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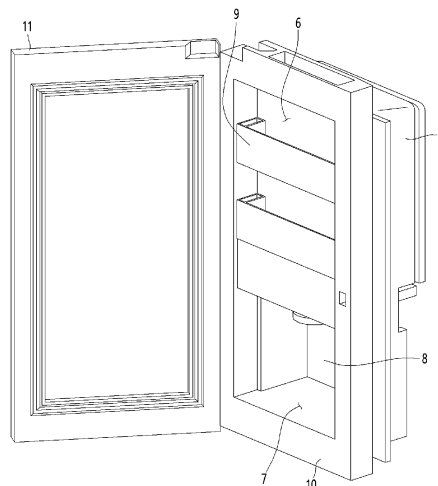
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(54) **REFRIGERATOR AND REFRIGERATOR DOOR**

(57) The refrigerator according to the present invention may comprise: a cabinet having an item-accommodating space; a door for opening/closing the item-accommodating space; an ice-making unit provided in the door;

and a first receiving unit placed on the opposite side of the item-accommodating space with respect to the ice-making unit to receive items.

Figure 2



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Description

Technical Field

[0001] The present disclosure relates to a refrigerator and a refrigerator door.

Background Art

[0002] A refrigerator is a device used to store items by refrigerating or freezing items. A refrigerator includes a main body that provides item-accommodating space and a door that opens and closes opening of the main body. A refrigerator's primary function is to store more items under optimal conditions. To increase the item-accommodating space of the refrigerator, the walls can be made thinner. The refrigerator may also include an ice maker. The ice maker can produce and provide ice to the user.

[0003] The applicant disclosed a technology for providing an ice maker to the door. An example of such technology is KR20230094436A. This prior art discloses a technology for providing a thin door while providing an ice maker.

Disclosure

Technical Problem

[0004] There is no known technology for providing an item-accommodating space in a door having an ice maker. Here, the item-accommodating space may be a space where food containers can be stored. The reasons for the absence of such a prior art may include the difficulty in providing a separate item-accommodating space due to the sufficiently large length of the ice maker in the front and rear direction, the difficulty caused by interference between components that draw cold air into and out of the door, the difficulty in maintaining the temperature of the separate item-accommodating space, the temperature of the separate item-accommodating space becoming uneven (especially in a direction of up and down), the difficulty in insulating the door, and/or the complexity of the cold air flow path for the ice maker and the cold air flow path structure for the separate receiving space. The item-accommodating space may be referred to as a storage section.

[0005] Accordingly, the present disclosure provides a refrigerator and a refrigerator door that can provide an item-accommodating space in a door having an ice maker by solving the above problems.

Technical Solution

[0006] The refrigerator of the present disclosure may include a cabinet having an item-accommodating space; a door opening and closing the item-accommodating space; and an ice-making unit provided in the door.

[0007] The refrigerator of the present disclosure may

further include a first storage section on the opposite side of the item-accommodating space, with respect to the ice-making unit, for storing items. Accordingly, the door can be utilized as an item storage space.

[0008] At least a portion of the ice-making unit and the first storage section can overlap in the front and rear direction. Accordingly, space utilization can be further improved.

[0009] The item-accommodating space may be a refrigerating space.

[0010] The first storage section can be supplied with cold air from the upper portion.

[0011] Cold air can be discharged downward from the lower portion of the first storage section.

[0012] A second storage section may be provided below the first storage section.

[0013] The second storage section and the first storage section can be connected.

[0014] The second storage section may have a shorter length than the first storage section in a direction of up and down.

[0015] The second storage section may have a longer length than the first storage section in the front and rear direction.

[0016] The front of the second storage section may include a discharge port through which cold air passing through the second storage section is discharged to the item-accommodating space.

[0017] A display may be provided between the first storage section and the second storage section.

[0018] Cold air can pass through the rear of the display.

[0019] The upper end of the display may be disposed higher than the lower end of the ice making part.

[0020] The frame supporting the display may be the same frame as the frame supporting the first storage section.

[0021] The virtual line extending from the lower end of the display in the front and rear direction may not pass through the chute that guides the forward movement of ice extracted from the ice making part.

[0022] The virtual line extending from the lower end of the display in the front and rear direction may pass through a funnel that guides the downward movement of ice extracted from the ice-making unit.

[0023] The refrigerator may further include another door defining a space of the first storage section.

[0024] The other door may include at least one transparent panel.

[0025] A cold air movement path passing through the first storage section in a direction of up and down may include at least one of a first cold air movement path provided in the first storage section and being a gap between a basket for storing containers and another door, and a second cold air movement path that is an opening and/or recess provided in the basket. The first cold air movement path and the second cold air movement path may be spaced apart from each other.

[0026] A virtual line extending in a direction of up and

down from a rear end of the ice-making unit in a front and rear direction may pass through a chute that guides the forward movement of ice extracted from the ice-making unit.

[0027] A virtual line extending in a direction of up and down from a rear end of the ice-making unit in a front and rear direction may pass through a funnel that guides the downward movement of ice extracted from the ice-making unit.

[0028] Any virtual line extending in the front and rear direction in an installation area of the ice-making unit may pass through at least three insulation walls.

[0029] The length through which the virtual line passes may be such that the first insulation wall at the rearmost front of the at least three insulation walls is the shortest, the ice-making unit is the longest, or the third insulation wall at the rearmost end of the at least three insulation walls is the shortest.

[0030] The second insulation wall in a middle of the at least three insulation walls may have two different parts in a direction of up and down.

[0031] The length of the first storage section through which the virtual line passes may have different parts of the first storage section in the vertical direction.

[0032] The refrigerator may further include a blowing unit that blows cold air from the item-accommodating space to the first storage section.

[0033] The blowing unit can be disposed above the ice making part.

[0034] A virtual line extending from the blowing unit in a direction of up and down can pass through the ice-making unit.

[0035] A virtual line extending from the front end of the blowing part in a direction of up and down can pass through the ice-making unit.

[0036] A virtual line extending from the rear end of the blowing unit in a direction of up and down can pass through the insulation wall of the above door.

[0037] The blowing unit includes a blowing fan, a fan housing in which the fan is seated, a grill covering the fan, and a channel guiding cold air discharged from the fan to the first storage section.

[0038] The channel may guide the cool air discharged from the fan to the rear.

[0039] A foam member may be provided between the channel and the fan housing.

[0040] The frame of the fan housing may contacts lower surface of a door dike of the door.

[0041] The respective members of the blowing unit may be provided in the following order from top to bottom: the door dike of the door, the frame of the fan housing, a first foam member, an upper surface of the channel, an internal space of the channel, a lower surface of the channel, and a second foam member.

[0042] A refrigerator may further include another door opening to extract ice from the ice-making unit; and at least one storage section opening when the other door is opened, thereby allowing the extraction of stored items.

[0043] The at least one storage section may include a first storage section disposed at the rear of the ice-making unit and a second storage section disposed below the ice-making unit.

[0044] The at least one storage section may include at least two spaced-apart storage sections, and the cold air of the at least two storage sections may be communicated with each other

[0045] The at least one storage section may include at least two spaced-apart storage sections, and the at least two storage sections may have different sizes in a front and rear direction, or the at least two storage sections may have different sizes in a direction of up and down.

[0046] The at least one storage section may include at least two spaced-apart storage sections, and a display may be provided in the space between the at least two storage sections.

[0047] The refrigerator door of the present disclosure may include a third door having an ice-making unit for making ice and at least one storage section for storing items; and a fourth door that rotates relative to the third door to allow the items to be extracted without opening the third door.

[0048] The first storage section among the at least one storage section may be aligned with the ice-making unit in a front and rear direction.

[0049] The second storage section among the at least one storage section may be aligned with the ice-making unit in a vertical direction.

[0050] The refrigerator may further include a blowing unit provided on the upper portion of the ice-making unit to supply cold air to at least one storage section.

[0051] According to the present disclosure, a refrigerator may include a cabinet having an item-accommodating space for accommodating a first item; a door opening and closing the item-accommodating space; an ice-making unit disposed on the door; a first storage section provided in the door, disposed in front of the ice-making unit, and storing the first item; and a blowing unit provided in the door, and blowing cold air from the item-accommodating space toward the first storage section. The refrigerator may further include a fan provided in the blowing unit for blowing the cold air in a direction adjacent to a bottom.

[0052] The blowing unit may include a fan housing in which the fan is seated, a grill covering the fan, and a channel guiding cold air discharged from the fan to the first storage section.

[0053] A refrigerator may further include at least two cold air movement paths spaced apart from each other through which cold air passes through the storage section.

[0054] According to the present disclosure, a refrigerator door may include an ice-making unit for making ice; at least one storage section for storing items; and a cold air movement flow path disposed on the opposite side of the ice-making unit with respect to the at least one storage section.

Advantageous Effect

[0055] According to the present disclosure, a storage section may be provided in the door where the ice maker is provided. Even if the storage section is provided, the door can be made thinner. Interference with components for supplying cold air can be avoided. The temperature of the storage section can be maintained at a low temperature. Temperature unevenness in the storage section can be prevented. Insulation of the door can be maintained. The cold air flow path of the ice maker and the cold air flow path of the storage section can interact without interference.

