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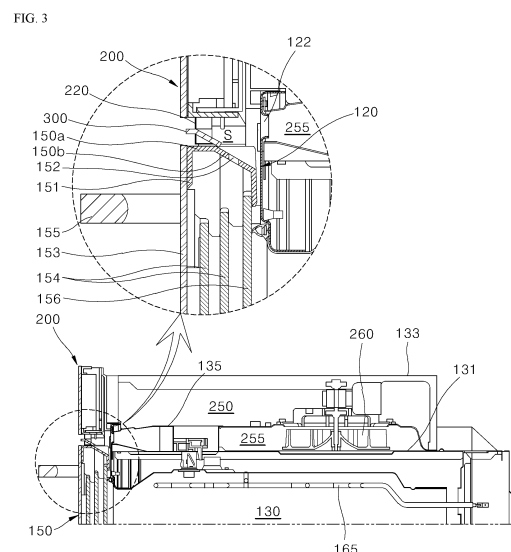
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(54) **COOKING APPARATUS**

(57) An invention related to a cooking apparatus is disclosed. The disclosed invention has an air guide disposed in a gap between a door and a control panel, wherein the air guide comprises a first guide part, which vertically partitions the space between the control panel and the door, and a second guide part, which blocks the space between the first guide part and the door.



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Description

Technical Field

[0001] The present disclosure relates to a cooking apparatus, and in particular, a cooking apparatus provided with a door for opening and closing a cooking compartment.

Background Art

[0002] Cooking apparatuses are installed in the kitchen and used to cook food items as the user wants. Cooking apparatuses can fall into different categories, based on a heat source or a type, and the sort of fuel.

[0003] Additionally, cooking apparatuses can be categorized into an open cooking apparatus in which a food item is placed in an open space, and a sealed cooking apparatus in which a food item is placed in a closed space, based on a space in which a food item is placed. The sealed cooking apparatus comprises an oven, a microwave oven and the like, and the open cooking apparatus comprises a cooktop, a hob, a griddle and the like.

[0004] In the sealed cooking apparatus, a space in which a food item is placed is shielded, and the shielded space is heated to cook the food item.

[0005] In the sealed cooking apparatus, provided is a cooking compartment in which a food item is placed and which is shielded when a food item is cooked, is provided in a main body. The cooking compartment is a space in which a food item is substantially cooked.

[0006] A door is swivably provided at the sealed cooking apparatus and selectively opens and closes the cooking compartment. The door may be swivably installed at a main body by a door hinge provided between the main body having the cooking compartment therein and the door. The door swivels around a portion where the door is coupled to the main body through the door hinge, to open and close the cooking compartment selectively.

[0007] A heat source may be provided in the inner space of the cooking compartment opened and closed by the door. The heat source is provided to heat the cooking compartment. The heat source may comprise a gas burner or an electric heater and the like.

[0008] An electronic component compartment may be disposed over the cooking compartment. Electronic components needed to operate the sealed cooking apparatus may be provided in the electronic component compartment. The electronic component compartment is formed apart from the cooking compartment.

[0009] A cooling fan for cooling the electronic component compartment may be provided in the electronic component compartment. The cooling fan may be provided in the form of a centrifugal fan such as sirocco fan, and disposed eccentrically toward the rear of the electronic component compartment.

[0010] The cooling fan may suction external air and

allow the external air to flow into the electronic component compartment, and discharge hot air in the electronic component compartment forcibly to the outside to cool the electronic component compartment.

[0011] The main body may comprise a cavity and a front panel. The cavity may form the skeleton of the main body, and the cooking compartment may be formed in the cavity. The front panel may be disposed at the front of the cavity and form the front surface of the main body.

[0012] The electronic component compartment may be disposed over the cavity. The front surface of the electronic component compartment may be shielded by the front panel. For example, at least a portion of the front panel may protrude to the upper portion of the cavity, and the upper area of the front panel disposed over the cavity may shield the front surface of the electronic component compartment.

[0013] The front panel may have an exhaust opening. The exhaust opening may be formed in such a way that the exhaust opening penetrates the front panel in a front-rear direction. The exhaust opening may form a passage for discharging air in the electronic component compartment to the outside, on the front panel.

[0014] The exhaust opening may be disposed on the front surface of the electronic component compartment, i.e., in the upper area of the front panel. Additionally, a discharge flow path may be formed at the front side of the exhaust opening. A control panel and the door may be disposed at the front side of the exhaust opening, and a gap of predetermined height may be formed between the control panel and the door that are disposed in an up-down direction. The discharge flow path may be formed in the gap between the control panel and the door.

[0015] The exhaust opening may connect to the discharge flow path while being exposed toward the discharge flow path. Additionally, at least a portion of the exhaust opening may be exposed to the front of the cooking apparatus through the discharge flow path. That is, at least a portion of the exhaust opening may be exposed forward through the gap between the control panel and the door.

[0016] Air drawn into the electronic component compartment by the cooling fan in the electronic component compartment may be discharged out of the electronic component compartment through the exhaust opening. Additionally, the air discharged through the exhaust opening may be discharged to the front of the cooking apparatus through the discharge flow path between the control panel and the door.

[0017] Further, heat generated in the cooking compartment during cooking may be transferred to the outside of the door through the door. To block the conductive heat, the door may be provided with a plurality of glasses.

[0018] For example, a front glass disposed on the outer surface of the door and a rear glass disposed on the inner surface of the door may be provided at the door, and a plurality of intermediate glasses may be installed between the front glass and the rear glass. Each of the

intermediate glasses may be provided in such a way that the intermediate glass is coated for heat shielding.

[0019] Heat in the cooking compartment may be transferred to the inner surface of the door and then to the front glass through the intermediate glass in the door, such that conductive heat is blocked by the radiation energy reflection coating of the inner glass.

[0020] Further, a discharge hole may be provided at the upper end of the door. The discharge hole may be formed in such a way that the discharge hole penetrates the upper end of the door in the up-down direction. Through the discharge hole, hot air in the door may be discharged to the discharge flow path. At the same time, cold air may be suctioned into the door from which the hot air escapes, through the lower portion of the door.

[0021] That is, hot air in the door may be discharged to the upper portion of the door, and cold air is drawn into the door through the lower portion of the door, and based on the flow of the air, the door may cool.

[0022] As described above, the discharge hole may be disposed at the upper end of the door. The discharge hole disposed at the upper end of the door may connect to the discharge flow path. That is, hot air discharged through the exhaust opening and hot air discharged through the discharge hole may be combined in the discharge flow path.

[0023] Hot air discharged out of the electronic component compartment through the exhaust opening may pass through the upper area of the discharge hole and then be discharged out of the cooking apparatus, while passing through the discharge flow path. During the process, hot air flowing in the discharge flow path may flow reversely into the door through the discharge hole.

[0024] That is, air discharged out of the electronic component compartment may flow reversely into the door through the discharge hole without escaping out of the cooking apparatus. In the case where such a reverse flow occurs, cold air may not be properly drawn into the door, and accordingly, the door may not cool smoothly.

[0025] An oven is disclosed in prior art document 1 (KR Patent Publication No. 10-2015-0030016)

[0026] The oven 1 in prior art document 1, as illustrated in FIGS. 29 and 30, may comprise a casing 10 provided with a cooking compartment 20, and a door 30 configured to open and close an open front of the cooking compartment 20.

[0027] The cooking compartment 20 is a cooking space formed by an upper plate 21, a bottom plate 22, both lateral plates 23 and a rear plate 24. A variety of components constituting the oven 1 may be built into a space (hereinafter, "electronic component compartment") between the outer portion of the cooking compartment 20 and the casing 10. A control panel 12 for controlling the operation of the oven 1 may be installed in the upper end portion of the casing 10.

[0028] A cooling fan 50 may be installed outside the upper plate 21. The cooling fan 50 may suction external

air into the electronic component compartment through at least one of openings installed on the rear plate 11 of the casing 10 and the like, and then be discharged the air drawn into the electronic component compartment to the outside again.

[0029] A cooling flow path 55 may be provided in the electronic component compartment. The cooling flow path 55 forms a passage allowing air suctioned by the cooling fan 50 to flow toward the front surface of the oven 1.

[0030] A cooling outlet 57 may be provided at the front side of the cooling flow path 55. Air having passed through the cooling flow path 55 may be discharged to the upper portion of the door 30 through the cooling outlet 57. The cooling outlet 57 may be disposed further rearward than the door 30.

[0031] A cooling guide 80 may be installed in the end portion of the front side of the cooling outlet 57. The cooling guide 80 may be shaped into a bracket that bends to narrow the width of the cooling outlet 57.

[0032] In the cooling outlet 57 the width of which is narrowed by the cooling guide 80, the flow velocity of air passing through the cooling outlet 57 may increase. Accordingly, the air passing through the cooling outlet 57 is discharged out of the oven 1 at high speed, and while the pressure of the cooling outlet 57 decreases, air around the cooling outlet 57 may be collected around the cooling outlet 57.

[0033] The force of collecting air around the cooling outlet 57 to the upper portion of the door 30 may lead to discharge of air in the door 30 to the upper portion of the door 30.

[0034] In prior art document 1, the discharge of air in the door 30, guided as described above, helps to facilitate the inflow of cold air into the door 30 and suppress a reverse flow of air discharged through the cooling outlet 57 into the door 30.

[0035] However, problems of prior art document 1 are described as follows.

[0036] According to prior art document 1, air having passed through the cooling outlet 57 and air having been discharged from the door 30 are discharged to the front of the cooling outlet 57 and a space on the door 30.

[0037] That is, while air discharged through the cooling outlet 57 and air discharged out of the door 30 are combined in one space, eddy current may be generated in the space. As the eddy current is generated, the air having passed through the cooling outlet 57 and the air having been discharged from the door 30 may not be properly discharged out of the oven 1, and air in the space may flow reversely into the door 30.

[0038] At this time, the inner portion of the electronic component compartment may not cool properly, and the inner portion of the door 30 may not cool properly.

[0039] Additionally, in prior art document 1, the cooling guide 80 may be elongated in the lengthwise direction thereof, along the lower portion of the cooling outlet 57, and fixed to the lower portion of the cooling outlet 57.

[0040] If the cooling outlet 57 is formed in such a way that the cooling outlet 57 is divided into a plurality of cooling outlets along the widthwise direction of the oven 1, the cooling guide 80 fixed to the lower portion of the cooling outlet 57 needs to be provided in a plurality of numbers.

[0041] At this time, the man-hour of assembly and the number of components required to install the cooling guide 80 increase.

[0042] Additionally, in the case where the cooling outlet 57 is provided in succession along the widthwise direction of the oven 1, that is, in the case where one long cooling outlet 57 is only formed at the oven 1, the strength of the front surface of the casing 1 decreases.

[0043] Additionally, in the case where meat or a food item containing meat is heated and cooked with a sealed cooking apparatus described above, an oily ingredient such as fat or oil and the like from the food item, floating in the cooking compartment, is attached to the wall surface of the cooking compartment and contaminates the inner wall of the cooking compartment.

[0044] The oily ingredient attached (adhering) to the wall surface of the cooking compartment may be polymerized (reacted) and firmly fixed, and may be hardly cleaned (removed).

[0045] Among cooking apparatuses that have been launched in recent years, cooking apparatuses have a self-cleaning function of automatically removing contaminants such as an oily ingredient and the like described above.

[0046] The self-cleaning function involves automatically removing a contaminant such as an oily ingredient and the like attached (adhering) to the wall surface of the cooking compartment.

[0047] In a cooking apparatus, the self-cleaning function is performed in such a way that a heat source such as a burner or a heater heats the inner portion of the cooking compartment to keep the inner portion of the cooking compartment at high temperature for a long period, such that a contaminant is burned and removed based on pyrolysis (thermal degradation) in the case where a contaminant such as an oily ingredient and the like is attached to the wall surface of the cooking compartment.

[0048] A thermal degradation cleaning function similar to or the same as the self-cleaning function is also disclosed in prior art document 1. The cleaning function is performed in such a way a control unit 38 in prior art document 1 increases temperature in the cooking compartment 20 to thermally degrade a contaminant. The thermal degradation cleaning function may be performed in such a way that an electric heater 42 is used to keep the inner portion of the cooking compartment 20 at high temperature for a long period to burn and remove a contaminant.

[0049] During the thermal degradation cleaning, the inner portion of the cooking compartment 20 may be maintained at high temperature. To prevent an accident, the door of the cooking apparatus needs to be closed

firmly during the self-cleaning operation.

[0050] To the end, the oven 1 may be provided with a door locking mechanism. The door locking mechanism may be installed on the front surface of the oven 1, and may comprise a latch provided in such a way that the latch is holdable at the door 30, and a driving unit for operating the latch.

[0051] The driving unit may comprise a motor, and the driving unit and the latch may be connected by a link structure. While the door 30 needs to remain closed, the latch remains held at the door 150. In the case where the door 30 does not need to remain closed, the latch may be unheld from the door 30.

[0052] The latch may be installed on the front surface of the oven 1, and protrude to the front of the oven 1 while rotating forward. The latch may protrude while rotating forward and be held at the door 30, and escape from the door 30 while rotating rearward.

[0053] A hold groove may be provided at the upper end of the door 30, and the latch may be inserted into the hold groove from the upper portion of the hold groove and held at the door 30, such that the door 30 is locked by the door locking mechanism.

[0054] When necessary, the latch may be installed on the front surface of the oven 1 in such a way that the latch is exposed to the front of the oven 1. The latch may be disposed further upward than the door 30 such that the latch comes in and out of the hold groove provided at the upper end of the door 30.

[0055] According to prior art document 1, in the case where the latch is installed at the above-described position, the latch is exposed to the front of the oven 1 in the state where the door 30 closes the cooking compartment 20 as well as the state where the door 30 opens the cooking compartment 20.

[0056] That is, the latch disposed further upward than the door 30 is exposed to the front of the oven 1 through a gap between the door 30 and a control panel, causing deterioration in the aesthetic quality of the oven 1.

[0057] Further, a cooking apparatus is disclosed in prior art document 2 (FR Patent No. 2746903).

[0058] The cooking apparatus in prior art document 2, as illustrated in FIGS. 31 to 33, may comprise a component 5 disposed at an outlet side of a duct 3.

[0059] The component 5 may be installed at the door 2 and divide a second air current F2 flowing along a cooling flow path formed by the duct 3 in the up-down direction. The component 5 may divide the second air flow F2 into an upper air current Fa2 at an upper side and a lower air current F2b at a lower side, at the outlet side of the cooling flow path.

[0060] Out of the upper air current Fa2 and the lower air current F2b divided as described above, the lower air current F2b moves at higher speed than the upper air current Fa2. The lower air current F2b may be discharged forward after being combined with the first air current F1 moving upward in the door 2.

[0061] Problems of prior art document 2 are described

as follows.

[0062] According to prior art document 2, the lower air current F2b at the lower side is combined with the first air current F1, such that flow resistance increases in a space between the upper portion of the door 2 and the component 5.

[0063] As the flow resistance increases as described above, the amounts of the first air current F1 and the second air current F2, discharged forward, decrease, causing deterioration in the cooling performance of the cooking apparatus.

[0064] Further, as the flow resistance increases as described above, noise around the door 2 increases.

[0065] According to prior art document 2, the first air current F1 and the lower air current F2b are discharged through the lower side of the component 5, and the air currents are discharged forward at a position very close to the door 2.

[0066] During this process, the flow of discharge of hot air increases the temperature of the front surface of the door 2, while contacting a glass panel 2a of the door 2.

[0067] Further, according to prior art document 2, a path in which the lower air current F2b flows through the lower portion of the component 5 communicates with an outlet of the upper end of the door 2. Accordingly, a portion of the lower air current F2b may be drawn into the door 2, or a portion of the first air current F may flow reversely into the door 2.

[0068] As the above-described phenomenon occurs, the temperature of the door 2 may increase, causing deterioration in product reliability and increasing the possibility that the user is burned.

[0069] Further, according to prior art document 2, the component 5 contacts the flow of discharge of hot air for a long period at a time of operation of the cooking apparatus. Since the component 5 is installed at the door 2, the component moves toward the user along the door 2 in the case where the door 2 is opened.

[0070] Thus, at a time when the door 2 is opened, the user is highly likely to be burned by the component 5 of high temperature.

Prior Art Document

Patent Document

[0071]

Document 1: KR Patent Publication
No.10-2015-0030016
Document 2: FR Patent No. 2746903

Description of the Invention

Technical Problems

[0072] The objective of the present disclosure is to provide a cooking apparatus having an improved struc-

ture in which flow resistance that is generated while air discharged from an electronic component compartment and air discharged from a door are combined.

[0073] Another objective of the present disclosure is to provide a cooking apparatus having an improved structure in which an increase in the temperature of the front surface of the door, caused by a flow of discharge of hot air, is suppressed.

[0074] Another objective of the present disclosure is to provide a cooking apparatus having an improved structure in which the possibility that the user contacts a component of high-temperature decrease in the case where the user opens the door.

[0075] Another objective of the present disclosure is to provide a cooking apparatus having an improved structure in which a reverse flow of air discharged from the electronic component compartment into the door is suppressed.

[0076] Another objective of the present disclosure is to provide a cooking apparatus having an improved structure in which deterioration in the aesthetic quality of the cooking apparatus, which is caused by a structure such as a latch and the like of a door locking mechanism, exposed through a gap between a control panel and the door, is suppressed.

[0077] Another objective of the present disclosure is to provide a cooking apparatus having an improved structure in which the cooking apparatus is less affected by high-temperature air discharged from the cooking apparatus, and the aesthetic quality of the cooking apparatus improves.

[0078] Yet another objective of the present disclosure is to provide a cooking apparatus having an improved structure in which improvement in the aesthetic quality of the cooking apparatus as well as suppression of the generation of eddy current are ensured.

Technical Solutions

[0079] In one aspect, a cooking apparatus has an air guide in a gap between a door and a control panel, and the air guide covers at least a portion of the front panel from forward.

[0080] Accordingly, in the present disclosure, a certain portion of the gap between the door and the control panel is covered, ensuring improvement in the aesthetic quality of the front surface of the cooking apparatus.

[0081] The air guide comprises a first guide part configured to partition the space between the control panel and the door in an up-down direction, and a second guide part configured to block a space between the first guide part and the door.

[0082] Accordingly, in the present disclosure, air currents may be combined in the upper space of the air guide rather than the lower space of the air guide, which is adjacent to a door exhaust opening, and air may be discharged only through the upper space, ensuing a decrease in flow resistance generated in the process

of combining the air currents.

[0083] In another aspect, an anterior space surrounded by the control panel and the door is formed between the control panel and the door, and the air guide disposed in the anterior space is exposed to the front of the cooking apparatus through the gap between the door and the control panel.

[0084] In another aspect, the air guide is disposed in the gap between the door and the control panel, and covers at least a portion of a structure disposed at the same height as the gap between the door and the control panel, from forward.

[0085] In another aspect, the air guide is disposed in the gap between the door and the control panel, and comprises the first guide part that is disposed at the front side of the air guide and the second guide part that is disposed at the rear side of the first guide part, and the second guide part covers the space between the first guide part and the door, at the lower side of the first guide part.

[0086] Accordingly, in the present disclosure, the efficiency of discharging air may improve while the gap at the front of the cooking apparatus is covered effectively.

[0087] In another aspect, the door exhaust opening provided at the door is disposed between an exhaust opening and the air guide.

[0088] Accordingly, in the present disclosure, a reverse flow of air, discharged from an electronic component compartment, into the door may be suppressed effectively.

[0089] In another aspect, the door exhaust opening is disposed eccentrically toward the rear side of the door.

[0090] In another aspect, the door is divided into an anterior part and a posterior part that are arranged in a front-rear direction, and the door exhaust opening is disposed at the posterior part disposed at the rear of the anterior part, and disposed further downward than the upper end of the anterior part.

[0091] In another aspect, at least a portion of the structure disposed at the same height as the gap between the door and the control panel is covered by a cover projection provided to fix the air guide to the control panel.

[0092] In another aspect, the cover projection provided to fix the air guide to the control panel is disposed to cover a separation wall partitioning between an exhaust opening and an exhaust opening.

[0093] Accordingly, in the present disclosure, the cooking apparatus may produce the effects of improving the aesthetic quality of the cooking apparatus while the cooking apparatus is less affected by high-temperature air discharged from the cooking apparatus.

[0094] In another aspect, the anterior space surrounded by the control panel and the front panel and the door is formed between the control panel and the door, and the air guide is disposed eccentrically toward the front side of the anterior space, in the anterior space.

[0095] Accordingly, the aesthetic quality of the cooking apparatus may improve, while the generation of eddy

current is suppressed.

[0096] In one aspect, the cooking apparatus may comprise a cavity configured to have a cooking compartment, a front side of which is open, therein; a door disposed at a front of the cavity and configured to open and close the cooking compartment; a control panel disposed over the cavity and the door; and an air guide installed at the door and disposed between the door and the control panel.

[0097] The air guide may comprise a first guide part configured to partition a space between the control panel and the door in the up-down direction.

[0098] The first guide part may partition the space between the control panel and the door into a first space between the control panel and the first guide part, and a second space between the first guide part and the door.

[0099] The air guide may further comprise a second guide part configured to connect to the first guide part and to block the second space.

[0100] The cooking apparatus may further comprise a front panel disposed between the cavity and the door.

[0101] Preferably, at least a portion of the front panel is disposed between the cavity and the control panel, and the air guide covers at least a portion of the front panel from forward.

[0102] Preferably, the air guide is disposed in an anterior space surrounded by the door and the front panel and the control panel.

[0103] Preferably, a door exhaust opening is provided at an upper end of the door facing the control panel, and opens an inner portion of the door to the anterior space or to the space between the door and the control panel.

[0104] Preferably, the door exhaust opening is disposed between the air guide and the front panel with respect to the front-rear direction.

[0105] Preferably, an electronic component compartment is formed at an upper side of the cavity, at least a portion of the front panel is disposed at a front side of the electronic component compartment, and an exhaust opening is formed at the front panel and opens an inner portion of the electronic component compartment to the anterior space.

[0106] Preferably, the door exhaust opening is disposed between the air guide and the exhaust opening with respect to the front-rear direction.

[0107] Preferably, a cooling flow path is formed in the electronic component compartment, and the cooling flow path forms a passage configured to guide a flow of air drawn into the electronic component compartment toward the exhaust opening, in the electronic component compartment.

[0108] Preferably, a door exhaust opening is provided at an upper end of the door facing the control panel and opens an inner portion of the door to the anterior space.

[0109] Preferably, the door is divided into an anterior part and a posterior part arranged in the front-rear direction, and the door exhaust opening is disposed at the posterior part disposed at a rear of the anterior part.

[0110] Preferably, the second guide part blocks the

second space, between the first guide part and the door exhaust opening.

[0111] Preferably, the second guide part blocks the second space while contacting the door.

[0112] Preferably, the second guide part extends rearward from the first guide part in such a way that the second guide part inclines downward.

[0113] Preferably, the posterior part forms an inclination surface configured to incline downward toward a rear thereof, and at least a portion of the second guide part contacts the posterior part at a position where the second guide part overlaps the posterior part in the up-down direction.

[0114] Preferably, the posterior part forms an inclination surface configured to incline downward toward a rear thereof, and at least a portion of the second guide part forms an inclination surface parallel with an inclination surface of the posterior part and contacts the posterior part.

[0115] Preferably, at least a portion of the second guide part contacts the posterior part at a position lower than an upper end of the anterior part.

[0116] Preferably, the air guide may further comprise a fastening projection coupled to the control panel.

[0117] Preferably, the second guide part is disposed at a front of the guide part in such a way that the second guide part inclines from the first guide part downward and rearward, and the fastening projection protrudes from the second guide part in the up-down direction.

[0118] The cooking apparatus may further comprise a cover projection configured to protrude downward from a lower end of the control panel and coupled to the fastening projection.

[0119] Preferably, a plurality of cover projections is laterally spaced a predetermined distance apart from each other, a plurality of exhaust openings is disposed at the front panel, and laterally spaced a predetermined distance apart from each other, a separation wall is formed between two exhaust openings adjacent to each other, and at least any one of the fastening projection and the cover projection is disposed respectively at a front of the separation wall and covers the separation wall from forward.

Advantageous Effects

[0120] In the cooking apparatus of the present disclosure, air may be discharged only based on a flow through the upper space of an air guide in the state where the lower space of the air guide, adjacent to a door exhaust opening, is blocked by the air guide.

[0121] In the air guide of the present disclosure, air currents may be combined in the upper space of the air guide rather than the lower space of the air guide, adjacent to the door exhaust opening, and air may be discharged only through the upper space of the air guide.

[0122] The air guide guiding the flow of discharge of air may help to reduce flow resistance generated while air

currents are combined, such that the generation of eddy current decreases significantly at the fronts of the air guide and the cooking apparatus.

[0123] Accordingly, in the present disclosure, the amount of air discharged after the cooking apparatus cools may increase effectively, and noise generated due to flow resistance and eddy current may decrease.

[0124] In the present disclosure, the flow of air may be guided to discharge the air through a first space of an anterior space, which is eccentric upward, such that a distance between hot air discharged to the front of the cooking apparatus and a door increases.

[0125] In the present disclosure, the possibility that the temperature of the door increases due to contact between the flow of discharge of hot air and the door may decrease effectively.

[0126] The air guide of the present disclosure may be fixed to a control panel rather than the door, such that the air guide does not move forward together with the door in the case where the door is opened.

[0127] In the cooking apparatus comprising the air guide, the possibility that the user contacts the air guide that may have high temperature due to its contact with the flow of discharge of hot air may decrease, such that the user is effectively prevented from being burned by a high-temperature component in the case where the user opens the door.

[0128] In the cooking apparatus, flow resistance generated while air is combined may decrease, and air may move in the upper space of the air guide, which is far away from the door, such that a reverse flow of air discharged from an electronic component compartment into the door is suppressed effectively.

[0129] In the cooking apparatus, the door exhaust opening may be disposed at a position where the door exhaust opening escapes to a maximum degree from an area where air discharged through an exhaust opening flows, such that a reverse flow of hot air discharged to an anterior space into the door is suppressed effectively.

[0130] In the cooking apparatus, a portion of structures exposed through an anterior gap may be covered by the air guide providing a structure that covers an anterior gap while crossing the anterior gap laterally, such that the aesthetic quality of the front surface of the cooking apparatus improves.

[0131] In the cooking apparatus, the user's gaze may be focused on the air guide in the case where the user looks at the anterior gap, such that the user feels like the air guide is only in the anterior gap because of an optical illusion, ensuring improvement in the aesthetic quality of the front surface of the cooking apparatus.

[0132] In the cooking apparatus, since a first guide part forming the front surface of the air guide is disposed in a central position of the anterior gap, the upper area of the anterior gap and the lower area of the anterior gap may be symmetrical to each other, such that the exterior of the front surface of the cooking apparatus looks reliably while the aesthetic quality of the cooking apparatus improves.

[0133] In the cooking apparatus, the lower area of the anterior gap may be covered further by a second guide part that is disposed at a less noticeable position than the first guide part disposed at the front of the air guide.

