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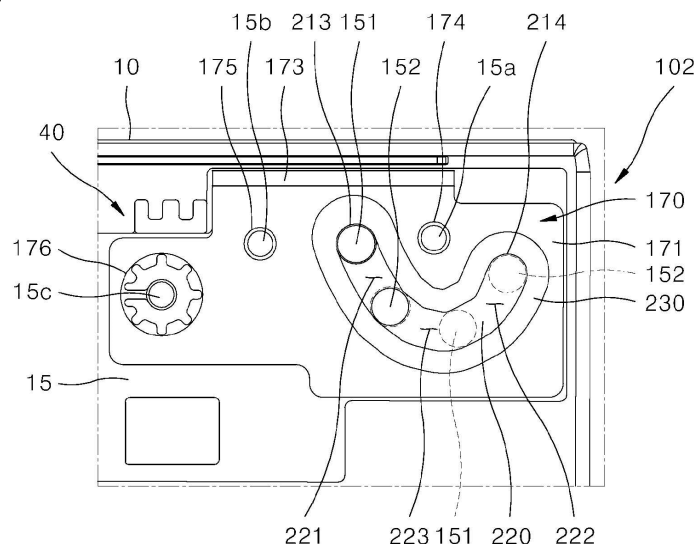
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(54) **REFRIGERATOR**

(57) In the refrigerator according to the present invention, by surrounding at least a partial area of an outer surface of a bush member for guiding movement of a pin with a bush reinforcing member, an amount of

impact applied to the bush member or a component of a door when the door is opened and closed can be absorbed.

[Fig. 4]



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Description

TECHNICAL FIELD

[0001] The present invention relates to a refrigerator including a hinge assembly.

BACKGROUND ART

[0002] A refrigerator is a home appliance that supplies cold air generated through heat exchange with a refrigerant circulating in a cooling cycle to a storage chamber, thereby storing various types of objects to be stored freshly in the storage chamber for a long period of time.

[0003] In the refrigerator, a front surface of the storage chamber can be opened or closed by a door.

[0004] The door may be implemented as a rotation type or a drawer type according to an opening and closing method.

[0005] When the door is a rotation type, the door may operate to be opened and closed by being rotated from a cabinet by a hinge assembly.

[0006] In this case, one side of the hinge assembly is fixed to the cabinet, and the door is connected to the other side of the hinge assembly so as to be rotatable in one direction from the cabinet.

[0007] Generally, a door rotates in one direction in a state where a center of rotation by a rotation shaft is fixed.

[0008] In this case, the center of rotation of the door is located inside the door, not outside the door.

[0009] Meanwhile, according to a user's request for a specific space where the refrigerator is installed, the refrigerator may be disposed adjacent to a wall of the installation space.

[0010] However, when the refrigerator is installed adjacent to the wall of the installation space as described above, the following problems may occur.

[0011] When the door is opened in a state where the center of rotation by the rotation shaft of the door is fixed inside the door, since a front corner portion of the door protrudes laterally beyond an outer side surface of a cabinet of the refrigerator, interference occurs with the wall of the installation space, so that it may be difficult for the door to be opened properly.

[0012] Accordingly, even when the refrigerator is installed adjacent to the wall of the installation space, a hinge assembly in which the center of rotation of the door varies can be used so that the door can be easily opened without being interfered with by the wall of the installation space.

[0013] However, in the case of such a hinge assembly in which the center of rotation of the door varies, an impact is applied to components for guiding the rotation of the door in a process of opening or closing the door, or a collision occurs between components, which may cause damage.

[0014] Particularly, when an action of rapidly opening and closing the door by applying more force than necessary is repeated according to a user's usage pattern, a repetitive load increase and impact occur on components constituting the hinge assembly and the door, which may cause deformation, damage, cracks, and the like.

SUMMARY OF THE INVENTION

TECHNICAL PROBLEM

[0015] An object of the present invention is to provide a refrigerator capable of absorbing an amount of impact acting on components constituting a door and a hinge assembly when the door is opened and closed.

[0016] Another object of the present invention is to provide a refrigerator capable of absorbing an amount of impact in both end areas of a bush member where the amount of impact is concentrated when a door is maximally closed or maximally opened.

[0017] Still another object of the present invention is to provide a refrigerator capable of sharing components of a bush reinforcing member and a door stopper.

[0018] Still another object of the present invention is to provide a refrigerator capable of preventing a pin of a hinge member from directly contacting both end portions of a guide slot to be damaged or deformed.

[0019] Still another object of the present invention is to provide a refrigerator capable of preventing a lifting phenomenon, in which a gasket disposed on a rear surface of a door is lifted from a front surface of a cabinet due to an installation tolerance of the gasket, from occurring.

[0020] Still another object of the present invention is to provide a refrigerator in which a door can be easily opened without being interfered with by a wall of an installation space even when the refrigerator is installed adjacent to the wall of the installation space.

[0021] The objects of the present invention are not limited to the above-mentioned objects, and other objects and advantages of the present invention not mentioned can be understood by the following description, and will be more clearly understood by embodiments of the present invention. In addition, it will be easily understood that the objects and advantages of the present invention can be realized by the means shown in the claims and combinations thereof.

TECHNICAL SOLUTION

[0022] A refrigerator according to an embodiment of the present invention for solving the problems as described above includes a cabinet including one or more storage chambers, one or more doors for opening and closing the storage chamber, and a hinge assembly having one side and the other side connected to the cabinet and the door, respectively, wherein the hinge

assembly includes a hinge member on which one or more pins are mounted, a bush member including a guide slot for guiding movement of the pin, and a bush reinforcing member surrounding at least a partial area of an outer surface of the bush member.

[0023] The bush reinforcing member may include a bush reinforcing portion formed to match a shape of an outer surface of the guide slot.

[0024] A guide rib on which the pin is seated may be disposed on an upper surface of the guide slot, and the bush reinforcing member may include a bush reinforcing portion formed to match a shape of an outer surface of the guide rib.

[0025] The bush reinforcing portion may contact the outer surface of the bush member.

[0026] The guide slot may include a first end portion and a second end portion located in directions in which the pin can maximally move in a first direction and a second direction, respectively, and the bush reinforcing portion may surround the first end portion and the second end portion of the guide slot.

[0027] The bush reinforcing portion may surround a first contact surface contacting the first end portion when the pin maximally moves in the first direction, and a second contact surface contacting the second end portion when the pin maximally moves in the second direction.

[0028] The bush reinforcing member may be a door stopper for controlling a maximum angle at which the door is opened.

[0029] The hinge member may include a stopper stopping portion, and the bush reinforcing member may include a stopper portion for restricting opening of the door by contacting the stopper stopping portion when the door is opened at a maximum angle.

[0030] The bush reinforcing member may be made of a material harder than the bush member.

[0031] The bush reinforcing member may include metal.

[0032] A first buffer region and a second buffer region formed to have a predetermined separation space so as not to contact the pin may be located at both end portions of the guide slot, respectively.

[0033] When the pin maximally moves in a first direction, the pin may move to a first boundary line of the first buffer region, and when the pin maximally moves in a second direction, the pin may move to a second boundary line of the second buffer region.

[0034] The first direction is a direction in which the door is closed, and when the door is closed at a maximum angle, the pin may move to the first boundary line.

[0035] The second direction is a direction in which the door is opened, and when the door is opened at a maximum angle, the pin may move to the second boundary line.

[0036] A gasket for sealing between the door and the cabinet is located on a rear surface of the door, and

when the gasket is maximally compressed, the door may be closed at a maximum angle.

[0037] An inner diameter of the guide slot corresponding to a path along which the pin moves may be identical to inner diameters of the first buffer region and the second buffer region.

[0038] The inner diameters of the first buffer region and the second buffer region may be larger than an inner diameter of the pin.

[0039] The guide slot includes a first end portion and a second end portion located in directions in which the pin can maximally move in a first direction and a second direction, respectively, wherein, when the pin maximally moves in the first direction, the pin does not contact the first end portion, and when the pin maximally moves in the second direction, the pin may not contact the second end portion.

[0040] When the door is opened and closed, a center of rotation of the door may vary according to a movement path of the pin.

[0041] The pin includes a first pin and a second pin arranged to be spaced apart from each other, and when the door is opened and closed, the first pin and the second pin may be constrained to the guide slot and move along the guide slot.

[0042] The pin includes a first pin and a second pin arranged to be spaced apart from each other, and the guide slot includes a first guide slot and a second guide slot arranged to be spaced apart from each other, wherein, when the door is opened and closed, the first pin is constrained to the first guide slot and moves along the first guide slot, and when the door is opened and closed, the second pin is constrained to the second guide slot and moves along the second guide slot.

EFFECTS OF THE INVENTION

[0043] In the refrigerator according to the present invention, by surrounding at least a partial area of an outer surface of a bush member for guiding movement of a pin with a bush reinforcing member, an amount of impact applied to the bush member or a component of a door when the door is opened and closed can be absorbed.

[0044] As described above, since the bush reinforcing member absorbs the amount of impact, deformation or damage of components constituting the door and the hinge assembly, which may occur when the door is repeatedly opened and closed, can be prevented.

[0045] In the refrigerator according to the present invention, by surrounding the first end portion and the second end portion of the guide slot located in directions in which the pin can maximally move in the first direction and the second direction, respectively, with the bush reinforcing member, the amount of impact in both end areas where the amount of impact is concentrated when the door is maximally closed or maximally

opened can be absorbed more effectively.

[0046] In the refrigerator according to the present invention, since the bush reinforcing member for absorbing the amount of impact due to opening and closing of the door can also serve as a door stopper for controlling a maximum angle at which the door is opened, components can be shared and space utilization of components installed on the door can be increased.

[0047] In addition, since the refrigerator according to the present invention includes a first buffer region and a second buffer region formed to have a predetermined separation space so as not to contact the pin at both end portions of the guide slot, respectively, even when the door is closed at a maximum angle or opened at a maximum angle, the pin of the hinge member can be prevented from directly contacting both end portions of the guide slot.

[0048] Accordingly, even when a user applies more force than necessary to the door so that the door is closed or opened beyond the maximum angle, the pin of the hinge member is prevented from directly contacting both end portions of the guide slot, so that deformation or damage of components constituting the door and the hinge assembly can be prevented.

[0049] In addition, since the refrigerator according to the present invention includes the first buffer region, which is a predetermined separation space, between the pin and the first end portion of the guide slot, when the door is closed at the maximum angle, a gasket of the door contacting the front surface of the cabinet to seal the storage chamber can be prevented from being lifted from the front surface of the cabinet due to an installation tolerance.

[0050] In addition, in the refrigerator according to the present invention, as the center of rotation of the door varies according to the movement path of the pin when the door is opened and closed, even when the refrigerator is installed adjacent to the wall of the installation space, the door can be easily opened without being interfered with by the wall of the installation space.

[0051] Specific effects of the present invention in addition to the above-described effects will be described together while describing specific details for carrying out the invention below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0052]

FIG. 1 is a front perspective view of a refrigerator.

FIG. 2 is an exploded perspective view of a second hinge assembly disposed on an upper portion of a first door.

FIG. 3 illustrates a second hinge assembly connected to a lower portion of a first door in a state where a door is closed.

FIGS. 4 to 6 illustrate various embodiments of a bush reinforcing member.

FIG. 7 illustrates the second hinge assembly connected to the lower portion of the first door in a state where the door is opened at a maximum opening angle.

FIG. 8 illustrates a first buffer region of a guide slot according to an embodiment in a state where the door is closed.

FIG. 9 illustrates a second buffer region of the guide slot according to an embodiment in a state where the door is opened at the maximum opening angle.

FIG. 10 illustrates another first buffer region of a guide slot according to another embodiment in a state where the door is closed.

FIG. 11 illustrates a second buffer region of a guide slot according to another embodiment in a state where the door is opened at the maximum opening angle.

FIG. 12 is an exploded perspective view of a second hinge assembly according to another embodiment.

FIG. 13 is a plan view illustrating that a bush reinforcing member is coupled to a bush member according to another embodiment.

