(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 551 617 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
18.09.2019 Bulletin 2019/38

(21) Application number: **11758949.9**

(22) Date of filing: **07.03.2011**

(51) Int Cl.:
F25D 25/00 *(2006.01)* ***F25D 23/02*** *(2006.01)*

(86) International application number:
PCT/JP2011/001307

(87) International publication number:
WO 2011/118137 (29.09.2011 Gazette 2011/39)

(54) REFRIGERATOR

KÜHLSCHRANK

RÉFRIGÉRATEUR

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **25.03.2010 JP 2010069642**
25.03.2010 JP 2010069641

(43) Date of publication of application:
30.01.2013 Bulletin 2013/05

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Description

[Technical Field]

[0001] The present invention relates to refrigerators, and particularly relates to a refrigerator having a pull-out structure including a pull-out storage compartment.

[Background Art]

[0002] Conventionally, a pull-out storage compartment is often provided at a lower part of a refrigerator in consideration with usability and so that the items can be stored in the back without wasting space. For such a pull-out storage compartment, it is necessary that a container can be smoothly set into or removed from the storage compartment, that food can be easily placed to or removed from the storage compartment, and that a container placed inside the storage compartment can be easily attached and detached.

[0003] In view of the problem, techniques for improving the convenience of the pull-out storage compartment have been disclosed (for example, see the patent literature 1 or the patent literature 2).

[0004] FIG. 9 is a diagram illustrating a side cross-section of a conventional refrigerator 500.

[0005] The conventional refrigerator 500 in FIG. 9 includes a vegetable compartment 510 and a freezer compartment 520 as the storage compartments in a heat-insulating main body 501. A container 550 provided inside the vegetable compartment 510 is supported by two rail devices 540 connected to the pull-out door 530 of the vegetable compartment 510. The container 550 provided inside the freezer compartment 520 is also supported by two rail devices 540 connected to the pull-out door 530 of the freezer compartment 520.

[0006] This structure allows the vegetable compartment 510 and the freezer compartment 520 to be pull-out storage compartments capable of pushed into and pulled out of the heat-insulating main body 501. As described above, the container 550 is supported by the two rail devices 540, and the container 550 is pushed into or pulled out of the vegetable compartment 510 or the freezer compartment 520, which makes the refrigerator more convenient.

[0007] JP 2002-071250 discloses a refrigerator which comprises a storage compartment formed therein; a draw out type door for opening/closing the storage compartment, and a container opening upward disposed to be drawn out freely as the door is opened/closed are further provided with a container disposed on the inside of the storage compartment, means for supporting the container slidably formed on the side wall of the storage compartment, and means for connecting the container with the door.

[0008] Further, JP 2001-263931 provides a refrigerator for enhancing the ability of housing variety of contained articles such as a bottle and the like. Therefore, protrusions are provided at a plurality of opposed height positions of an inner plate and a back surface plate for forming an indoor side of a drawer type door body to support opening flanges of a plurality of housing containers, to be disposed detachably and selectively at a height interval. Then, egg cases are detachably provided in the containers. Further, a 1 liter or more liquid-like article container can be stood and housed. Thus, the housing ability and handleability of large-sized containers, eggs, the other small articles or the like are improved.

[0009] JP 2009-228948 discloses a refrigerator including a heat insulating housing, a drawer-type storage chamber provided with the heat insulating housing inside and opened at its front face, a drawer door for openably and closably closing the front opening of the storage chamber, a partitioning wall for defining the storage chamber of the heat insulating housing, and a rail device which has a fixed rail and a moving rail in a state that the fixed rail and the moving rail are incorporated in advance, and fixed to an inner box wall or the partitioning wall, and in which the drawer door and the heat insulating housing are expandably and contractibly connected, and a container disposed inside of the storage chamber is longitudinally movable, wherein the rail device is connected to a lower part with respect to a central portion in the vertical direction of the drawer door at both end portions in the horizontal direction, and right and left both ends of a bottom portion of the container are supported, thus the actual storage volume of the drawer-type storage chamber can be increased.

[Citation List]

[0010]

[Patent Literature 1] Japanese Unexamined Patent Application Publication No. 2006-177653
[Patent Literature 2] Japanese Unexamined Patent Application Publication No. 2006-214642
[Patent Literature 3] Japanese Unexamined Patent Application Publication No. 2002-071250
[Patent Literature 4] Japanese Unexamined Patent Application Publication No. 2001-263931
[Patent Literature 5] Japanese Unexamined Patent Application Publication No. 2009-228948

[Summary of Invention]

[Technical Problem]

[0011] In recent years, there is a trend of increasing an inner volume that can be actually used for storing items, by changing arrangement of the components of the refrigerator, for example.

[0012] However, the container provided inside the conventional pull-out storage compartment is supported only by the rail device. Accordingly, when the inner volume of the container increases, the pull-out door is distorted due

to deformation of the rail device. This causes a problem that the cooling capability is not secured.

[0013] Stated differently, when the inner volume of the container increases, the amount of the items stored in the container increases, which increases load. If the pull-out door is open in this state, a large amount of load is exerted on the rail device, and particularly stress on the end of the rail device at which the rail device is attached to the pull-out door increases.

[0014] When the pull-out door is open to the maximum, only the rail device supports the container which moves in connection with the opening movement of the pull-out door. Furthermore, the pull-out door in which foam insulation is provided inside is connected to the end of the rail device. Accordingly, the load of the pull-out door is exerted on the end of the rail device, in addition to the load of the container. In addition, a vacuum heat-insulating material is sometimes buried in the pull-out door in order to save energy. This further increases the load on the rail device.

[0015] Accordingly, the rail device is deformed by the movement for opening and closing the pull-out door for a long period of time. With this, even if the pull-out door closes the opening of the vegetable compartment or the freezer compartment, there is a possibility that the pull-out door closing the opening is distorted with respect to the opening, or the opening is not sealed by the sealing part of the pull-out door. As a result, there is a possibility that the cold air inside the compartment leaks, making it unable to cool the compartment to a predetermined temperature.

[0016] The present invention is conceived in order to solve the problems described above, and it has been an object of the present invention to provide a refrigerator having a pull-out storage compartment, capable of reducing the deformation of the rail device, and securing cooling capability, while securing large actual storage capacity in a pull-out storage compartment.

[Solution to Problem]

[0017] In order to solve the problems described above, the refrigerator according to an aspect of the present invention includes a heat-insulating main body having an inner casing, an outer casing, and a heat-insulating material filled between the inner casing and the outer casing; a storage compartment formed inside of the heat-insulating main body and having an opening in a front face; a pull-out door which opens and closes the opening on the front face of the storage compartment and which includes a supporting unit provided on an inner board of the pull-out door and configured to support a container provided inside of the storage compartment; a rail device which makes the container movable forward and backward as the pull-out door opens and closes; and a door frame which is fixed to the pull-out door, joined to the rail device, and holds the container, wherein the rail device includes: a fixed rail fixed with respect to the storage compartment; and a movable rail connected to the pull-out door, movable forward and backward along the fixed rail, provided below a center of the pull-out door in a vertical direction, and which supports the container. Further, the container includes (i) on a front side and on a back side, a respective projection that, while the container is placed on the door frame, is inserted into a respective hole in the door frame, and (ii) on a front face, a flange portion that is detachably inserted in the supporting unit such that the container is fitted in and supported by the pull-out door so as to be vertically attachable to and detachable from the pull-out door.

[0018] With this, the movable rail for supporting the container is provided below the center of the pull-out door in the vertical direction. Accordingly, it is possible to increase the size and capacity of the container supported by the rail device. Since the pull-out door has a supporting unit for supporting the container, the container is supported not only by the rail device but also by the supporting unit. Therefore, it is possible to reduce the distortion of the pull-out door due to the deformation of the rail device, thereby securing the cooling capacity.

[Advantageous Effects of Invention]

[0019] The refrigerator according to the present invention can reduce the distortion caused by the deformation of the rail device and secure the cooling capacity, while securing the large actual storage volume in the pull-out storage compartment.

[Brief Description of Drawings]

[0020]

FIG. 1 is a front view of a refrigerator according to an embodiment of the present invention.

FIG. 2 is a vertical cross-sectional view of the refrigerator according to the embodiment of the present invention.

FIG. 3 is a perspective view of the rail device of the refrigerator according to the embodiment of the present invention.

FIG. 4 is a perspective view illustrating a state in which the pull-out door and the rail device are connected by a door frame in the refrigerator according to the embodiment of the present invention.

