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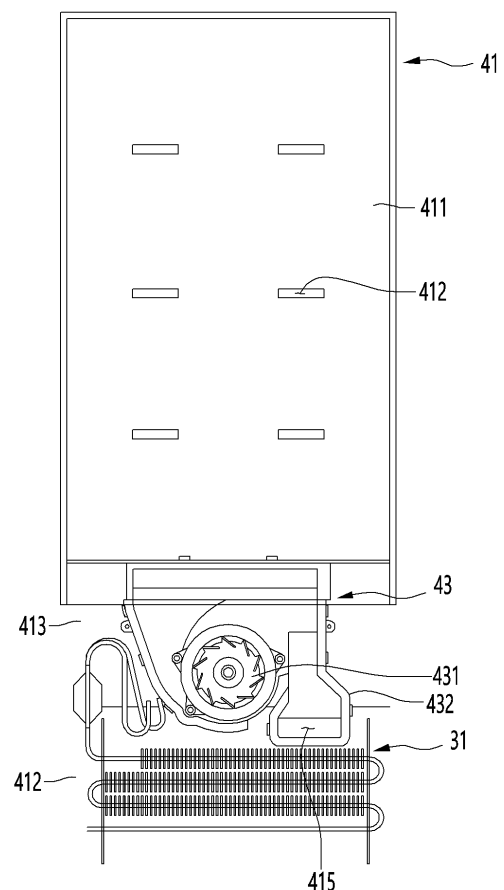
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(54) **REFRIGERATOR**

(57) A refrigerator according to an embodiment of the present disclosure includes a cabinet forming a storage space; an evaporator located at a rear of the storage space and forming cold air; and a grill pan assembly located at the rear of the storage space, in which the grill pan assembly includes a grill pan, and a blowing fan assembly disposed at a rear of the grill pan and configured to supply the cold air to the storage space, and the blowing fan assembly includes a first flow path through which the cold air moves in a direction away from the evaporator, and a second flow path through which the cold air moves in a direction closer to the evaporator.

FIG. 5



Description

BACKGROUND

[0001] The present disclosure relates to refrigerators.

[0002] In general, refrigerators supply cold air generated from an evaporator to a storage space to maintain the freshness of various foods for a long period of time. The storage space of the refrigerator is divided into a refrigerating chamber which is maintained at approximately 3 degrees Celsius and thus stores foods in a refrigerated state and a freezing chamber where is maintained at approximately -20 degrees Celsius and thus stores foods in a frozen state.

[0003] The freezing chamber stores foods that must be maintained at the freezing temperatures or less, such as meat, fish, and frozen desserts, and the freezing chamber stores foods that must be maintained at the freezing temperatures or less, such as vegetables, fruits, and beverages.

[0004] A refrigerator uses a compressor, a condenser, an expander, and an evaporator to repeat the cooling cycle of compressing, condensing, expanding, and evaporating the refrigerant. The evaporator cools the surroundings by taking evaporation heat from the surroundings as the liquid refrigerant evaporates.

[0005] At this time, both the freezing chamber and the refrigerating chamber may be cooled by a single evaporator provided on the freezing chamber side, or the freezing chamber and the refrigerating chamber may each be provided with evaporators and cooled independently.

[0006] Meanwhile, in the refrigerating chamber, a separate storage space may be provided to maintain a lower temperature than other areas in the refrigerating chamber or for rapid cooling. In this case, it may be advantageous in terms of cooling efficiency for the evaporator to be provided in each of the freezing chamber and the refrigerating chamber.

SUMMARY

[0007] An object of an embodiment of the present disclosure is to provide a refrigerator capable of supplying cold air from an evaporator provided on the side of the refrigerating chamber to a plurality of storage spaces maintained at different temperatures within the refrigerating chamber.

[0008] An object of an embodiment of the present disclosure is to provide a refrigerator that may improve the flow of cold air provided to a plurality of storage spaces in a refrigerating chamber.

[0009] An object of an embodiment of the present disclosure is to provide a refrigerator with improved cooling efficiency by minimizing the supply flow path of cold air provided from the evaporator to the refrigerating chamber.

[0010] An object of an embodiment of the present

disclosure is to provide a refrigerator with improved space efficiency by placing the evaporator provided on the side of the refrigerating chamber at the rear of the rapid cooling chamber.

[0011] The object is solved by the features of the independent claims. Preferred embodiments are given in the dependent claims.

[0012] A refrigerator according to an embodiment to solve the above problem includes a cabinet forming a storage space; an evaporator located at a rear of the storage space and forming cold air; and a grill pan assembly located at the rear of the storage space, in which the grill pan assembly includes a grill pan, and a blowing fan assembly disposed at a rear of the grill pan and configured to supply the cold air to the storage space, and the blowing fan assembly includes a first flow path through which the cold air moves in a direction away from the evaporator, and a second flow path through which the cold air moves in a direction closer to the evaporator.

[0013] The blowing fan assembly may include a blowing fan configured to flow the cold air.

[0014] The blowing fan may be located between the first flow path and the second flow path.

[0015] The blowing fan may be configured to inhale the cold air from a front and discharge the cold air in a radial direction.

[0016] The evaporator may be located below the blowing fan assembly.

[0017] The grill pan assembly may further include an insulation member disposed at the rear of the grill pan.

[0018] The grill pan assembly may form a flow path through which the cold air flows.

[0019] The insulation member may be disposed not to overlap the blowing fan in the front and rear direction.

[0020] The grill pan may include a first plate part formed with a first pan discharge port through which the cold air provided from the first flow path is discharged, and a second plate part formed with a second pan discharge port through which the cold air provided from the second flow path is discharged and located at a front of the first plate part, and in which the second pan discharge port may be located lower than the first pan discharge port.

[0021] The blowing fan assembly may include a blowing fan disposed between the first flow path and the second flow path and configured to flow the cold air, and the second pan discharge port may be located lower than the blowing fan.

[0022] The second plate part may be located at the front of the first plate part.

[0023] The grill pan assembly may further include an insulation member disposed at the rear of the grill pan and forming a flow path through which the cold air flows, the grill pan may further include a third plate part connecting the first plate part and the second plate part, and the insulation member may be disposed to overlap the first plate part and the second plate part in the front and rear direction, but not to overlap the third plate part in the

front and rear direction.

[0024] The evaporator may be located at a rear of the second plate part, and the second pan discharge port may be located above the evaporator.

[0025] The blowing fan assembly may include a blowing fan configured to flow the cold air, and the blowing fan may be located between the first plate part and the second plate part.

[0026] The storage space may include a first storage part provided with the cold air moving through the first flow path, and a second storage part provided with the cold air moving through the second flow path, and the second storage part may be maintained at a lower temperature than the first storage part.

[0027] A refrigerator according to another embodiment to solve the above problem includes a cabinet forming a storage space; an evaporator located at a rear of the storage space and forming cold air; and a grill pan assembly installed at the rear of the storage space, in which the grill pan assembly includes a grill pan, and a blowing fan assembly disposed at a rear of the grill pan and configured to supply the cold air to the storage space, the blowing fan assembly includes a blowing fan, and a blowing fan cover configured to accommodate the blowing fan, and the blowing fan cover includes a cover main body including an upper opening opened upward and defining an accommodation space in which the blowing fan is provided, and a cover extension part protruding forward from the cover main body and includes a front opening that opens forward.

[0028] Features of the first embodiment can be combined with the features of the second embodiment.

[0029] The upper opening may be disposed on one side of the blowing fan, and the cover extension part may be disposed on the other side of the blowing fan.

[0030] The cover extension part may extend in a downwardly inclined direction toward the front.

[0031] The front opening may be disposed below the blowing fan.

[0032] The storage space may include a first storage part, and a second storage part maintained at a lower temperature than the first storage part, and in which the front opening may be connected to the second storage part.

[0033] The grill pan may include a first plate part located above the blowing fan and having a first pan discharge port through which the cold air provided from the upper opening is discharged, a second plate part located lower than the blowing fan, having a second pan discharge port through which the cold air provided from the front opening is discharged, and located forward of the first plate part, and a third plate part connecting the first plate part and the second plate part.

[0034] The grill pan assembly may further include an insulation member disposed at the rear of the grill pan and forming a flow path through which the cold air flows, and the insulation member may be disposed to overlap the first plate part and the second plate part in the front

and rear direction, but not to overlap the third plate part in the front and rear direction.

[0035] The evaporator may be located at a rear of the second plate part, and the second pan discharge port may be located above the evaporator.

[0036] The home appliance according to the proposed embodiment may expect the following effects.

[0037] According to an embodiment of the present disclosure, cold air may be supplied from an evaporator provided on the side of the refrigerating chamber to a plurality of storage spaces maintained at different temperatures within the refrigerating chamber.

[0038] According to an embodiment of the present disclosure, the flow of cold air provided to a plurality of storage spaces in the refrigerator may be improved.

[0039] According to an embodiment of the present disclosure, cooling efficiency may be improved by minimizing the supply flow path of cold air provided from the evaporator to the refrigerating chamber.

[0040] According to an embodiment of the present disclosure, space efficiency may be improved by placing the evaporator provided on the side of the refrigerating chamber at the rear of the rapid cooling chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

[0041]

FIG. 1 is a front view illustrating a refrigerator according to one embodiment.

FIG. 2 is a front view illustrating a state where the door of a refrigerator is opened according to one embodiment.

FIG. 3 is a schematic diagram illustrating the location of an evaporator in a refrigerator according to one embodiment.

FIG. 4 is a side schematic diagram illustrating the refrigerating chamber of a refrigerator according to one embodiment.

FIG. 5 is a front view illustrating an evaporator and grill pan assembly of a refrigerator according to one embodiment

FIG. 6 is an exploded perspective view of a grill pan assembly of a refrigerator according to one embodiment.

FIG. 7 is a cross-sectional view taken along line VII-VII of FIG. 5.

FIG. 8 is a perspective view illustrating a path through which cold air is discharged from a refrigerator according to one embodiment.

FIG. 9 is a front view illustrating a blowing fan assembly included in a refrigerator according to one embodiment.

FIG. 10 is a side view illustrating a blowing fan assembly included in a refrigerator according to one embodiment.

FIG. 11 is an exploded perspective view illustrating a blowing fan assembly included in a refrigerator ac-

cording to one embodiment.

FIG. 12 is a schematic diagram illustrating the flow of cold air passing through a blowing fan assembly in a refrigerator according to one embodiment.

FIG. 13 is a front view illustrating a cold air control module in a refrigerator according to one embodiment.

FIG. 14 is a top view illustrating a cold air control module according to one embodiment.

FIG. 15 is an exploded perspective view illustrating a cold air control module according to one embodiment.

FIG. 16 is a schematic diagram illustrating a blowing fan assembly according to another embodiment.

FIG. 17 is a schematic diagram of a blowing fan assembly according to another embodiment.

FIG. 18 is a schematic diagram of a blowing fan assembly according to another embodiment.

FIG. 19 is a side schematic diagram illustrating the refrigerating chamber of a refrigerator according to another embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0042] Hereinafter, specific embodiments of the present disclosure will be described in detail along with the drawings. However, the present disclosure cannot be said to be limited to the embodiments in which the idea of the present disclosure is presented, and other disclosures that are regressive or other embodiments included within the scope of the present disclosure may be easily suggested by adding, changing, or deleting other components.

[0043] Before explaining, the direction is defined. In an embodiment of the present disclosure, the direction toward the door based on the cabinet illustrated in FIG. 2 may be referred to as a front direction, the direction toward the cabinet based on the door may be referred to as a rear direction, the direction toward the floor where the refrigerator is installed may be referred to as a lower direction, and the direction away from the floor may be referred to as an upper direction.

[0044] FIG. 1 is a front view illustrating a refrigerator according to one embodiment. FIG. 2 is a front view illustrating a state where the door of a refrigerator is opened according to one embodiment.

