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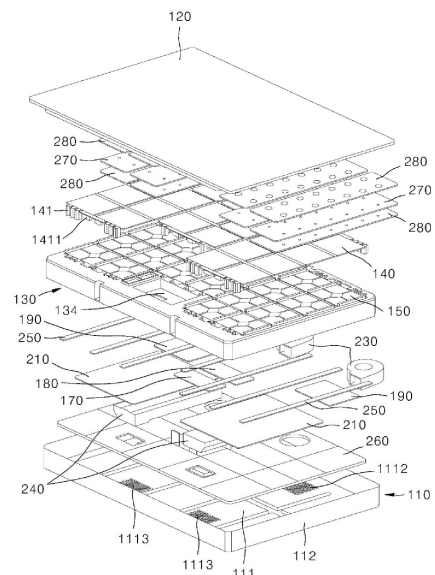
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(54) **ELECTRIC RANGE**

(57) One embodiment of an electric range may include a plurality of ferrite modules that are disposed on the upper part of a supporter and below a coil portion, and arranged at positions corresponding to a plurality of coil substrates, respectively. The ferrite modules may comprise: a ferrite core; and a core fixing part that is coupled to the supporter and formed by insert injection molding with the ferrite core, and that fixes the ferrite core. The ferrite cores may be formed as one of a first type, formed by combining ferrites having different surface areas, or a second type, in which a plurality of ferrites having the same shape are radially arranged with respect to the center of the ferrite module.

FIG. 3



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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 comprising a ferrite module comprising ferrite cores having various shapes and a core fixing part.

[0014] Another object of the present disclosure is to provide an electric range comprising a ferrite module having a structure that is easily and stably assembled to a supporter.

[0015] Another object of the present disclosure is to provide an electric range having a structure in which cooling efficiency of a coil part is improved.

[0016] 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

[0017] An embodiment of an electric range may comprise a plurality of ferrite modules disposed above a supporter, disposed below a coil part, and disposed at positions corresponding to each of a plurality of coil parts. The ferrite module may comprise a ferrite core; and a core fixing part coupled to the supporter, formed by insert molding with the ferrite core, and fixing the ferrite core.

[0018] The ferrite core may be formed in any one of a first type in which ferrites having different areas are combined to form the ferrite core, or a second type in which a plurality of ferrites having an identical shape are radially arranged with respect to a center of the ferrite module.

[0019] The ferrite module may be manufactured by coupling the ferrite core and the core fixing part by an insert molding method. A shape of the core fixing part may be freely formed by insert molding.

[0020] In the case of the first type, the ferrite core may comprise 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.

[0021] In the case of the first type, the core fixing part may comprise a bottom plate; a bent part bent from an

end of the bottom plate; and a first extension part bent and extending from the bent part and covering a portion of upper surfaces of the first ferrites and the second ferrites.

[0022] In the case of the second type, the ferrite core may be provided as a plurality of ferrite core, the plurality of ferrite cores being radially disposed while being spaced apart from each other with respect to a center of the core fixing part, and the ferrite core may be formed in any one of a first type in which a portion of an upper surface is covered by the core fixing part, or a second type comprising at least one inclined part formed at a corner and configured to be fixed to the core fixing part.

[0023] In the case of the first type, the core fixing part may comprise a bottom plate; a bent part bent from an end of the bottom plate; a second extension part bent and extending from the bent part and covering a portion of an upper surface of the ferrite core; and a cover part formed at a central portion of the core fixing part and covering a portion of an upper surface of a corner portion of the ferrite core.

[0024] In the case of the second type, the ferrite core may be formed in a rectangular shape, and the inclined parts may be provided as a pair respectively formed at corners located at positions corresponding to each other in a diagonal direction of the ferrite core.

[0025] The core fixing part may comprise a fitting protrusion protruding outward from a corner of the core fixing part and fitted to the supporter. The supporter may comprise a plurality of seating grooves on which the plurality of ferrite modules are respectively seated.

[0026] A fitting groove into which the fitting protrusion is fitted may be formed in the supporter at a position corresponding to the fitting protrusion, and a first distance from a lower surface of the fitting protrusion to a lower surface of the ferrite module may be formed smaller than a second distance from a lower surface of the fitting groove to a bottom surface of the seating groove.

[0027] By forming a gap between the lower surface of the ferrite module and the bottom surface of the seating groove, the ferrite module and the seating groove may be assembled so as not to contact each other.

[0028] The electric range according to an embodiment may comprise an insulating plate disposed between the coil part and the ferrite module and formed of an electrically insulating material.

[0029] The insulating plate is disposed between the coil part and the ferrite module to electrically insulate the coil part and the ferrite module from each other, and may effectively cool a coil board by serving as a heat transfer medium by conduction.

Advantageous Effects

[0030] In the electric range according to the present disclosure, the ferrite module may be manufactured by insert molding the ferrite core and the core fixing part made of a plastic material so that the ferrite core and the core fixing part are coupled to each other. Since a shape

of the core fixing part may be freely formed by insert molding, even when ferrite pieces forming the ferrite core are provided in various shapes, the core fixing part may be easily manufactured in a shape corresponding to the seating groove of the supporter.

[0031] Accordingly, the ferrite pieces may be manufactured to have various shapes, and since the core fixing part is manufactured in a shape corresponding to the seating groove, the ferrite module may be stably coupled to and mounted on the supporter.

[0032] In the electric range according to the present disclosure, when the bottom surface of the seating groove and the lower surface of the ferrite module contact each other, the ferrite module may be inclined with respect to the seating groove due to the above-described processing tolerance, or heights of a plurality of ferrite modules assembled in the seating groove may become different from each other. This may cause assembly defects and deterioration in performance of the electric range.

[0033] Accordingly, by forming a gap between the lower surface of the ferrite module and the bottom surface of the seating groove so that the ferrite module and the seating groove are assembled without contacting each other, occurrence of inclination of the ferrite module due to contact may be suppressed, and heights of the plurality of ferrite modules assembled in the seating groove may be made uniform with each other. Accordingly, the assembly defects and deterioration in performance of the electric range may be suppressed.

[0034] In addition, in the electric range according to the present disclosure, the insulating plate is disposed between the coil part and the ferrite module to electrically insulate the coil part and the ferrite module from each other, thereby preventing the coil part and the ferrite core from being electrically connected and preventing reduction of magnetic field generation efficiency.

[0035] In addition, an upper surface and a lower surface of the insulating plate may respectively contact the coil part and the ferrite module. Due to such a structure, the coil part may be effectively cooled.

[0036] When electricity is applied to the coil part and the coil part operates, the coil part may be heated due to current. In this case, heat generated from the coil board may be transmitted to the relatively cooler ferrite module by conduction through the insulating plate.

[0037] Accordingly, the insulating plate may serve as a heat transfer medium by conduction to effectively cool the coil board and suppress degradation of performance of the electric range due to overheating of the coil board.

[0038] 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

[0039] 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; 5

FIG. 2 is a front view illustrating an electric range according to an embodiment; 10

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; 15

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; 20

FIG. 6 is a bottom view illustrating an electric range according to an embodiment; 25

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; 30

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; 35

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; 40

FIG. 13 is a plan view illustrating a state in which the ferrite module is coupled to the upper supporter; 45

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; 50

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; 55

FIG. 18 is a plan view of a ferrite module according to an embodiment;

FIG. 19 is a cross-sectional view of FIG. 18;

FIG. 20 is a perspective view of FIG. 19;

FIG. 21 is a plan view of a ferrite module according to another embodiment;

FIG. 22 is a cross-sectional view of FIG. 21;

FIG. 23 is a perspective view of FIG. 22;

FIG. 24 is a perspective view of a ferrite core according to another embodiment;

FIG. 25 is a plan view of FIG. 24;

FIG. 26 is a front view of FIG. 24;

FIG. 27 is a perspective view of a ferrite module according to another embodiment;

FIG. 28 is a plan view of FIG. 27;

FIG. 29 is a cross-sectional view taken along line 29-29 of FIG. 28;

FIG. 30 is an exploded perspective view of an upper supporter and a ferrite module;

FIG. 31 is a cross-sectional view illustrating a state in which the upper supporter and the ferrite module are assembled;

FIG. 32 is an enlarged view of portion 32 of FIG. 31; and

FIG. 33 is an exploded perspective view of some components of an electric range in which an insulating plate is shown.

DETAILED DESCRIPTION

[0040] 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.

[0041] 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.

[0042] Throughout the disclosure, unless specifically stated to the contrary, each component may be singular or plural.

[0043] In the disclosure, singular forms include 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.

[0044] 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.

[0045] 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.

[0046] 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.

[0047] 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.

[0048] 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.

[0049] 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.

[0050] 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.

[0051] An electric range according to an embodiment

may comprise a case 110, a cover plate 120, a supporter 130, a coil part 140, and a ferrite module 150. Hereinafter, for clarity of description, the supporter 130 is referred to as an upper supporter 130.

[0052] The coil part 140 may be provided as a litz wire plate in which a coil is wound or a coil board on which a working coil is printed. Hereinafter, for example, the coil part 140 provided as the coil board will be described.

[0053] 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.

[0054] 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.

[0055] 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.

[0056] 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.

[0057] 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.

[0058] 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.

[0059] 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.

[0060] 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.

[0061] 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.

[0062] 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.

[0063] 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.

[0064] 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.

[0065] 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.

[0066] As an example, the input interface 160 may be a thin film transistor liquid crystal display (TFT LCD), but is not limited thereto.

[0067] 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.

[0068] 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 supporter 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.

[0069] 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.

[0070] 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.

[0071] 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.

[0072] 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.

[0073] 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.

[0074] 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.

[0075] 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.

[0076] 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.

[0077] 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.

[0078] 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.

[0079] 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.

[0080] 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.

[0081] 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.

[0082] 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.

[0083] 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.

[0084] 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.

[0085] 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.

[0086] 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.

[0087] 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.

[0088] 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.

[0089] 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.

[0090] 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.

[0091] 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.

[0092] 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.

[0093] 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.

[0094] 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.

[0095] 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.

[0096] 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.

[0097] In addition, the inverter part may comprise two switching elements, and the two switching elements may be alternately turned on and turned off by switching signals provided from the controller. Further, a high-frequency alternating current (i.e., a resonance current) may be generated by switching operations of the two switching elements, and the generated high-frequency alternating current may be applied to the working coil 140a.

[0098] Referring to FIGS. 3 and 7, the inverter board 210 according to an embodiment may comprise a resonance capacitor. That is, the inverter board 210 illustrated in FIG. 3 is in a form in which the inverter part and the resonance capacitor are integrated.

[0099] Referring to FIG. 17, the inverter board 210 according to another embodiment may comprise only the inverter part without comprising the resonance capacitor. In this case, a separate resonance board 220 comprising the resonance capacitor may be provided in the electric range.

[0100] Hereinafter, the resonance board 220 and the resonance capacitor will be described first. The resonance capacitor is electrically connected to the inverter part, and when a resonance current is applied to the working coil 140a by switching operations of the inverter part, resonance starts.

[0101] In addition, when the resonance capacitor resonates, a current flowing through the working coil 140a connected to the resonance capacitor increases. That is, through such a process, an eddy current may be induced in a heating target disposed above the working coil 140a connected to the resonance capacitor.

[0102] A plurality of resonance capacitors may be provided. In the case of an integrated type in which the inverter part and the resonance capacitor are all provided on the inverter board 210, the resonance capacitor may be disposed on the inverter board 210 to be spaced apart from the inverter part.

[0103] Of course, when the inverter board 210 and the resonance board 220 are separated from each other and separately provided, the resonance capacitor may be provided on the resonance board 220.

[0104] The indicator board 250 may comprise a light

source. For example, the light source may be provided in a form in which a plurality of LEDs are aligned in a row.

[0105] The indicator board 250 may be turned on when the electric range operates to inform a user whether the heating part operates. In addition, the indicator board 250 may inform the user of an operating state of the electric range by changing lighting patterns, colors, and the like of the plurality of LEDs.

[0106] The electric range may comprise a lower supporter 260 disposed above the bottom plate 111 of the case 110. The lower supporter 260 may be disposed below the upper supporter 130, received in the case 110, disposed below boards coupled to a lower surface of the upper supporter 130, and support the upper supporter 130.

[0107] The lower supporter 260 is formed in a plate shape, and holes may be formed in portions corresponding to the inlet hole 1112 and the outlet hole 1113 so that air flows through the inlet hole 1112 and the outlet hole 1113 formed in the bottom plate 111, which will be described later.

[0108] A plurality of boards, the blowing fan 230, the heat sink 240, the ferrite module 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, deformation in which the upper supporter 130 sags downward may occur due to loads of these components.

[0109] Accordingly, the lower supporter 260 may be 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.

[0110] 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 large elements provided on the various boards, the blowing fan 230 having a larger volume than other components, and the heat sink 240.

[0111] 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 toward an upper side. Meanwhile, on an upper surface of the bottom plate 111 of the case 110, protrusions for supporting the lower supporter 260 may protrude toward an upper side.

[0112] Various boards may be disposed above the lower supporter 260. Accordingly, it is necessary to electrically insulate the boards that may contact the lower supporter 260 from the bottom plate 111 of the case 110, which is made of a material such as aluminum, to prevent electric leakage and electrical short.