FIG. 5 is a cross-sectional view of the main section illustrating the rail device 202 according to the embodiment of the present invention supporting the container 206.

FIG. 6 is a perspective view illustrating the rail device 202 according to the embodiment of the present invention supporting the container 206.

FIG. 7 is a cross-sectional view illustrating a state, from the back, in which the container is provided between the rail devices of the refrigerator according to the embodiment of the present invention.

FIG. 8A is an enlarged view of the major part illustrating an arrangement in the rail device and the container in the refrigerator in the embodiment of the present invention.

FIG. 8B is an enlarged view of the major part illustrating an arrangement of the rail device and the container in the refrigerator in the variation 1 of the embodiment of the present invention.

FIG. 8C is an enlarged view of the major part illustrating an arrangement of the rail device and the container in the refrigerator in the variation 2 of the embodiment of the present invention.

FIG. 9 is a cross-sectional view illustrating a conventional refrigerator.

[Description of Embodiments]

[0021] The refrigerator according to the present invention includes a heat-insulating main body having an inner casing, an outer casing, and a heat-insulating material filled between the inner casing and the outer casing; a storage compartment formed inside of the heat-insulating main body and having an opening in a front face; a pull-out door which opens and closes the opening on the front face of the storage compartment and which includes a supporting unit provided on an inner board of the pull-out door and configured to support a container provided inside of the storage compartment; a rail device which makes the container movable forward and backward as the pull-out door opens and closes; and a door frame which is fixed to the pull-out door, joined to the rail device, and holds the container, wherein the rail device includes: a fixed rail fixed with respect to the storage compartment; and a movable rail connected to the pull-out door, movable forward and backward along the fixed rail, provided below a center of the pull-out door in a vertical direction, and which supports the container. Further, the container includes (i) on a front side and on a back side, a respective projection that, while the container is placed on the door frame, is inserted into a respective hole in the door frame, and (ii) on a front face, a flange portion that is detachably inserted in the supporting unit such that the container is fitted in and supported by the pull-out door so as to be vertically attachable to and detachable from the pull-out door.

[0022] Accordingly, the movable rail for supporting the container is provided below the center of the pull-out door in the vertical direction. Thus, it is possible to increase the size and volume of the container supported by the rail device by supporting the lateral ends of the bottom of the container, for example. The pull-out door further includes a supporting unit for supporting the container. Thus, it is possible to disperse the load on the movable rail by supporting the container not only by the rail device, but also by the supporting unit. With this, in the pull-out storage compartment, it is possible to reduce the distortion in the pull-out door due to the deformation of the rail device and secure the cooling capacity, while securing the large actual storage volume.

[0023] It is preferable that the supporting unit includes a first fixing part projecting upward for fixing the flange portion inserted from above.

[0024] With this, the user can insert the container with respect to the rail device from above. It also prevents the rail device from bowing, which causes the pull-out door to open outward. Accordingly, it is possible to reduce the distortion of the pull-out door due to the deformation of the rail device.

[0025] It is preferable that the supporting unit further includes a second fixing part which abuts an upper surface of the flange portion to regulate an upward movement of the flange portion.

[0026] With this, the user can insert the container with respect to the rail device from above. This prevents the rail device from bowing, which leads to the opening movement of the pull-out door outward. In addition, it is also possible to prevent the pull-out door from moving upward when opening and closing the pull-out door. With this, the container can be attached and detached using both the first fixing part and the second fixing part, and the container is strongly fixed. It is also possible to increase the strength of the rail device supporting the load of the storage items stored in the container, preventing the rail device from bowing when the pull-out door is pulled out. Accordingly, the pull-out door can be pushed and pulled smoothly.

[0027] It is preferable that the first fixing part is formed separately from the inner board, and the second fixing part is formed integrally with the inner board.

[0028] With this, it is possible to reduce the number of components for the pull-out door as much as possible, to connect the rail device and the pull-out door, and to reduce the distortion of the pull-out door caused by the deformation of the rail device.

[0029] It is preferable that the refrigerator further includes a door frame on the part of the pull-out door below the center in the vertical direction, extending from the pull-out door toward the back, in which the movable rail is connected to the pull-out door with the door frame provided in between and supports the container with the door frame provided in between.

[0030] With this, the pull-out door and the door frame supporting the container allow dispersion of load on the end part of the rail device on the pull-out door side. Accordingly, in the pull-out storage compartment, it is possible to reduce the distortion of the pull-out door due to the deformation of the rail device, secure the strength, and secure the cooling capability, while securing a large actual storage volume in the pull-out storage compartment.

[0031] It is preferable that the projection is formed on a back part of the side face part of the container.

[0032] With this, it is possible to disperse the load on the end portion of the rail device on the pull-out door side to the back part of the door frame, which is in a position farther from the end portion on the pull-out door side.

[0033] It is preferable that the projection is provided leaning downward toward the back when the container is supported by the movable rail through the door frame.

[0034] With this, even if the load is exerted on the pull-out door side, it is possible to fix the container such that the container is not easily detached from the door frame, and to prevent the container from moving upward when opening and closing the pull-out door.

[0035] The following shall describe an embodiment of the present invention with reference to the drawings. Note that, the embodiment is not intended to limit the present invention.

[0036] FIG. 1 is a front view of a refrigerator 100 according to the embodiment of the present invention.

[0037] As illustrated in FIG. 1, the refrigerator 100 according to the embodiment includes side-by-side doors in the upper part, and storage compartments partitioned inside a heat-insulating main body 101 which separates the outside and the inside of the refrigerator 100 in heat-insulating state.

[0038] The storage compartments partitioned in the refrigerator 100 may be referred to as a refrigerator compartment 102, an ice compartment 105, a switchable compartment 106 a temperature of which can be switched, a vegetable compartment 103, a freezer compartment 104, and others, depending on the function (cooling temperature).

[0039] On a front opening of refrigerator compartment 102 in the uppermost part of the refrigerator 100, a rotating heat-insulating door 107 in which a foam insulator such as urethane is filled by foaming, and the refrigerator compartment 102 is a storage space having shelves.

[0040] Furthermore, the ice compartment 105, the switchable compartment 106, the vegetable compartment 103, and the freezer compartment 104 which are provided below the refrigerator compartment 102 are pull-out storage spaces. More specifically, a pull-out door 201 which opens and closes an opening in the front face of the storage compartment is provided for each of the storage compartment.

[0041] The heat-insulating main body 101 is a cuboidal body formed by filling a heat-insulating material such as hard-foamed urethane between an outer casing 112 made of metal and an inner casing 110 made of resin, and has an opening on at least one side. The heat-insulating main body 101 has a function of blocking the heat entering from the outer atmosphere (outer air) toward the inside of the heat-insulating main body 101.

[0042] The refrigerator compartment 102 is a storage compartment for refrigeration in which a temperature is maintained to a low temperature with which the stored items are not frozen. More specifically, the lowest temperature is usually set to 1 to 5°C.

[0043] The vegetable compartment 103 is a storage compartment provided at the lowermost part of the heat-insulating main body 101, and is a storage compartment mainly for storing vegetables in refrigeration. The temperature of the vegetable compartment 103 is set to be identical to or slightly higher than the refrigerator compartment 102. More specifically, the lowest temperature is 2 to 7°C. Note that, the lower the temperature is, the longer the freshness of the green leaves can be preserved.

[0044] The freezer compartment 104 is a storage compartment with a temperature set to a freezing temperature zone. More specifically, the temperature of the freezer compartment 104 is usually set to -22 to -18°C; however, a lower temperature, for example, -30 to -25°C may be set for improving the freezing storage state.

[0045] The ice compartment 105 is a storage compartment in which an ice maker (not illustrated) is provided inside, and is a compartment for storing the ice made by the ice maker. The temperature of the ice compartment 105 is set to be substantially equal to the freezer compartment 104.

[0046] The temperature of the switchable compartment 106 may be switched from a refrigeration temperature zone to the freezing temperature zone suitable for the usage, by using the operation board attached to the refrigerator 100.

[0047] A partition 108 (see FIG. 2) is provided between the temperature zones in the heat-insulating main body 101 in order to partition multiple different temperature zones.

[0048] FIG. 2 is a vertical cross-sectional view of the refrigerator 100 according to the embodiment of the present invention, and illustrates a cross-section along the line A-A' in FIG. 1.

[0049] As illustrated in FIG. 2, the rail device 202 is provided for each of the pull-out storage compartments (in FIG. 2, the vegetable compartment 103 and the freezer compartment 104) among the storage compartments included in the refrigerator 100. The rail device connects the pull-out door 201 and the heat-insulating main body 101 in an expandable and contractable manner, and allows the container 206 provided inside of the storage compartment to move forward and backward along with closing and opening the pull-out door 201.