[0045] Referring to FIGS. 1 and 2, an outer appearance of the refrigerator 1 according to an embodiment of the present disclosure may be formed by a cabinet 10 forming storage spaces 11 and 12, and a door 20 that opens and closes the storage space of the cabinet 10.

[0046] For example, the cabinet 10 may form storage spaces 11 and 12 divided into upper and lower sections, and a refrigerating chamber 11 may be formed at the upper portion and a freezing chamber 12 may be formed at the lower portion. The refrigerating chamber 11 may be referred to as an upper storage space, and the freezing chamber 12 may be referred to as a lower storage space.

[0047] The door 20 may be configured to open and close the refrigerating chamber 11 and the freezing chamber 12, respectively. For example, the door 20 may be rotatably mounted on the cabinet 10, and the refrigerating chamber 11 and the freezing chamber 12 may be opened and closed by rotation, respectively. Of course, the door 20 may have a structure that opens and closes by pulling in and out.

[0048] The door 20 may include a refrigerating chamber door 21 that opens and closes the refrigerating chamber 11 and a freezing chamber door 22 that opens and closes the freezing chamber 12. The refrigerator door 21 may be referred to as an upper door and the freezing chamber door 22 may be referred to as a lower door.

[0049] Of course, in this embodiment, for convenience of explanation and understanding, the refrigerator 1 is described as an example in which the refrigerating chamber 11 is disposed at the top and the freezing chamber 12 is disposed at the bottom, but the present disclosure is not limited to a shape of the refrigerator and may be applied to all types of refrigerators equipped with doors.

[0050] Meanwhile, the door 20 forms an outer appearance of the front surface of the refrigerator 1 in a closed state, and may form the outer appearance of the refrigerator 1 seen from the front in a state where the refrigerator 1 is installed.

[0051] FIG. 3 is a schematic diagram illustrating the location of an evaporator in a refrigerator according to one embodiment.

[0052] Referring to FIG. 3, the refrigerator 1 according to one embodiment may include a plurality of evaporators. The plurality of evaporators may include a refrigerating chamber evaporator 31 that forms cold air supplied to the refrigerating chamber 11 and a freezing chamber evaporator 32 that forms cold air supplied to the freezing chamber.

[0053] For example, the refrigerating chamber evaporator 31 may be placed at the rear of the refrigerating chamber 11, and the freezing chamber evaporator 32 may be placed at the rear of the freezing chamber. Although not illustrated, the refrigerator 1 according to one embodiment is provided with one compressor and one condenser, respectively, and may provide refrigerant to the refrigerating chamber evaporator 31 and the freezing chamber evaporator 32, respectively. At this time, the compressor and condenser may be placed adjacent to the freezing chamber evaporator 32.

[0054] Hereinafter, the relationship between the refrigerating chamber, the evaporator, and the grill pan assembly will be described with reference to FIGS. 4 and 5.

[0055] FIG. 4 is a side schematic diagram illustrating the refrigerating chamber of a refrigerator according to one embodiment. FIG. 5 is a front view illustrating an evaporator and grill pan assembly of a refrigerator according to one embodiment.

[0056] Referring to FIGS. 4 and 5, in the refrigerator 1 according to one embodiment, the refrigerating chamber

11 may include a plurality of refrigerating spaces maintaining different temperatures. As an example, the refrigerating chamber 11 may include a first storage part 111 and a second storage part 112 that maintains a lower temperature than the first storage part 111.

[0057] The first storage part 111 occupies a larger volume than the second storage part 112 and may be located above the second storage part 112. The second storage part 112 may be defined as the internal space of the cooling case 113 provided on the lower side inside the refrigerating chamber 11. The first storage part 111 may be defined as an external space of the cooling case 113 in the refrigerating chamber 11. In other words, the first storage part 111 and the second storage part 112 may be spatially separated by the cooling case 113 to be maintained at different temperatures.

[0058] Cold air formed in the refrigerating chamber evaporator 31 may be supplied to the first storage part 111 and the second storage part 112. Cold air supplied to the first storage part 111 may be supplied from the refrigerating chamber evaporator 31 to the first storage part 111 via the blowing fan assembly 43 and the grill pan 41. The grill pan 41 may be placed at the rear of the first storage part 111. Cold air supplied to the second storage part 112 may be supplied from the refrigerating chamber evaporator 31 to the second storage part 112 via the blowing fan assembly 43.

[0059] As an example, cold air supplied to the first storage part 111 may be inhaled in from the refrigerating chamber evaporator 31 by the blowing fan assembly 43 and moved upward. Cold air moving upward may be supplied to the first storage part 111 through the first pan discharge port 414 formed in the grill pan 41. Additionally, the cold air supplied to the second storage part 112 may be inhaled in from the refrigerating chamber evaporator 31 by the blowing fan assembly 43 and supplied to the second storage part 112.

[0060] In other words, the path through which cold air is supplied from the refrigerating chamber evaporator 31 may be shorter in the second storage part 112 than in the first storage part 111. As a result, cold air of a lower temperature than the cold air supplied to the first storage part 111 may be supplied to the second storage part 112.

[0061] Hereinafter, the detailed structure of the grill pan assembly 40 will be described with reference to FIGS. 6 to 8.

[0062] FIG. 6 is an exploded perspective view of a grill pan assembly of a refrigerator according to one embodiment. FIG. 7 is a cross-sectional view taken along line VII-VII of FIG. 5. FIG. 8 is a perspective view illustrating a path through which cold air is discharged from a refrigerator according to one embodiment.

[0063] Referring to FIGS. 6 to 8, the refrigerator 1 according to one embodiment may include a grill pan 41 assembly 40. The grill pan 41 assembly 40 according to an embodiment may include a grill pan 41 disposed at the rear of the refrigerating chamber and defining the rear wall of the refrigerating chamber, an insulation member

42 disposed at the rear of the grill pan 41, and a back cover 44 and a blowing fan assembly 43 disposed at the rear of the insulation member 42.

[0064] The grill pan 41 forms the rear surface of the refrigerating chamber and may be injection molded from a plastic material. The grill pan 41 may be formed in a rectangular plate shape.

[0065] The grill pan 41 may include a first plate part 411 disposed at the upper portion, a second plate part 412 disposed at the lower portion, and a third plate part 413 connecting a lower end of the first plate part 411 and an upper end of the second plate part 412.

[0066] The first plate part 411 may be disposed at the rear of the first storage part 111. The first plate part 411 may include a plurality of first pan discharge ports 414. The plurality of first pan discharge ports 414 may be passages through which cold air provided to the first storage part 111 is discharged.

[0067] The second plate part 412 may be disposed at the rear of the second storage part 112. The second plate part 412 may be located at the front of the first plate part 411. The second plate part 412 may include a second pan discharge port 415. The second pan discharge port 415 may be a passage through which cold air provided to the second storage part 112 is discharged. The second pan discharge port 415 may be located above the refrigerating chamber evaporator 31.

[0068] As will be described later, the opening area of the second pan discharge port 415 may be adjusted by the cold air control module 50.

[0069] The third plate part 413 may be located between the first plate part 411 and the second plate part 412. The third plate part 413 may be disposed at the rear of the first storage part 111. A blowing fan assembly 43 may be disposed at the rear of the third plate part 413. The blowing fan assembly 43 may be located above the evaporator 31 in the refrigerator.

[0070] Cold air formed in the refrigerating chamber evaporator 31 may be inhaled into the blowing fan assembly 43 through the space between the third plate part 413 and the blowing fan assembly 43. The insulation member 42 may not be disposed at the rear of the third plate part 413, but is not limited thereto.

[0071] The second plate part 412 may be disposed at the front of the first plate part 411. Accordingly, the third plate part 413 may be disposed to be inclined. For example, the lower end of the third plate part 413 may be located at the front of the upper end.

[0072] The first to third plate parts 413 may be formed integrally, but are not limited to this and may be formed separately and then joined to each other.

[0073] An insulation member 42 may be provided at the rear of the grill pan 41. The insulation member 42 prevents cold air provided from the refrigerating chamber evaporator 31 from being radiated and conducted into the refrigerating chamber, and at the same time may form a flow path part of the grill pan 41 that allows cold air to flow into the first storage part 111.

[0074] The insulation member 42 may be made of an EPS material that is easy to form and has excellent insulation performance. The insulation member 42 may be in close contact with the rear of the grill pan 41. The perimeter of the insulation member 42 may be in close contact with the inner surface of the grill pan 41 and the back cover 44.

[0075] The insulation member 42 may include a first insulation part 421 disposed at the rear of the first storage part 111 and a second insulation part 422 disposed at the rear of the second storage part 112. The first insulating part 421 may be located at the rear of the first plate part 411, and the second insulating part 422 may be located at the rear of the second plate part 412. The insulation member 42 may not be located at the rear of the third plate part 413. The heat insulation member 42 may not be disposed at the rear of the third plate part 413 because a blowing fan 431, which will be described later, inhales cold air from the front. In other words, the insulation member 42 may be arranged to non-overlap the blowing fan 431 in the front and rear direction. However, the insulation member 42 may also be located at the rear of the third plate part 413 without being limited thereto.

[0076] A first insulation member discharge port 423 that opens at a position corresponding to the first pan discharge port 414 of the first plate part 411 may be formed in the first insulation part 421. For example, the first heat insulation member discharge port 423 may be formed to have substantially the same shape as the first pan discharge port 414. Additionally, a grill pan 41 flow path through which cold air supplied to the first storage part 111 moves may be formed at the rear surface of the first insulation part 421. In other words, the cold air supplied to the first storage part 111 may pass through the grill pan 41 flow path, pass through the first insulation member discharge port 423 and the first pan discharge port 414, and be supplied to the first storage part 111.

[0077] A second insulation member discharge port 424 formed at a position corresponding to the second pan discharge port 415 of the second plate part 412 may be formed in the second insulation part 422. As an example, the second insulation member discharge port 424 may have a shape cut downward from the upper end of the second insulation part 422. The front end portion of the cover extension part 432b of the blowing fan assembly 43, which will be described later, may be coupled to the second insulation member discharge port 424. Cold air supplied to the second storage part 112 may pass through the second insulation member discharge port 424 and the second pan discharge port 415 and be supplied to the second storage part 112.

[0078] A blowing fan assembly 43 may be located at the rear of the insulation member 42. The blowing fan assembly 43 may inhale in cold air formed in the refrigerating chamber evaporator 31 and supply the cold air to the first storage part 111 and the second storage part 112. The blowing fan assembly 43 may be located above the refrigerating chamber evaporator 31.

[0079] The blowing fan assembly 43 may include a blowing fan 431 that inhales cold air through rotation and a blowing fan cover 432 that accommodates the blowing fan 431.

[0080] The blowing fan 431 may inhale in cold air from the front and discharge the cold air in a radial direction. The blowing fan cover 432 may guide the movement of cold air inhaled in and discharged from the blowing fan 431. In detail, cold air discharged in a radial direction from the blowing fan 431 may be guided according to the inner shape of the blowing fan cover 432 and discharged to the outside of the blowing fan assembly 43. An upper opening 436 may be formed on the upper side of the blowing fan cover 432 to discharge cold air into the flow path part of the grill pan 41, and a front opening 437 may be formed at the front to discharge cold air to the second storage part 112. The upper opening part 436 may be connected to the first storage part 111. The front opening part 437 may be connected to the second storage part 112.

[0081] The blowing fan 431 may be located at the rear of the third plate part 413. The blowing fan 431 may be located between the first plate part 411 and the second plate part 412. The blowing fan 431 may be located lower than the first pan discharge port 414. The blowing fan 431 may be located above the second pan discharge port 415.

[0082] The blowing fan cover 432 may be composed of a plurality of injection molded products. For example, the blowing fan cover 432 may include a front cover part 433 that covers the blowing fan 431 from the front and a rear cover part 434 that covers the blowing fan 431 from the rear. In this specification, the description is based on the blowing fan cover 432 consisting of the front cover part 433 and the rear cover part 434, but the blowing fan cover 432 is not limited thereto and may be formed as a single injection molded product or may be formed from a plurality of injection molded products of different structures.