[0113] Accordingly, the lower supporter 260 is 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.

[0114] The electric range may comprise a heat insulating material 270 and a MICA sheet 280. The heat insulating material 270 may be disposed between the upper supporter 130 and the cover plate 120 to suppress heat transfer from a heating target to the upper supporter 130.

[0115] 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 various components coupled thereto.

[0116] Such heat transfer heats the inside of the electric range and may adversely affect an operation of the electric range particularly when transmitted to various boards. Accordingly, by disposing the heat insulating material 270 between the cover plate 120 and the upper supporter 130, heat transfer from the heating target to the inside of the electric range may be suppressed to prevent heating of internal components, thereby improving operational performance of the electric range.

[0117] For example, the heat insulating material 270 may be formed of a carbon material having good heat insulating performance even when manufactured with a relatively thin thickness, but is not limited thereto.

[0118] The heat insulating material 270 is formed in a plate shape and may be 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.

[0119] 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.

[0120] 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.

[0121] 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 a front-rear direction of the electric range.

[0122] 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 in-

insulating material 270 from being damaged by an impact.

[0123] 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.

[0124] 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.

[0125] 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 in a direction of 5-5 in FIG. 4A. FIG. 6 is a bottom view illustrating an electric range according to an embodiment.

[0126] Elements that generate heat during operation of the electric range may be mounted on various boards.

[0127] For example, switching elements responsible for on/off control in the electric range generate a large amount of heat. Accordingly, these elements require forced cooling in order to suppress occurrence of operation stop or failure of the electric range due to overheating.

[0128] To this end, the electric range may comprise a blowing fan 230 and a heat sink 240. The blowing fan 230 and the heat sink 240 may serve to cool various boards and other components that are heated.

[0129] The blowing fan 230 may be coupled to the lower surface of the upper supporter 130 and disposed at a position spaced apart from the boards. The blowing fan 230 may be provided to face the heat sink 240 so as to discharge air. The blowing fan 230 is electrically connected to the main board 170, and an operation thereof may be controlled by a controller provided in the main board 170.

[0130] 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.

[0131] In the embodiment, since the inverter boards 210 are provided as a pair disposed to be spaced apart from each other, the heat sinks 240 may be provided as a pair to be coupled to the respective 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.

[0132] A plurality of cooling fins are formed in 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 of the heat sink 240 and an internal air flow path of the heat sink 240, and accordingly the inverter board 210 may be effectively cooled.

[0133] 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.

[0134] Since the inverter board 210 comprises an inverter part that 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.

[0135] Meanwhile, since air flowing by the blowing fan 230 flows along the entire lower side of the lower supporter 260, boards other than the inverter board 210 are also cooled by the forced air flow, and thus an inside of the electric range may be cooled as a whole.

[0136] As illustrated 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 flow in from outside.

[0137] 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 sink 240 and the blowing fan 230 are each formed as a pair, the inlet holes 1112 and the outlet holes 1113 may also be formed as a pair corresponding thereto.

[0138] The working coil 140a may be formed in multiple layers on the coil board 140. For example, a sensing coil for sensing a heating target is printed on an uppermost portion of the coil board 140, and a plurality of working coils 140a may be disposed below the sensing coil while forming respective layers.

[0139] 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.

[0140] In FIG. 4B, the working coil 140a has an overall rectangular outline 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 increases.

[0141] However, in another embodiment, the working coil 140a may have an outer shape formed as a polygon, a circle, or an ellipse.

[0142] As described above, one working coil 140a illustrated in FIG. 4B may be provided as a plurality of working coils while forming layers spaced apart from each other in an up-down direction of the coil board 140. However, for clarity of description, hereinafter, the working coil 140a that overlaps in the up-down direction and forms a plurality of layers may be referred to as one same working coil 140a.

[0143] As illustrated in FIG. 4B, a plurality of working coils 140a may be disposed in a lateral direction of the coil board 140 on one coil board 140.

[0144] 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 working coils 140a printed on one coil board 140 may be changed in consideration of a shape or size of the entire electric range and ease of assembly or disassembly.

[0145] Meanwhile, a through hole 1419 may be formed between the working coils 140a adjacent to each other in one coil board 140. The 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 placed at a designed position. The through hole 1419 may have a shape corresponding to the first piece 1321 and the slit 1323 of the upper supporter 130.

[0146] 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 the slit 1323 hole of the upper supporter 130 and transmit through the cover plate 120.

[0147] One working coil 140a is disposed at a position corresponding to one ferrite module 150 and may overlap with the ferrite module 150 in an up-down direction. That is, one working coil 140a may be disposed to correspond to one ferrite module 150.

[0148] At this time, a coil boundary part 1412 may be provided between the working coils 140a adjacent to each other. The coil boundary part 1412 is disposed such that a longitudinal direction thereof intersects with a longitudinal direction of the through hole 1419, and of course the through hole 1419 is not formed in the coil boundary part 1412.

[0149] 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.

[0150] In FIG. 5, a flow direction of air is illustrated by arrows. When the blowing fan 230 operates, air may be introduced from outside into the electric range through the inlet hole 1112. A portion of the introduced air passes through an outer surface of the heat sink 240 and an air flow path formed inside the heat sink 240, and a remainder of the introduced air may be diffused throughout an interior of the case 110 of the electric range.

[0151] Air forcibly flowing 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 effectively 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.

[0152] 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, the case 110 may not comprise a separate structure for coupling the blowing fan 230 and the heat sink 240.

[0153] Accordingly, a support structure of the electric range is simplified as a whole, thereby simplifying a structure of the electric range and reducing manufacturing cost.

[0154] In addition, since a structure contacting the blowing fan 230 and the heat sink 240 is omitted from the case 110, assembly and disassembly of the case 110 become easy, and maintenance work of the electric range may become easy.

[0155] 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.

[0156] 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.

[0157] The upper supporter 130 may comprise a flat plate 135 disposed in a direction parallel to a lateral direction of the electric range, and a side plate 136 bent downward from an edge of the flat plate 135. The ferrite module 150 and the coil board 140 are disposed on the flat plate 135, and the side plate 136 may support the flat plate 135 at the edge of the flat plate 135.

[0158] The upper supporter 130 may comprise a seating groove 131 and a boundary rib 132.

[0159] 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 groove 131 is generally formed in a rectangular shape, and thus the coil board 140 and the ferrite module 150 having a rectangular shape may be fitted into the seating groove 131.

[0160] The boundary rib 132 forms boundaries of the plurality of seating grooves 131, is provided to protrude from an upper surface of the upper supporter 130, and may be provided as a plurality of boundary ribs.

[0161] The boundary rib 132 may comprise a first piece 1321 and a second piece 1322. A longitudinal direction of the first piece 1321 may be disposed 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.

[0162] 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 disposed such that the longitudinal directions thereof intersect each other, the upper surface of the upper

supporter 130 may be entirely formed in a grid shape.

[0163] A slit 1323 may be formed in the first piece 1321. The slit 1323 may be formed to penetrate the upper supporter 130 and may have a narrow and long 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.

[0164] 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 correspondingly.

[0165] In the indicator board 250, the light source emits light toward an upper side, and the emitted light passes through the slit 1323 and transmits through the cover plate 120 made of glass, so that a user may see the emitted light.

[0166] 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.

[0167] 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.

[0168] 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.

[0169] 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.

[0170] 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.

[0171] 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.

[0172] 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 is formed around the working coil 140a, and the formed magnetic field may form an eddy current in the heating target. The ferrite core 151 may raise the formed magnetic field toward an upper side where the heating target is located. The ferrite cores 151 may be provided as a plurality of ferrite cores.

[0173] The core fixing part 152 has the ferrite core 151 mounted thereon and may fix the ferrite core 151 to the seating groove 131. The core fixing part 152 is coupled to the upper supporter 130, is formed by insert molding together with the ferrite core 151, and may fix the ferrite core 151.

[0174] The core fixing part 152 forms an outer shape of the ferrite module 150 and may be formed entirely 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.

[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 an 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. In this order, 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 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, side surfaces 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 positioned 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 is placed at a designed position and may be supported by the first piece 1321 so that movement of the upper supporter 130 in a lateral

direction may be suppressed.

[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 is 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 an end of the coil board 140 in a longitudinal direction. The protruding board coupling part 141 may be coupled to the upper supporter 130 by a fastening member such as a screw bolt.

[0183] A connection pin 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 contacts a terminal formed in 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] A 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 an upper portion of the upper supporter 130. The input interface 160 may be coupled to the upper supporter 130. To this end, 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 substantially rectangular shape to correspond to the input interface 160 having a rectangular shape. 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 may easily perform an input from the user's point of view.

[0189] A hole through which a cable or the like may pass may be formed in a bottom of the insertion groove 134 to electrically connect 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 include 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 include 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 include 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

ter 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 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 include 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] The ferrite module 150 may comprise a ferrite core 151 and a core fixing part 152.

[0219] The ferrite cores 151 form a magnetic field, and a plurality of pieces may be disposed while being spaced apart from each other. The core fixing part 152 is coupled to the upper supporter 130, is formed by insert molding together with the ferrite core 151, and may fix the ferrite core 151.

[0220] The ferrite module 150 may be formed of a ferrite material and may generate a magnetic field when current is applied to the working coil 140a. The core fixing part 152 may be provided of a plastic material. The ferrite core 151 and the core fixing part 152 may be manufactured by insert molding.

[0221] One ferrite module 150 may correspond to one working coil 140a. That is, one working coil 140a and one ferrite module 150 may form one set to generate a magnetic field.

[0222] In one ferrite module 150, the ferrite core 151 may comprise a plurality of pieces disposed while being spaced apart from each other. The plurality of pieces forming one ferrite core 151 may maintain positions spaced apart from each other by the core fixing part 152.

[0223] In the embodiment, the ferrite module 150 may be manufactured by insert molding the ferrite core 151 and the core fixing part 152 made of a plastic material so that the ferrite core 151 and the core fixing part 152 are coupled to each other. Since a shape of the core fixing part 152 may be freely formed by insert molding, even when ferrite pieces forming the ferrite core 151 are provided in various shapes, the core fixing part 152 may be easily manufactured in a shape corresponding to the seating groove 131 of the upper supporter 130.

[0224] Accordingly, the ferrite pieces may be manufactured to have various shapes, and since the core fixing part 152 is manufactured in a shape corresponding to the seating groove 131, the ferrite module 150 may be stably coupled to and mounted on the upper supporter 130.

[0225] The ferrite module 150 may be easily coupled to the upper supporter 130 and may be provided in various shapes and structures in order to raise the magnetic field generated in the working coil 140a in a direction in which a heating target is located.

[0226] Since the ferrite module 150 is composed of the ferrite core 151 and the core fixing part 152, the ferrite core 151 and the core fixing part 152 may also be provided in various shapes and structures. Hereinafter, embodiments of the ferrite module 150 having various shapes and structures will be described in detail.

[0227] The ferrite core 151 may be formed in any one of a first type in which ferrites having different areas are combined to form the ferrite core, or a second type in which a plurality of ferrites having an identical shape are radially disposed with respect to a center of the ferrite module 150.

[0228] FIG. 18 is a plan view of a ferrite module 150 according to an embodiment. FIG. 19 is a cross-sectional view of FIG. 18. FIG. 20 is a perspective view of FIG. 19. The ferrite module 150 illustrated in FIG. 18 may include 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.

[0229] The first-type ferrite core 151 may include 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.

[0230] 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.

[0231] 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.

[0232] 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.

[0233] In the embodiment, the ferrite core 151 may include a plurality of ferrites having identical or different shapes disposed therein and may be insert-injection-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.

[0234] 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.

[0235] 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.

[0236] 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.

[0237] 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.

[0238] The second ferrites 1512 may be partially disposed as a plurality of second ferrites between the plurality of first ferrites 1511, and the plurality of second ferrites 1512 may be disposed spaced apart from each other.

[0239] 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.

[0240] In the embodiment, when the square-shaped

first ferrites 1511 are disposed at corners of the core fixing part 152, as illustrated in FIG. 18, since the ferrite module 150 has a rectangular shape having a left-right side longer than a front-rear side, a considerable separation space SS may be formed between the first ferrites 1511 along the left-right side.

[0241] In the separation space 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.

[0242] In the case of the first type, the core fixing part 152 may include 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.

[0243] 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.

[0244] 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.

[0245] 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.

[0246] 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.

[0247] The core fixing part 152 corresponding to the first-type ferrite core 151 may include 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.

[0248] 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.

[0249] 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.

[0250] 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.

[0251] 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.

[0252] 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.

[0253] 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 generation efficiency due to direct contact between the ferrite core 151 and the coil board 140.

[0254] The core fixing part 152 may include 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.

[0255] The core fixing part 152 may include fastening protrusions 1528 protruding from outer surfaces of the bent parts 1522 and coupled to the upper supporter 130. For example, the fastening protrusions 1528 may protrude from outer surfaces of a pair of bent parts 1522 disposed at positions facing each other, and a plurality of fastening protrusions 1528 may also be provided on one bent part 1522.

[0256] 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.

[0257] 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.

[0258] FIG. 21 is a plan view of the ferrite module 150 according to another embodiment. FIG. 22 is a cross-sectional view of FIG. 21. FIG. 23 is a perspective view of FIG. 22. The ferrite module 150 illustrated in FIG. 21 may

include 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.