[0050] Here, the pull-out door 201 is a board-shaped member capable of opening and closing the opening of the storage compartment, and has insulation property. The pull-out door 201 includes a gasket 207 at the periphery on the back side. The gasket 207 is closely attached to the heat-insulating main body 101 when the pull-out door 201 closes the opening of the storage compartment, and prevents the cold air from leaking.

[0051] FIG. 3 is a perspective view of the rail device 202 in the refrigerator 100 according to the embodiment of the present invention.

[0052] As illustrated in FIG. 3, the rail device 202 includes three rails layered in three stages; namely, a cabinet rail 221 which is a fixed rail, a middle rail 222 which is a movable rail, and a top rail 223. More specifically, the middle rail 222 can move along the cabinet rail 221 fixed with respect to the storage compartment, and the top rail 223 can move along the middle rail 222. Accord-

ingly, the rail device 202 can expand and contract as a whole.

[0053] Note that, the fixed rail and the movable rail are supported by rotation supporting members (not illustrated), and the rail device 202 is fixed to the inner wall of the inner casing 110 with the fixed rail and the movable rail set in advance.

[0054] More specifically, the cabinet rail 221 is fixed to the inner casing 110 of the heat-insulating main body 101 through the rail attachment part 224. Furthermore, the top rail 223 is connected to the pull-out door 201, and the top rail 223 and the middle rail 222 move forward and backward along the cabinet rail 221. Accordingly, the pull-out door 201 can be pulled out or pushed back to the heat-insulating main body 101 along the orbit of the rail device 202 contracting and expanding.

[0055] Next, the structure of the rail device 202 connected to the pull-out door 201 for supporting the container 206 shall be described in detail.

[0056] FIG. 4 is a perspective view illustrating a state in which the pull-out door 201 and the rail device 202 are connected by the door frame 205 of the refrigerator 100 in the embodiment of the present invention.

[0057] FIG. 5 is a cross-sectional view of the main section illustrating a state in which the rail device 202 supports the container 206 in the embodiment of the present invention.

[0058] FIG. 6 is a schematic view illustrating a state in which the rail device 202 supports the container 206 in the embodiment of the present invention.

[0059] As illustrated in these diagrams, the pull-out door 201 includes an inner board 211, which configures the pull-out door 201, covering the back surface of the heat-insulating main body. The door frame 205 extending toward the back from the inner board 211 of the pull-out door 201 is provided below the center of the pull-out door 201 in the vertical direction.

[0060] The inner board 211 is one of the members composing the pull-out door 201, and is a tabular member formed by vacuum molding.

[0061] The door frame 205 is directly fixed to the inner board 211, perpendicular to the pull-out door 201, and is connected to the top rail 223, using screws or others. In other words, the top rail 223 is connected to the pull-out door 201 with the door frame 205 provided in between. With this, the pull-out door 201 can be pulled out or pushed back horizontally while maintaining its vertically upright state, with the expansion and contraction function of the rail device 202.

[0062] The top rail 223 and the middle rail 222 which are movable rails are provided below the center of the pull-out door 201 in the vertical direction, and support the container 206 with the door frame 205 provided in between. More specifically, as illustrated in FIG. 5, a gap portion formed on the sides of the lower part of the container 206 is inserted between a pair of movable rails so as to place the container 206 on the movable rails for supporting the container 206.

[0063] Here, the stress that occurs when pushing and pulling the pull-out door 201, particularly by holding a top end portion of the pull-out door 201 concentrates on a base end portion (back end portion) of the top rail 223. In order to reduce the concentration of the stress, first fixing parts 301 which fix the container 206 to the pull-out door 201 are provided at both lateral ends of the inner board 211 of the pull-out door 201.

[0064] The first fixing part 301 is provided at a position at which a substantial L-shaped front flange portion 206a formed at an upper opening part of the container 206 when the container 206 is placed on the rail device 202. In other words, the first fixing part 301 is a member projecting upward for fixing the front flange portion 206a inserted from above. The front flange portion 206a is inserted into the first fixing part 301 from above and fixed.

[0065] The first fixing part 301 is a metal member, and is fixed to a tabular metal plate (not illustrated) fixed in the foaming insulation material on the back of the inner board 211 by screws or others through the inner board 211. Subsequently, the front flange portion 206a is inserted into the first fixing part 301 from above and is fixed. More specifically, the first fixing part 301 is formed separately from the inner board 211.

[0066] Furthermore, as illustrated in FIG. 4, the door frame 205 includes a bent part 241 which is an end of the door frame 205 on one side, bent along the inner board 211 of the pull-out door 201, and the bent part 241 is fixed to a tabular metal plate (not illustrated) fixed in the foam heat-insulating material on the back of the inner board 211 by screws and others.

[0067] As described above, fixing the front flange portion 206a of the container 206 to the first fixing part 301 provided at the upper part of the inner board 211 of the pull-out door 201 compensates the insufficient strength on the attachment part of the rail device and the pull-out door 201 attached with respect to a lower part of the pull-out door 201, thereby allowing opening and closing the pull-out door smoothly.

[0068] The pull-out door 201 further includes a second fixing part 303 which is a floating prevention member having a projected form which abuts the periphery 304 forming the upper opening of the container 206, preventing the front flange part 206a floating upward.

[0069] More specifically, the second fixing part 303 is a part abutting the upper surface of the front flange portion 206a and for regulating the movement of the front flange portion 206a upward. As illustrated in FIG. 4, the second fixing part 303 is provided between the first fixing parts 301 provided on both of the lateral sides. Furthermore, the second fixing part 303 is formed integrally with the inner board 211.

[0070] As described above, the pull-out door 201 includes the first fixing part 301 and the second fixing part 303 provided on the inner board 211 of the pull-out door 201 as a part supporting the container 206, and fixes the front flange portion 206a provided at the front face of the container 206.

[0071] As described above, when the removable container 206 is attached from above the pull-out door 201, the front flange portion 206a is inserted into the first fixing part 301 as described above, and the peripheral part 304 forming the upper opening of the container 206 abuts the second fixing part 303 from below. More specifically, the first fixing part 301 supports and fixes the front part of the container 206 from below, and the second fixing part 303 supports and fixes the front part of the container 206 from above, thereby fixing the container 206 to the inner board 211. With this, the upper part of the container 206 is supported by the inner board 211 and fixed. Accordingly, it is possible to fill insufficient strength at the attachment part of the rail device 202 and the pull-out door 201 attached with respect to the lower part of the pull-out door 201, allowing opening the closing the pull-out door 201 smoothly.

[0072] Furthermore, even when the pull-out door 201 is pulled out or pushed back by holding the pull-out door 201, the stress is not concentrated on the attachment part of the top rail 223, but is dispersed to the parts connected through the bend part 241 and the door frame 205. Thus, it is possible to increase the strength of attachment between the pull-out door 201 and the top rail 223 as a whole. This is particularly effective in the case of the embodiment, in which the top rail 223 is attached to the lower part of the pull-out door 201.

[0073] If the pull-out door 201 is opened and closed forward and backward with the rail device 202 provided below the center of the pull-out door 201 in the vertical direction as illustrated in the embodiment, using the door frame 205 having a minimum strength necessary when the rail device 202 is attached near the center of the pull-out door 201 in the vertical direction, the door frame 205 or the inner board 211 is deformed due to the insufficient strength of the door frame 205 on a side fixed to the pull-out door 201. As a result, the gasket 207 provided on the pull-out door 201 is detached from the heat-insulating main body 101, causing a gap. This may lead to defect of the quality of the refrigerator such as frost inside.

[0074] Here, if the attachment part of the pull-out door 201 and the top rail 223 is in a lower part of the pull-out door 201, the moment on the attachment part is relatively large when the pull-out door 201 is pulled out or pushed by holding the upper part. However, in the embodiment, the first fixing part 301 or the second fixing part 303, or both the first fixing part 301 and the second fixing part 303 are provided above the attachment part so as to fix the container 206. Accordingly, the moment on the attachment part is small, protecting the attachment part of the top rail 223 from being broken. More specifically, in the embodiment, by providing the pull-out door 201 with the first fixing part 301 and/or the second fixing part 303, it is possible to set a supporting point of the tension in an upper part.