FIG. 14 is a plan view illustrating a bush member mounted on a door according to another embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0053] The above-mentioned objects, features, and advantages will be described later in detail with reference to the accompanying drawings, and accordingly, those skilled in the art to which the present invention pertains will be able to easily practice the technical spirit of the present invention. In describing the present invention, when it is determined that a detailed description of a known technology related to the present invention may unnecessarily obscure the subject matter of the present invention, the detailed description will be omitted. Hereinafter, preferred embodiments according to the present invention will be described in detail with reference to the accompanying drawings. In the drawings, the same reference numerals are used to indicate the same or similar components.

[0054] Although first, second, etc. are used to describe various components, it goes without saying that these components are not limited by these terms. These terms are only used to distinguish one component from another component, and it goes without saying that the first component may be the second component unless otherwise specified.

[0055] Throughout the specification, each component may be singular or plural unless otherwise specified.

[0056] Hereinafter, the arrangement of an arbitrary configuration on the "upper portion (or lower portion)" of a component or "on (or under)" a component may mean not only that the arbitrary configuration is dis-

posed in contact with the upper surface (or lower surface) of the component, but also that another configuration may be interposed between the component and the arbitrary configuration disposed on (or under) the component.

[0057] In addition, when it is described that a certain component is "connected", "coupled", or "joined" to another component, although the components may be directly connected or joined to each other, it should be understood that another component may be "interposed" between the respective components, or each component may be "connected", "coupled", or "joined" through another component.

[0058] As used herein, expressions in the singular include plural expressions unless the context clearly indicates otherwise. In the present application, terms such as "consists of" or "comprises" should not be interpreted as necessarily including all of the various components or steps described in the specification, and should be interpreted as meaning that some components or steps may not be included, or that additional components or steps may be further included.

[0059] Throughout the specification, when referring to "A and/or B", this means A, B, or A and B unless otherwise specified, and when referring to "C to D", this means C or more and D or less unless otherwise specified.

[0060] Hereinafter, a refrigerator according to some embodiments of the present invention will be described.

[0061] First, with reference to FIGS. 1 to 3, a connection relationship among a refrigerator, a hinge assembly, and main components constituting the same according to an embodiment of the present invention will be described.

[0062] An appearance of the refrigerator (1) may be formed by a cabinet (2) including one or more storage chambers inside, which are storage spaces for products, and one or more doors capable of opening and closing an opened front surface of the cabinet (2).

[0063] The cabinet (2) may include an outer case (4) forming an outer surface of the refrigerator (1) and an inner case (3) forming an inner surface thereof.

[0064] The outer case (4) and the inner case (3) are formed to have a space spaced apart from each other, and the spaced space may be filled with an insulating material to form a foaming region.

[0065] An inside of the inner case (3) may be divided into one or more storage spaces.

[0066] The inner case (3) may include one or more storage chambers, and for example, when a plurality of storage chambers are provided, it may include a first storage chamber (5) and a second storage chamber (6) arranged in an up-down direction.

[0067] As an example, the first storage chamber (5) located at an upper portion may be a refrigerating chamber, and the second storage chamber (6) located at a lower portion may be a freezing chamber.

[0068] However, positions of the first storage chamber (5) and the second storage chamber (6) are not limited thereto, and in another embodiment, the positions of the first storage chamber (5) and the second storage chamber (6) may be reversed, or they may be arranged side by side in a left-right direction.

[0069] The first storage chamber (5) may be opened and closed by a pair of first doors (10) arranged side by side in a left-right direction.

[0070] The pair of first doors (10) may be arranged to be connected to the cabinet (2) so as to be rotatable from the cabinet (2) by hinge assemblies respectively disposed on one side and the other side of the cabinet (2).

[0071] For example, a first hinge assembly (30) for supporting an upper side of the first door (10) may be disposed in an upper region of the first door (10), and a second hinge assembly (40) for supporting a lower side of the first door (10) may be disposed in a lower region of the first door (10).

[0072] On one side of the first door (10) adjacent to an upper surface of one side of the cabinet (2), a hinge seating portion (17) in which a predetermined space is recessed in a direction from a rear surface and a side surface of the first door (10) toward a front surface may be formed.

[0073] That is, the hinge seating portion (17) may be formed at a corner portion on one side where the rear surface and the side surface of the first door (10) contact.

[0074] A first hinge assembly (30) allowing the first door (10) to be rotatably rotated from the cabinet (2) may be mounted on the hinge seating portion (17).

[0075] The second hinge assembly (40) may support an upper side of a second door (20) disposed below the first door (10).

[0076] Accordingly, the second hinge assembly (40) can simultaneously support the lower side of the first door (10) and the upper side of the second door (20).

[0077] A third hinge assembly (50) for supporting a lower side of the second door (20) may be disposed in a lower region of the second door (20).

[0078] A height adjusting member (51) for adjusting an up-down height difference of the refrigerator (1) may be disposed on the third hinge assembly (50).

[0079] As described above, the first door (10) is opened and closed so as to be rotatable from the cabinet (2) by the first hinge assembly (30) and the second hinge assembly (40), and the second door (20) may be opened and closed so as to be rotatable from the cabinet (2) by the second hinge assembly (40) and the third hinge assembly (50).

[0080] Although structures of the first hinge assembly (30), the second hinge assembly (40), and the third hinge assembly (50) described in the present specification fixed to the cabinet (2) may be different from each other, an operation mechanism for rotating the first door (10) and the second door (20) to open and close may

be the same.

[0081] Hereinafter, the description will focus on the second hinge assembly (40), and the configuration and operation mechanism of the first hinge assembly (30) and the second hinge assembly (40) may be equally applied to the first hinge assembly (30) and the third hinge assembly (50) for which detailed descriptions are omitted.

[0082] Referring to FIGS. 2 and 3, when viewed from a front direction of the refrigerator (1), the second hinge assembly (40) may be connected to a lower region of the first door (10) located on a right side.

[0083] The second hinge assembly (40) connected to an upper region of the first door (10) located on a left side when viewed from the front direction of the refrigerator (1) may have the same structure as the second hinge assembly (40) located on the right side or a structure in which left and right shapes are reversed.

[0084] A front frame (11), a rear frame, and a side frame (12) are respectively disposed on a front surface, a rear surface, and a side surface of the first door (10) so that the front surface, the rear surface, and the side surface of the first door (10) can be finished, respectively, and an upper cap deco may be disposed on an upper surface of the first door (10) so that the upper surface of the first door (10) can be finished.

[0085] A door liner (18) forming a rear surface of the first door (10) and providing a shape for mounting a storage structure such as a basket or other components may be disposed on the rear surface of the first door (10).

[0086] Accordingly, the rear surface of the first door (10) may be finished by the door liner (18) and the rear frame, and the rear frame may be located higher than the door liner (18) to finish the rear surface of the upper region of the first door (10).

[0087] In addition, a gasket (19) may be disposed on the rear surface of the first door (10).

[0088] For example, the gasket (19) may be disposed to surround an outer circumference of the door liner (18).

[0089] When the first door (10) is closed, the gasket (19) comes into contact with a front surface portion of the cabinet (2) to seal the first storage chamber (5), thereby preventing cold air from leaking from the first storage chamber (5).

[0090] The first door (10) may be formed to further protrude in an upward direction beyond a top surface of the cabinet (2).

[0091] The second hinge assembly (40) may include a second hinge member (102).

[0092] The second hinge member (102) may include a flange portion (112) fixed to the front surface of the cabinet (2) and a hinge bracket (122) extending forward of the flange portion (112).

[0093] One or more fastening holes are formed in the flange portion (112), and the flange portion (112) may be fixed to the front surface of the cabinet (2) through a

separate fastening member fastened through the fastening holes.

[0094] The hinge bracket (122) may extend to protrude forward perpendicularly to the flange portion (112).

[0095] In front of the hinge bracket (122), a pair of pin coupling holes (140) penetrating in an up-down direction may be formed to be spaced apart from each other at a predetermined distance.

[0096] A first pin (151) and a second pin (152), which are a pair of pins (150) extending in the up-down direction, may be respectively connected to the pair of pin coupling holes (140).

[0097] Accordingly, the first pin (151) and the second pin (152) may also be formed to be spaced apart from each other at a predetermined distance.

[0098] A virtual line connecting a center of the first pin (151) and a center of the second pin (152) may be arranged to be inclined to have a predetermined angle with respect to the front surface of the first door (10).

[0099] The pin (150) connected to the pin coupling hole (140) may be connected to protrude long in both directions, which are an upward direction and a downward direction of the hinge bracket (122).

[0100] Accordingly, the pin (150) extending in the upward direction of the hinge bracket (122) may control movement of a lower surface of the first door (10), and the pin (150) extending in the downward direction of the hinge bracket (122) may control movement of an upper surface of the second door (20).

[0101] The pin (150) may be formed to have a generally uniform outer diameter, and an expanded portion (153) having a further expanded outer diameter may be formed in some regions.

[0102] The expanded portion (153) may be arranged to contact an upper surface of the second hinge member (122).

[0103] A stopper stopping portion (124) may be formed in front of the hinge bracket (122).

[0104] For example, the stopper stopping portion (124) may be formed to protrude to have a predetermined height and thickness in an upward direction of the hinge bracket (122).

[0105] A maximum angle at which the first door (10) is opened may be determined according to an arrangement form and an arrangement angle of the stopper stopping portion (124).

[0106] The stopper stopping portion (124) may be disposed adjacent to a side surface of the first door (10) rather than the pair of pins (150).

[0107] In addition, a virtual line in a direction in which the stopper stopping portion (124) extends may be arranged to be inclined to have a predetermined angle with respect to the front surface of the first door (10).

[0108] The hinge bracket (122) may be provided with a latch catching portion (123) formed by cutting a partial area of an outer surface of the hinge bracket (122).

[0109] For example, as a recessed space drawn in-

ward from the outer surface of the hinge bracket (122) is formed between the latch catching portion (123) and the flange portion (112), the latch catching portion (123) may be formed to relatively protrude.

[0110] The second hinge assembly (40) may include a latch member (160) fastened to a lower surface of the first door (10) to perform a stopper function so that the first door (10) maintains a closed state.

[0111] The latch member (160) may include a latch portion (161) formed to be hook-coupled to the latch catching portion (123) of the second hinge member (102).

[0112] The latch portion (161) may be formed to have a generally U-shaped shape.

[0113] In a state where the first door (10) is closed, an end portion of the latch portion (161) is located inside the latch catching portion (123) of the second hinge member (102) so as to be hook-coupled by the latch catching portion (123).

[0114] Accordingly, the latch portion (161) can perform a stopper function for maintaining the closed state of the first door (10).

[0115] In addition, the second hinge assembly (40) may include a door stopper (170) capable of controlling a maximum opening angle of the first door (10).

[0116] The door stopper (170) may include a stopper body portion (171) extending in a horizontal direction.

[0117] A stopper portion (173) bent and extending in a downward direction may be formed on one side of the stopper body portion (171).

[0118] The door stopper (170) may be fixed to a lower cap deco (15) finishing the lower surface of the first door (10).

[0119] For example, a first lower hole (15a), a second lower hole (15b), and a third lower hole (15c) may be formed in the lower cap deco (15).

[0120] Correspondingly, a first fastening hole (174), a second fastening hole (175), and a third fastening hole (176) formed at positions respectively corresponding to the first lower hole (15a), the second lower hole (15b), and the third lower hole (15c) may be formed in the stopper body portion (171) of the door stopper (170).

[0121] A first fastening member (181) fastens the first lower hole (15a) and the first fastening hole (174), and a second fastening member (182) fastens the second lower hole (15b) and the second fastening hole (175), thereby fixing the door stopper (170) to the lower surface of the first door (10).

[0122] And the third lower hole (15c) and the third fastening hole (176) are for fixing the latch member (160), and a third fastening member (183) penetrating the latch member (160) fastens the third lower hole (15c) and the third fastening hole (176) together with the latch member (160), thereby fixing the latch member (160) to the lower surface of the first door (10).