[0259] 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.

[0260] 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.

[0261] 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.

[0262] 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.

[0263] 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.

[0264] 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.

[0265] 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.

[0266] As illustrated in FIG. 21, in the case of the first type, the core fixing part 152 may include 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.

[0267] In the first type, the core fixing part 152 may include 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.

[0268] 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.

[0269] 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.

[0270] 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.

[0271] 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.

[0272] FIG. 24 is a perspective view of the ferrite core 151 according to another embodiment. FIG. 25 is a plan view of FIG. 24. FIG. 26 is a front view of FIG. 24. The ferrite module 150 illustrated in FIG. 24 may include a second-type ferrite core 151. The second-type ferrite core 151 and the corresponding core fixing part 152 will be described in detail.

[0273] As illustrated in FIG. 24, 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.

[0274] 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.

[0275] 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.

[0276] 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.

[0277] Accordingly, when the plurality of ferrite cores 151 are disposed, as illustrated in FIG. 25, a rhombus-shaped space may be formed at a central portion of the entire ferrite core 151.

[0278] 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.

[0279] FIG. 27 is a perspective view of the ferrite

module 150 according to another embodiment. FIG. 28 is a plan view of FIG. 27. FIG. 29 is a cross-sectional view taken along line 29-29 of FIG. 28.

[0280] As illustrated in FIG. 27, in the case of the second type, the core fixing part 152 may include 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.

[0281] The core fixing part 152 corresponding to the second-type ferrite core 151 may include a first cover 1529, a second cover 1531, and second partition walls 1532.

[0282] 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.

[0283] 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.

[0284] 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.

[0285] 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.

[0286] 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.

[0287] 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.

[0288] FIG. 30 is an exploded perspective view of the upper supporter 130 and the ferrite module 150. FIG. 31 is a cross-sectional view in a state in which the upper supporter 130 and the ferrite module 150 are assembled. FIG. 32 is an enlarged view of portion 32 of FIG. 31.

[0289] The core fixing part 152 may be formed in a rectangular shape. The core fixing part 152 may include 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.

[0290] The upper supporter 130 may include a plurality of seating grooves 131 in which respective ferrite modules 150 are seated.

[0291] 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.

[0292] 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.

[0293] 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.

[0294] 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.

[0295] 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.

[0296] A separation space SS may be formed between a bottom surface of the seating groove 131 and a lower surface of the ferrite module 150. Such a separation space SS may be implemented by designing a structure of the fitting protrusions 1533 as follows.

[0297] That is, referring to FIG. 32, 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.

[0298] 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 separation space SS may be formed therebetween. The separation space SS may improve assembly performance when the ferrite module 150 is inserted into the seating groove 131.

[0299] 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.

[0300] 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.

[0301] Accordingly, by forming the separation space 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.

[0302] For example, the separation space SS may be provided to be approximately 0.5 mm in a up-down direction of the electric range.

[0303] FIG. 33 is an exploded perspective view of some components of the electric range in which the insulating plate 310 is illustrated.

[0304] 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.

[0305] 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.

[0306] 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.

[0307] 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 include the insulating plate 310 disposed between the coil board 140 and the ferrite module 150 and formed of an electrically insulating material.

[0308] 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.

[0309] 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.

[0310] 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.

[0311] 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.

[0312] 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.

[0313] 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.

[0314] Although the present disclosure has been described above with reference to the illustrated drawings by way of example, it is apparent that the present disclosure 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;
- a supporter accommodated in the case;
- a plurality of coil parts disposed above the supporter, disposed to be spaced apart from each other, and having working coils provided therein; and
- a plurality of ferrite modules disposed above the supporter, disposed below the coil part, and disposed at positions corresponding to each of the plurality of coil parts, wherein the ferrite module comprises:
 - a plurality of ferrite cores; and

a core fixing part coupled to the supporter, formed by insert molding with the ferrite cores, and fixing the

- ferrite cores.
2. The electric range according to claim 1, wherein the ferrite cores are formed in any one of:
 - a first type in which ferrites having different areas are combined to form the ferrite cores, or
 - a second type in which a plurality of ferrites having an identical shape are disposed radially with respect to a center of the ferrite module.
 3. The electric range according to claim 2, wherein, in the first type, the ferrite core comprises:
 - a plurality of first ferrites respectively disposed at corners of the core fixing part provided in a rectangular shape; and
 - a plurality of second ferrites in which at least one is disposed between the plurality of first ferrites.
 4. The electric range according to claim 3, wherein the second ferrites are disposed between the plurality of first ferrites to be spaced apart from the first ferrites.
 5. The electric range according to claim 4, wherein some of the second ferrites are disposed as a plurality of second ferrites between the plurality of first ferrites, and the plurality of second ferrites are disposed to be spaced apart from each other.
 6. The electric range according to claim 5, wherein, in the first type, the core fixing part comprises:
 - a bottom plate;
 - a bent part bent from an end of the bottom plate; and
 - a first extension part bent and extending from the bent part and covering a portion of upper surfaces of the first ferrites and the second ferrites.
 7. The electric range according to claim 6, wherein the core fixing part comprises:
 - a fixing wall formed to protrude from the bottom plate, disposed between the first ferrites and the second ferrites, and disposed to surround at least a portion of edges of the first ferrites and the second ferrites.
 8. The electric range according to claim 2, wherein, in the second type,
 - the ferrite cores are provided as a plurality of ferrite cores,
 - the plurality of ferrite cores are disposed radially spaced apart from each other with respect to a center of the core fixing part, and
 - the ferrite cores are formed in any one of:
 - 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.
 9. The electric range according to claim 8, wherein, in the first type, the core fixing part comprises:
 - a bottom plate;
 - a bent part bent from an end of the bottom plate;
 - a second extension part bent and extending from the bent part and covering a portion of an upper surface of the ferrite core; and
 - a cover part formed at a central portion of the core fixing part and covering a portion of an upper surface of a corner portion of the ferrite core.
 10. The electric range according to claim 9, wherein the core fixing part comprises:
 - a first separation wall protruding from the bottom plate, connecting the bent part and the cover part, and disposed between the plurality of ferrite cores to separate the plurality of ferrite cores from each other.
 11. The electric range according to claim 8, wherein, in the second type, the ferrite core is formed in any one of a rectangular shape or a triangular shape.
 12. The electric range according to claim 8, wherein, in the ferrite core,
 - chamfered parts are formed at corners at which the plurality of ferrite cores face each other, and
 - the chamfered parts are formed at corners at which the inclined parts are formed.
 13. The electric range according to claim 12, wherein the core fixing part comprises:
 - a bottom plate;
 - a bent part bent from an end of the bottom plate;
 - a first cover formed at a corner of the core fixing part, provided to cover the inclined part, and fixing the ferrite core;
 - a second cover formed at a central portion of the core fixing part, provided to cover the inclined part at which the chamfered part is formed, and fixing the ferrite core; and
 - a second separation wall protruding from the bottom plate, connecting the bent part and the second cover, and disposed between the plurality of ferrite cores to separate the plurality of ferrite cores from each other.
 14. The electric range according to claim 1, wherein the

core fixing part is formed in a rectangular shape and comprises a fitting protrusion protruding outward from a corner of the core fixing part and fitted to the supporter.

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15. The electric range according to claim 14, wherein the supporter comprises a plurality of seating grooves on which the plurality of ferrite modules are respectively seated, and
a gap is formed between a bottom surface of the seating groove and a lower surface of the ferrite module. 10
16. The electric range according to claim 15, wherein a fitting groove into which the fitting protrusion is fitted is formed in the supporter at a position corresponding to the fitting protrusion, and
a first distance from a lower surface of the fitting protrusion to a lower surface of the ferrite module is formed smaller than a second distance from a lower surface of the fitting groove to a bottom surface of the seating groove. 15 20
17. The electric range according to claim 8, further comprising: an insulating plate disposed between the coil part and the ferrite module and formed of an electrically insulating material. 25
18. The electric range according to claim 1, wherein the coil part is provided as a litz wire plate in which a coil is wound or a coil board on which a working coil is printed. 30