[0075] Furthermore, as described above, the first fixing part 301 and the inner board 211 are made of separate material, and the second fixing part 303 is formed integrally with the inner board 211. For this reason, by forming the first fixing part 301 forming the fixed structure of the front flange portion 206a in the container 206 with a metal component separate from the inner board 211, it is possible to maintain the container 206 fixed with the movable pull-out door 201, even if items are stored in the container 206. Furthermore, the number of components is reduced by forming the second fixing part 303 integrally with the inner board 211.

[0076] Furthermore, in a step part 262 formed under the both sides of the container 206 (see FIG. 7), two projections integrally formed with the container 206 are formed. More specifically, the container 206 includes a front projection 206b formed in the front side part of the container 206 and a back projection 206c formed at the back side part of the container 206. Here, the back projection 206c is provided leaning downward toward the back.

[0077] Furthermore, the front projection and the back projection are inserted to the front fixing hole 205a and the back fixing hole 205b formed in the door frame 205, respectively. With this, the container 206 is supported by the door frame 205. More specifically, the front fixing hole 205a may be a cutout, and the front projection 206b is inserted into the front fixing hole 205a for positioning, and the back projection 206c is inserted to the back fixing hole 205b formed at the back part of the door frame 205.

[0078] As such, by setting the shape of the back projection 206c leaning downward toward the back of the door frame 205, it is possible to prevent the back projection 206c from dislocated from the back fixed hole 205b easily, and prevent the container 206 from floating upward when opening and closing the pull-out door 201.

[0079] More specifically, as described above, by fixing the back projection 206c to the door frame 205 at the back with the front flange portion 206a of the container 206 fixed to the pull-out door 201, it is possible to compensate the insufficient strength of the attachment part of the rail device 202 and the pull-out door 201, allowing smooth opening and closing of the pull-out door.

[0080] More specifically, since the moment exerted on the attachment part is small, it is possible to protect the attachment part of the top rail 223 or the attachment part of the rail fixing part from being broken. More specifically, in this embodiment, the front flange portion 206a of the container 206 is fixed to the pull-out door 201 provided with the first fixing part 301 and/or the second fixing part 303, and the back projection 206c of the container 206 is inserted and fixed to the back fixing hole 205b provided in the door frame 205. With this, the position of the supporting point of the tension is set to be behind the pull-out door 201.

[0081] FIG. 7 is a cross-sectional view illustrating, from the back, a state in which the container 206 is provided between the rail devices 202 of the refrigerator 100 according to the embodiment of the present invention.

[0082] As illustrated in FIG. 7, the container 206 is a container for housing vegetables, drinks filled in plastic

bottles, and frozen food, and is a casing made of resin having an opening on an upper side. The container 206 has a step part 262 having a gap inward at the both sides of the lower part. More specifically, the container 206 has a narrow-width part 261 in the lower part, in which the lateral width is narrow. The container 206 is supported by the top rail 223 when the narrow-width part 261 is provided between two top rails 223, and the step part 262 is placed on the upper surface of the door frame 205.

[0083] As described above, the top rails 223 are provided at the corners of the lower part of the pull-out door 201. This allows suppressing the height of the narrow-width part 261 which has to be narrow in the container 206 as low as possible. Accordingly, a shape which makes the storage volume as large as possible can be used for the container 206.

[0084] Next, the description shall be made with reference to the positional relationship between the rail device 202 and the container 206 with the container 206 placed on the rail device 202.

[0085] FIG. 8A is an enlarged view of the major part illustrating an arrangement of the rail device 202 and the container 206 in the refrigerator 100 in the embodiment of the present invention. FIG. 8B is an enlarged view of the major part illustrating an arrangement of the rail device 202 and the container 206 in the refrigerator 100 in the variation 1 of the embodiment of the present invention. FIG. 8C is an enlarged view of the major part illustrating an arrangement of the rail device 202 and the container 206 in the refrigerator 100 in the variation 2 of the embodiment of the present invention.

[0086] In the embodiment, as illustrated in FIG. 8A, the container 206 includes a narrow-width part 261 having a narrow width such that the step part 262 provided inward at the sides of the lower part. The step part 262 of the container 206 is placed on the top rail 223 of the rail device 202.

[0087] Furthermore, as illustrated in FIG. 8B and FIG. 8C, the side surface of the container 206 may be substantially straight without providing the step part 262, and the rail device 202 may be supported on the lateral sides of the bottom of the container 206 (see FIG. 8B). Alternatively, the rail device 202 may be supported below the lateral sides of the bottom of the container 206 (see FIG. 8C).

[0088] Note that, the diagrams illustrate the positional relationship between the rail device 202 and the container 206, and the door frame 205 is omitted from the illustration.

[0089] As described above, the refrigerator according to the present invention has been described based on the embodiment. However, the present invention is not limited by the embodiment.

[0090] The embodiment is only an exemplary embodiment of the present invention that has been described in detail above, and those skilled in the art will readily appreciate that many modifications are possible in the exemplary embodiments without materially departing from the novel teachings and advantages of the present invention. Accordingly, all such modifications are intended to be included within the scope of the present invention.

[Industrial Applicability]

[0091] The refrigerator according to the present invention can secure an actual large storage space. Therefore, the refrigerator may be used as a refrigerator having pull-out storage compartments, and may also be used as a unit kitchen having drawers.

[Reference Signs List]

[0092]

100, 500 Refrigerator
101, 501 Heat-insulating main body
102 Refrigerator compartment
103, 510 Vegetable compartment
104, 520 Freezer compartment
105 Ice compartment
106 Switchable compartment
107 Heat-insulating door
108 Partition
110 Inner casing
111 Heat-insulating material
112 Outer casing
201, 530 Pull-out door
202, 540 Rail device
205 Door frame
205a Front fixing hole
205b Back fixing hole
206, 550 Container
206a Front flange portion
206b Front projection
206c Back projection
207 Gasket
211 Inner board
221 Cabinet rail
222 Middle rail
223 Top rail
224 Rail attachment part
241 Bent part
261 Narrow-width part
262 Step part
301 First fixing part
303 Second fixing part
304 Peripheral part

Claims

1. A refrigerator (100) comprising:

a heat-insulating main body (101) having an inner casing (110), an outer casing (112), and a

heat-insulating material (111) filled between the inner casing (110) and the outer casing (112);
a storage compartment formed inside of the heat-insulating main body (101) and having an opening in a front face;
a pull-out door (201) which opens and closes the opening on the front face of the storage compartment and which includes a supporting unit (301, 303) provided on an inner board (211) of the pull-out door (201) and configured to support a container (206) provided inside of the storage compartment;
a rail device (202) which makes the container (206) movable forward and backward as the pull-out door (201) opens and closes; and
a door frame (205) which is fixed to the pull-out door (201), joined to the rail device (202), and holds the container (206),
wherein the rail device (202) includes:

a fixed rail (221) fixed with respect to the storage compartment; and
a movable rail (222, 223) connected to the pull-out door (201), movable forward and backward along the fixed rail (221), provided below a center of the pull-out door (201, 530) in a vertical direction, and which supports the container (206), and
wherein the container (206) includes on a front face, a flange portion (206a) that is detachably inserted in the supporting unit (301, 303) such that the container (206) is fitted in and supported by the pull-out door (201) so as to be vertically attachable to and detachable from the pull-out door (201),
characterized in that the container (206) further includes, on a front side and on a back side, a respective projection (206b, 206c) that, while the container (206) is placed on the door frame (205), is inserted into a respective hole (205a, 205b) in the door frame (205).

2. The refrigerator (100) according to claim 1,
wherein the supporting unit (301, 303) includes a first fixing part (301) projecting upward for fixing the flange portion (206a) inserted from above.

3. The refrigerator (100) according to claim 2,
wherein the supporting unit (301, 303) further includes a second fixing part (303) which abuts an upper surface of the flange portion (206a) to regulate an upward movement of the flange portion (206a).

4. The refrigerator (100) according to claim 3,
wherein the first fixing part (301) is formed separately from the inner board (211), and
the second fixing part (303) is formed integrally with the inner board (211).

5. The refrigerator (100) according to any one of claims 1 to 4,
wherein the door frame (205) is disposed on the part of the pull-out door (201) below the center in the vertical direction, and extends from the pull-out door (201) toward the back, and
the movable rail (222, 223) is connected to the pull-out door (201) with the door frame (205) provided in between and supports the container (206) with the door frame (205) provided in between.

6. The refrigerator (100) according to claim 5,
wherein the projection (206b, 206c) is formed on a back part of the side face part of the container (206).

7. The refrigerator (100) according to claim 6,
wherein the projection (206b, 206c) is provided leaning downward toward the back when the container (206) is supported by the movable rail (222, 223) through the door frame (205).