[0123] As described above, since the latch member (160) can be fixed to the lower surface of the first door (10) with the door stopper (170) having very high

strength interposed therebetween, a fastening member for fixing the door stopper (170) and the latch member (160) can be shared, and the latch member (160) can be assembled in closer contact with the door stopper (170).

[0124] The first fastening member (181), the second fastening member (182), and the third fastening member (183) may use screws, but are not limited thereto.

[0125] When the door stopper (170) is fixed to the lower surface of the first door (10), the stopper portion (173) may be formed to be bent in a downward direction of the first door (10).

[0126] In addition, the stopper portion (173) may be formed to extend also in a direction parallel to the front surface of the first door (10).

[0127] When the first door (10) is opened, when the stopper portion (173) of the door stopper portion (173) fixed to the first door (10) contacts the stopper stopping portion (124) of the second hinge member (102), rotation of the first door (10) is stopped.

[0128] Accordingly, at a point where the stopper portion (173) of the door stopper portion (173) contacts the stopper stopping portion (124) of the second hinge member (102), a maximum opening angle of the first door (10) may be defined.

[0129] The second hinge assembly (40) may include a bush member (200) for guiding movement of the pin (150).

[0130] The bush member (200) may be inserted into and fixed to the lower cap deco (15) of the first door (10).

[0131] The bush member (200) may include a bush body portion (210) provided with a guide slot (220) having a hollow that provides a space into which the pin (150) protruding in a downward direction from the second hinge member (102) is inserted.

[0132] The bush body portion (210) may be formed such that an upward direction into which the pin (150) is inserted is open, and a downward direction, which is an opposite direction, is closed.

[0133] The bush body portion (210) may be formed in a shape corresponding to the guide slot (220).

[0134] The guide slot (220) may be formed to have a generally U-shape.

[0135] For example, a first end portion (213) and a second end portion (214), which are both end portions of the guide slot (220), may have a U-shape bent to face the front surface of the first door (10).

[0136] Accordingly, a circumferential length of a first outer surface of the bush body portion (210) facing the rear surface of the first door (10) may be longer than a circumferential length of a second outer surface of the bush body portion (210) facing the front surface of the first door (10).

[0137] In this case, the first outer surface (211) of the bush body portion (210) corresponds to an outer guide line of the guide slot (220), and the second outer surface (212) of the bush body portion (210) may corre-

spond to an inner guide line of the guide slot (220).

[0138] The first end portion (213) connects one end of the outer guide line and one end of the inner guide line, and the second end portion (214) may connect the other end of the outer guide line and the other end of the inner guide line.

[0139] The guide slot (220) may have a form in which section regions of various shapes such as a circular arc portion and/or a straight line portion are connected.

[0140] A guide rib (230) may be formed along an upper surface border portion of the bush body portion (210).

[0141] When the pin (150) of the second hinge member (102) is inserted into the guide slot (220) of the bush member (200) and moves along the guide slot (220), the guide rib (230) can guide the expanded portion (153) of the pin (150) to slide along an upper surface of the guide rib (230).

[0142] That is, the pin (150) of the second hinge member (102) inserted into the guide slot (220) of the bush member (200) slides along the guide slot (220) in a state of contacting the guide rib (230), thereby performing a role of generating movement of the first door (10).

[0143] Accordingly, the bush member (200) can perform a role of determining a rotational movement direction of the first door (10) while contacting the pin (150).

[0144] Such a rotational movement direction of the first door (10) may vary according to a shape of the guide slot (220) formed in the bush member (200).

[0145] In this case, an area of the guide slot (220) disposed adjacent to the first end portion (213) may be defined as a first guide area (221), an area of the guide slot (220) disposed adjacent to the second end portion (214) may be defined as a second guide area (222), and an area of the guide slot (220) between the first guide area (221) and the second guide area (222) may be defined as a third guide area (223).

[0146] Accordingly, the guide slot (220) defining a movement path along which the pin (150) moves may be formed such that the first guide area (221), the third guide area (223), and the second guide area (222) are sequentially arranged along the path along which the pin (150) moves.

[0147] In addition, the guide slot (220) may also be described as having the second guide area (222), the third guide area (223), and the first guide area (221) sequentially arranged along the path along which the pin (150) moves.

[0148] Curvatures of the guide slot (220) corresponding to the first guide area (221), the second guide area (222), and the third guide area (223) may be formed to be different from each other.

[0149] In addition, guide areas having different curvatures may be included even within the first guide area (221), the second guide area (222), and the third guide area (223).

[0150] For example, the third guide area (223) may

include three guide areas having different curvatures.

[0151] The stopper body portion (171) may be formed to surround at least a partial area of the outer surface of the bush member (200).

[0152] For example, the stopper body portion (171) may further include a bush reinforcing portion (172) opened to surround at least a part of an outer circumference portion.

[0153] As the bush reinforcing portion (172) is formed to surround at least a part of the outer circumference portion of the bush member (200), strength of the outer surface of the bush member (200) can be reinforced.

[0154] The stopper body portion (171) performing a role of reinforcing the strength of the bush member (200) may be named a bush reinforcing member (171).

[0155] Hereinafter, the description will be made by naming the stopper body portion (171) as the bush reinforcing member (171).

[0156] The bush reinforcing portion (172) of the bush reinforcing member (170) may be formed to match a shape of the outer surface of the guide slot (220).

[0157] In this case, the bush reinforcing portion (172) of the bush reinforcing member (170) may contact the outer surface of the guide slot (220).

[0158] In addition, the bush reinforcing portion (172) of the bush reinforcing member (170) may be formed to match a shape of an outer surface of the guide rib (230) of the bush member (200).

[0159] In this case, the bush reinforcing portion (172) of the bush reinforcing member (170) may contact the outer surface of the guide rib (230).

[0160] It is preferable that the bush reinforcing member (170) is made of a hard material having higher strength than the bush member (200) so as to sufficiently absorb and support an external force and an impact force applied to the bush member (200).

[0161] For example, the bush reinforcing member (170) may include metal.

[0162] As an example, the bush reinforcing member (170) may be formed of sheet metal, which is a metal sheet, and formed through sheet metal processing.

[0163] Referring to FIG. 3, in a state where the first door (10) is completely closed, that is, when an angle between the first door (10) and the cabinet (2) is 0 degrees, the first pin (151) is disposed adjacent to the first end portion (213) in the first guide area (221) of the guide slot (220), and the second pin (152) may be located in the third guide area (223).

[0164] Accordingly, the first pin (151) and the second pin (152) may be located in areas where curvatures of the guide slot (220) are different from each other.

[0165] In this case, the gasket (19) formed on the rear surface of the first door (10) contacts the front surface of the cabinet (2) to seal the first storage chamber (5).

[0166] Referring to FIG. 7, in a state where the first door (10) is completely opened, the second pin (152) is disposed adjacent to the second end portion (214) in

the second guide area (222) of the guide slot (220), and the first pin (151) may be located in the third guide area (223).

[0167] Accordingly, the first pin (151) and the second pin (152) may be located in areas where curvatures of the guide slot (220) are different from each other.

[0168] For example, an opening angle between the first door (10) and the cabinet (2) may be 110 degrees.

[0169] In this case, opening of the first door (10) may be stopped by interference due to contact between the stopper portion (173) and the stopper stopping portion (124).

[0170] The refrigerator (1) according to the present invention can allow the first door (10) to be easily opened without being interfered with by a wall of an installation space, even when the refrigerator (1) is installed adjacent to the wall of the installation space.

[0171] For example, a center of rotation of the first door (10) may be defined as an intersection of a line normal to the guide slot (220) at a position of the first pin (151) and a line normal to the guide slot (220) at a position of the second pin (152).

[0172] Referring to FIG. 3, in a state where the first door (10) is completely closed, the center of rotation may be located on a front outer side relative to the first door (10).

[0173] In addition, when opening the first door (10), the center of rotation moves together toward an inward direction of the first door (10) according to rotation of the first door (10), and when the first door (10) is maximally opened as shown in FIG. 7, it may be located inside the first door (10).

[0174] If the first door (10) rotates around one fixed rotation shaft, since the first door (10) rotates around one fixed rotation shaft, a front corner portion of the first door (10) located ahead of the one fixed rotation shaft protrudes further outward than a side surface of the cabinet (2).

[0175] Accordingly, when the refrigerator (1) is installed adjacent to the wall of the installation space, it may be difficult to open the first door (10).

[0176] However, according to the present invention, since the center of rotation of the first door (10) varies according to a movement path of the pin (150) when the first door (10) is opened and closed, even when the refrigerator (1) is installed adjacent to the wall of the installation space, the first door (10) can be easily opened without being interfered with by the wall of the installation space.

[0177] In addition, in a process in which the first pin (151) and the second pin (152) move within the guide slot (220), the first pin (151) and the second pin (152) may be disposed in guide areas of the guide slot (220) having different curvatures.

[0178] For example, when the first pin (151) is located in the first guide area (221), the second pin (152) is disposed in the third guide area (223), and when the first pin (151) is located in the third guide area (223),

the second pin (152) may be disposed in the second guide area (222).

[0179] In addition, even when the first pin (151) and the second pin (152) are disposed in the third guide area (223), they may be respectively located within sections having different curvatures even within the third guide area (223).

[0180] As described above, as the first pin (151) and the second pin (152) move within the guide slot (220) while being located in the guide areas of the guide slot (220) having different curvatures, the first door (10) can be horizontally opened and closed without sagging.

[0181] Meanwhile, in the case of the first hinge assembly (30) in which the center of rotation of the first door (10) varies as described above, when an action of rapidly opening and closing the first door (10) by applying more force than necessary is repeated according to a user's usage pattern, a repetitive load increase and impact occur on components constituting the first hinge assembly (30) and the first door (10), which may cause deformation, damage, cracks, and the like.

[0182] For example, in a process of opening and closing the first door (10), a pair of pins (150) move along the guide slot (220) of the bush member (200).

[0183] However, when a user opens and closes the first door (10) at a high speed, an inertial force is generated in the first door (10) in a movement direction of the first door (10), so that when the first door (10) is maximally opened or closed, a collision may occur between the pin (150) and the bush member (200).

[0184] When a movement speed of the first door (10) is high, an amount of impact due to the collision between the pin (150) and the bush member (200) may become larger.

[0185] The first door (10) is completely closed by contacting the cabinet (2), and may be opened at a maximum angle to a point stopped by the bush reinforcing member (170) which is a door stopper.

[0186] Particularly, when opening the first door (10) at the maximum angle, the amount of impact at the moment when the first door (10) stops by the bush reinforcing member (170), which is the door stopper, becomes larger.

[0187] In the case of the refrigerator (1), since it is used such that a user repeatedly opens and closes the first door (10), damage may occur due to a limit lifespan of components due to the repeated opening and closing action of the first door (10).

[0188] Therefore, the refrigerator (1) according to the present invention surrounds at least a partial area of an outer surface of the bush member (200) for guiding movement of the pin (150) with the bush reinforcing member (170), thereby absorbing an amount of impact applied to the bush member (200) or a component of the first door (10) when opening and closing the first door (10).

[0189] As described above, since the bush reinforcing member (170) absorbs the amount of impact, de-

formation or damage of components constituting the first door (10) and the hinge assembly, which may occur when repeatedly opening and closing the first door, can be prevented.

[0190] In addition, in the refrigerator (1) according to the present invention, since the bush reinforcing member (170) for absorbing the amount of impact due to opening and closing of the first door (10) can also serve as a door stopper for controlling a maximum angle at which the first door (10) is opened, components can be shared and space utilization of components installed on the first door (10) can be increased.

[0191] Referring to FIG. 5, the bush reinforcing portion (172) of the bush reinforcing member (170) may be formed to surround a partial area of the bush member (200).

[0192] The guide slot (220) of the bush member (200) may include a first end portion (213) located in a direction in which the first pin (151) can maximally move in a first direction, and a second end portion (214) located in a direction in which the second pin (152) can maximally move in a second direction.

[0193] The first direction is a direction in which the first door (10) is closed, and the second direction may be a direction in which the first door (10) is opened.

[0194] The bush reinforcing portion (172) of the bush reinforcing member (170) may be formed in a shape surrounding the first end portion (213) and the second end portion (214) of the guide slot (220).