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FIG. 1

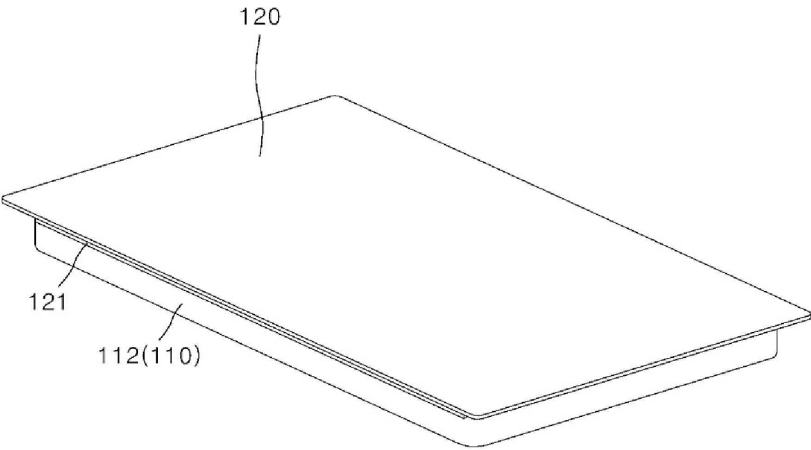


FIG. 2

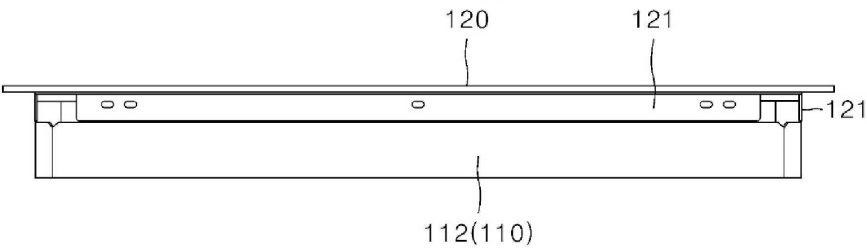


FIG. 3

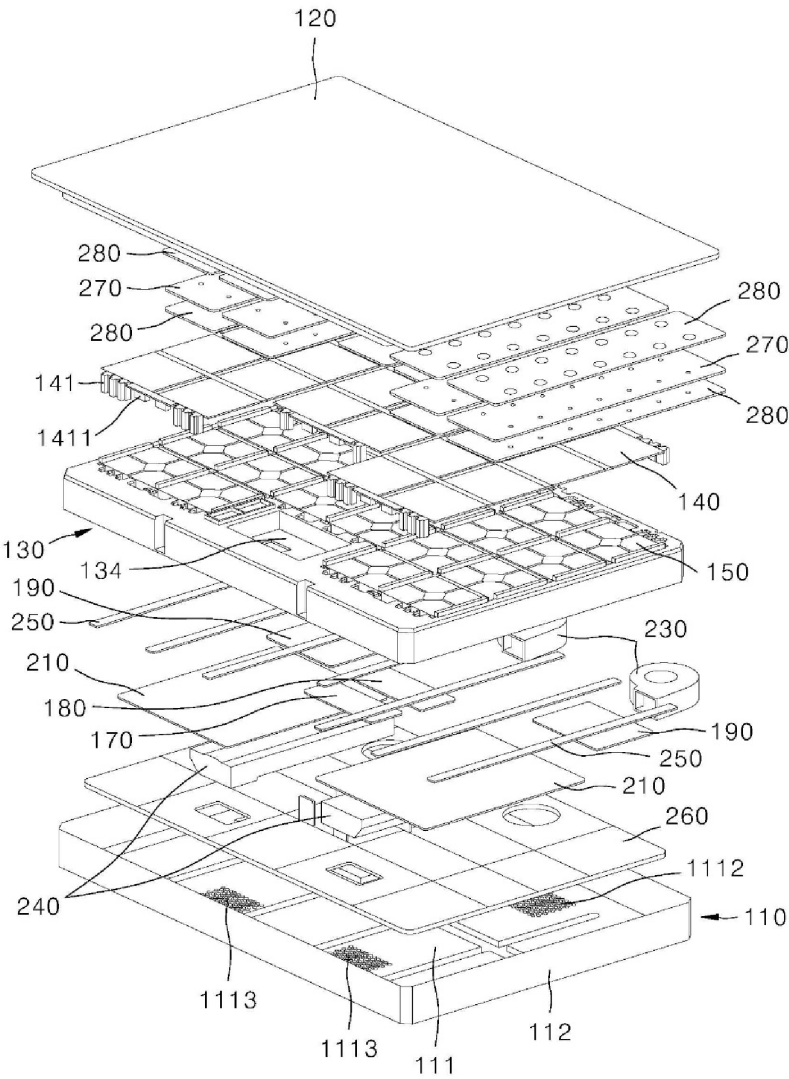


FIG. 4A

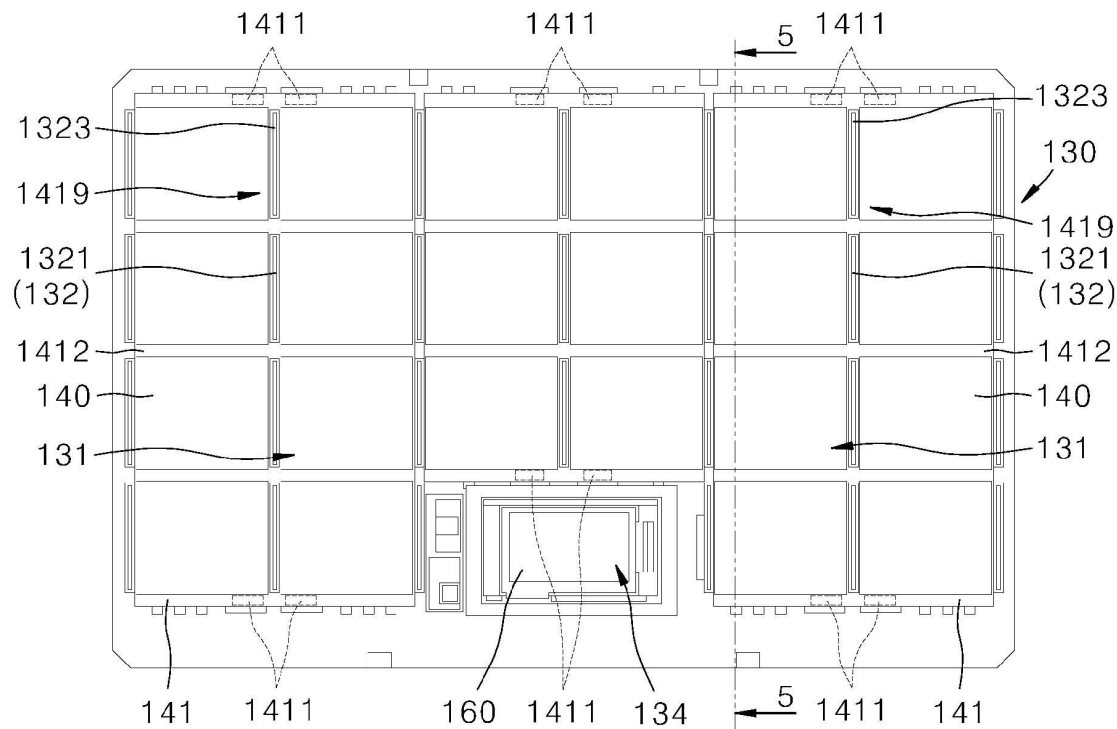


FIG. 4B

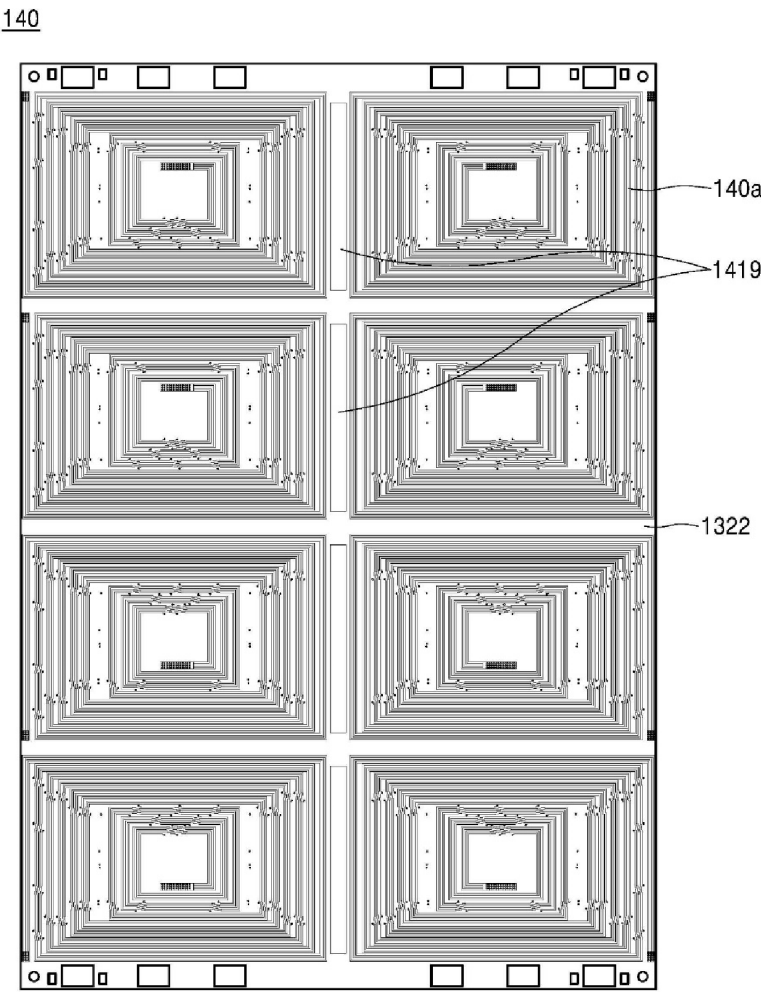


FIG. 5

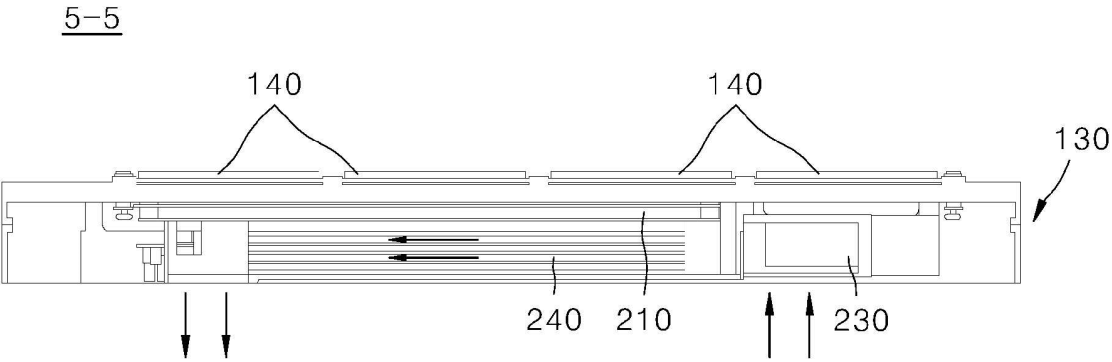


FIG. 6

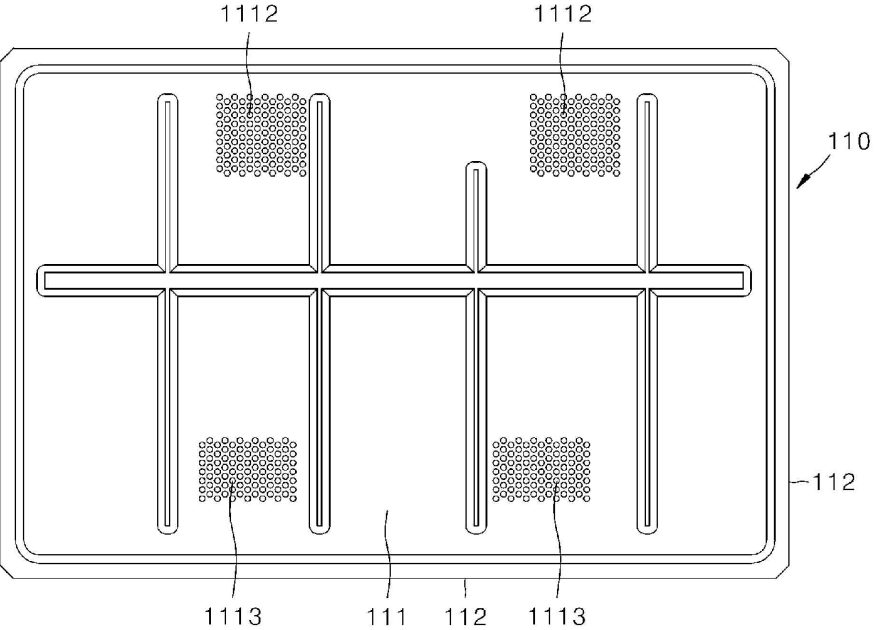


FIG. 7

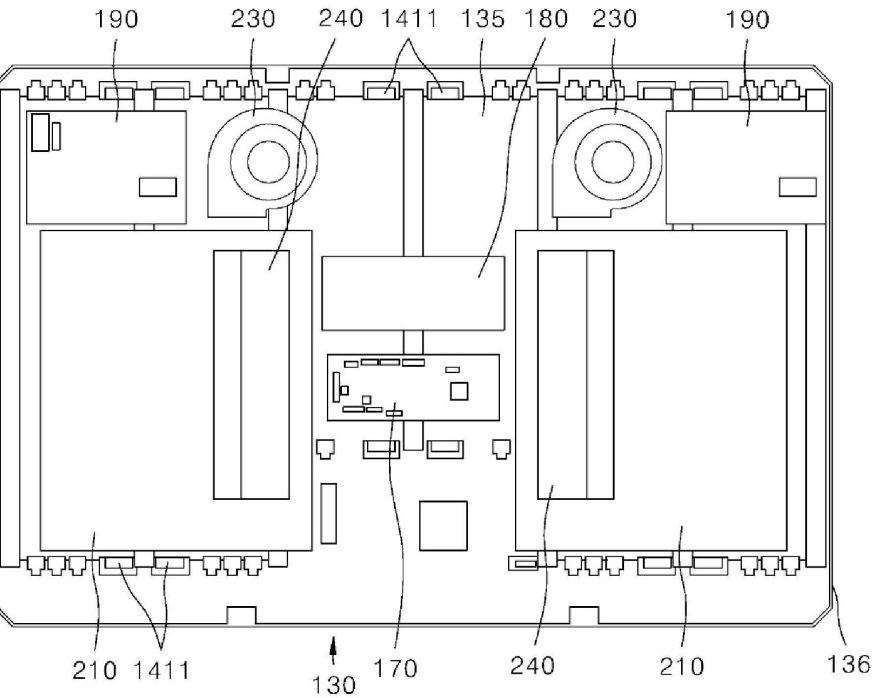


FIG. 8

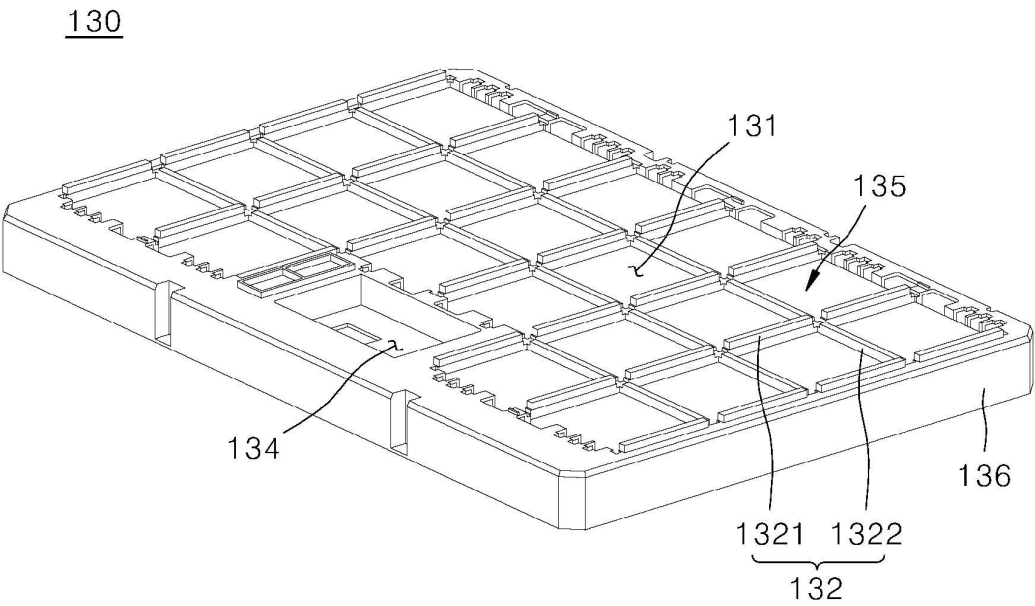


FIG. 9

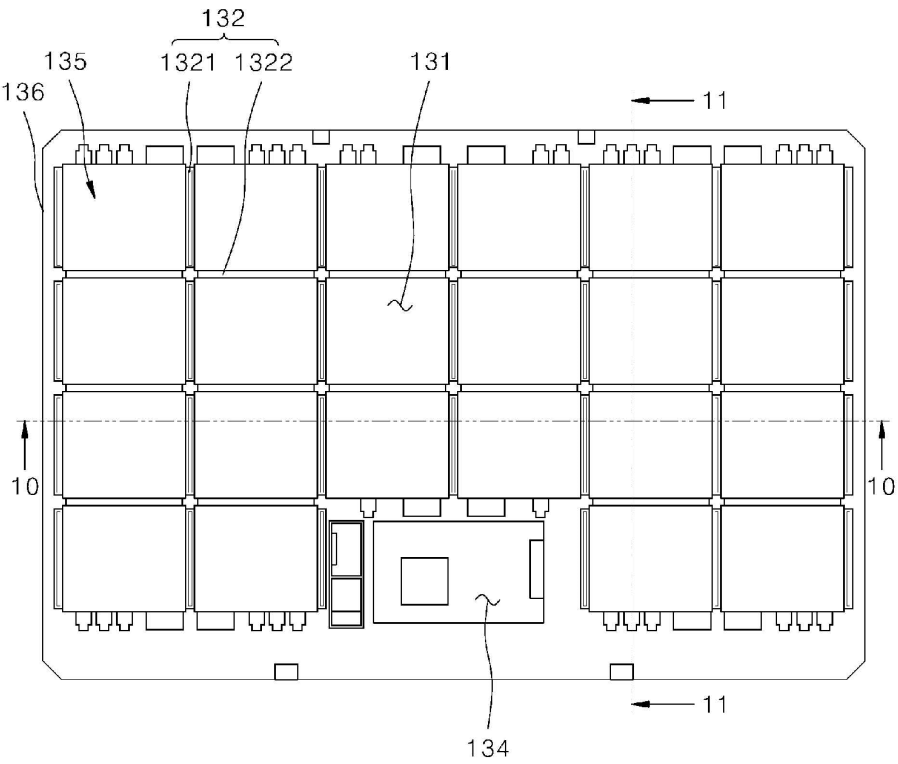


FIG. 10

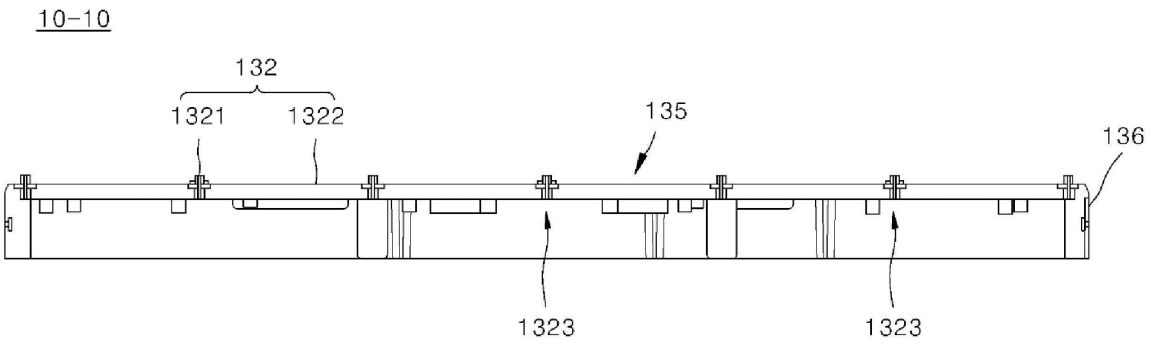


FIG. 11

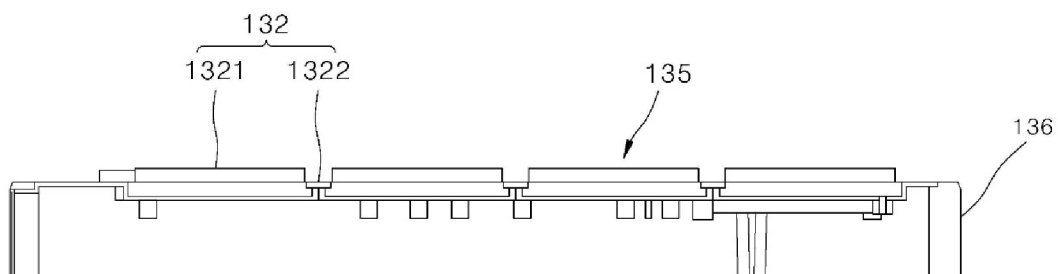


FIG. 12

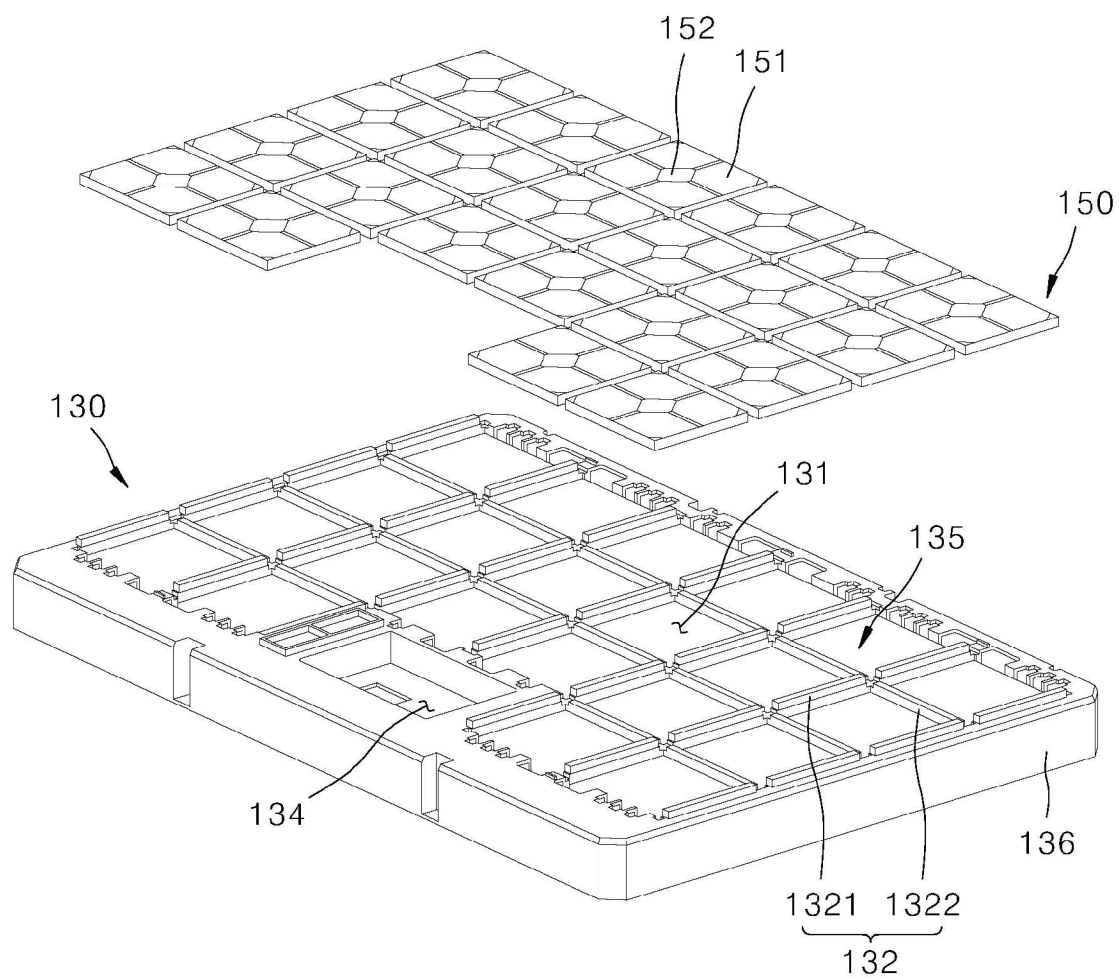


FIG. 13

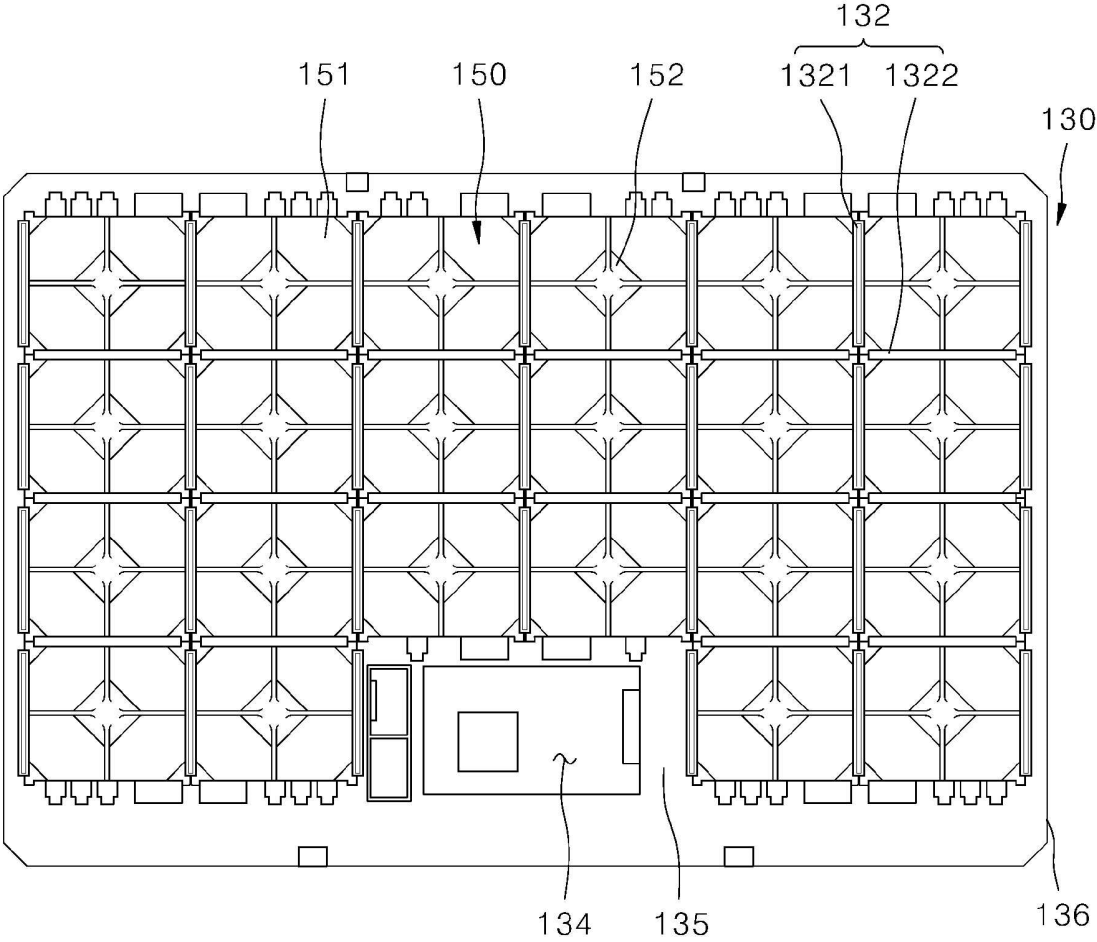


FIG. 14

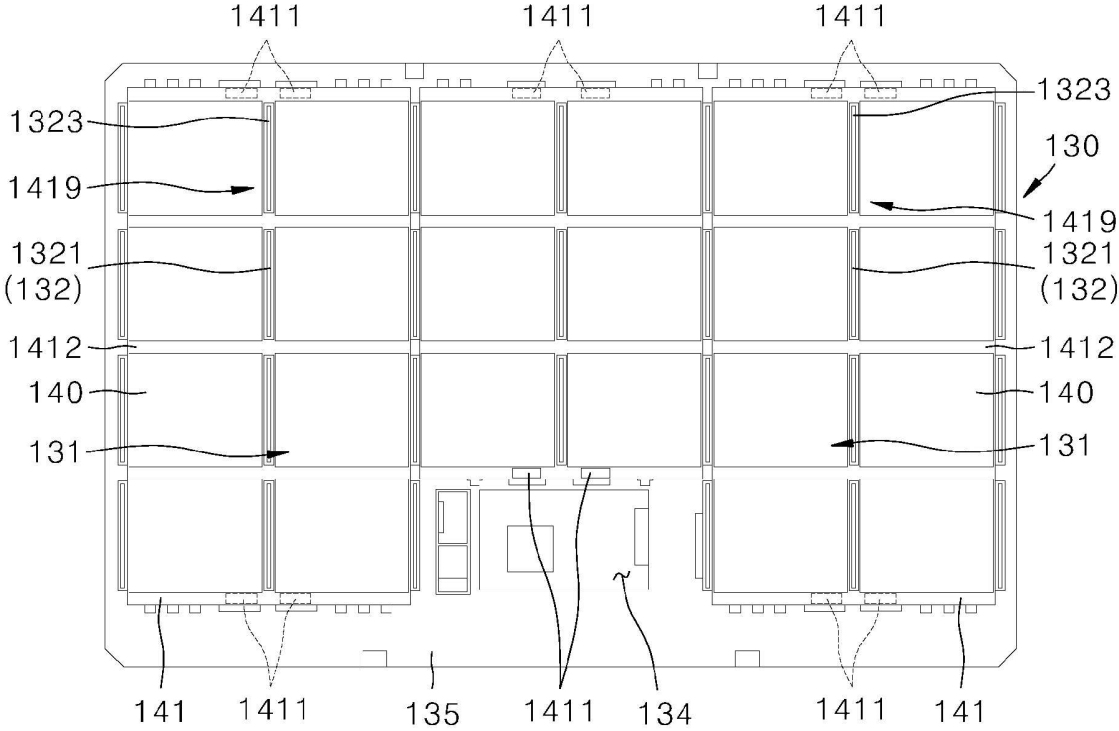