Patentansprüche

1. Kühlschrank (100), umfassend:

einen Wärmeisolationshauptkörper (101) mit einem Innengehäuse (110), einem Außengehäuse (112) und einem Wärmedämmstoff (111), der zwischen das Innengehäuse (110) und das Außengehäuse (112) gefüllt ist;
ein Lagerfach, das in dem Wärmeisolationshauptkörper (101) ausgebildet ist und eine Öffnung in einer Vorderseite aufweist;
eine Auszugstür (201), welche die Öffnung auf der Vorderseite des Lagerfachs öffnet und schließt und die eine Trageinheit (301, 303) umfasst, die auf einer Innenplatte (211) der Auszugstür (201) vorgesehen und dazu eingerichtet ist, einen Behälter (206) zu tragen, der in dem Lagerfach vorgesehen ist;
eine Schienenvorrichtung (202), die den Behälter (206) vorwärts und rückwärts bewegbar macht, wenn sich die Auszugstür (201) öffnet und schließt; und
einen Türrahmen (205), der an der Auszugstür (201) befestigt und mit der Schienenvorrichtung (202) verbunden ist und den Behälter (206) festhält,
wobei die Schienenvorrichtung (202) umfasst:

eine feste Schiene (221), die gegenüber dem Lagerfach unbeweglich ist; und
eine bewegliche Schiene (222, 223), die mit der Auszugstür (201) verbunden, entlang der festen Schiene (221) vorwärts und rück-

wärts bewegbar und unterhalb einer Mitte der Auszugstür (201, 530) in einer vertikalen Richtung vorgesehen ist und die den Behälter (206) trägt, und
wobei der Behälter (206) auf einer Stirnfläche einen Flanschabschnitt (206a) umfasst, der derart lösbar in die Trageinheit (301, 303) eingesetzt ist, dass der Behälter (206) derart in die Auszugstür (201) eingefügt ist und von ihr getragen wird, dass er vertikal an der Auszugstür (201) befestigt und von ihr gelöst werden kann,
dadurch gekennzeichnet, dass der Behälter (206) ferner auf einer Vorderseite und auf einer Rückseite einen jeweiligen Ansatz (206b, 206c) umfasst, der, während der Behälter (206) auf dem Türrahmen (205) angeordnet ist, in ein entsprechendes Loch (205a, 205b) in dem Türrahmen (205) eingefügt ist.

2. Kühlschrank (100) nach Anspruch 1,
wobei die Trageinheit (301, 303) ein nach oben herausragendes erstes Befestigungsteil (301) zum Befestigen des von oben eingesetzten Flanschabschnitts (206a) umfasst.

3. Kühlschrank (100) nach Anspruch 2,
wobei die Trageinheit (301, 303) ferner ein zweites Befestigungsteil (303) umfasst, das an einer oberen Fläche des Flanschabschnitts (206a) anliegt, um eine Aufwärtsbewegung des Flanschabschnitts (206a) zu regulieren.

4. Kühlschrank (100) nach Anspruch 3,
wobei das erste Befestigungsteil (301) getrennt von der Innenplatte (211) ausgebildet ist, und
das zweite Befestigungsteil (303) einstückig mit der Innenplatte (211) ausgebildet ist.

5. Kühlschrank (100) nach einem der Ansprüche 1 bis 4,
wobei der Türrahmen (205) auf dem Teil der Auszugstür (201) unterhalb der Mitte in der vertikalen Richtung angeordnet ist und sich von der Auszugstür (201) nach hinten erstreckt, und
die bewegliche Schiene (222, 223) mit der Auszugstür (201) verbunden ist, wobei der Türrahmen (205) dazwischen vorgesehen ist, und den Behälter (206) trägt, wobei der Türrahmen (205) dazwischen vorgesehen ist.

6. Kühlschrank (100) nach Anspruch 5,
wobei der Ansatz (206b, 206c) auf einem hinteren Teil des Seitenflächenteils des Behälters (206) ausgebildet ist.

7. Kühlschrank (100) nach Anspruch 6,
wobei der Ansatz (206b, 206c) nach unten zur Rückseite hin schräg stehend vorgesehen ist, wenn der Behälter (206) von der beweglichen Schiene (222, 223) mittels des Türrahmens (205) getragen wird.

Revendications

1. Réfrigérateur (100) comprenant :

un corps principal d'isolation thermique (101) possédant un boîtier interne (110), un boîtier externe (112) et un matériau d'isolation thermique (111) introduit entre le boîtier interne (110) et le boîtier externe (112) ;
un compartiment de stockage formé à l'intérieur du corps principal d'isolation thermique (101) et possédant une ouverture dans une face avant ;
une porte extractible (201) qui ouvre et ferme l'ouverture sur la face avant du compartiment de stockage et qui comprend une unité de support (301, 303) disposée sur un panneau interne (211) de la porte extractible (201) et conçue pour supporter un récipient (206) disposé à l'intérieur du compartiment de stockage ;
un dispositif de rail (202) qui rend le récipient (206) mobile vers l'avant et vers l'arrière lorsque la porte extractible (201) s'ouvre et se ferme ; et
un cadre de porte (205) qui est fixé à la porte extractible (201), relié au dispositif de rail (202) et supportant le récipient (206),
le dispositif de rail (202) comprenant :

un rail fixe (221) fixe par rapport au compartiment de stockage ; et
un rail mobile (222, 223) relié à la porte extractible (201), mobile vers l'avant et vers l'arrière le long du rail fixe (221), disposé sous un centre de la porte extractible (201, 530) dans une direction verticale et qui supporte le récipient (206) et
le récipient (206) comprenant, sur une face avant, une partie de bride (206a) qui est introduite de manière amovible dans l'unité de support (301, 303) de telle sorte que le récipient (206) est ajusté dans et supporté par la porte extractible (201) de façon à pouvoir être fixé verticalement à la porte extractible (201) et détaché de celle-ci,
caractérisé en ce que le récipient (206) comprend en outre, sur un côté avant et sur un côté arrière, une saillie respective (206b, 206c) qui, pendant que le récipient (206) est placé sur le cadre de porte (205), est introduite dans un trou respectif (205a, 205b) dans le cadre de porte (205).

2. Réfrigérateur (100) selon la revendication 1,

l'unité de support (301, 303) comprenant une première partie de fixation (301) faisant saillie vers le haut pourfixer la partie de bride (206a) introduite depuis le dessus.

3. Réfrigérateur (100) selon la revendication 2, l'unité de support (301, 303) comprenant en outre une deuxième partie de fixation (303) qui vient en butée contre une surface supérieure de la partie de bride (206a) pour réguler un mouvement vers le haut de la partie de bride (206a).

4. Réfrigérateur (100) selon la revendication 3, la première partie de fixation (301) étant formée séparément du panneau interne (211) et la deuxième partie de fixation (303) étant formée d'un seul tenant avec le panneau interne (211).

5. Réfrigérateur (100) selon l'une quelconque des revendications 1 à 4, le cadre de porte (205) étant disposé sur la partie de la porte extractible (201) sous le centre dans la direction verticale et s'étendant à partir de la porte extractible (201) vers l'arrière et le rail mobile (222, 223) étant relié à la porte extractible (201), le cadre de porte (205) étant disposé entre les deux et supportant le récipient (206), le cadre de porte (205) étant disposé entre les deux.

6. Réfrigérateur (100) selon la revendication 5, la saillie (206b, 206c) étant formée sur une partie arrière de la partie de face latérale du récipient (206).

7. Réfrigérateur (100) selon la revendication 6, la saillie (206b, 206c) est réalisée en s'inclinant vers le bas et vers l'arrière lorsque le récipient (206) est supporté par le rail mobile (222, 223) via le cadre de porte (205).

