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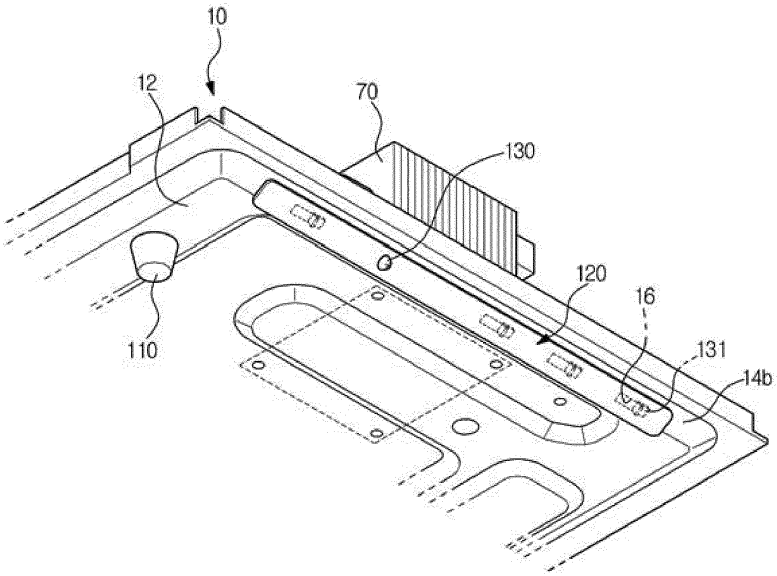
(54) Microwave Oven

(57) Disclosed is a microwave oven having an improved structure to effectively reduce the heat conductivity of a bottom surface, the microwave oven including a cooking compartment configured to accommodate food, a machine chamber provided at inside thereof with a machine part to cook the food, a housing configured to accommodate the cooking compartment and the machine chamber, and a cover member provided at an outer side of a bottom surface of the machine chamber to block heat generated from the machine chamber and transmitted through the housing.

FIG.5



EP 2 844 034 A1

Description

[0001] The present invention relates to a microwave oven, and more particularly, to a microwave oven having an improved structure to ensure the safety of a user.

[0002] A microwave oven is an appliance that heats food by using the nature of electromagnetic waves, called microwaves. The microwave oven heats food using a process known as dielectric heating.

[0003] In general, a microwave oven is installed such that a predetermined space is secured for a bottom surface thereof to emit heat generated during cooking the food.

[0004] The bottom surface of the microwave oven is generally positioned high enough from the ground for a part of a user's body to be inserted into the space, and if a user, including a child, touches the bottom surface that is overheated by the heat generated during cooking, the body part may be injured.

[0005] Therefore, it is an aspect of the present disclosure to provide a microwave oven having an improved structure to ensure the safety of a user.

[0006] It is another aspect of the present disclosure to provide a microwave oven having an improved structure to effectively lower the heat conductivity of the bottom surface to enhance economic efficiency.

[0007] Additional aspects of the disclosure will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the disclosure.

[0008] In accordance with an embodiment of the present disclosure, a microwave oven includes: a cooking compartment configured to accommodate food, a machine chamber provided at inside thereof with a machine part to cook the food; a housing configured to accommodate the cooking compartment and the machine chamber; and a cover member provided at an outer side of a bottom surface of the machine chamber to block heat generated from the machine chamber and transmitted through the housing.

[0009] The bottom surface of the machine chamber may be spaced apart from a ground, and the cover member may be coupled to the outer side of the bottom surface of the machine chamber to prevent a part of a user's body from being inserted into a gap between the bottom surface of the machine chamber and the ground.

[0010] The cover member may include material resistance to heat and having a low heat conductivity.

[0011] The cover member may include material including at least one of plastic, urethane and rubber.

[0012] The cover member may be coupled to the outer side of the bottom surface of the machine chamber by a fixing member.

[0013] The fixing member may include at least one of a hook, a screw and an adhesive.

[0014] The machine part may include a heat emitting apparatus, and the cover member may be provided at the outer side of the bottom surface of the machine chamber while corresponding to the heat emitting apparatus to block heat generated from the heat emitting apparatus and transmitted through the housing.

[0015] The heat emitting apparatus may be coupled to an inner side of the bottom surface of the machine chamber, and the cover member may form a boundary on the outer side of the bottom surface of the machine chamber along a circumference of the heat emitting device.

[0016] In accordance with another aspect of the present disclosure, a microwave oven includes: a cooking compartment configured to accommodate food; a machine chamber provided at inside thereof with a heat emitting apparatus; a housing configured to accommodate the cooking compartment and the machine chamber; and a cover member coupled to an outer side of a bottom surface of the machine chamber to block heat generated from the machine chamber and transmitted through the housing, the cover member having a low heat conductivity.

[0017] The cover member may include material including at least one of plastic, urethane and rubber.

[0018] The heat emitting apparatus may include a high voltage transformer configured to change a voltage; and the cover member is coupled to the outer side of the bottom surface of the machine chamber while corresponding to the high voltage transformer coupled to an inner side of the bottom surface of the machine part, to prevent heat generated from the high voltage transformer from being transferred to a part of a user's body.

[0019] A part of the bottom surface of the machine chamber may be spaced apart from a ground, and the cover member may be coupled to the outer side of the bottom surface of the machine chamber to prevent a part of a user's body from being inserted into a gap between the bottom surface of the machine chamber occupied by the high voltage transformer and the ground.

[0020] The cover member may be coupled to the outer side of the machine chamber to cover a part of the bottom surface of the machine chamber which is occupied by the high voltage transformer.

[0021] A plurality of fastening holes may be formed through the bottom surface of the machine chamber, and the cover member may be coupled to the outer side of the bottom surface of the machine chamber by a fixing member passing through at least one of the plurality of fastening holes.

[0022] The bottom surface of the machine chamber may include a groove part recessed toward the machine chamber. The cover member may include a first blocking part coupled to a side edge of the bottom surface of the machine chamber, and a second blocking part bentedly extending from the first blocking part and accommodated in the groove part.

[0023] The cover member may further include at least one fastening rib extending from the first blocking part and having a fastening hole coupled to the groove part. The fixing member may include at least one of a hook and a screw.