FIG. 15

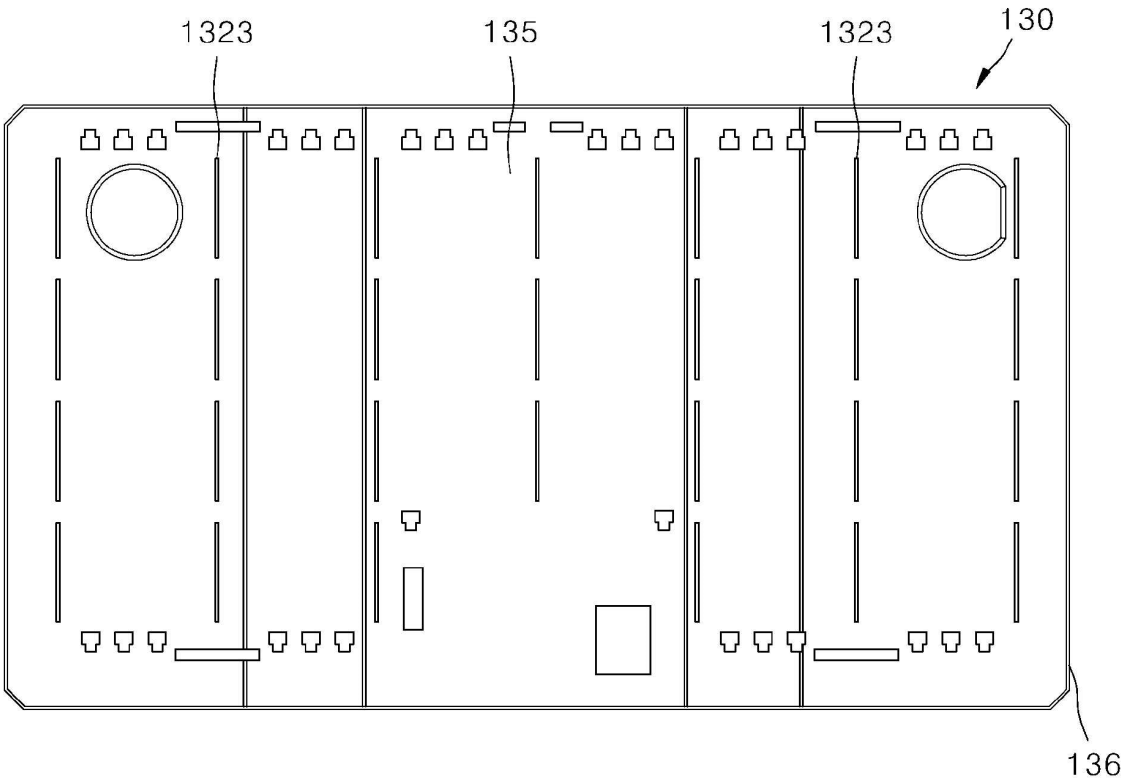


FIG. 16

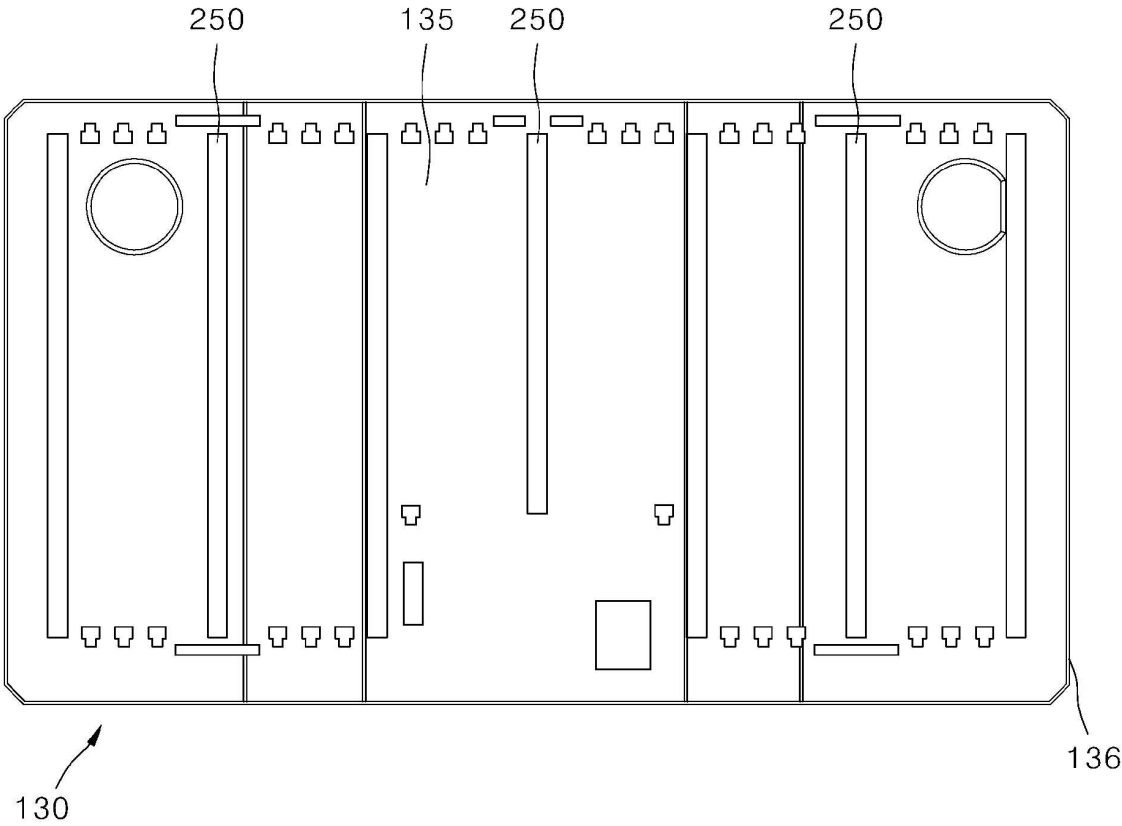


FIG. 17

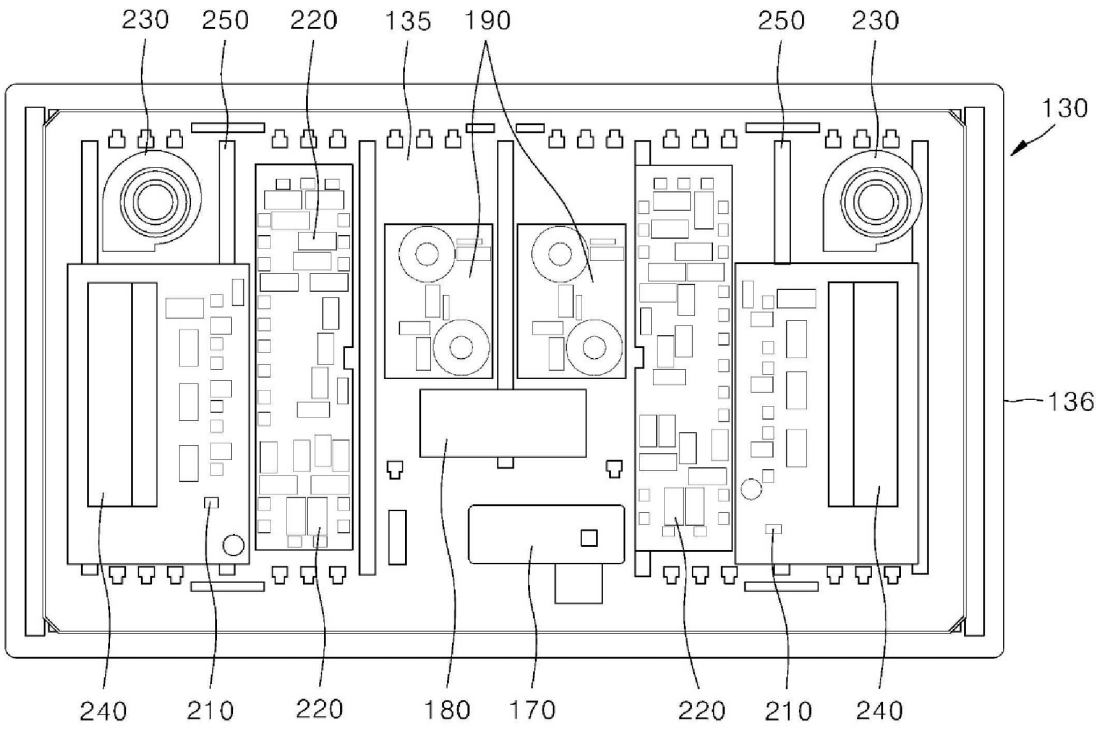


FIG. 18

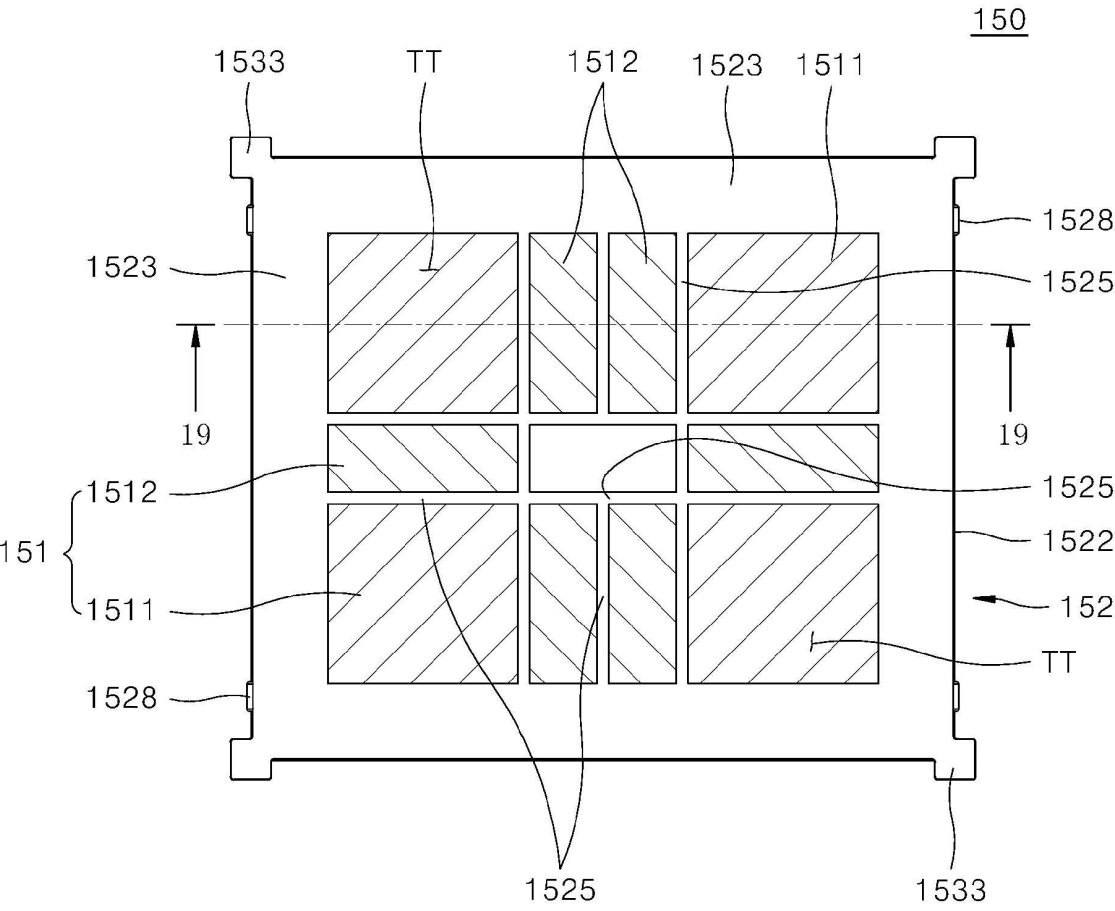


FIG. 19

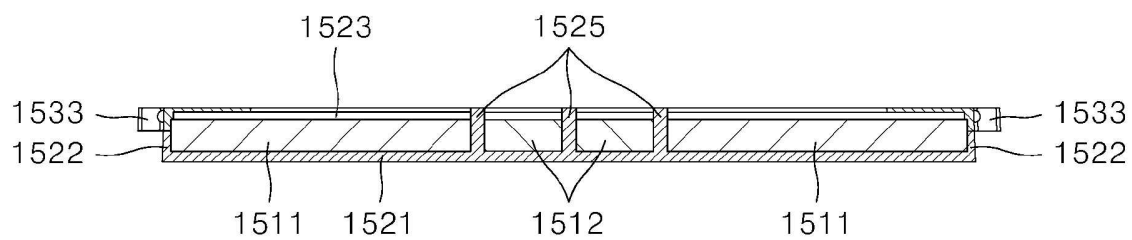


FIG. 20

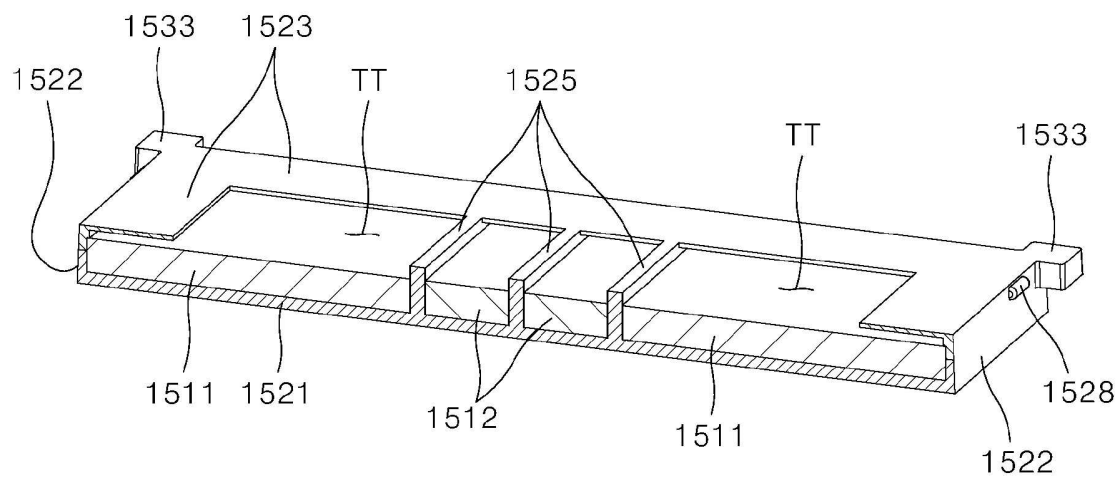


FIG. 21

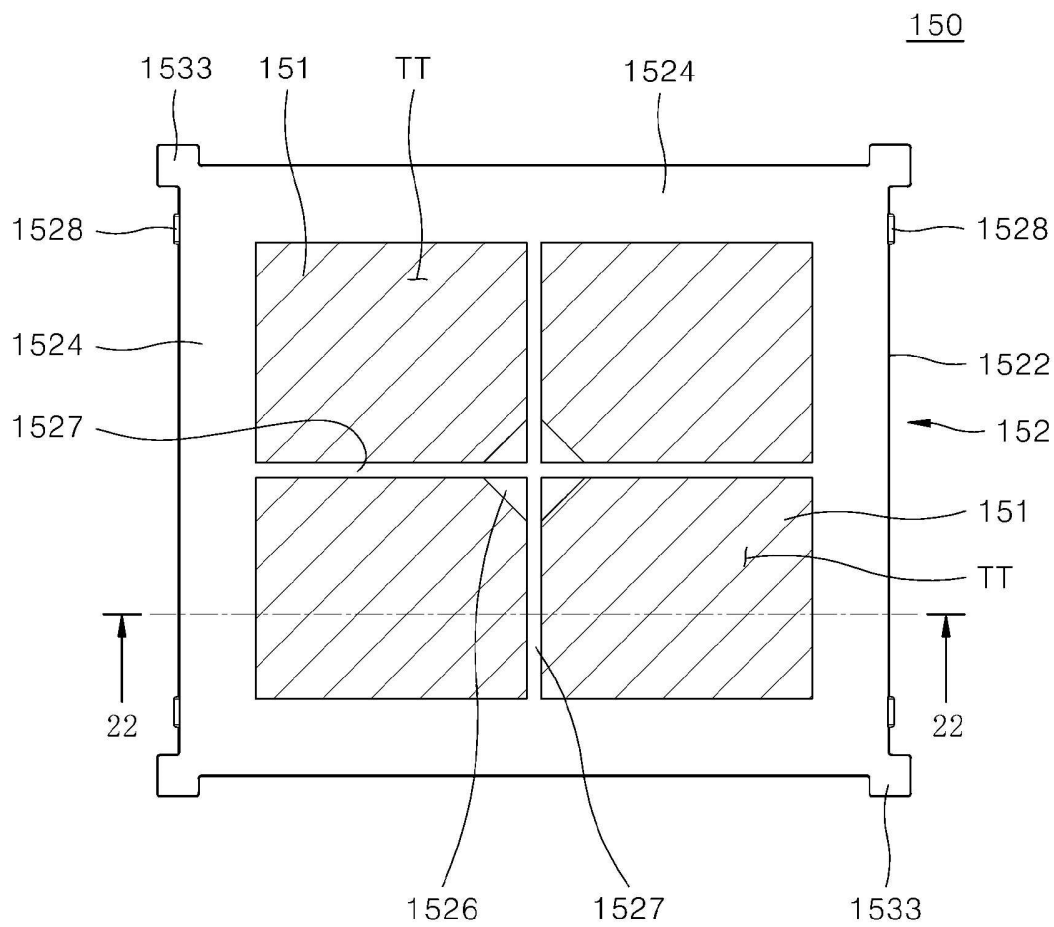


FIG. 22

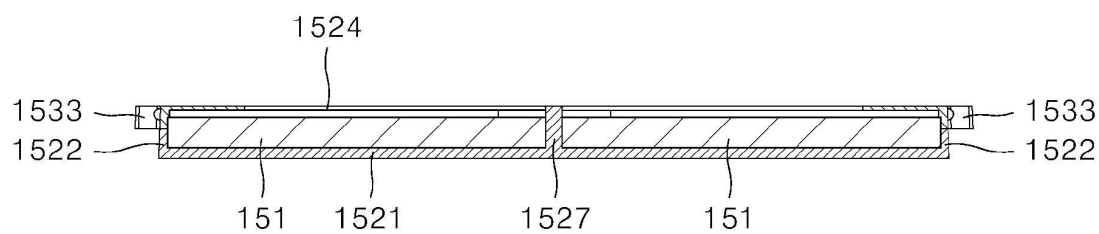


FIG. 23

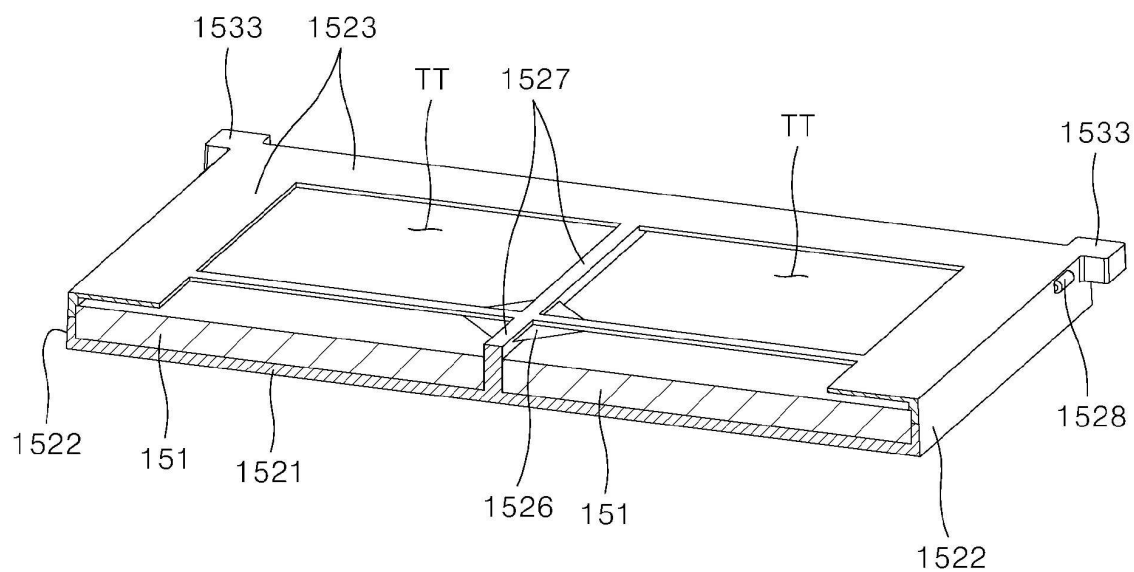


FIG. 24

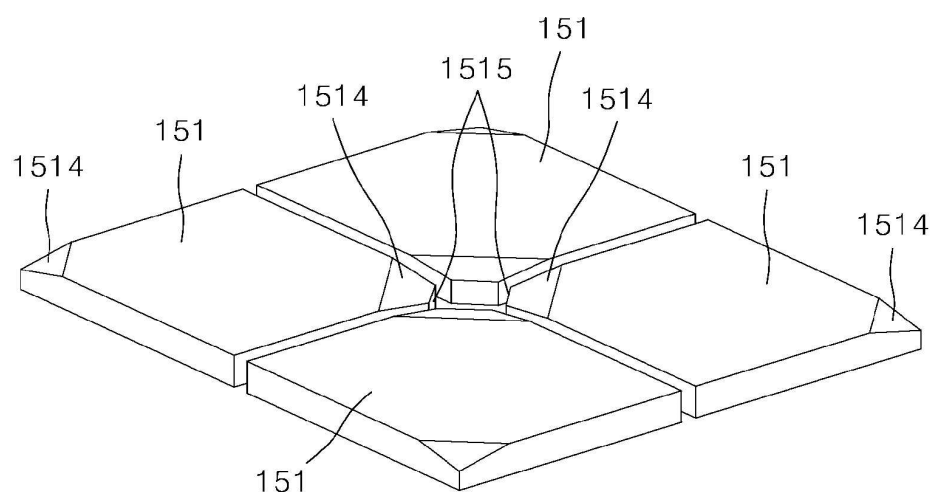


FIG. 25

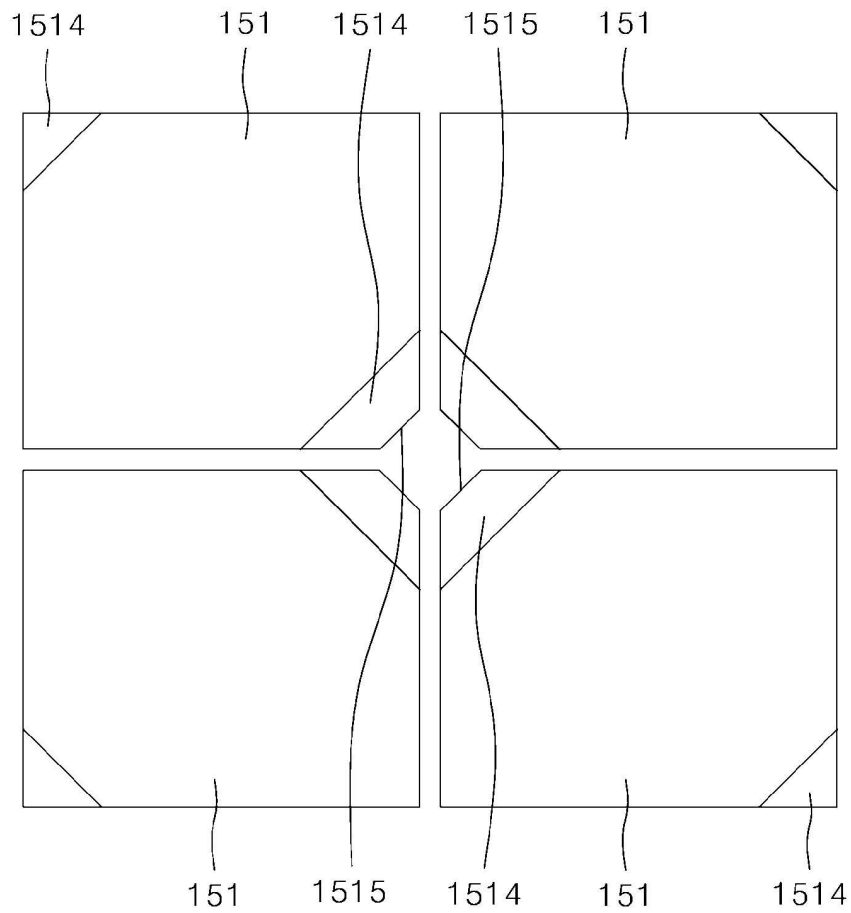


FIG. 26

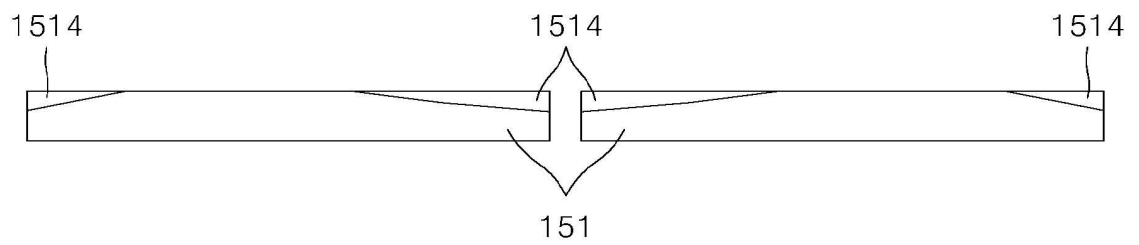


FIG. 27

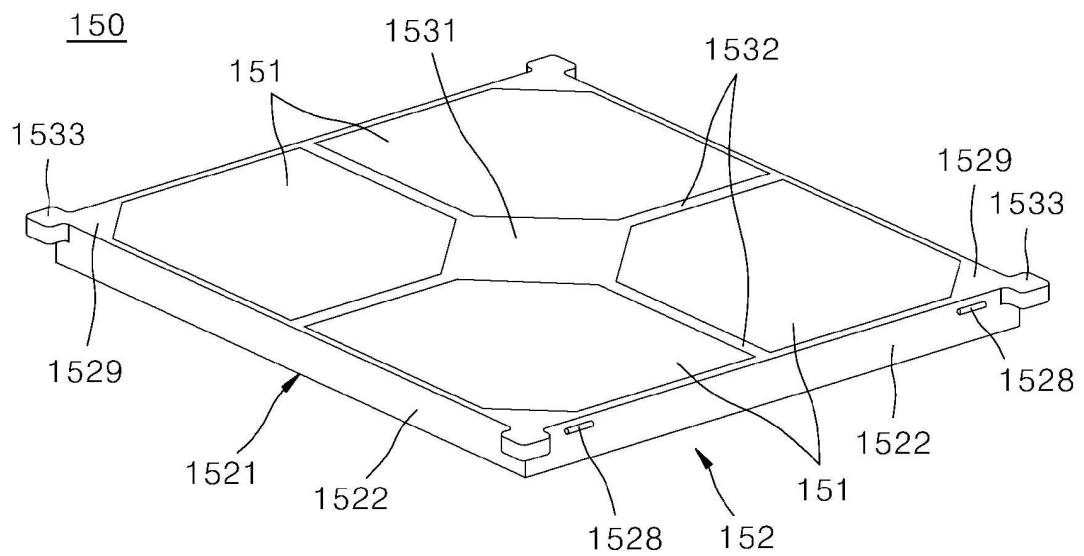


FIG. 28

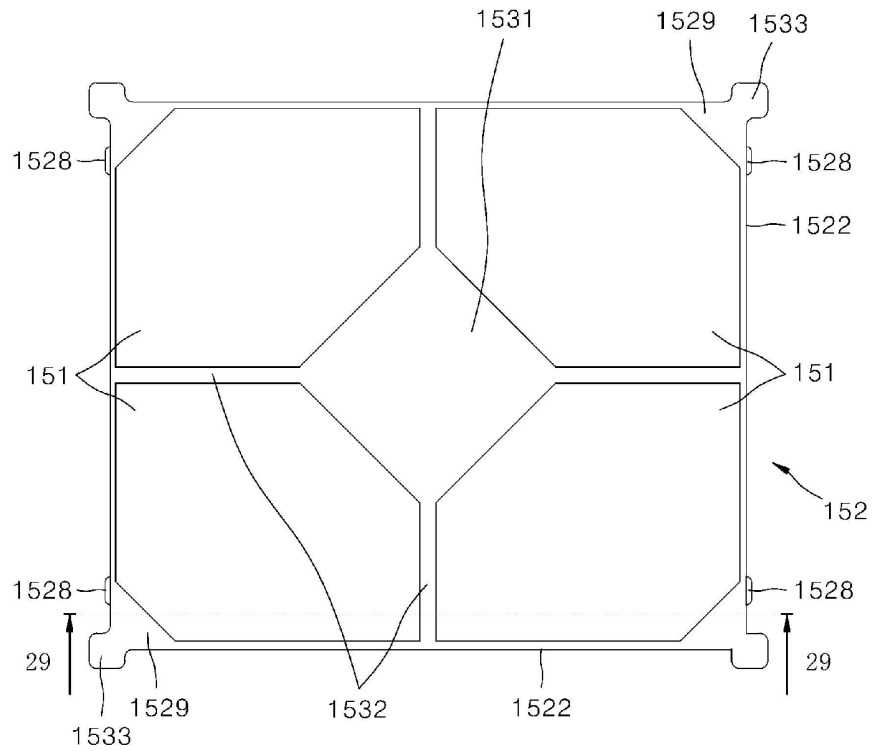


FIG. 29

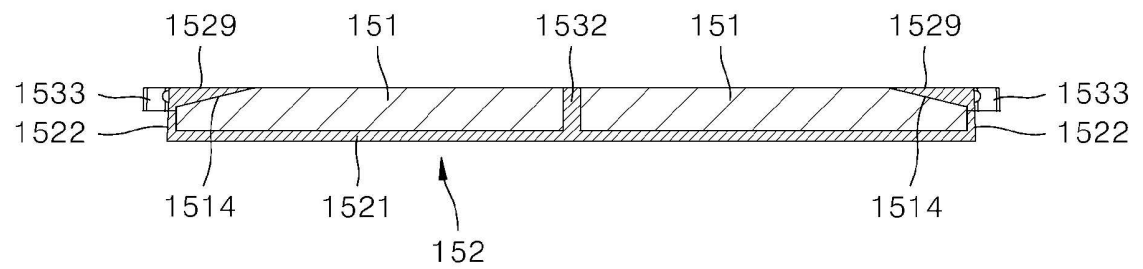


FIG. 30

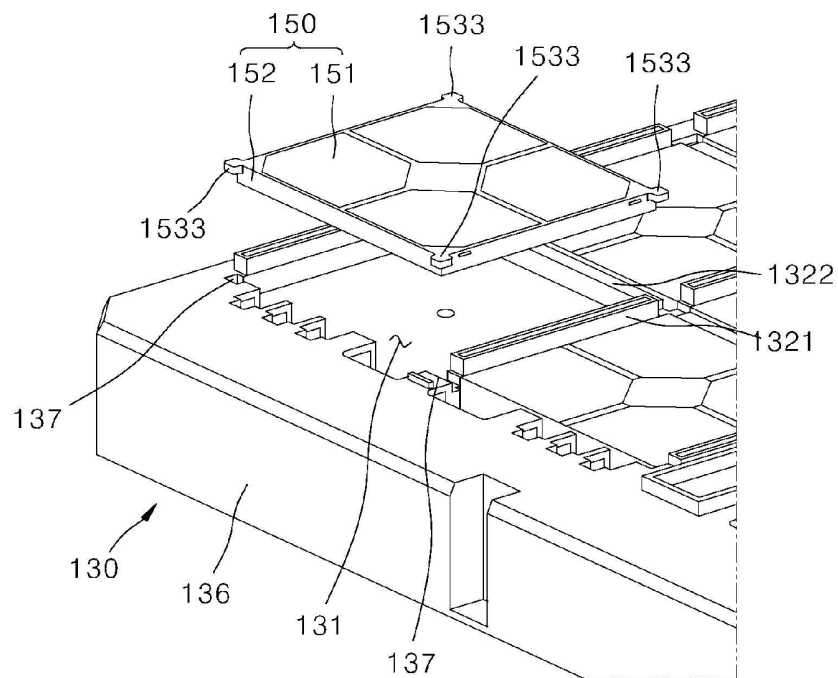


