685 A (HITACHI APPLIANCES INC.) 18 May 2017 (2017-05-18) See paragraph [0024]; and figures 5-9.	4,8,10

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
24 December 2024	24 December 2024
Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208	
Facsimile No. +82-42-481-8578	Telephone No.

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International application No.
PCT/KR2024/014281

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	KR 10-2023-0099250 A (LG ELECTRONICS INC.) 04 July 2023 (2023-07-04) See paragraphs [0096]-[0195]; and figures 3-23.	12-18

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2024/014281

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		WO 2022-250494 A1	01 December 2022
		WO 2022-250496 A1	01 December 2022

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