[0024] In accordance with another aspect of the present disclosure, a microwave oven includes: a cooking compartment configured to accommodate food; a machine chamber provided at inside thereof with a magnetron to emit microwaves; a housing configured to accommodate the cooking compartment and the machine chamber, and including a bottom surface provided with a plurality of protrusions protruding toward a ground; a high voltage transformer accommodated in the machine chamber and coupled to an inner side of the bottom surface of the housing to apply a voltage to the magnetron; and a cover member provided at an outer side of the bottom surface of the machine chamber while corresponding to the high voltage transformer, to block heat generated from the machine chamber and transmitted through the housing.

[0025] The bottom surface of the machine chamber may be provided at a side edge thereof with a bead protruding toward the ground; and the cover member may be coupled to one side of the bead to prevent a part of a user's body from being inserted into a gap between the bottom surface of the machine chamber and the ground.

[0026] As is apparent from the above, the heat generated from a high voltage transformer and transmitted to a user can be reduced by coupling a cover member to an outer side of a bottom surface of a housing.

[0027] The material cost can be reduced by using a cover member, and the safety of a user can be ensured by lowering the heat conductivity of the bottom surface of the housing.

[0028] These and/or other aspects of the disclosure will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a perspective view illustrating the external appearance of a microwave oven in accordance with an embodiment of the present disclosure.

FIG. 2 is a perspective view illustrating a high voltage transformer of the microwave oven in accordance with an embodiment of the present disclosure.

FIG. 3 is a view illustrating a bottom surface of the microwave oven in accordance with an embodiment of the present disclosure.

FIG. 4 is a view illustrating a cover member of the microwave oven in accordance with an embodiment of the present disclosure.

FIG. 5 is a view illustrating the bottom surface of the microwave oven in accordance with an embodiment of the present disclosure to which the cover member of FIG. 4 is coupled.

FIG. 6 is a view illustrating a cover member of a microwave oven in accordance with another embodiment of the present disclosure.

FIG. 7 is a view illustrating a bottom surface of the microwave oven in accordance with the other embodiment of the present disclosure to which the cover member of FIG. 6 is coupled.

FIG. 8 is a view illustrating a bottom surface of a microwave oven in accordance with still another embodiment of the present disclosure to which a cover member is coupled.

[0029] Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

[0030] FIG. 1 is a perspective view illustrating the external appearance of a microwave oven in accordance with an embodiment of the present disclosure, and FIG. 2 is a perspective view illustrating a high voltage transformer of the microwave oven in accordance with an embodiment of the present disclosure.

[0031] Referring to FIGS. 1 and 2, a microwave oven 1 includes a housing 10 forming the external appearance thereof, a cooking compartment 20 having an open front surface to input food therethrough, and a machine chamber 30 in which various machine parts are installed.

[0032] A door 40 has one side thereof hingedly coupled to a front surface of the housing 10 to open and close the cooking compartment 20, and a control panel 50 is installed on a front side of the machine chamber 30 to operate the various machine parts in the machine chamber 30.

[0033] Installed in the machine chamber 30 are a magnetron 60 configured to generate microwaves that is to be emitted to the cooking compartment 20, and a high voltage transformer 70, a high voltage condenser 80 and a high voltage diode 90 that form a driving circuit to drive the magnetron 60. Provided on a rear side of the machine part 30 is a cooling fan 100 to cool the various machine parts in the machine chamber 30 by suctioning outside air.

[0034] The high voltage transformer (HVT) 70 outputs a high voltage of about 2000V by receiving a commercial AC power source (110V or 220V), and the output voltage is doubled by the high voltage condenser 80 and the high voltage diode 90 and kept at 4000V. The voltage is supplied to the magnetron 60, and microwaves of about 2450MHz are generated from the magnetron 60.

[0035] The high voltage transformer 70 includes a core 71, a primary coil 72 and a secondary coil 73. In detail, the high voltage transformer 70 includes the core 71 formed by stacking silicon plates or steel plates formed of permalloy or ferrite, and the primary coil 72 and the secondary coil 73 wounded around the core 71. The primary coil 72 is provided with an input terminal to receive a commercial power source, and the secondary coil 73 is provided with an output terminal 75 to output a high voltage power. The output voltage of the output terminal 75 is set by a turn ratio of the primary coil 72 and the second coil 73. The core 71, the primary coil 72 and the secondary coil 73 are fixed to the bottom of the machine chamber 30 by a mounting plate 76.

[0036] Hereinafter, an operation of the microwave oven 1 will be described. First, foods are placed in the cook-

ing compartment 20, and as the microwave oven is operated by the control panel 50, a commercial power source is applied to the high voltage transformer 70 to be boosted to about 2000V. The boosted voltage is doubled to about 4000V by the high voltage condenser 80 and the high voltage diode 90, and then transferred to the magnetron 60. The magnetron 60 generates microwaves of about 2450MHz by receiving the high voltage power, and emits the generated microwaves to the cooking compartment 20 for foods in the cooking compartment 20 to be cooked.

[0037] Meanwhile, when the microwave oven 1 operates, the cooling fan 100 operates to cool the heat generated from the magnetron 60 or the high voltage transformer 70 to form an air flow that may circulate outside air to the inside of the machine chamber 30.

[0038] FIG. 3 is a view illustrating a bottom surface of the microwave oven in accordance with an embodiment of the present disclosure.

[0039] Referring to FIG. 3, a bottom surface of the microwave oven 1 includes a first region 1 corresponding to the cooking compartment 20 and a second region 12 corresponding to the machine chamber 30. In general, since the cooking compartment 20 in which foods are accommodated has an area larger than that of the machine chamber 30 in which machine parts are provided, the first region 11 has an area larger than that of the second region 12. However, the areas and positions of the first region 11 and the second region 12 is not limited thereto, and may vary.

[0040] The first region 11 is provided with a plurality of louvers 13 to dissipate heat generated according to operation of the microwave oven 1. The plurality of louvers 13 may be formed on a lateral side surface of the housing 10 as well as the bottom surface of the machine chamber 30.

[0041] The high voltage transformer 70 may be provided on the second region 12. In order to prevent heat generated from the high voltage transformer 70 from being transferred to a user through the second region 12, a cover member 120 may be provided on the second region 12. The coupling structure of the cover member 120 may be described later in detail.