[0083] The detailed structure of the blowing fan assembly 43 and the flow of cold air through the blowing fan assembly 43 will be described later with reference to FIGS. 9 to 12.

[0084] FIG. 9 is a front view illustrating a blowing fan assembly included in a refrigerator according to one embodiment. FIG. 10 is a side view illustrating a blowing fan assembly included in a refrigerator according to one embodiment. FIG. 11 is an exploded perspective view illustrating a blowing fan assembly included in a refrigerator according to one embodiment. FIG. 12 is a schematic diagram illustrating the flow of cold air passing through a blowing fan assembly in a refrigerator according to one embodiment.

[0085] Referring to FIGS. 9 to 12, the blowing fan cover 432 may include a cover main body part 432a that covers the blowing fan 431, and a cover extension part 432b extending from one side of the cover main body part 432a to be inclined downward toward the front. In this embodiment, the description is based on a structure in which the cover extension part 432b extends forward from the right

side of the cover main body part 432a when viewed from the front of the refrigerator 1, but is not limited to this and the cover extension part (432b) may extend forward from the left side of the cover main body part 432a. If the portion to which the cover extension part 432b extends from the cover main body 432a is changed, the rotation direction of the blowing fan 431 may be changed accordingly.

[0086] The front cover part 433 may include a front main body part 433a defining the cover main body part 432a and a front extension part 433b defining the cover extension part 432b. The rear cover part 434 may include a rear body part 434a defining the cover main body part 432a and a rear extension part 434b defining the cover extension part 432b.

[0087] In other words, the cover main body part 432a may include a front main body part 433a and a rear main body part 434a. The cover extension part 432b may include a front extension part 433b and a rear extension part 434b.

[0088] A cold air inhale part 435 that opens to allow cold air to be inhaled in by the blowing fan 431 may be formed in the front main body part 433a. The cold air inhale part 435 may be open toward the front of the front main body part 433a.

[0089] An upper opening 436 through which cold air is supplied to the flow path part of the grill pan 41 may be formed on the upper side of the cover main body part 432a. As an example, the upper opening 436 may be defined by the upper end of the front main body part 433a and the upper end of the rear main body part 434a. The upper opening 436 may be formed entirely on the upper end of the cover main body part 432a, but is not limited to this and may be formed only on a portion of the upper end of the cover main body part 432a. The cover main body part 432a may form a first flow path 438 through which cold air supplied from the blowing fan cover 432 to the flow path part of the grill pan 41 moves. In other words, the first flow path 438 may be defined by the front main body part 433a and the rear body part 434a. Cold air flowing inside the blowing fan cover 432 may move in a direction away from the refrigerating chamber evaporator 31 through the first flow path 438.

[0090] The cover extension part 432b may extend toward the lower front. A portion of the cover extension part 432b connected to the cover main body part 432a may be located on the lower rear. The end portion of the cover extension part 432b where the front opening 437 is formed may be located at the lower front. The front extension part 433b may form one front and upper surface of the cover extension part 432b. The front end portion of the front extension part 433b may be coupled to the second insulation member discharge port 424. The rear extension part 434b may form one rear and lower surface of the cover extension part 432b.

[0091] As an example, the front opening 437 may be formed by opening the end portion of the front extension part 433b, but is not limited to this and may be formed by

opening the end portion of the rear opening, or may be formed by coupling the end portion of the front opening 437 and the end portion of the rear opening. The cover extension part 432b may form a second flow path 439 through which cold air supplied from the blowing fan cover 432 to the second storage part 112 moves. In other words, the second flow path 439 may extend toward the front and lower side. The second flow path 439 may be defined by a front extension part 433b and a rear extension part 434b. Cold air flowing inside the blowing fan cover 432 may move in a direction closer to the refrigerating chamber evaporator 31 through the second flow path 439.

[0092] The first flow path 438 and the second flow path 439 may be located on opposite sides of each other with the blowing fan 431 in between. In other words, the blowing fan 431 may be disposed between the first flow path 438 and the second flow path 439.

[0093] The front opening 437 may be located at the front of the upper opening 436. Additionally, the front opening 437 may be located at the front of the cold air inhale part 435.

[0094] A portion of the cold air inhaled from the refrigerating chamber evaporator 31 by the blowing fan assembly 43 may pass through the first flow path 438 and the upper opening 436 formed in the cover main body part 432a to move the flow path part of the upper grill pan 41 and thus may be supplied to the first storage part 111 through the first insulation member discharge port 423 and the first pan discharge port 414. Meanwhile, another part of the cold air inhaled by the blowing fan assembly 43 from the refrigerating chamber evaporator 31 moves to the front opening 437 through the second flow path 439 formed in the cover extension part 432b, and thus may be supplied to the second storage part 112 through the second insulation member discharge port 424 and the second pan discharge port 415.

[0095] At this time, due to the difference in the movement path of cold air, the cold air supplied to the second storage part 112 may be lower in temperature than the cold air supplied to the first storage part 111. Accordingly, the second storage part 112 may be maintained at a lower temperature than the first storage part 111.

[0096] FIG. 13 is a front view illustrating a cold air control module in a refrigerator according to one embodiment. FIG. 14 is a top view illustrating a cold air control module according to one embodiment. FIG. 15 is an exploded perspective view illustrating a cold air control module according to one embodiment.

[0097] Referring to FIGS. 13 to 15, the refrigerator 1 according to one embodiment may include a cold air control module 50 for adjusting the opening area of the front opening 437.

[0098] The cold air control module 50 according to one embodiment is disposed adjacent to the front opening 437 and may adjust the opening area of the front opening 437. Through this, the amount of cold air discharged from the front opening 437 may be adjusted. In other words,

the cold air control module 50 may control the temperature of the second storage part 112 by adjusting the amount of cold air provided to the second storage part 112. The operation of the cold air control module 50 may be performed manually, but may be automatically controlled in conjunction with the temperature set by the user.

[0099] The cold air control module 50 according to one embodiment may include an upper plate 51, a lower plate 52, an opening adjustment part 53, a power transmission part 54, and an operating part 55.

[0100] The upper plate 51 may be coupled to the upper surface of the cooling case 113. Without being limited thereto, the upper plate 51 may constitute the upper surface of the cooling case 113.

[0101] The lower plate 52 may be coupled to the upper plate 51 to guide the movement path of the power transmission part 54. The lower plate 52 may also be coupled with the manipulation part 55 and the opening adjustment part 53. The lower plate 52 may include a support part 521 on which the power transmission part 54 moves on the upper surface, a first lower plate coupling part 522 coupled to the manipulation part 55, a second lower plate coupling part 522 coupled to the opening adjustment part 53, and a third lower plate coupling part 524 having a protrusion shape to which the second lower plate coupling parts 523 and the power transmission part 54 are coupled.

[0102] The opening adjustment part 53 may include a first part 531 that covers the front opening 437 and a second part 532 that opens the front opening 437. The opening adjustment part 53 may include a first opening adjustment part 533 coupled to the second lower plate 52 coupling part of the lower plate 52, and a second opening adjustment part 534 coupled to the power transmission part 54.

[0103] The power transmission part 54 may transmit the left and right movement force provided by the user to the opening adjustment part 53 through the manipulation part 55. The power transmission part 54 may include a first power transmission coupling part 541 coupled to the second opening adjustment coupling part 534, a second power transmission coupling part 542 coupled to the manipulation part 55, and a load part 543 disposed between the first power transmission coupling part 541 and the second power transmission coupling part 542. The power transmission part 54 is disposed on the rod part 543 and may include a third power transmission coupling part 544 of an open shape coupled to the third lower plate coupling part 524.

[0104] The manipulation part 55 may be coupled to the second power transmission coupling part 542 of the power transmission part 54 and configured to transmit the user's left and right movement force to the opening adjustment part 53 through the power transmission part 54.

[0105] As an example, the user may move the manipulation part 55 to the left to align the front opening 437 and the first part 531 of the opening adjustment part 53 to

shield the front opening 437. Additionally, the user may completely open the front opening 437 by moving the manipulation part 55 to the right to align the front opening 437 and the second part 532 of the opening adjustment part 53. In addition, the user can partially shield and partially open the front opening 437 by appropriately adjusting the position of the manipulation part 55. Through this, the amount of cold air discharged to the second storage part 112 through the front opening 437 may be adjusted.

[0106] In this embodiment, the cold air control module 50 is described as manually controlled, but the present disclosure is not limited thereto and may include a cold air control module 50 which is automatically controlled. For example, the present disclosure may be controlled through manipulation through a touch display formed on the outer surface of the door or through manipulation through a control box provided inside the door. Additionally, the cold air control module 50 may have other types of structures, such as dampers.

[0107] According to the refrigerator 1 according to one embodiment, cold air may be supplied from the refrigerating chamber evaporator 31 provided on the side of the refrigerating chamber 11 to a plurality of storage spaces 111 and 112 maintained at different temperatures within the refrigerating chamber 11, respectively.

[0108] According to the refrigerator 1 according to one embodiment, the flow of cold air provided to the plurality of storage spaces 111 and 112 in the refrigerating chamber 11 may be improved.

[0109] According to the refrigerator 1 according to one embodiment, cooling efficiency may be improved by minimizing the supply flow path of cold air provided from the refrigerating chamber evaporator 31 to the refrigerating chamber 11.

[0110] According to the refrigerator 1 according to an embodiment, space efficiency may be improved by disposing the refrigerating chamber evaporator 31 provided on the side of the refrigerating chamber 11 at the rear of the second storage part 112 disposed below the refrigerating chamber 11.

[0111] Hereinafter, the blowing fan assembly 43' according to another embodiment will be described. The description will focus on differences from the blowing fan assembly 43 according to one embodiment.

[0112] FIG. 16 is a schematic diagram illustrating a blowing fan assembly according to another embodiment.

[0113] Referring to FIG. 16, the blowing fan assembly 43' according to this embodiment may include a blowing fan cover 432' of a different structure than the blowing fan assembly 43 according to one embodiment. In detail, the blowing fan cover 432' included in the blowing fan assembly 43' according to this embodiment may include a cover extension part 432b' extending diagonally when viewed from the front surface. The cover extension part 432b' may extend in a direction corresponding to the rotational direction of the cold air discharged from the blowing fan 431. The cover extension part 432b' may

extend forward in a direction closer to the blowing fan 431. When the cover extension part 432b' is disposed on one side of the blowing fan 431, the cover extension part 432b' may extend toward the other side toward the front. In the cover extension part 432b', one end portion connected to the cover main body part 432a may be located outside the other end portion where the front opening 437 is formed.

[0114] The blowing fan assembly 43' according to this embodiment may more smoothly flow cold air discharged through the front opening 437 through the blowing fan cover 432' having the above structure. In addition, the space of the second flow path 439 may be secured more widely, so that the flow rate of cold air discharged through the front opening 437 may be increased.

[0115] FIG. 17 is a schematic diagram of a blowing fan assembly according to another embodiment.

[0116] Referring to FIG. 17, the blowing fan assembly 43" according to this embodiment may include a blowing fan cover 432" of a different structure from the blowing fan assembly 43 according to one embodiment. In detail, the blowing fan cover 432" included in the blowing fan assembly 43" according to this embodiment may include a plurality of cover extensions 432b" and 432c".

[0117] As an example, the blowing fan cover 432" according to this embodiment may include a first cover extension part 432b" and a second cover extension part 432c" each branched from the cover main body part 432a. The first cover extension part 432b" may have substantially the same shape as the cover extension part 432b included in the blowing fan cover 432 according to one embodiment. The second cover extension 432c" may be provided between the first cover extension part 432b" and the blowing fan 431. The first cover extension part 432b" may include a first front opening 437a that opens toward the front, and the second cover extension part 432c" may include a second front opening 437b that opens toward the front. Since the first front opening 437a and the second front opening 437b are disposed to be spaced apart from each other, and thus a plurality of cold air supply paths may be formed in the second storage part 112.