[0134] In the cooking apparatus, the shape of the front surface of the cooking apparatus may look reliably while the aesthetic quality of the front surface of the cooking apparatus may improve.

[0135] In the cooking apparatus, a structure such as a latch having a large complex shape may be covered by an outer cover projection provided to fix the air guide, such that the air guide is fixed reliably while the aesthetic quality of the front surface of the cooking apparatus improves.

[0136] In the cooking apparatus, an inner cover projection may be disposed at a position where the inner cover projection covers a separation wall partitioning between an exhaust opening and an exhaust opening from forward such that the inner cover projection does not interfere with the discharge of air through the exhaust opening and is less likely to be thermally deformed, while the aesthetic quality of the front surface of the cooking apparatus improves.

[0137] In the cooking apparatus, the air guide may be made of a metal material having excellent heat resistance, such that the air guide disposed on a path in which high-temperature air is discharged is not easily deformed despite high-temperature heat and is not easily damaged despite an impact, while its metallic luster helps to improve the aesthetic quality of the cooking apparatus.

[0138] In the cooking apparatus, the air guide may be disposed eccentrically toward the front of the anterior space, in the anterior space, such that the generation of eddy current is suppressed in the anterior space, while the aesthetic quality of the cooking apparatus improves.

Brief Description of the Drawings

[0139]

FIG. 1 is a perspective view showing a cooking apparatus of one embodiment.

FIG. 2 is a lateral cross-sectional view showing the inner structure of the cooking apparatus illustrated in FIG. 1.

FIG. 3 is an enlarged view showing a portion of the cooking apparatus illustrated in FIG. 2 in an enlarged manner.

FIG. 4 is a front view showing a front panel illustrated in FIG. 2 in a separate manner.

FIG. 5 is a planar cross-sectional view showing the inner structure of an electronic component compartment illustrated in FIG. 2.

FIG. 6 is an enlarged view showing a portion of a cooking apparatus illustrated in FIG. 5 in an enlarged manner.

FIG. 7 is an enlarged view showing a portion of the cooking apparatus illustrated in FIG. 6 in an enlarged

manner.

FIGS. 8 and 9 are lateral cross-sectional views showing the structure of a door locking mechanism of one embodiment.

FIG. 10 is a front view showing the cooking apparatus of one embodiment.

FIG. 11 is a front exploded perspective view showing a state in which a door, a control panel and an air guide illustrated in FIG. 10 separate.

FIG. 12 is a rear exploded perspective view showing a state in which the door, the control panel and the air guide illustrated in FIG. 10 separate.

FIG. 13 is a front perspective view showing an air guide of one embodiment in a separate manner.

FIG. 14 is a rear perspective view showing the air guide illustrated in FIG. 13.

FIG. 15 is a side view showing the air guide illustrated in FIG. 13.

FIGS. 16 to 18 are side views showing another example of the air guide illustrated in FIG. 15.

FIG. 19 is a front view showing a portion of the front surface of a cooking apparatus without an air guide.

FIG. 20 is an enlarged view showing a portion of the front surface of the cooking apparatus illustrated in FIG. 19 in an enlarged manner.

FIG. 21 is a front view showing a portion of the front surface of the cooking apparatus of one embodiment.

FIG. 22 is an enlarged view showing a portion of the front surface of the cooking apparatus illustrated in FIG. 21 in an enlarged manner.

FIG. 23 is a cross-sectional perspective view showing a coupling structure between an air guide and a control panel.

FIG. 24 is a cross-sectional exploded perspective view showing a state in which the air guide and the control panel illustrated in FIG. 23 separate.

FIG. 25 is a cross-sectional view showing a flow of air in the cooking apparatus of one embodiment.

FIG. 26 is an enlarged view showing a portion of the cooking apparatus illustrated in FIG. 25 in an enlarged manner.

FIG. 27 is an enlarged view showing a portion of the cooking apparatus illustrated in FIG. 26 in an enlarged manner.

FIG. 28 is an enlarged view showing portion "XXVIII" of FIG. 27 in an enlarged manner.

FIG. 29 is a view showing a lateral cross section of an existing oven.

FIG. 30 is an enlarged view showing a portion of the oven illustrated in FIG. 29 in an enlarged manner.

FIG. 31 is a view showing a lateral cross section of an existing cooking apparatus.

FIG. 32 is an enlarged view showing a portion of the cooking apparatus illustrated in FIG. 31 in an enlarged manner.

FIG. 33 is a perspective view showing a door illustrated in FIG. 31 in a separate manner.

Detailed Description of Exemplary Embodiments

[0140] 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*. Hereinafter, 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.

[0141] 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 restricted by the terms. Certainly, a first component can be a second component, unless stated to the contrary.

[0142] Embodiments are not restricted to the embodiments set forth herein, and can be modified and changed in various different forms. The embodiments in the disclosure are provided such that the disclosure can be through and complete and fully convey its scope to one having ordinary skill in the art. Accordingly, *all modifications, equivalents or replacements as well as a replacement of the configuration of any one embodiment with the configuration of another embodiment or an addition of the configuration of any one embodiment to the configuration of another embodiment, within the technical spirit and scope of the disclosure, are to be included in the scope of the disclosure.*

[0143] The accompanying drawings are provided for a better understanding of the embodiments set forth herein and are not intended to restrict the technical spirit of the disclosure. It is to be understood that *all the modifications, equivalents or replacements within the spirit and technical scope of the disclosure are included in the scope of the disclosure.* The sizes or thicknesses of the components in the drawings are exaggerated or reduced to ensure ease of understanding and the like. However, the protection scope of the subject matter of the disclosure is not to be interpreted in a restricted way.

[0144] The terms in the disclosure are used only to describe specific embodiments or examples and not intended to restrict the subject matter of the disclosure. In the disclosure, singular forms include plural forms as well, unless explicitly indicated otherwise. In the disclosure, the terms "comprise", "comprised of" and the like specify the presence of stated features, integers, steps, operations, elements, components or combinations thereof but do not imply the exclusion of the presence or addition of one or more other features, integers, steps, operations, elements, components or combinations thereof.

[0145] The terms "first", "second" and the like are used herein only to distinguish one component from another

component, and the components are not to be restricted by the terms.

[0146] When any one component is described as "connected" or "coupled" to another component, any one component can be directly connected or coupled to another component, but an additional component can be "interposed" between the two components or the two components can be "connected" or "coupled" by an additional component. When any one component is described as "directly connected" or "directly coupled" to another component, an additional component cannot be "interposed" between the two components or the two components cannot be "connected" or "coupled" by an additional component.

[0147] When any one component is described as being "on (or under)" another component, any one component can be directly on (or under) another component, and an additional component can be interposed between the two components.

[0148] Unless otherwise defined, all the terms including technical or scientific terms used herein have the same meaning as commonly understood by one having ordinary skill in the art. Additionally, terms such as those defined in commonly used dictionaries are to be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art, and unless explicitly defined herein, are not to be interpreted in an ideal way or an overly formal way.

[0149] In the state where a cooking apparatus stands on the floor, a direction in which a door is installed with respect to the center of the cooking apparatus is defined as a forward direction. Accordingly, a direction toward the inside of the cooking apparatus with the door open is defined as a rearward direction. For convenience, the forward direction and the rearward direction can be referred to as a first direction. Then the forward direction is referred to as one direction of the first direction, and the rearward direction is referred to as the other direction of the first direction.

[0150] Additionally, a gravitational direction can be defined as a downward direction, and a direction opposite to the gravitational direction can be defined as an upward direction.

[0151] Further, a horizontal direction across a front-rear direction of the cooking apparatus, i.e., a widthwise direction of the cooking apparatus that is viewed in front of the door of the cooking apparatus, can be referred to as a left-right direction. For convenience, the left-right direction can be referred to as a second direction. Then the right side can be referred to as one direction of the second direction, and the left side can be referred to as the other direction of the second direction.

[0152] Further, the widthwise direction of the cooking apparatus can also be referred to as a lateral direction. Then the right side can also be referred to as one side of the lateral direction, and the left side can be referred to the other side of the lateral direction.

[0153] Additionally, an up-down direction can be re-

ferred to as a third direction. Then the upward direction can be referred to as one direction of the third direction, and the downward direction can be referred to as the other direction of the third direction.

[0154] Furthermore, the up-down direction can be referred to as a vertical direction. Then the front-rear direction and the left-right direction, i.e., the first direction and the second direction, can be referred to as the horizontal direction.

[0155] 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.

Entire structure of cooking apparatus

[0156] FIG. 1 is a perspective view showing a cooking apparatus of one embodiment, and FIG. 2 is a lateral cross-sectional view showing the inner structure of the cooking apparatus illustrated in FIG. 1. Additionally, FIG. 3 is an enlarged view showing a portion of the cooking apparatus illustrated in FIG. 2 in an enlarged manner, and FIG. 4 is a front view separately showing a front panel illustrated in FIG. 2.

[0157] Referring to FIGS. 1 to 4, the exterior of the cooking apparatus of one embodiment is formed by a main body 100. The main body 100 may have a shape comprising an approximately rectangular cuboid shape. The main body 100 may be made of a material having predetermined strength to protect a plurality of components that is installed in the inner space of the main body.

[0158] The main body 100 may comprise a cavity 110. The cavity 110 may form the skeleton of the main body 100.

[0159] The main body 100 may further comprise a front panel 120. The front panel 120 may be disposed at the front of the cavity 110 and form the front surface of the main body 100.

[0160] In another example, the front panel 120 may not be provided apart from the cavity 110, and the front surface of the cavity 110 may form the front surface of the main body 100.

[0161] For example, the cavity 110 and the front panel 120 may be provided at the main body 100 in such a way that the cavity 110 and the front panel 120 are integrated.

[0162] A cooking compartment 130 may be formed in the cavity 110. Additionally, an open part 126 opening the cooking compartment 130 forward may be formed in the front panel 120.

[0163] The cooking compartment 130 may be shaped into a cuboid the front surface of which is open. With the cooking compartment 130 closed, the cooking apparatus may heat the inner space of the cooking compartment 130 to cook a food item. That is, in the cooking apparatus, the inner space of the cooking compartment 130 is a space in which a food item is cooked substantially.

[0164] The cooking apparatus may be provided with a heating unit that heats the cooking compartment 130. As

an example of the heating unit, a convection part 160 may be provided at the rear side of the cooking compartment 130, and perform convection of hot air and heat the inner space of the cooking compartment 130. Additionally, an upper heater 165 or an upper burner may be provided as the heating unit at the upper side of the cooking compartment 130 and heat the inner space of the cooking compartment 130 from above. Further, a lower heater or a lower burner may be provided as the heating unit at the lower side of the cooking compartment 130 and heat the inner space of the cooking compartment 130 from below.

[0165] A door 150 may be swivably provided at the front of the main body 100, and selectively open and close the cooking compartment 130. The door 150 may open and close the cooking compartment 130 in a pull-down manner, i.e., in such a way that the upper end of the door 150 swivels up and down around the lower end of the door 150.

[0166] The door 150 may be shaped into a cuboid that has a predetermined thickness entirely. Additionally, a handle 165 may be provided on the front surface of the door 150, such that the user grips the handle 165 when the user swivels the door 150.

[0167] Further, the door 150 may be provided with a see-through window. The see-through window may be made of a transparent material, e.g., glass or transparent plastics and the like. In the case of a cooking apparatus to which a see-through window is applied, the see-through window may need to resist high temperature and high pressure, and need to have a water resistant function, a heat resistant function and the like.

[0168] A control panel 200 may be provided in the upper portion of the front surface of the cooking apparatus, i.e., on the front surface of the upper portion of the cavity 110. The control panel 200 may form a portion of the exterior of the front surface of the cooking apparatus. The control panel 200 may be provided with a display unit. The display unit may comprise an input part for adjusting the operation of the cooking apparatus and a display displaying an operation state of the cooking apparatus.

[0169] In an example, the input part and the display may be comprised of one panel. For example, the input part and the display may be formed into a touch panel to which a touch input of the user is provided.

[0170] The display unit may display a user interface (UI) or a graphic user interface (GUI) in relation to the driving of the cooking apparatus.

[0171] Specifically, the display unit may comprise at least one of a liquid crystal display, a thin film transistor-liquid crystal display, an organic light-emitting diode, a flexible display and a 3D display.

[0172] In the case where the display unit and a touch sensor detecting a touch motion form a mutually layered structure to form a touch screen, the display unit may be used as an input device as well as an output device. The touch sensor, for example, may be formed into a touch film, a touch sheet, a touch pad and the like.

[0173] The touch sensor may be configured to convert a change in the pressure applied to a specific portion of the display or a change in the electrostatic capacity and the like produced in a specific portion of the display unit into an electrical input signal.

[0174] A plurality of buttons may be displayed at the display unit. For example, a knock on button for setting a function of turning on/off a lamp 70 installed in the cooking compartment 130 based on a knock input of the user may be disposed at the display unit.

[0175] Additionally, a lamp button for setting a function of turning on/off the lamp manually may be displayed at the display unit. Additionally, in the case of an oven as the cooking apparatus, a self cleaning button for setting a self cleaning function of the cooking compartment 130 and the like may be disposed at the display unit.

[0176] An electronic component compartment 250 may be provided outside the cavity 110, specifically, on the cavity 110. The electronic component compartment 250 may be disposed over the cavity 250 and behind the control panel 200. A space for installing electronic components may be formed in the electronic component compartment 250.

[0177] The front surface of the electronic component compartment 250 may be shielded by the front panel 120. The front panel 120 may be disposed between the cavity 110 and the door 150. At least a portion of the front panel 120 may be disposed to block the front of the electronic component compartment 250.

[0178] For example, the upper area of the front panel 120 disposed over the cooking compartment 130 may shield the front surface of the electronic component compartment 250. The front panel 120 may protrude to the upper portion of the cavity 110 and define the boundary surface of the front of the electronic component compartment 250.

[0179] An exhaust opening 122 may be provided at the front panel 120. The exhaust opening 122 may be formed in such a way that the exhaust opening penetrates the front panel 120 in the front-rear direction. The exhaust opening 122 for discharging air in the electronic component compartment 250 out of the electronic component compartment 250 through the front panel 120 may form a passage on the front panel 120.

[0180] The exhaust opening 122 may be disposed at a position eccentric to the end portion of one side of the front panel 120 in the left-right direction thereof from the center of the front panel 120 in the left-right direction thereof. For example, the exhaust opening 122 may be disposed across between the center of the front panel 120 in the left-right direction thereof to the right side of the front panel 120.

[0181] In another example, the front surface of the cavity 110 may form the front surface of the main body 100, while the front panel 120 is not provided apart from the cavity 110. At this time, the exhaust opening 122 may be provided on the front surface of the cavity 110 having a shape corresponding to the shape of the front panel 120.

Structure of door

[0182] Referring to FIGS. 1 to 3, the door 150 may comprise a door frame 151 and a front glass 153.

[0183] The door frame 151 may form the exteriors of the upper surface, the lower surface and the lateral surface of the door 150, while forming the skeleton of the door 150. The door frame 151 may be shaped into a cuboid the front surface and the rear surface of which are open.

[0184] A hinge swivably coupling the door frame 151 to the main body 100 may be installed at the lower side of the door frame 151. The hinge may be installed respectively at both sides of the door frame 151 in the lateral direction thereof, while being installed at the lower end of the door frame 151.

[0185] A front glass 153 may be disposed at the front side of the door frame 151. The front glass 153 may form the exterior of the front surface of the door 150 while the front glass 153 is coupled to the door frame 151, at the front side of the door frame 151.

[0186] Additionally, the door 150 may further comprise a rear glass 156. The rear glass 156 may be coupled to the door frame 151, at the rear side of the door frame 151, and form the exterior of the rear surface of the door 150.

[0187] The door 150 may further comprise an inner glass 154. In this embodiment, the door 150 comprises a plurality of inner glasses 154, for example. The inner glass 154 may be disposed at the rear side of the front glass 153 and at the front side of the rear glass 156, and at the rear side of the front glass 153 and the front side of the rear glass 156, coupled to the door frame 151.

[0188] The plurality of inner glasses 154 may be disposed in the door 150 in such a way that the plurality of inner glasses 154 is spaced a predetermined distance apart from each other in the front-rear direction. The plurality of inner glasses 154 may be disposed between the rear glass 156 and the front glass 153.

[0189] The inner glasses 154 disposed as described above may partition the inner portion of the door 150 into a plurality of spaces that are arranged in the front-rear direction. The plurality of inner glasses 154 disposed as described above may suppress a transfer of heat, transferred from the inner portion of the cooking compartment 130 to the door 150, to the front surface of the door 150.

[0190] External air may be drawn into the door 150 at which the inner glasses 154 are disposed as described above. For example, external air may be drawn into the door 150 through the open lower end of the door 150. The air drawn into the door 150 as described above may cool the door 150 while passing through the inner portion of the door 150.

[0191] A door exhaust opening 152 may be provided at the upper end of the door 150, facing the control panel 200. The door exhaust opening 152 may form a passage allowing the inner portion of the door 150 to be opened to the outside of the door 150, at the upper end of the door 150. The door exhaust opening 152 may be formed at the

upper end of the door frame 151, in such a way that the door exhaust opening 152 penetrates the door frame 151 in the up-down direction.

[0192] In this embodiment, the upper end of the door frame 151 may be divided into an anterior part 150a and a posterior part 150b. The anterior part 150a may form the front side of the upper end of the door frame 151, and the posterior part 150b may form the rear side of the upper end of the door frame 151.

[0193] The anterior part 150a may be provided in such a way that the anterior part 150a forms a planar surface in the horizontal direction across an up-down axis. The posterior part 150b disposed at the rear side of the anterior part 150a may be provided in such a way that the posterior part 150b forms an inclination surface inclining downward toward the rear of the posterior part 150b.

[0194] The door exhaust opening 152 may be provided on the posterior part 150b, while being provided at the upper end of the door 150. Accordingly, the door exhaust opening 152 may be disposed at a position eccentric to the rear side of the door 150, on the door 150, and may be disposed further downward than an uppermost end of the door 150, formed by the anterior part 150a.

Inner structure of electronic component compartment

[0195] FIG. 5 is a planar cross-sectional view showing the inner structure of an electronic component compartment illustrated in FIG. 2.

[0196] Referring to FIGS. 3 and 5, the lower boundary surface of the electronic component compartment 250 may be defined by an upper panel 131 disposed at the upper side of the cavity 110. Additionally, the upper, lateral and rear boundary surfaces of the electronic component compartment 250 may be defined by an electronic component compartment cover 133 covering the electronic component compartment 250 from above.

[0197] A variety of electronic components may be disposed in the electronic component compartment 250, as described above. In an example, a circuit board may be disposed in the electronic component compartment 250. A variety of elements, a circuit and the like in relation to the generation and the like of a control signal for controlling the receipt of a manipulation signal input through the control panel 200 and controlling the operation of the heating unit may be provided on the circuit board.

[0198] A fan 260 may be disposed in the electronic component compartment 250. The fan 260 may be disposed near the rear surface of the cavity 110, i.e., at a position eccentric to the rear side of the electronic component compartment 250 in the electronic component compartment 250.

[0199] The fan 260 may comprise a turbo fan that is installed in the electronic component compartment 250. The fan 260 may suction external air through the rear side of the electronic component compartment 250, and dis-

charge the external air to the front side of the electronic component compartment 250.

[0200] Based on the operation of the fan 260, external air may be drawn from the rear side of the cooking apparatus into the electronic component compartment 250.

[0201] For example, after passing through a space at the rear side of the cooking apparatus, external air drawn through the lower portion of the main body 100 may be drawn into the electronic component compartment 250 through a penetration hole 132 formed at the upper end of a rear surface cover covering the space at the rear side of the cooking apparatus or through a penetration hole 132 formed at the upper panel 131.

[0202] The air drawn into the electronic component compartment 250 may cool the electronic components in the electronic component compartment 250 while moving to the front of the electronic component compartment 250 in the electronic component compartment 250.

The air having moved to the front of the electronic component compartment 250 in the electronic component compartment 250 may be discharged to the front of the electronic component compartment 250 through the exhaust opening 122.

[0203] A cooling flow path 255 may be provided in the electronic component compartment 250. The cooling flow path 255 may form a passage that allows the air suctioned by the fan 260 to flow toward the exhaust opening 122.

[0204] The lower boundary surface of the cooling flow path 255 may be defined by the upper panel 131 disposed between the upper surface of the cavity 110 and the electronic component compartment cover 133. Additionally, the upper, lateral and rear boundary surfaces of the cooling flow path 255 may be defined by a cooling flow path cover 135 covering the cooling flow path 255 from above.

[0205] Further, an air inflow hole 132 may be provided at the upper panel 131. The air inflow hole 132. The air inflow hole 132 may be disposed at a position where the air inflow hole 132 is connectable to the cooling flow path 255. The air inflow hole 131 may be formed at the upper panel 131, in such a way that the air inflow hole 131 penetrates the upper panel 131 in the up-down direction.

[0206] The air inflow hole 132 may form a passage that connects a space between the upper surface of the cavity 110 and the upper panel 131, and the cooling flow path 255. Air, heated between the upper surface of the cavity 110 and the upper panel 131 because of the cavity 110 heated, may be drawn into the cooling flow path 255 through the air inflow hole 132, and then discharged out of the cooking apparatus through the exhaust opening 122.

[0207] The temperature of the space between the upper surface of the cavity 110 and the upper panel 131 significantly affects the temperature of the electronic component compartment 250. In the case where the temperature of the space between the upper surface of

the cavity 110 and the upper panel 131 decreases, the temperature of the electronic component compartment 250 may decrease effectively.

[0208] Considering this, heat between the upper surface of the cavity 110 and the upper panel 131 may be discharged outward through the air inflow hole 132, in this embodiment, such that the electronic component compartment 250 cools effectively.

Structures of protrusion surface part of front panel and peripheral thereof

[0209] FIG. 6 is an enlarged view showing a portion of a cooking apparatus illustrated in FIG. 5 in an enlarged manner, and FIG. 7 is an enlarged view showing a portion of the cooking apparatus illustrated in FIG. 6 in an enlarged manner.

[0210] Referring to FIGS. 3 to 7, a protrusion surface part 123 may be provided at the front panel 120. The protrusion surface part 123 may be disposed respectively in the end portions of both sides of the front panel 120.

[0211] Each of the protrusion surface parts 123 may be formed to protrude forward from the end portion of the front panel 120 in the lateral direction thereof. For example, each protrusion surface part 123 may comprise a first protrusion surface 123a and a second protrusion surface 123b.

[0212] The first protrusion surface 123a may protrude forward from the end portion of the front panel 120 in the lateral direction thereof. Additionally, the second protrusion surface 123b may extend from the first protrusion surface 123a laterally. The first protrusion surface 123a may protrude in a direction perpendicular to the front panel 120, and the second protrusion surface 123b may extend in a direction parallel with the front panel 120.

[0213] The door 150 disposed at the front side of the front panel 120 may close the cooking compartment 130 while covering the protrusion surface part 123.

[0214] For example, the cooking compartment 130 may be closed in such a way that the lateral surface of the door 150 covers the first protrusion surface 123a while the edge of the rear surface of the door 150 covers the second protrusion surface 123b.

[0215] In this embodiment, the front glass 156 of the door 150 may protrude further laterally than the remaining components, i.e., the door frame 151, the inner glass 154 and the rear glass 156, of the door 150.

[0216] A portion of the front glass 156, protruding laterally, may cover the second protrusion surface 123b from forward, and the lateral surface of the door frame 151 may cover the first protrusion surface 123a, inside the protrusion surface part 123 in the lateral direction thereof.

[0217] The door 150 provided to cover the protrusion surface part 123 from forward as described above may close the cooking compartment 130 while covering the main body 100 from forward completely.

[0218] Further, the cooking apparatus of this embodi-

ment may further comprise a reinforcement member 125. In this embodiment, the protrusion surface part 123 may be a protrusion object integrated with the front panel 120. The reinforcement member 125 may be provided to improve the strength of the protrusion surface part 123 that is a protrusion object extending from the front panel 120.

[0219] The rear side of the reinforcement member 125 may be coupled to the front panel 120, and the front side of the reinforcement member 125 may be coupled to the protrusion surface part 123. Specifically, the front side of the reinforcement member 125 may be coupled to the second protrusion surface 123b.

[0220] Preferably, the front side of the reinforcement member 125 may form a planar surface parallel with the second protrusion surface 123b. The front side of the reinforcement member 125 may be coupled to the second protrusion surface 123b while surface-contacting the second protrusion surface 123b.

[0221] The reinforcement member 125 coupled to the protrusion surface part 123 as described above may improve the strength of the protrusion surface part 123 while firmly supporting the protrusion surface part 123, in particular, the second protrusion surface 123b.

[0222] In the case where the strength of the protrusion surface part 123 improves, the protrusion surface part 123 may contact the door 120 closely while reliably supporting the door 120 closing the cooking compartment 130.

[0223] Further, the protrusion surface part 123 may further comprise a fastening boss 123c. The fastening boss 123c may be formed to protrude rearward from the second protrusion surface 123b. The second protrusion surface 123b and the reinforcement member 125 may be coupled by a fastening member such as a screw and the like, in the state where the second protrusion surface 123b and the reinforcement member 125 touch each other in the front-rear direction.

[0224] The fastening member coupling the second protrusion surface 123b and the reinforcement member 125 may be supported at the protrusion surface part 123 reliably by the fastening boss 123c. Additionally, since the thickness of the second protrusion surface 123b is increased by the fastening boss 123c, the strength of the protrusion surface part 123, in particular, the second protrusion surface 123b, may improve effectively.

Structures of anterior space and peripheral thereof

[0225] FIGS. 8 and 9 are lateral cross-sectional views showing the structure of a door locking mechanism of the cooking apparatus illustrated in FIG. 1.

[0226] Referring to FIGS. 2 to 8, an anterior space S may be formed at the front side of the electronic component compartment 250. The anterior space S may be disposed at the front side of the front panel 120. Additionally, the anterior space S may be disposed at the lower side of the control panel 200. Further, the anterior

space S may be disposed at the upper side of the door 150 having closed the cooking compartment 130.

[0227] In this embodiment, the anterior space S is a space surrounded by the door 150, the front panel 120 and the control panel 200, for example. That is, the anterior space S may be the front side of the front panel 120, and a space formed between the control panel 200 and the door 150.

[0228] The anterior space S may be exposed to the front of the cooking apparatus through a gap between the control panel 200 and the door 150.

[0229] The exhaust opening 122 may be disposed at the rear side of the anterior space S. The exhaust opening 122, as described above, may be formed at the front panel 120. Air, which flows forward in the electronic component compartment 250 while cooling the electronic components, may be discharged to the anterior space S through the exhaust opening 122.

[0230] In this embodiment, a plurality of exhaust openings 122 may be provided at the front panel 120. The plurality of exhaust openings 122 may be spaced a predetermined distance apart from each other laterally.

[0231] Additionally, a separation wall 121 may be formed between two exhaust openings 122 that are adjacent to each other laterally. The separation wall 121 may support the front panel 120, between the two adjacent exhaust openings 122, to improve the strength of the front panel 120.