[0056] According to the present disclosure, the door's item-accommodating space is enlarged, improving user convenience. Since items can be extracted by simply opening the door, cold air loss can be reduced.

Description of Drawings

[0057]

FIG. 1 is a perspective view illustrating a refrigerator of the present disclosure.

FIG. 2 is a perspective view illustrating a refrigerator door of the present disclosure.

FIG. 3 is a drawing illustrating the configuration of the second door, (a) is a side view, (b) is a rear perspective view with the third door closed, and (c) is a rear perspective view with the third door open.

FIG. 4 is a cross-sectional view of 4-4' of FIG. 3(b).

FIG. 5 is an enlarged cross-section view of the upper portion of the door.

FIG. 6 is a drawing illustrating the thickness of a refrigerator door in the front and rear direction along the extension line of FIG. 5.

FIG. 7 is a drawing illustrating the lower configuration illustrating the ice making part in detail.

FIG. 8 is a partial cutaway perspective view illustrating a refrigerator door.

FIG. 9 is a drawing of a basket, (a) is a perspective view, (b) is a bottom view, (c) is a cross-sectional perspective view of (c)-(c)' of (a), and (d) is a bottom perspective view.

FIG. 10 is a drawing that explains the cold air movement path in detail, (a) is a view that illustrates a case where the second cold air movement path is weakened, and (b) is a view that illustrates a case where the first cold air movement path is weakened.

FIG. 11 is a top view illustrating the refrigerator door.

FIG. 12 is an exploded perspective view illustrating the blowing unit.

FIG. 13 is a drawing illustrating the relationship between components of the blowing unit, (a) is an installed view of the blowing unit, and (b) is a cross-sectional perspective view of (b)-(b)' of (a).

Best Mode

[0058] Hereinafter, specific embodiments of the present disclosure will be described in detail with reference to the drawings. However, the idea of the present disclosure is not limited to the following embodiments, and those skilled in the art who understand the idea of the present disclosure will be able to easily propose other embodiments included within the scope of the same idea by adding, changing, deleting, and adding components, and this may also be included within the scope of the idea of the present disclosure. In the description of the drawings, identical or similar components are given identical or similar reference numbers regardless of the drawing numbers, and redundant descriptions thereof may be omitted. The suffixes "module" and "part" for components used in the following description are given or used interchangeably only for the convenience of writing the specification, and do not in themselves have distinct meanings or roles. In describing the embodiments disclosed in the present specification, if it is determined that a detailed description of a related known technology may obscure the subject matter of the embodiments disclosed in the present specification, the detailed description thereof will be omitted. The attached drawings are only intended to facilitate easy understanding of the embodiments disclosed in this specification, and the technical ideas disclosed in this specification are not limited by the attached drawings, and it should be understood that they include all modifications, equivalents, and substitutes included in the idea and technical scope of the present disclosure. Terms including ordinal numbers, such as first, second, or the like, may be used to describe various components, but the components are not limited by the terms. The terms are used only for the purpose of distinguishing one component from another. When a component is referred to as being "connected" or "accessed" to another component, it should be understood that it may be directly connected or connected to the other component, but there may also be other components in between. On the other hand, when a component is referred to as being "directly connected" or "directly accessed" to another component, it should be understood that there are no other components in between. Singular expressions may include plural expressions unless the context clearly indicates otherwise. In this application, terms such as "include" or "have" are intended to specify the presence of a feature, number, step, operation, component, part or combination thereof described in the specification, but should be understood not to exclude in advance the possibility of the presence or addition of one or more other features, numbers, steps, operations, components, parts or combinations thereof.

[0059] In the description of the present disclosure, the direction is based on the user looking straight at the refrigerator door with the door closed. For example, the height Z of the refrigerator can be said to be a direction of up and down, the left-right Y of the refrigerator can be

said to be a left and right direction, and the depth Z of the body can be said to be a front and rear direction.

[0060] FIG. 1 is a perspective view illustrating a refrigerator of the present disclosure.

[0061] Refer to FIG. 1. A refrigerator R may have a cabinet C having an item-accommodating space in which items are accommodated, and a door 1, 2 for opening and closing the cabinet. The cabinet may be divided into upper and lower sections. The cabinet may be partitioned into an upper refrigerating space and a lower freezing space. The door may include a first door 1 for opening and closing the refrigerating space. The door may include a second door 2 for opening and closing the freezing space. The first door 1 may have an ice-making unit. In the following description, when a door or a refrigerator door is referred to without separate mention, it may refer to the first door 1.

[0062] FIG. 2 is a perspective view illustrating a refrigerator door of the present disclosure. The refrigerator door of FIG. 2 may include at least two doors. The door of FIG. 2 illustrates a state where the outer door among the at least two doors is open.

[0063] Referring to FIG. 2, the refrigerator door 1 may include a third door 10. The refrigerator door 1 may include a fourth door 11 disposed at the rear of the third door 10. The third door 10 may rotate about a rotation axis in the direction of up and down with respect to the cabinet C. The third door 10 may be referred to as an inner door. The fourth door 11 may be referred to as an outer door. The fourth door 11 may rotate about a rotation axis in the direction of up and down with respect to the third door 10. When the third door 10 and the fourth door 11 are referred to as a refrigerator door without distinction, the refrigerator door may refer to the third door 10.

[0064] The fourth door 11 may include at least two transparent panels spaced apart from each other. The fourth door 11 may perform an insulation function by the at least two transparent panels and the insulation layer therebetween. The fourth door 11 may use at least one of a vacuum insulation part, a vacuum insulation body, and a vacuum insulation module. The fourth door 11 may be opened when extracting ice from the ice making part.

[0065] A first storage section 6 may be provided on the upper portion of the third door 10. When the fourth door 11 is opened, a user can directly access the first storage section 6. Cold air may be supplied from the upper portion of the first storage section 6. The cold air may be supplied from the item-accommodating space of the cabinet. The cold air may pass through the first storage section in the direction of up and down. An ice-making unit (see 42 in FIG. 4) may be disposed in front of the first storage section 6. The item-accommodating space and the first storage section 6 may be disposed on opposite sides with respect to the ice-making unit. The first storage section and the ice-making unit may overlap at least partially in the front and rear direction. The first storage section may be entirely included in the area of the ice-making unit in the front and rear direction. If a virtual line is drawn in the

front and rear direction in the installation area of the first storage section, the virtual line can all pass through the ice making part. A basket 9 may be provided in the first storage section 6. The basket 9 may support a food container. The basket may completely overlap the ice making part. If a virtual line is drawn in the front and rear direction in the installation area of the basket, the virtual line can all pass through the ice making part. The ice making part 42 may be accommodated in the door dike 4. The first storage section 6 may extend in the vertical direction. The basket 9 may extend in the left and right direction.

[0066] A second storage section 7 may be provided below the first storage section 6. Cold air passing through the first storage section may be supplied to the second storage section. The second storage section 7 may have a shorter length than the first storage section in a direction of up and down. The second storage section 7 may have a longer length in the front and rear direction than the first storage section. The second storage section may store items having a wider width in the front and rear direction than the first storage section. A discharge port 8 may be provided at the front of the second storage section 7. The discharge port may be an area through which cold air passing through the second storage section 7 returns to the item-accommodating space of the cabinet. The second storage section may be located below the ice making part.

[0067] FIG. 3 is a drawing illustrating the configuration of the second door, (a) is a side view, (b) is a rear perspective view with the third door closed, and (c) is a rear perspective view with the third door open.

[0068] Refer to FIG. 3. A door dike 4 extending rearward from the door liner 3 may be formed. A suction port 5 may be provided on the upper surface of the door dike 4. The door liner 3 may partition the inner surface of the door. The door liner may extend primarily in the direction of up and down and the left and right direction. The door dike 4 may extend rearward from the door liner 3 to block cold air leakage. The door dike 4 may extend in the front and rear direction. The door dike may have a larger component extending in the front and rear direction than the door liner. Due to this difference in configuration, the suction port 5 may be provided in the door dike. The door dikes 4 may be connected. A space may be provided inside the connected door dike. The ice making part 42 may be disposed inside the space.

[0069] The door liner and the door dike may be referred to as a door liner without distinction. In this case, it can be said that the door liner is provided with the suction port 5. By providing the suction port 5 in the door dike 4, cold air from the item-accommodating space of the cabinet can be supplied to the first storage section 6. The cold air passing through the first and second storage sections 6, 7 can return to the item-accommodating space through the discharge port 8.

[0070] FIG. 4 is a cross-sectional view of 4-4' of FIG. 3(b). FIG. 4 shows the fourth door in a closed state.

[0071] Refer to FIG. 4. The third door 10 and the fourth door 11 can be aligned in the front and rear direction. When the fourth door 11 is closed, the cold air flow paths of the storage sections 6, 7 can be defined. When the fourth door 11 is open, the cold air flow paths of the storage sections 6, 7 can be open. The inner surface of the fourth door can be a wall defining the inner space of the storage sections 6, 7. When the fourth door is opened, the air blowing through the suction port 5 may not operate. Accordingly, the loss of cold air in the item-accommodating space of the cabinet can be prevented. When the third door 10 is opened, the air blowing through the suction port 5 may not operate. Accordingly, the loss of cold air in the first storage section 6 can be prevented.