[0042] A bead 14 may be formed on the bottom surface of the microwave oven 1. The bead 14 may be naturally formed by the various electronic parts coupled to the bottom surface, or may be intentionally formed to reinforce the bottom surface. The bead 14 may be provided in the form recessed toward an inner side of the bottom surface, or protruding toward an outer side of the bottom surface. A part of the bottom surface on which the bead 14 is formed may be not flat.

[0043] At least one support member 110 may be provided on the bottom surface of the microwave oven 1 to support the housing 10. Elastic material may be provided on an outer side of the support member 110 to prevent the support member 110 from being slipped from the ground. The elastic material may include rubber. The support member 110 may be formed as a separate part, or may be provided as a bead 14a formed through injection molding to be faced outward of the housing 10.

[0044] The bottom surface of the microwave oven 1 may be spaced apart from the ground (or the external surface on which the microwave is placed) by the beads 14 and 14a provided on the bottom surface of the microwave oven 1 or the support member 110.

[0045] FIG. 4 is a view illustrating a cover member of the microwave oven in accordance with an embodiment of the present disclosure, and FIG. 5 is a view illustrating the bottom surface of the microwave oven in accordance with an embodiment of the present disclosure to which the cover member of FIG. 4 is coupled.

[0046] Referring to FIGS. 4 and 5, the microwave oven 1 may include the cover member 120. The cover member 120 may be provided on the outer side of the bottom surface of the machine chamber 30 to block heat generated during cooking food and transferred through the housing 10. The cover member 120 prevents a part of a use's body from being inserted between a gap between the bottom surface of the machine part 30 and the ground, thereby ensuring the user's safety.

[0047] In particular, the cover member 120 may be provided at the outer side of the bottom surface of the machine chamber 30 while corresponding to a heat emitting apparatus provided in the machine chamber 30, to block heat generated from the heat emitting apparatus and transferred through the housing 10. The heat emitting apparatus includes the high voltage transformer 70, and the cover member 120 may be installed in the second region 12 to prevent heat generated from the high voltage transformer 70 from being transferred to a user through the bottom surface of the housing 10.

[0048] The cover member 120 may be coupled to the outer side of the bottom surface of the machine chamber 30 to cover a part of the second region 12 corresponding to the high voltage transformer 70 or the entire area of the second region 12.

[0049] The cover member 120 may be provided in a linear shape, but the shape of the cover member 120 is not limited thereto.

[0050] The cover member 120 may be formed of material resistant to heat, and having a low heat conductivity. The material of the cover member 120 includes at least one of plastic, urethane and rubber.

[0051] The cover member 120 may be installed at a side edge of the second region 12 to prevent a part of a user's body from being inserted between a gap between the second region 12 occupied by the high voltage transformer 70 and the ground. In detail, the cover member 120 may be installed on a lateral side of a bead 14b formed at a side edge of the second region 12 while protruding toward the ground. The cover member 120 may cover all or a part of a side edge of the second region 12 to prevent heat generated from the high voltage transformer 70 from being transferred to a user through the bottom surface of the machine chamber 30.

[0052] The cover member 120 may be coupled to the outer side of the bottom surface of the machine chamber 30. The bottom surface of the machine chamber 30 may be provided with a first fastening hole15 and a second fastening hole 16 each having a different shape. Each of the first fastening hole 15 and the second fastening hole 16 may be provided in at least one unit thereof. Alternatively, only one of the first fastening hole 15 and the second fastening hole 16 may be formed.

[0053] The cover member 120 may be provided with a fastening hole 121 corresponding to the first fastening hole 15 and a second fixing member 131 corresponding to the second fastening hole 16.

[0054] The cover member 120 may be coupled to the outer side of the bottom surface of the machine chamber 30 by fixing members 130 and 131. The fixing members 130 and 131 may include at least one of a hook, a screw and an adhesive. In detail, as the second fixing member 131 is fastened to the second fastening hole 16 formed through the bottom surface of the machine chamber 30, the cover member 120 is temporarily fixed to the outer side of the bottom surface of the machine chamber 30, and as the first fixing member 130 passes through the fastening hole 121 formed through the cover member 120 and the first fastening hole 15 formed through the bottom surface of the machine chamber 30, the cover member 120 is coupled to the outer side of the bottom surface of the machine chamber 30.

[0055] If the cover member 120 is coupled to the bottom surface of the machine chamber 30 only by the second fixing member 131 fastened to the second fastening hole 16, the coupling force between the cover member 120 and the bottom surface of the machine chamber 30 may be weak. Accordingly, the cover member 120 may be coupled to the bottom surface of the machine chamber 30 by the at least one first fixing member 130 passing through the fastening hole 121 and the first fastening hole 15.

[0056] The number and positions of the first and second fixing members 130 and 131 may be variously provided.

[0057] The cover member 120 may include various colors or patterns to enhance the aesthetic quality. When the cover member 120 is provided to have the same color and texture as those of the housing 10, the unity with the housing 10 is promoted.

[0058] FIG. 6 is a view illustrating a cover member of a microwave oven in accordance with another embodiment of the present disclosure, and FIG. 7 is a view illustrating a bottom surface of the microwave oven in accordance with the other embodiment of the present disclosure to which the cover member of FIG. 6 is coupled. Referring to FIGS. 6 and 7, a cover member 120a may be provided in a bent shape.

[0059] The cover member 120a may be provided with a shape of "¬" or "⊏" in a second region 12a of a housing 10a in which the high voltage transformer 70 is placed, to prevent a part of a user's body from being inserted between a gap between the second region 12a of the housing 10a and the ground.

[0060] The bottom surface of the machine chamber 30 includes a groove part 143 recessed toward the machine chamber 30, and the cover member 120a includes a first blocking part 140 coupled to a side edge of the bottom surface of the machine chamber 30 and a second blocking part 141 bentedly extending from the first blocking part 140 and accommodated in the groove part 143.

[0061] In addition, the cover member 120a may further include at least one fastening rib 142 extending from the first blocking part 140 and having a fastening hole 121a coupled to the groove part 143.

[0062] The cover member 120a may be coupled to the outer side of the bottom surface of the housing 10a by fixing members 130a and 131a.

[0063] The fixing members 130a and 131a may include at least one of a hook, a screw and an adhesive. In detail, the bottom surface of the housing 10a may be provided with at least one first fastening hole 15a and at least one second fastening hole 16a having a shape different from that of the at least one first fastening hole 15a.