[0232] The door exhaust opening 152 may be disposed at the lower side of the anterior space S. The door exhaust opening 152, as described above, may be formed at the upper end of the door 150. Air, which flows upward in the door 150 while cooling the door 150, may be discharged to the anterior space S through the door exhaust opening 152.

[0233] The door locking mechanism may be provided at the front side of the main body 100. The door locking mechanism may be installed on the front surface of the main body 100. The door locking mechanism may comprise a latch 140 provided in such a way that the latch 140 is holdable at the door 150 and a driving unit 145 for driving the latch 140.

[0234] The driving unit 145 and the latch 140 may be connected by a link structure. While the door 150 needs to remain closed, the latch remains holdable at the door 150. In the case where the door 150 does not need to remain closed any longer, the latch 140 may get out of the state where the latch 140 is holdable at the door 150.

[0235] The latch 140 may be installed on the front surface of the main body 100, e.g., at the front side of the cavity 110 or at the front panel 120, and while rotating forward, protrude to the front of the main body 100. The latch 140 may protrude forward while rotating forward, and be held at the door 150 (see FIG. 9), and escape from the door 150 while rotating rearward (see FIG. 8).

[0236] A hold groove 151a may be provided at the upper end of the door 150. The hold groove 151a may be formed in such a way that the hold groove 151a is

concave downward from the upper end of the door frame 151. The latch 140 may be inserted into the hold groove 151a from the upper portion of the hold groove 151a, and held at the door 150, and accordingly, the door 150 may be locked by the door locking mechanism.

[0237] The latch 140 may be installed to be exposed to the front surface of the main body 1 such that the latch 140 protrudes forward toward the door 150 when necessary. Additionally, the latch 140 may be disposed further upward than the door 150 such that the latch 140 comes in and out of the hold groove 151a provided at the upper end of the door 150.

[0238] In this embodiment, the cooking apparatus may provide a self cleaning function. The self cleaning function may involve heating the inside of the cooking compartment 130 with the heating unit to keep the temperature in the cooking compartment 130 at high temperature for a long period and burning and removing contaminants.

[0239] In this embodiment, the locking mechanism locks the door 150 while the latch 140 is held at the door 200 at a time when the self cleaning function proceeds, for example. Accordingly, the latch 140 may remain inserted into the main body 100 at ordinary times, and only at a time when the self cleaning function proceeds, protrude forward and fix the door 150.

[0240] In this embodiment, the latch 140 is disposed approximately at a height corresponding to the height at which the exhaust opening 122 is disposed, for example. Accordingly, the latch 140 may be disposed at a position higher than the door 150 and lower than the control panel 200.

[0241] In an example, a latch hole 124 may be formed at the control panel 200 in such a way that the latch hole 124 penetrates the control panel 200 in the front-rear direction. Additionally, the latch 140 may be installed in such a way that the latch 140 comes in and out of the main body 100 through the latch hole 124.

[0242] For example, the latch 140 may be exposed to the front of the main body 100 through the latch hole 124, and protrude to the front of the main body 100 through the latch hole 124. At least a portion of the latch 140 disposed as described above may be exposed to the anterior space S, and exposed to the front of the cooking apparatus through a gap between the door 150 and the control panel 200.

Structure of air guide

[0243] FIG. 10 is a front view showing the cooking apparatus of one embodiment, FIG. 11 is a front exploded perspective view showing a state in which a door, a control panel and an air guide illustrated in FIG. 10 separate, and FIG. 12 is a rear exploded perspective view showing a state in which the door, the control panel and the air guide illustrated in FIG. 10 separate. Additionally, FIG. 13 is a front perspective view showing an air guide of one embodiment in a separate manner, and FIG.

14 is a rear perspective view showing the air guide illustrated in FIG. 13. Further, FIG. 15 is a side view showing the air guide illustrated in FIG. 13, and FIGS. 16 to 18 are side views showing another example of the air guide illustrated in FIG. 15.

[0244] Referring to FIGS. 3 and 10 to 12, the cooking apparatus of this embodiment may further comprise an air guide 300.

[0245] The air guide 300 may be disposed between the door 150 and the control panel 200. Specifically, the air guide 300 may be disposed between the door 150 and the control panel 200 while covering at least a portion of the front panel 120.

[0246] The air guide 300 may partition the space between the door 150 and the control panel 120 in the up-down direction.

[0247] Additionally, the air guide 300 may be disposed in the space surrounded by the door 150, the front panel 120 and the control panel 200, i.e., in the anterior space S.

[0248] In this embodiment, the air guide 300 may be formed into a frame where a length in the lateral direction is much greater than a length in the front-rear direction and a length in the up-down direction, for example. The air guide 300 may have a shape in which a length in the front-rear direction is greater than a length in the up-down direction.

[0249] Hereinafter, the length of the air guide 300 in the front-rear direction thereof is referred to as a "length", the length of the air guide 300 in the lateral direction thereof is referred to as a "width", and the length of the air guide 300 in the up-down direction thereof is referred to as a "thickness".

[0250] In this embodiment, the air guide 300 may be shaped into a frame where the width is greater than the length and the thickness, and the thickness is less than the length and the width.

[0251] The length of the air guide 300 in the up-down direction thereof, i.e., the thickness of the air guide, may be the length of the anterior space S in the up-down direction thereof or less. The air guide 300 may be accommodated in the anterior space S. Additionally, air discharged from the exhaust opening 122 or the door exhaust opening 152 may pass through the air guide 300 while flowing forward in the anterior space S, and be discharged out of the cooking apparatus by passing through the air guide 300.

[0252] The air guide 300 disposed in the anterior space S as described above may partition at least a portion of the anterior space S into a first space S1 and a second space S2.

[0253] The length of the air guide 300 in the lateral direction thereof, i.e., the width of the air guide 300, may correspond to the length of the anterior space S in the lateral direction thereof. For example, the width of the air guide 300 may correspond to at least any one of the length of the control panel 200 in the lateral direction thereof and the length of the door 150 in the lateral

direction thereof.

[0254] In this embodiment, the first space S1 may be defined as a space between the control panel 120 and the air guide 300, and the second space S2 may be defined as a space the air guide 300 and the door 150.

[0255] Specifically, the first space S1 may be defined as a space between a first guide part 310 described hereinafter and the control panel 120, and the second space S2 may be defined as a space the first guide part 310 described hereinafter and the door 150. The first space S1 and the second space S2 may be divided by the first guide part 310 in the up-down direction.

[0256] The air guide 300 may be disposed in an area of the anterior space S, which is eccentric forward, while being disposed in the anterior space S. The air guide 300 may partition an anterior area of the anterior space S into a first space S1 and a second space S2.

[0257] Additionally, the air guide 300 may be disposed at the lower side of the control panel 200 and coupled to the control panel 200. To this end, a cover projection 210, 220 may be provided between the control panel 200 and the air guide 300.

[0258] The cover projection 210, 220 may be formed to protrude downward from the lower end of the control panel 200. The air guide 300 may be coupled to the cover projection 210, 220 at a position where the air guide 300 is spaced from the lower end of the control panel 200. The air guide 300 may be disposed in such a way that the air guide 300 is spaced a predetermined distance apart from the control panel 200, at the lower side of the control panel 200.

[0259] In this embodiment, a plurality of cover projections 210, 220 is spaced a predetermined distance apart from each other laterally. Additionally, the air guide 300 may be coupled to each of the plurality of cover projections 210, 220 and fixed to the lower side of the control panel 200 reliably.

[0260] Referring to FIGS. 3 and 13 to 15, the air guide 300 may comprise a first guide part 310.

[0261] The first guide part 310 as a portion disposed at the front side of the air guide 300 may be disposed further forward than the second guide part 320. The first guide part 310 may be disposed between the control panel 120 and the door 150 and partition a space between the control panel 120 and the door 150 in the up-down direction.

[0262] The first guide part 310 may partition the space between the control panel 120 and the door 150 into a first space S1 at the upper side of the space and a second space S2 at the lower side of the space.

[0263] The air guide 300 may comprise a second guide part 320. The first guide part 310 and the second guide part 320 may be portions that occupy most of the area of the air guide 300, and form most of the exterior of the air guide 300. In this embodiment, the cover projection 210, 220 may be coupled to at least any one of the first guide part 310 and the second guide part 320.

[0264] In another example, the air guide 300 may only

comprise the first guide part 310 or the second guide part 320. In this embodiment, the air guide 300 comprises both the first guide part 310 and the second guide part 320, for example.

[0265] The second guide part 320 may be a portion disposed at the rear side of the air guide 300, and disposed further rearward than the first guide part 310. The second guide part 320 may connect to the first guide part 310, at the rear side of the first guide part 310. The second guide part 320 provided as described above may block the second space S2.

[0266] The second guide part 320 may be provided to block the second space S2, between the first guide part 310 and the door exhaust opening 152. The second guide part 320 may extend from the first guide part 310 rearward in such a way that the second guide part 320 inclines downward.

[0267] In an example, the first guide part 310 may be shaped into a planar surface parallel with the lower surface of the control panel 120 or the upper end surface of the door 150. At this time, the first guide part 310 may have a shape comprising a planar surface across the up-down axis.

[0268] The second guide part 320 may be provided in such a way that the second guide part 320 connects to the first guide part 310 in the front-rear direction. The second guide part 320 may be formed to extend rearward from the rear end of the first guide part 310.

[0269] In an example, the second guide part 320 may be shaped into an inclination surface that extends rearward from the rear end of the first guide part 310. At this time, the second guide part 320 may be shaped into an inclination surface that extends downward toward the rear side of the second guide part 320.

[0270] The second guide part 320 formed as described above may block the second space S2, between the first guide part 310 and the door exhaust opening 152, and prevent a forward movement of air through the second space S2. Detailed description in relation to this is provided hereinafter.

[0271] In another example, an air guide 300a may comprise a first guide part 310a and a second guide part 320 that connect to each other linearly (see FIG. 16).

[0272] At this time, the first guide part 310a may be shaped into an inclination surface that extends to the front of the second guide part 320 linearly.

[0273] The air guide 300a formed as described above may allow expand an area covered by the air guide 300a, in the up-down direction, in an anterior gap, and allow air to be discharged to the front of the cooking apparatus through the anterior space.

[0274] In another example, an air guide 300b may comprise a second guide part 320b that has a curved line shape (see FIG. 17).

[0275] At this time, the second guide part 320a may have a curved shape the upper surface of which is convex, while the second guide part 320a is formed to incline downward toward the rear thereof.

[0276] The air guide 300b formed as described above may smoothly guide a flow of air toward the second guide part 320b forward along the curved surface of the second guide part 320b.

5 **[0277]** The air guide 300b may decrease resistance that is generated as air discharged through the exhaust opening 122 contacts the second guide part 320b.

[0278] The air guide 300b may allow air to be discharged smoothly to the front of the cooking apparatus through the anterior space.

10 **[0279]** In another example, an air guide 300c may comprise a first guide part 320c and the second guide part 320b that connect in the form of one curved line (see FIG. 18).

15 **[0280]** At this time, while the first guide part 320c extends to the front of the second guide part 320b, the first guide part 320c may be shaped into a curved line smoothly connecting to the second guide part 320b. At this time, like the second guide part 320b, the first guide part 320c may be shaped into a curved line the upper surface of which is convex.

[0281] The air guide 300c formed as described above may have an exterior more smooth than the exterior of the air guide 300b illustrated in FIG. 17 and allow air to be discharged smoothly.

25 **[0282]** Further, the air guide 300, as illustrated in FIGS. 3 and 10 to 15, may further comprise a fastening projection 330. The fastening projection 330 may be provided for a coupling between the air guide 300 and the control panel 120.

30 **[0283]** In this embodiment, the fastening projection 330 may be disposed toward the second guide part 320 that is disposed further rearward than the first guide part 310. The fastening projection 330 may be formed to protrude from the second guide part 320 in the up-down direction.

35 **[0284]** Each fastening projection 330 may be coupled to the cover projection 210, 220. In an example, the plurality of cover projections 210, 220 and the fastening projection 330 may be disposed in such a way that each cover projection 210, 220 and the fastening projection 330 touch each other in the up-down direction. As each cover projection 210, 220 and the fastening projection 330 touching each other in the up-down direction are coupled, the control panel 120 and the air guide 300 may be coupled to each other.

40 **[0285]** The air guide 300 may further comprise an extension part 315. The extension part 315 may be disposed at both sides of the first guide part 310 in the lateral direction thereof. The extension part 315 may be formed to protrude from the first guide part 310 laterally.

[0286] The extension part 315 is not a portion that is coupled to the cover projection 210, 220. Accordingly, the length of the extension part 315 may be less than the entire length of the air guide 300.

55 **[0287]** Since the extension part 315 is formed in such a way that the length of the extension part 315 is less than the entire length of the air guide 300, the entire size and

the weight of the air guide 300 may not increase unnecessarily.

[0288] The extension part 315 may be disposed eccentrically toward the front side of the air guide 300, on the air guide 300. Preferably, the first guide part 310 and the extension part 315 may connect laterally, such that the end portion of the front side of the extension part 315 and the end portion of the front side of the first guide part 310 are disposed on the same line.

[0289] In this embodiment, the extension part 315 protrudes from the first guide part 310 to have the same length as the length of the first guide part 310, for example.

[0290] Accordingly, despite the fact that the length of the extension part 315 is less than the entire length of the air guide 300, the exterior of the air guide 300 viewed from forward may be formed to connect smoothly.

[0291] Further, the extension part 315, as illustrated in FIG. 7, may be disposed at the front of the protrusion surface part 123. The protrusion surface part 123, as described above, is formed to protrude forward from the end portion of the front panel 120 in the lateral direction thereof.

[0292] The extension part 315 disposed at the front of the protrusion surface part 123 has a length less than the length of the first guide part 310, as described above, and is disposed eccentrically toward the front of the air guide 300, on the air guide 300, to avoid interference with the protrusion surface part 123.

[0293] That is, the extension part 315 formed as described above may produce the effects of maintaining the aesthetic quality of the air guide 300 viewed from forward and preventing an unnecessary increase in the size and weight of the air guide 300, while avoiding interference with the protrusion surface part 123.

Disposition structure of air guide considering exterior of front surface of cooking apparatus

[0294] FIG. 19 is a front view showing a portion of the front surface of a cooking apparatus without an air guide, and FIG. 20 is an enlarged view showing a portion of the front surface of the cooking apparatus illustrated in FIG. 19 in an enlarged manner. Additionally, FIG. 21 is a front view showing a portion of the front surface of the cooking apparatus of one embodiment, and FIG. 22 is an enlarged view showing a portion of the front surface of the cooking apparatus illustrated in FIG. 21 in an enlarged manner.

[0295] Referring to FIGS. 19 and 20, in the state where the cooking apparatus is without the air guide, portions of the cooking apparatus may be exposed to the front of the cooking apparatus through the gap (hereinafter, "anterior gap") between the control panel 200 and the door 150.

[0296] In an example, a portion of the front panel 120 may be exposed to the front of the cooking apparatus through the anterior gap. Specifically, the plurality of exhaust openings 122 provided at the control panel

200 may be exposed to the front of the cooking apparatus through the anterior gap. Additionally, the separation walls 121 disposed between the exhaust openings 122 may be exposed to the front of the cooking apparatus through the anterior gap.

[0297] Further, a portion of a variety of electronic components disposed in the electronic component compartment 250, which is disposed at the rear of the exhaust opening 122, may be exposed to the front of the cooking apparatus through the anterior gap.

[0298] Further, at least a portion of the door locking mechanism may also be exposed to the front of the cooking apparatus through the anterior gap. For example, most of the latch 140 may be exposed to the front of the cooking apparatus through the anterior gap. Further, a portion of the driving unit 145 together with the latch 140 may be exposed to the front of the cooking apparatus through the anterior gap.

[0299] In the case where the above components are exposed to the front of the cooking apparatus, the components may adversely affect the exterior of the front surface of the cooking apparatus. That is, structures such as an exhaust opening 122 and a separation wall 121 formed at the front panel 120, a structure such as a latch 140 and the like having a complex structure, and electronic components exposed through the exhaust opening 122 may be factors causing deterioration in the aesthetic quality of the front surface of the cooking apparatus.

[0300] To reduce the effect of the components on the aesthetic quality of the front surface of the cooking apparatus, in this embodiment, the air guide 300 may be provided at the cooking apparatus, as illustrated in FIGS. 21 and 22.

[0301] The air guide 300 may be disposed in the anterior gap described above. The air guide 300 may be disposed between the control panel 200 and the door 150, and provided to cover a portion of the front panel 120, the latch 140, the electronic components and the like from forward.

[0302] The air guide 300 may cover a portion of the anterior gap, between the control panel 200 and the door 150, and accordingly, a portion of the front panel 120, the latch 140, the electronic components and the like exposed to the front of the cooking apparatus through the anterior gap may be covered by the air guide 300.

[0303] In the case where the thickness of the air guide 300 increases, the area covered by the air guide 300 may expand. In the case where the area covered by the air guide 300 expands, the aesthetic quality of the front surface of the cooking apparatus may improve, making it difficult for air to be discharged to the front of the cooking apparatus through the anterior space S (see FIG. 3).

[0304] In the case where the thickness of the air guide 300 decreases, the area covered by the air guide 300 may shrink. In the case where the area covered by the air guide 300 shrinks, improvement in the aesthetic quality of the front surface of the cooking apparatus may deteriorate, making it easy for air to be smoothly discharged to

the front of the cooking apparatus through the anterior space S.

[0305] Considering this, the thickness of the air guide 300 may be set to a maximum one within the range where air is smoothly discharged to the front of the cooking apparatus through the anterior space S, preferably.

[0306] In the case where the thickness of the air guide 300 is set to satisfy the above-described conditions, the aesthetic quality of the front surface of the cooking apparatus may improve effectively, while the efficiency of discharging air through the anterior gap may be maintained at a certain level or above.

[0307] In this embodiment, a portion of the area exposed to the front of the cooking apparatus through the anterior gap may be covered by the air guide 300, ensuring improvement in the aesthetic quality of the front surface of the cooking apparatus.

[0308] In an example, the air guide 300 may be disposed in such a way that the first guide part 310 is disposed at the center of the anterior gap in the up-down direction, while being disposed in the anterior gap. That is, the air guide 300 may be disposed at a position (hereinafter, "central position") where a distance between the first guide part 310 and the control panel 200 in the up-down direction and a distance between the first guide part 310 and the door 150 in the up-down direction are set to be the same, while the air guide 300 is disposed between the door 150 having closed the cooking compartment and the control panel 200.

[0309] Accordingly, the air guide 300 may form a structure that allows the first guide part 310 to cover the center of the anterior gap in the up-down direction thereof, i.e., to cover the anterior gap at the central position.

[0310] The air guide 300 allows the upper area of the anterior gap and the lower area of the anterior gap to be symmetrical to each other with respect to the first guide part 310, making the shape of the front surface of the cooking apparatus look reliable and ensuring improvement in the aesthetic quality of the front surface of the cooking apparatus.

[0311] Additionally, the air guide 300 in this embodiment may cover the lower area of the anterior gap through the second guide part 320 disposed at the rear side of the first guide part 310. At this time, the second guide part 320 is disposed at the rear side of the first guide part 310, and when viewed from forward, is less noticeable than the first guide part 310.

[0312] That is, the second guide part 320 may cover the lower area of the anterior gap at a position that is less noticeable than the position the first guide part 310.

[0313] While the air guide 300 having the second guide part 320 may cover the anterior gap in such a way that the upper area of the anterior gap is symmetrical to the lower area of the anterior gap with respect to the first guide part 310, the second guide part 320 less noticeable than the first guide part 310 may be used to cover the lower area of the anterior gap further.

[0314] The air guide 300 in this embodiment may make

the shape of the front surface of the cooking apparatus look reliable and effectively ensure improvement in the aesthetic quality of the front surface of the cooking apparatus.

[0315] As described above, the air guide 300 may be coupled to the control panel 200 by the cover projection 210, 220.

[0316] In an example, the cover projection 210, 220 may comprise an outer cover projection 210.

[0317] The outer cover projection 210 may be provided to protrude downward from the lower end of the control panel 200. The outer cover projection 210 may be coupled to the air guide 300, under the control panel 200. Based on a coupling between the outer cover projection 210 and the air guide 300, the air guide 300 may be coupled to the control panel 200 while being spaced a predetermined distance apart from the lower end of the control panel 200.

[0318] Preferably, in the case where the outer cover projection 210 is coupled to the air guide 300, the air guide 300 may be disposed at the central position.

[0319] The outer cover projection 210 may be disposed at a position where at least a portion of the outer cover projection 210 covers at least a portion of the latch 140 from forward. For example, the outer cover projection 210 may protrude from the upper side of the latch 140 in the perpendicular direction thereof, while protruding downward from the lower end of the control panel 200.

[0320] The outer cover projection 210 disposed as described above covers at least a portion of the latch 140. Accordingly, when viewed from forward, at least a portion of the latch 140 is covered by the outer cover projection 210 and is not seen.

[0321] In an example, the outer cover projection 210 may be formed to protrude from the lower end of the control panel 200 up to the central position. Additionally, the width of the outer cover projection 210 may be set to be the width of the latch 140 or greater. The outer cover projection 210 may cover the upper half of the latch 140, exposed through the anterior gap, from forward. The lower half of the latch 140 may be exposed to the lower side of the air guide 300.

[0322] In this embodiment, the shape of the lateral surface of the latch 140 may be shaped into an approximate "┐" shape. The latch 140 may be formed in such a way that the upper end portion of the latch 140 protrudes forward. Accordingly, when viewed from forward, the upper half of the latch 140 has a shape more complex than the shape of the lower half of the latch 140.

[0323] While the outer cover projection 210 protrudes from the control panel 200 to have a length that is enough for the outer cover projection 210 to be coupled to the air guide 300, the outer cover projection 210 may protrude from the control panel 200 to have a length that is enough to cover the upper half of the latch 140.

[0324] That is, the outer cover projection 210 does not protrude to have a length that is greater than the length at which the outer cover projection 210 covers the upper

half of the latch 140 as well as fixing the air guide 300 at the central position.

[0325] If the outer cover projection 210 protrudes further, a coupling structure between the outer cover projection 210 and the air guide 300 may become complex or their coupling itself may not occur, although the outer cover projection 210 covers the latch 140 further. Additionally, because of a structure protruding unnecessarily, the aesthetic quality of the front surface of the cooking apparatus may deteriorate.

[0326] Considering this, the outer cover projection 210 in this embodiment protrudes to have a length at which the outer cover projection 210 covers the upper half of the latch 140 as well as fixing the air guide 300 at the central position, without protruding in such a way that the outer cover projection 210 is long unnecessarily.

[0327] The outer cover projection 210 may help the upper half of the latch 140, which a portion significantly affecting the aesthetic quality of the front surface of the cooking apparatus, to be covered first, and help the air guide 300 at the central position, effectively ensuring improvement in the aesthetic quality of the front surface of the cooking apparatus.

[0328] In another example, the air guide 300 may be disposed at a position eccentric to the lower portion of the anterior gap from the center of the anterior gap in the up-down direction thereof, while being disposed in the anterior gap.

[0329] Considering that the height of the eye level of the user is ordinarily greater than the height of the air guide 300 disposed between the door 150 and the control panel 200, the user may identify the air guide 300 readily in the case where the air guide 300 is disposed at the position described above.

[0330] The air guide 300 needs to be disposed at a position where the air guide 300 is noticeable outside the cooking apparatus, such that the aesthetic quality provided by the air guide 300 is shown effectively.

[0331] That is, since the air guide 300 is disposed at a position eccentric to the lower portion of the anterior gap from the center of the anterior gap in the up-down direction, to embody an esthetic quality effectively.

[0332] In the case where the air guide 300 is disposed at the above-described position, the length of the cover projection 210, 220, in particular, the outer cover projection 210, in the up-down direction increases.

[0333] In the case where the length of the outer cover projection 210 increases, the outer cover projection 210 may cover an area greater than the upper half of the latch 140, while the outer cover projection 210 covers the latch 140. Since a greater portion of the latch 140 is covered by the outer cover projection 210 as described above, the aesthetic quality of the front surface of the cooking apparatus may improve effectively.

[0334] In this embodiment, the latch 140 is disposed at one side of the main body 100 in the lateral direction thereof, for example. For example, one latch 140 may be disposed at a position eccentric to one side of the main

body 100 in the lateral direction thereof, in the cooking apparatus. At this time, the latch 140 may be disposed at a position more eccentric to one side of the main body 100 in the lateral direction thereof than the exhaust opening 122.

[0335] In this embodiment, a pair of outer cover projections 210 may be disposed between the control panel 200 and the air guide 300. The pair of outer cover projections 210 may be disposed in such a way that the pair of outer cover projections 210 is symmetrical to each other with respect to the center of the cooking compartment in the lateral direction thereof, i.e., the center of the main body 100 in the lateral direction thereof. To put it another way, the pair of outer cover projections 210 is disposed in such a way that the pair of outer cover projections 210 is symmetrical to each other with respect to the center of the control panel 200 in the lateral direction thereof.

[0336] One of the pair of outer cover projections 210 may be disposed at the front of the latch 140 and cover the upper half of the latch 140. The other of the pair of outer cover projections 210 is not disposed at the front of the latch 140.

[0337] Since the pair of outer cover projections 210 is symmetrically disposed as described above, the shapes of the cover projection 210, 220 and the air guide 300 that are exposed through the anterior gap may look balanced.

[0338] The cover projection 210, 220 may comprise an inner cover projection 220.

[0339] The inner cover projection 220 may be provided in such a way that the inner cover projection 220 protrudes downward from the lower end of the control panel 200. The inner cover projection 220 may be coupled to the air guide 300, under the control panel 200. Based on a coupling between the inner cover projection 220 and the air guide 300, the air guide 300 may be coupled to the control panel 200 while being spaced a predetermined distance apart from the lower end of the control panel 200.

[0340] Preferably, in the case where the inner cover projection 220 is coupled to the air guide 300, the air guide 300 may be disposed at the central position.

[0341] At least a portion of the inner cover projection 220 may be disposed at a position where at least a portion of the inner cover projection 220 covers at least a portion of the separation wall 121 from forward. For example, the inner cover projection 220 may protrude from the upper side of the separation wall 121 in the perpendicular direction thereof, while protruding downward from the lower end of the control panel 200.

[0342] The inner cover projection 220 disposed as described above covers at least a portion of the separation wall 121. Accordingly, when viewed from forward, at least a portion of the separation wall 121 is covered by the inner cover projection 220 and not be seen.

[0343] The inner cover projection 220 disposed as described above may be disposed between the pair of outer cover projections 210. For example, out of the plurality of cover projections 210, 220 arranged laterally,

the outer cover projections 210 may be disposed at outermost sides laterally, and the inner cover projections 220 may be disposed between the outer cover projections 210.

[0344] The inner cover projection 220 and the outer cover projection 210 may allow the air guide 300 to be coupled to the cover projections 210, 220 at a plurality of points laterally and to be fixed to the lower portion of the control panel 200 reliably.