FIG. 31

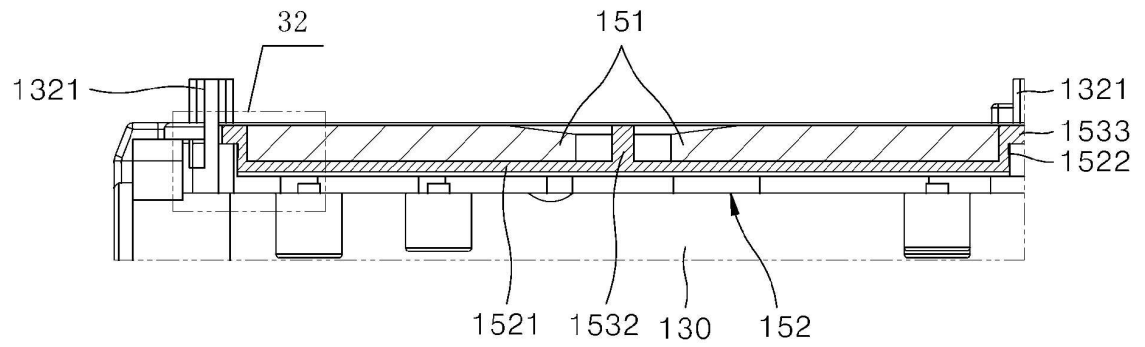


FIG. 32

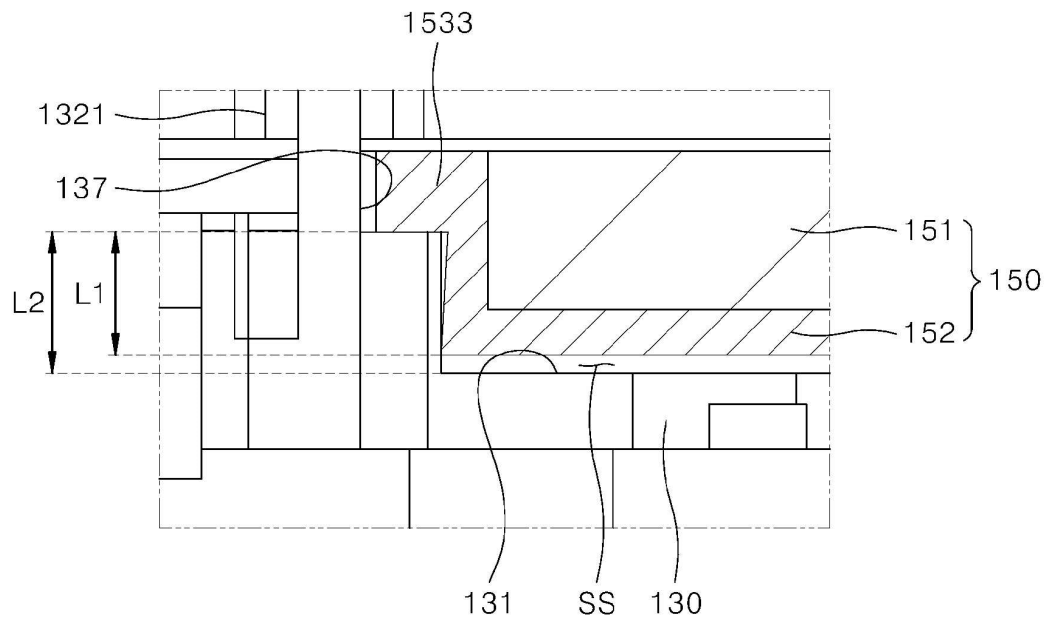
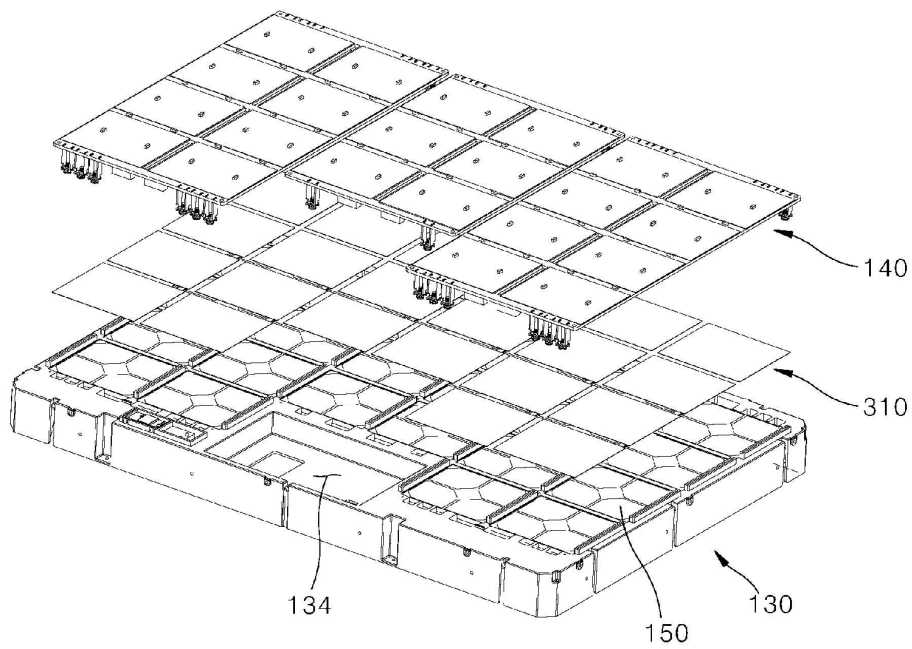


FIG. 33



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2024/014288

A. CLASSIFICATION OF SUBJECT MATTER

H05B 6/12(2006.01)i; F24C 15/10(2006.01)i; F24C 15/34(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; H05B 6/06(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); 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: supporter, working coil, ferrite module, ferrite core, core fixing element, type, arrangement, printed coil plate, winding wire

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]; and figures 6-9.	1-2,8-11,17-18
A		3-7,12-16
Y	JP 2017-084685 A (HITACHI APPLIANCES INC.) 18 May 2017 (2017-05-18) See paragraphs [0023]-[0024] and [0060]; and figures 5-9.	1-2,8-11,17-18