[0064] The cover member 120a may be provided with the at least one fastening hole 121a corresponding to the at least one first fastening hole 15a, and the at least one second fixing member 131a corresponding to the at least one second fastening hole 16a. The at least one second fixing member 131a may include a hook.

[0065] As the at least one second fixing member 131a is fastened to the second fastening hole 16a formed through the bottom surface of the housing 10a, the cover member 120a is temporarily fixed to the outer side of the bottom surface of the housing 10a, and as the first fixing member 130a passes through the fastening hole 121a formed through the cover member 120a and the first fastening hole 15a formed through the bottom surface of the housing 10a, the cover member 120a is coupled to the outer side of the bottom surface of the housing 10a.

[0066] The bottom surface of the microwave oven 1 may be provided with at least one support member 110a to support the housing 10a. A bead 14c also serves to support the housing 10a in the same manner of the support member 110a.

[0067] FIG. 8 is a view illustrating a bottom surface of a microwave oven in accordance with still another embodiment of the present disclosure to which a cover member is coupled.

[0068] Referring to FIG. 8, a boundary 122 may be formed on an outer side of a bottom surface of a housing 10b. A cover member 120b may form the boundary 122 in a second region 12b corresponding to a circumference of the high voltage transformer 70 to prevent heat generated from the high voltage transformer 70 from being transferred to a user through the bottom surface.

[0069] In order to have the bottom surface of the housing 10b spaced apart from the ground by a constant height, the support member 110b formed on the bottom surface of the housing 10b may have the same height

as that of a bead 14d serving as the support 110b.

[0070] The boundary 122 formed in the second region 12b may have a height smaller than or equal to those of the support member 110b formed on the bottom surface of the housing 10b and the bead 14d serving as the support 110b.

[0071] The boundary 122 may be formed on all or a part of the second region 12b corresponding to a circumference of the high voltage transformer 70. The boundary 122 may be formed on a part of the second region 12b corresponding to a circumference of the high voltage transformer 70 to prevent a part of a user's body from being inserted between a gap between the second region 12b corresponding to the high voltage transformer 70 and the ground.

[0072] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles of the invention, the scope of which is defined in the claims.

Claims

1. A microwave oven comprising:

a cooking compartment configured to accommodate food;
a machine chamber provided at the inside thereof with a machine part to cook the food;
a housing configured to accommodate the cooking compartment and the machine chamber; and
a cover member provided at an outer side of a bottom surface of the machine chamber to block heat generated from the machine chamber and transmitted through the housing.

2. The microwave oven of claim 1, wherein:

the bottom surface of the machine chamber is arranged to be spaced apart from a support surface on which the microwave oven is supported; and
the cover member is coupled to the outer side of the bottom surface of the machine chamber to prevent a part of a user's body from being inserted into a gap between the bottom surface of the machine chamber and the support surface.

3. The microwave oven of claim 1 or 2, wherein the cover member includes material resistant to heat and having a low heat conductivity.

4. The microwave oven of claim 3, wherein the cover member includes material including at least one of plastic, urethane and rubber.

5. The microwave oven of any one of the preceding claims, wherein the cover member is coupled to the outer side of the bottom surface of the machine chamber by a fixing member.

6. The microwave oven of claim 5, wherein the fixing member includes at least one of a hook, a screw and an adhesive.

7. The microwave oven of claim 5, wherein:

a plurality of fastening holes are formed through the bottom surface of the machine chamber; and
the cover member is coupled to the outer side of the bottom surface of the machine chamber by a fixing member passing through at least one of the plurality of fastening holes.

8. The microwave oven of claim 7, wherein:

the bottom surface of the machine chamber includes a groove part recessed toward the machine chamber; and
wherein the cover member includes:

a first blocking part coupled to a side edge of the bottom surface of the machine chamber; and
a second blocking part extending from the first blocking part and accommodated in the groove part.

9. The microwave oven of claim 8, wherein the cover member further includes at least one fastening rib extending from the first blocking part and having a fastening hole coupled to the groove part.

10. The microwave oven of any one of the preceding claims, wherein:

the machine part includes a heat emitting apparatus; and
the cover member is provided at the outer side of the bottom surface of the machine chamber while corresponding to the heat emitting apparatus to block heat generated from the heat emitting apparatus and transmitted through the housing.

11. The microwave oven of claim 10, wherein:

the heat emitting apparatus is coupled to an inner side of the bottom surface of the machine chamber; and
the cover member forms a boundary on the outer side of the bottom surface of the machine cham-

ber along a circumference of the heat emitting device.