[0345] That is, the inner cover projection 220 may increase the number of coupling points between the control panel 200 and the air guide 300, and help the air guide 300 to be fixed reliably.

[0346] Additionally, the inner cover projection 220 may be disposed at a position where the inner cover projection 220 covers the separation wall 121 from forward, such that the number of vertical structures exposed through the anterior gap does not increase.

[0347] That is, the inner cover projection 220 may be disposed in such a way that the separation wall 121 as a vertical structure unavoidably exposed through the anterior gap is covered by the inner cover projection 220. As a result, apparently, the number of vertical structures exposed through the anterior gap does not increase.

[0348] Thus, the vertical structure exposed through the anterior gap may prevent deterioration in the aesthetic quality of the front surface of the cooking apparatus effectively.

[0349] Additionally, the inner cover projection 220 disposed as described above may be disposed at a position where the inner cover projection 220 avoids the exhaust opening 122. The exhaust opening 122 may form a passage required for air of the electronic component compartment 250 (see FIG. 3) to be discharged to the anterior space S.

[0350] Air drawn into the electronic component compartment 250 by the fan 260 (see FIG. 3) may cool the electronic components while being heat-exchanged in the electronic component compartment 250. The air heat-exchanged in the electronic component compartment 250 may be discharged to the anterior space S through the exhaust opening 122 in the state where the air is at high temperature.

[0351] Under the assumption that the inner cover projection 220 is made of a plastic material, the inner cover projection 220 is highly likely to be thermally deformed, in the case where the inner cover projection 220 is ordinarily exposed to high-temperature air discharged through the exhaust opening 122.

[0352] For example, in the case where the inner cover projection 220 is disposed at the front of the exhaust opening 122 rather than being disposed at the front of the separation wall 121, the inner cover projection 220 may be thermally deformed due to the high-temperature air discharged through the exhaust opening 122.

[0353] Considering this, the inner cover projection 220 may be disposed at a position where the inner cover projection 220 avoids the exhaust opening 122, i.e., at

the front of the separation wall 121 rather than the front of the exhaust opening 122, in this embodiment.

[0354] Accordingly, the thermal deformation of the inner cover projection 220 may be prevented effectively, and air may be discharged smoothly through the exhaust opening 122 without being interfering with by the inner cover projection 220.

[0355] That is, the inner cover projection 220 in this embodiment may be disposed at a position where the inner cover projection 220 covers the exhaust opening 122 from forward, such that the inner cover projection 220 may be disposed at a position where the inner cover projection 220 is less likely to be thermally deformed without interfering with the discharge of air through the exhaust opening 122, and a position where the aesthetic quality of the front surface of the cooking apparatus improves.

[0356] In summary, the air guide 300 disposed as described above, and the cover projection 210, 220 for fixing the air guide 300 produce the following effects.

[0357] First, a portion of the structures exposed through the anterior gap is covered by the air guide 300 providing a structure that covers the anterior gap while crossing the anterior gap laterally, ensuring improvement in the aesthetic quality of the front surface of the cooking apparatus.

[0358] In the case where the user looks at the anterior gap, the user's gaze is focused on the air guide 300 such that the user feels like the air guide 300 is only in the anterior gap because of an optical illusion, at the same time as the air guide 300 covers a portion of other structures at the rear of the air guide 300.

[0359] Additionally, since the air guide 300 may form a structure covering the anterior gap at a central position of the anterior gap, the upper area of the anterior gap and the lower area of the anterior gap may be symmetrical to each other, and the shape of the front surface of the cooking apparatus may look reliably.

[0360] Accordingly, the air guide 300 may help to improve the aesthetic quality of the front surface of the cooking apparatus effectively.

[0361] Second, at least a portion of a structure such as a latch 140 having a large complex shape may be covered by the outer cover projection 210, effectively ensuring improvement in the aesthetic quality of the front surface of the cooking apparatus.

[0362] In this embodiment, the upper half of the latch 140, which is a portion significantly affecting the aesthetic quality of the front surface of the cooking apparatus, may be covered by the outer cover projection 210 provided for fixing the air guide 300.

[0363] That is, since the outer cover projection 210 provided for fixing the air guide 300 is properly disposed at the front of the latch 140, the air guide 300 may be fixed reliably, and the aesthetic quality of the front surface of the cooking apparatus may improve.

[0364] Third, since the inner cover projection 220 may be disposed at a position where the inner cover projection

220 covers the separation wall 121 partitioning between the exhaust opening 122 and the exhaust opening 122 from forward, the inner cover projection 220 is less likely to be thermally deformed without interfering with discharge of air through the exhaust opening 122, and the aesthetic quality of the front surface of the cooking apparatus may improve.

Coupling structure between control panel and air guide

[0365] FIG. 23 is a cross-sectional perspective view showing a coupling structure between an air guide and a control panel, and FIG. 24 is a cross-sectional exploded perspective view showing a state in which the air guide and the control panel illustrated in FIG. 23 separate.

[0366] Referring to FIGS. 21 to 24, the cover projection 210, 220 may be included in the front panel 120. In an example, the cover projection 210, 220 may be integrated with the front panel 120. Specifically, the cover projection 210, 220 may be integrated with the lower end of the front panel 120.

[0367] In this embodiment, the lower end of the front panel 120 and the cover projection 210, 220 are made of a plastic material, for example. Since the cover projection 210, 220 made of a plastic material is integrated with the lower end of the front panel 120, costs incurred for adding the cover projection 210, 220 may decrease, and the cover projection 210, 220 made of a plastic material may weigh much less than a cover projection 210, 220 made of a metal material.

[0368] The air guide 300 may be made of a metal material. In an example, the air guide 300 may be made of a metal material having excellent heat resistance and metallic luster. The air guide 300 may not be easily deformed despite high-temperature heat and not be easily damaged despite an impact, and its metallic luster may help to improve the aesthetic quality of the cooking apparatus.

[0369] Considering that the air guide 300 is disposed on a path in which high-temperature air is discharged, disposed at a noticeably position on the front surface of the cooking apparatus, and disposed at a position where the air guide 300 is frequently contacted by the user, the air guide 300 in this embodiment is made of a metal material.

[0370] The cover projection 210, 220 may be coupled to the fastening projection 330. Each of the cover projection 210, 220 may have a hollow hole, and the fastening projection 330 may have a fastening hole that is formed in such a way that the fastening hole penetrates the fastening projection 330 in the up-down direction, and communicates with the hollow hole. The cover projection 210, 220 and the fastening projection 330 may be coupled by a fastening member 305 such as a screw and the like.

Disposition structure of air guide considering discharge flow

[0371] FIG. 25 is a cross-sectional view showing a flow of air in the cooking apparatus of one embodiment, FIG. 26 is an enlarged view showing a portion of the cooking apparatus illustrated in FIG. 25 in an enlarged manner, and FIG. 27 is an enlarged view showing a portion of the cooking apparatus illustrated in FIG. 26 in an enlarged manner.

[0372] Referring to FIGS. 25 and 28, based on the operation of the fan 260, external air may be drawn into the electronic component compartment 250 from the rear side of the cooking apparatus. The air drawn into the electronic component compartment 250 may cool the electronic components in the electronic component compartment 250, while moving forward in the electronic component compartment 250.

[0373] Specifically, external air may be drawn into the cooking apparatus through the lower portion of the main body 100. The external air drawn through the lower portion of the main body 100 may cool a variety of components, e.g., a motor for driving the convection part 160 and the like, disposed in the space at the rear side of the cooking apparatus, while passing through the space at the rear side of the cooking apparatus, where the convection part 160 and the like is disposed.

[0374] The air having moved upward by passing through the space at the rear side of the cooking apparatus may move to the electronic component compartment 250 through the space covered by the electronic component compartment 133, between the space at the rear side of the cooking apparatus and the electronic component compartment 250.

[0375] The air having moved into the electronic component compartment 250 may be suctioned by the fan 260 and drawn into the cooling flow path 255. The air drawn into the cooling flow path 255 may cool the electronic components in the electronic component compartment 250 while moving forward in the cooling flow path 255.

[0376] The air having moved forward in the electronic component compartment 250 may be discharged to the front of the electronic component compartment 250, i.e., the anterior space S, through the exhaust opening 122.

[0377] During a cooking process, air in the door 150, heated by heat transferred from the cooking compartment 130, may be discharged out of the door 150 through the door exhaust opening 152 provided at the upper end of the door 150.

[0378] As the hot air in the door 150 is discharged, external air at the lower side of the front of the cooking apparatus may be drawn into the door 150 through an air flow hole provided in the lower portion of the door 150 and move upward. In this process, the door 150 that is heated by heat transferred to the door 150 from the cooking compartment 130 may cool.

[0379] Additionally, the air, having moved upward in

the door 150 while cooling the door 150, may be discharged to the anterior space S through the door exhaust opening 152. That is, the air discharged through the exhaust opening 122 and the air discharged through the door exhaust opening 152 may be discharged to the front of the cooking apparatus while being combined in the anterior space S.

[0380] In this embodiment, the anterior space S may be a space surrounded by the door 150, the front panel 120 and the control panel 200, and the air guide 300 may be disposed in the anterior space S.

[0381] The exhaust opening 122 may communicate with the anterior space S, at the rear side of the anterior space S, and the door exhaust opening 152 may communicate with the anterior space S, at the lower side of the anterior space S. Additionally, the anterior space S may be open toward the front of the cooking apparatus.

[0382] The door exhaust opening 152 may be disposed between the air guide 300 and the front panel 120. Specifically, the door exhaust opening 152 may be disposed at the front of the exhaust opening 122. That is, the door exhaust opening 152 may be disposed between the air guide 300 and the exhaust opening 122 with respect to the front-rear direction.

[0383] Additionally, the door exhaust opening 152 may be disposed at the lower sides of the air guide 300 and the exhaust opening 122. Further, the door exhaust opening 152 may be provided on the posterior part 150b while being provided at the upper end of the door 150.

[0384] Accordingly, the door exhaust opening 152 may be disposed at a position that is eccentric rearward on the door 150, and disposed further downward than an uppermost end of the door 150, formed by the anterior part 150a.

[0385] In a disposition relationship among the exhaust opening 122 and the door exhaust opening 152 and the air guide 300, the door exhaust opening 152 is disposed at a position closest to the exhaust opening 122 in the front-rear direction, on the door 150.

[0386] If the door exhaust opening 152 is disposed at the anterior part 150a of the door 150 rather than the posterior part 150b of the door 150, hot air discharged through the exhaust opening 122 is highly likely to flow reversely into the door 150 through the door exhaust opening 152.

[0387] Air discharged through the exhaust opening 122 moves to the front of the anterior space S while spreading in the anterior space S gradually. That is, air discharged through the exhaust opening 122 moves forward while spreading in the up-down direction as well as the front-rear direction in the anterior space S.

[0388] Accordingly, in the case where the door exhaust opening 152 is disposed further forward in the anterior space S, air discharged through the exhaust opening 122 is highly likely to be drawn toward the door exhaust opening 152. In the case where hot air discharged through the exhaust opening 122 flows reversely into the door 150 through the door exhaust opening 152,

the door 150 may not cool smoothly, and heat drawn into the anterior space S may not be discharged smoothly out of the cooking apparatus.

[0389] Considering this, the door exhaust opening 152 may be disposed at the posterior part 150b of the door 150, and accordingly, the door exhaust opening 152 may be disposed at a position closest to the exhaust opening 122 in the front-rear direction, on the door 150, in this embodiment.

[0390] Thus, the door exhaust opening 152 may be disposed at a position where the door exhaust opening 152 escapes to a maximum degree from an area in which air discharged through the exhaust opening 122 flows, among positions in the front-rear direction, which may be selected in the door 150.

[0391] Further, in this embodiment, since the door exhaust opening 152 is disposed at the posterior part 150b, door exhaust opening 152 may be disposed further downward than an uppermost end of the door 150, formed by the anterior part 150a. That is, the door exhaust opening 152 may be disposed at a position that is far from the area in which air discharged through the exhaust opening 122 flows, in the downward direction.

[0392] Thus, the door exhaust opening 152 may be disposed at a position where the door exhaust opening 152 escapes to a maximum degree from the area in which air discharged through the exhaust opening 122 flows. The door exhaust opening 152 disposed as described above may help to suppress a reverse flow of hot air discharged to the anterior space S into the door 150 effectively.

[0393] Further, the door exhaust opening 152 may be disposed further rearward than the air guide 300, without being disposed at the lower side of the air guide 300 in the perpendicular direction thereof. Thus, the flow of air discharged from the door exhaust opening 152 may not be interfered with by the air guide 300, and the air may flow toward the anterior space S smoothly.

[0394] In this embodiment, the door exhaust opening 152 may be disposed between the air guide 300 and the front panel 120. That is, the air guide 300 may be disposed at the front sides of the exhaust opening 122 and the door exhaust opening 152. The air guide 300 may be disposed at a position that is eccentric forward in the anterior space S.

[0395] The air guide 300, disposed as described above, may guide the flow of air, discharged from the exhaust opening 122 and the door exhaust opening 152 to the anterior Space S, at the front side of the anterior space S.

[0396] For example, air discharged to the anterior space S respectively from the exhaust opening 122 and the door exhaust opening 152 may be discharged to the front of the cooking apparatus while being combined in the anterior space S. The air guide 300, as described above, may be disposed on a flow path (hereinafter, "discharge flow path") of the air discharged from the anterior space S to the front of the cooking apparatus.

[0397] The air guide 300 disposed as described above may be shaped into a frame the width of which is greater than the length and thickness of the air guide 300 and the thickness of which is less than the length and width of the air guide 300.

[0398] The air guide 300 may partition a space between the control panel 120 and the door 150 into a first space S1 and a second space S2.

[0399] The first guide part 310 of the air guide 300 is disposed at the center of the anterior space S in the up-down direction thereof. Additionally, the second guide part 320 disposed at the rear side of the first guide part 310 blocks the second space S2, at the lower side of the first guide part 310.

[0400] Accordingly, air drawn into the anterior space S through the exhaust opening 122 may flow forward only through the first space S1 disposed at the upper side of the second space S2, without moving forward through the second space S2 blocked by the second guide part 320. Thus, air discharged from the exhaust opening 122 may be discharged to the front of the cooking apparatus through a space of the anterior space S, which is eccentric upward.

[0401] Additionally, air discharged from the door exhaust opening 152 may also flow forward only through the first space S1, without moving forward through the second space S2. Accordingly, the air discharged from the door exhaust opening 152 may move to a higher position than the second space S2 and then be discharged to the front of the cooking apparatus through a space of the anterior space S, which is eccentric upward.

[0402] Thus, air drawn to the anterior space S through the exhaust opening 122 and the door exhaust opening 152 may be combined in the anterior space S and move forward through the first space S1.

[0403] At this time, the air combined in the anterior space S after being discharged from the exhaust opening 122 and the door exhaust opening 152 as described above may be discharged to the front of the cooking apparatus while forming one flow passing through the first space S1, without being branched into a variety of flows by the air guide 300.

[0404] Additionally, the air forming the above-described flow may be discharged to the front of the cooking apparatus through a space of the anterior space S, which is eccentric upward.

[0405] In the case where the flow discharged forward from the anterior space S is separated in the up-down direction by the air guide 300, there may be a difference between the velocity of the flow of air passing through the upper side of the air guide 200 and the velocity of the flow of air passing through the lower side of the air guide 300.

[0406] In the case where the velocities of the two flows of the separated air differ, eddy current may occur at the front of the air guide 300.

[0407] In the case where eddy current occurs as described above, air drawn into the anterior space S may not be discharged properly out of the cooking apparatus,

or air of the anterior space S may flow reversely into the door 150 through the door exhaust opening 152.

[0408] Considering this, air may flow only through one space formed at the upper side of the air guide 300, i.e., the first space S1, in this embodiment.

[0409] To this end, the air guide 300 of this embodiment may block the second space S2 through the second guide part 320, such that air is prevented from moving forward through the second space S2.

[0410] Accordingly, in the anterior space S, air may move forward only based one flow through the first space S1.

[0411] In the case where air moves forward only based one flow through the first space S1, it is much less likely to generate eddy current at the fronts of the air guide 300 and the cooking apparatus.

[0412] That is, the air guide 300 provided to block a space at the lower side of the air guide 300 may not allow the flow of air flowing through the discharge flow path to separate and may allow the same forward, ensuring a smooth discharge toward the front of the cooking apparatus.

[0413] Additionally, the air guide 300 may guide the flow of air such that air is discharged through the first space S1 of the anterior space S, which is eccentric to upward. The air guide 300 may guide the flow of air such that a distance between the flow of the air discharged and the door 150 increases.

[0414] Accordingly, since air is charged toward the front of the cooking apparatus, at a side of the anterior space S far away from the door 150, a distance between hot air discharged from the front of the cooking apparatus and the door 150 increases.

[0415] In the case where a distance between hot air discharged from the front of the cooking apparatus and the door 150 increases, reducing the possibility of an increase in the temperature of the door 150 based on contact between the hot air and the door 150.

[0416] Since air discharged from the exhaust opening 122 and the door exhaust opening 152 moves through a space of the anterior space S, which is eccentric upward, it is less likely that air discharged from the exhaust opening 122 moves downward and flows into the door 150 through the door exhaust opening 152 or it is less likely that air discharged from the door exhaust opening 152 flows reversely into the door 150 again.

[0417] Since the flow of air toward the front of the cooking apparatus is guided in the upward direction where the flow of the air becomes far away from the door exhaust opening 152, air drawn into the anterior space S is much less likely to be drawn into the door 150.

[0418] To this end, the second guide part 320 may block the flow of air through a space adjacent to the door exhaust opening 152 by blocking the second space S2 adjacent to the door exhaust opening 152.

[0419] Additionally, the second guide part 320 may form a blocking wall that inclines forward and upward, to guide an upward movement of air drawn into the

anterior space S.

[0420] The air guide 300 of this embodiment, as described above, may effectively suppress a reverse flow of air discharged out of the electronic component compartment or the door 150 into the door 150 as well as effectively suppressing an increase in the temperature of the door 150 caused by hot air discharged to the front of the cooking compartment.

[0421] Referring to FIGS. 27 and 28, the second guide part 320 may block the second space S2 while contacting the door 150. Specifically, the second guide part 320 may block the second space S2 while contacting the posterior part 150b of the door 150.

[0422] At this time, since the second guide part 320 is disposed at the upper side of the posterior part 150b, at least a portion of the second guide part 320 may contact the posterior part 150b, at the upper side of the posterior part 150b. That is, the second guide part 320 may contact the posterior part 150b at a position where the second guide part 320 overlaps the posterior part 150b in the up-down direction.

[0423] In the case where the second guide part 320 contacts the posterior part 150b as described above, the gap between the air guide 300 and the door 150 in the second space S2 may be blocked. Accordingly, a forward movement of air through the second space S1 may be effectively prevented by the second guide part 320.

[0424] In this embodiment, the posterior part 150b may be shaped into an inclination surface that inclines downward toward the rear of the posterior part 150b. Additionally, the second guide part 320 may be shaped into an inclination surface parallel with the posterior part 150b.

[0425] Accordingly, at least a portion of the second guide part 320 may contact the posterior part 150b while forming an inclination surface parallel with the inclination surface of the posterior part 150b. The second guide part 320 and the posterior part 150b may contact each other at a position where the second guide part 320 and the posterior part 150b overlap each other in the up-down direction, and at this time, a contact surface between the second guide part 320 and the posterior part 150b may form an inclination surface that inclines downward toward the rear of the contact surface.

[0426] Additionally, since the contact surface between the second guide part 320 and the posterior part 150b is formed to incline as described above, at least a portion of the second guide part 320 may contact the posterior part 150b at a lower position than the upper end of the anterior part 150a.

[0427] To the end, the second guide part 320 may have a length at which the lower end of the second guide part 320 reaches a lower position than the upper end of the anterior part 150a.

[0428] In an example, the length of the second guide part 320 in the up-down direction may be set to a length at which the second guide part 320 reaches a position where the lower end of the second guide part 320 is lower than the upper end of the anterior part 150a and

higher than the upper end of the door exhaust opening 122.

[0429] Additionally, the length of the second guide part 320 in the front-rear direction may be set to a length at which the rear end of the second guide part 320 is disposed between the anterior part 150a and the door exhaust opening 150b. At this time, the rear end of the second guide part 320 may be disposed between the rear end of the anterior part 150a and the door exhaust opening 150b, with respect to the front-rear direction.

[0430] Accordingly, the second guide part 320 and the posterior part 150b may contact each other at a position where the second guide part 320 and the posterior part 150b overlap each other in the up-down direction and the front-rear direction.

[0431] Since the second guide part 320 and the posterior part 150b contact each other in this way, the gap between the air guide 300 and the door 150 in the second space S2 may be blocked effectively.

[0432] In the case where the shape and length of the second guide part 320 are set as described above and the contact surface between the second guide part 320 and the posterior part 150b is formed to incline, any portion of the second guide part 320 may not overlap a range in which the door 150 moves, while the second guide part 320 is disposed at a position where the second guide part 320 overlaps at least a portion of the door 150 in the up-down direction.

[0433] Thus, the second guide part 320 may contact the door 150 at a position where the second guide part 320 does not interfere with the movement of the door 150. The second guide part 320 may block the second space S2 while blocking the gap between the air guide 300 and the door effectively, without interfering with the door 150's movement for opening and closing.

[0434] Additionally, the inner cover projection 220 fixing the air guide 300 to the control panel 200, as illustrated in FIGS. 21 and 27, may be disposed between the exhaust opening 122 and the exhaust opening 122.

[0435] The inner cover projection 220 may be disposed at a position where the inner cover projection does not overlap the exhaust opening 122, while covering the separation wall 121 from the front of the separation wall 121 (see FIG. 19) such that the separation wall is not seen, to reduce flow resistance generated by the cover projection 210, 220 or the air guide 300 effectively.

[0436] Further, the end portion 301 of the front of the air guide 300 disposed at the front side of the anterior space S in the anterior space S, i.e., the end portion 301 of the front of the first guide part 310, as described above, may be disposed at a position where the end portion of the front of the air guide 300 overlaps at least a portion of the front glass 153 of the door 150 in the up-down direction.

[0437] In an example, the end portion 301 of the front of the air guide 300 may be disposed at the same position as the rear end of the front glass 152, or at a position protruding further forward than the rear end of the front glass 152, with respect to the front-rear direction.

[0438] Since the air guide 300 is disposed as described above at a position that is eccentric forward in the anterior space S, the flow of air flowing toward the front of the cooking apparatus in the anterior space S may be guided by the air guide 300 effectively.

[0439] Additionally, since the air guide 300 is disposed as described above at a position where the air guide 300 is noticeable outside the cooking apparatus, the aesthetic quality provided by the air guide 300 may be shown effectively.

[0440] In the process of discharging hot air from the anterior space S, a portion of the air discharged may contact the lower end of the control panel 200, and accordingly, condensed water may be formed at the lower end of the control panel 200.

[0441] In the case where the condensed water formed at the lower end of the control panel 200 as described above drops to the upper end of the door 150, the water having hit the door 150 splashes around the door 150 and contaminates surroundings thereof.

[0442] In the case where the air guide 300 is disposed at a position that is eccentric forward in the anterior space S as described above, the air guide 300 may block between the control panel 200 and the door 150 such that the condensed water formed at the lower end of the control panel 200 does not fall to the door 150.

[0443] Since the distance between the control panel 200 and the air guide 300 is much less than the distance between the control panel 200 and the door 150, the amount of the water splashing around the air guide is not that great, even if the condensed water drops to the air guide 300.

[0444] That is, the air guide 300 disposed in the above-described way may significantly reduce the occurrence of contamination around the cooking apparatus, caused by the condensed water.

[0445] Additionally, in the case of an air guide 300 of this embodiment, the second guide part 320 is formed to incline downward and rearward. Accordingly, the condensed water falling to the air guide 300 may flow down the rear side of the door 150 along the inclination surface of the second guide part 320.

[0446] In particular, in the case where the first guide part is formed to incline downward and rearward like the air guide 300a illustrated in FIG. 16 or the air guide 300c illustrated in FIG. 18, the condensed water may flow down the rear side of the door 150 effectively.

[0447] Since the air guide allows the condensed water falling toward the door 150 to flow down the rear side of the door 150 as described above, the occurrence of contamination around the cooking apparatus, caused by the condensed water, may decrease effectively.

[0448] Further, the end portion 303 of the rear of the air guide 300, i.e., the end portion 303 of the rear of the second guide part 320, may be disposed further forward than the door exhaust opening 152, with respect to the front-rear direction.

[0449] Accordingly, a passage having an enough

height may be formed between the door exhaust opening 152 and the air guide 300, to discharge air in the door 150 to the anterior space S through the door exhaust opening 152.

5 **[0450]** Thus, air discharged from the door exhaust opening 152 and air discharged from the exhaust opening 112 may be combined sufficiently and then pass through the section where the air guide 300 is disposed.

10 **[0451]** Additionally, in the case where the end portion of the rear of the air guide 300 is disposed at the above-described position, the air guide 300 does not act as an obstacle that is disposed perpendicularly over the door exhaust opening 152. The air guide 300 may reduce flow resistance effectively around the door exhaust opening 152.

15 **[0452]** In another example, the end portion 301 of the front of the air guide 300 may be disposed at a position where the end portion 301 of the front of the air guide 300 is aligned with the position of at least any one of the end portion of the front side of the control panel 200 and the end portion of the front side of the door 150 in the front-rear direction.

20 **[0453]** For example, when viewed laterally, the end portion 301 of the front of the air guide 300 and the edge of the lower end of the front side of the control panel 200 may be disposed on the same line. Additionally, when viewed laterally, the end portion 301 of the front of the air guide 300 and the edge of the upper end of the front side of the door 150 may be disposed on the same line.

25 **[0454]** Since the air guide 300 is disposed as described above, the positions of the control panel 200 and the air guide 300 and the door 150 are aligned, such that the exterior of the cooking apparatus looks balanced, ensuring improvement in the aesthetic quality of the cooking apparatus.

30 **[0455]** The improvement in the aesthetic quality of the cooking apparatus may be ensured by disposing the air guide 300 eccentrically toward the front side of the anterior space S, in the anterior space S.

35 **[0456]** That is, the air guide 300 of this embodiment is disposed eccentrically toward the front side of the anterior space S, in the anterior space S, producing the effects of suppressing the occurrence of eddy current in the anterior space S and ensuring improvement in the aesthetic quality of the cooking apparatus.

40 **[0457]** The embodiments are described above with reference to a number of illustrative embodiments thereof. However, the embodiments are provided as examples, and numerous other modifications and equivalent embodiments can be drawn by one having ordinary skill in the art from the embodiments. Thus, the technical scope of protection of the subject matter of the disclosure is to be defined according to the following claims.