FIG. 1

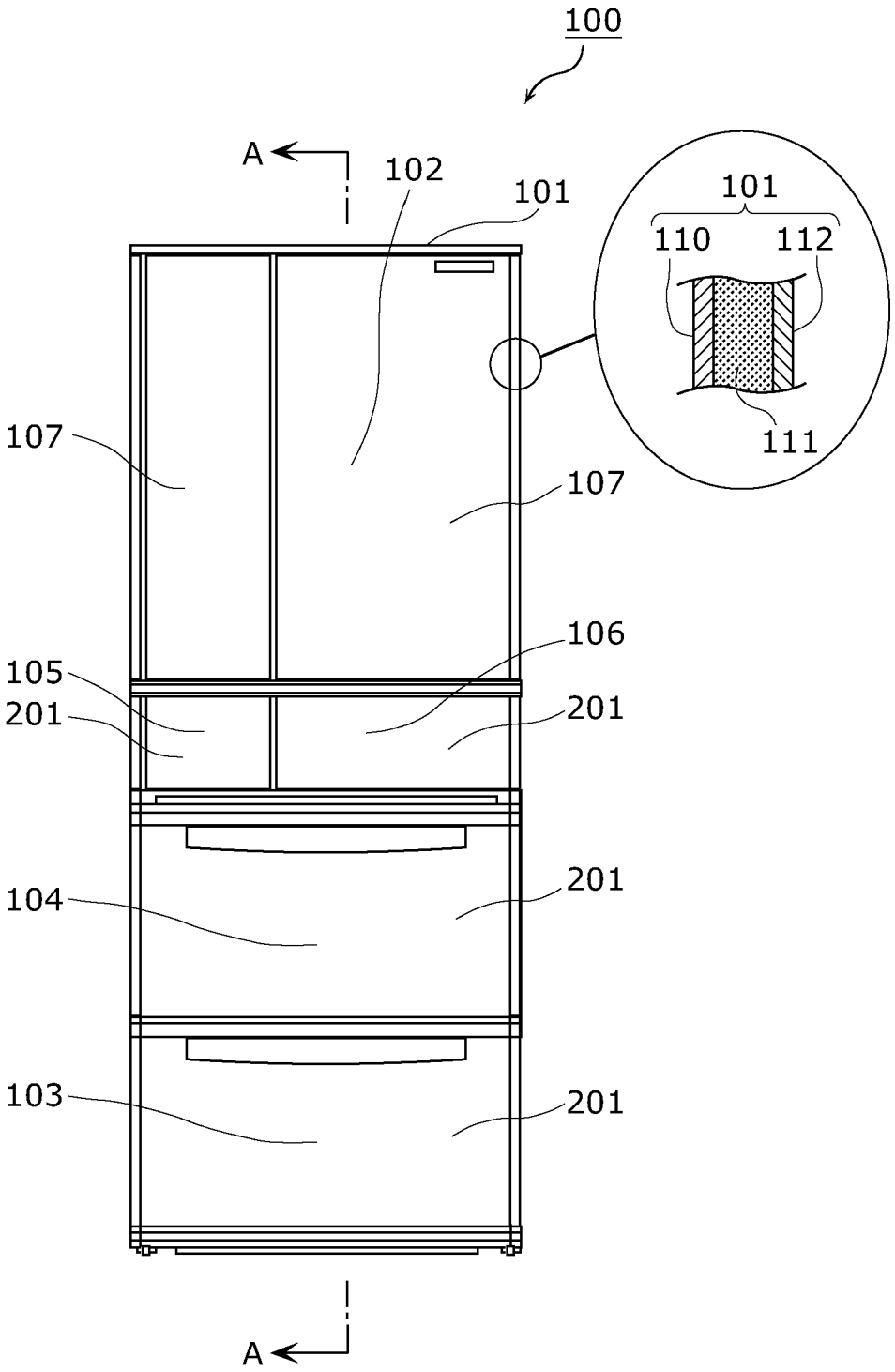

100
A
102
101
101
110
112
111
107
107
106
105
201
201
201
104
201
103
A

FIG. 2

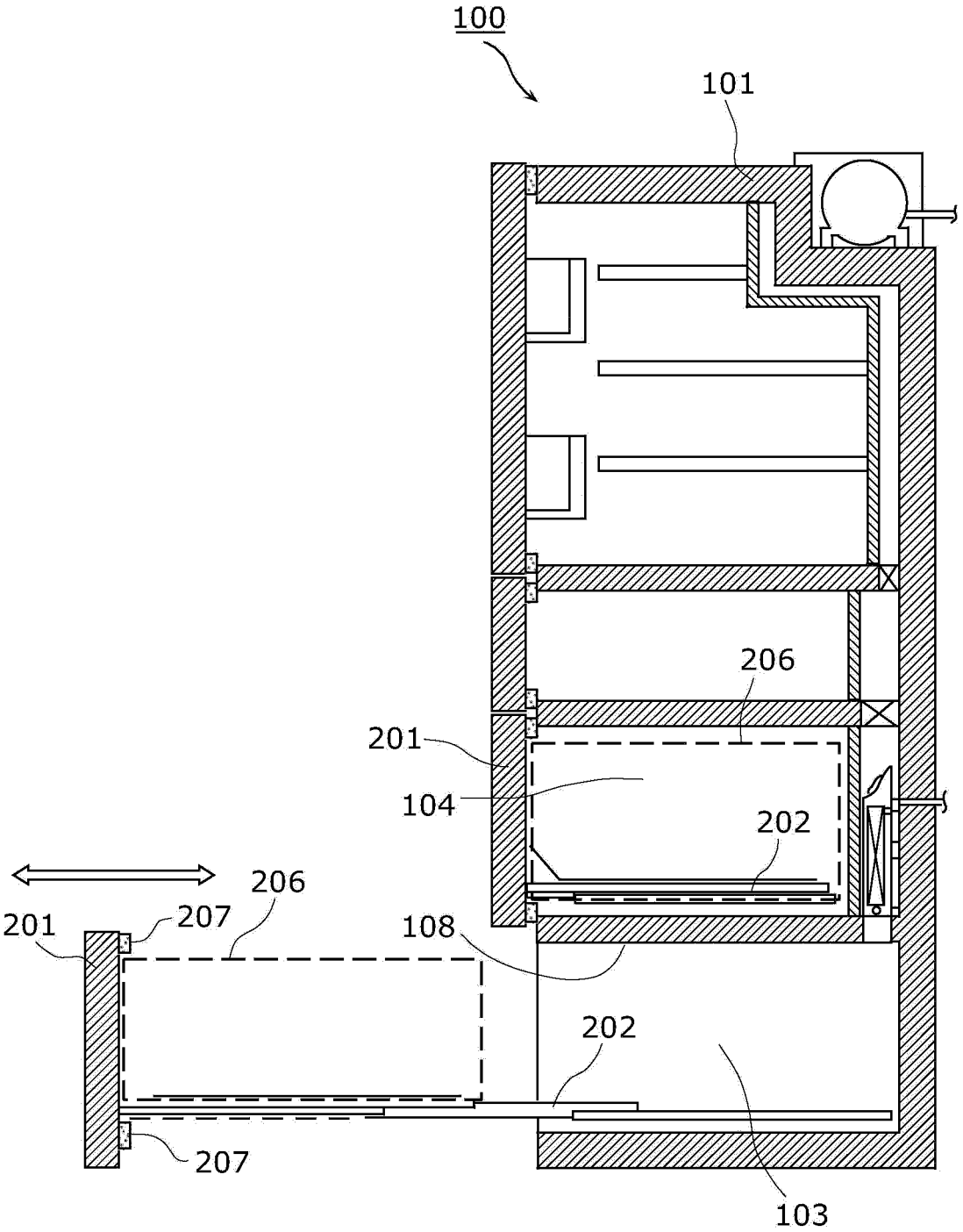


FIG. 3

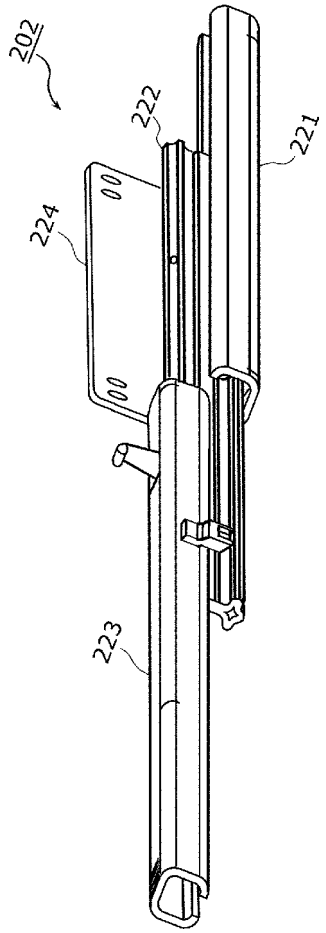


FIG. 4

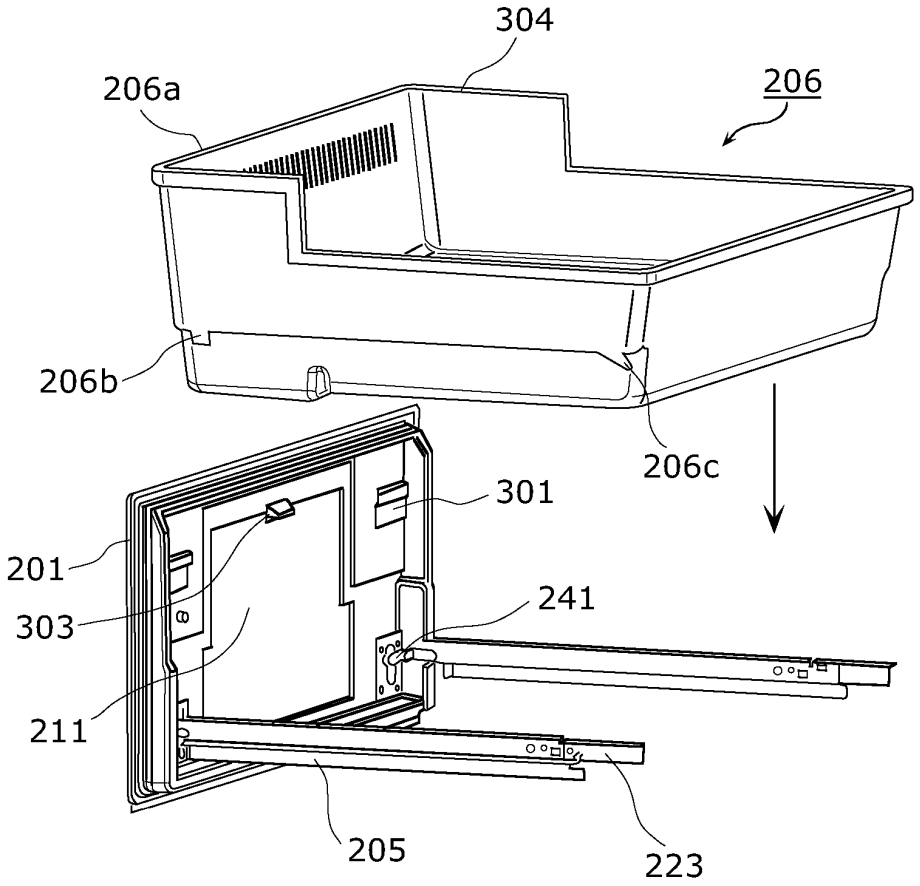

304