[0072] The fourth door 11 may have a frame 111. The frame may be provided as a rectangular frame. The frame 111 may support three transparent panels 112 to 114. The transparent panels may transmit light. The user may observe the storage section through the transparent panels.

[0073] The third door 10 may have a frame 1111. The frame may be provided as a rectangular frame. A door liner 3 may be provided on the inner surface of the frame 1111. A door dike 4 may be provided forward from the door liner. A suction port 5 may be provided on the upper surface of the door dike 4. Cold air suctioned through the suction port 5 may move rearward and move to the first storage section 6. The cold air may cool items in the first storage section 6. The cold air in the first storage section may move downward.

[0074] The cold air movement path of the first storage section may include at least two. The at least two cold air movement paths may be spaced apart from each other. The cold air movement path of the first storage section may include a gap between the rear end portion of the basket 9 and the front surface of the third transparent panel 114. Cold air may move downward through the gap. This cold air movement path may be referred to as the first cold air movement path. The transparent panel may define the cold air movement path of the first storage section. The transparent panel may form a portion of the fourth door. The cold air movement path of the first storage section may include an opening or recess of the basket 9. This cold air movement path may be referred to as the second cold air movement path. In the drawing, the two movement paths are respectively indicated by arrows. The cold air can reach the second storage section 7 after passing through the first storage section 6. The cold air can return to the item-accommodating space of the cabinet through the discharge port 8. A temperature sensor 1112, 1113 can be disposed in the storage section.

[0075] An ice-making unit 42 may be disposed inside the door dike 4. The ice-making unit may include a water supply part, a cold air supply module, an ice-making module, an ice-separating module, an ice bin, and a rapid ice-making module. Ice stored in the ice bin may be supplied upon a user's request. The rapid ice-making

module may operate when supplying ice. Other ice-making units, such as the ice-making unit of FIGS. 8 and 9 of KR20230094436A disclosed as a prior art, and the flow path technology for supplying cold air to the ice maker, are included in the description of the present disclosure. Various other ice-making unit technologies may be applied to the present disclosure. The cold air supply for freezing for the ice-making unit 42 and the cold air supply for refrigeration for the storage section 6, 7 may be separated. Accordingly, cold air supply corresponding to each purpose may be possible. Accordingly, the cold air supplies may not interfere with each other.

[0076] The blowing unit 51 of the suction port 5 may be provided so as to slope downward as it goes forward. The installation angle of the blowing unit 51 may be closer to a horizontal line than a vertical line. In other words, the installation angle of the blowing unit 51 may be close to a lying position. Accordingly, even when the fourth door 11 is opened, the blowing unit may not be clearly visible.

[0077] Below the ice-making unit, a chute 421 that guides the discharge of ice from the ice-making unit 42 and a funnel 422 that drops ice into the user's disposal container can be provided. The arrangement of the chute and the funnel can be provided compactly.

[0078] Below, each component of the door is described in detail. Each component of the door can have the following effects: maintaining a thin door while still having a storage section, preventing interference between components for supplying cold air, maintaining a low temperature in the storage section, preventing temperature unevenness in the storage section, maintaining door insulation, and preventing interference with the cold air flow path.

[0079] FIG. 5 is an enlarged cross-section view of the upper portion of the door.

[0080] Refer to FIG. 5. An arbitrary extension line can be provided in the front and rear direction in the area where the ice making part 42 is installed. The extension line can include, from the frontmost to the rearmost, a first insulation wall 41, an ice making part 42, a second insulation wall 43, a storage gap 44 of the first storage section 6, a first cold air movement path 45, and a third insulation wall 46. The first insulation wall 41 can perform an insulation function for the temperature difference between the ice making space of the ice making part and the item-accommodating space. The ice making part 42 performs an ice making function using cold air at a temperature below zero. The second insulation wall 43 can perform an insulation function for the temperature difference between the ice making space of the ice making part and the first storage section. The first storage section 6 can store items and maintain a low temperature. The first cold air movement path 45 can guide the downward movement of cold air. The first cold air movement path can perform an insulation function for the temperature difference between the room temperature outside the third insulation wall 46 and the first storage section 6.

[0081] FIG. 6 is a drawing illustrating the thickness of a

refrigerator door in the front and rear direction along the extension line of FIG. 5.

[0082] Refer to FIG. 6. The thickness w6 of the first insulation wall 41 in the front and rear direction, the thickness w5 of the ice making part 42 in the front and rear direction, the thickness w4 of the second insulation wall 43 in the front and rear direction, the thickness w3 of the first storage section 6 in the front and rear direction, the thickness w2 of the first cold air movement path 45 in the front and rear direction, and the thickness w1 of the third insulation wall 46 in the front and rear direction may have the following relationship. The thickness w3 of the first storage section in the front and rear direction may provide an item storage gap 44 in the door.

[0083] First, w4 may be > w6. This may be because the insulation load of the second insulation wall 43 is greater than that of the first insulation wall 41. This may be because the second insulation wall 43 may be provided with a cold air supply path and a water supply path for the ice making part. Second, w1 may be > w4. This may be because the insulation load between the external room temperature and the low temperature of the refrigerating space is the greatest. Among the various insulation walls, the thickness of the third insulation wall 46 may be the largest. Third, w3 may be > w1. This is because a length in the front and rear direction suitable for storing items must be secured. Fourth, w2 may be the shortest. This may be because the first cold air movement path is a passage of cold air in a gaseous state with smooth fluidity.

[0084] The first storage section 6 may have a different length in the front and rear direction according to the position thereof in the direction of up and down. The longest point in the front and rear direction of the first storage section may be longer than the length w1 of the third insulation wall 46 in the front and rear direction. The longest point in the front and rear direction of the first storage section may be the uppermost point of the first storage section. The longest point in the front and rear direction of the first storage section may be the upper end of the basket. The shortest point in the front and rear direction of the first storage section may be shorter than the length w1 of the third insulation wall 46 in the front and rear direction. The shortest point in the front and rear direction of the first storage section may be the lowermost point of the first storage section. The shortest point in the front and rear direction of the first storage section may be the bottom of the basket.

[0085] The thickness w4 of the second insulation wall 43 may vary in length in the front and rear direction according to the direction of up and down. The thickness w4 of the second insulation wall 43 may be thicker at the upper portion than at the lower portion. The thinner part of the thickness w4 of the second insulation wall 43 may be thinner than the first insulation wall w6. In either case, the gap necessary for the introduction of the insulating foam member can be secured.

[0086] FIG. 7 is a drawing illustrating the lower configuration illustrating the ice making part in detail.

[0087] Refer to FIG. 7. The chute 421 can guide ice discharged from the ice-making unit forward. It may be important to remove ice caught in the chute. Ice that moves forward along the chute can move downward. The funnel 422 can guide the downward movement of the ice. The chute and funnel may be arranged so that the ice falls properly into the user's gripping container, does not fall outside the funnel, and prevents clogging of the ice.

[0088] The virtual line l1 extending vertically from the rear end of the funnel can be disposed further back than the virtual line l2 extending vertically from the front end of the first storage section. Through this, ice detachment can be prevented. The ice can properly fall into the user's gripping container. The length of the first storage section in the front and rear direction can be made sufficiently long. Accordingly, the gap of the first storage section in the front and rear direction can be secured. The virtual line l1 extending vertically from the rear end of the funnel can pass through the first storage section 6. The virtual line l3 extending vertically from the rear end of the front wall of the ice making part 42 can pass through the chute 421. This can smoothly guide the ice forward. The virtual line l3 extending vertically from the rear end of the ice making part 42 can pass through the funnel. This can prevent ice clogging.

[0089] A display 69 may be provided on the refrigerator door. The display information of the display 69 can be viewed from the outside through the fourth door 11. The display may be disposed below the rear end of the first storage section 6. The first cold air movement path 45 may extend vertically along the rear surface of the display. The display may be provided by being connected to the first storage section 6. The display may be supported by the same frame as the frame supporting the first storage section 6. The identical frame may be, for example, an injection-molded plastic part that provides a single body. The upper end of the display may be disposed higher than the lower end of the ice-making unit 42 by a predetermined height h1. This can enhance user visibility. This can enable more efficient use of space. A virtual line l4 extending from the lower end of the display in the front and rear direction may pass through a funnel. The virtual line l4 extending from the bottom of the display in the front and rear direction may not pass through the suit. This can improve the efficient layout of the space and user visibility.

[0090] FIG. 8 is a partial cutaway perspective view illustrating a refrigerator door. FIG. 9 is a drawing of a basket, (a) is a perspective view, (b) is a bottom view, (c) is a cross-sectional perspective view of (c)-(c)' of (a), and (d) is a bottom perspective view.

[0091] A basket and the operation thereof will be described with reference to FIGS. 8 and 9. The basket may be supported by an outliner 21 defining the first storage section 6. The outliner 21 may be compared with the door liner 3. The door liner 3 may be provided on the front surface of the door. The outliner 21 may be provided on

the rear surface of the door. Here, the rear side of the door may be the outside of the door. The door liner 3 may be referred to as an inner liner in contrast to the outliner 21. The outliner 21 may be provided in a configuration that is recessed forward. The recessed area of the outliner 21 may provide the first storage section 6. A basket hook 91 may be provided on a side wall of the first storage section 6. The basket 9 may be supported by being hung on the basket hook 91. The basket can contact the front wall of the outliner. The basket hooks 91 can be provided on each of the left and right sides.