[0118] The blowing fan cover 432 according to this embodiment includes a plurality of cover extension parts 432b, which may facilitate the flow of cold air supplied to the second storage part 112. Additionally, the second storage part 112 may receive cold air supplied through a plurality of flow paths spaced apart from each other, such as the first and second front openings 437, thereby improving cooling efficiency.

[0119] FIG. 18 is a schematic diagram of a blowing fan assembly according to another embodiment. FIG. 19 is a side schematic diagram illustrating the refrigerating chamber of a refrigerator according to another embodiment.

[0120] Referring to FIGS. 18 and 19, FIG. 19 is a side schematic view illustrating the refrigerating chamber of a refrigerator equipped with the blowing fan assembly 43'''

illustrated in FIG. 18. The blowing fan assembly 43''' according to this embodiment may include a blowing fan cover 432''' of a different structure from the blowing fan assembly 43''' according to one embodiment. In detail, the blowing fan cover 432''' included in the blowing fan assembly 43''' according to this embodiment may include a plurality of front openings 437a and 437a'. The plurality of front openings 437a and 437a' may include a first front opening 437a located at the end portion of the cover extension 432b''' and a second front opening 437a' located above the first front opening 437a.

[0121] Meanwhile, in the refrigerator 1 according to this embodiment, the refrigerating chamber 11 may include a plurality of refrigerating spaces maintaining different temperatures. As an example, the refrigerating chamber 11 may include a first storage part 111, a second storage part 112, and a third storage part 114 that maintain a lower temperature than the first storage part 111. The temperatures of the second storage part 112 and the third storage part 114 may be controlled independently of each other. For example, the temperature of the third storage part 114 may be maintained lower than the temperature of the second storage part 112.

[0122] The first storage part 111 occupies a larger volume than the second storage part 112 and the third storage part 114, and may be located above the second storage part 112 and the third storage part 114.

[0123] The second storage part 112 and the third storage part 114 may have the same volume, but are not limited thereto and may have different volumes. The third storage part 114 may be located above the second storage part 112. In other words, the third storage part 114 may be located between the first storage part 111 and the second storage part 112.

[0124] The third storage part 114 may be defined as the inner space of the cooling case 113 provided on the lower side inside the refrigerating chamber 11. The first storage part 111 and the third storage part 114 may be spatially separated by the cooling case 113 and maintained at different temperatures. The cooling case 113 defining the third storage part 114 may be substantially the same as the cooling case 113 of the second storage part 112, but is not limited thereto.

[0125] Cold air formed in the refrigerating chamber evaporator 31 may be supplied to the first storage part 111, the second storage part 112, and the third storage part 114. Cold air supplied to the first storage part 111 may be supplied from the refrigerating chamber evaporator 31 to the first storage part 111 via the blowing fan assembly 43''' and the grill pan 41. The cold air supplied to the second storage part 112 may be supplied from the refrigerating chamber evaporator 31 to the second storage part 112 through the first front opening 437a via the blowing fan assembly 43'''. Cold air supplied to the third storage part 114 may be supplied from the refrigerating chamber evaporator 31 to the third storage part 114 through the second front opening 437a' via the blowing fan assembly 43'''.

[0126] The path through which cold air is supplied from the refrigerating chamber evaporator 31 may be shorter in the third storage part 114 than in the second storage part 112. As a result, cold air of a lower temperature than the cold air supplied to the second storage part 112 may be supplied to the third storage part 114. 5

[0127] In addition, the temperatures of the second storage part 112 and the third storage part 114 may be controlled through the sizes of the first front opening 437a and the second front opening 437a'. For example, by making the size of the second front opening 437a' larger than the first front opening 437a, a larger amount of cold air may be provided to the third storage part 114 than to the second storage part 112. Through this, the temperature of the third storage part 114 may be maintained lower than that of the second storage part 112. 10

[0128] Additionally, the cold air control module 50 described above with reference to FIGS. 13 to 15 may be installed in the first front opening 437a and the second front opening 437a', respectively. At this time, the sizes of the first front opening 437a and the second front opening 437a' may be substantially the same. In this case, the amount of cold air may be independently controlled which is provided to the first front opening 437a and the second front opening 437a' through the cold air control module 50 installed in the first front opening 437a and the second front opening 437a', respectively. For example, the opening size of the second front opening 437a' is made larger than the opening size of the first front opening 437a through the cold air control module 50, and a larger amount of cold air than the second storage part 112 may be provided to the third storage part 114. Through this, the temperature of the third storage part 114 may be maintained lower than that of the second storage part 112. 20 25

[0129] The blowing fan cover 432''' according to this embodiment includes a plurality of front openings 437a and 437a', and may have a plurality of independent cooling spaces in the refrigerating chamber 11, such as the second storage part 112 and the third storage part 114. In addition, the second storage part 112 and the third storage part 114 may independently control their respective temperatures by controlling the opening sizes of the first front opening 437a and the second front opening 437a'. 30 35 40 45

Claims

1. A refrigerator comprising:

a cabinet (10) forming a storage space (11, 12);
an evaporator (31) located at a rear of the storage space (11, 12) and providing cold air; and
a grill pan assembly (40) located at the rear of the storage space (11, 12), wherein the grill pan assembly (40) includes:

a grill pan (41), and
a blowing fan assembly (43) disposed at a rear of the grill pan (41) and configured to supply cold air to the storage space (11, 12), wherein the blowing fan assembly (43) includes:

a first flow path (438) through which the cold air moves in a direction away from the evaporator (31), and
a second flow path (439) through which the cold air moves in a direction closer to the evaporator (31).

2. The refrigerator of claim 1, wherein the blowing fan assembly (43) includes a blowing fan (431) configured to flow cold air, wherein the blowing fan (431) is located between the first flow path (438) and the second flow path (439).

3. The refrigerator of claim 2, wherein the evaporator (31) is located below the blowing fan assembly (43),

wherein the grill pan assembly (40) further includes an insulation member (42) disposed at the rear of the grill pan (41) and forming a flow path through which the cold air flows, and wherein the insulation member (42) is disposed not to overlap the blowing fan (431) in the front and rear direction.

4. The refrigerator of any one of the preceding claims, wherein the grill pan (41) includes:

a first plate part (411) formed with a first pan discharge port (414) through which the cold air provided from the first flow path (438) is discharged, and
a second plate part (412) formed with a second pan discharge port (415) through which the cold air provided from the second flow path (439) is discharged and located at a front of the first plate part (414), and
preferably the second pan discharge port (415) is located lower than the first pan discharge port (414).

5. The refrigerator of claim 4, wherein the blowing fan assembly (43) includes a blowing fan (431) disposed between the first flow path (438) and the second flow path (439) and configured to flow the cold air, wherein the second pan discharge port (415) is located lower than the blowing fan (431).

6. The refrigerator of claim 4 or 5,

wherein the grill pan assembly (40) further includes an insulation member (42) disposed at

- the rear of the grill pan (41) and forming a flow path through which the cold air flows, wherein the grill pan (41) further includes a third plate part (413) connecting the first plate (411) part and the second plate part (412) and wherein the insulation member (42) is disposed to overlap the first plate part (411) and the second plate part (412) in the front and rear direction, but not to overlap the third plate part (413) in the front and rear direction.
7. The refrigerator of claim 4, 5 or 6, wherein the evaporator (31) is located at a rear of the second plate part (412), and the second pan discharge port (415) is located above the evaporator (31).
8. The refrigerator of any one of the preceding claims 4-7, wherein the blowing fan assembly (43) includes a blowing fan (431) configured to flow the cold air, wherein the blowing fan (431) is located between the first plate part (411) and the second plate part (412).
9. The refrigerator of any one of the preceding claims, wherein the storage space (11) includes:
- a first storage part (111) provided with the cold air moving through the first flow path (438), and a second storage part (112) provided with the cold air moving through the second flow path (439), and wherein the second storage part (112) is maintained at a lower temperature than the first storage part (111).
10. A refrigerator comprising:
- a cabinet (10) forming a storage space (11, 12); an evaporator (31) located at a rear of the storage space (11, 12) and providing cold air; and a grill pan assembly (40) installed at the rear of the storage space (11, 12), wherein the grill pan assembly (40) includes:
- a grill pan (41), and a blowing fan assembly (43) disposed at a rear of the grill pan (41) and configured to supply the cold air to the storage space (11, 12), wherein the blowing fan assembly (43) includes:
- a blowing fan (431), and a blowing fan cover (432) configured to accommodate the blowing fan (431), wherein the blowing fan cover (432) includes:
- a cover main body (432a) including an upper opening (436) opened upward and defining an accommodation space in which the blowing fan (431) is provided, and a cover extension part (432b) protruding forward from the cover main body (432a) and includes a front opening (437) that opens forward.
11. The refrigerator of claim 10, wherein the upper opening (436) is disposed on one side of the blowing fan (431), and wherein the cover extension part (432b) is disposed on the other side of the blowing fan (431) and extends in a downwardly inclined direction toward the front.
12. The refrigerator of claim 10 or 11, wherein the storage space (11, 12) includes:
- a first storage part (111), and a second storage part (112) maintained at a lower temperature than the first storage part (111), and wherein the front opening (437) is connected to the second storage part (112) and disposed below the blowing fan (431).
13. The refrigerator of claim 10, 11 or 12, wherein the grill pan (41) includes:
- a first plate part (411) located above the blowing fan (431) and having a first pan discharge port (414) through which the cold air provided from the upper opening (436) is discharged, a second plate part (412) located lower than the blowing fan (431), having a second pan discharge port (415) through which the cold air provided from the front opening (437) is discharged, and located forward of the first plate part (414), and a third plate part (413) connecting the first plate part (411) and the second plate part (412).
14. The refrigerator of claim 13, wherein the grill pan assembly (40) further includes an insulation member (42) disposed at the rear of the grill pan (41) and forming a flow path through which the cold air flows, and wherein the insulation member (42) is disposed to overlap the first plate part (411) and the second plate part (412) in the front and rear direction, but not to overlap the third plate part (413) in the front and rear direction.
15. The refrigerator of claim 13, wherein the evaporator

(31) is located at a rear of the second plate part (412), wherein the second pan discharge port (415) is located above the evaporator (31).