206a
206
206b
206c
301
201
303
241
211
205
223

FIG. 5

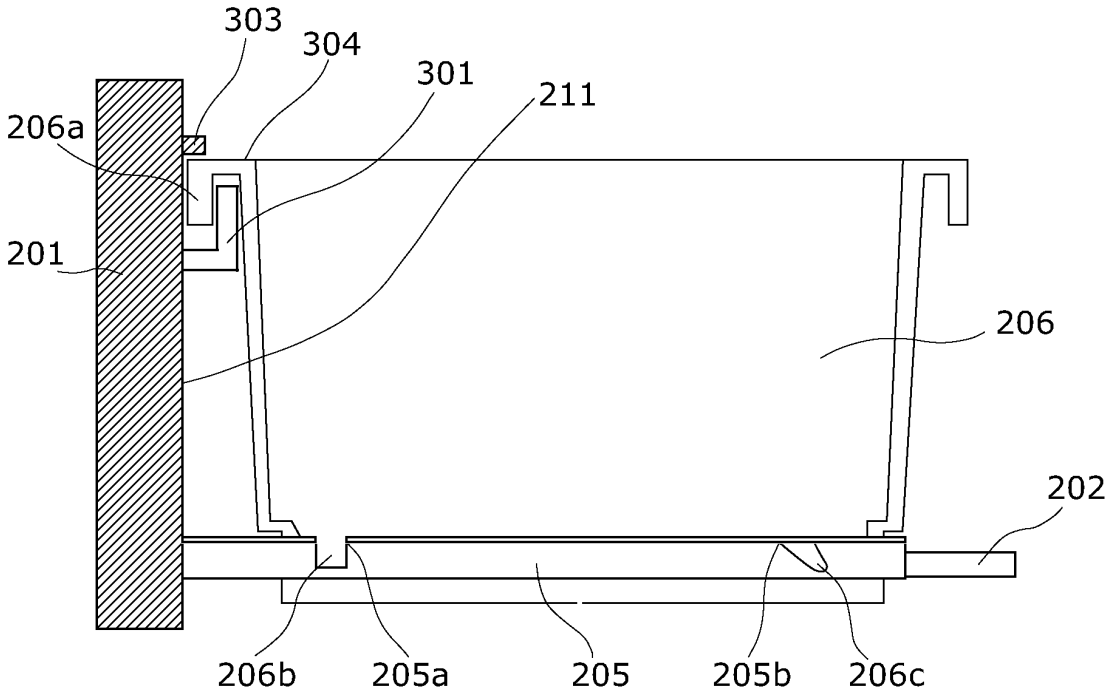

303
304
301
211
206a
201
206
202
206b
205a
205
205b
206c

FIG. 6

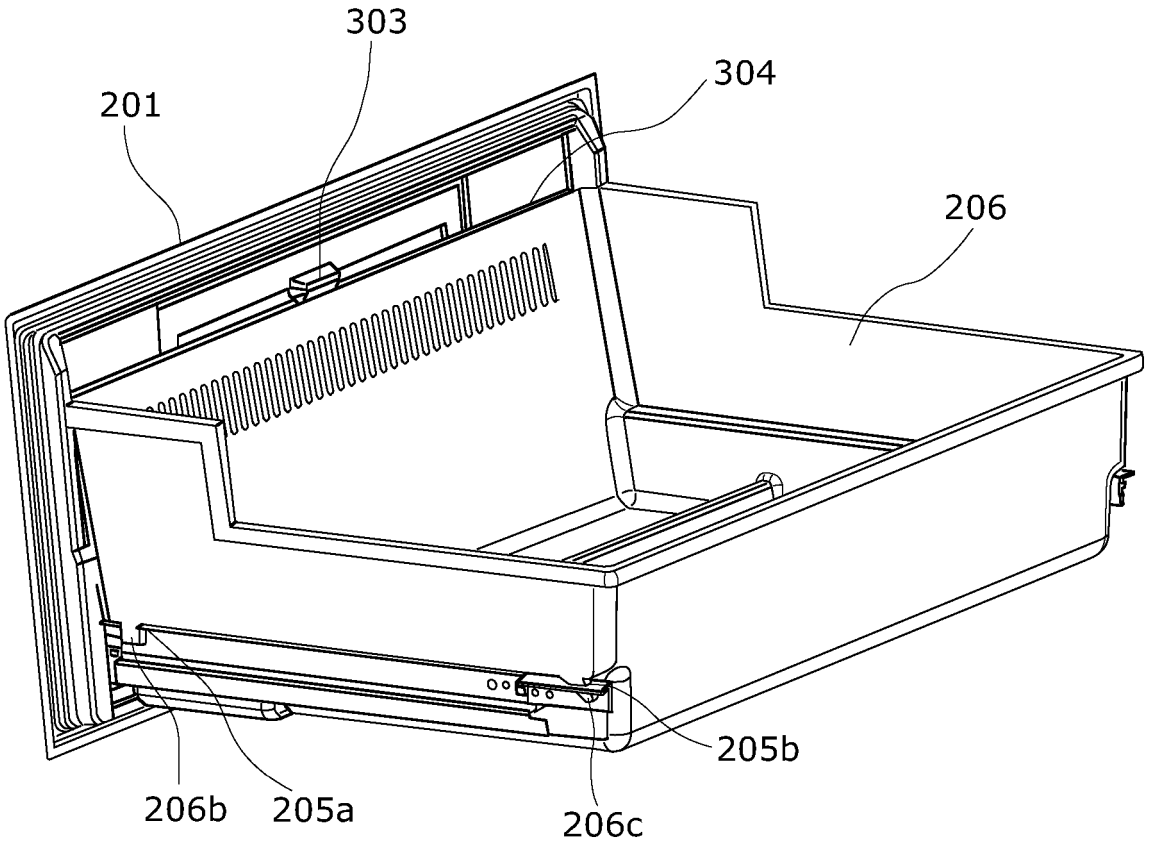


FIG. 7

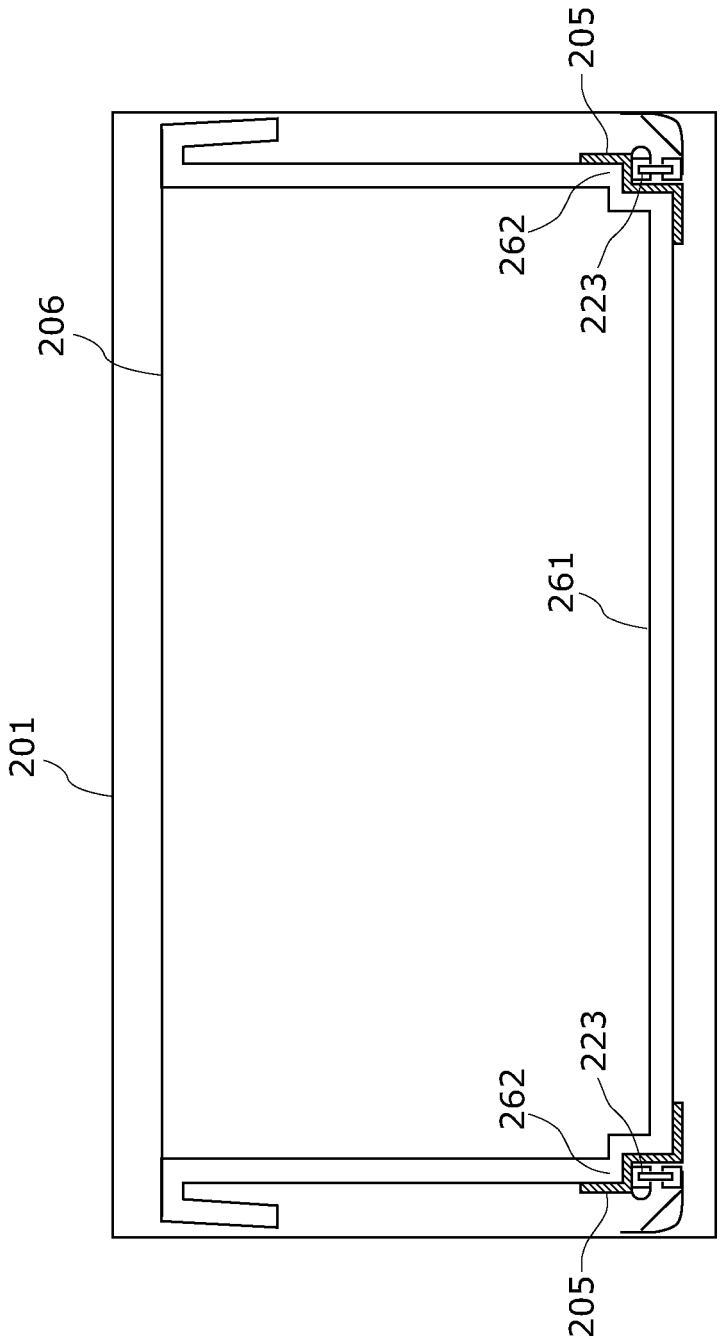


FIG. 8A