[0092] The basket 9 may have a rear wall 92 disposed at the rear. The basket 9 may have side walls 93 extending forward from the rear wall. The side walls may be provided at the left and right end portions of the rear wall. The basket 9 may have a bottom wall 99 extending forward from the lower portion of the rear wall. The basket may accommodate an accommodation container.

[0093] The basket 9 may have the opening. The opening may be provided at right and left sides of the basket. The opening may provide a second cold air movement path 95 of the first storage section. The opening may provide a lateral flow path on both sides of the basket. The first cold air movement path of the first storage section may be referred to as a rear flow path corresponding to the lateral flow path. The rear flow path may allow cold air to flow downward along the rear part of the first storage section. The lateral flow path may allow cold air to flow downward along both sides of the first storage section.

[0094] The second cold air movement path 95 may be divided into at least two ribs. The at least two ribs may extend in the direction of up and down. The at least two ribs may include a first rib 96 extending in the front and rear direction. The at least two ribs may include a second rib 97 extending in the left and right direction. The at least two ribs may be connected to each other. The basket 9 may have a mount 94. The mount may be a member corresponding to the basket hook 91. The mount may extend in the direction of up and down. When the basket is moved downward during the fastening operation, the basket may be mounted on the basket hook. The mount 94 may be provided in connection with the rib.

[0095] A recess may be provided instead of the opening or together with the opening. The recess may be recessed inwardly at an end portion of the basket. Cold air may move through the recess. The cold air may move through the recess and/or the opening. The movement of the cold air may include at least downward movement. The movement of the cold air may include lateral and/or forward and/or backward movement. Here, the movement of the cold air may include movement along the extension direction of the recess and/or the extension direction of the opening.

[0096] The first cold air movement path 45 and the second cold air movement path 95 can cooperate with each other. If the action of one of the first cold air movement path 45 and the second cold air movement path 95 increases, the other can decrease.

[0097] FIG. 10 is a drawing that explains the cold air movement path in detail, (a) is a drawing that shows a case where the second cold air movement path is weakened, and (b) is a drawing that shows a case where the first cold air movement path is weakened.

[0098] Refer to FIG. 10. If the first cold air movement path 45 is sufficiently large, the second cold air movement path 95 may not be provided. The opposite may also apply. It may be desirable to provide the first cold air movement path 45. This can prevent collision between the third insulation wall 46 and the basket. If the area of the first cold air movement path is small, the area of the second cold air movement path may be provided to be large. The opposite may also apply. The second cold air movement path 95 may be provided as an opening 97 and/or a recess 98 of the basket 9. The second cold air movement path may be provided symmetrically on both left and right sides of the first storage section. The second cold air movement path may be provided on either side of the first storage section.

[0099] The first cold air movement path 45 can be provided by the gap G between the first storage section 6 and the third insulation wall 46. If the gap G1 is large, the length of the first storage section in the front and rear direction can be reduced. If the gap G2 is small, the length of the first storage section in the front and rear direction can be increased.

[0100] FIG. 11 is a top view illustrating the refrigerator door.

[0101] Refer to FIG. 11. The third door 10 and the fourth door 11 can be aligned in the front and rear direction. The doors can be rotated by hinges. For example, the door can be opened by rotating clockwise around the hinge on the left side. A water inlet is shown in the third door. A dyke 4 can extend forward of the third door 10. A suction port 5 can be provided on the upper surface of the dyke 4. A blowing unit 51 can be provided in the suction port 5. A grill 55 can be provided on the outside of the suction port 5. Cold air from the item-accommodating space can be introduced through the suction port 5.

[0102] A virtual line can be extended from the blowing unit 51 in a direction of up and down. In the description of FIG. 11, the blowing unit may mean one excluding the channel (see 52 of FIG. 12). The virtual line can pass through the ice-making unit. A virtual line extending from the front end of the blowing unit in a direction of up and down can pass through the ice-making unit 42. A virtual line extending from the rear end of the blowing unit in a direction of up and down can pass through the second insulation wall 43. By the arrangement, the refrigerator door can be configured compactly. According to the arrangement of the blowing unit, interference prevention, efficiency of cold air flow, and optimization of the arrangement of components can be achieved.

[0103] FIG. 12 is an exploded perspective view illustrating the blowing unit. FIG. 13 is a drawing illustrating the relationship between components of the blowing unit, (a) is an installed view of the blowing unit, and (b) is a

cross-sectional perspective view of (b)-(b)' of (a).

[0104] Refer to Figs. 12 and 13. The blowing unit 50 can introduce cold air from the item-accommodating space into the first storage section 6. The blowing unit 50 can include a fan 54 and a fan housing 53 in which the fan is disposed. The fan 54 can be an axial fan. The fan can blow air from the upper side to the lower side. The blowing unit can include downward movement of cold air. The fan 54 can discharge cold air downward. The fan 54 can blow air preferentially downward among the front and the lower side. Here, the preferential can mean blowing air in a direction adjacent to the bottom among the up and down, and front and rear directions. Accordingly, the blowing unit 50 can be installed compactly. The blowing unit 50 can include a grill 55 covering the fan. The blowing unit 50 may include a channel 52 that guides cold air discharged from the fan to the first storage section.

[0105] The blowing unit 50 may have a channel 52 extending in the front and rear direction. The channel 52 may be embedded in the insulation wall of the third door 10. The channel 52 may be provided in the form of a case 521 that is elongated in the left and right direction. A foam member (F1 for the upper surface and F2 for the lower surface) providing an insulation wall may contact the upper and lower surfaces of the channel. Accordingly, the insulating effect may be enhanced. The case may be provided with a height in the direction of up and down or as low as possible. Accordingly, the insulating effect may be enhanced. The channel may be slightly shorter than the length of the first storage section in the left and right direction. The rear of the case may be open to provide a discharge port 522. A seating rib 523 having an opening for suction may be provided on the upper surface of the case. The channel may guide air suctioned in through the seating rib 523 to the rear. The channel can discharge air guided to the rear through the discharge port 522. The air discharged through the channel 52 can move downward toward the first storage section 6.

[0106] A fan housing 53 may be disposed on the upper portion of the channel 52. The fan housing 53 may be connected to the seating rib 523. The seating rib may have a rectangular frame 531 extending in the front and rear and left and right directions. An extension member extending in a direction of up and down may be disposed on the inside of the frame. The extension member may perform an alignment function and/or a fastening function with an adjacent member. The extension member may have a partition wall 534 that separates the internal space of the fan housing. The fan 54 may be disposed in one of the spaces divided by the partition wall 534. One of the spaces divided by the partition wall 534 may be a storage groove 535 in which a fan control member such as a sensor, a substrate, and an electric wire is disposed. The storage groove 535 may not be aligned with the channel 52 and the suction port. The extension member may have a grill fastening part 536. The grill fastening part 536 may be fastened to the grill as a fastening member. The fan housing may further have a part that extends in the front

and rear direction or the left and right direction to facilitate positioning between the respective members when the extension member is fastened to a corresponding member. Accordingly, convenience of fastening, improvement of structural strength, and prevention of interference can be provided.

[0107] The upper surface of the frame may provide a dike seating surface 533 on which the door dike 4 is seated. The frame may be in contact with the door dike 4. A foam member F1, F2 may be filled between the frame 531 and the channel. The frame and the extension member may provide a dike fastening part 532. The dike fastening part 532 may be aligned with the alignment part A of the dike. A fastening member may be fastened to the dike fastening part 532 and the alignment part A to be firmly fastened. After the fan 54 is seated, the grill 55 may be covered. The grill 55 may be fastened to the grill fastening part.

[0108] The order in which the components of the blowing unit 5 are arranged downward is observed based on FIG. 13(b). From the top, the following may be provided in order: a dike 4, a frame 531 of a fan housing, a first foam member F1, an upper surface of a channel, an internal space of a channel, a lower surface of a channel, and a second foam member F2. An ice-making unit 42 may be provided on the lower side of the second foam member. Accordingly, stable positioning of the fan housing and channel, increased insulation effect, stable insertion of the foam member, and improved structural strength may be obtained.

Industrial Applicability

[0109] According to the present disclosure, the ice-making unit can increase the usability of the refrigerator door. Users can conveniently extract items without having to open the entire refrigerator door.

Claims

1. A refrigerator comprising:

a cabinet having an item-accommodating space for accommodating a first item;
a door opening and closing the item-accommodating space;
an ice-making unit positioned on the door;
a first storage section provided in the door, positioned in front of the ice-making unit, and storing the first item;
a blowing unit provided in the door, and blowing cold air from the item-accommodating space toward the first storage section; and
a fan provided on the blowing unit for blowing the cold air in a direction adjacent to a bottom.

2. The refrigerator of claim 1, wherein at least a portion

of the blowing unit is positioned above the ice-making unit, and
wherein at least a portion of the ice-making unit and the first storage section overlap in a front and rear direction.