Y	KR 10-2011-0040120 A (SAMSUNG ELECTRONICS CO., LTD.) 20 April 2011 (2011-04-20) See paragraphs [0052] and [0060]; and figures 4-5.	2,8-11,17
A	EP 3291644 A1 (PANASONIC INTELLECTUAL PROPERTY MANAGEMENT CO., LTD.) 07 March 2018 (2018-03-07) See paragraphs [0012]-[0014]; claim 1; and figures 1-6.	1-18

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

☒ See patent family annex.

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“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

26 December 2024

Date of mailing of the international search report

27 December 2024

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
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Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2024/014288

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2021-150442 A (SHIMADA PHYS & CHEM INDUSTRY CO., LTD.) 27 September 2021 (2021-09-27) See paragraphs [0018]-[0233]; claim 29; and figures 12 and 17.	1-18

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2024/014288

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KR	10-2020-0129003	A	17 November 2020	EP	3737212	A1	11 November 2020
				EP	3737212	B1	20 December 2023
				EP	4355029	A2	17 April 2024
				EP	4355029	A3	17 July 2024
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				US	12089320	B2	10 September 2024
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				EP	2312910	A1	20 April 2011
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				JP	6708208	B2	10 June 2020
				WO	2016-174856	A1	03 November 2016

JP	2021-150442	A	27 September 2021	JP	7084956	B2	15 June 2022