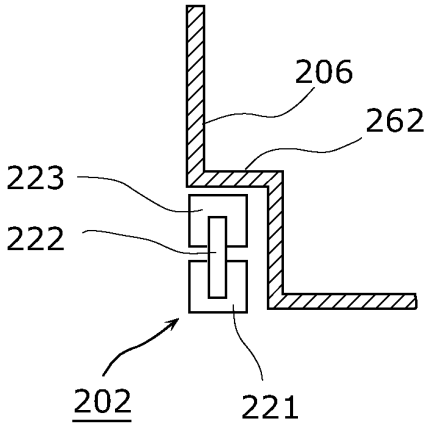


FIG. 8B

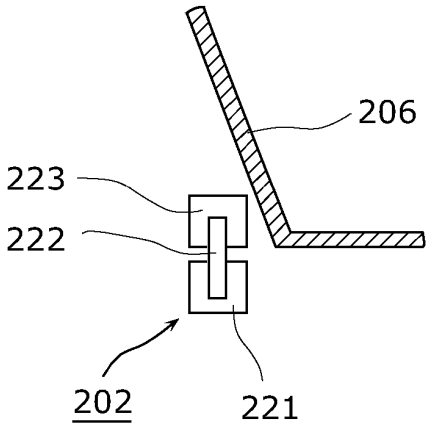


FIG. 8C

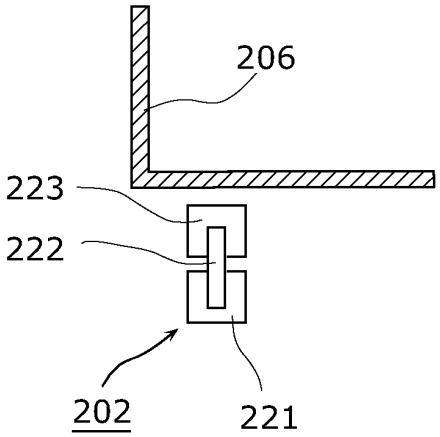
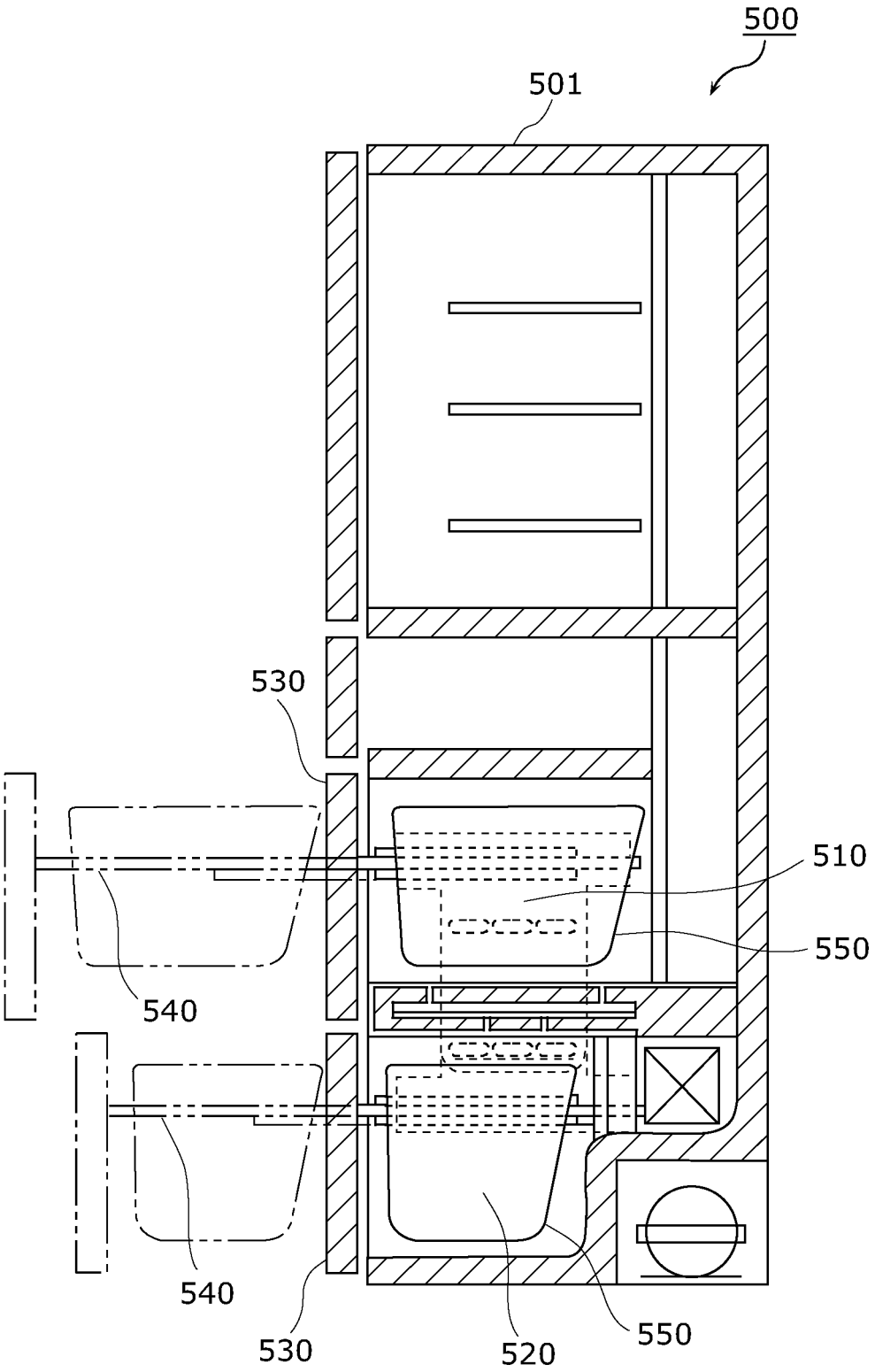


FIG. 9



REFERENCES CITED IN THE DESCRIPTION

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