[0195] As described above, at a time point when the first door (10) is closed or completely opened, the amount of impact applied to the bush member (200) by a rotational inertial force of the first door (10) may become larger.

[0196] Therefore, even if the bush reinforcing portion (172) according to the present invention does not surround the entire outer circumference portion of the guide slot (220), by being formed in a shape surrounding the first end portion (213) and the second end portion (214) of the guide slot (220), the amount of impact at the first end portion (213) and the second end portion (214) of the bush member (200) where the amount of impact is large can be absorbed to prevent damage more effectively.

[0197] The first end portion (213) and the second end portion (214) of the guide slot (220) may be arranged to face the front surface of the first door (10).

[0198] Accordingly, by being formed to surround the outer surface of the guide slot (220) facing the front surface of the first door (10), including the first end portion (213) and the second end portion (214) of the guide slot (220), the bush reinforcing portion (172) absorbs the amount of impact at the outer surface of the bush member (200) including the first end portion (213) and the second end portion (214) of the bush member (200) where the amount of impact is large, thereby preventing damage to the bush member (200) more effectively.

[0199] The bush reinforcing portion (172) may be formed in a shape corresponding to the outer surface of the guide slot (220), and may also be formed in a shape corresponding to the outer surface of the guide rib (230).

[0200] Referring to FIG. 6, the bush reinforcing portion (172) of the bush reinforcing member (170) may be formed to have a minimum shape capable of absorbing the amount of impact of the bush member (200).

[0201] For example, when the pin (150) maximally moves in the first direction of the guide slot (220), the first pin (151) may contact the first end portion (213), and an area of the first end portion (213) of the guide slot (220) contacted by the first pin (151) may be defined as a first contact surface (217).

[0202] In addition, when the pin (150) maximally moves in the second direction of the guide slot (220), the second pin (152) may contact the second end portion (214), and an area of the second end portion (214) of the guide slot (220) contacted by the second pin (152) may be defined as a second contact surface (218).

[0203] As described above, since the first contact surface (217) and the second contact surface (218) of the guide slot (220) are areas that can directly contact the first pin (151) and the second pin (152), respectively, the amount of impact applied when the first door (10) is opened and closed may become larger.

[0204] Therefore, by being formed to surround the first contact surface (217) and the second contact surface (218) of the guide slot (220), the bush reinforcing portion (172) absorbs the amount of impact at the outer surface of the bush member (200) including the first contact surface (217) and the second contact surface (218) of the bush member (200) where the amount of impact is large, thereby preventing damage to the bush member (200) more effectively.

[0205] Meanwhile, in order to prevent damage to the bush member (200) and the pin (150) due to an impact applied through direct contact between the pin (150) and the bush member (200), buffer regions may be formed such that both end portions of the bush member (200) do not contact the pin (150).

[0206] For example, referring to FIGS. 8 and 9, at both end portions of the guide slot (220), a first buffer region (227) and a second buffer region (228) formed to have a predetermined separation space so as not to contact the pin (150) may be located, respectively.

[0207] When the first pin (151) maximally moves in the first direction, the first pin (151) may move to a first boundary line (229a) of the first buffer region (227).

[0208] When the first door (10) is maximally closed, so that the first pin (151) does not directly contact the first end portion (213) of the guide slot (220), an end portion of the first pin (151) may move to the first boundary line (229a) of the guide slot (220) spaced apart from the first end portion (213) of the guide slot (220) by a predetermined distance.

[0209] That is, when the first door (10) is closed at a maximum angle, the first pin (151) may move to the first boundary line (229a), and a space between the first boundary line (229a) and the first end portion (213) may be defined as the first buffer region (227).

[0210] The case where the first door (10) is closed at the maximum angle meant in the present specification may mean a state in which the gasket (19) of the first door (10) is maximally compressed.

[0211] Therefore, the first buffer region (227) can act as an avoidance space for preventing direct collision between the first pin (151) and the first end portion (213) of the guide slot (220).

[0212] In addition, when the second pin (152) maximally moves in the second direction, the second pin (152) may move to a second boundary line (229b) of the second buffer region (228).

[0213] When the first door (10) is maximally opened, so that the second pin (152) does not directly contact the second end portion (214) of the guide slot (220), an end portion of the second pin (152) may move to the second boundary line (229b) of the guide slot (220) spaced apart from the second end portion (214) of the guide slot (220) by a predetermined distance.

[0214] That is, when the first door (10) is opened at a maximum angle, the second pin (152) may move to the second boundary line (229b), and a space between the second boundary line (229b) and the second end portion (214) may be defined as the second buffer region (228).

[0215] Therefore, the second buffer region (228) can act as an avoidance space for preventing direct collision between the second pin (152) and the second end portion (214) of the guide slot (220).

[0216] Accordingly, when the first door (10) is opened, the first door (10) can be stopped from further opening by contact between the bush reinforcing member (170) and the stopper stopping portion (124) of the second hinge member (102), but by a rotational inertial force of the first door (10), the first door (10) may tend to be opened more beyond the maximum angle that can be momentarily opened, and in this process, an impact between the second pin (152) of the first door (10) and the guide slot (220) may occur.

[0217] Since the refrigerator (1) according to the present invention includes the first buffer region (227) and the second buffer region (228) formed to have a predetermined separation space so as not to contact the pin (150) at both end portions of the guide slot (220), respectively, even when the first door (10) is closed at the maximum angle or opened at the maximum angle, the pin (150) of the hinge member can be prevented from directly contacting both end portions of the guide slot (220).

[0218] Accordingly, even when a user applies more force than necessary to the door so that the door is closed or opened beyond the maximum angle, the pin (150) of the hinge member is prevented from directly

contacting both end portions of the guide slot (220), so that deformation or damage of components constituting the door and the hinge assembly can be prevented.

[0219] In addition, the refrigerator (1) according to the present invention can also prevent a lifting phenomenon, in which the gasket (19) of the first door (10) contacting the front surface of the cabinet (2) to seal the first storage chamber (5) when the first door (10) is closed at the maximum angle is lifted from the front surface of the cabinet (2) due to an installation tolerance, from occurring.

[0220] For example, a thickness of the gasket (19) installed on the rear surface of the first door (10) may be formed thinner than an initially designed thickness due to a design error or an installation error.

[0221] In this case, when there is the first buffer region (227), which is a predetermined separation space, between the first pin (151) and the first end portion (213) of the guide slot (220), the first pin (151) may move beyond the first boundary line (229a) to a partial area of the first buffer region (227).

[0222] Accordingly, according to the present invention, since a space in which the first door (10) having the gasket (19) with a thin thickness can be additionally further closed can be provided, the occurrence of the lifting phenomenon of the gasket (19) can be corrected.

[0223] An inner diameter of the guide slot (220) corresponding to a path along which the pin (150) described as above moves may be identical to inner diameters of the first buffer region (227) and the second buffer region (228).

[0224] That is, since the inner diameters of the first buffer region (227) and the second buffer region (228) are identical to the inner diameter of the guide slot (220), the first pin (151) and the second pin (152) moving along the guide slot (220) can freely intrude into and move without interference with side surfaces of the first buffer region (227) and the second buffer region (228), respectively.

[0225] However, referring to FIGS. 10 and 11, as another embodiment, the inner diameters of the first buffer region (227) and the second buffer region (228) may be formed larger than inner diameters of the first pin (151) and the second pin (152).

[0226] That is, the inner diameters of the first buffer region (227) and the second buffer region (228) may be formed larger than the inner diameter of the guide slot (220) corresponding to the path along which the pin (150) moves.

[0227] The first pin (151) and the second pin (152) moving along the guide slot (220) by the rotational inertial force of the first door (10) may intrude into the first buffer region (227) and the second buffer region (228), respectively.

[0228] In this case, when the inner diameters of the first buffer region (227) and the second buffer region (228) are formed larger than the inner diameters of the first pin (151) and the second pin (152), even when an

external force in a direction different from a rotation direction occurs in the first door (10), the first pin (151) and the second pin (152) can be prevented from directly colliding with the side surfaces of the first buffer region (227) and the second buffer region (228).

[0229] As another embodiment, referring to FIGS. 12 and 13, the bush member (200) of the first hinge assembly (30) may be configured to include a first guide slot (220a) and a second guide slot (220b) arranged to be spaced apart from each other.

[0230] For example, the bush member (200) may include a coupling body portion (215) having a flat plate shape, and a bush body portion (210) formed to extend in a downward direction from one side of the coupling body portion (215).

[0231] The bush body portion (210) may include a first guide slot (220a) and a second guide slot (220b) respectively defining movement paths of the first pin (151) and the second pin (152) arranged to be spaced apart from each other.

[0232] On upper surfaces of the first guide slot (220a) and the second guide slot (220b), a guide rib (230) formed along shapes of the first guide slot (220a) and the second guide slot (220b) may be disposed.

[0233] The first pin (151) and the second pin (152) arranged to be spaced apart from each other are constrained to the first guide slot (220a) and the second guide slot (220b), respectively, and can move along the first guide slot (220a) and the second guide slot (220b).

[0234] For example, the first guide slot (220a) may be formed to have a longer movement path of the pin than the second guide slot (220b).

[0235] The bush reinforcing portion (172) of the bush reinforcing member (170) may be formed to surround an outer surface circumference portion of the bush member (200) including the first guide slot (220a) and the second guide slot (220b).

[0236] In addition, referring to FIG. 14, the bush member (200) including the first guide slot (220a) and the second guide slot (220b) may be inserted into and fixed to the lower cap deco (15) finishing the lower surface of the first door (10).

[0237] In this case, instead of installing a separate bush reinforcing member to absorb the amount of impact applied to the bush member (200), the lower cap deco (15) may be formed to surround at least a partial area of a circumference of the outer surface of the bush member (200).

[0238] To this end, the lower cap deco (15) surrounding the circumference of the outer surface of the bush member (200) may include a strength reinforcing portion (15d).

[0239] The strength reinforcing portion (15d) of the lower cap deco (15) may be formed to have a thicker thickness than other areas of the lower cap deco (15) where the strength reinforcing portion (15d) is not formed, thereby absorbing the amount of impact ap-

plied to the bush member (200).

[0240] As described above, the present invention has been described with reference to the illustrated drawings, but the present invention is not limited by the embodiments and drawings disclosed in the present specification, and it is obvious that various modifications can be made by those skilled in the art within the scope of the technical spirit of the present invention. In addition, although the effects according to the configuration of the present invention were not explicitly described and described while describing the embodiments of the present invention above, it goes without saying that predictable effects by the corresponding configuration should also be recognized.

Claims

1. A refrigerator comprising:

a cabinet including one or more storage chambers;
one or more doors for opening and closing the storage chamber; and
a hinge assembly having one side and the other side connected to the cabinet and the door, respectively,
wherein the hinge assembly comprises:

a hinge member on which one or more pins are mounted;
a bush member including a guide slot for guiding movement of the pin; and
a bush reinforcing member surrounding at least a partial area of an outer surface of the bush member.

2. The refrigerator according to claim 1, wherein the bush reinforcing member includes a bush reinforcing portion formed to match a shape of an outer surface of the guide slot.

3. The refrigerator according to claim 1,

wherein a guide rib on which the pin is seated is disposed on an upper surface of the guide slot, and
the bush reinforcing member includes a bush reinforcing portion formed to match a shape of an outer surface of the guide rib.

4. The refrigerator according to claim 1, wherein the bush reinforcing portion contacts the outer surface of the bush member.

5. The refrigerator according to claim 1,

wherein the guide slot includes a first end por-

tion and a second end portion located in directions in which the pin can maximally move in a first direction and a second direction, respectively, and

the bush reinforcing portion surrounds the first end portion and the second end portion of the guide slot.

6. The refrigerator according to claim 5,

wherein the bush reinforcing portion surrounds a first contact surface contacting the first end portion when the pin maximally moves in the first direction, and

a second contact surface contacting the second end portion when the pin maximally moves in the second direction.

7. The refrigerator according to claim 1, wherein the bush reinforcing member is a door stopper for controlling a maximum angle at which the door is opened.