FIG.1

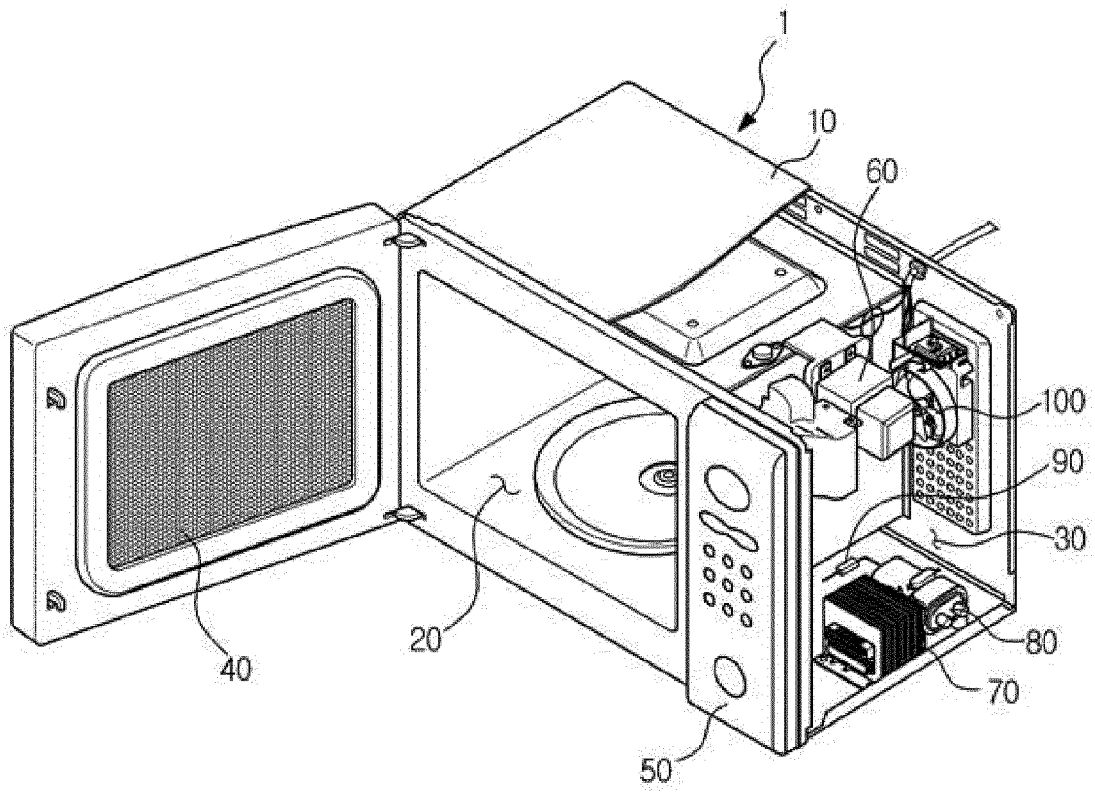


FIG.2

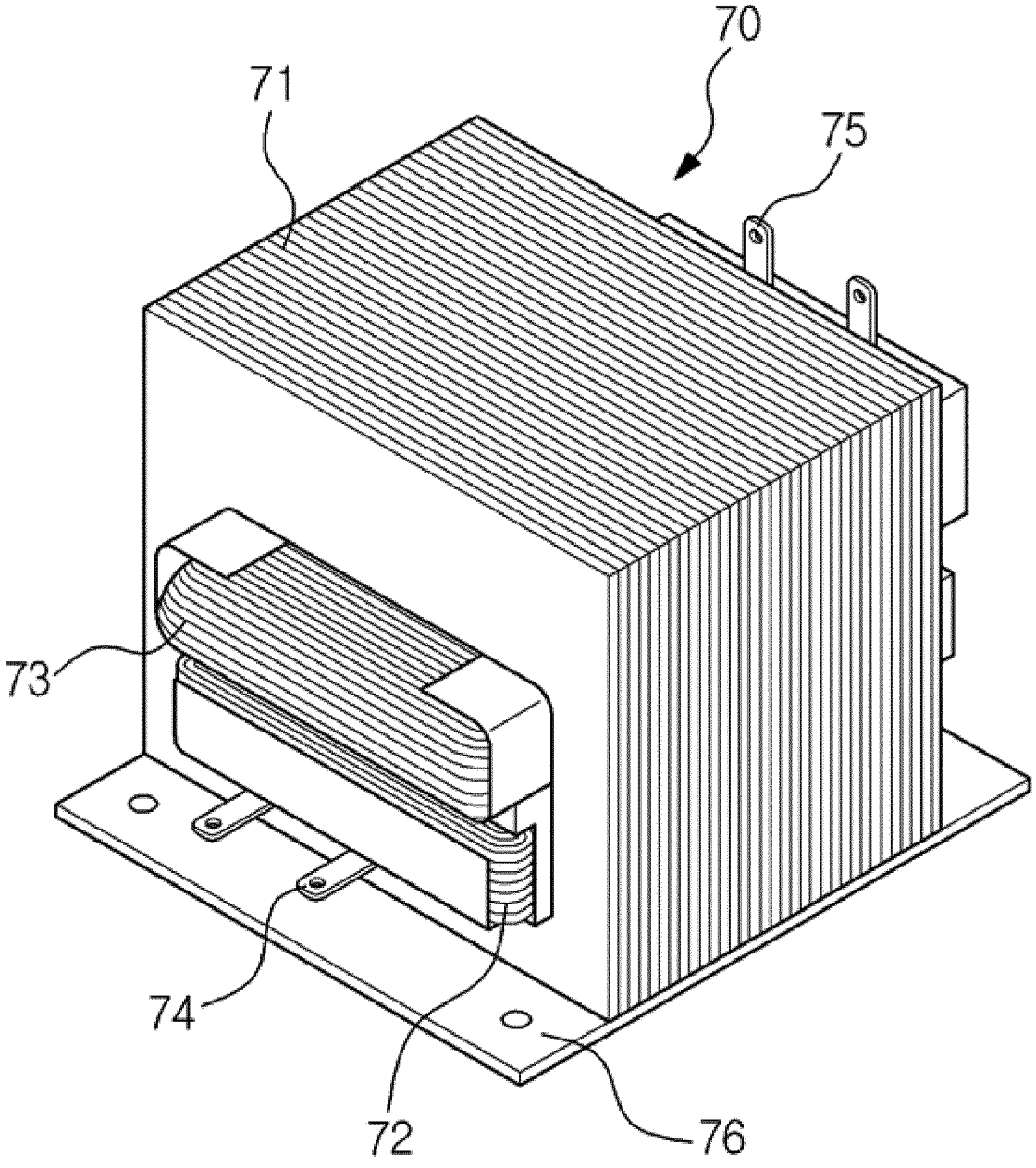


FIG.3

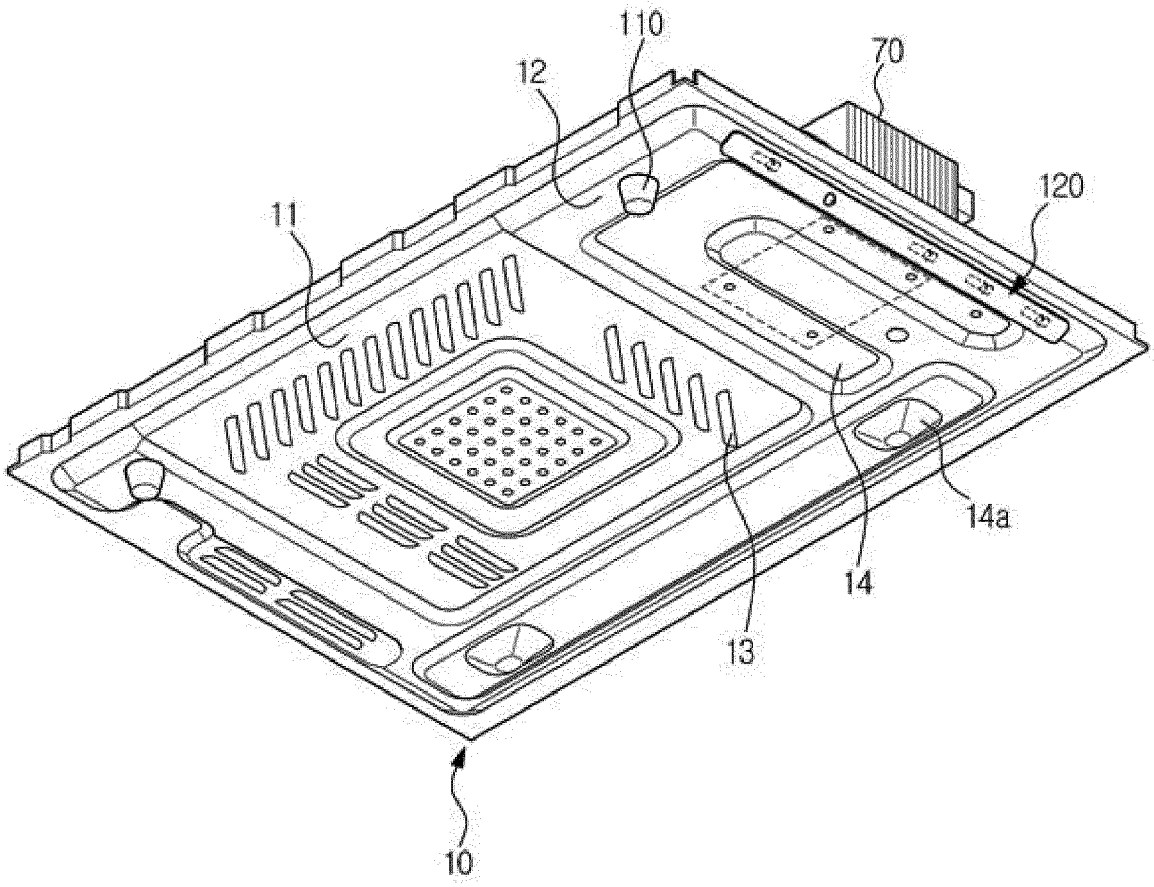


FIG.4

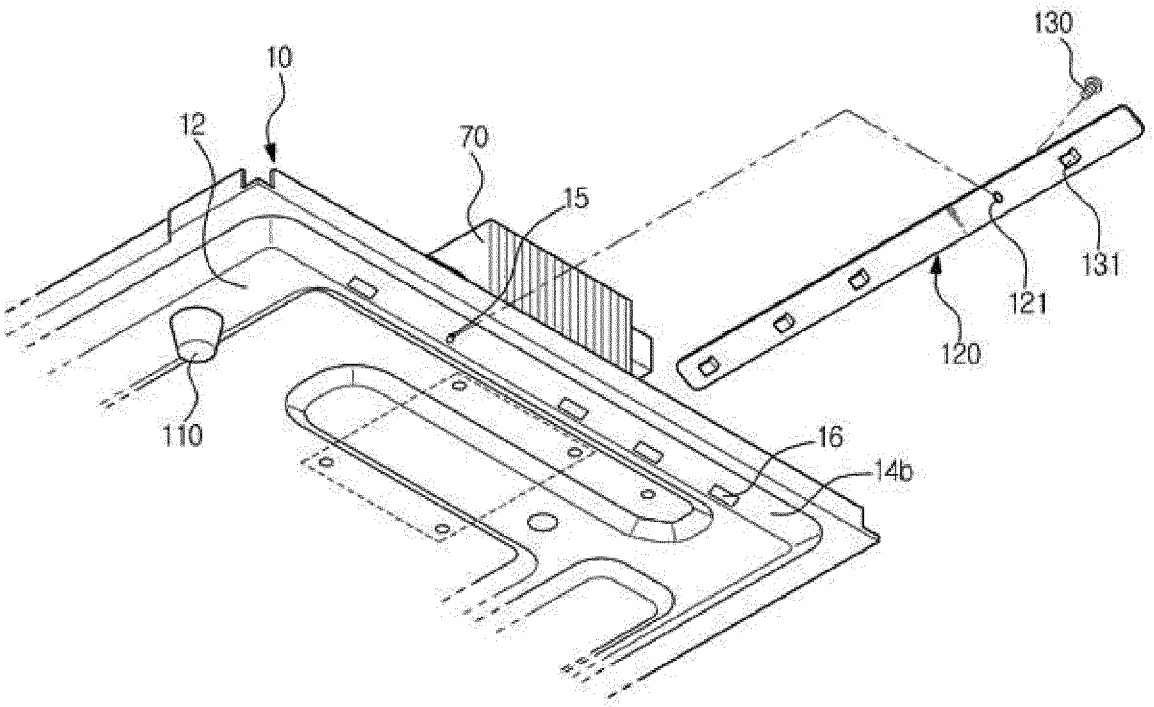


FIG.5

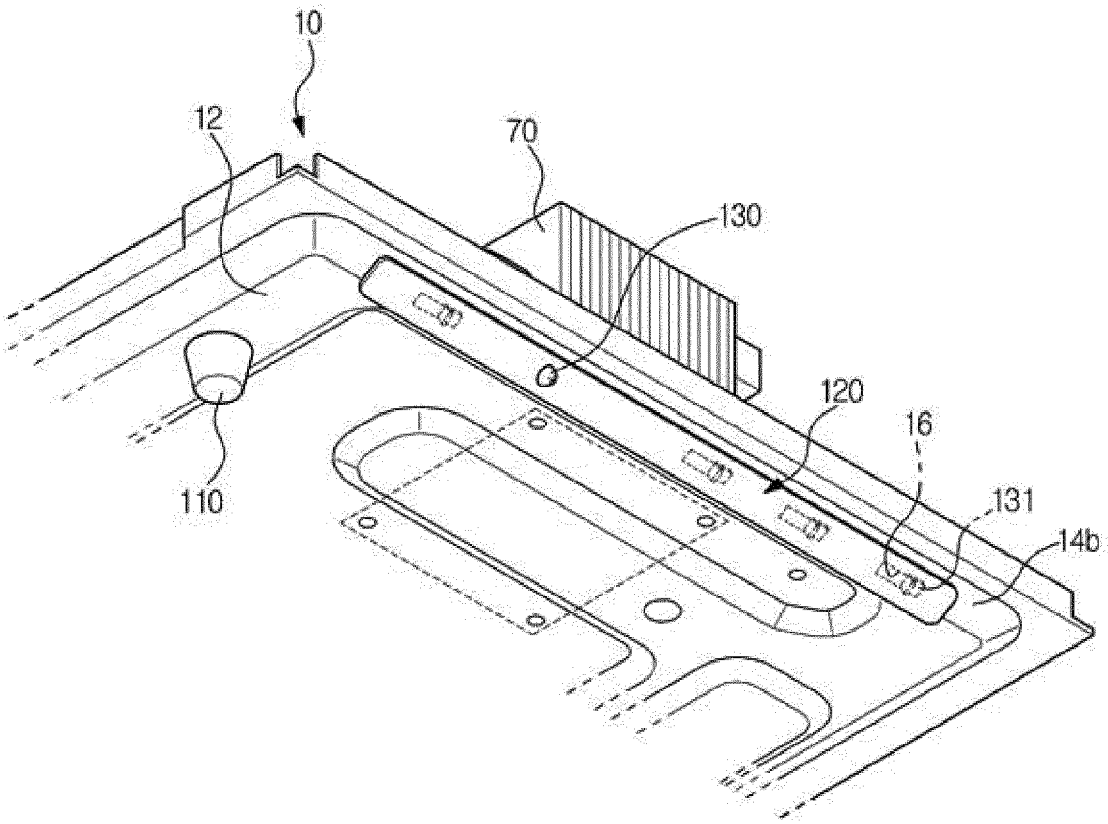


FIG.6

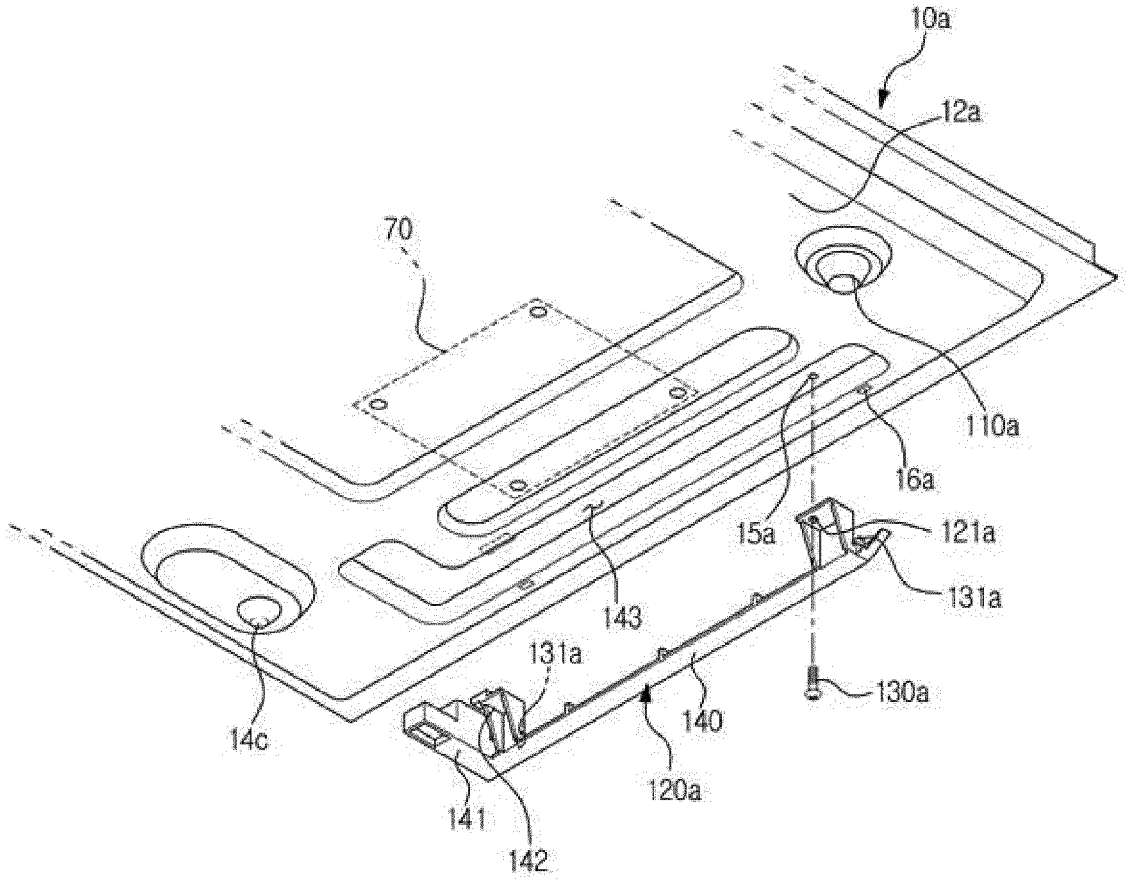

10a
12a
70
110a
16a
15a
121a
131a
143
131a
130a
140
14c
120a
141
142