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FIG. 1

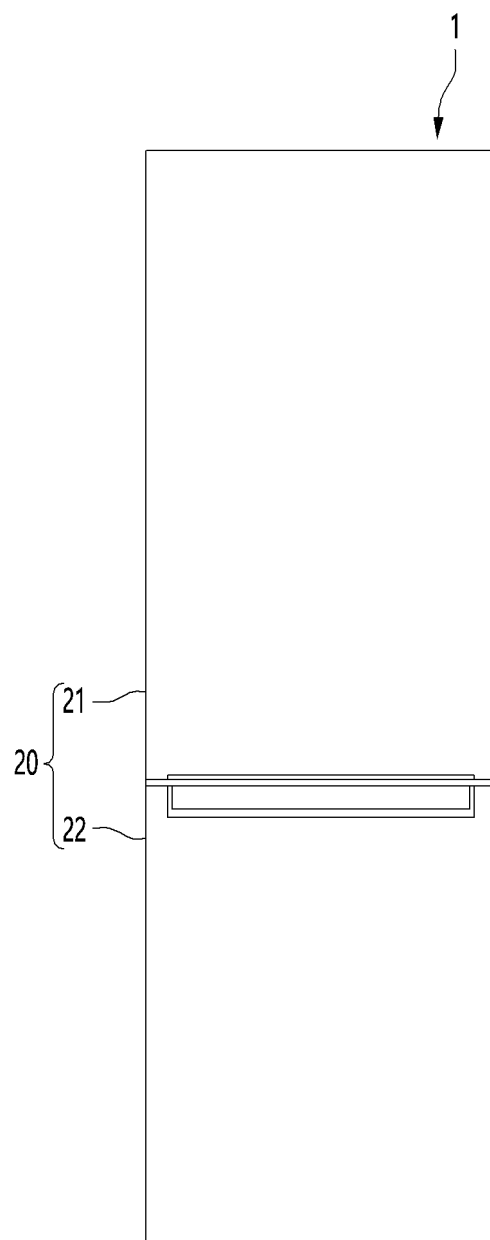


FIG. 2

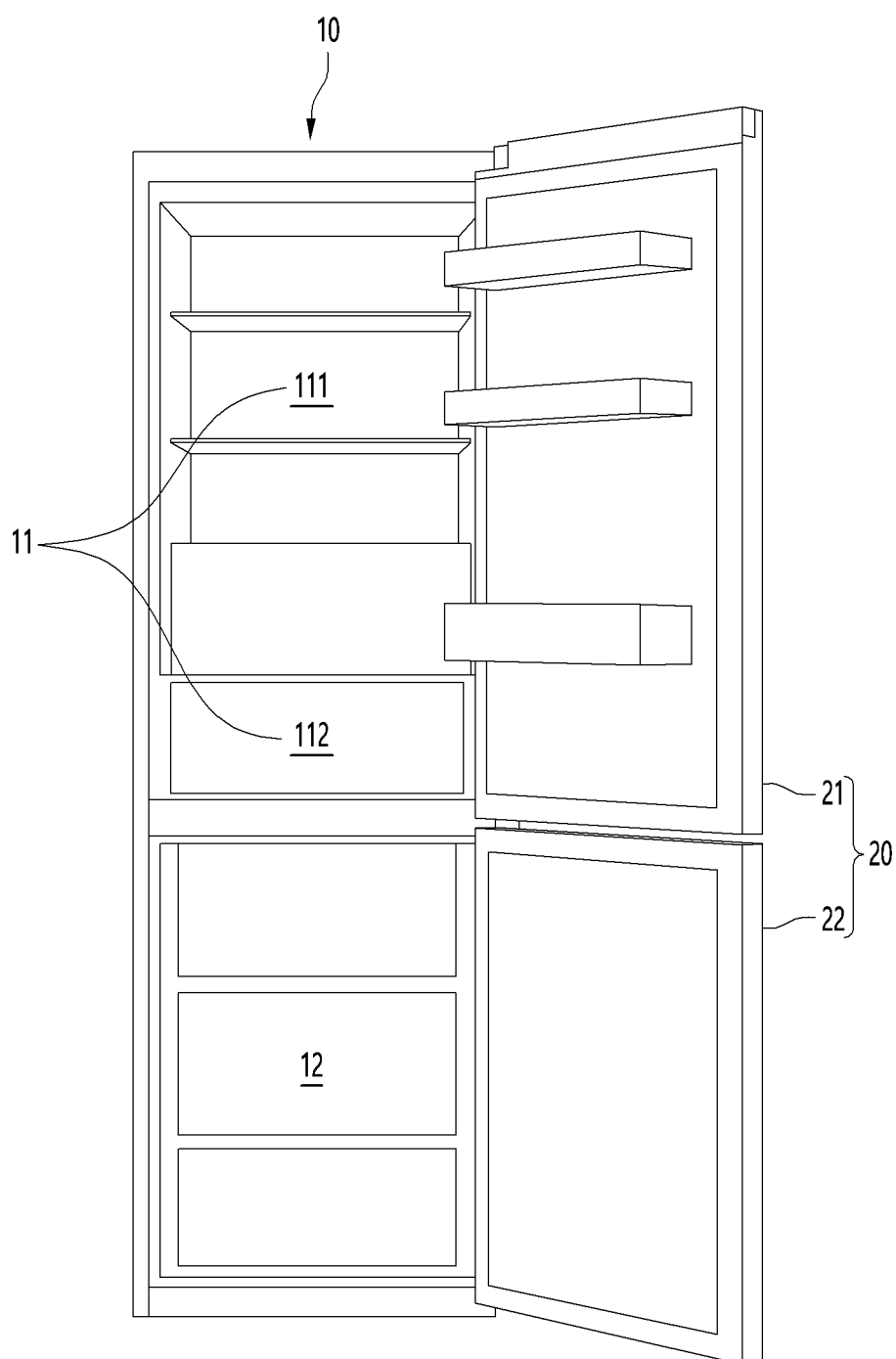


FIG. 3

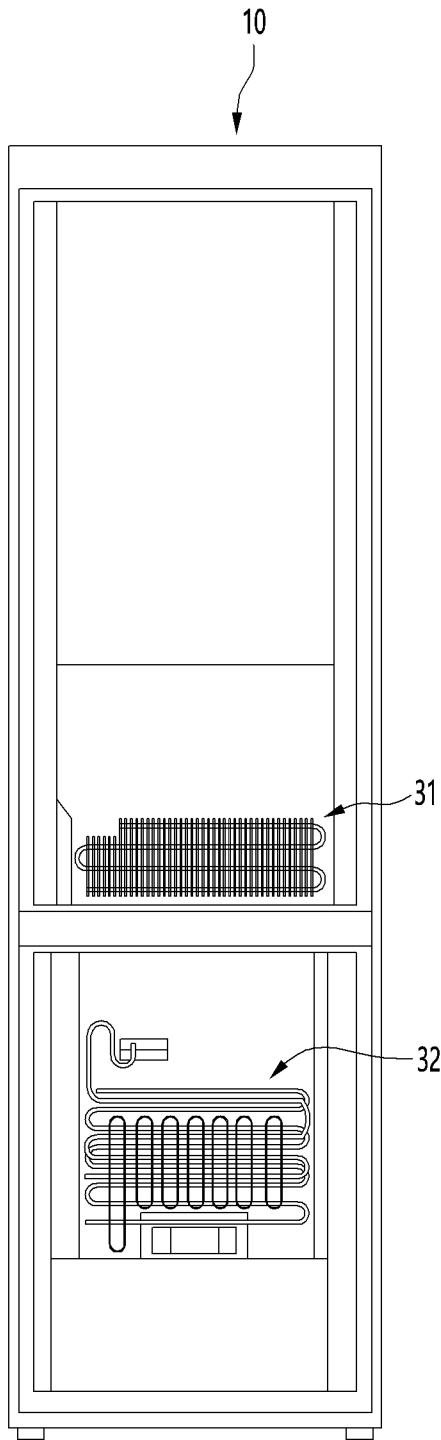


FIG. 4

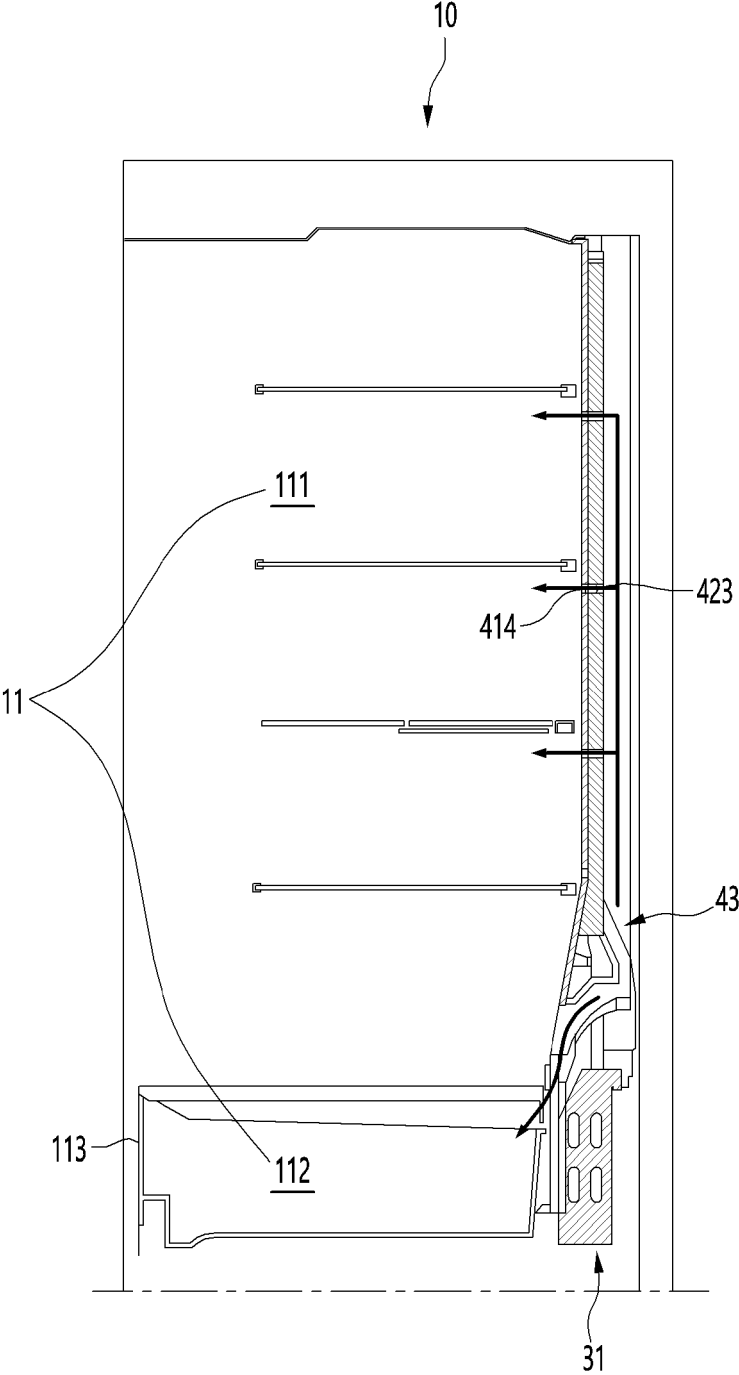


FIG. 5

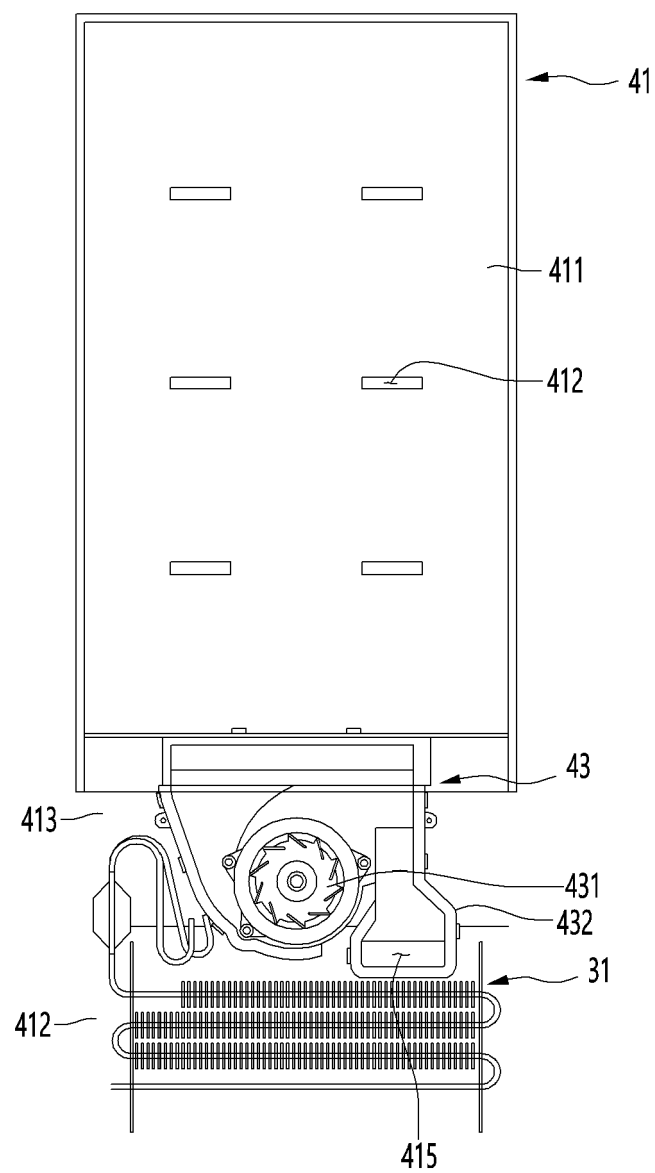


FIG. 6

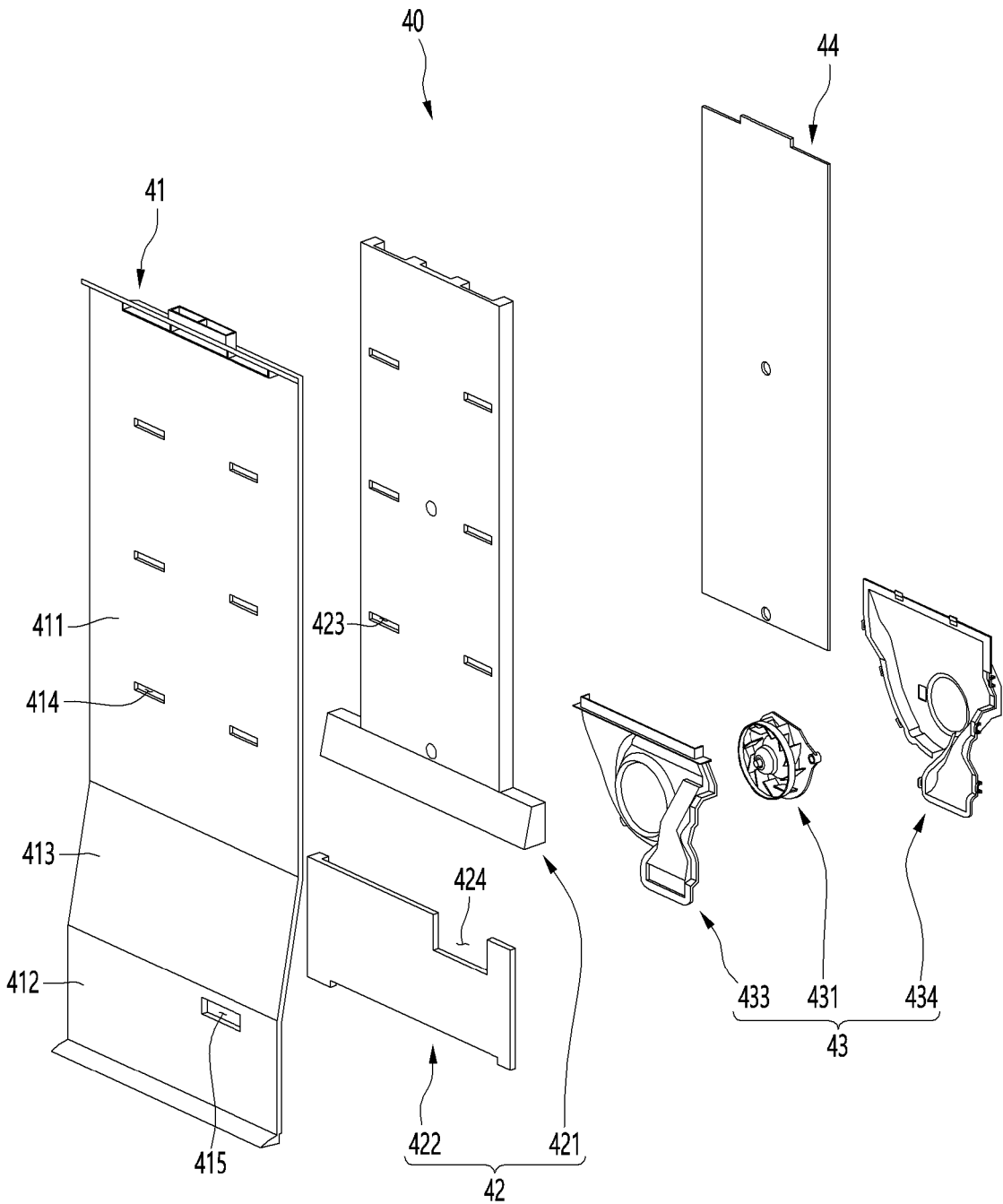