55 Description of reference numerals

[0458]

100: Main body
 110: Cavity
 120: Front panel
 121: Separation wall
 122: Exhaust opening
 124: Latch hole
 130: Cooking compartment
 131: Upper panel
 132: Air inflow hole
 133: Electronic component compartment
 135: Cooling flow path cover
 140: Latch
 145: Driving unit
 150: Door
 150a: Anterior part
 150b: Posterior part
 151: Door frame
 151a: Hold groove
 152: Door exhaust opening
 153: Front glass
 154: Inner glass
 155: Handle
 160: Convection part
 200: Control panel
 210, 330: Outer cover projection
 220, 340: Inner cover projection
 250: Electronic component compartment
 255: Cooling flow path
 260: Fan
 300: Air guide
 305: Fastening member
 310: First guide part
 315: Extension part
 320: Second guide part
 S: Anterior space

Claims

1. A cooking apparatus, comprising:

a cavity configured to have a cooking compartment, a front side of which is open, therein;
 a door disposed at a front of the cavity and configured to open and close the cooking compartment;
 a control panel disposed over the cavity and the door; and
 an air guide installed at the door and disposed between the door and the control panel, wherein the air guide comprises a first guide part configured to partition a space between the control panel and the door in an up-down direction, and
 the first guide part partitions the space between the control panel and the door into a first space between the control panel and the first guide part, and a second space between the first guide

part and the door.

2. The cooking apparatus of claim 1, wherein the air guide further comprises a second guide part configured to connect to the first guide part and to block the second space.

3. The cooking apparatus of claim 1, wherein the cooking apparatus further comprises a front panel disposed between the cavity and the door,

at least a portion of the front panel is disposed between the cavity and the control panel, and the air guide covers at least a portion of the front panel from forward.

4. The cooking apparatus of claim 1, wherein a door exhaust opening is provided at an upper end of the door facing the control panel and opens an inner portion of the door to the space between the door and the control panel, the door is divided into an anterior part and a posterior part arranged in a front-rear direction, and the door exhaust opening is disposed at the posterior part disposed at a rear of the anterior part.

5. The cooking apparatus of claim 4, wherein the air guide further comprises a second guide part configured to connect to the first guide part and to block the second space, and the second guide part blocks the second space, between the first guide part and the door exhaust opening.

6. The cooking apparatus of claim 5, wherein the second guide part blocks the second space while contacting the door.

7. The cooking apparatus of claim 5, wherein the second guide part extends rearward from the first guide part in such a way that the second guide part inclines downward.

8. The cooking apparatus of claim 5, wherein the posterior part forms an inclination surface configured to incline downward toward a rear thereof, and at least a portion of the second guide part forms an inclination surface parallel with an inclination surface of the posterior part and contacts the posterior part.

9. The cooking apparatus of claim 1, wherein the air guide further comprises a fastening projection coupled to the control panel,

the second guide part is disposed at a front of the guide part in such a way that the second guide part inclines from the first guide part downward and rearward, and

the fastening projection protrudes from the second guide part in an up-down direction.

10. The cooking apparatus of claim 9, wherein the cooking apparatus further comprises a cover projection 5 configured to protrude downward from a lower end of the control panel and coupled to the fastening projection,

a plurality of cover projections is laterally spaced 10
a predetermined distance apart from each other,
a plurality of exhaust openings is disposed at the front panel, and laterally spaced a predetermined distance apart from each other,
a separation wall is formed between two exhaust 15
openings adjacent to each other, and
at least any one of the fastening projection and the cover projection is disposed respectively at a front of the separation wall and covers the separation wall from forward. 20