FIG.7

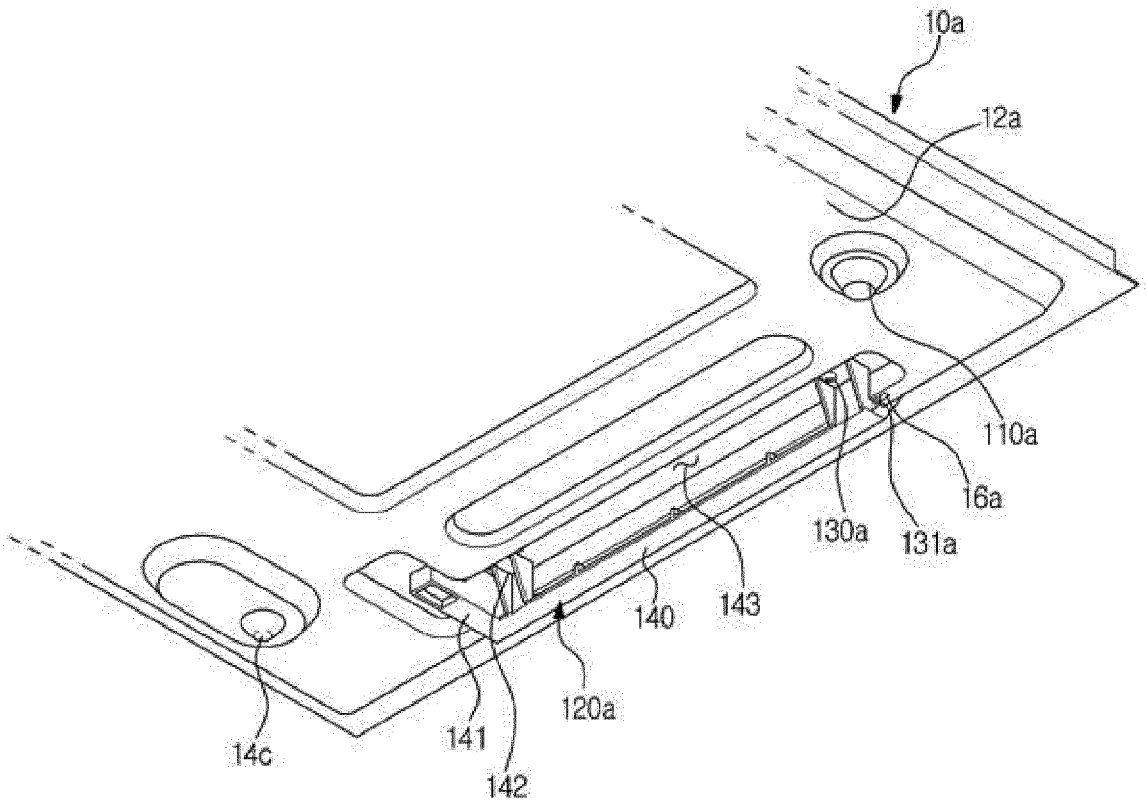
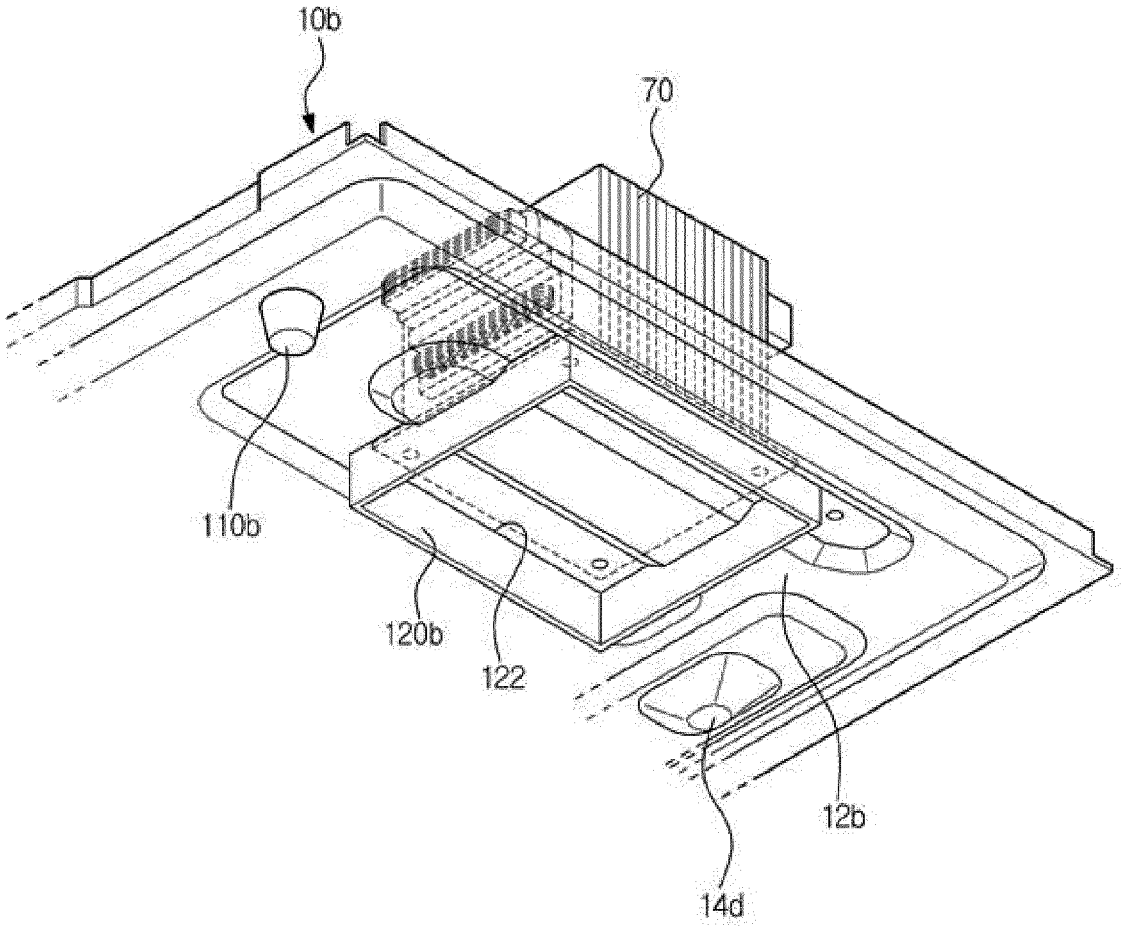


FIG.8



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EUROPEAN SEARCH REPORT

Application Number
EP 14 17 8375

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 825 802 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 25 February 1998 (1998-02-25) * column 2, line 39 - column 3, line 20; figure 3 *	1	INV. H05B6/64
X	US 5 886 328 A (YUN JI-TAE [KR]) 23 March 1999 (1999-03-23) * column 2, line 59 - column 4, line 14; figure 3 *	1	
A	WO 2007/035068 A1 (LG ELECTRONICS INC [KR]; CHOI SUNG-HO [KR]) 29 March 2007 (2007-03-29) * page 13, line 2 - line 6; figures 2,4 *	1-11	
A	JP S60 65510 U (UNKNOWN) 9 May 1985 (1985-05-09) * figures 4,5 *	1-11	

TECHNICAL FIELDS SEARCHED (IPC)
H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 January 2015	Gea Haupt, Martin

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 17 8375

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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14-01-2015

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