3. The refrigerator of claim 1, wherein a virtual line extending from the blowing unit in a direction of up and down passes through the ice-making unit, or

wherein a virtual line extending from a front end of the blowing unit in a direction of up and down passes through the ice-making unit, or
wherein a virtual line extending from a rear end of the blowing unit in a direction of up and down passes through an insulation wall of the door.

4. The refrigerator of claim 1, wherein the blowing unit includes a fan housing in which the fan is seated, a grill covering the fan, and a channel guiding cold air discharged from the fan to the first storage section.

5. The refrigerator of claim 4, wherein the channel guides the cool air discharged from the fan to the rear, or

wherein a foam member is provided between the channel and the fan housing, or
wherein the frame of the fan housing contacts a lower surface of a door dike of the door, or
wherein the respective members of the blowing unit are provided in the following order from top to bottom: the door dike of the door, the frame of the fan housing, a first foam member, an upper surface of the channel, an internal space of the channel, a lower surface of the channel, and a second foam member.

6. The refrigerator of claim 1, wherein cold air is supplied from an upper portion of the first storage section, or
wherein cold air is discharged downward from a lower portion of the first storage section.

7. The refrigerator of claim 1, wherein a second storage section is provided below the first storage section, and
wherein the second storage section and the first storage section are connected, the second storage section has a shorter length than the first storage section in a direction of up and down, the second storage section has a longer length than the first storage section in a front and rear direction, or a discharge port through which cold air passing through the second storage section is discharged to the item-accommodating space is provided at the front of the second storage section.

8. The refrigerator of claim 7, wherein a display is provided between the first storage section and the second storage section, and

wherein cold air passes through the rear of the display, an upper end of the display is positioned higher than a lower end of the ice-making unit, or
wherein the frame supporting the display is the same frame as the frame supporting the first storage section, or
the virtual line extending from the lower end of the display in the front and rear direction does not pass through a chute that guides the forward movement of ice extracted from the ice-making unit, or
the virtual line extending from the lower end of the display in the front and rear direction passes through a funnel that guides the downward movement of ice extracted from the ice-making unit.

9. The refrigerator of claim 1, further comprising: another door defining a space of the first storage section.

10. The refrigerator of claim 1, wherein a virtual line extending in a direction of up and down from a rear end of the ice making part in a front and rear direction passes through a chute that guides the forward movement of ice extracted from the ice-making unit.

11. The refrigerator of claim 1, wherein a virtual line extending in a direction of up and down from a rear end of the ice-making unit in a front and rear direction passes through a funnel that guides the downward movement of ice extracted from the ice-making unit.

12. The refrigerator of claim 1, wherein any virtual line extending in the front and rear direction in an installation area of the ice-making unit passes through at least three insulation walls, and

wherein the length through which the virtual line passes is such that the first insulation wall at the frontmost of the at least three insulation walls is the shortest, the ice-making unit is the longest, or the third insulation wall at the rearmost of the at least three insulation walls is the shortest, or the second insulation wall in a middle of the at least three insulation walls has two different parts in a direction of up and down, or
the length of the first storage section through which the virtual line passes has different parts of the first storage section in the vertical direction.

13. The refrigerator of claim 1, wherein a cold air movement path passing through the first storage section in

a direction of up and down, includes at least one of a first cold air movement path that is a gap between a basket storing a container and provided in the first storage section and the another door, and a second cold air movement path that is an opening and/or recess provided in the basket.

14. The refrigerator of claim 1, wherein the first cold air movement path and the second cold air movement path are spaced apart from each other.

15. A refrigerator comprising:

a cabinet having an item-accommodating space;
a door opening and closing the item-accommodating space;
an ice-making unit provided in the door;
another door opening to extract ice from the ice-making unit;
at least one storage section opening when the other door is opened, thereby allowing the extraction of stored items, and is positioned on the opposite side of the item-accommodating space with respect to the ice-making unit; and
at least two cold air movement paths spaced apart from each other through which cold air passes through the storage section.

16. The refrigerator of claim 15, wherein the at least one storage section includes a first storage section positioned at the rear of the ice-making unit and a second storage section positioned below the ice-making unit, or

the at least one storage section includes at least two spaced-apart storage sections, and the cold air of the at least two storage sections is communicated with each other, or
the at least one storage section includes at least two spaced-apart storage sections, and the at least two storage sections have different sizes in a front and rear direction, or the at least two storage sections have different sizes in a direction of up and down, or
the at least one storage section includes at least two spaced-apart storage sections, and a display is provided in the space between the at least two storage sections.

17. The refrigerator of claim 15, wherein the first storage section among the at least one storage section is aligned with the ice-making unit in a front and rear direction, or
wherein the second storage section among the at least one storage section is aligned with the ice-making unit in a vertical direction.

18. The refrigerator of claim 17, further comprising a blowing unit provided above the ice-making unit to supply cold air to the at least one storage section.

19. A refrigerator door comprising:

an ice-making unit for making ice;
at least one storage section for storing items;
and
a cold air movement flow path positioned on the opposite side of the ice-making unit with respect to the at least one storage section.

20. The refrigerator door of claim 19, further comprising: another door that rotates relative to the refrigerator door of claim 19 so that the item can be extracted without moving the refrigerator door of claim 19.