8. The refrigerator according to claim 1, wherein the bush reinforcing member is made of a material harder than the bush member.

9. The refrigerator according to claim 1, wherein a first buffer region and a second buffer region formed to have a predetermined separation space so as not to contact the pin are located at both end portions of the guide slot, respectively.

10. The refrigerator according to claim 9,

wherein, when the pin maximally moves in a first direction, the pin moves to a first boundary line of the first buffer region, and when the pin maximally moves in a second direction, the pin moves to a second boundary line of the second buffer region.

11. The refrigerator according to claim 9, wherein an inner diameter of the guide slot corresponding to a path along which the pin moves is identical to inner diameters of the first buffer region and the second buffer region.

12. The refrigerator according to claim 1,

wherein the guide slot includes a first end portion and a second end portion located in directions in which the pin can maximally move in a first direction and a second direction, respectively,

wherein, when the pin maximally moves in the first direction, the pin does not contact the first end portion, and

when the pin maximally moves in the second direction, the pin does not contact the second end portion.

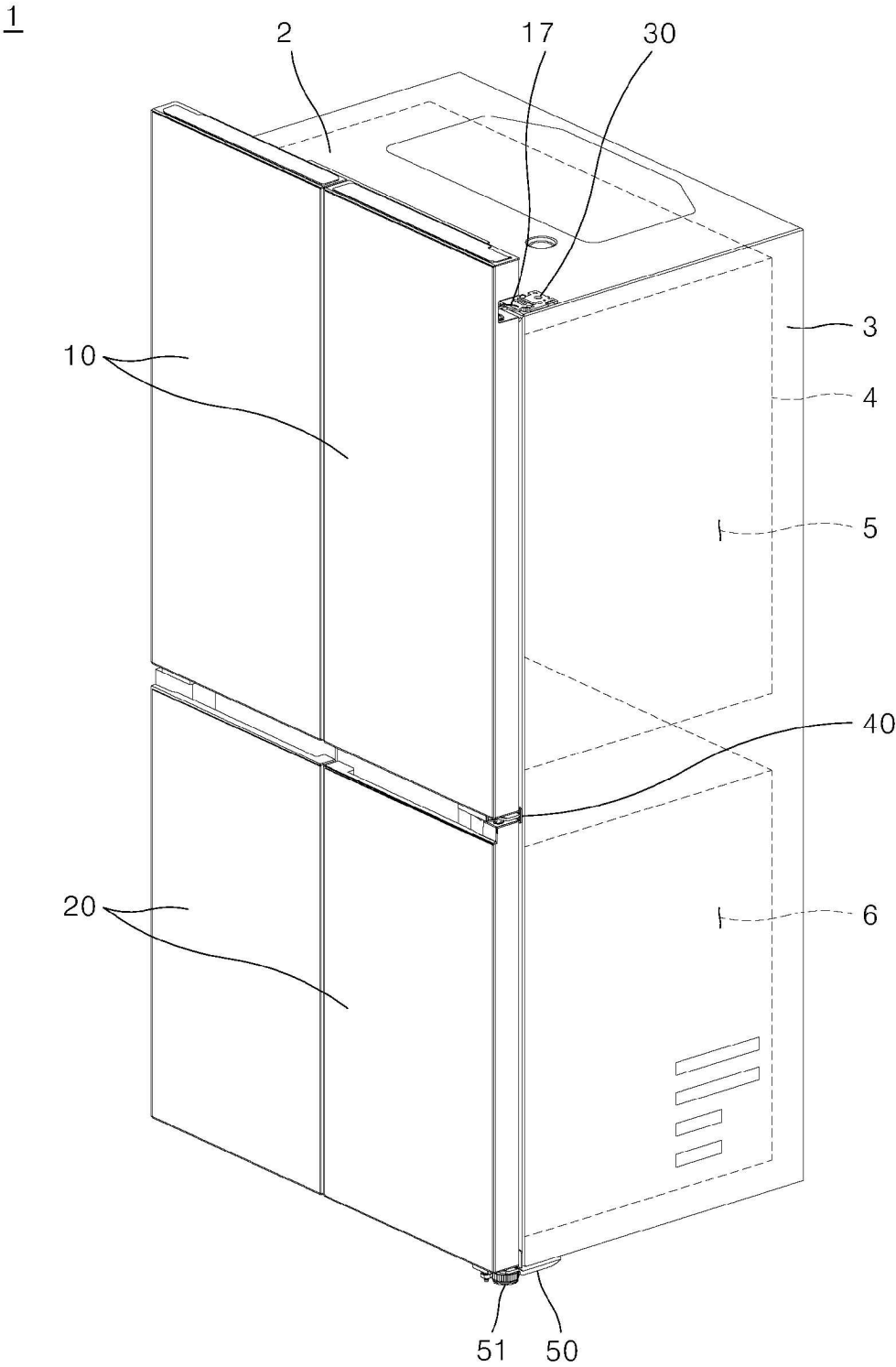
13. The refrigerator according to claim 1, wherein, when the door is opened and closed, a center of rotation of the door varies according to a movement path of the pin.

14. The refrigerator according to claim 1, wherein the pin includes a first pin and a second pin arranged to be spaced apart from each other, and when the door is opened and closed, the first pin and the second pin are constrained to the guide slot and move along the guide slot.

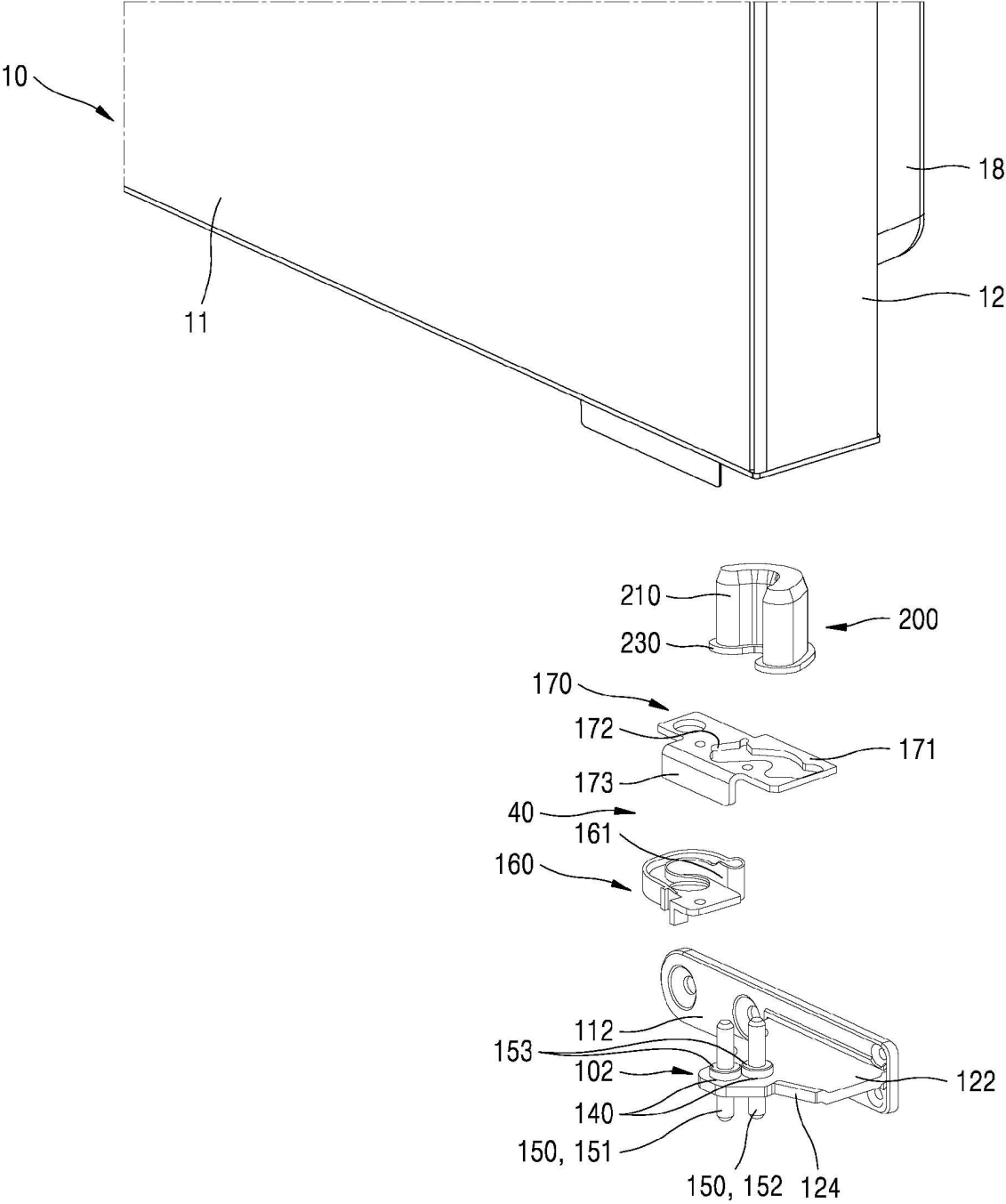
15. The refrigerator according to claim 1,

wherein the pin includes a first pin and a second pin arranged to be spaced apart from each other, and the guide slot includes a first guide slot and a second guide slot arranged to be spaced apart from each other, wherein, when the door is opened and closed, the first pin is constrained to the first guide slot and moves along the first guide slot, and when the door is opened and closed, the second pin is constrained to the second guide slot and moves along the second guide slot.