FIG. 7

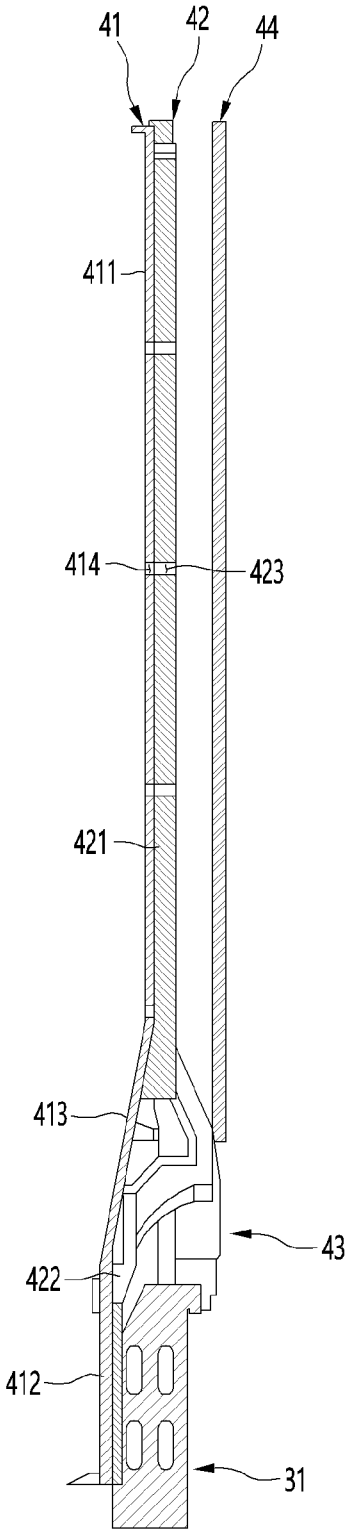


FIG. 8

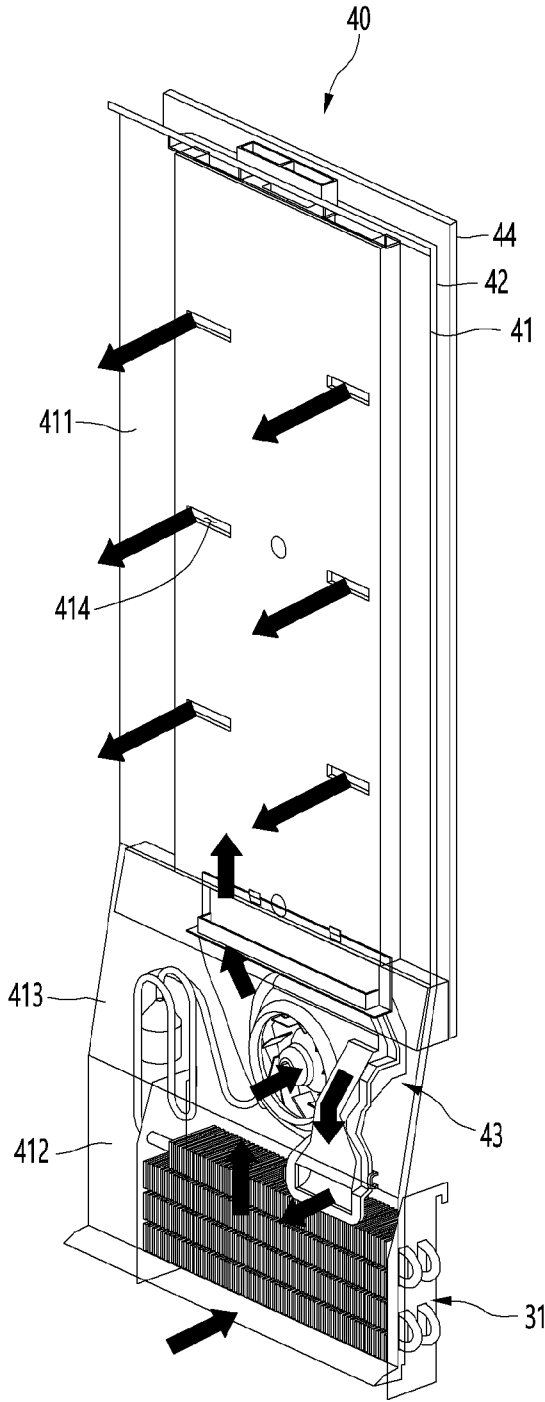


FIG. 9

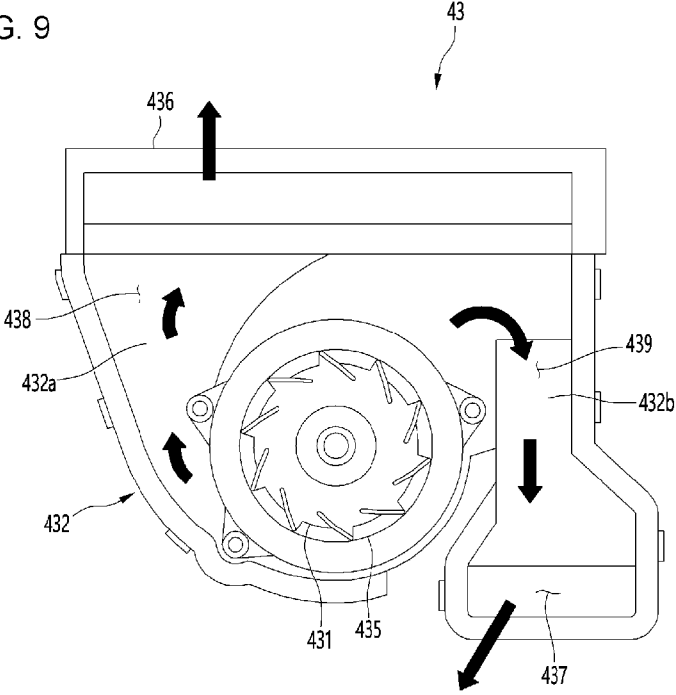


FIG. 10

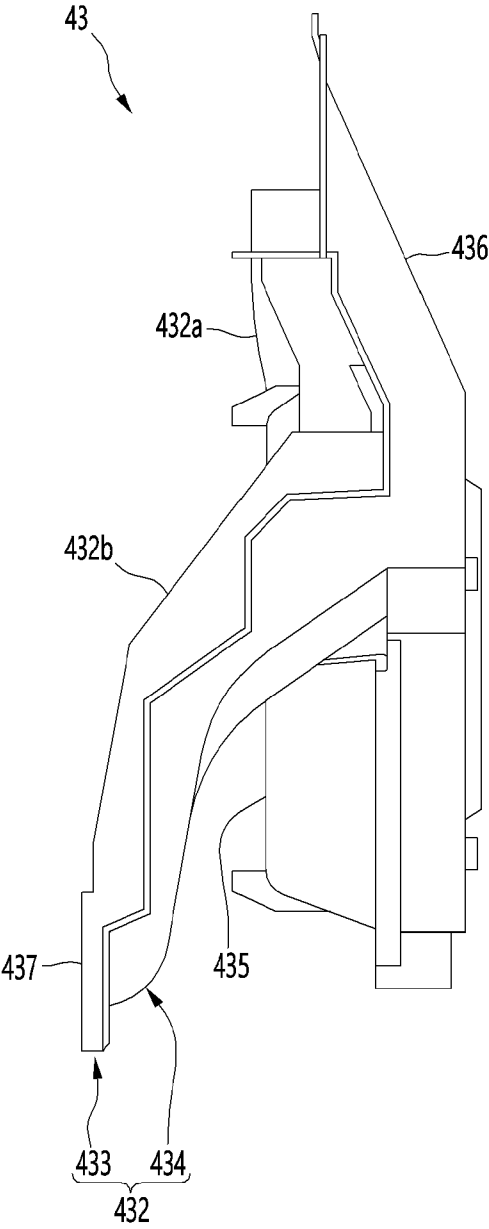


FIG. 11

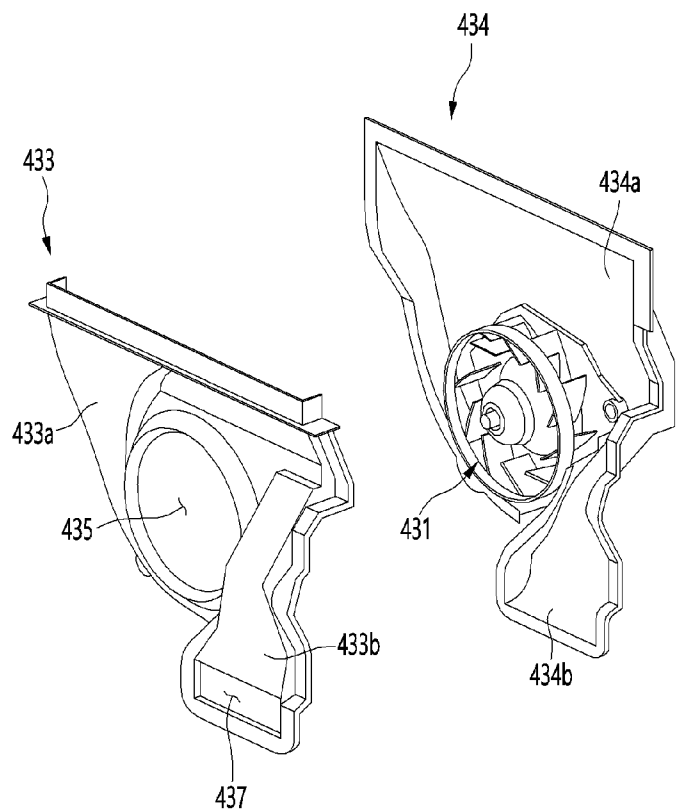


FIG. 12

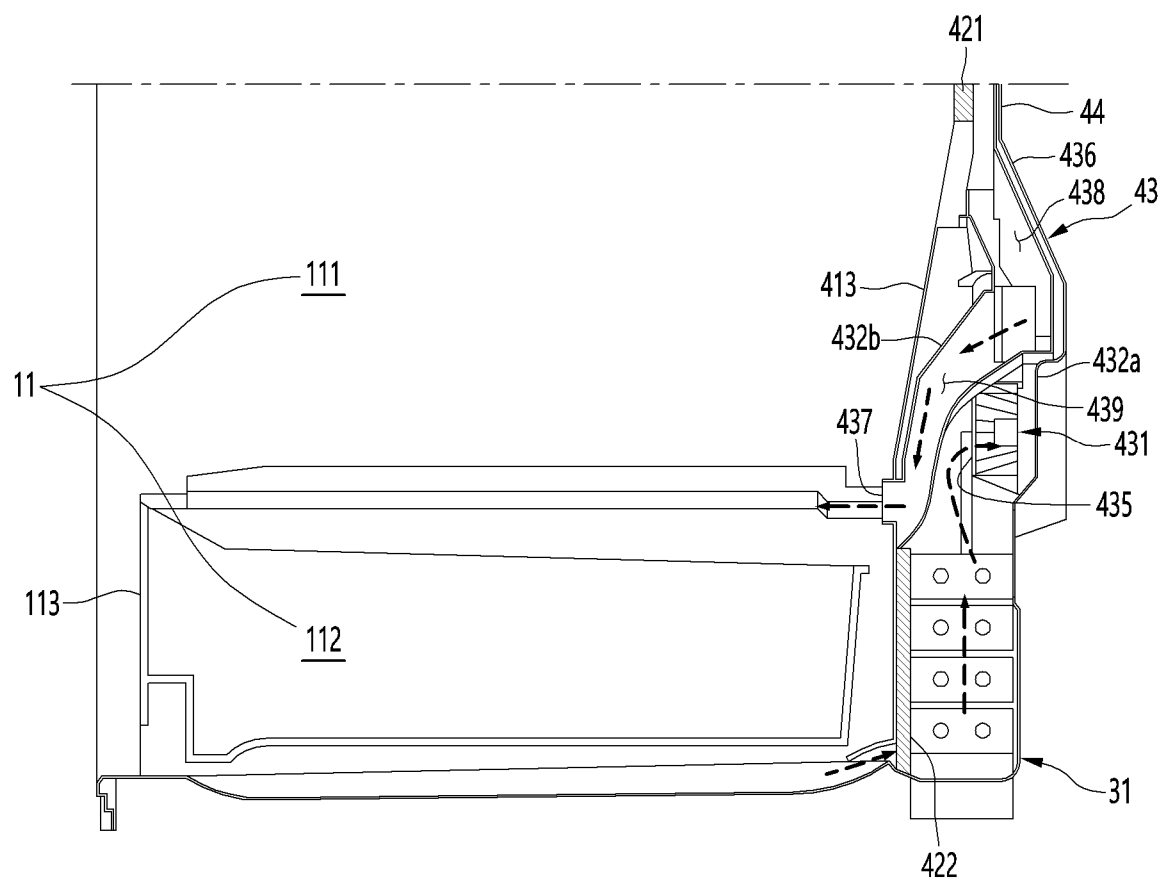


FIG. 13