Figure 1

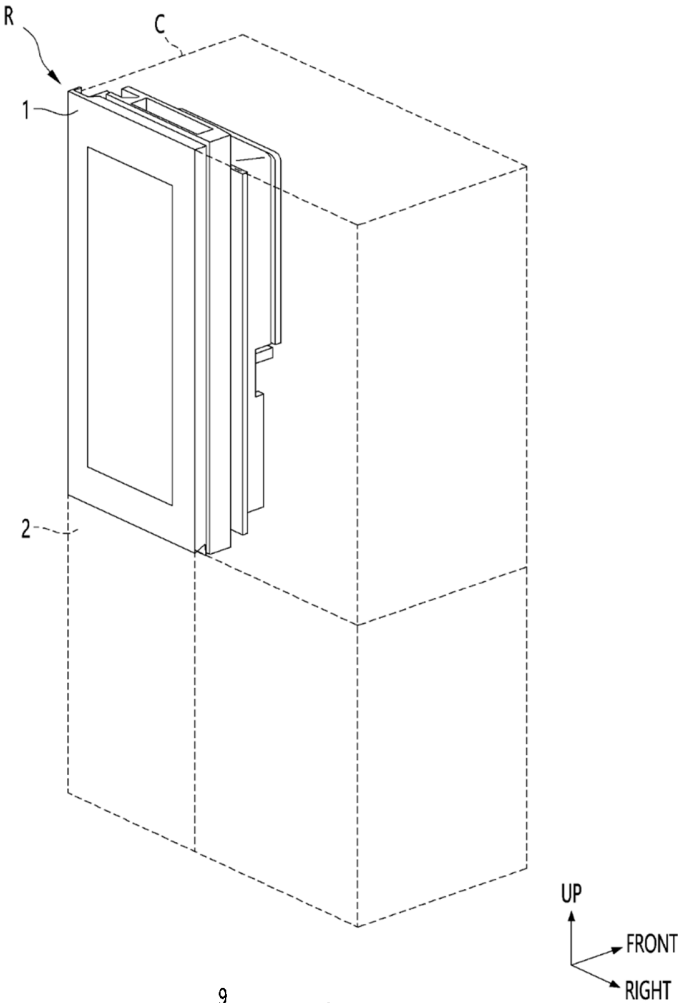


Figure 2

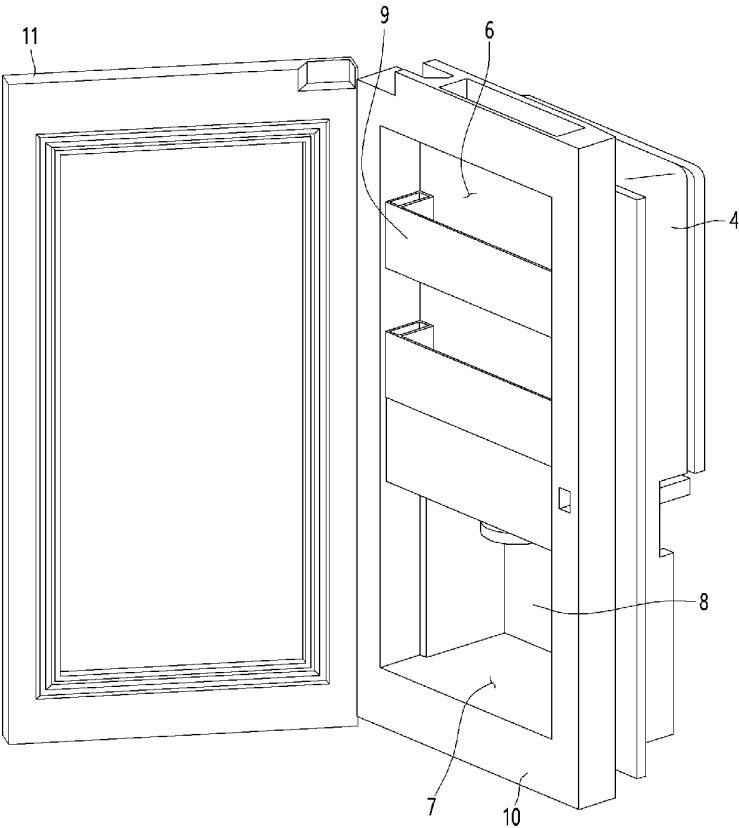


Figure 3

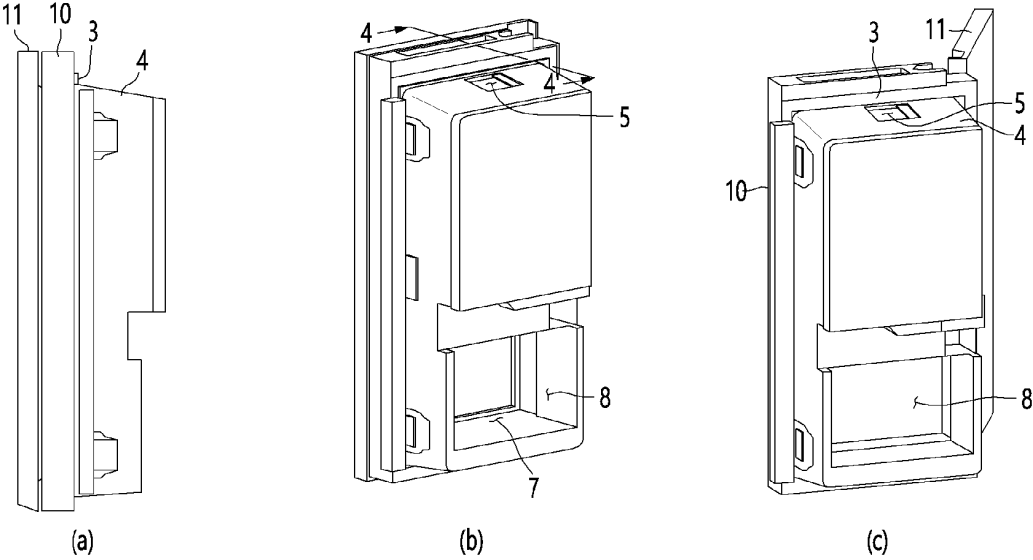


Figure 4

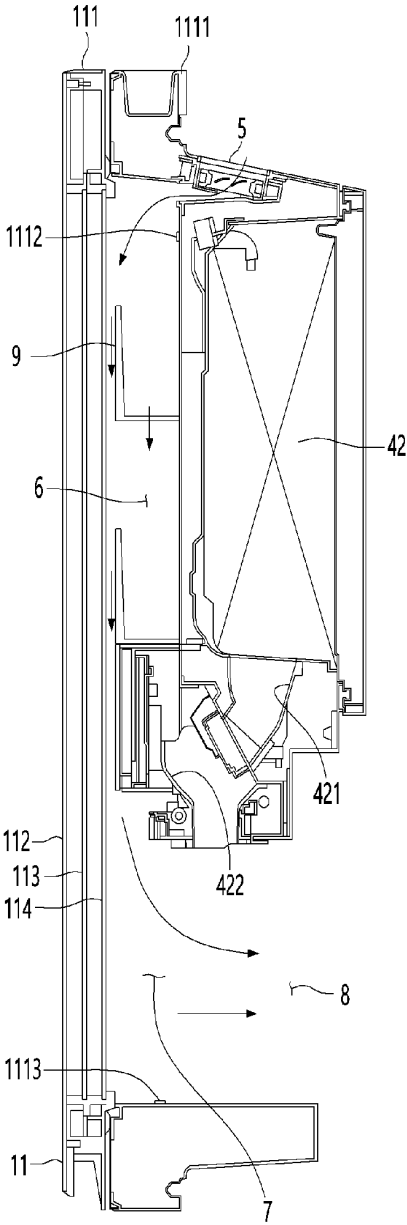


Figure 5

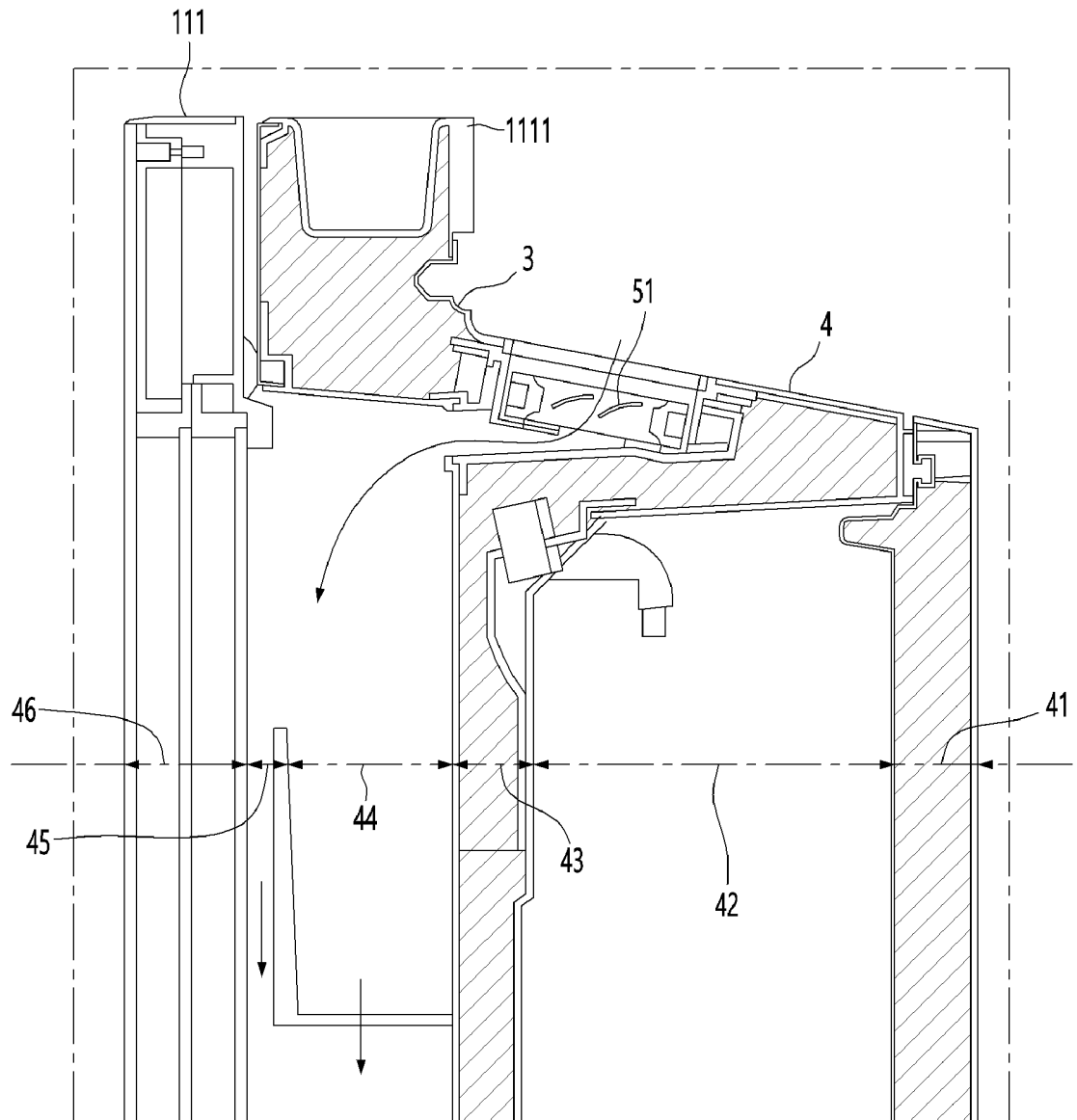


Figure 6

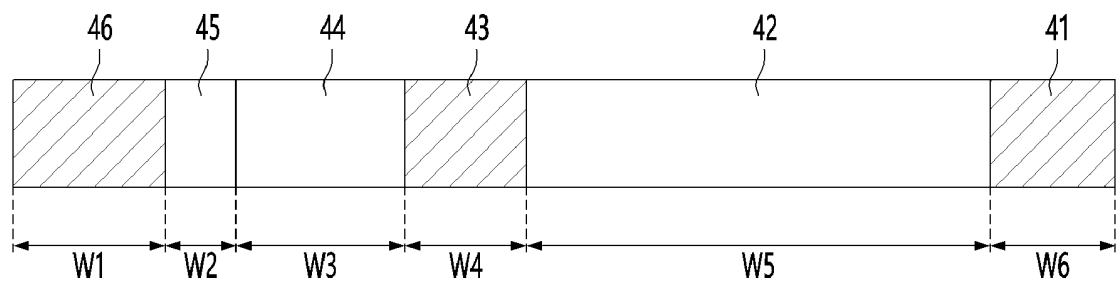


Figure 7

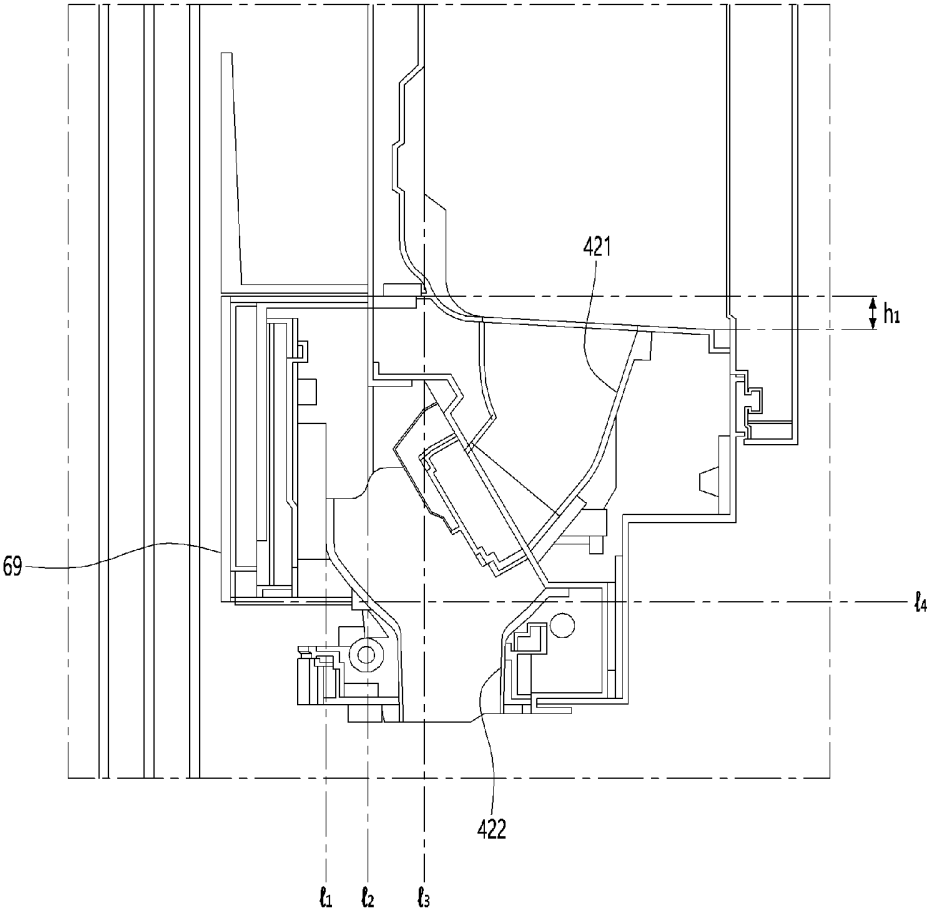


Figure 8

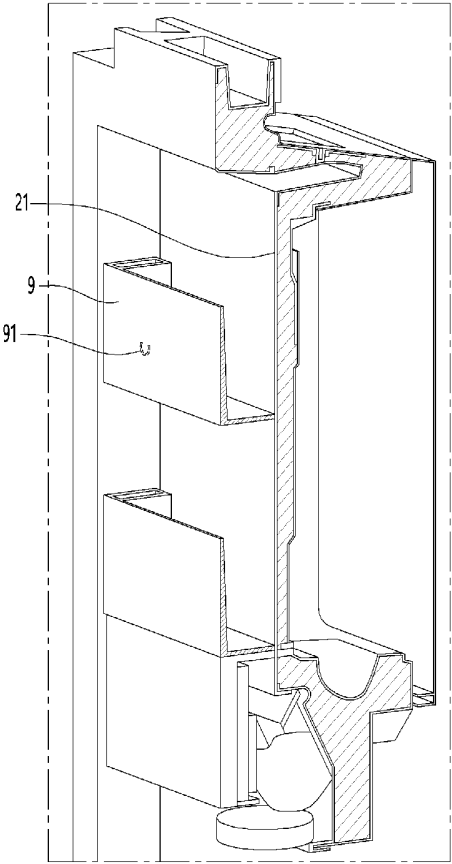


Figure 9

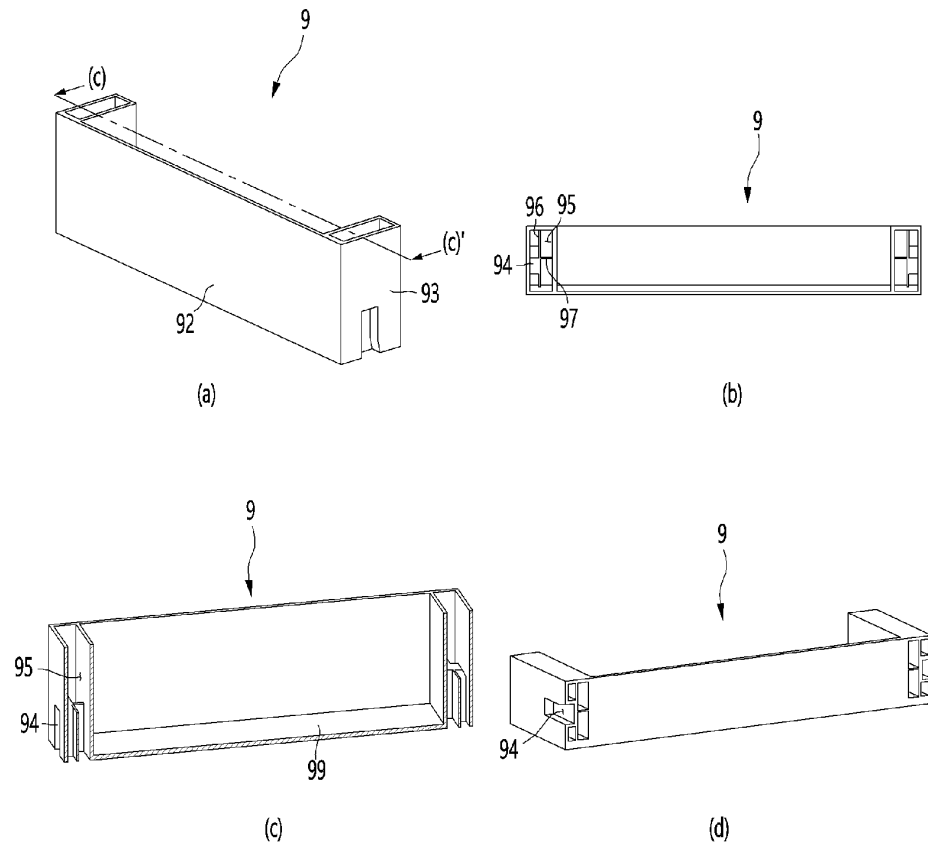


Figure 10

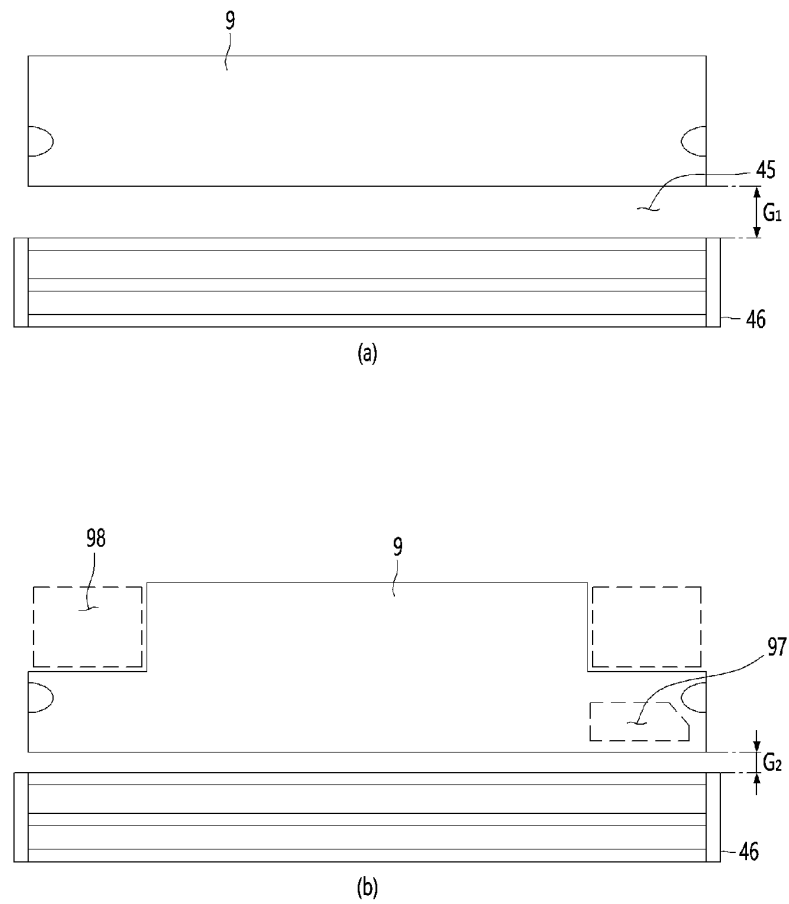


Figure 11

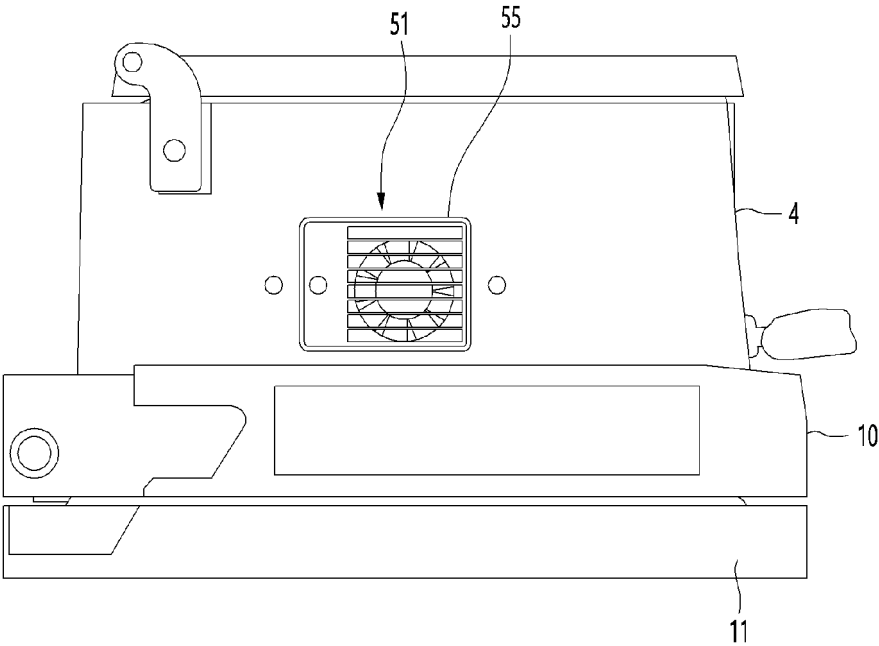


Figure 12

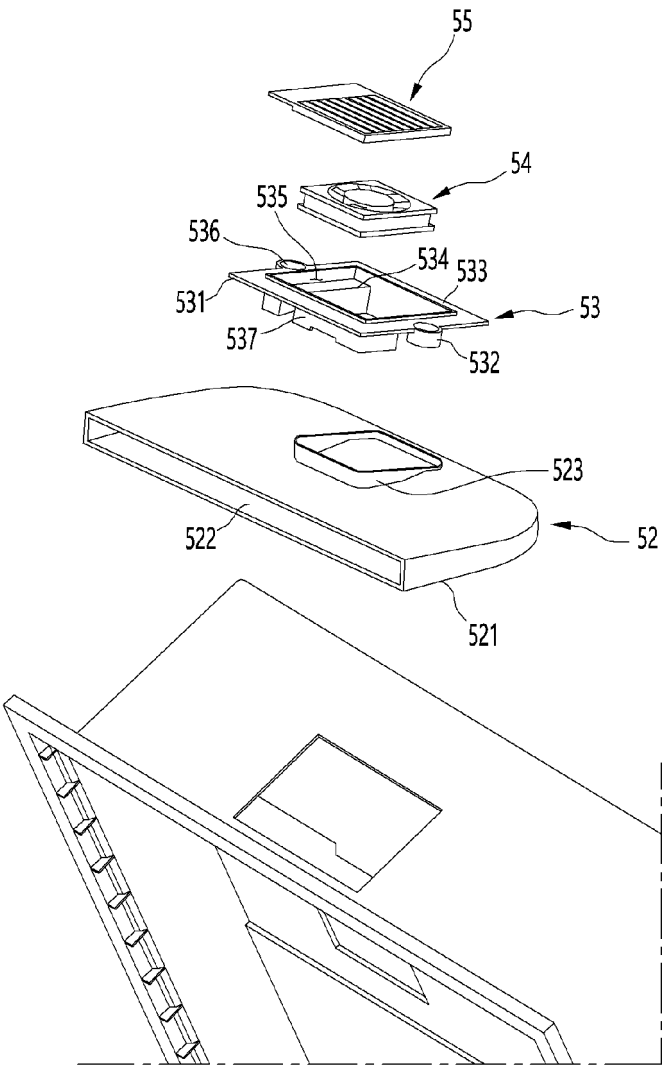
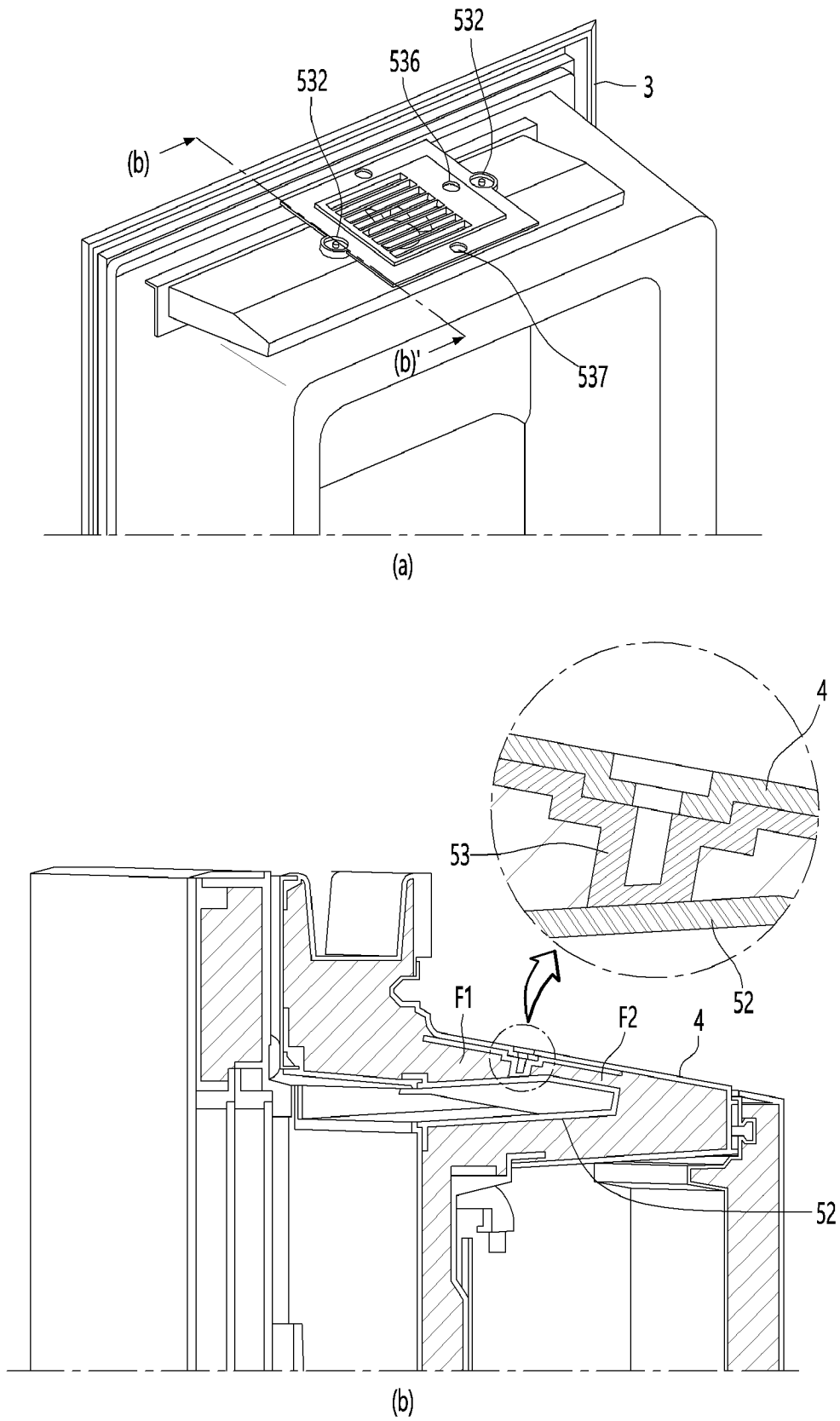


Figure 13



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2024/015948

A. CLASSIFICATION OF SUBJECT MATTER