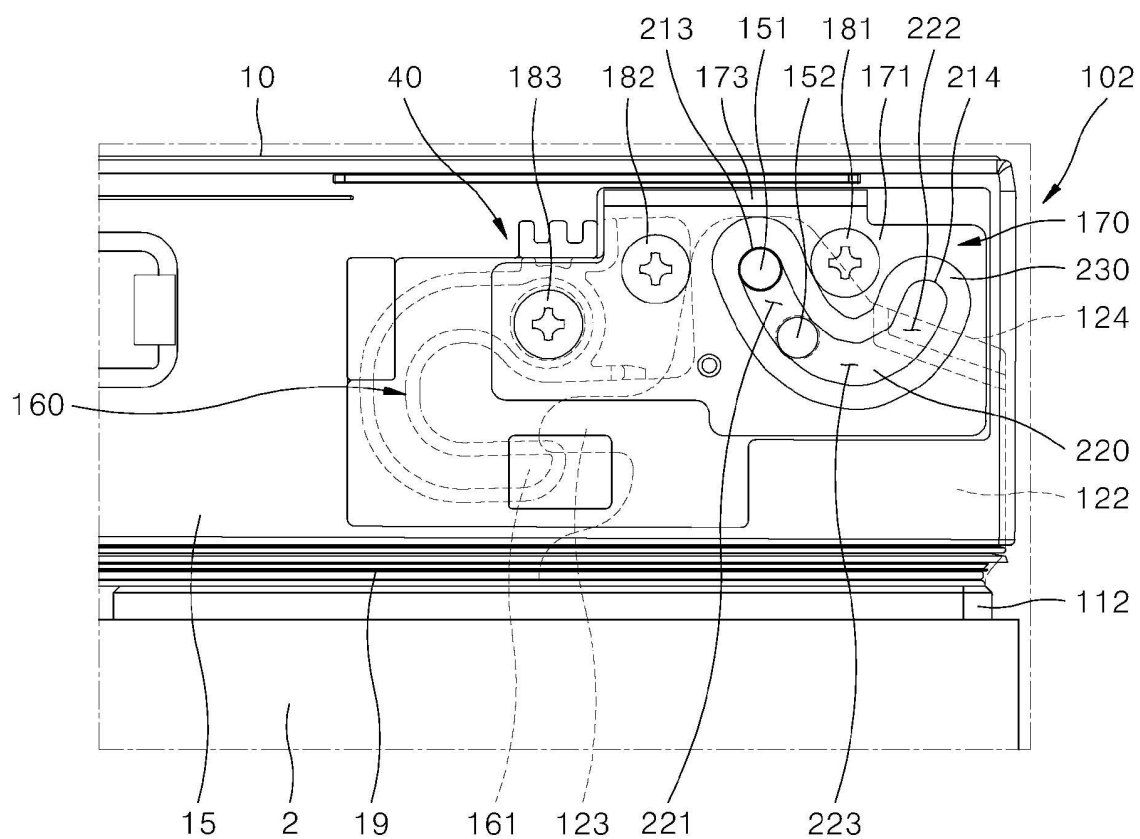
【Fig. 1】



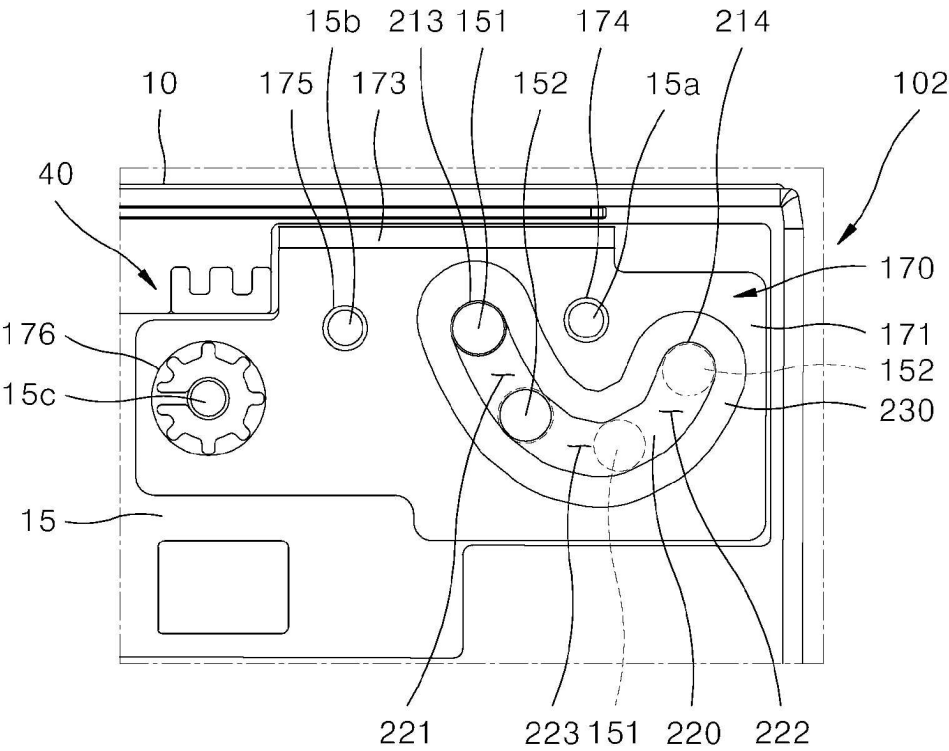
【Fig. 2】



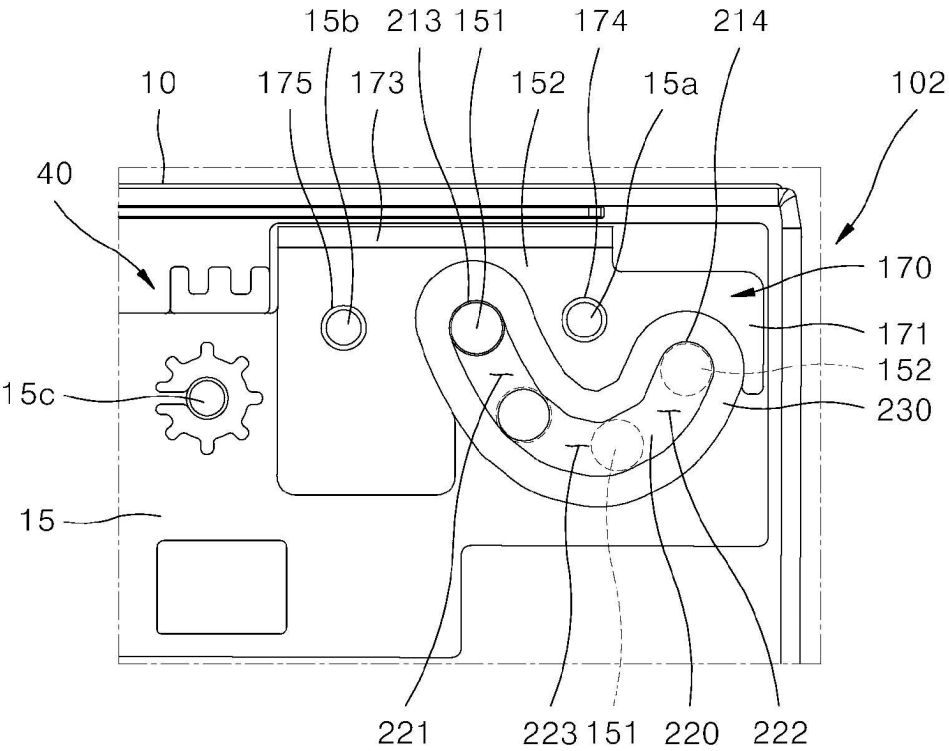
【Fig. 3】



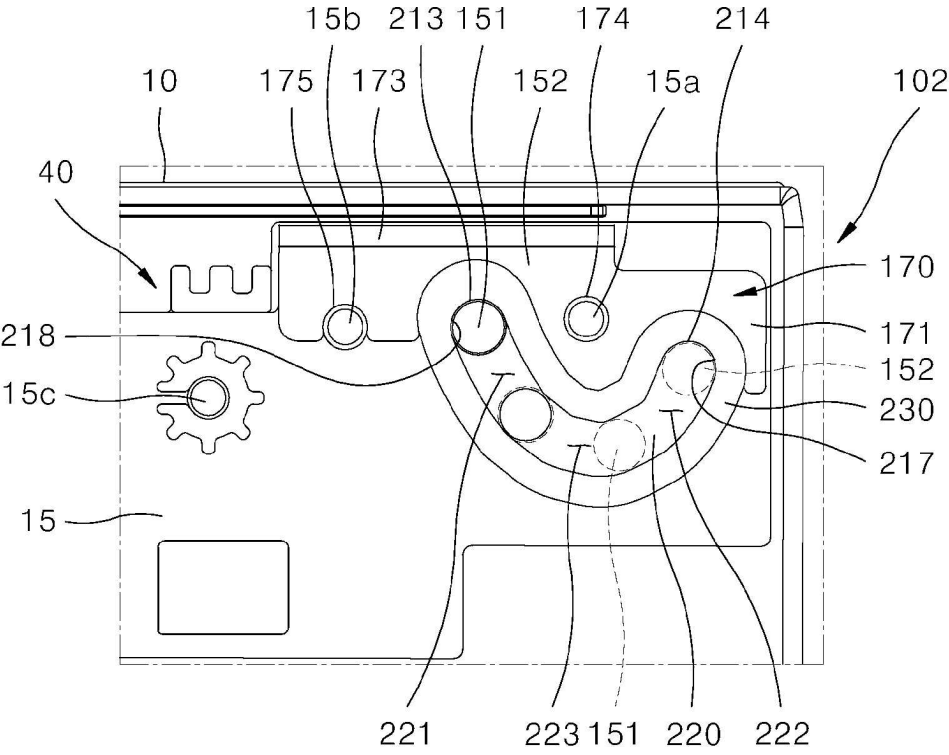
【Fig. 4】



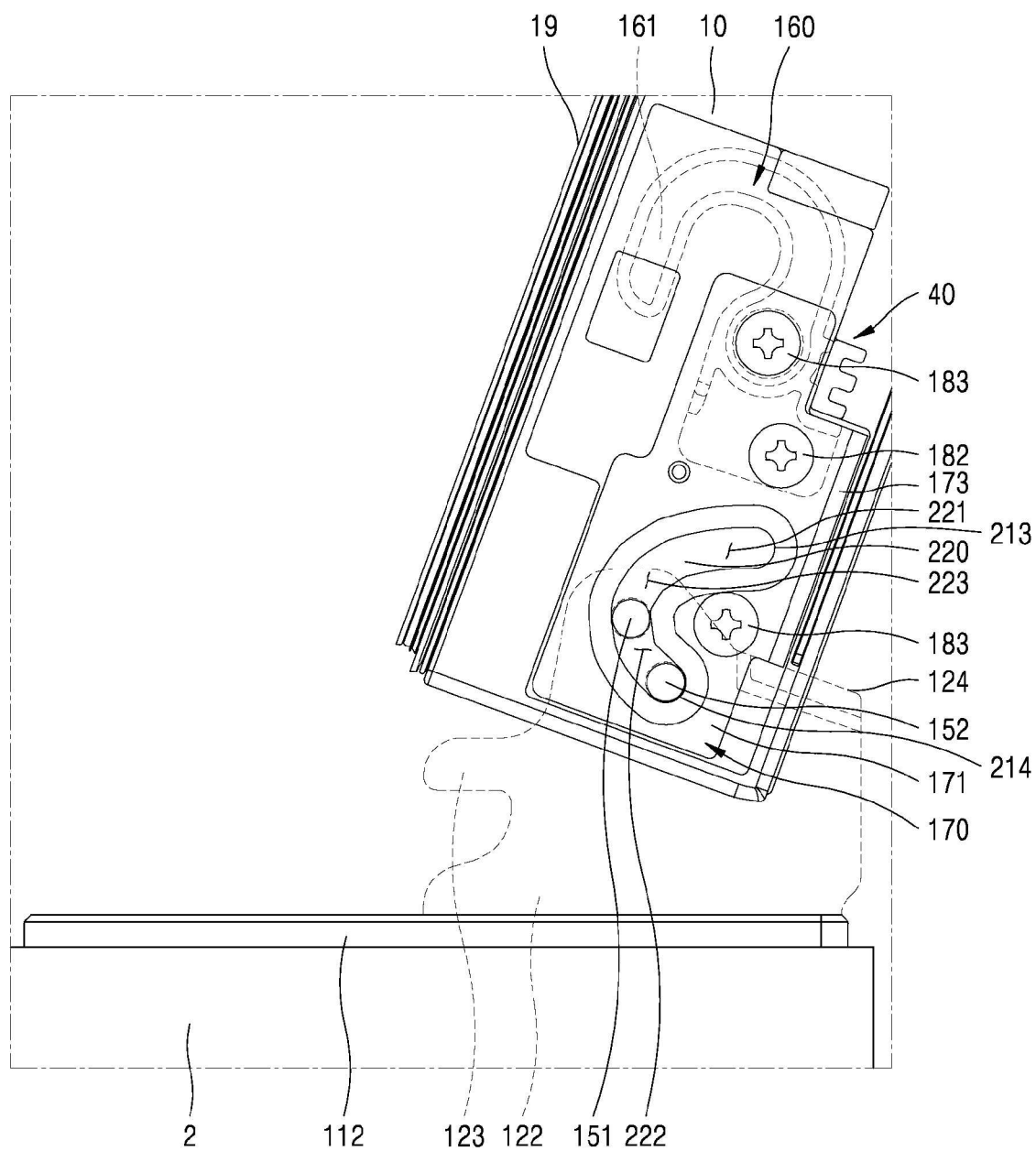
【Fig. 5】



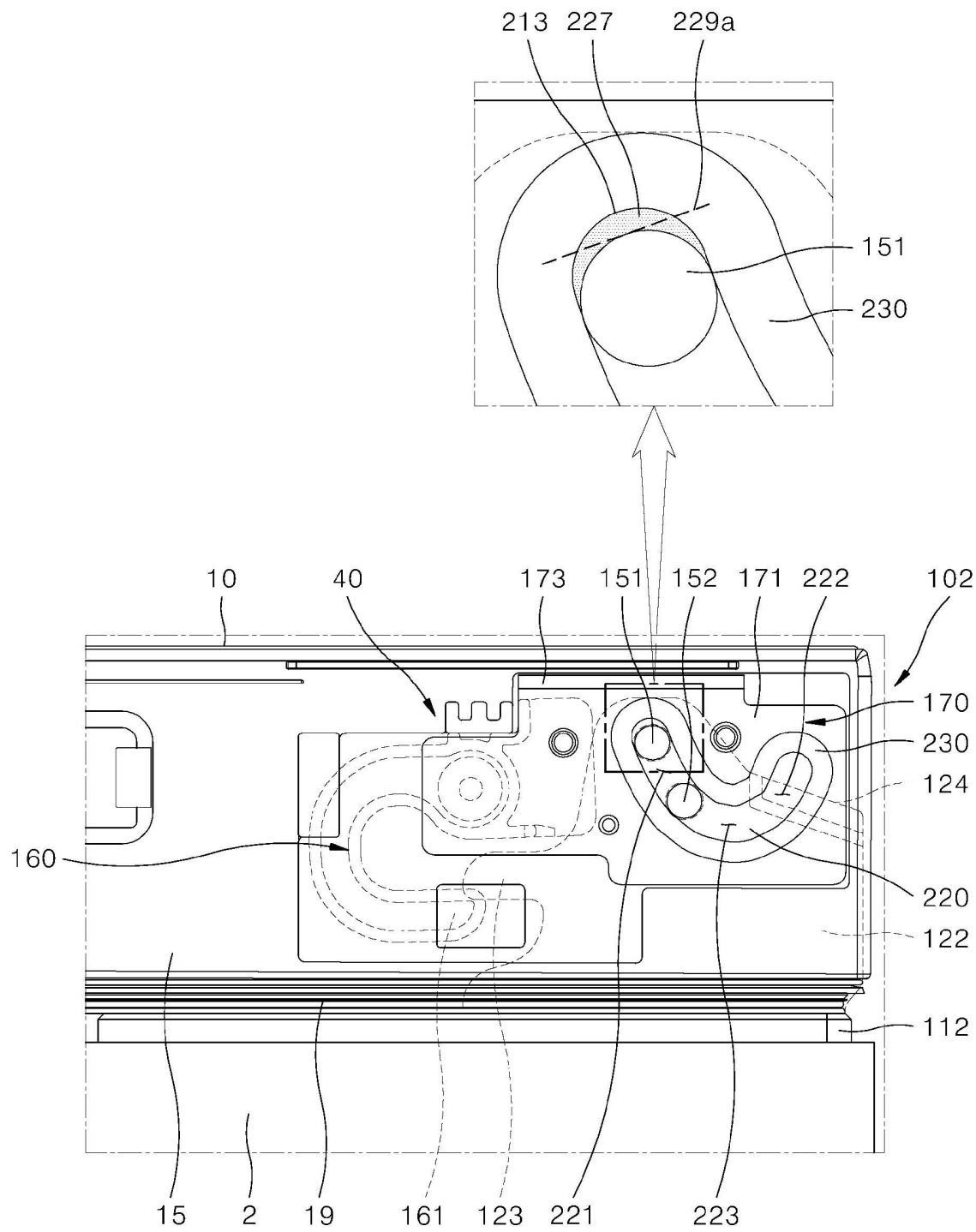
【Fig. 6】



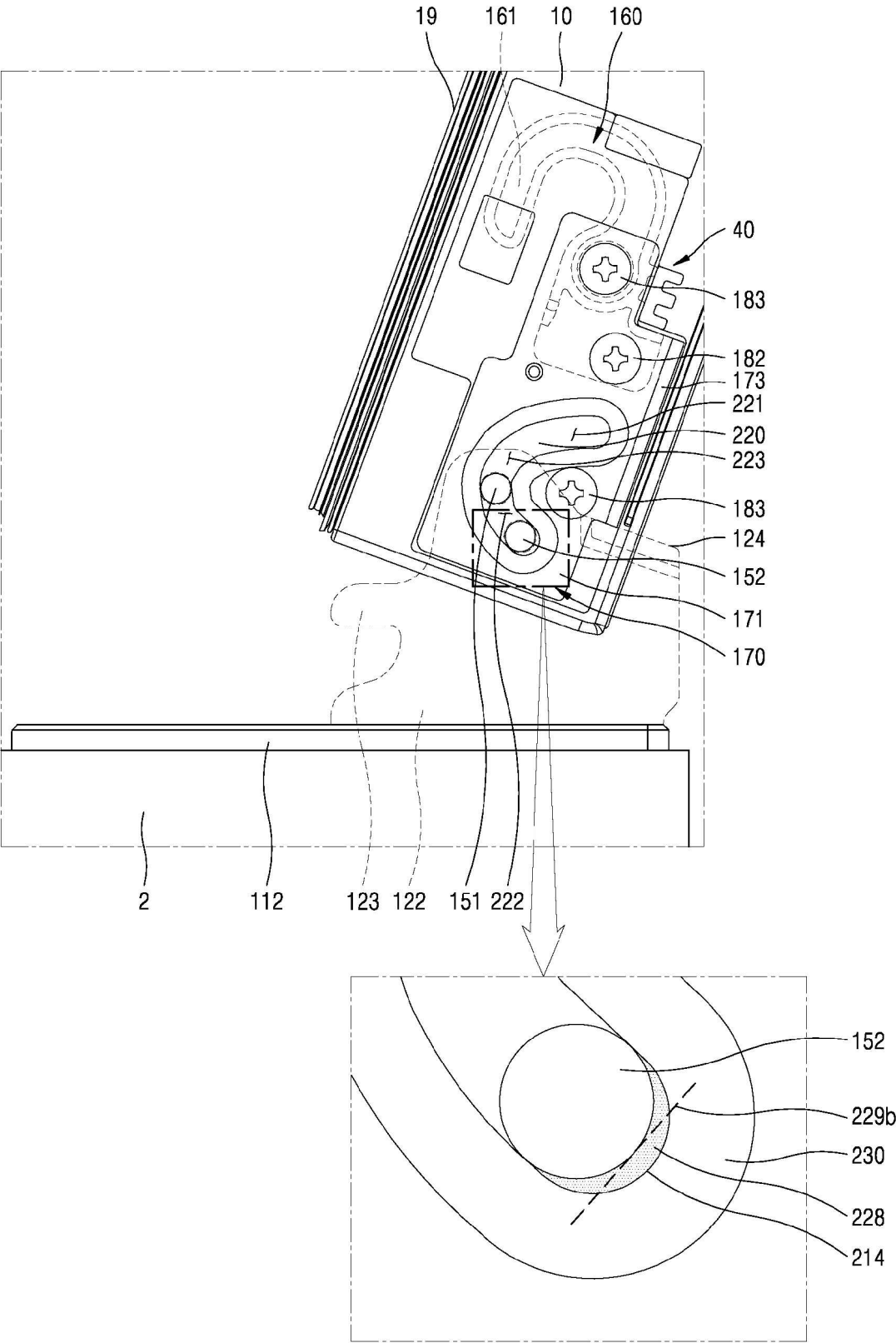
【Fig. 7】



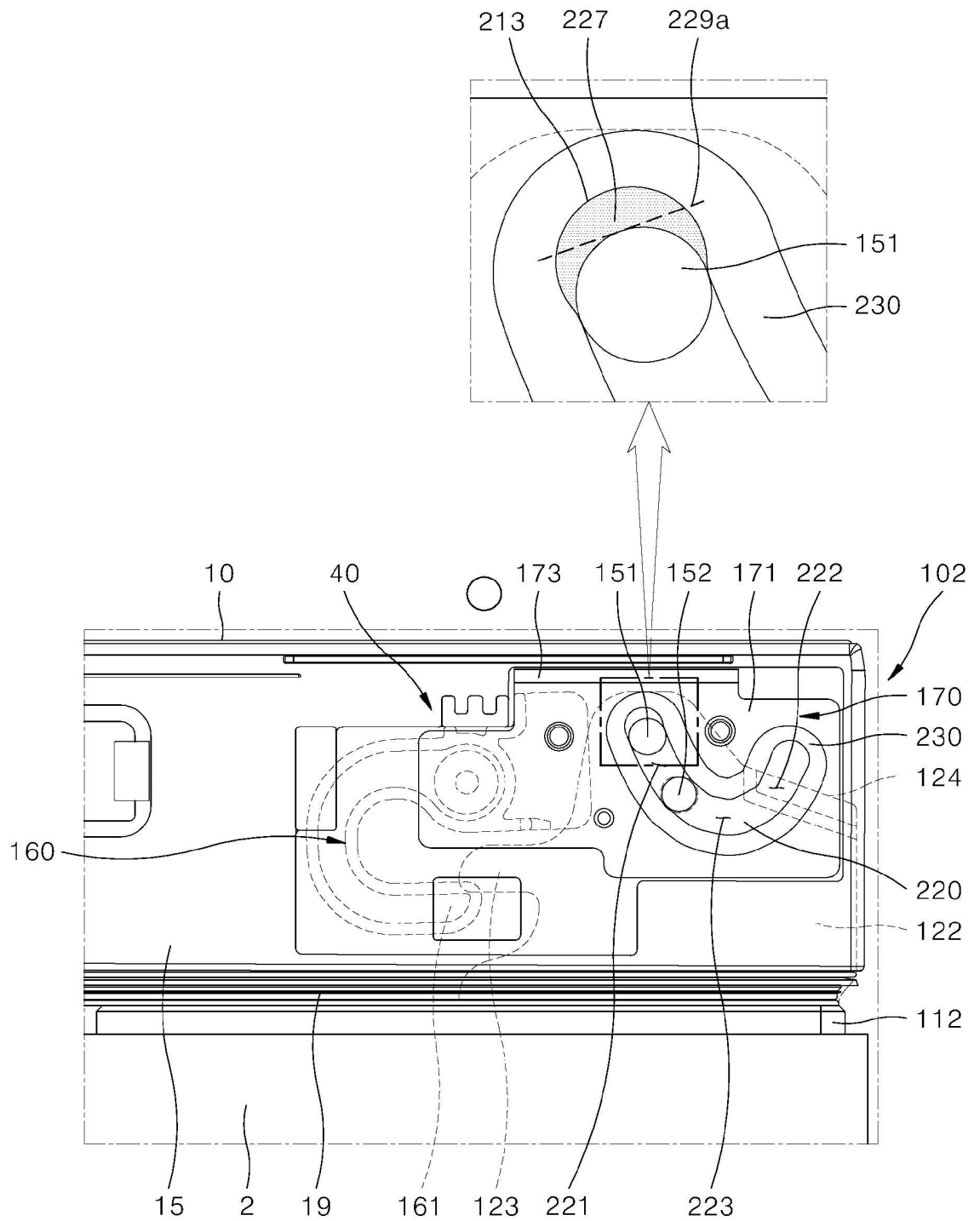
【Fig. 8】



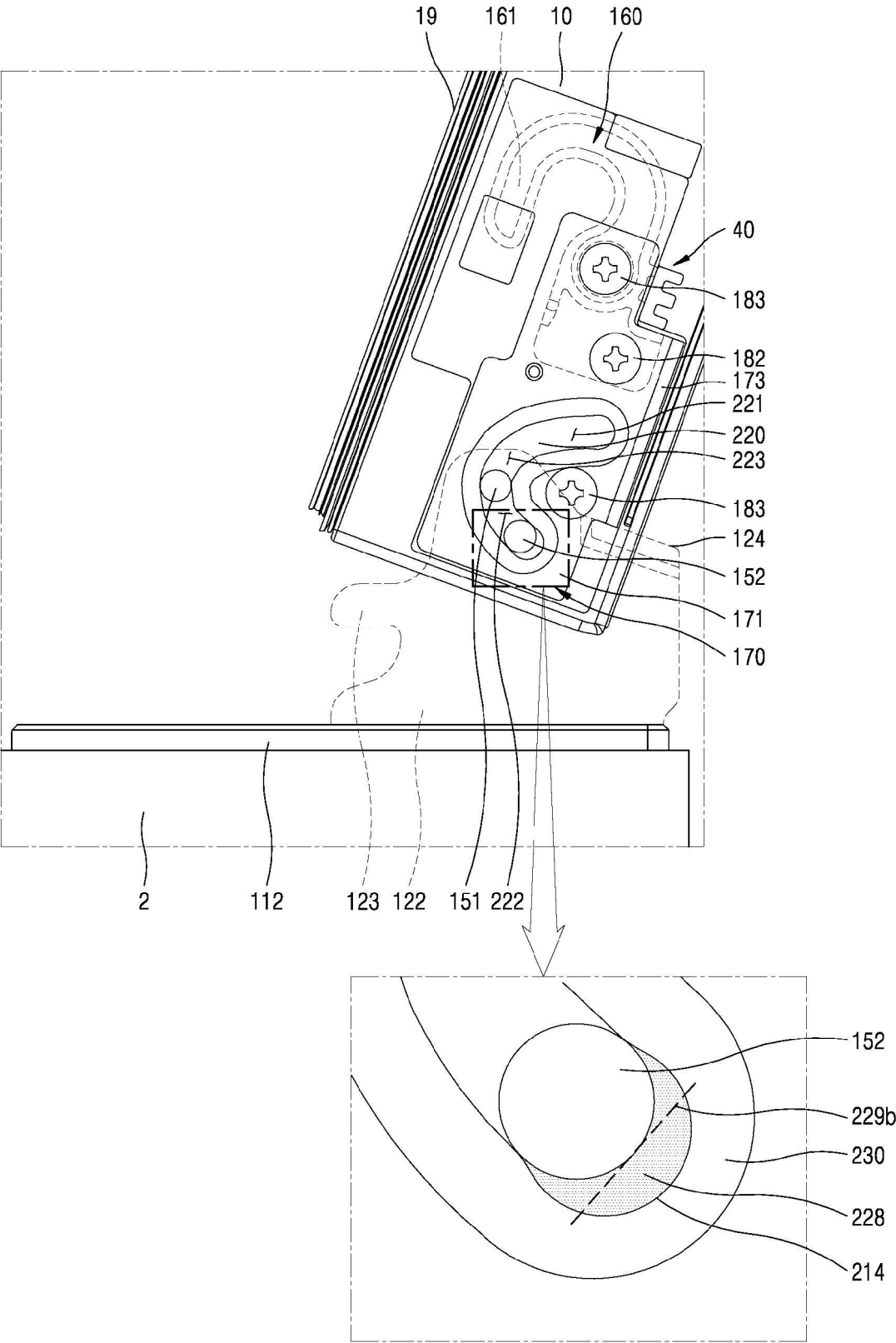
【Fig. 9】



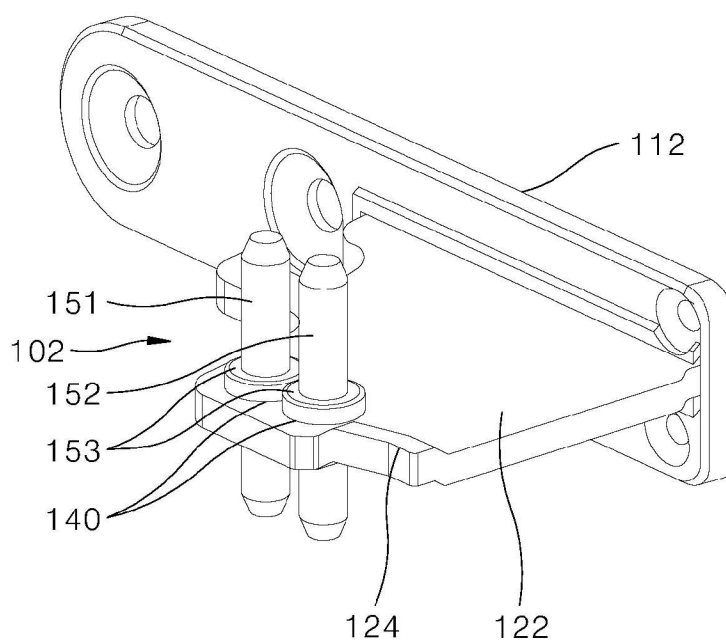
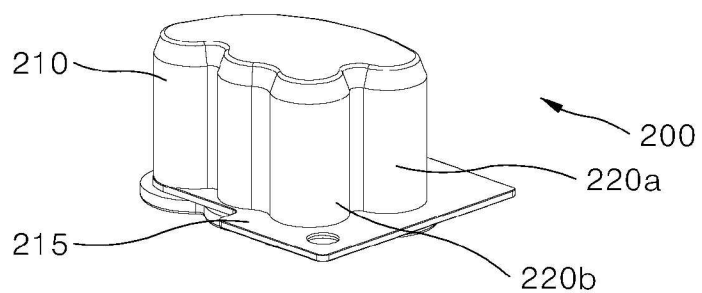
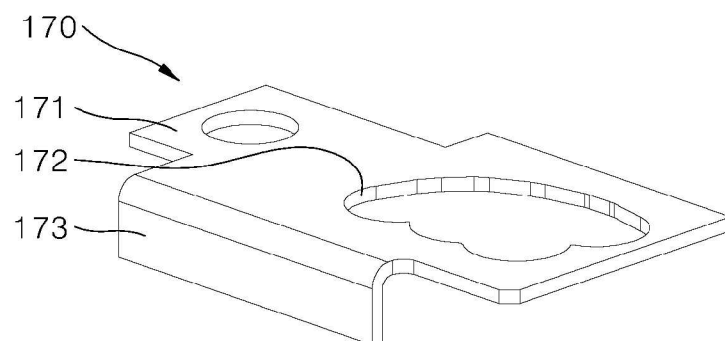
【Fig. 10】



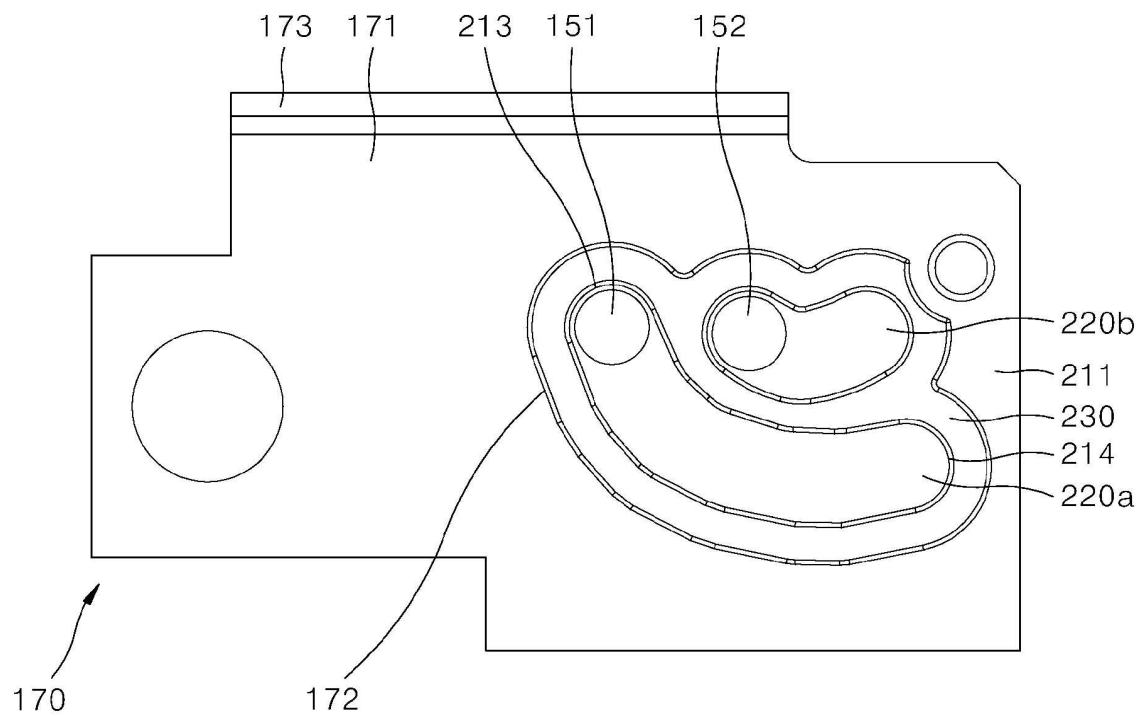
【Fig. 11】



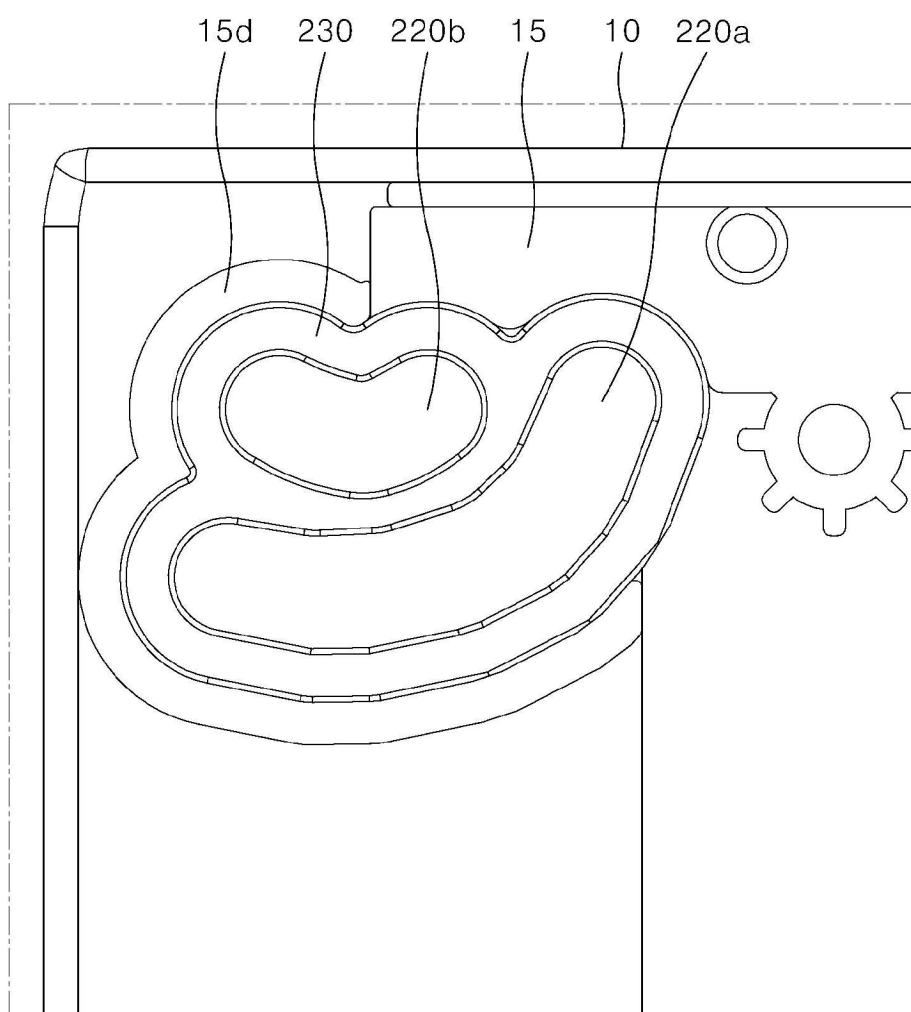
【Fig. 12】



【Fig. 13】



【Fig. 14】



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2025/099285

A. CLASSIFICATION OF SUBJECT MATTER**F25D 23/02**(2006.01)i; **E05D 3/02**(2006.01)i; **E05D 15/58**(2006.01)i; **E05F 3/20**(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 23/02(2006.01); E05D 7/081(2006.01); F25D 11/00(2006.01); F25D 23/00(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), 도어(door), 힌지(hinge), 부시(bush), 보강 부재(reinforcing member), 가이드 슬롯(guide slot), 핀(pin), 버퍼(buffer)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2022-079245 A (PANASONIC IP MANAGEMENT CORP.) 26 May 2022 (2022-05-26) See paragraphs [0016]-[0023], [0030]-[0033] and [0046] and figures 1 and 5-9.	1-8,13-14
Y		9-12,15
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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“&” document member of the same patent family

Date of the actual completion of the international search

23 May 2025

Date of mailing of the international search report

23 May 2025

Name and mailing address of the ISA/KR

**Korean Intellectual Property Office
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Authorized officer

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INTERNATIONAL SEARCH REPORT

International application No.
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
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