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FIG. 1

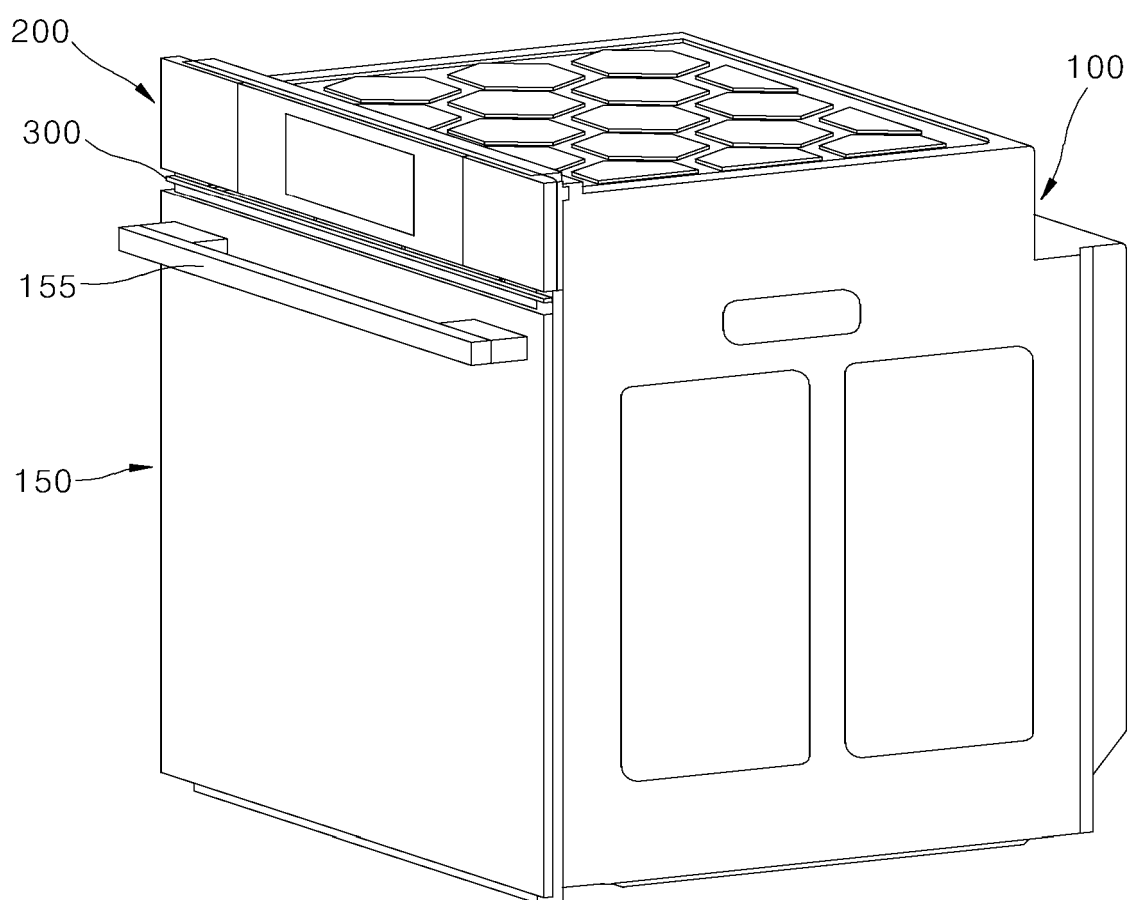


FIG. 2

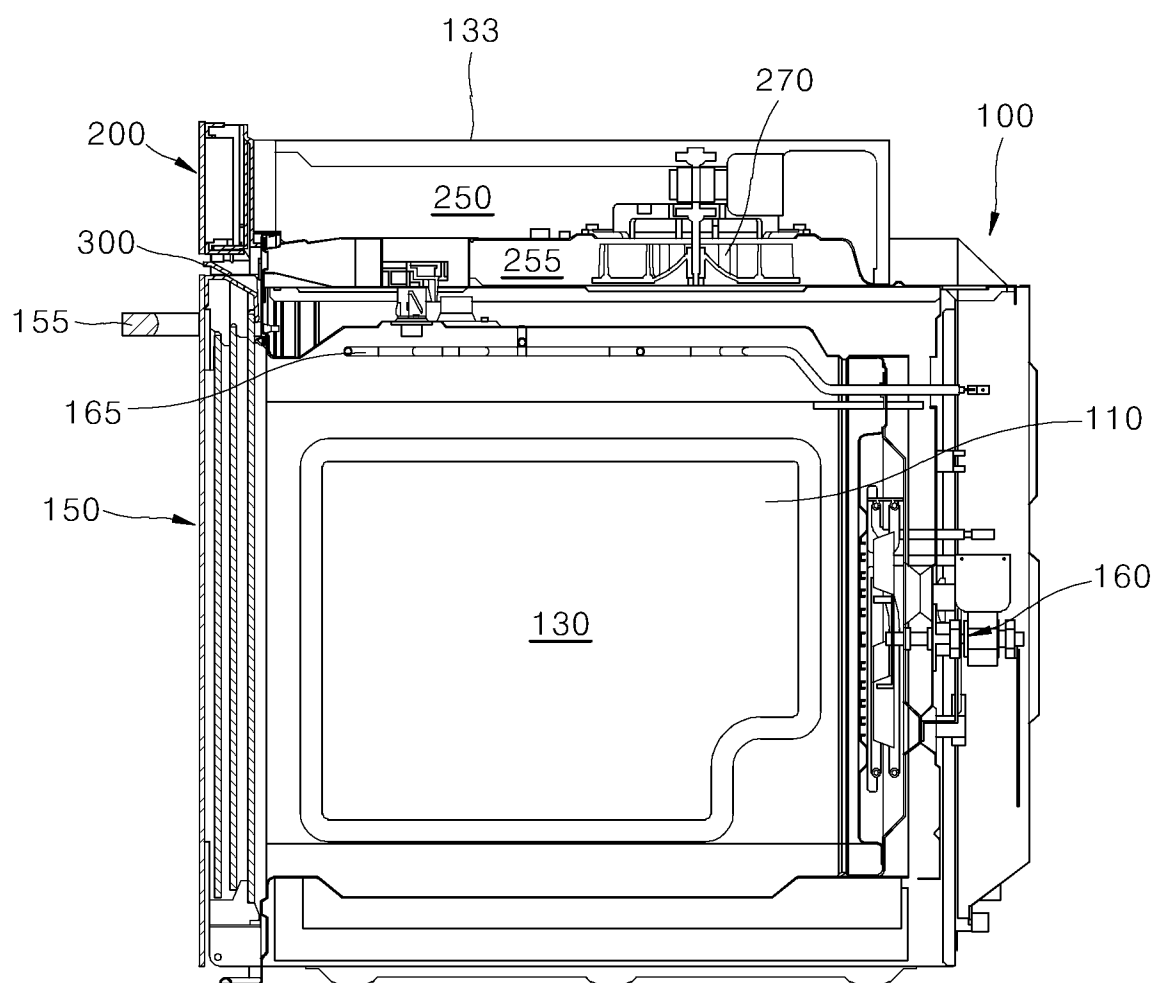


FIG. 3

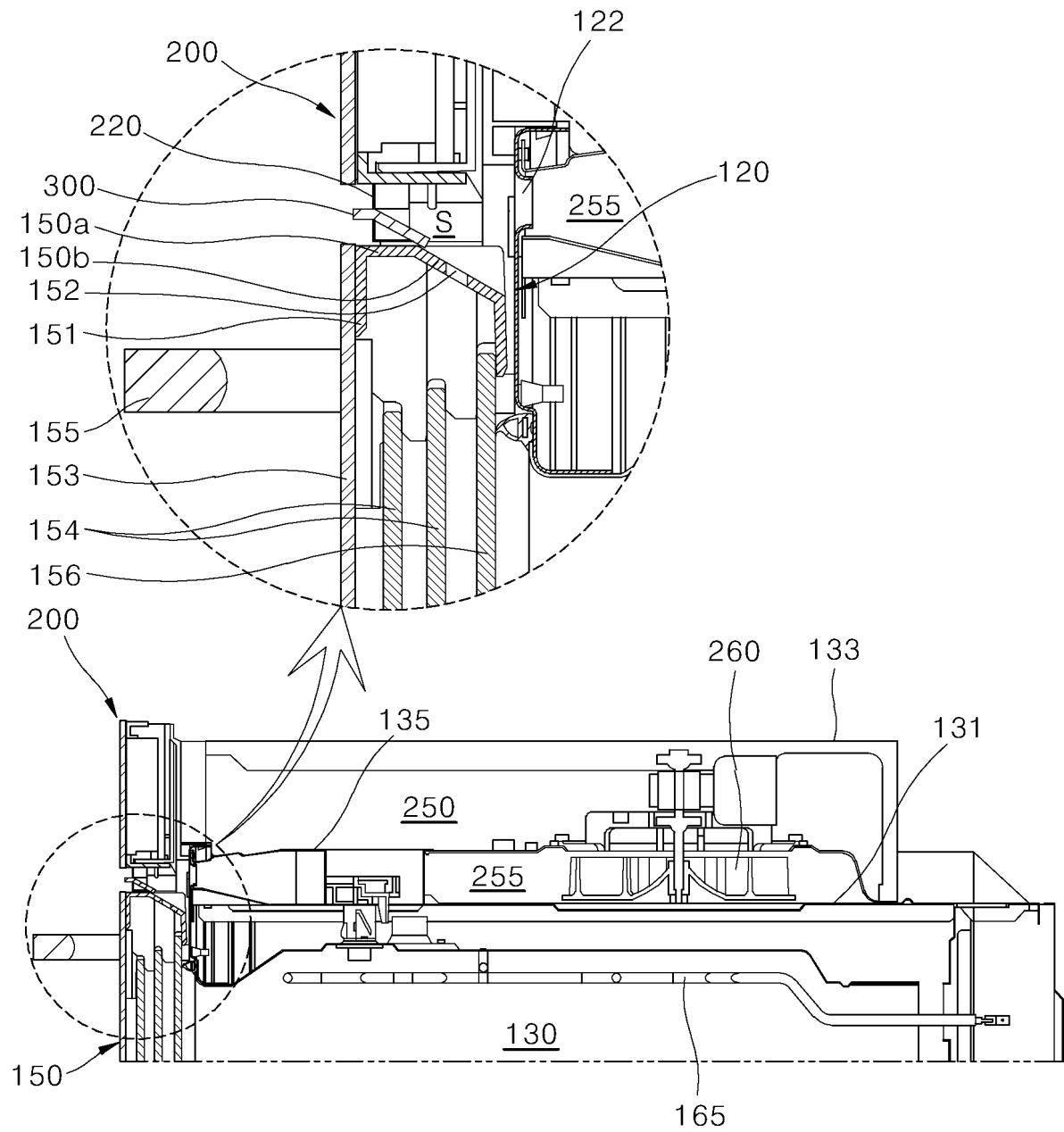


FIG. 4

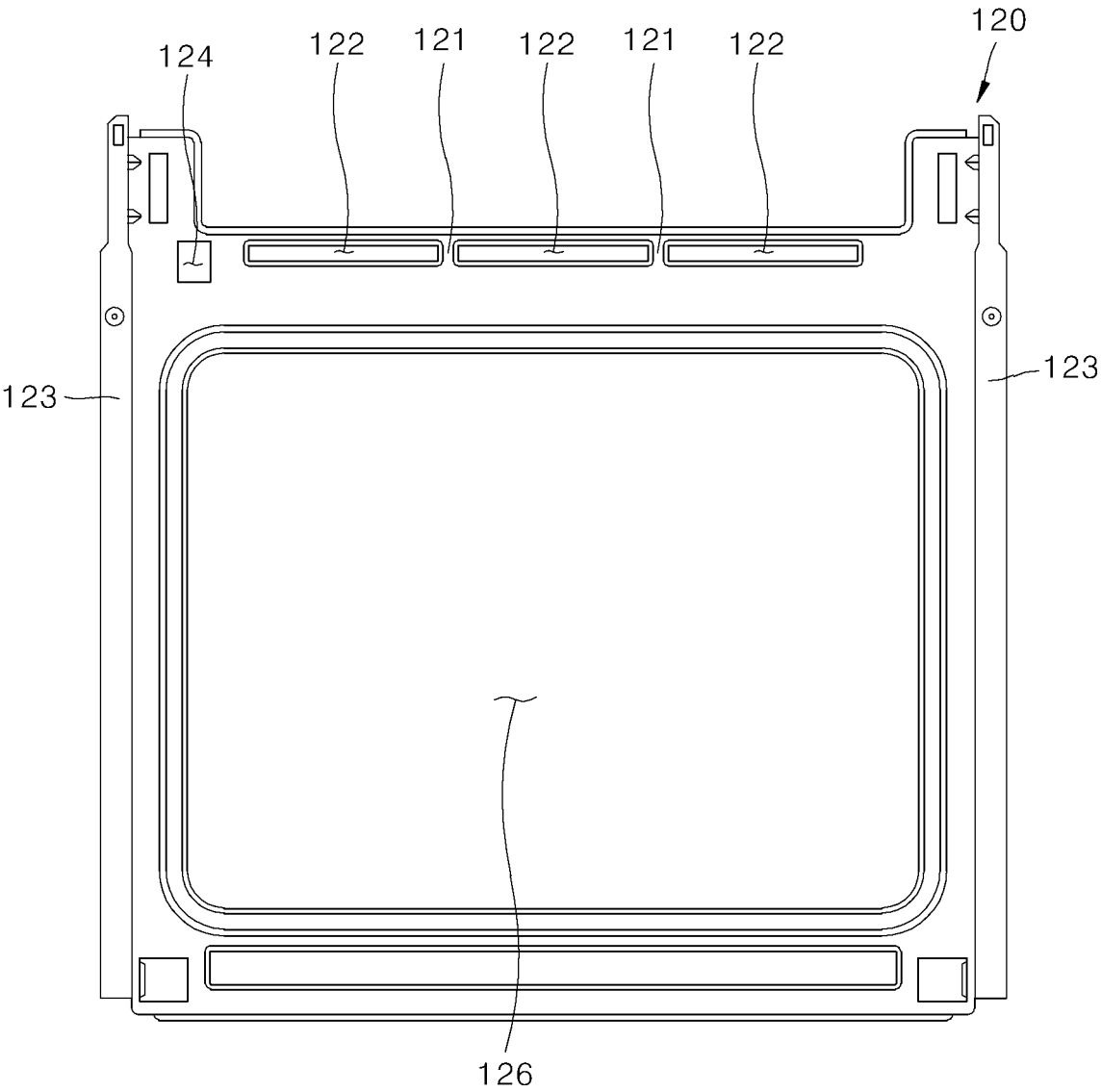


FIG. 5

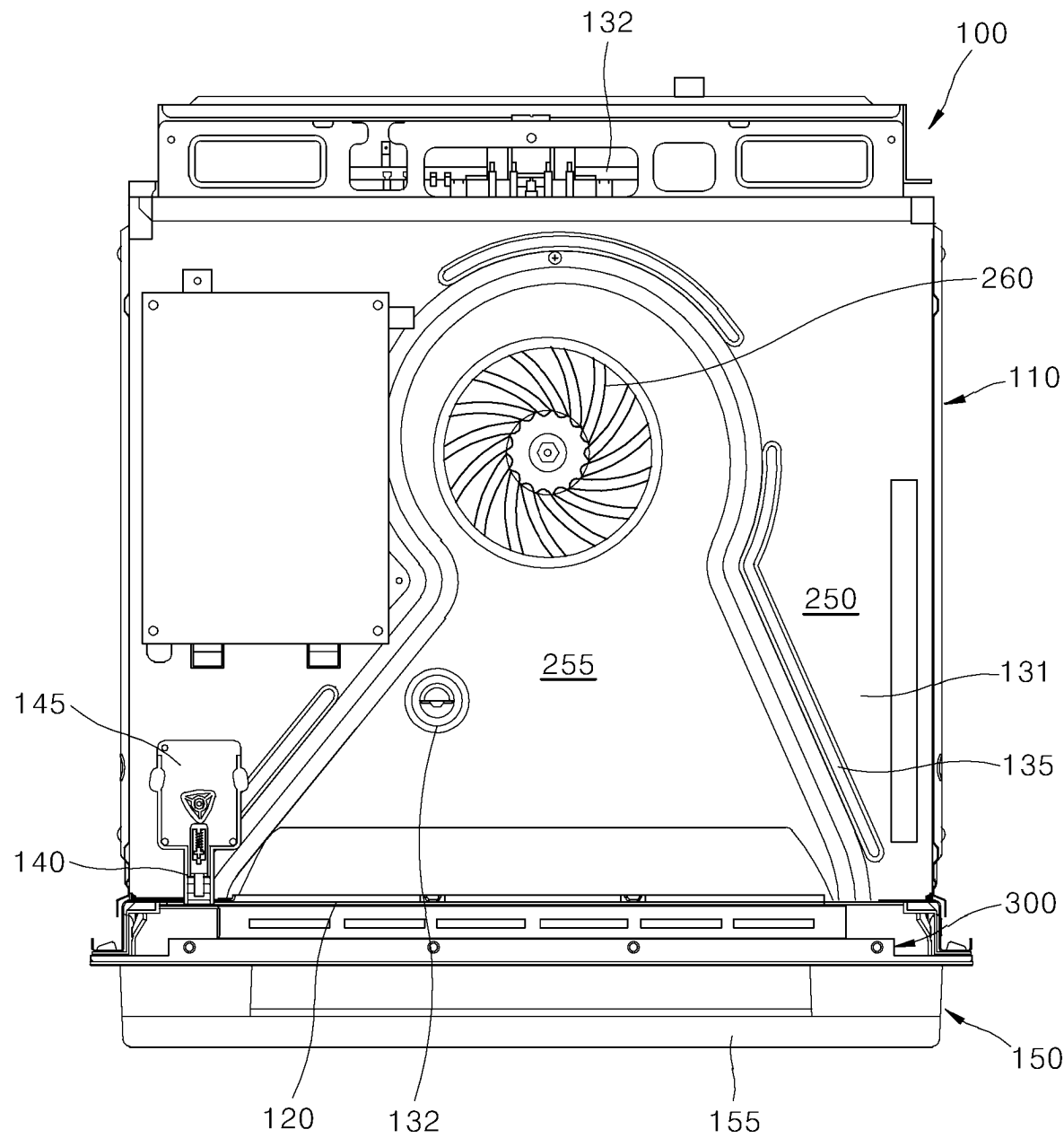


FIG. 6

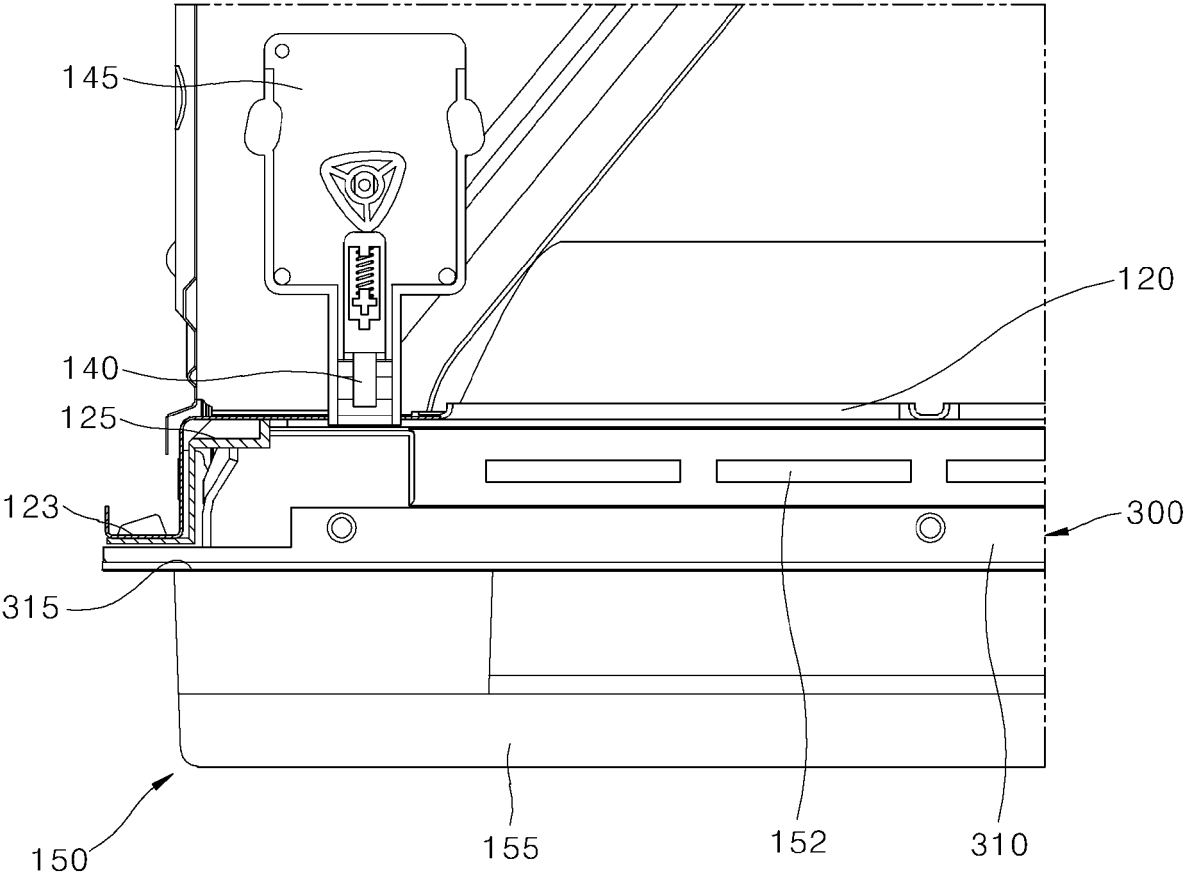


FIG. 7

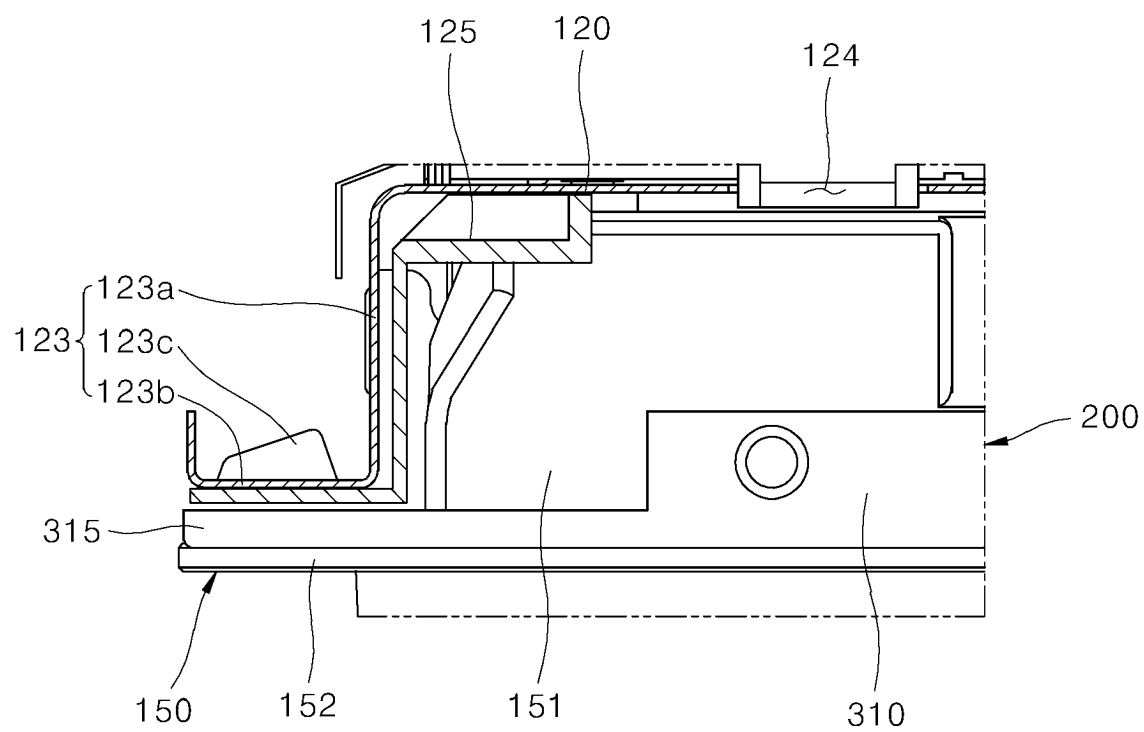


FIG. 8

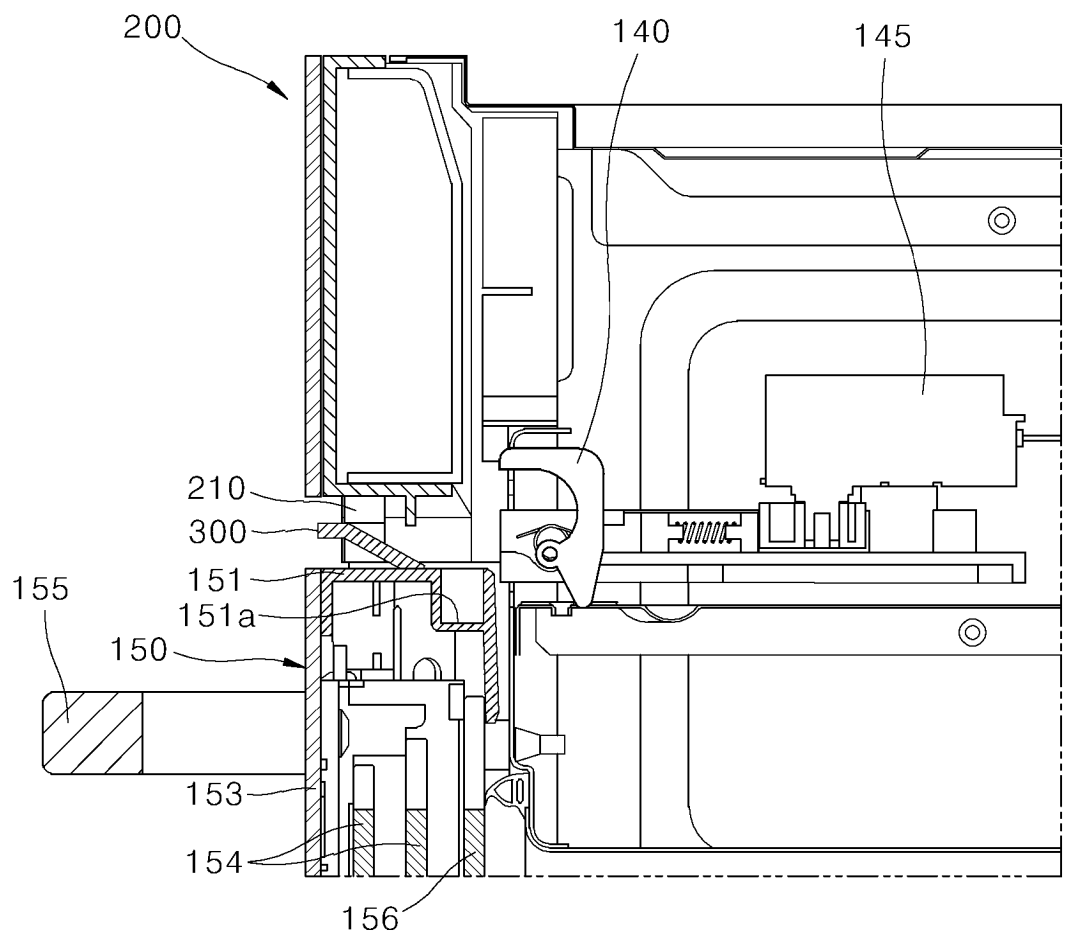


FIG. 9

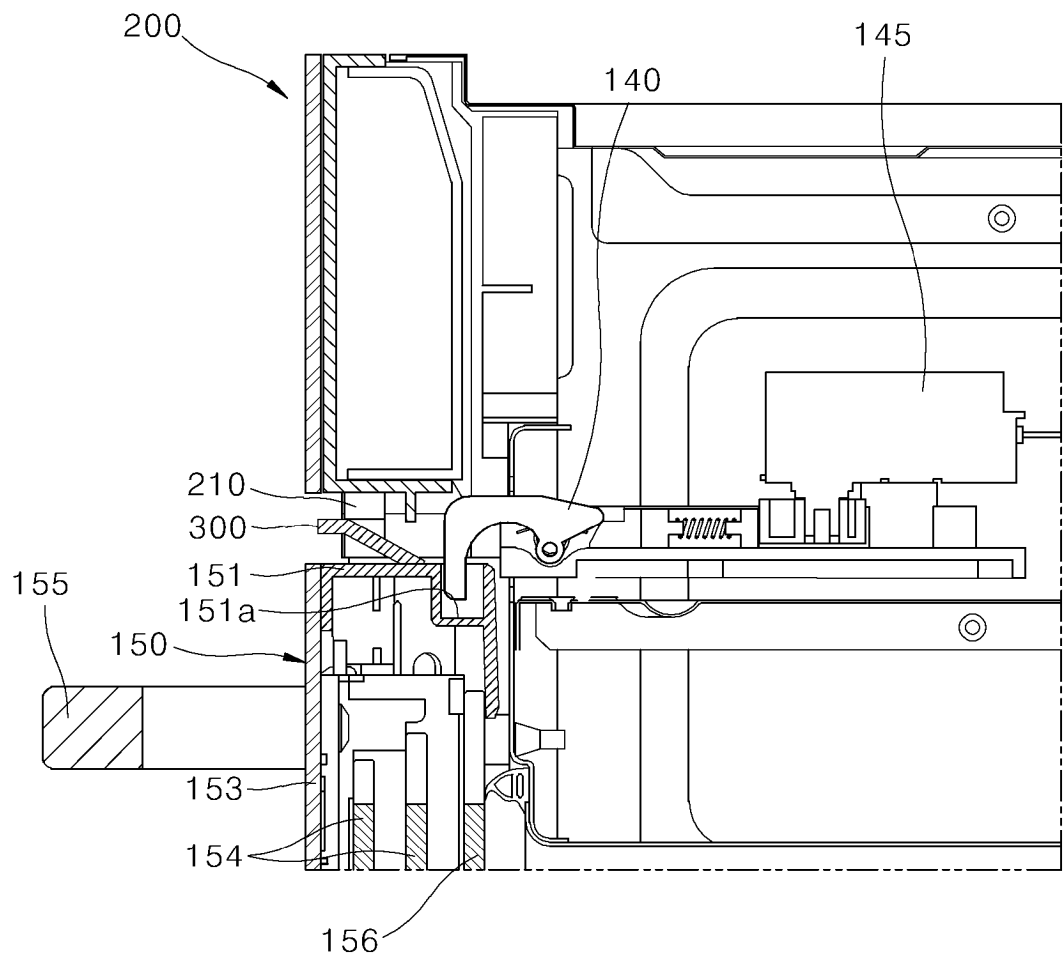


FIG. 10

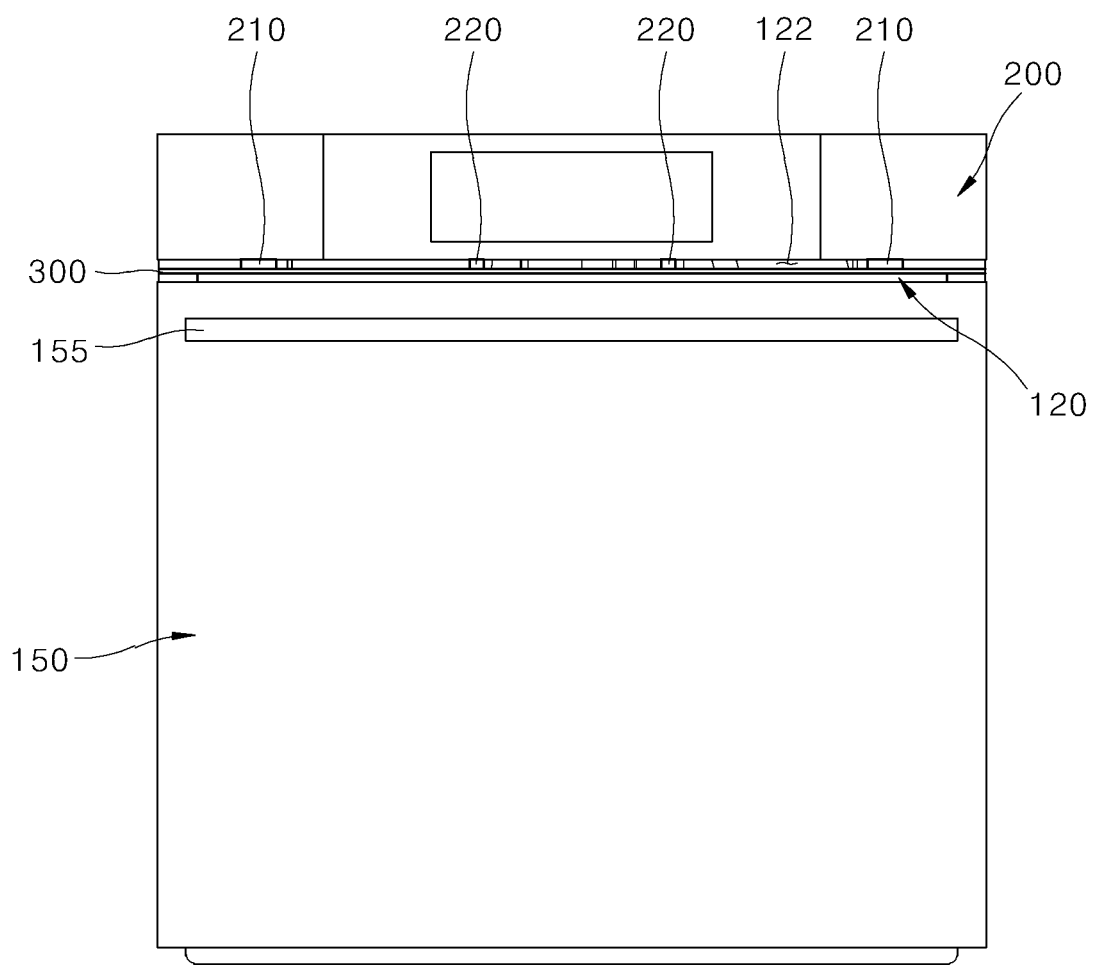


FIG. 11

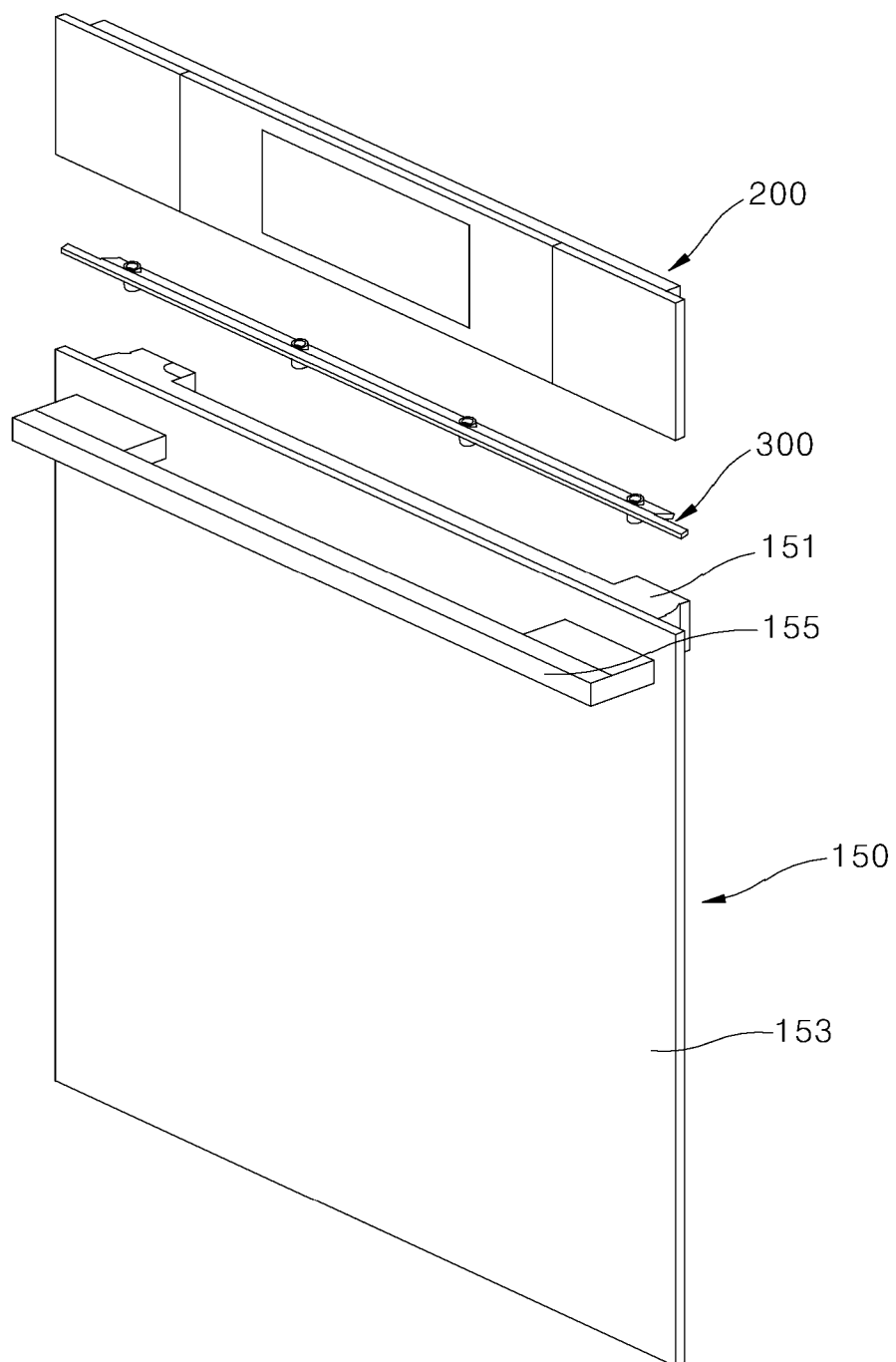


FIG. 12

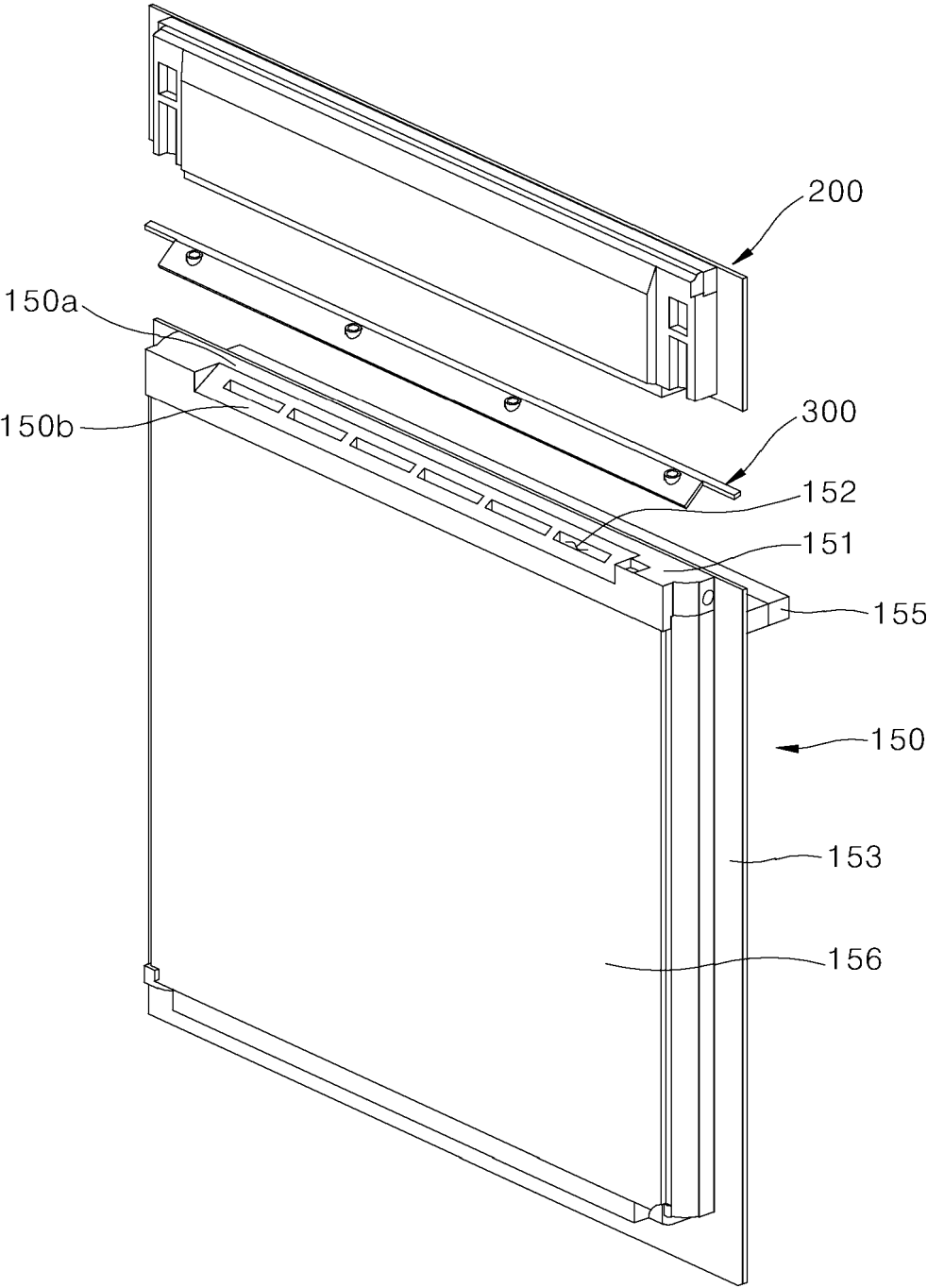


FIG. 13

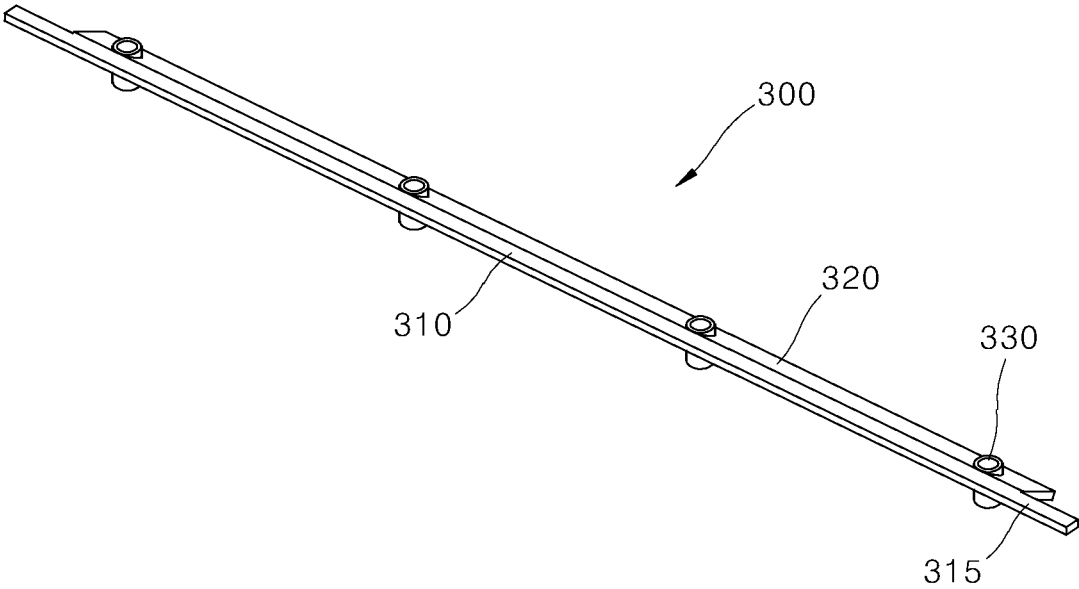


FIG. 14

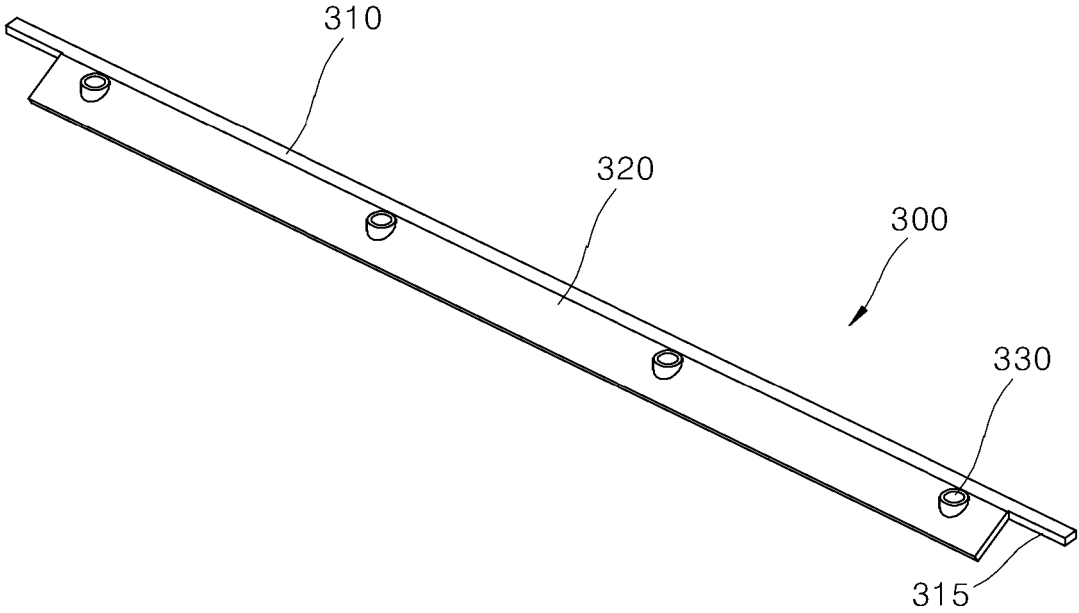


FIG. 15

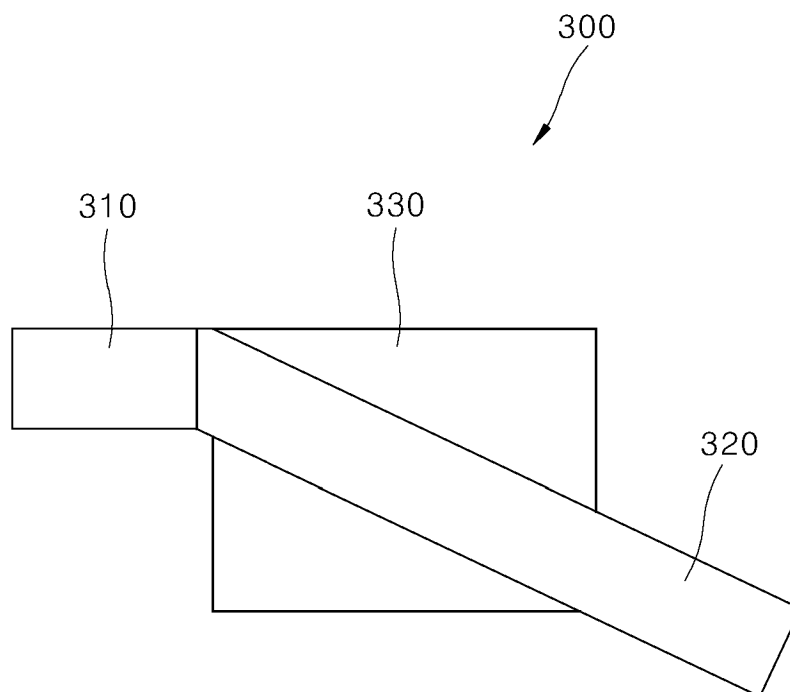


FIG. 16

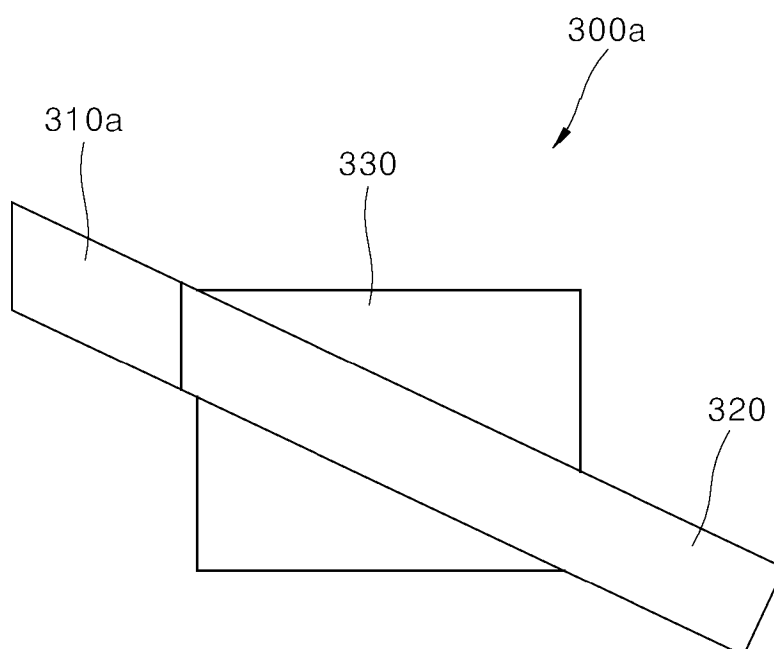


FIG. 17

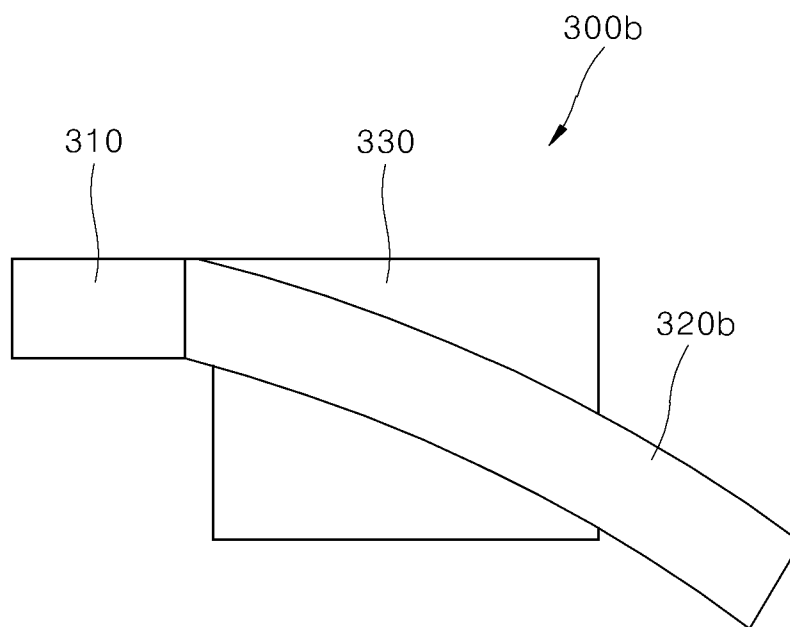


FIG. 18

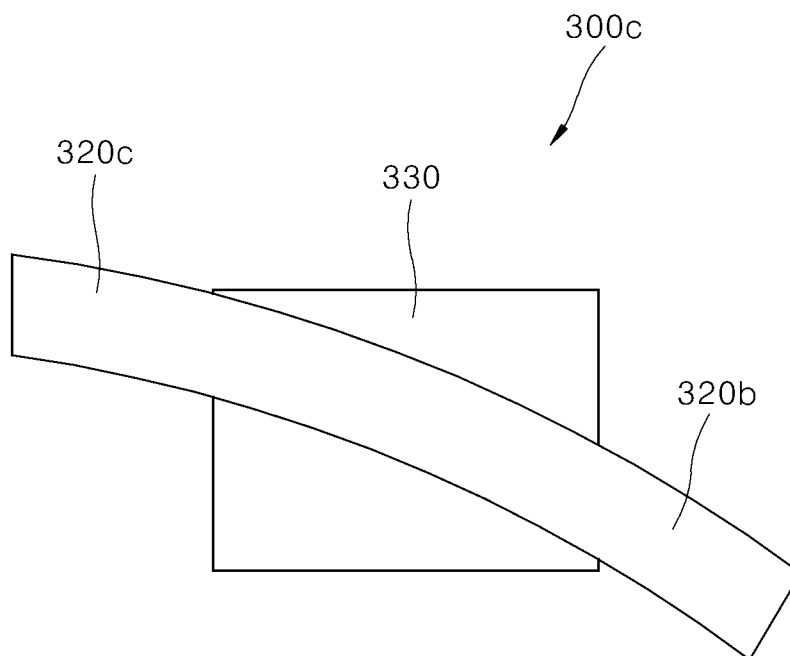


FIG. 19

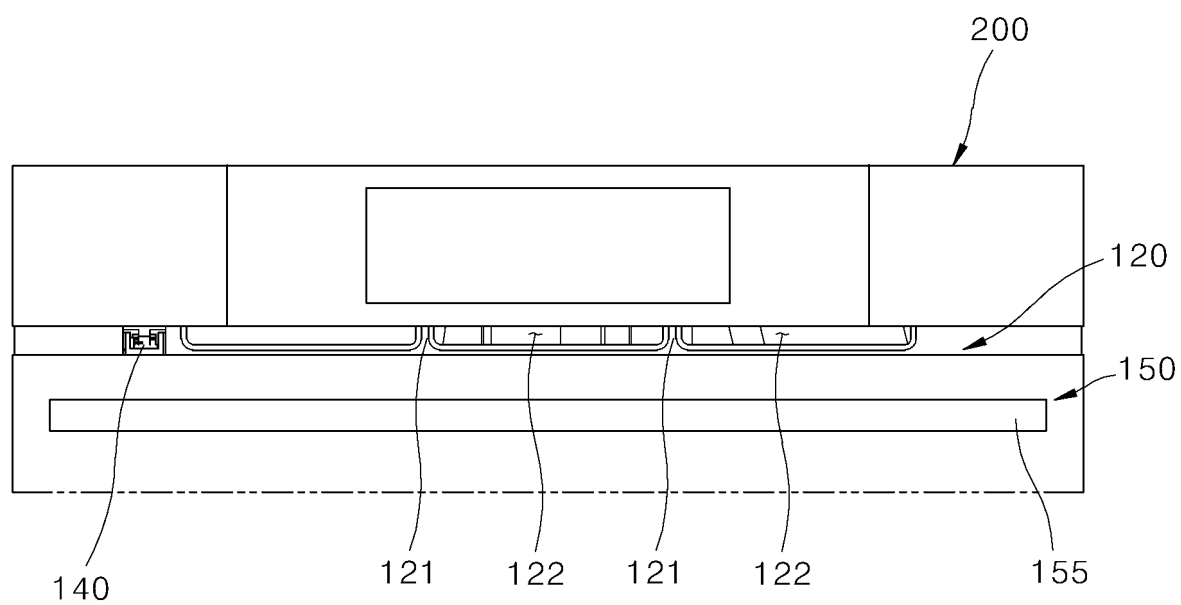


FIG. 20

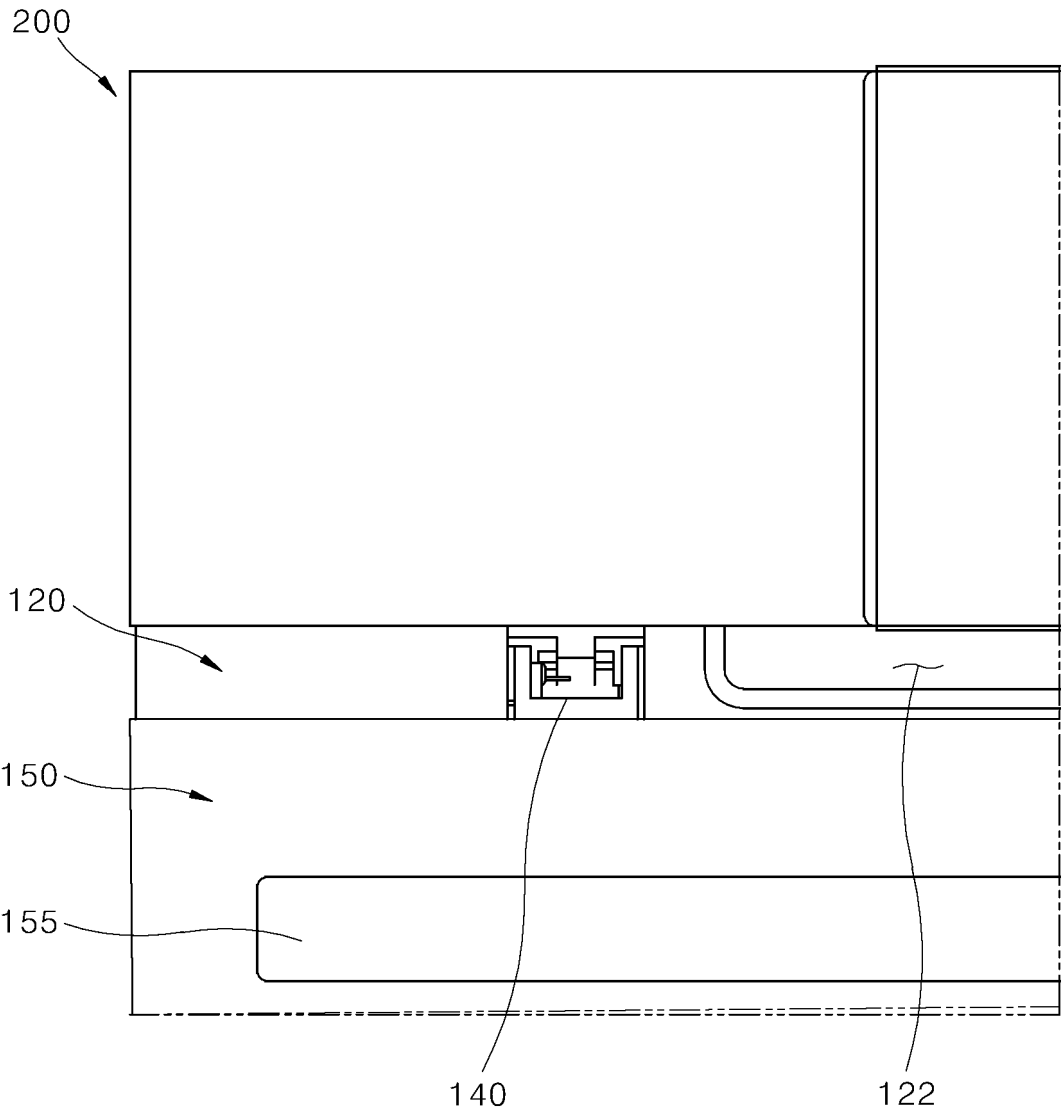


FIG. 21

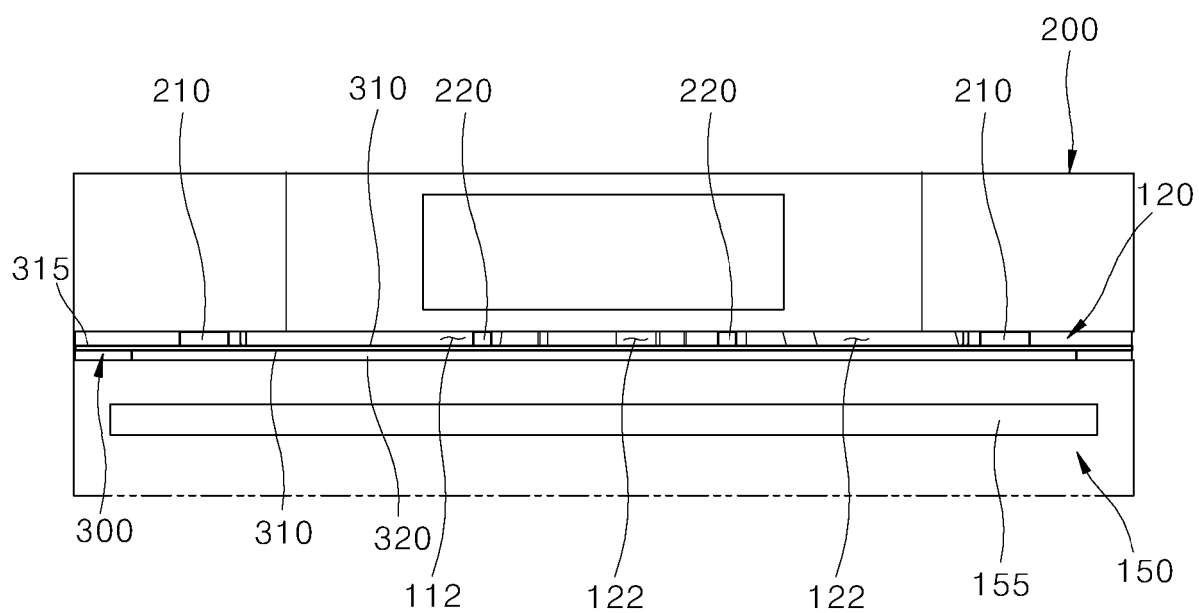


FIG. 22

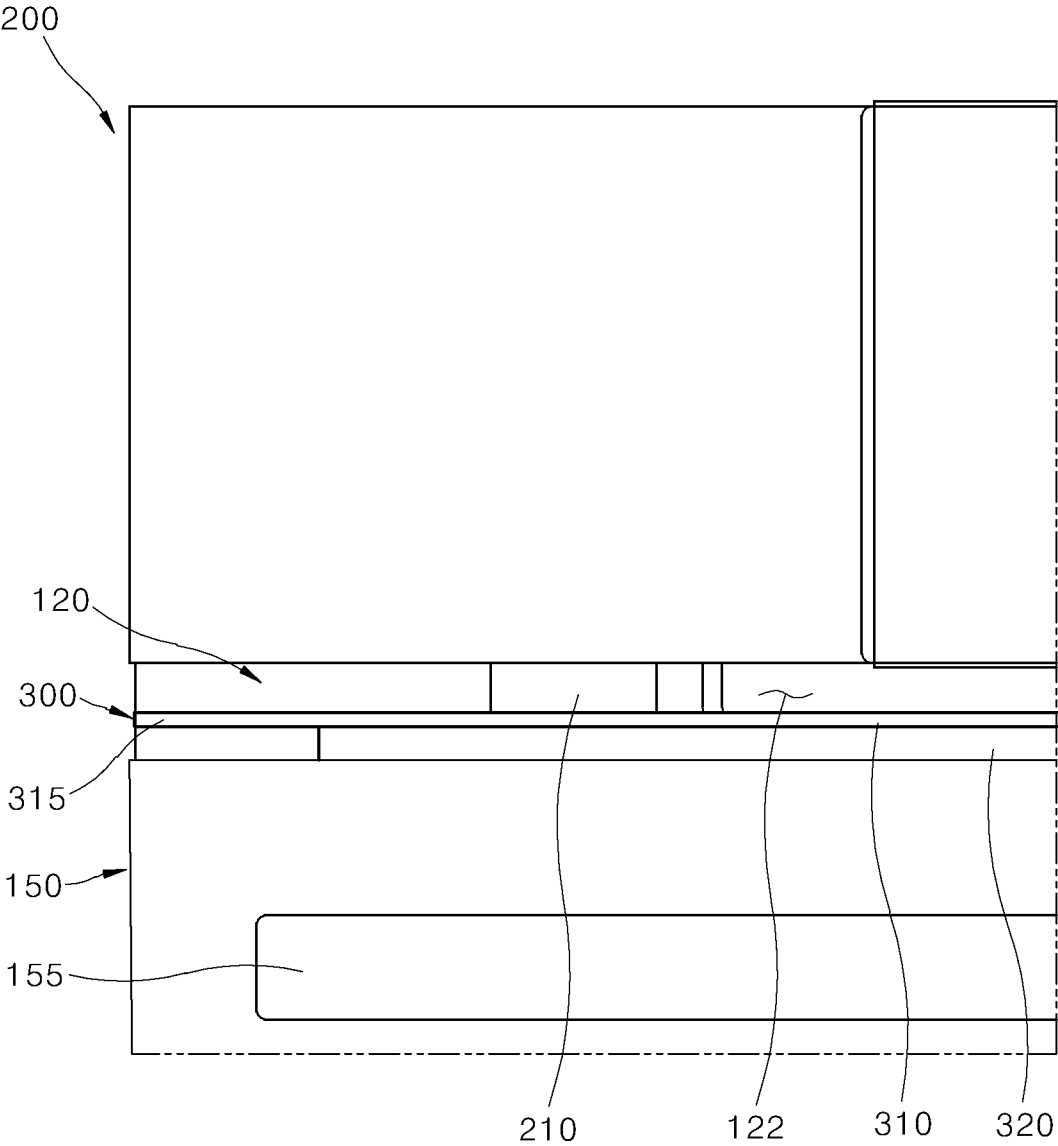


FIG. 23

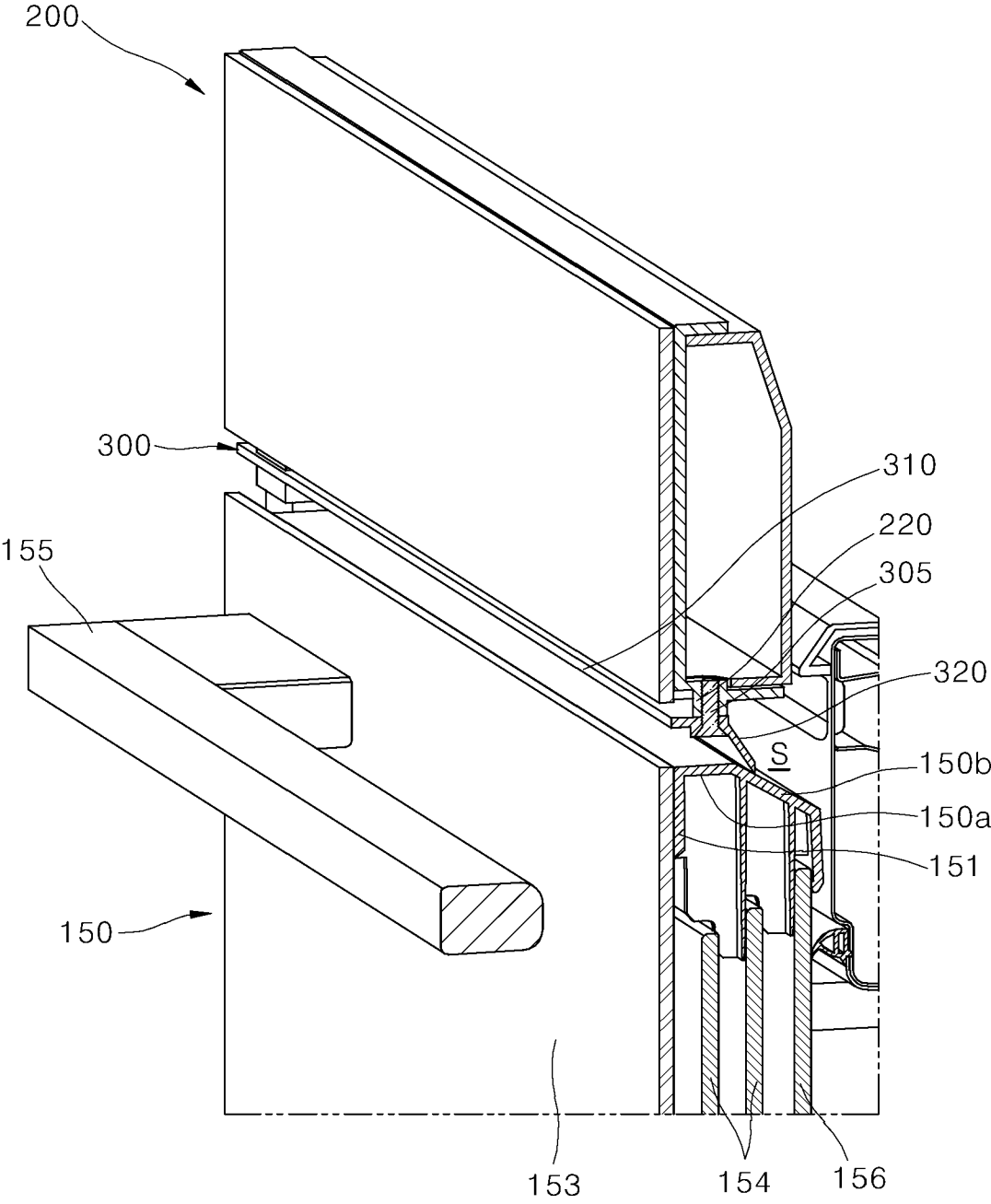


FIG. 24

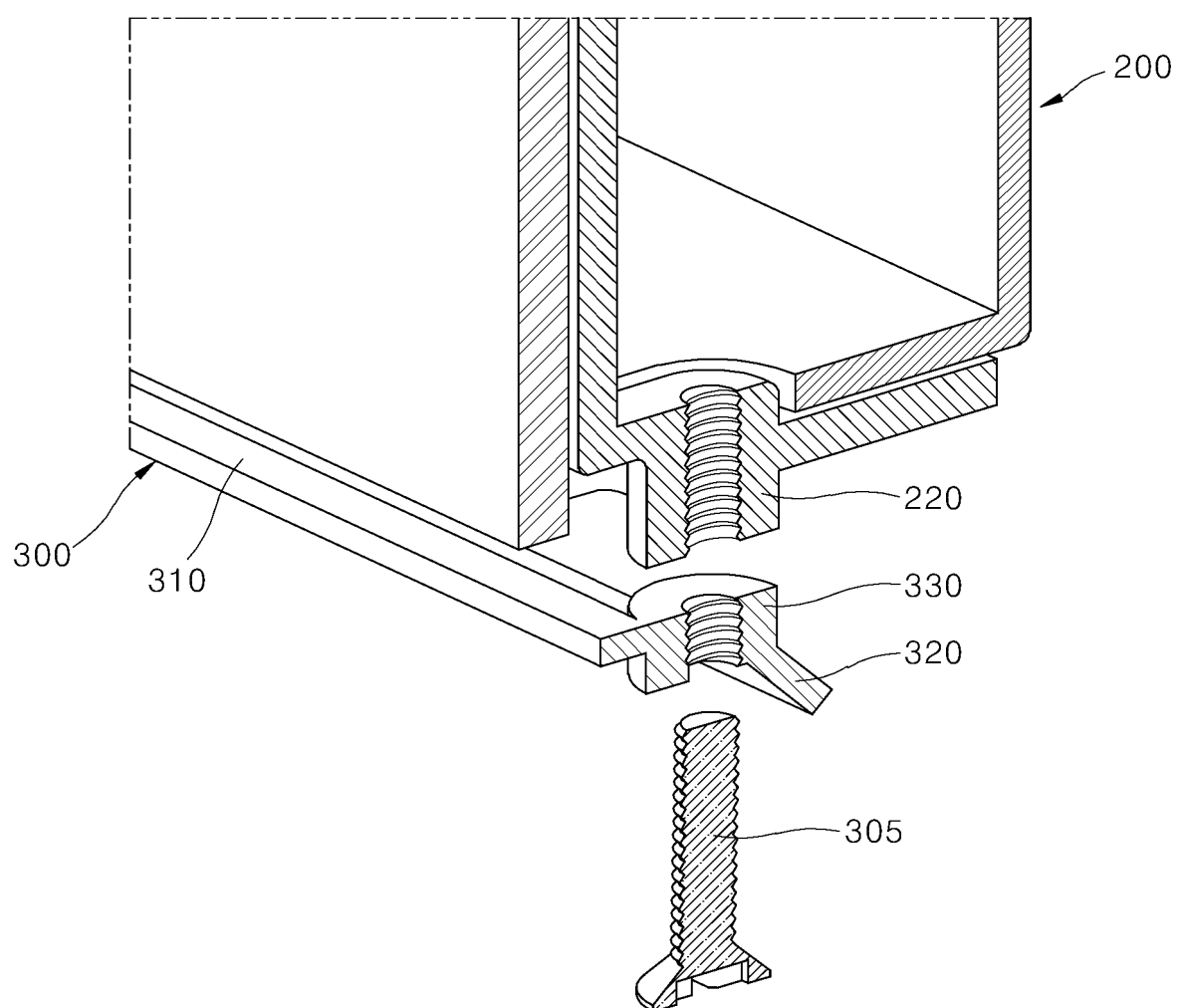


FIG. 25

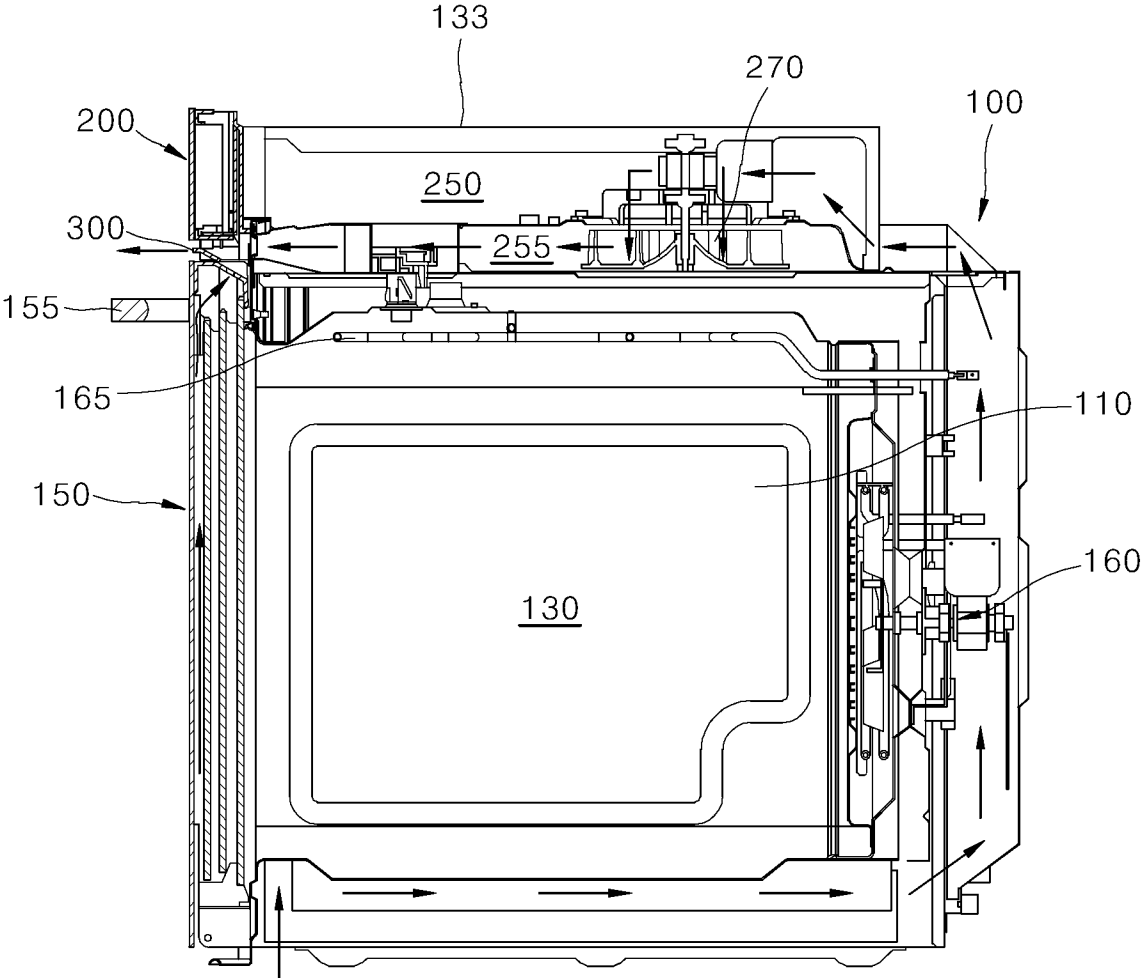


FIG. 26

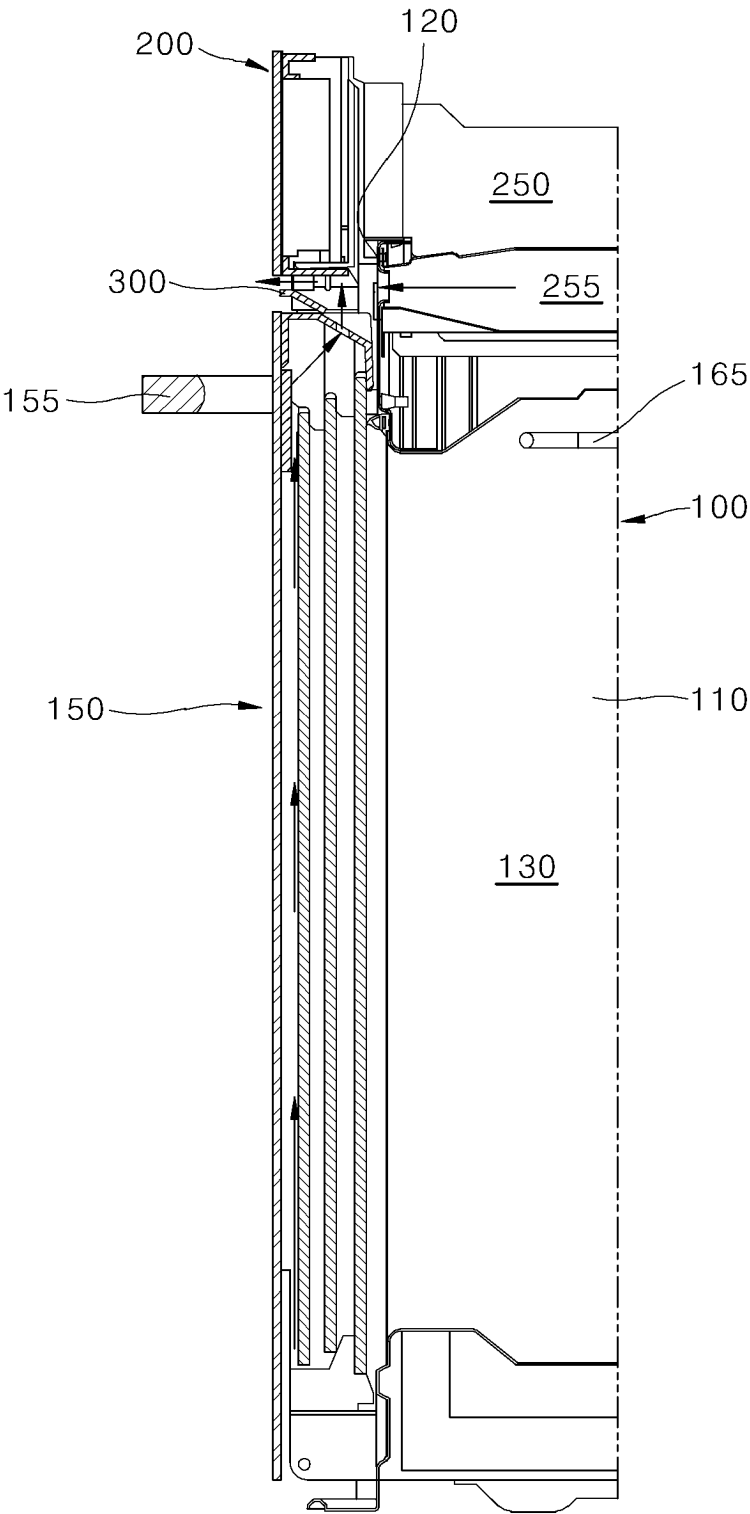


FIG. 27

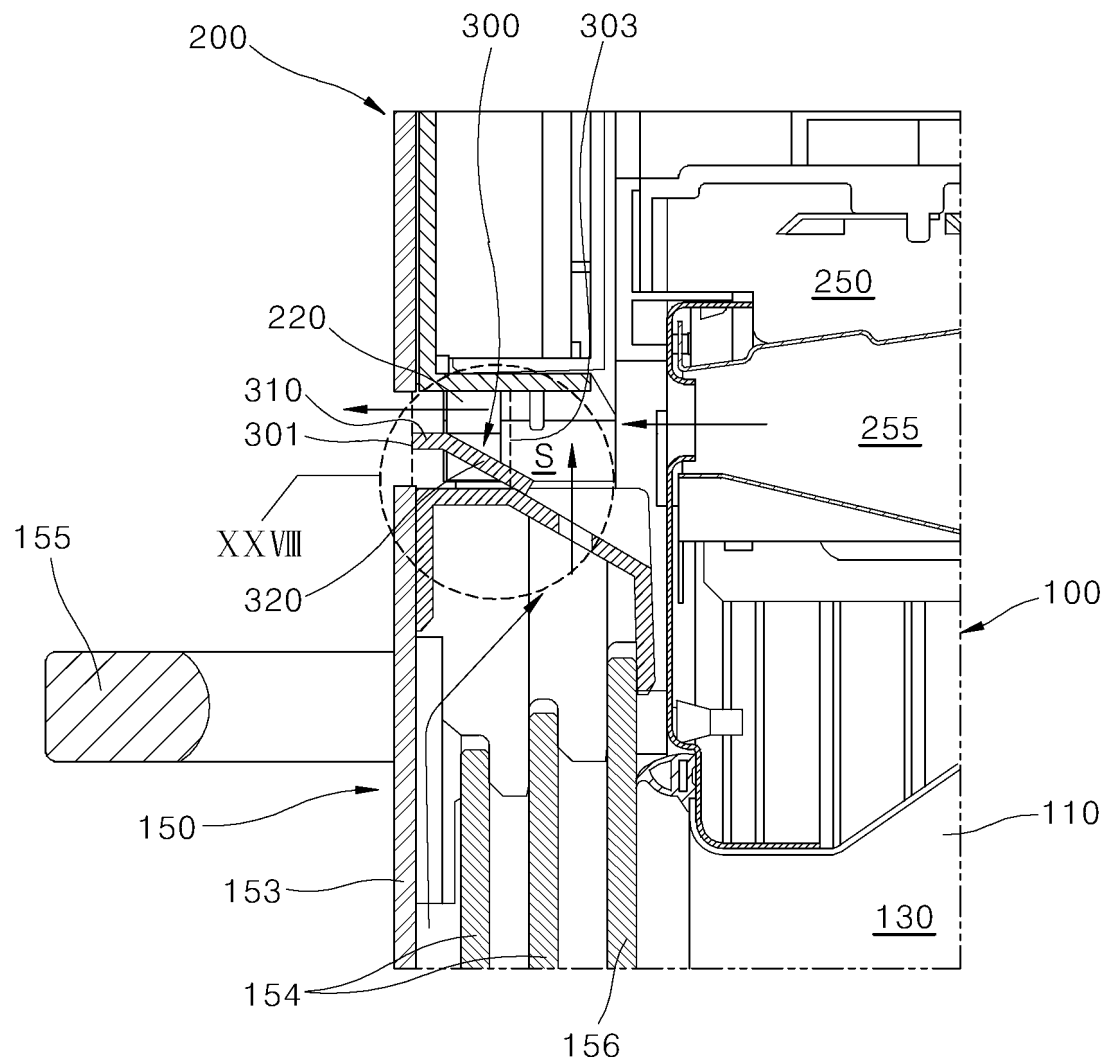


FIG. 28

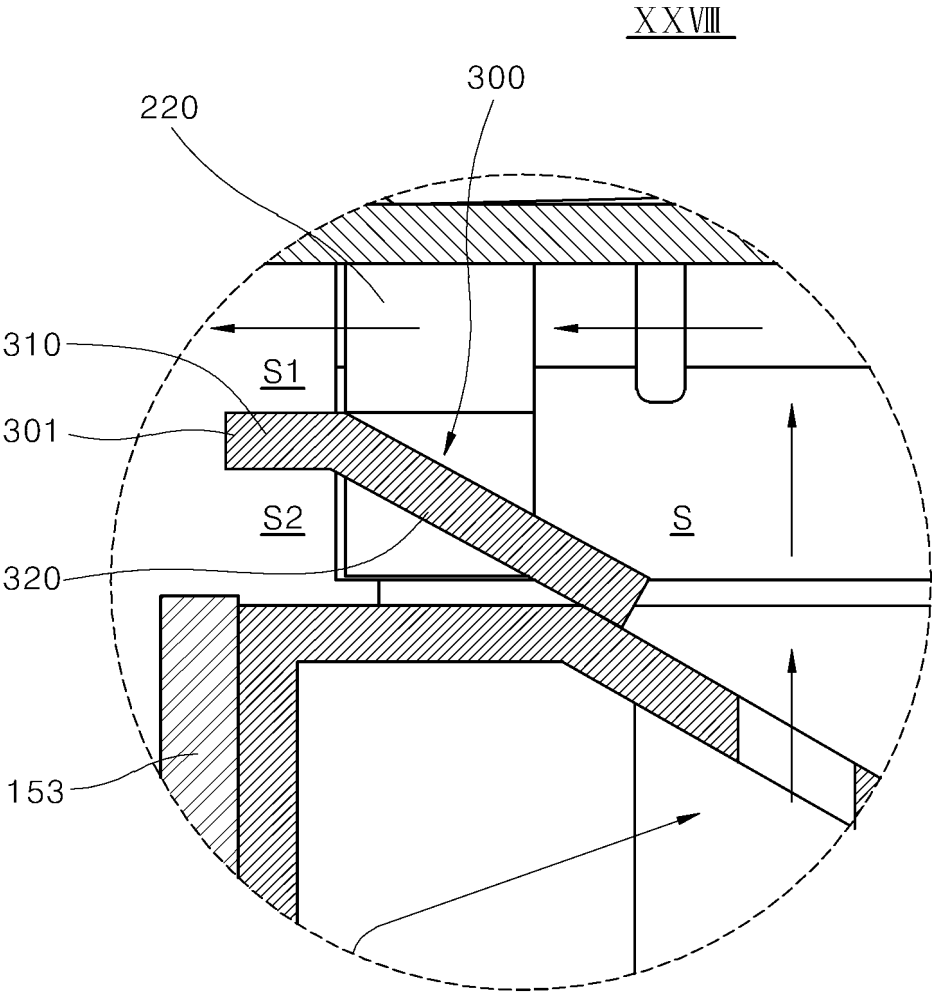


FIG. 29