F25D 23/04(2006.01)i; F25D 23/02(2006.01)i; F25D 17/06(2006.01)i; F25C 1/24(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)

F25D 23/04(2006.01); F25C 1/24(2006.01); F25D 17/06(2006.01); F25D 17/08(2006.01); F25D 23/02(2006.01);
F25D 23/12(2006.01)

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

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

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

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

eKOMPASS (KIPO internal) & keywords: 냉장고(refrigerator), 캐비닛(cabinet), 도어(door), 제빙유닛(ice making), 수납부
(storage compartment), 송풍유닛(blower unit)**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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A		8
Y	KR 10-1787202 B1 (LG ELECTRONICS INC.) 18 October 2017 (2017-10-18) See paragraphs [0051], [0067]-[0071] and [0082]-[0084] and figures 2-8.	1-7,9-18
Y	KR 10-2006-0041513 A (LG ELECTRONICS INC.) 12 May 2006 (2006-05-12) See paragraphs [0018], [0025] and [0031] and figures 1-4.	2,10-11,19-20
A	JP 2001-248961 A (MIYAMURA, Yukiharu) 14 September 2001 (2001-09-14) See claim 1 and figures 1-3.	1-20
A	US 10605517 B2 (BSH HAUSGERAETE G.M.B.H.) 31 March 2020 (2020-03-31) See claims 1 and 6 and figures 2-3.	1-20

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

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“&” document member of the same patent family

Date of the actual completion of the international search

20 January 2025

Date of mailing of the international search report

20 January 2025

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2024/015948

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