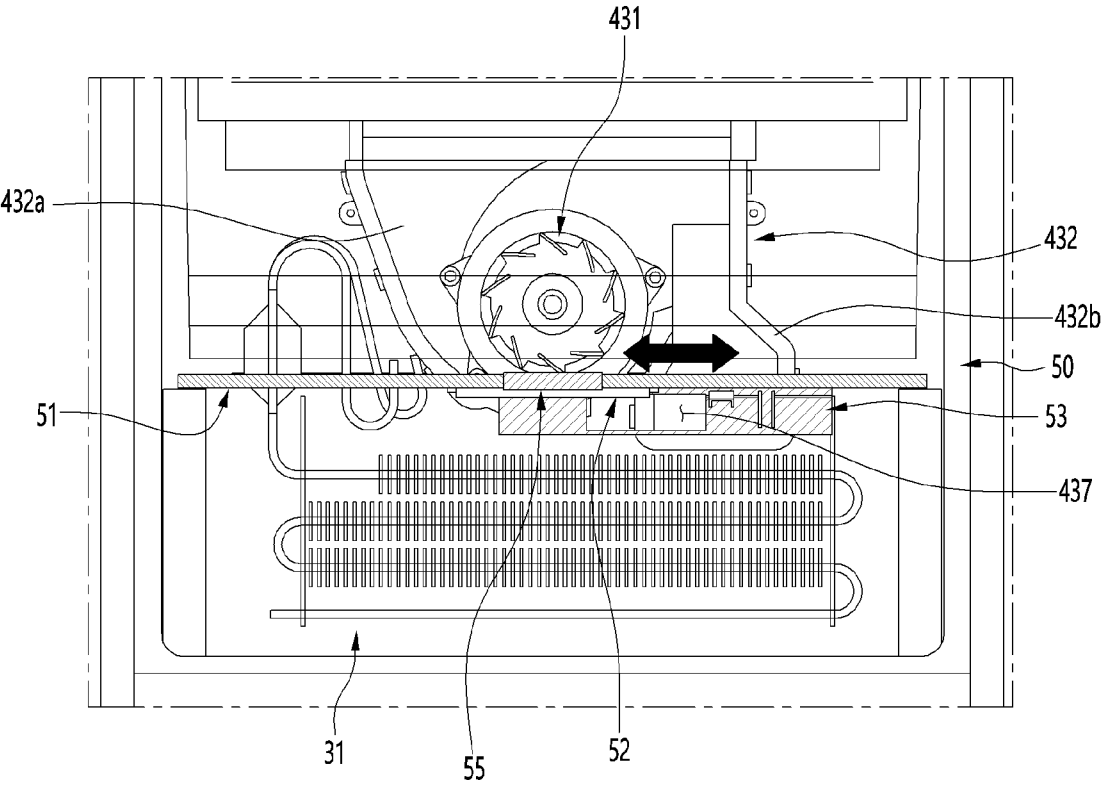


FIG. 14

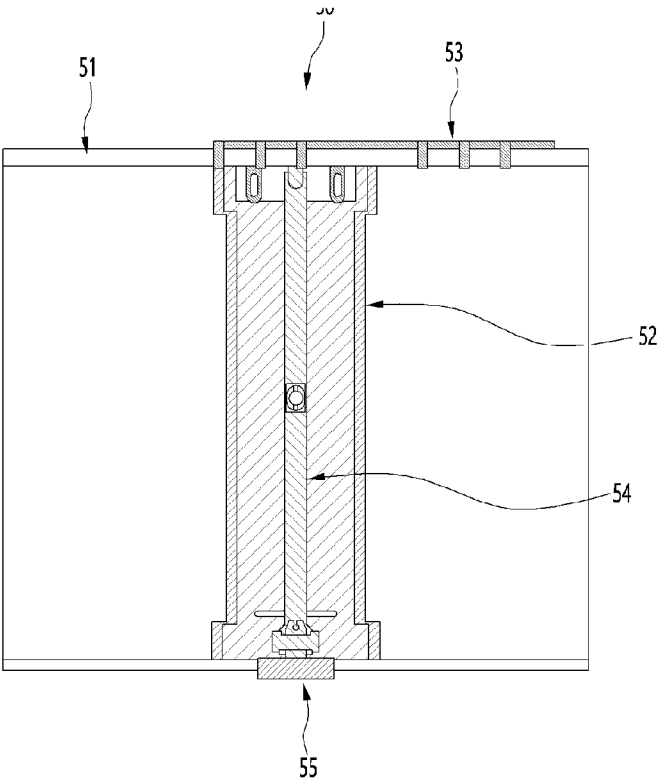


FIG. 15

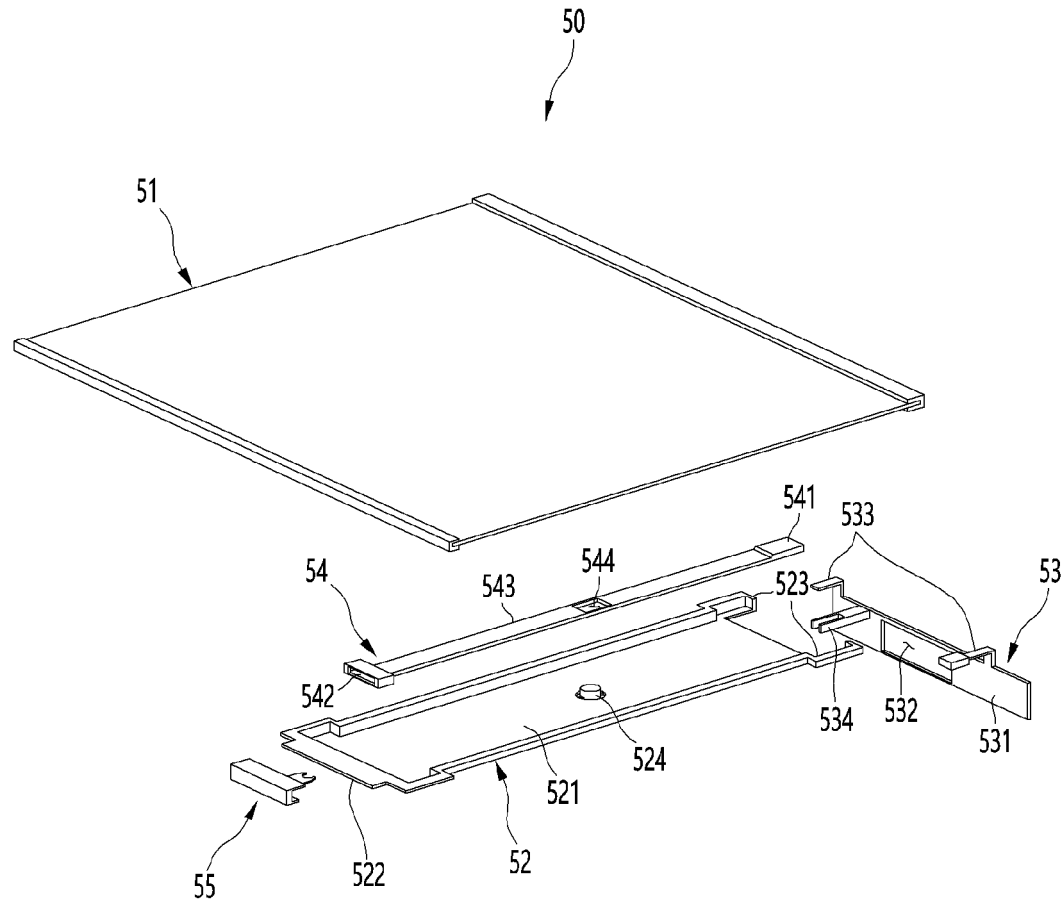


FIG. 16

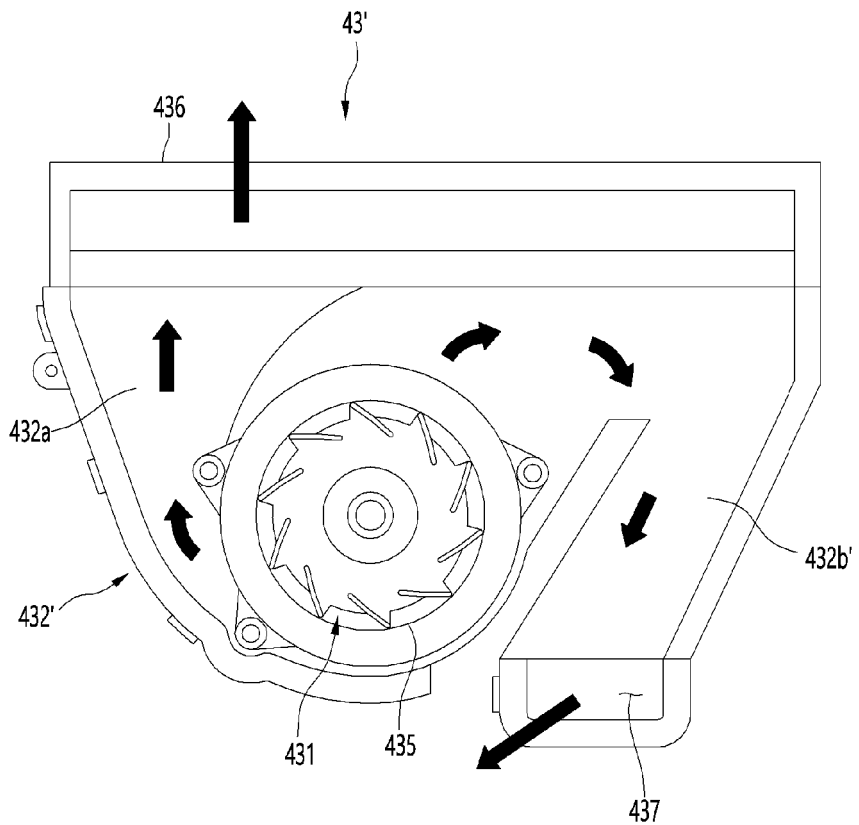


FIG. 17

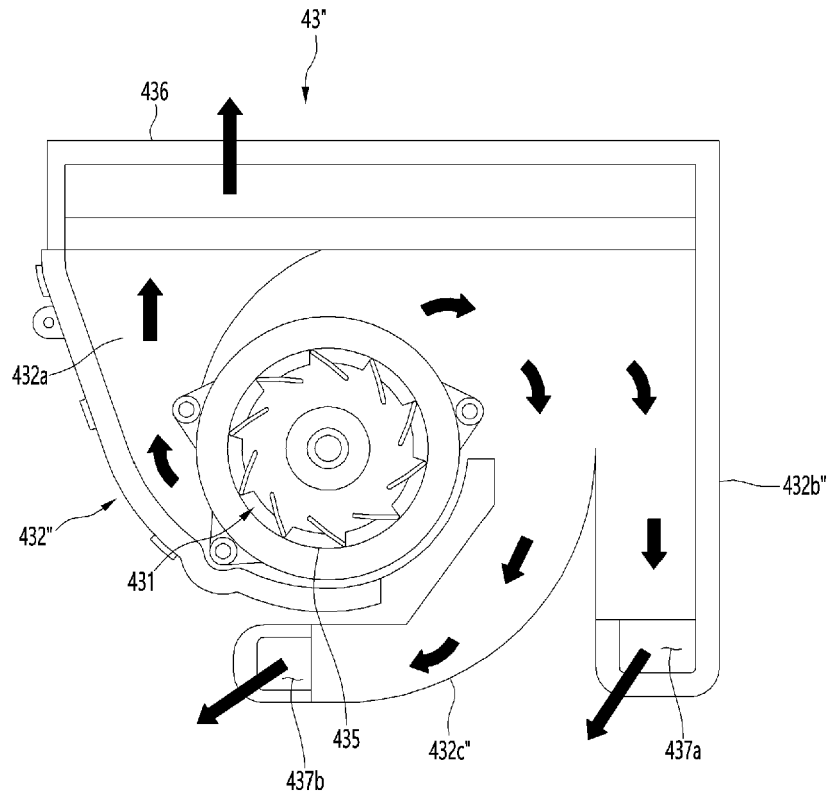


FIG. 18

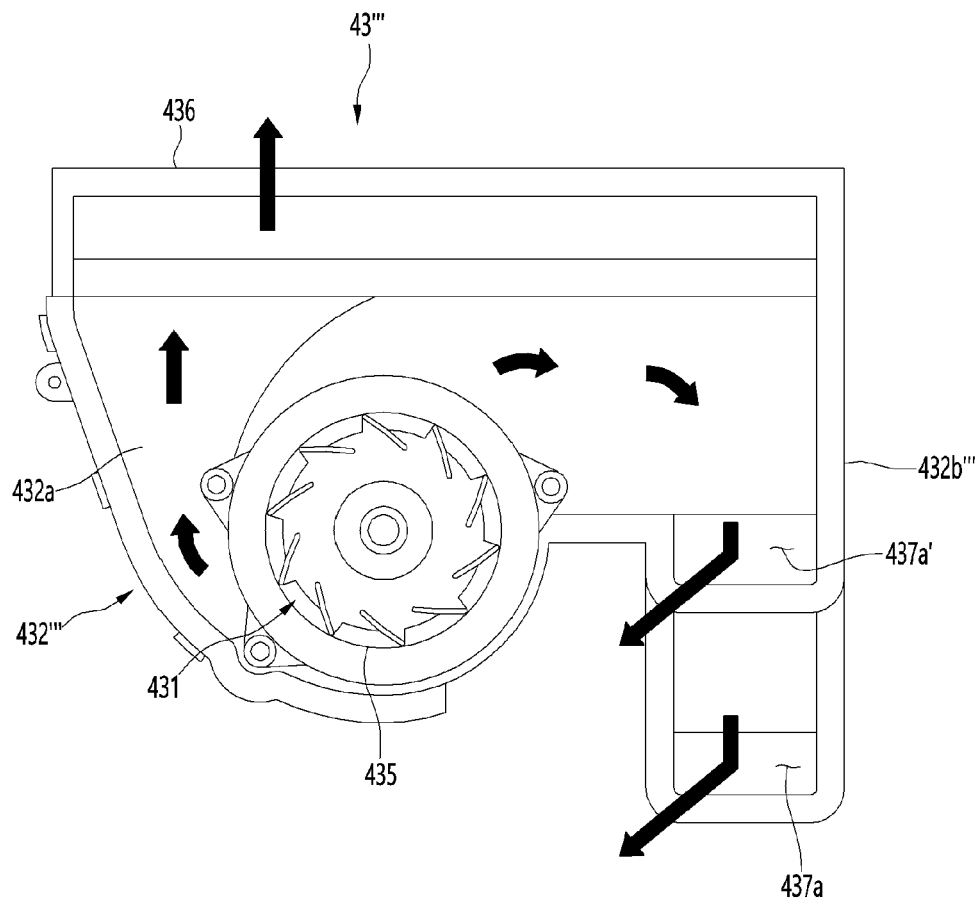
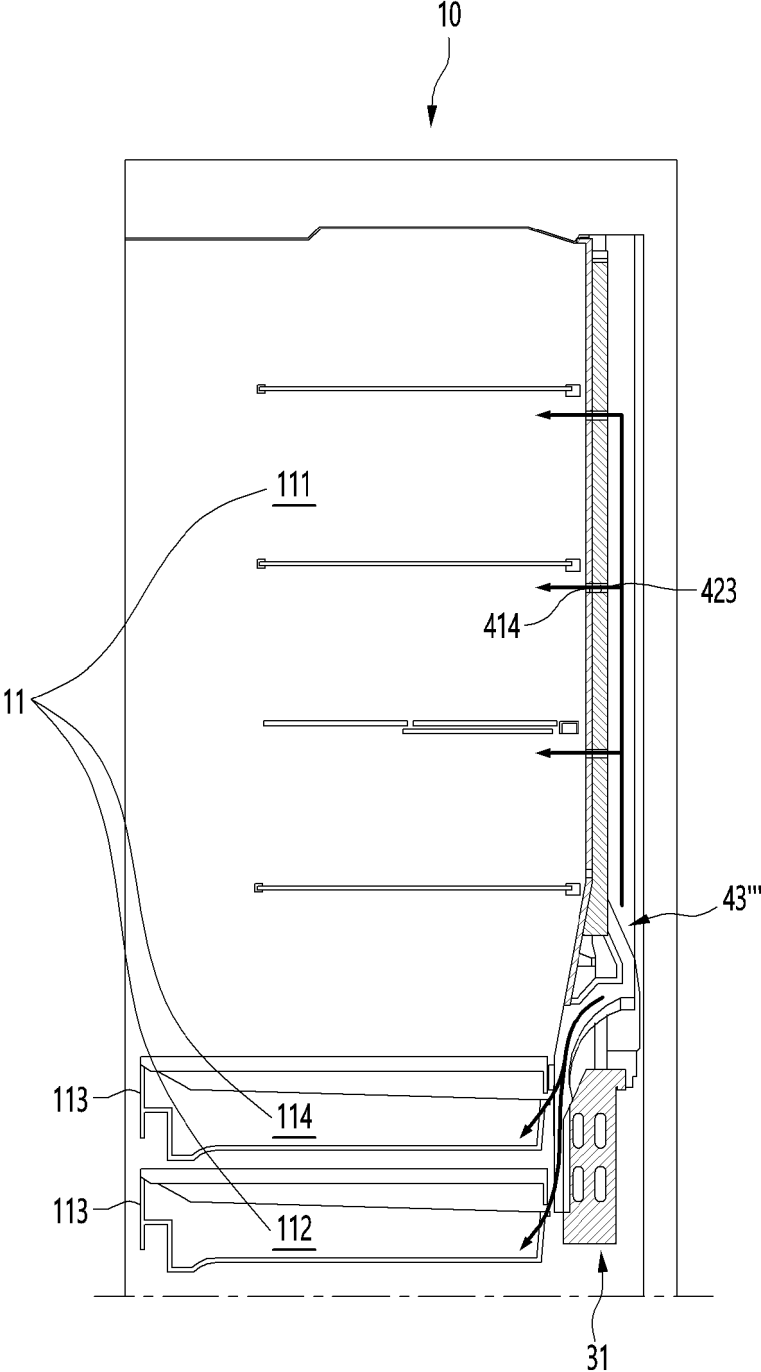


FIG. 19





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Application Number

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Place of search		Date of completion of the search	Examiner
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T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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