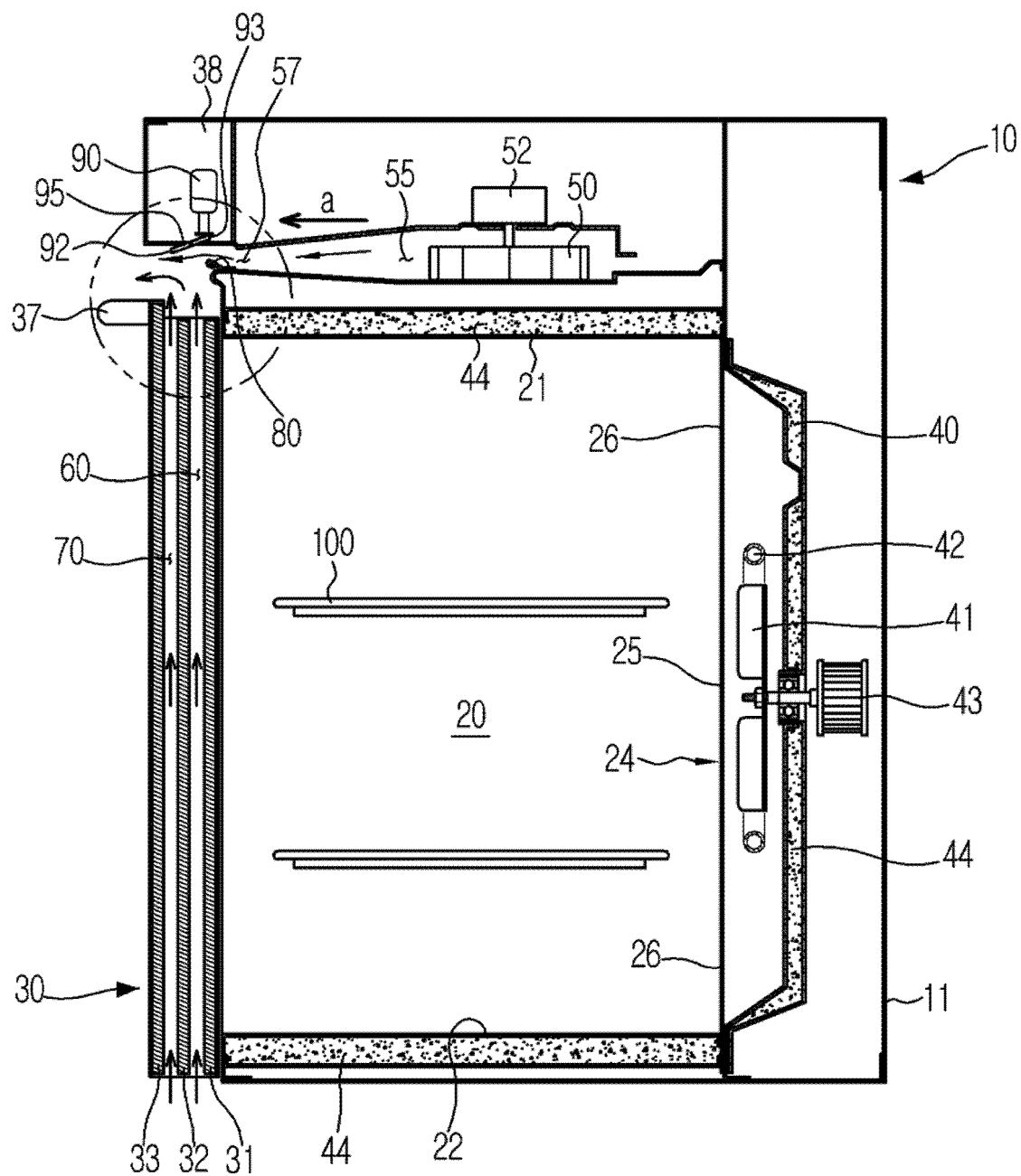


FIG. 30

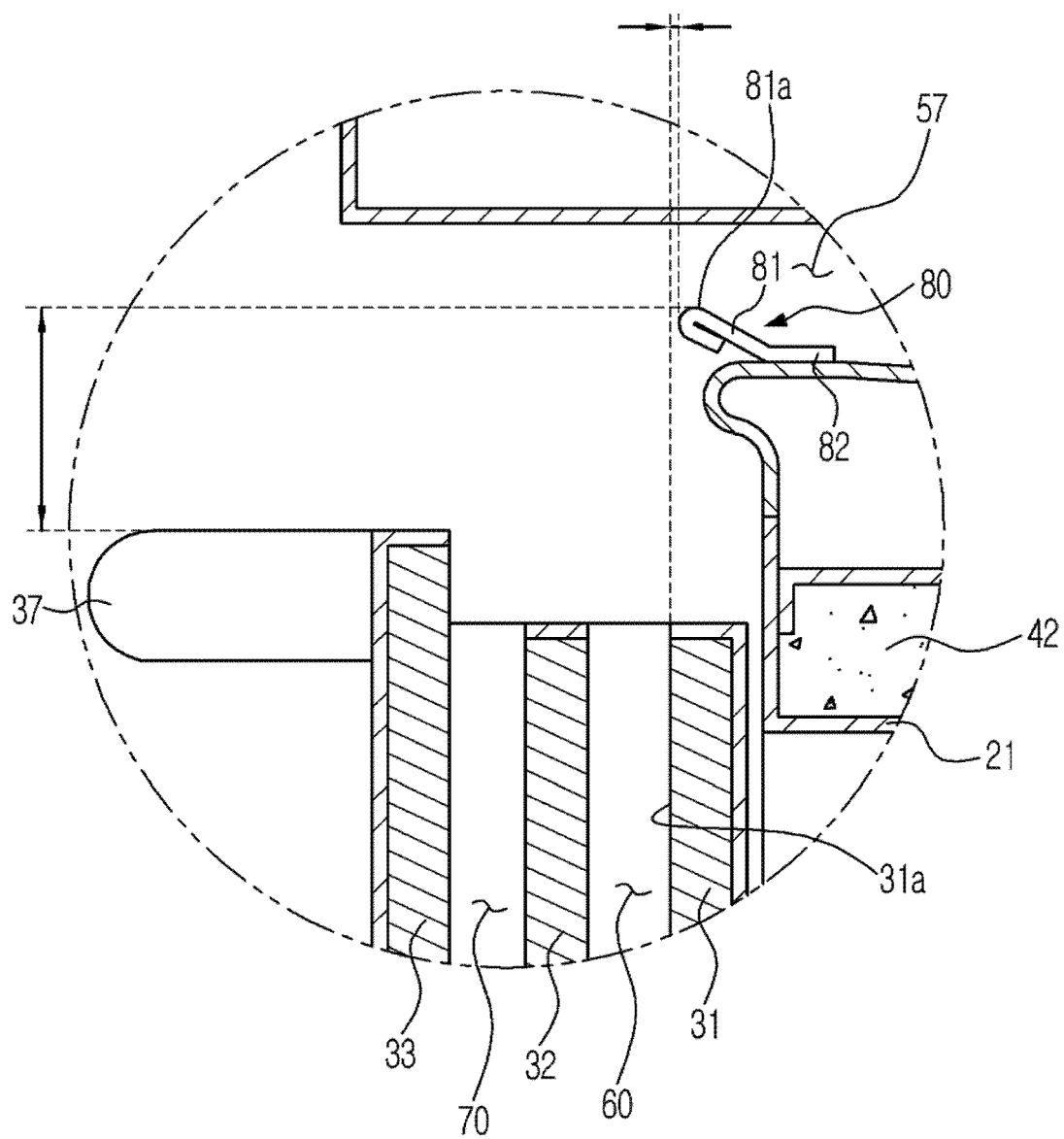


FIG. 31

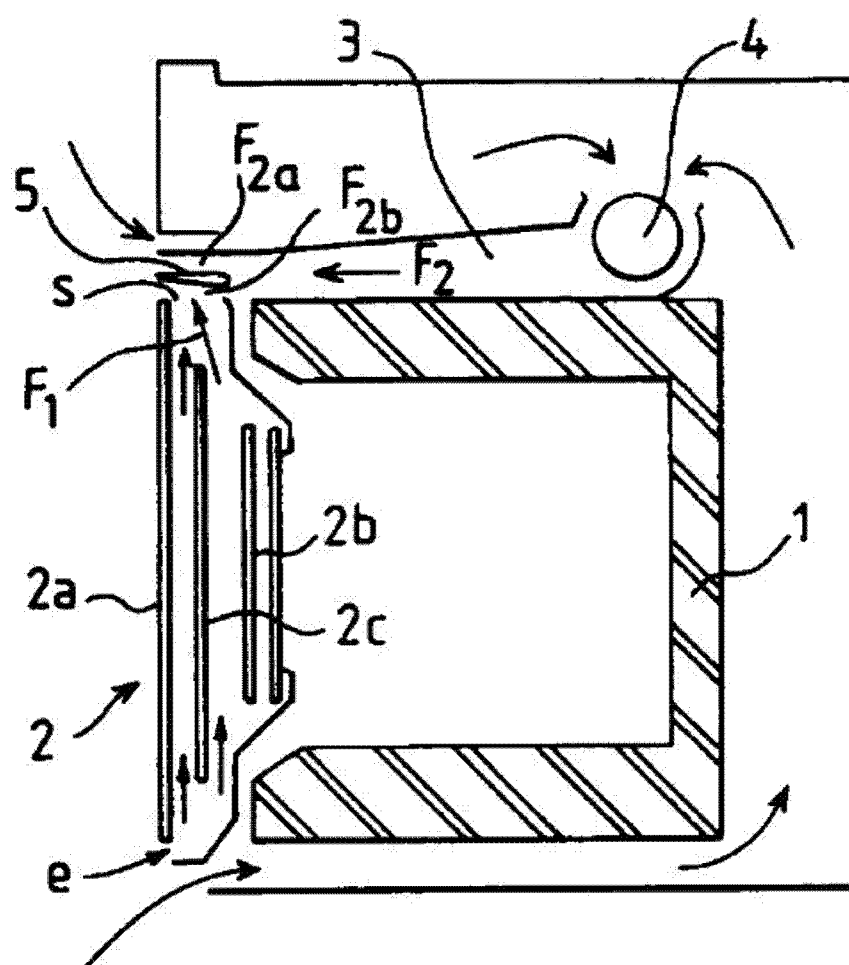


FIG. 32

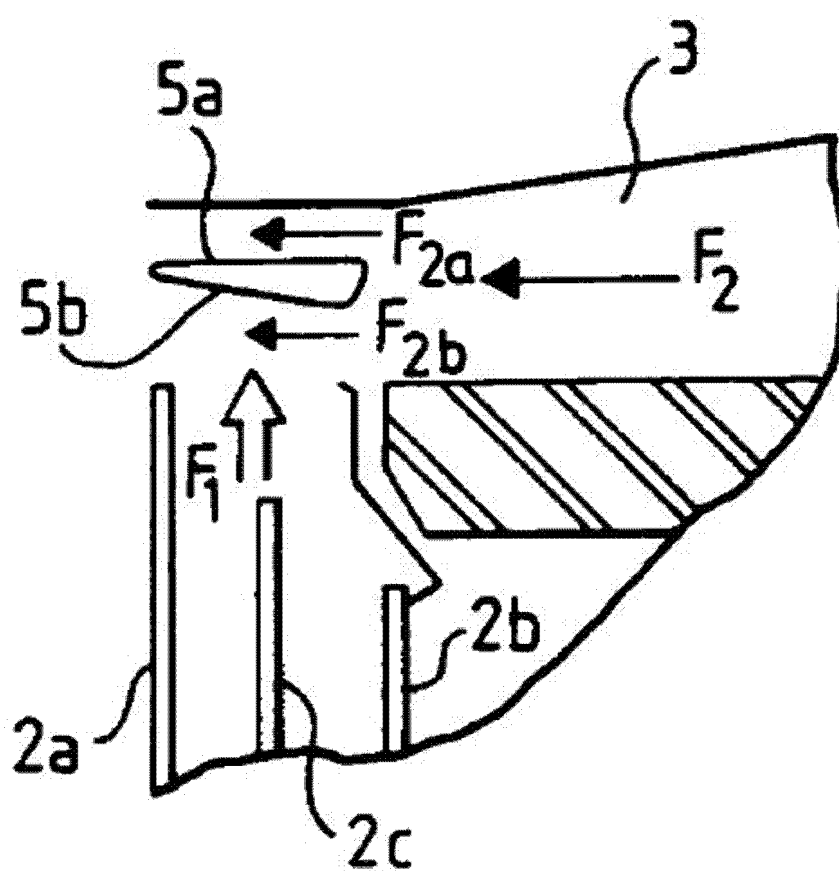
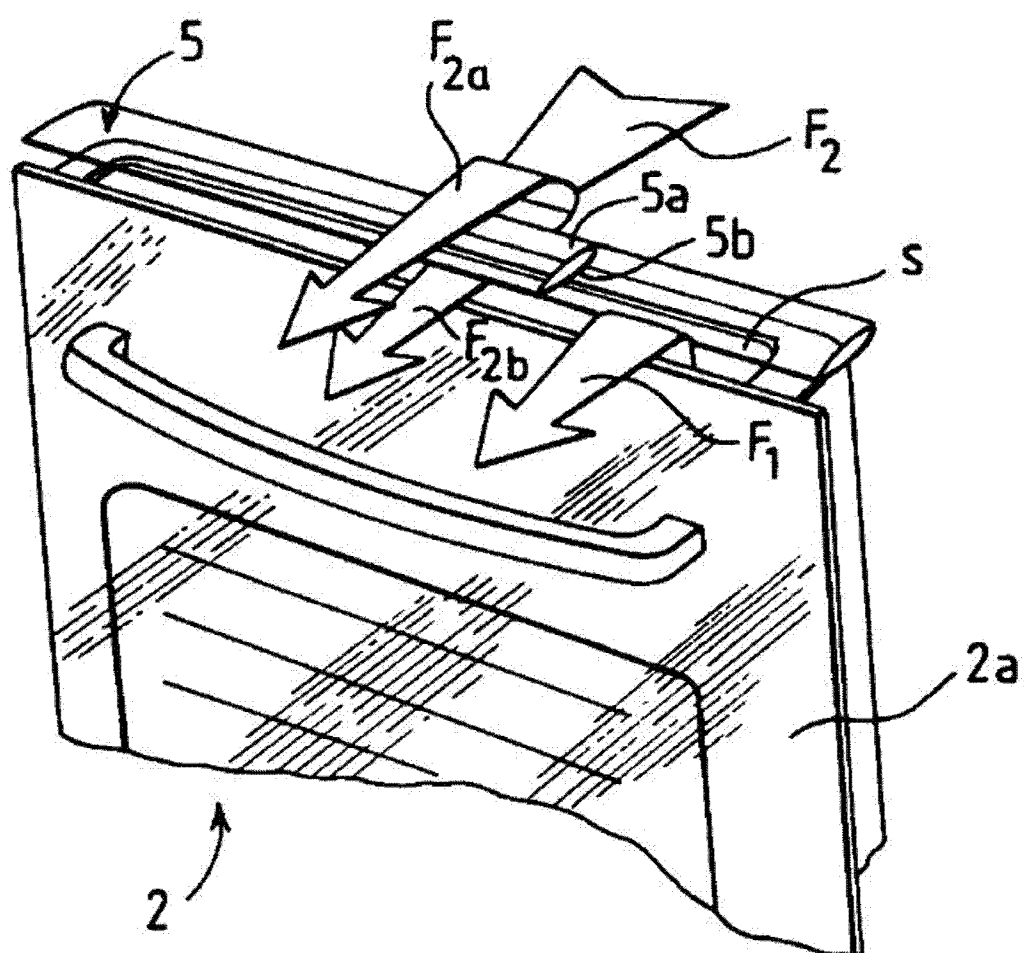


FIG. 33



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2023/005672

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A. CLASSIFICATION OF SUBJECT MATTER

F24C 15/02(2006.01)i; F24C 15/00(2006.01)i; F24C 15/06(2006.01)i; F24C 3/12(2006.01)i; F24C 7/08(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)

F24C 15/02(2006.01); F24C 15/00(2006.01); F24C 15/04(2006.01); F24C 15/20(2006.01); F27D 11/02(2006.01)

15

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

20

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

eKOMPASS (KIPO internal) & keywords: 조리 기기(cooking appliance), 에어 가이드(air guide), 경사(inclination), 공간(space), 도어(door), 컨트롤 패널(control panel), 프런트 패널(front panel)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

25

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0731318 B1 (BSH BOSCH UND SIEMENS HAUSGERATE G.M.B.H.) 23 September 1998 (1998-09-23) See column 2, line 28 - column 3, line 36 and figure 1.	1,2,4,5
Y		3,6,7,9
A		8,10
Y	KR 10-2019-0124584 A (SAMSUNG ELECTRONICS CO., LTD.) 05 November 2019 (2019-11-05) See paragraphs [0048]-[0052] and [0116] and figures 1-4.	3
Y	EP 0900985 B1 (AEG HAUSGERATE G.M.B.H. et al.) 14 May 2003 (2003-05-14) See paragraph [0022] and figure 1.	6,7
Y	US 3889099 A (NUSS, James J.) 10 June 1975 (1975-06-10) See column 4, lines 41-61 and the drawings.	9

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☒ Further documents are listed in the continuation of Box C.
☒ See patent family annex.

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“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

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“&” document member of the same patent family

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Date of the actual completion of the international search

02 August 2023

Date of mailing of the international search report

02 August 2023

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2023/005672

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1022517 A1 (CANDY S.P.A.) 26 July 2000 (2000-07-26) See paragraphs [0012]-[0040] and figures 1 and 2.	1-10

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2023/005672

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
EP 0731318 B1	23 September 1998	EP 0731318 A1	11 September 1996
		ES 2125504 T3	01 March 1999
KR 10-2019-0124584 A	05 November 2019	KR 10-2471491 B1	28 November 2022
		US 11506396 B2	22 November 2022
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		WO 2019-208953 A1	31 October 2019
EP 0900985 B1	14 May 2003	DE 19738601 C1	18 March 1999
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		SE 7507948 L	02 February 1976
EP 1022517 A1	26 July 2000	EP 1022517 B1	21 April 2004

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 1020150030016 [0025] [0071]
- FR 2746903 [0057] [0071]